

INTERNATIONAL ORGANIZATION
for **BIOLOGICAL CONTROL**
of Noxious Animals and Plants



History of the first 50 Years (1956-2006)

Ernst F. Boller, Joop C. van Lenteren & Vittorio Delucchi (Editors)



**International Organization for Biological Control
of Noxious Animals and Plants
(IOBC)**

History of the first 50 Years (1956 – 2006)

Edited by

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IOBC

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Preface

The International Organization for Biological Control of Noxious Animals and Plants (IOBC), is celebrating its 50th anniversary this year. This provides us with an excellent opportunity to publish a historic review, to complement the various meetings that have been organised worldwide. The mission of IOBC is to promote the development of biological control and its application in integrated control programmes, where biological control means the use of living organisms or their products to prevent or reduce the losses or harm caused by pest organisms (or, in short, the use of biota to control biota). During the past 50 years, IOBC has been an effective advocate of biological control, applying its considerable influence as an independent, international, professional body to assist policy making in FAO, EU, OECD, World Bank and other international lending banks, NGOs and national agricultural and environmental ministries.

The first official plenary session of IOBC took place on 20 November 1956 in Antibes, France, after ideas had been expressed to establish an international organisation of biological control at the 8th International Congress of Entomology in 1948 in Stockholm, where experts in this field met under the auspices of and supported by the International Union of Biological Sciences (IUBS). At that time, ecologists and entomologists had serious concerns about environmental and health effects of chemical pest control, and they considered biological control an important potential alternative for pesticides. Biological control was, of course, not new to science. The first description of use of biological control dates from around 300 AD, when predatory ants were used for control of pests in citrus orchards in China, a method which is still used today in Asia. “Modern” application of biological control started in 1888, when an entomologist set sail from San Francisco for Australia to collect natural enemies for the control of the exotic cottony cushion scale insect in citrus. He was successful in finding natural enemies and sent a total number of 129 *Vedalia* beetles to California. These predatory beetles were propagated and by June 1889, more than 10,000 adult beetles had been distributed throughout the infested citrus areas. In a little more than a year after the accidental release of the scale pest, its populations had collapsed throughout most of the infested Californian citrus regions. After this project, many successes followed and several large national organisations for development of biological control programmes were created.

In continental Europe, however, biological control was practised in few countries and there by only a small number of researchers. Therefore, at the IUBS meeting in Stockholm in 1948, it was thought necessary to combine the skills of these relatively small national research groups in Europe under the umbrella of an international organisation. This resulted in the IOBC, which was originally a mainly European affair. The formation of numerous working groups resulted in excellent work and several important European biological control and integrated pest management (IPM) projects, and later integrated plant protection (IPP) projects were developed and implemented. In 1971, IOBC Global was established and the European group became one of the six Regional Sections which represent the world’s major biogeographical zones. The activities of the various Regional Sections have evolved differently, but experiences in certain regions have helped developments in other regions. IOBC Global profited considerably, for instance, from 15 years of IOBC experience in

Europe. The same can be said about the Working Groups. With its global network of collaborating scientists, IOBC now has the status of a dependable, professional organisation providing objective information about biological control and IPM.

We expect that the IOBC will continue to play an important role in realizing sustainable and environmentally friendly food production worldwide. In those areas where we currently see overproduction of food (e.g. Europe, North America, Australia and New Zealand) we foresee that biological control will be used increasingly because it contributes to the maintenance or augmentation of biodiversity, and also because consumers appreciate pesticide-free food. In these areas, biological control will be the corner-stone of Integrated Protection and Production of food. In areas where food production does not yet meet demands, biological control can be used to reduce the production costs, increase production, contribute to improved health and safety of farmers, and a cleaner environment.

As we celebrate IOBC, it is worth noting some of its remarkable features:

- An international organisation without permanent staff, without permanent physical headquarters, without permanent offices and (up to 2006) without official archives;
- An organisation with high international reputation and low budget, financed by official institutional members, individual and supporting memberships whilst remaining fully independent;
- An organisation run on a voluntary and honorary basis by a motivated community of independent scientists, university teachers and field advisers;
- An international organisation with a long tradition and reputation as a trend-setter, identifying, addressing and developing emerging future fields of interest in the context of a sustainable agriculture;
- An effective and influential organisation without professional public relation managers and marketing departments.

In summary it is an organisation where the contents of the package were always more important than the wrapping paper.

Frequent changes in the composition of executive committees of IOBC Global and the Regional Sections has made it difficult to summarise the history of such a colourful and highly stimulating organisation, as there were no archives to consult. In preparation of this review, the editors have invested considerable time to collect, to read and to analyse both published and unpublished documentation from around the world. These facts and figures were augmented by anecdotes and eye-witness reports. The editors themselves provided overlapping continua of personal experience in IOBC management, since 1956 in the case of Vittorio Delucchi, since the late 1960s in the case of Ernst Boller and since the early 1970s in the case of Joop van Lenteren. It was indeed this strongly individual, and hence transient, knowledge of IOBC's history that influenced the decision taken in 2005 to start a systematic collection of historic traces and personal reflections, and to create from these a permanent IOBC archive in Switzerland.

Many colleagues have made most valuable contributions to this book either by adding interesting details to Parts I to VII, or by writing short historic reviews of individual IOBC Commissions and Working Groups presented in Appendix I to III of this book. In reading all these texts, you will discover another interesting characteristic of IOBC: its linguistic diversity. The vast majority of persons actively involved in IOBC activities do not communicate in English as their mother tongue, but in 30 or more different languages. Inevitably, the effort to communicate during international meetings and through written

contributions in IOBC publications has created an unorthodox but lively “IOBC English” which captures the flavour of the authors’ own culture and geographic regions. Transmitting the content has always been more important than striving for linguistic perfection. Therefore, following a long IOBC tradition, we as editors of this book have refrained from linguistic polishing of the individual contributions but have intervened discretely where errors could have led to serious confusion.

As many abbreviations of organisations and countries have been used in this book we have added a list of acronyms in Appendix IV to facilitate reading

We would like to thank everyone involved in the collection of materials and writing of the various chapters. A particular word of thanks is due to Nina Fatouros and Tibor Bukovinszky, both of the Laboratory of Entomology, Wageningen University in the Netherlands), who designed the cover of this book.

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Part I. The early history of IOBC (1948 – 1971)

Ernst F. Boller

The early history of IOBC from the very beginning in 1948 to the establishment of Global IOBC in 1971 at Rome has been described by various founding members, namely the first president A. S. Balachowsky (1956), P. Bovey (1961), Ch. Ferrière (1961), J. Franz (1988) and V. Delucchi (1993). Each author described, from his personal perspective, the most important events, emphasising different aspects, omitting others. The first published document dealing with the future IOBC (IUBS 1949) describes in adequate details the initiative to establish an international organisation on biological control and gives insight into the prevailing situation at that time.

Documents covering the period between 1948 and 1956 do no longer exist because until 2005 IOBC apparently never thought to establish an official permanent archive. The reports of meetings and General Assemblies between 1956 and 1965 published by the Secretary General (P. Grison) in the IOBC journal *ENTOMOPHAGA* are often rather sober and do not reveal much information about persons and important decisions taken. These facts were obviously circulated in internal letters and documents, but are no longer existing. This restrictive information policy was normal procedure at that time and prevailed with many Commissions and Working Groups until the early 1980s. However, the quality of information was substantially improved from 1968 onward by the regular publication of detailed reports of the Secretary General and, starting in 1971, by information published in the Newsletter of IOBC Global and its Regional Sections as well as in the IOBC WPRS Bulletins.

1948 – 1955: Preparing the ground for establishing a “Commission Internationale de Lutte Biologique” (CILB)

IOBC has always been very flexible with dates of celebrating anniversaries. Whereas many authors refer to the year 1948 as the starting point, two IOBC presidents mentioned the year 1950 as the real beginning. IOBC was celebrating in 1979 its 25th anniversary focussing apparently on the year 1954. Global IOBC and WPRS are celebrating the 50th anniversary in 2005, but others emphasise that the first official plenary session of CILB did take place on 20 November 1956 at Antibes, France.

Four events possibly merit to be called historic landmarks of this preparatory period. They occurred in 1948, 1950, 1955 and 1956, respectively (see IOBC timescale in Figure 1).

1948 Stockholm: First idea to create an international organisation on biological control

The first idea to create an international organisation on biological control emerged in 1948. At the 8th International Congress of Entomology in Stockholm 11 specialists of biological control met under the auspices of IUBS (International Union of Biological Sciences) and with the financial support of UNESCO. They discussed possibilities to establish an organisation able to coordinate biological control activities on an international basis. This important meeting is well documented (IUBS 1949).

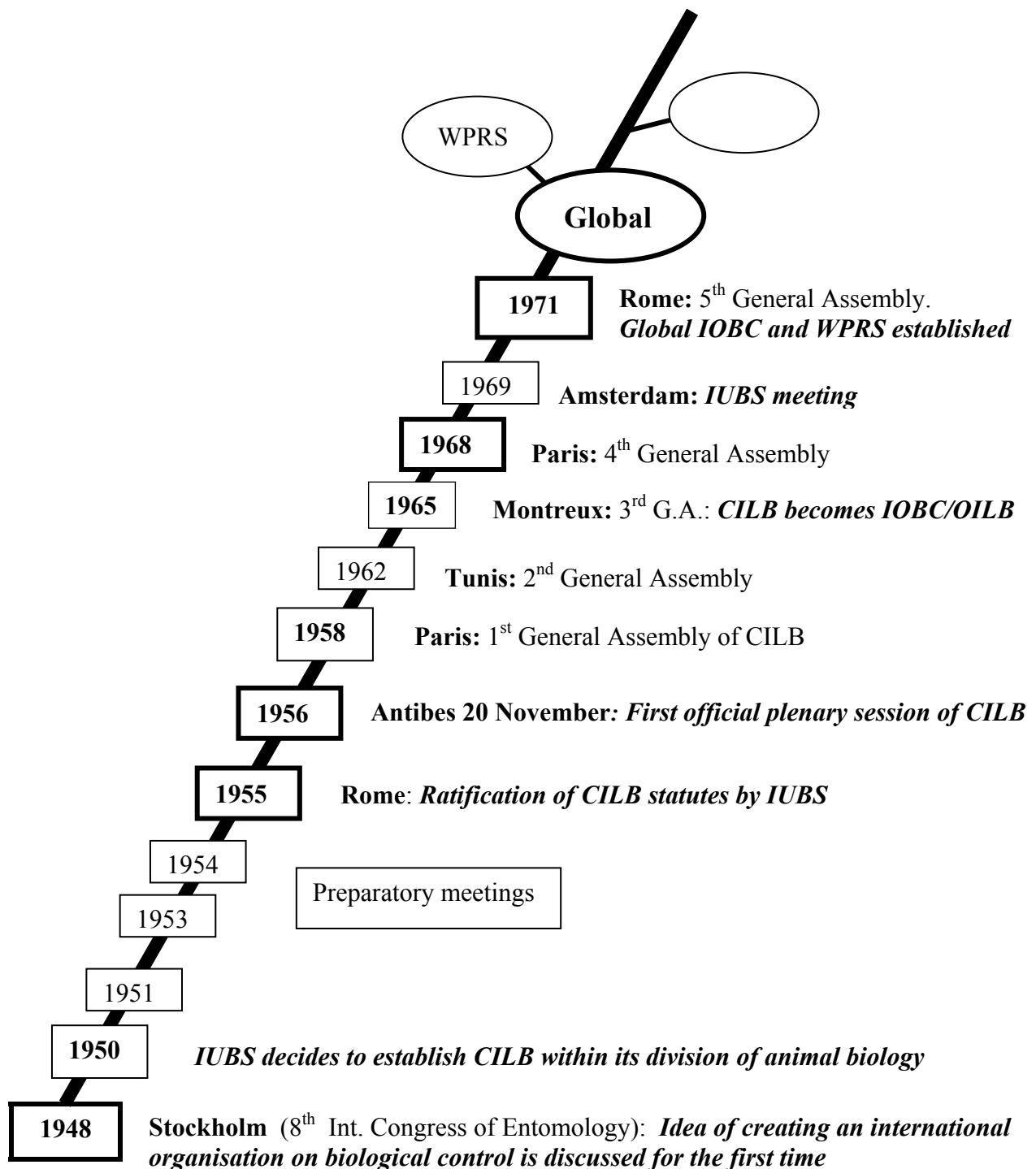


Figure 1. The IOBC Timescale 1948 - 1971

Present at this meeting and shown in Figure 2, were M. André (France), A. S. Balachowsky (France), Ch. Ferrière (Switzerland), J. Ghesquière (Belgium, Congo), D. Miller (New Zealand); A. J. Nicholson (Australia), S. Novicky (Austria), L.O. Parker (USA), F. Silvestri (Italy); O. H. Trägårdh (Sweden) and P. Vayssière (France, Secretary General of IUBS). M. Caryon (France) and Le Gall (France) were acting as secretaries of the meeting. After examination and analysis of the national and international situation of biological control the group formulated a resolution addressed to UNESCO and being transmitted by Vayssière of IUBS.



Membres du colloque (de gauche à droite) : MM. GHESQUIÈRE, FERRIÈRE, CARAYON, BALACHOWSKY, ANDRÉ, MILLER, SILVESTRI, PARKER, NICHOLSON, LE GALL, VAYSSIÈRE (photo Carayon).

Figure 2. Participants of the Stockholm meeting of 1948

The political landscape in 1948 and the situation in Europe with respect to plant protection problems have been described in detail in the IUBS document of 1949 and later in personal reviews published by Balachowsky (1956), Bovey (1961), Ferrière (1961) and Franz (1988). In Europe the plant protection practice had focussed for the past decades on chemical pest control and made extended use of the new synthetic insecticides. Contrarily, entomologists of the British Commonwealth and in the United States had developed and applied biological control next to chemical control for almost a century. Important institutions specialised in biological control had been established in these countries. Post-war continental Europe with possessions in Africa and overseas was divided politically into Eastern and Western Europe. Despite the existence of several famous taxonomists in Europe the individual countries had inadequate resources and very few specialists to effectively implement biological control.

The intention of the entomologists meeting in Stockholm was described in the resolution as follows: *“The proposed international organisation is viewed as an extension to other countries of the kind of work already being carried out by the United States of America*

and the British Commonwealth. (This organisation should) work in co-operation with all institutes and individuals actively carrying out biological control work". It can be concluded that especially the European participants of the meeting had great interest to establish a network covering the needs of continental western Europe, the Mediterranean region and the Middle East.

The participants recommended in their resolution "*that international action can and should begin at once, by setting up an organisation providing the following services*":

- A documentation service for the collection of pertinent information
- A taxonomic service dealing with the identification of natural enemies
- A survey service to study the natural enemies existing in the major regions of interest
- An application service devoted to collecting, breeding, transporting, acclimatising and establishing natural enemies in regions where local institutions are unable to undertake this work themselves

The importance of an efficient taxonomic identification and documentation centre for entomophagous species in continental Europe was evident. Close collaboration with existing taxonomic institutions in London and Washington was identified as an essential prerequisite for the formation of European taxonomists. In this critical stage a specialist entered the scenery, who would later play an important role in the further preparation of this IOBC service: Ch. Ferrière from Geneva, Switzerland. He had worked for many years as taxonomist at the Commonwealth Institute of Entomology in London and was now working at the Museum of Natural History at Geneva.

1950: IUBS supports the establishment of an international commission on biological control

IUBS decided to support the establishment of a "Commission Internationale de Lutte Biologique (CIBC) as part of the IUBS Division of Animal Biology. Although important entomologists from English speaking countries had participated in the Stockholm meeting and had made valuable technical proposals it was evident that the institutions operating in English speaking regions were not much interested in European problems. Therefore, the future organisation should later focus its attention on the regions falling into the sphere of influence of France providing not only important scientists but also strong financial support of the project. A first *ad hoc* committee ("Commission pour les recherches sur la lutte biologique") was established at Menton/France and started the detailed planning. In retrospective, Franz (1988) referred to these early activities as the "French initiative".

1951 – 1954

Many difficulties had to be overcome, however, before an organisation could be established. Most European countries were reluctant to officially acknowledge a non-governmental organisation which only had modest funding for a few research programmes and special projects. Therefore, one of the first requirements was to establish an international identification service for natural enemies of pest arthropods by coordinating and subsidising the efforts of the few existing European specialists. Preparatory meetings were held with government representatives, experts and potential members of the future organisation at Madrid (1951), Jouy-en-Josas, Geneva and Portici (1953), Colmar (1954) and Zürich (1955). Although original reports of these meetings are not available, it can be concluded that during these years of preparation the composition and working modus of the future Commission was shaping up. It can be speculated that a triplet of countries consisting of France (Balachowsky,

Vayssière, Grison), Switzerland (Ferrière, Bovey) and Germany (Franz) was acting as locomotive. This group produced the final draft of the statutes, formulated in legally correct form by Swiss lawyers. The Institute of Entomology of the Swiss Federal Institute of Technology (ETH), Zürich, was selected as the legal seat of the future Commission. Cooperation with other international organisations such as FAO (Food and Agriculture Organisation), EPPO (European Plant Protection Organisation) and the European laboratories of the Commonwealth Institute of Biological Control, especially in the field of taxonomy, was approved. The future taxonomic identification centre of CILB was planned to be in Geneva.

1955: IUBS ratified the statutes of CILB

The statutes, written in French and reflecting the philosophy and approach of many scientific French institutions of that time, would influence the politics and activities of the new organisation until the mid 1960s, and also influence the statutes of the future Global IOBC and, in certain aspects, the management of IOBC WPRS until the late 1970s. Therefore, we present here the original French text of the title and the first three of 22 articles of the statutes that read as follows:

*STATUTS DE LA COMMISSION INTERNATIONALE DE LUTTE BIOLOGIQUE
CONTRE LES ENNEMIES DES CULTURES (C.I.L.B.)*

Art. 1^{er} – TITRE ET SIÈGE

Dans le cadre de l'Union internationale des sciences biologiques (U.I.S.B.) il est créé une Commission internationale de lutte biologique contre les ennemis des cultures (ci-après nommée la C.I.L.B.). Son siège est à Zurich (Suisse), à l'Institut entomologique de l'Ecole polytechnique fédérale.

Art. 2 – MEMBRES

Peuvent devenir membres de la C.I.L.B.:

- a) Les services gouvernementaux;*
- b) Les institutions officielles ou privées;*
- c) Les personnes physiques ou morales que les problèmes de la lutte biologique intéressent, apportant une contribution financière et admises par l'assemblée générale à la majorité des deux tiers des votants.*

Art. 3 – TÂCHES ET BUTS

1° Les tâches et buts que se propose la C.I.L.B. sont de promouvoir, coordonner et intensifier pour un meilleur rendement les recherches et les applications de la lutte biologique contre les insectes et les plantes nuisibles à l'agriculture des pays ayant des adhérents.

2° On entend par la lutte biologique les recherches et les applications ayant pour but:

- a) La destruction des insectes et acariens nuisibles par l'utilisation rationnelle des insectes et microorganismes entomophages;*
- b) La destruction des mauvaises herbes par les insectes phytophages;*
- c) Le contrôle des facteurs qui interviennent dans la prolifération des auxiliaires indigènes afin d'en préserver ou d'en accroître l'action.*

Articles 4 – 22 deal with administrative and organisational matters. Of interest is article 13 dealing with working units called “Comités de travail”:

Art. 13 – COMITES DE TRAVAIL

1° Les Comités de travail sont nommés par le Bureau exécutif qui définit leur tâche et précise la durée de leur mandat.

2° Les Comités jouent le rôle de conseillers scientifiques ou techniques. Ils sont composés de spécialistes affiliés ou non à la C.I.L.B. dont le nombre est adapté aux besoins de la tâche à remplir. Dans la règle, ils sont présidés par un membre du Bureau exécutif.

3° Les Comités remettent leurs rapports au Bureau exécutif qui décide de la suite à donner.

The period of 1956 until 1971

The first 15 years of CILB are probably best characterised by six historic landmarks: 1956, 1959, 1965, 1968, 1969 and 1971.

1956: The first official plenary session of CILB

The first plenary session of CILB took place on 20 November at Antibes/France. Participants at the Antibes meeting were government representatives from Algeria, Belgium, Belgium-Congo, France, French overseas territories, Germany Federal Republic, Morocco, Portugal, Spain, Switzerland and Yugoslavia. Although several countries had not yet nominated their official representatives the delegates listed here mirror the main geographic focus of the Commission at the very beginning. The picture of the full delegation participating in the first plenary working session is shown in Figure 3.

The delegates confirmed the “Bureau executive” of CILB as follows:

- President: A. S. Balachowsky, Institut Pasteur, Paris/France;
- Three vice presidents:
 - W. E. van den Bruel, Entomology Research Station, Gembloux/Belgium;
 - J. Franz, Federal Institute for Biological Control, Darmstadt/Germany;
 - P. Vassière, National museum of natural history, Paris/France;
- Secretary general: P. Grison, INRA Versailles/France;
- Treasurer: P. Bovey, Institute of Entomology, ETH Zürich/Switzerland.

Another rare picture taken of an important IOBC event shows the members of the “Bureau exécutif” and of the appointed coordinators of the different services (Figure 4). The composition of the “Bureau exécutif” remained practically the same for 12 years (see Appendix I).

Two “Services” were established with top priority as had been requested by all interested countries:

- ***Identification service for entomophagous insects:***
 - Director: Ch. Ferrière, Museum of Natural History, Geneva/Switzerland
 - Deputy director: L. P. Mesnil, Commonwealth Institute of Biological Control, European Laboratory at Feldmeilen/Zürich/Switzerland;
 - Secretary: V. Delucchi, Commonwealth Institute of Biological Control, European Laboratory at Mendrisio/ TI/ Switzerland.

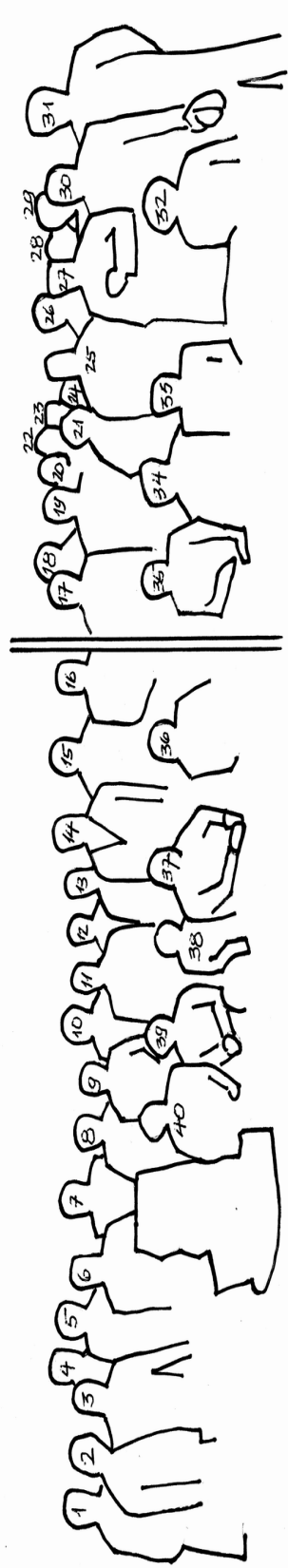


Figure 3. Participants in the first plenary working session of CIBC at Antibes (November 20, 1956)

1. Haudiquet; 2. Remaudière; 3. Ghesquière; 4. Mesnil; 5. Parker; 6. Caudri; 7. Féron; 8. Castel Branco; 9. Joseph; 10. Vayssièr*; 11. Zarco; 12. Joly; 13. Braconnier; 14. Balachowsky*;
15. Lemoigne; 16. Bovey*; 17. Poutiers; 18. Vezin; 19. Bonnefoi; 20. Tadic; 21. Mme. Béguin; 22. Rampal; 23. Targe; 24. Trouvelot; 25. Bouriquet; 26. Franz*; 27. Frézal; 28. Davatchi;
29. Klett; 30. van den Bruel*; 31. Burgerfjon; 32. Meltzer; 33. Milaire; 34. Martouret; 35. Biliotti; 36. Delucchi; 37. Mathys; 38. Arambourg; 39. Pesson; 40. Grison*.

(The individuals identified with * became members of the "Bureau exécutif" of CILB).



Figure 4. The first session of the “Bureau Exécutif” in Antibes, November 20 1956.

1. P. Bovey (CH); 2. P. Grison (F); 3. A. Balachowsky (F); 4. D. Caudri (EPPO); 5. V. Delucchi (CH); 6. W.E. van den Bruel (B); 7. Bouriquet (F); 8. Ch. Ferrière (CH); 9. E. Biliotti (F); 10. J. Franz (D); 11. W. Klett (D).

- **Documentation service**, with 2 sections:
Biology and application: J. Franz, Darmstadt/Germany
Systematics: V. Delucchi, Mendrisio/Switzerland.

The Secretariat of publications (G. Remaudière, Institut Pasteur, Paris/France) was responsible for the journal ENTOMOPHAGA with the first issue published in July 1956.

One of the most effective actions of CILB was the establishment of project-oriented “Comités de travail” (Working Groups, Table 1). Through their activities CILB exerted its

influence by channelling the individual and fragmented national efforts into joint projects. Under the guidance of well-experienced specialists selected by the Executive Board, groups of young and active scientists were given financial support by the founding organisations to develop international projects. This cooperation was greatly facilitated by the relatively short travel distances in Europe. Projects were carried out in those countries that had the best perspective of a successful outcome.

Table 1. Working Groups established between 1956 and 1958

1956	Application of <i>Prospaltella perniciosi</i> against <i>Quadraspidiotus perniciosus</i> (San José scale) (in collaboration with EPPO)	W. Klett (D)
1956	Biological control of <i>Ceratitis capitata</i> and <i>Dacus oleae</i> (in close collaboration with EPPO and FAO)	M. Féron (F)
1956	Biological control of <i>Leptinotarsa decemlineata</i>	J. Franz (D)
1956	Biological control of Lepidopteran pests of Mediterranean forests (gypsy moth and processionary caterpillars)	E. Biliotti (F)
1957	Biological control of <i>Hyphantria cunea</i> (in cooperation with FAO and EPPO)	M. Tadic (YU)
1957	Biological control of sugar cane miners (Africa) and of <i>Earias insulana</i>	P. Frézal (F)
1958	Insect pathology and microbial control	B. Hurpin (F)
1959	Integrated pest control in fruit orchards	H. J. de Fluiter (NL)



Figure 5.
P. Vayssière (France), Honorary President of IOBC (1958)

The 1st General Assembly of 1958 awarded the title of an Honorary President to P. Vayssière, France, who had organised the Stockholm meeting of 1948 and promoted the establishment of CILB within the IUBS (Figure 5).

An important milestone in the development of biological control at an international scale was the 1st International Conference for Insect Pathology and Biological Control organised in 1958 in Prague by J. Weiser. Participating scientists from both East and West Europe met to discuss the best way of cooperation (see history in Appendix III).

1959: Integrated plant protection moving in from the North

The establishment of the “Commission” on Integrated Pest Control in 1958, followed in 1959 by the establishment of a Working Group on Integrated Pest Control in Fruit Orchards (both

directed by H. J. de Fluiter/NL) were an early indication that CILB started activities in a wider context of plant protection than biological control alone. At its beginning the orchard group was operating mainly in the Netherlands, Germany, Switzerland and France. This group was inspired by the pioneering practical work of Pickett and his team in Nova Scotia/Canada (Pickett, A. D. & Patterson, N. A. 1953; Pickett, A. D., Putman, W. L. & LeRoux, E. S. 1958) and by the conceptual ideas published in California (Stern et al. 1959). European entomologists involved in apple production can be considered in many respects as the pioneers of integrated pest management and later in the development of Integrated Production.

1965: CILB changes its name

At the 3rd General Assembly held at Montreux (Switzerland) it was decided to change the name of CILB to OILB. The term “Commission” was replaced by “Organisation” to symbolise its growth both in range and importance. Working groups of general interest and of permanent character became “Commissions (i.e. “Integrated Pest Control”, “Pathology and microbial control”, “Intertropical problems”, “Documentation” and “Publications”).

OILB had to establish relations and face confrontations with similar organisations operating in the field of biological control. Difficulties were experienced with the “International Advisory Committee for Biological Control (IACBC)”, established in 1964 in London and consisting mainly of experts from English speaking countries (e.g. F. Wilson/CSIRO Australia; B.S. Beirne, director of the Belleville institute in Canada; and F. J. Simmonds, Commonwealth Institute of Biological Control in Trinidad). The main role of IACBC was to assist institutions and countries wishing information on the possibilities of world-wide biological control. During the International Congresses of Entomology in London (1964) and Moscow (1968) IACBC presented proposals to avoid competition between organisations dealing with biological control of pests, and submitted in 1967 a request for its affiliation with IUBS. Without success, however, because that particular niche was already occupied by IOBC since 1955.

OILB changed its consultative status with FAO (Food and Agriculture Organization of the United Nations) into a liaison status. This closer cooperation between OILB and FAO was stimulated by the fact that V. Delucchi held a double function both within OILB and FAO (with responsibilities in the FAO Division of Plant Production and Protection).

1968: The turning point in the history of IOBC

The 4th General Assembly held from 26-29 March 1968 in Paris marks an important turning point in the history of OILB. The entire old Council - with several members acting without interruption since the beginning – was replaced by a new Council of 9 individuals with E. Biliotti (F, President), V. Benvenuti (I, Vice-President), A. J. F. Castel-Branco (P, Vice-President), J. de Wilde (NL; Vice-President), V. Delucchi (CH/FAO, Secretary General), Mathys (EPPO, Treasurer) and M. Arroyo Varela (E), Z. Düzgüneş (Turkey) and H. Steiner (D) as members (Appendix I).

OILB now counted 5 Commissions (Documentation; Publications; Taxonomy of Entomophages; Pathology of insects and microbiological control; Integrated Control) and 10 Working Groups (Integrated control in orchards; San José scale; *Leptinotarsa*; Olive pests; Defoliators in forestry; *Hyphantria cunea*; *Formica rufa*; Xylophagous insects; Citrus scales; Tropical pests). The operational annual budget of the organisation at that time was about 100,000 Swiss Francs (ca. 65,000 Euro or 80,000 US\$).

Two recommendations of the General Assembly in 1968 indicate and document for the first time the potential influence of the General Assembly as regulating power. The first recommendation is signalling the increased importance given to the integrated control approach. As the Commission on Integrated Control had focussed its attention since 1958 almost exclusively on the WG “Integrated control in orchards” (chaired up to 1968 in double function by H. J. de Fluiter/NL) , the General Assembly recommended that the Commission (under new chairmanship of J. de Wilde/NL) expanded its range by establishing a new WG on Integrated Control in annual crops and a new WG on Integrated Control in protected crops. The second recommendation concerns the termination of one of the first WG established in 1957 (Biological control of *Leptinotarsa*). This new Council significantly influenced the future shape of OILB. The reports of that time suggest that the old patterns of the organisation were somehow worn out and that the change imposed by the General Assembly had not occurred without internal frictions.

Autocidal control of insect pests became an important research area in the 1960s, a term that was later replaced by “Genetic Control” and “Sterile Insect Technique”. The Council established a new Commission (Autocidal Control, chaired by J. Ticheler/NL), three new WG focussing on Autocidal Control (Autocidal control of *Carpocapsa* and *Adoxophyes*; Autocidal control of *Rhagoletis cerasi*; and Autocidal control of *Ceratitis capitata*), and terminated the Commission on Documentation. The widely spread activities of the forestry oriented Working Groups were now coordinated by a Working Group on Biological Control in forests (chaired by P. Grison/F). Noteworthy is a first indication given in the annual report of the WG “Integrated control in orchards” about the desirability to establish rules for measuring the side-effects of pesticides on natural enemies. H. Steiner, the convenor of this group, had been contacted by the German plant protection service, which proposed a cooperation with OILB to establish guidelines for testing the side-effects of pesticides that could possibly become part of the official registration process. OILB did apparently not react immediately to this request and this matter was raised again at the General Assembly 1971.

The year 1968 was also a milestone with respect to the quality of reports. V. Delucchi, the new Secretary General, published the proceedings of the General Assembly for the first time as off-set document entitled “ Comptes Rendus de la 4e Assemblée Générale” both in French and English (OILB 1968). H. Steiner and M. Baggiolini published the first title in a series of remarkable OILB brochures: “Anleitung zum integrierten Pflanzenschutz im Apfelanbau” (Introduction to Integrated Plant Protection in Apple Orchards), followed in 1969 by the French version “Introduction à la lutte intégrée en vergers de pommiers” (by C. Benassy & H. G. Milaire).

1969: The year of confrontations and agreements

The confrontation between the two organisations claiming international leadership in biological control, namely IOBC and IACBC seemed to culminate. The efforts of IACBC to get the status of an IUBS-affiliated organisation were not successful. The long lasting forth and back movements between the two organisations and the final solution of this confrontation reached in 1969 is well documented (OILB 1970) and can be summarised as follows: IUBS considered the existence of two international bodies with almost identical objectives undesirable and explored the possibility of having one single organisation concerned with biological control which could satisfy the needs of the majority of biological control research workers and institutions.

OILB and IACBC representatives met three times and prepared a draft document to be discussed at a joint meeting of all parties involved. Given the importance of this negotiation we mention here the persons participating in this joint IUBS/OILB/IACBC *ad hoc* committee preparing the final draft of the future statutes: G. A. Beglyarov, E. Biliotti, P. S. Corbet, C. Davis, P. DeBach, V. Delucchi, G. Mathys, R. Sailer, F. J. Simmonds, F. Wilson and K. Yasumatsu. On the initiative of F. Stafleu, Secretary General of IUBS, an agreement was finally reached at a historic meeting between OILB, IACBC and IUBS held from 17-19 November 1969 at Amsterdam. The meeting was attended by 34 key persons in biological control. At the end of the meeting participants did agree

- on the name (IOBC: “International Organization for Biological Control of Noxious Animals and Plants”),
- that *ENTOMOPHAGA* would remain the journal of the organisation
- on the internal structures of the organisation with regional sections
- on the statutes
- on the financial principles
- on a first slate of candidates for the new Executive Committee to be presented at the 5th General Assembly of OILB/IOBC in 1971 (i.e. P. DeBach/President; E. Biliotti and F. Wilson/Vice-Presidents; V. Delucchi/Secretary General and F. J. Simmonds/Treasurer). With this composition all parties could be satisfied.

1971: IOBC Global established

IOBC Global was established at the 5th General Assembly of IOBC taking place in March 1971 in Rome at FAO headquarters. It was a large crowd of people, composed of IOBC Council members, Convenors of Working Group reporting on their activities, delegates of Institutional Members, high level representatives of FAO, EPPO, Commonwealth Institutions, US institutions and IUBS. Many scientists had arrived in Rome to attend the scientific symposium on “The implication of permanent insect production”. The topic of this scientific symposium held in conjunction with the General Assembly had been chosen by the old Council taking into account the emerging field of large sterile insect release operations worldwide. Presentations given by M. Mackauer, K. S. Hagen and E. F. Boller anticipated later developments with respect to quality control concepts related to mass rearing of arthropods.

Different meetings organised at various levels (old IOBC, new WPRS, new Global etc.) took place within a short period of time. Coffee breaks and apéro buffets attracted attention and many “ordinary” participants had a hard time to know exactly what was going on and where. Students and young scientists stumbled during the coffee breaks into personalities they knew only from textbooks. In summary, it can be speculated that only certain higher ranking participants who knew the history, were possibly aware of the historic importance of the event. The majority of the junior participants was probably not. Fortunately, the happening in Rome is well documented (OILB 1971). But the real impact of this Roman event was becoming visible for many persons only in retrospect.

Many general questions were discussed and resolutions were passed by the 5th General Assembly in Rome (which was also the 1st General Assembly of IOBC/WPRS). Of special interest were, among other points:

- The enlargement of IOBC by new institutional members (see Table 2). In 1968 scientific institutions from Egypt and Argentina had joined IOBC, followed in March 1971 by the Royal Society (London) as first institutional member from the United

Kingdom, The continental Europeans voiced their satisfaction on this geographic and professional expansion of IOBC.

- The report of the Secretary General of the old IOBC mentioned that the Executive Committee had tried to obtain the participation of institutes in the North of Europe, but without success.
- The International Union of Biological Sciences (IUBS) gave IOBC the status of a Section instead of a Commission.

Before the official establishment of IOBC Global in March 1971, IOBC covered the geographic areas presented in Table 2, and operated the Commissions and Working Groups mentioned in Table 3.

Importance of the period of 1968 till 1971 in retrospect

The period 1968-1971 was an important turning point in the history of OILB. The reports published between 1968 and 1971 describe the step-wise development of a fundamental change leading to the establishment of Global IOBC in 1971. One of the personalities which were instrumental in this transformation was V. Delucchi, the Secretary General of IOBC from 1968 till 1971 and elected new Secretary General of Global IOBC. We quote here from his report as Secretary General given at the 5th General Assembly held in 1971 in Rome (OILB 1971):

“The fortunate development (of IOBC) is due to the dynamic efforts of those directing the IOBC from its origins till 1968. Even if this long directorship by the same people certainly has its advantages, it resulted on the other hand in a certain inflexibility and in difficulties for the opening up to other continents where the work on biological control for the protection of plants and animals is even more important than in Europe.

Starting with the 4th General Assembly held in 1968 two lines of action have been taken:

- 1. the internal structures were redefined and re-evaluated, helped by the valuable assistance of the scientific and technical bodies, which created at the same time a current of information between these bodies and the Members of OILB;*
- 2. the external structure of the IOBC was enlarged to satisfy research workers and institutions of other countries in other parts of the world. This had been endorsed considerably by the IACBC (International Advisory Committee for Biological Control; dissolved in 1971) and by the IUBS (International Union of Biological Sciences) of which OILB had been a member since its foundation.*

The internal modifications and the external, more open policy have been met with much criticism, sometimes injudiciously, sometimes out of a conception too restricted for such a wide field as biological control. There are, however sufficient indications to suggest that these two lines of action have given very positive results in furthering the interests of the Organisation.”(...) *“The list of the new Working and Study Groups established since 1968 contains only three Groups of pure biological control; the others are based on programs of integrated control, reinforced by specific Groups on genetic control. (..) This rapid internal evolution of IOBC is in accordance with the general trend in Europe and the USA, that is, the feeling that an optimal solution of phytosanitary problems can only be found if the whole environment is considered. This environment is dynamic by definition; consequently even if the present day problems will probably not be the same as the future ones, as problems they will stay, and with them the Working Groups on integrated control, enlarging their activities. The evolution of “Integrated control in orchards” can be taken as an example: after 12 years*

Table 2. The geographical distribution of countries with institutional members of IOBC before the establishment of IOBC Global in 1971. The years marked with (*) indicate the first appearance of a country in an IOBC report but the official date of joining IOBC might have occurred 1 – 2 years earlier.

Year of joining IOBC	Countries in alphabetical order (and their number of institutional members in March 1971)
1956	Algeria (1), Belgium (2), France (9, including overseas institutions IRCT, IFCC, IRAT, IRHO, IFAC with partial membership), Germany (1), Morocco (1), Portugal (2), Spain (3), Switzerland (1), Yugoslavia (1)
1957	Iran (1), Italy (4)
1958	Tunisia (1)
1959*	The Netherlands (1)
1960*	Greece (1), Lebanon (1)
1962*	Syria (1), Turkey (1)
1968	Argentina (1), Egypt (1)
1971	United Kingdom (1)

of a very successful existence, this group can now enter the phase of practical application. But the problems are at least as manifold as before, necessitating an intensive international contact. International coordination limited to a relatively small zone such as France-Germany-Holland-Switzerland can be financially supported. If, on the other hand, the Mediterranean Region (olive pest or of citrus pests) and the Near and Middle East (cotton pests) are to be included, the financial problems cannot be neglected.

Accordingly, the financial policy of the Organisation regarding the Working Groups was changed in 1969 in order to reactivate certain groups. The old formula of self-finance, probably useful ten years ago was replaced by direct financial support of meetings and sometimes even of practical applications. Financial support, formerly an exception, is now (1971) standard practice.....The renewed activity of Working Groups has been detrimental to the other statutory bodies, notably to certain Commissions. But it has to be held in mind that the Working Groups constitute the most dynamic part of the Organisation, as well as the most interesting as regards international co-ordination.(..) Under these conditions the least active Groups are bound to disappear.”

Delucchi concluded his last report as Secretary General as follows: “The paramount activity of the Secretariat, like that of the Executive Committee and Council, has been the intensification of structures charged with scientific and technical performances, especially the Working Groups, as well as the restructure of the Organisation. At first sight, these two points appear to have nothing in common. Restructure of the IOBC, however, will only be of value if this can stimulate and realise international co-ordination. Working groups on Trypetids, or on Carpocapsa, or on borers of graminaceous plants, or integrated control in citrus growing and orchards, cannot be restricted exclusively to Western Europe or the Mediterranean Region. These groups have an international vocation. Certain inter-regional activities have been started already through other organisations such as the Joint Division FAO/IAEA in Vienna, or directly with the International Biological Program (IBP), or with national groups beyond countries where IOBC is represented. But these accords are always transitory and dominated by personal interests.”

Table 3. Commissions and Working Groups before the establishment of IOBC Global**5 Commissions**

- Taxonomy of entomophagous arthropods (V. Delucchi, C. Besuchet & P. Bovey);
- Publication and information (B. Hurpin);
- Integrated Control (J. de Wilde);
- Insect pathology and microbial control (C. Vago);
- Genetic control (J. Ticheler).

18 Working and Study Groups in chronological order of establishment:

- Integrated Control in Mediterranean pine forest (1956; C. Dafaue Ruiz);
- Biological control of olive pests (1956/1967; Y. Arambourg);
- Biological control of borers of gramineous crops/sugar cane in the tropics (1956; J. van Dinther & J. Brenière);
- Microbial control of *Lymantria dispar* (1957/1968; L. Vasiljevic);
- Integrated Control in orchards (1959; H. Steiner);
- Biological control of citrus scales (1962; C. Benassy);
- Biological control of *Saperda* (1962; G. M. Arru);
- Genetic control of *Carpocapsa* and *Adoxophyes* (1968; Th. Wildbolz);
- Integrated Control in glasshouses (1968; L. Bravenboer);
- Genetic control of *Rhagoletis cerasi* (1969; E. Boller);
- Genetic control of *Ceratitis capitata* (1969; L. Mellado);
- Integrated Control in *Brassica* crops (1970; T. Coaker);
- Biological control in soil pests (1970; R. Bardner);
- Genetic control of *Hylemia* (1970; C. Pelerents);
- Integrated Control in cotton growing (1970; M. Karman);
- Study Group on Genetic manipulation (C. Curtis)
- Study Group on Integrated Control in cereals (G. Latteur)
- Study Group on Microbial control of *Carpocapsa* (G. Benz)

Global IOBC and regional sections (see also Part II)

With the establishment of Global IOBC in 1971 in Rome, the early history of IOBC, dominated by activities in Europe, came to an end. Now, the new Global IOBC consisted of biogeographically defined Regional Sections which can be considered as 6 sisters, each with its individual history and a different personality. There are no twins. All, except WPRS and EPRS, changed their names several times, as well as their geographic range and their statutes (for details see Delucchi 1993). Three Regional Sections emerged almost immediately after the General Assembly in Rome: WPRS (West Palaearctic Regional Section) in 1971, WHRS (Western Hemisphere Regional Section including North, Central and South America) and SEARS (South and East Asian Regional Section) in 1972. In 1977 EPRS (East Palaearctic Region Section) was established and (after an unsuccessful attempt in 1972) in 1989 ATRS (AfroTropical Regional Section). Unlike the rather fortunate situation within WPRS, large distances and widely diverging economic, social and political environments within most

regional sections seem to have been important obstacles in the early phase of Global IOBC making successful regional co-ordination and financial support of IOBC activities difficult.

Acknowledgements

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Part II. The History of IOBC Global 1971 – 2006

Joop C. van Lenteren

The reason that IOBC originally developed in Europe and was limited to that area for its first 25 years of existence, was due mainly to the lack of a coordinating organisation for biological control in this area. Other areas, like northern America and the British Commonwealth (including Australia and New Zealand), had strong organisations and a long standing history in the field of biological control. Still it was felt necessary by many biological control researchers to form a truly worldwide organisation that would overview and coordinate the activities of this environmentally safe method of pest, disease and weed management. In this chapter the founding and development of this organisation is described, based on the information provided by previous board members, reports of board meetings (very few were still available, though) and summaries of meetings that were printed in newsletters of IOBC Global.

The mission of the International Organization for Biological Control of Noxious Animals and Plants (IOBC Global) is to promote the development of biological control (the use of living organisms or their products to prevent or reduce the losses or harm caused by pest organisms, or in short, the use of biota to control biota) and its application in integrated control programmes. This mission is illustrated in the following mission statement of IOBC Global: “Biological control is a science-based process, planned, conducted, delivered and evaluated by teams of colleagues. There is a high degree of international cooperation and free exchange of biological control germplasm. The highest ethical and scientific standards are upheld in the conduct of biological control. It is investigated as the first option for pest management, and replaces chemical control as the base strategy of integrated pest management. The desired outcome of biological control is science-based, sustainable, cost-effective, resource-conserving and environmentally compatible management of pests of agriculture, forestry, medical and veterinary importance, urban areas, interiorscapes and environmental areas. Biological control results in a global reduction in pesticide use and conservation of biological diversity.”

To realise the mission of IOBC, the organisation shall pursue the following aims:

- (a) promote the development of biological control and its application in integrated control programmes, and international cooperation to these ends;
- (b) collect, evaluate and disseminate information about biological control;
- (c) promote national and international action concerning research the training of personnel, the coordination of large-scale application and the encouragement of public awareness of the economic and social importance of biological control;
- (d) arrange conferences, meetings and symposia, and take any other action to implement the general objectives of the Organisation.

To reach these aims, IOBC:

- (a) may consult, collaborate, or make agreements with international or national governmental or non-governmental organisations;
- (b) coordinates biological control activities worldwide in 6 regional sections (Africa, Asia, East Europe, West Europe and the Mediterranean, North America, and Central and South America) and working groups.

IOBC Global, together with its Regional Sections, intends to continue to play its role of a reliable organisation providing objective information about biological control and IPM. It will do this by adhering to the original mission of the organisation, but there are additional challenges concerning pest management that it needs to meet in order to remain an important partner in biological control. These challenges are addressed in section II.6, the future of IOBC.

II.1 1969-1980: The Establishment and Initial Development of IOBC Global

IOBC Global could be established in 1971 after the question was answered which organisation should officially represent biological control. IOBC Global was first concerned with the establishment of Regional Sections. Next it developed international relationships with other organisations involved in crop protection and it started to issue newsletters on a regular basis to inform its members and relations.

1969-1971: Which organisation will represent worldwide biological control?

The formation of IOBC Global encountered some early diplomatic difficulties when another organisation, the International Advisory Committee for Biological Control, also claimed worldwide leadership in biological control. It was the International Union of Biological Sciences (IUBS) which took the initiative to assist in trying to solve this problem. Under the leadership of F. Stafleu, Secretary General of International Union of Biological Sciences, an agreement was finally reached at a historic meeting between IOBC, IACBC and IUBS held from 17-19 November 1969 at Amsterdam, The Netherlands. At the end of the meeting participants did agree (1) that the name of the new organisation should be IOBC = International Organization for Biological Control of Noxious Animals and Plants, (2) that Entomophaga would remain the international journal of the organisation, and that (3) the internal structures of the organisation would be based on regional sections that would work with a considerable measure of autonomy. Agreement was also reached on the statutes and the financial principles. Finally, a proposal was formulated for the first IOBC Global Executive Committee to be elected at the 5th General Assembly of OILB/IOBC in 1971: Paul DeBach/President; Emile Biliotti and Frank Wilson/Vice-Presidents; Vittorio Delucchi/Secretary General and Fred Simmonds/ Treasurer. With this composition, all parties were satisfied.

At the 5th **General Assembly** of IOBC in Rome, which also proved to be 1st General Assembly of IOBC Global, the proposal of the IUBS, IOBC and IACBC meeting of 1969 was approved and the creation of IOBC Global became a fact on 31 March 1971. At this meeting, the adaptation of the statutes was also approved (see Appendix I), and a plan to establish 5 to 6 Regional Sections was developed. Figure 1 gives a timeline for the foundation and development of IOBC Global.

IOBC Global comprises the Members and the following statutory bodies:

- (a) the **General Assembly**, which is open to all members, meets approximately once every four years; the purposes of the General Assembly are the provision of information on the affairs of the Organization, and the provision of opportunities for Members to express opinions on the activities of the Organization and to make recommendations to the Council;

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- (b) the **Council**, which consists of the members of the Executive Committee and one representative from each Regional Section, meets approximately once every two years; the Council is responsible for the functioning of the Organization;
 - (c) the **Executive Committee**, which consists of the President, the immediate Past-President, the two Vice-Presidents, the Treasurer and the Secretary-General; meets when necessary and usually once per year; the Executive Committee is responsible for implementing the decisions of the Council and to manage the day to day activities of IOBC Global; the composition of all previous IOBC Executive Committees is given in Appendix I;
 - (d) the **Regional Sections**, which are autonomous in respect of structure, finance, procedure and activities, and subject only to compatibility with the Statutes of the Organization and the general policy of the Council; the Regional Sections support the mission of IOBC Global in the world's biogeographical zones; the composition of all previous boards of Regional Sections is given in Appendix I;
 - (e) other bodies like **Working Groups**, the **Management Board** of the journal BioControl and ad-hoc committees responsible for the organisation of symposia.

1971: Establishment of Regional Sections of IOBC Global

The West Palearctic Regional Section (WPRS: West Europe, Mediterranean and Near East) was launched immediately upon the foundation of IOBC Global, and was a continuation of the old CILB/OILB/IOBC. It was also agreed at the Rome meeting to launch a Western Hemisphere Regional Section (WHRS: North, Central and South America, including the Caribbean). Further, plans to establish Regional Sections for Asia, East Europe (including USSR) and Africa were made. The year of establishment of Regional Sections is given in Figure 1.

On 28 August 1972, during the **6th General Assembly** of IOBC Global in Canberra, Australia, Carl Huffaker (USA) was elected as president, while the previous Secretary General and Treasurer remained in office. The establishment of the South and East Asian Section (SEARS), as well as the the Tropical Africa Regional Section (TARS) and the Pacific Regional Section (PRS) were officially approved. Some time later, approval of the East Palearctic Regional Section (EPRS, 1977) by the Executive Committee and Council of IOBC Global followed, after plans for establishment of this section were finalised in 1975.

The creation of the Regional Sections did not always result in immediate activity. WPRS, EPRS and WHRS have always been very active (see Part III, IV and VI of this book). WPRS and EPRS have always kept the same name since their establishment. The WHRS area appeared too large to be managed efficiently and was subsequently split in two sections in 1985, the Nearctic Regional Section (NRS, consisting of the USA and Canada) and the NeoTropicRegional Section (NTRS, representing Latin America). SEARS and PRS encountered many difficulties related to the vast area to be covered, with its very different biological control problems, cultures and financial possibilities. These two Regional Sections merged into one, the Asia Pacific Regional Section (APRS) and this new section was able to organise several meetings and produce a newsletter (see Part V). The development of TARS was even more difficult and, after a period of no activity, it was closed in 1982, reactivated in 1989 under the name of AfroTropical Regional Section (ATRS), and currently, new initiatives are under way to start up ATRS (see Part VII).

1971-1980: IOBC Global is Developing its Niche

IOBC Global did not have an easy start. Most of the earlier OILB/IOBC activities were now continuing under the wings of IOBC/WPRS, including all the Working Groups. Initially, IOBC Global was mainly concerned with networking and starting up several other Regional Sections, but there were also suggestions to form several Global Working Groups (WGs). As Canberra, Australia in 1972, with the goal to determine whether (a) a global Information a result, several *ad hoc* committees were formed during the **6th General Assembly** at Retrieval System for biological control could be realised, (b) the WPRS WG of borers of graminaceous crops should become a Global WG, (c) a Global WG on microbial control should be formed, (d) WGs on Integrated Control for several crops should be formed, and (e) a system for solving taxonomic problems should be developed within IOBC. At the same meeting it was proposed to organise a postal ballot to see if the name of IOBC Global should be changed to include IPM. Apparently, little progress on these fronts was made, because the results of work of only few of these *ad hoc* committees were mentioned at future IOBC meetings. Although the WGs proposed did not materialise, two global WGs were subsequently established that are still active today: one on biological and integrated control of maize pests and another one quality control in insect mass rearing.

IOBC Global also started the publication of a newsletter with a planned frequency of two per year. The first newsletter appeared on 1 March 1972. The Global Newsletters provided information on activities of all the Regional Sections and WGs, listed important upcoming biological control or IPM meetings, reported on collaboration with various organisations like FAO and WHO, published many references to important research papers and printed summaries of articles that appeared in the journal of IOBC, *Entomophaga* (see history of Publication Commission for details about *Entomophaga*, Appendix III).

The **7th General Assembly** of IOBC took place during the XVth International Congress of Entomology in Washington DC, August 1976. Newsletter 9 (1977) provides a report of this meeting. The newly elected president of IOBC Global, Emile Biliotti (F), stressed once more how important it was to coordinate worldwide activities in biological control, in order to find ecologically safe and socially sound alternatives for chemical pest control. IOBC was doing this within its regional sections, through its Newsletter and its journal, *Entomophaga*, and by way of its global and regional WGs. Progress was reported about the formation and functioning of Regional Sections. During this General Assembly it was decided to spend more energy on developing good relationships with such organisations as FAO (Food and Agriculture Organization of the United Nations), the IPM programme of the UNDP (United Nations Development Programme), WHO (World Health Organization) IIBC (International Institute of Biological Control), IBP (International Biological Programme) and the California IPM (Integrated Pest Management) project. A very important activity of IOBC Global was the co-organisation of 11 biological control symposia and additional paper reading sessions at the XVth International Congress of Entomology in Washington DC. IOBC had never before been so deeply involved in the co-organisation of meetings in the framework of a large international congress. As a result of this effort, IOBC was able to showcase its many activities in biological control and IPM. This opportunity was facilitated by prominent United States biological control scientists such as Paul DeBach, Ken Hagen, Carl Huffaker, Paul Messenger, Robert van den Bosch and others. Henceforth, IOBC Global would always co-organise symposia at International Congresses of Entomology, and this came to be seen as one of its key activities.

The **8th General Assembly** took place during XVIth International Congress of Entomology in Kyoto, Japan, August 1980. The meeting was well attended and quite intensive discussions followed about the name and objectives of the organisation. As at the previous General Assembly, it was proposed to include IPM in the name of the organisation. After a long and emotional discussion, a ballot revealed that there was insufficient support for this a change. Many members also expressed their views on the objectives of the global organisation. Many found provision of information via the Newsletter, and coordination of Regional Section and WG activities sufficient. Others felt that much more could be done, like the establishment of more working groups and action to make governments aware of the benefits of biological control relative to chemical control. The Executive Committee made clear that IOBC Global employed no permanent personnel and that all activities needed to be done in the spare time of often very busy researchers. During the General Assembly, the activities of the previous Executive Committee were also reviewed, as well as the status of the Regional Sections and WGs (see newsletter 19-20, 1981). At the end of the meeting, the new president, Ken Hagen (USA), gave an interesting and important presidential address. He stressed the importance of using biological control in combination with host plant resistance and other components of IPM in order to broaden possibilities for implementation of biological control. But he also stated that IPM is not simply using economic injury thresholds to reduce spraying, as was often the case during that period. He explained that real IPM should be aimed primarily at recognizing and augmenting natural enemies, and sketched new possibilities for biological control (for the full text of Hagen's presentation, see newsletter 19-20, 1981).

During this period, IOBC Global organised a Bellagio Conference on the future of IPM (Bellagio, Italy). The constraints and development opportunities to the introduction of IPM were extensively discussed. A summary of the meeting and the conclusions are published in newsletter 19-20, 1981. The conclusions were used to develop ideas about new WGs for IOBC Global, and to explore collaboration with other international partners such as FAO and WHO. In addition to organisation of the Bellagio meeting, IOBC provided financial and organisational support to a number of other biocontrol meetings during the period 1971-1980 (see below).

II.2 1980-1989: IOBC Global Establishes Working Groups and Relationships with International Organisations; the Regional Sections strengthen

Now that IOBC was firmly established and had several well functioning Regional Sections, it could invest time in improving the scientific status of its journal *Entomophaga*, but above all in developing a number of important Working Groups.

General Assemblies of 1984 and 1988.

The **9th General Assembly** of IOBC Global took place in Hamburg, Germany on 20 August 1984 and was well attended. A report of this meeting can be found in Newsletter 33, 1984. The Secretary General reported about IOBC Global's activities of the past 4 years. During the General Assembly it was decided to split WHRS in two Regional Sections: NRS and NTRS (see below). The Secretary General also reported on discussions that had taken place with WPRS and the new publisher for *Entomophaga* regarding the journal's quality, editorial board, regularity, speed and distribution, following concern from members.

The new president, Vittorio Delucchi (CH), presented a critical review of IOBC Global activities, due to an adverse financial situation in 1984. The assets had decreased from \$US100,000 in 1980 to about \$US6,000 in 1984, which was due mainly to inefficient management.

The activities of IOBC Global since its initiation in 1971 were discussed and the following conclusions were drawn:

- IOBC Global had established various active Regional Sections and was working on establishing sections in Latin America and Africa;
- IOBC Global had realised several well functioning WGs and was working on the establishment of more WGs;
- IOBC Global had also realised two other tasks suggested in 1971: better networking through creation of Regional Sections and WGs and provision of valuable information by the regular production of a Newsletter;
- The taxonomic service proposed for IOBC Global had been continued by IOBC WPRS and was, therefore, not developed within Global, though Global members could use the WPRS service;
- The proposed documentation service could not be realised due to the very high costs involved.

The **10th General Assembly** of IOBC Global took place in Vancouver, Canada on 4 July 1988. The meeting was announced early in IOBC newsletters and the Executive Committee stimulated members to suggest ideas for the Assembly. At the meeting, the activities of the previous four years were extensively reviewed, the statutes were slightly adapted and an overview of the financial situation was presented (for a report, see Newsletter 44, August 1988). The new president, Jack Coulson (USA) set out an ambition to strengthen regional and inter-regional activities of IOBC, to realise an official link between IOBC and the Weed Biological Control Symposia, and to generate more attention for biological control of plant pathogens and nematodes within IOBC Global. This Executive Committee also aimed at reviving two Regional Sections: Latin America (LARS) and Africa (TARS), and in the spring of 1989 the draft statutes for both regions were written and discussed by representatives of the regions and the Executive Committee of IOBC Global. During an IOBC Global Council meeting in 1989, the establishment of the statutes of TARS (now ATRS) and LARS (now NTRS) were approved, and revival of these regions seemed to take place. At the same Council meeting, a new contract was signed with Entomophaga, which included an increase in the number of pages per volume and a slight increase of subscription fees.

In the period 1980-1989 a critical review of relationships between IOBC Global, Regional Sections and WGs took place in order to re-establish the responsibilities of the different groups within the organisation. Many of the changes that occurred in this period were discussed and proposed during a Council meeting in Delémont, Switzerland in 1986. One of these concerned IOBC membership of persons taking part in IOBC Workshops. Usually, membership of IOBC was not demanded when attending an IOBC WG meeting, but the Council thought it fair to ask this from participants, or to ask an extra financial contribution from non-IOBC members in the form of higher registration fees. This issue was to come up again and again during future Executive Board and Council meetings of IOBC Global

The Executive Committee of Global also considered how to enhance scientific quality, management and review of contributions to Entomophaga. A new publisher was contracted,

the editorial board of *Entomophaga* was renewed and the review system of papers was improved. As a result, more papers were submitted, and, interestingly, more Regional Sections were found to be submitting papers. Previously, manuscripts were received mainly from WPRS and NRS.

The financial situation of IOBC Global slowly improved after reaching dramatically low reserves in 1984. This improvement was realised by increasing the membership fee and the subscription costs for *Entomophaga*, but also by a more careful management of the finances. In this period, IOBC Global financed and co-organised a number of activities in the field of biological control as in the previous period (see an overview of these activities below).

Global Working Groups: new ones formed and others dissolved

A key activity of the second decade of IOBC Global was the establishment of six Global WGs. The year of formation of all WGs is given in Figure 1. The first group that received IOBC Global WG status was ***Ostrinia and other Maize Pests (IWGO)*** in 1979/1980. This group was established during the International Congress of Entomology in Moscow (Russia) in 1968 and was already affiliated with IOBC for a long time. The group is still very active (see Appendix II). The second WG obtaining IOBC Global status in 1980 was ***Arthropod Mass Rearing and Quality Control (AMRQC)***. This WG is also still very active (see Appendix II). The third IOBC Global WG on ***Ecology of Bruchids*** met for the first time in 1981. It was dissolved in 1994, but part of its work was continued in a WPRS WG on stored product pests. The fourth group, the WG on ***Biological Control of Heliothis***, was established in 1981 in Hyderabad (India) and became a Global WG in 1982. Its activities were terminated in 1991. In 1982 a WG on ***Trichogramma and other Egg Parasitoids*** was established. It had a flying start with an excellent meeting in Antibes (France) and this fifth Global WG is still very active (see Appendix II). In 1986, the formation of the sixth WG on ***Fruit Flies of Economic Importance***, took place. This WG has been active for many years (see Appendix II), but seems to be in diapause since the year 1998. In 1988 the seventh Global WG was established on ***Ecology of Aphidophaga***, which was the continuation of a group that was formed in 1965 in Liblice, Czechoslovakia (see Appendix II).

Most of these Global WGs produce a newsletter, publish proceedings of their meetings and, more recently, produce a website (see Appendix II for more information). An interesting observation concerning the formation of WGs is that the ones that were formed during this decade were usually not those that were mentioned during the General Assembly meetings in Canberra, Washington, Kyoto, Hamburg or Vancouver. A lesson we may learn from this experience is that just mentioning ideas for WGs (or activities in general) is not so interesting, what really counts are committed persons who not only speak about an idea, but are also willing to spend a considerable amount of time to realise it!

Regional Sections expand their activities

Several Regional Sections functioned very well during this period. WPRS was active as ever with many WG meetings and production of bulletins containing the proceedings of these WG meetings. WHRS membership increased, and this region started a newsletter. But the region also reported to have difficulties in setting up WGs, because most biological control and IPM work was already institutionalised at the national level before IOBC became active in this region. In 1984, WHRS was divided in two Regional Sections because of its very large area and great regional differences in pest problems and pest control approaches. This resulted in

the Nearctic Regional Section (NRS: Canada and the United States) and the Latin America Regional Section (LARS: Latin America and the Caribbean). LARS changed its name to NTRS (Neotropical Regional Section) in 1989. EPRS developed many activities, including WG meetings and production of bulletins. EPRS often collaborated with WPRS in the organisation of meetings. SEARS/PRS had difficulties in the organisation of meetings and WGs due the vast area, difference in cultures and financial limitations. ATRS was not able to conduct any activities after its establishment and this Regional Section was terminated in 1982, but in 1989 a new proposal to establish ATRS was presented, following the establishment of a Biological Control Research Centre at the International Institute of Tropical Agriculture (IITA) at Cotonou (Benin).

Relationships with other international organisations

Since 1980, relationships with international organisations like FAO, WHO and EU intensified. Representatives of these organisations met on a regular basis and discussed collaboration. Several training courses were co-organised and research collaboration in IPM programmes was established between FAO, EU and IOBC. Also, the topic of biological control of insect vectors of human and animal diseases received much attention during meetings in which WHO and IOBC participated. The Global Newsletter played an increasingly important role in the exchange of information on biological control and IPM. Many reports of meetings were summarised and recent literature was reviewed, including papers that were published in *Entomophaga*.

Outside IOBC, a number of important developments took place concerning biological control. In 1989, the International Institute for Tropical Agriculture (IITA) opened its new biological control station in Bénin. This station not only contributed to the execution of large scale biological control projects in Africa, it also greatly assisted training of young biological control and IPM specialists in this area. Further, CAB International opened its new headquarters for its International Institute of Biological Control (IIBC, formerly CIBC) at Silwood Park, Ascot (UK), including a quarantine facility. These developments promoted the development of international biological control, and also offered possibilities for IOBC to play its role together with these new partners.

II.3 Period 1990-1999: IOBC Global is recognised as a major player in the field of biological control and influences pest management policies

This 10 year period can be characterised by having very active Executive Committees that started important new activities, and became much more active in policies concerning biological control and IPM. These Executives also communicated their activities extensively, and held more frequent Executive Committee and Council meetings than in previous periods. Summaries of these meetings can be found in IOBC Global Newsletters on the website of IOBC Global.

General Assemblies of 1992 and 1996

The 11th General Assembly was held on 3 July 1992 during the XIXth International Congress of Entomology in Beijing. The Newsletter had promoted it well in advance, with an agenda for the meeting. Reports of the General Assembly can be found in Newsletter 56, August 1992 and 57, March 1993. As at previous meetings, the President, the Secretary General and the Treasurer presented summary reports of their activities. Membership had

increased and the financial position of IOBC Global had improved. Most WGs were active, and there were proposals to start several new WGs: one on biological control of the weed *Chromolaena* (1993), and another on **Training, Information and Education** (TIE, 1994). Both groups were later established. A discussion was held on how WGs should use IOBC Global financial support and the conclusion was that this money should be spent on general costs of the meeting and publication of the proceedings, but not for travel expenses. The status of Regional Sections also showed several positive developments, the most important being the strong increase in activities in the NeoTropical Regional Section. However, there were still problems with Entomophaga: though the number of subscriptions remained high, members complained about the speed of production and distribution. During the General Assembly it was proposed to change the name of the journal and to widen the scope of the journal so as to include papers on microbiological control and biological control of weeds and diseases. Another topic discussed at this General Assembly was an idea expressed earlier to ask the IOBC Global Council to organise specific biological control congresses on important topics in the four year interval between the International Congresses of Entomology. The idea was supported and in the Newsletters which followed, the Executive Committee asked for topics and initiated a discussion about the format of the meeting; this resulted in the **1st IOBC Global Conference** in Montpellier, France in 1996. The new president, Ernest Delfosse (USA), presented a stimulating introduction speech during this General Assembly (see Newsletter 57, March 1993) with the following take home messages: (1) be clear what constitutes biological control, (2) be realistic about biological control, and (3) inform and educate biological control stakeholders.

In 1994, during a Council meeting of IOBC Global in Montpellier (France) two new WGs were approved: one on **Training, Information and Education** (Appendix II), and another on biological control of *Chromolaena* (Appendix II). The WG on **Ecology of Bruchids** was dissolved in 1994. During this Council meeting, it was proposed for the first time in the history of IOBC Global that clear guidelines for the management of WGs should be developed. However, this did apparently not result in actions until 2006, when a proposal for such guidelines was developed for discussion in a Council meeting in 2007. The Executive Committee also proposed to develop a mission statement for IOBC. A draft was published in Newsletter 63, April 1996, and the final version is given at the begin of this chapter. Another important issue raised was the idea to form a secretariat in order to reduce the administrative work of the Secretary General and the Treasurer of IOBC Global. During this Council, much time was also spent discussing the future of the journal Entomophaga. An *ad hoc* review committee was appointed, started its work and invited IOBC members to send their ideas and comments on how to improve Entomophaga. In 1995, the committee produced a report of which the most important conclusions were: IOBC needs its own journal, the name of the journal should be changed, more pages per volume are needed, a faster production and review system is essential, the journal should obtain higher standards and broaden its scope by including short notes and papers on biological control of diseases and weeds.

The **12th General Assembly** was held during the 1st IOBC Global Conference on Technology Transfer in Biological Control: From Research to Practice, from 9-11 September 1996 in Montpellier (France). A report of the General Assembly can be found in Newsletter 64, November 1996. The draft vision statement published in Newsletter 63 was unanimously accepted. Also the proposal of a secretariat was positively received and a follow up study about the place, tasks and financing of such a secretariat was commissioned to the Executive Committee. This resulted in the formation of a Secretariat in Montpellier (France) in 1997,

which was run by a multi-lingual secretary. All costs for the Secretariat were covered by CILBA-Agropolis. Most Regional Sections seemed to function well, including NTRS and ATRS, but it was observed that some of the statutes were no longer up to date and also that harmonisation of statutes might be needed. Also most WGs were productive. The financial situation was stable during this period. Membership had somewhat decreased during the previous four years. The journal *Entomophaga* continued to create problems for IOBC. The report of the *ad hoc* review committee was presented and discussed extensively, and it was proposed and accepted to change the name of the journal, to look for a new publisher, to broaden the scope of the journal (for full report see Newsletter 64, November 1996). The decisions taken during the General Assembly resulted in the termination of the *Entomophaga* contract with publisher Lavoisier by the end of 1997. The new journal *BioControl* started as per 1 January 1998 with Heikki Hokkanen as the new Editor in Chief, eight associate subject editors and Kluwer (Dordrecht, The Netherlands) as the publisher. In order to prevent problems encountered with *Entomophaga*, a management board for *BioControl* was appointed. IOBC Global initiated an internet website during this period, which was hosted by USDA. During the General Assembly various designs for a new IOBC Global logo were presented and the one developed by IOBC WPRS was chosen and used from 1 January 1997.

Jeff Waage (UK), the newly appointed President, presented his acceptance speech and summarised the role of IOBC as follows: (1) IOBC facilitates communication, networking and assistance within the organisation, (2) IOBC supports continuity of our initiatives; many projects are short term, our working groups can carry the longer term development of an idea, (3) IOBC helps to support careers and ambitions of biological control researchers, particularly for those that work in isolation or very small groups, and (4) IOBC is an effective advocate of biological control through the considerable influence which our independent, professional body can have on policy makers. This role of IOBC was stressed again by Waage in an editorial in Newsletter 66 (Winter 1997). IOBC, through its independent and professional work, has influenced implementation of biocontrol and IPM at FAO, EU, OECD, World Bank and other international lending banks, NGOs and national agricultural and environmental ministries.

Establishment of new, and activities of earlier-formed Global Working Groups

The WG **Ecology of Aphidophaga** formed in 1988, had its first and very successful meeting in 1990 and an impressive book was the end result. The group organised several other meetings in this period (see Appendix II). In 1990, a WG on **Biological Control of *Plutella*** was approved by IOBC Global (Appendix II). The WG had its first meeting in Taiwan on the Management of Diamondback Moth in December 1990. In 1993, the first WG devoted to biological control of a weed was established, the WG on **Biological control of *Chromolaena***. In 1994, a WG on **Training, Information and Education (TIE)** was formed. In 1997, the second WG on biological control of a weed was established, the WG on **Biological Control of Water Hyacinth** (Appendix II). The final two WGs formed in this decade were the ones on **Transgenic Organisms in IPM and Biological Control**, and **Biological Control of Coffee Berry Borer**, both in 1998. The first one on Transgenic Organisms became very active (see Appendix II), the second, however, died a silent death.

Most of the WGs formed in the period 1971-1989 remained very active also during this period, but some of them had difficulties. The activities of the WG on **Biological Control of *Heliothis*** were terminated in 1991 after the Secretary General of IOBC Global asked for ideas on how to continue the WG and received no suggestions. Also, the WG **Ecology of**

Bruchids found it difficult to continue its activities. The Executive Committee took the initiative to revive this WG by appointing new convenors, who produced several newsletters. Requests in the Global Newsletter for new members and ideas for this WG were not productive. In 1994 the termination of this WG was proposed to the Council and was approved.

Regional Sections

Most Regional Sections functioned well during this period. Also, the earlier problematic regions like NTRS and ATRS organised several activities. The SEARS and PRS regions proposed to merge, the Council approved this proposal and in 1999 the new Asia Pacific Regional Section (APRS) was established.

Relationships with other international organisations

On the initiative of IOBC Global, FAO accepted in 1990 to draft guidelines for the safe use of biological control agents covering all phases from collection, introduction, and quarantine to release. Development of a Code of Conduct for the Introduction and Release of Imported Biological Control Agents was finished by FAO and undertaken in collaboration with IOBC in 1991. A draft was released for extensive consultation which resulted in much feedback from, and subsequent work by, IOBC members. Comments from 53 parties were considered and a revised draft was circulated for a second consultation. In the assistance it provided, IOBC Global paid particular attention to ensuring that a Code acted as a facilitator and not a barrier to safe and responsible biological control introductions. The Code of Conduct was ratified in 1996 (Food and Agriculture Organization of the United Nations, “International Standards for Phytosanitary Measures: Code of Conduct for the Import and Release of Exotic Biological Control Agents” (FAO), February 1996). This Code was later adapted and extended (see period 2000-2006).

During this period, IOBC Global and WPRS took part in an EPPO, FAO, EC/EU, and USDA workshop on Safety and Efficacy of Biological Control (26-28 March, 1996, Streatley-on-Thames, UK). The risks of import and release of exotics biological control agents was extensively discussed. Outputs of this meeting included, amongst others, suggestions to (1) prepare a “white list” of “safe” natural enemies, (2) develop a certification system for reliable production of “safe” natural enemies instead of a registration system, and (3) substantially modify the EU system for registration of microbial control agents, which was built on a system chemical pesticides and therefore contains many irrelevant and inappropriate questions (for a full report of this meeting, see Bulletin OEPP/EPPO 27, 1997).

It is clear that regulation of biological control was a “hot topic” during this period, and prompted considerable discussion in the Newsletter of IOBC Global on the development of the FAO Code of Conduct, as well as new regulations proposed in the USA and Latin America. IOBC Global expressed a strong concern about over-regulation and the suspicion and disrespect with which regulators often regarded biological control researchers. Initially, researches were hardly involved in the development of these regulations and guidelines. But over the years, this improved, and researchers were active in developing guidelines in bodies such as FAO, EPPO, NAPPO, OECD, EU/EC and in national regulating authorities. IOBC Global and its Regional Sections have played an active role in this process, and are still strongly involved.

During the second half of the 1990s, EU/EC incorporated important work of IOBC WPRS on testing of side effects of pesticides on natural enemies into their Directive

91/414/EEC concerning the registration of pesticides. Each application for registration of a pesticide in the EU now has to contain a section on testing of side effects on biological control agents, and the tests that are used had earlier been developed and extensively tested by an IOBC working group. With these side effect data it is possible to estimate the effect of use of a pesticide within IPM programmes, but also the side effects on non-target invertebrates within and outside the cropping system can be evaluated. This achievement of WPRS influenced the attitude towards registration of pesticides in other countries and regions as well, particularly when IPM programmes were already in use like in Asia.

In the early 1990s, an International Complex for Biological Control Agropolis (CILBA) was established in Montpellier (France). Partners were French biological control organisations, as well as the European biological control stations of Australia and the USA. IOBC Global took also part in CILBA, and in 1997 a Secretariat of IOBC Global was established there. One of the results of IOBC's involvement in CILBA was the organisation of two very successful IOBC Global International Symposia in Montpellier (see below).

Another consortium of biological control, the International Biocontrol Manufacturers Association (IBMA), was formed in November 1995. IBMA mainly consists of European producers of biological control agents and beneficial arthropods. Members of this organisation collaborate with IOBC Global and WPRS in the field of regulation issues, quality control, mass production, and development and implementation of biological control and IPM.

Important activities of IOBC Global in this period included the development and implementation of side effect testing of pesticides on natural enemies, the design of basic guidelines for endorsement of organisations that apply Integrated Production approaches, the creation of quality control guidelines for mass produced natural enemies, and the harmonisation of regulation related to import and release of exotic natural enemies. IOBC Global also became active in the field of biological control and transgenic plants. In an editorial of the Newsletter, Waage wrote that: "Few developments in pest management and biological control have attracted more attention in the past year than the development of transgenic crops, particularly the use of genes from *Bacillus thuringiensis* (Bt) to protect crops against lepidopterous pests.... If these transgenic crops are to realise their full potential in crop protection, there is a need to treat them as components of integrated pest management (IPM) systems and to engage the scientists working in these systems. Anyone experienced in crop protection today will be concerned about the presentation of new technologies as stand alone solutions to problems, and in this context transgenic crops are no different than chemical pesticides or resistant crop varieties. The risk of resistance development to transgenic crops has already been the subject of some discussion. Other areas deserving research, which have recently come to light, are the impact of transgenic crops on the natural enemies of pests, their effect on changing the pest complex on crops (and the emergence of new pest problems requiring IPM solutions), and their overall impact and value in IPM systems on crops like rice, cotton and maize....(IOBC) can encourage new research initiatives, and help to form links between researchers in developed and developing countries and between the public and private sector. IOBC members from a number of Regional Sections are presently discussing the development of a Global Working Group on Transgenic Crops in IPM, the objective of which would be to promote and progress scientific research on the impact and role of transgenic crops for crop protection as components of IPM systems around the world." Shortly after this view was expressed, an IOBC Global WG on this topic was established (see Appendix II).

II.4 Period 2000 - 2006: New challenges concerning integration of biological control with other pest management methods

During this period, IOBC Global and its Regional Sections have organised a number of festivities to celebrate its 50th Anniversary. The festivities offered an excellent opportunity to present IOBC and to show how well biological control can be used to prevent and control pests, diseases and weeds. Many countries are studying possibilities to reduce the use of synthetic pesticides. IOBC can assist these countries in realizing sustainable pest management in an approach of integrated production of crops.

General Assemblies of 2000 and 2004

The **13th General Assembly** took place during the XXI International Congress of Entomology in Iguaçú, Brazil on 24 August 2000. A report of this meeting can be found in Newsletter 71 (summer 2000). Working Groups and Regional Sections showed stable performance, the financial situation was good and publication of the journal BioControl had improved. According to a Council meeting of 1999, a proposal should have been discussed during this General Assembly to ratify the option that in addition to the Secretary General, the President and the Treasurer could be elected for a second term of four years. However, none of the Board members remember that this proposal was discussed, neither was it recorded in the minutes of this meeting. Several meetings of the Executive Committee were held in the period 2000-2004. One of the main topics at these meetings was the still somewhat problematic distribution and late appearance of BioControl. The publisher, Kluwer, promised to ensure more rapid publication by increasing the number of pages per volume. Kluwer expressed interest in buying BioControl from IOBC, an issue set aside for discussion at the next General Assembly. Another important development that took place during this period was that CILBA Agropolis mentioned it would terminate the agreement with IOBC (signed June 1997) as per June 2004. This meant that the Secretariat of IOBC Global could not be continued at Montpellier and that the new Executive Committee would have to find a solution for a redistribution of management tasks.

The **14th General Assembly** was held on 16 August 2004 during the the XXII International Congress of Entomology in Brisbane, Australia. First, the Executive Committee 2000-2004 reported about its work. Ms. Mireille Montes de Oca, manager of the Secretariat of IOBC Global, reported that membership was increasing, some Regional Sections were very active while others were dormant, WGs had carried out many important activities, two well-attended IOBC Symposia had been held in Montpellier (France) and the impact factor of the journal BioControl was increasing, but that there were still problems with distribution of the journal. The president, Les Ehler, provided information about the financial situation, answered questions concerning IOBC Global and introduced the members of the new Executive Committee for the period 2004-2008. Next, Joop van Lenteren, the new president, thanked the old Executive Committee for their work, and in particular Ms. Mireille Montes de Oca for her excellent coordinating activities for IOBC Global during the past 8 years. Then, he presented the plans of the new Executive Committee for the coming 4 years. In 2004 the situation of IOBC Global was somewhat similar to an insect during quiescence. Few Newsletters had appeared during the period 2000-2004, contacts between the Executive Committee, WGs and several regions were rather poor, the financial situation had deteriorated, losses on the Journal of BioControl were considerable, so measures were needed to improve the situation. The new Executive Committee presented the following plans to: (1) show, whenever and wherever possible, how good biological control is, (2) use the 50th

anniversary of IOBC to make clear how important our organisation has been in coordinating biological control activities worldwide, (3) improve the relationships with Regional Sections and WGs and try to revive activities of some regions, (4) improve the financial situation, (5) develop a new agreement with the publisher of BioControl that will result in profits instead of debts for IOBC, (6) revamp the website, (7) write the IOBC internet book of Biological Control with free information for all members, (8) develop a writing partnership for members in non-English speaking countries to help them publish in top entomological journals, (9) resume publishing at least two Newsletters per year, and (10) hold two Executive Committee meetings per year. During the General Assembly, the proposal of the new Executive Committee was approved to keep BioControl within IOBC and, thus, not sell it to the publisher.

In the fall of 2006, and after four Executive Committee meetings since mid 2004, the situation of IOBC Global can be summarised as follows. Relationships have been improved and intensified with WGs and Regions, resulting in a revival of NTRS and EPRS. International relationships with other organisations have been intensified. The newsletter is now appearing at least twice a year again, and the website has been redesigned and enlarged. The financial situation has strongly improved. The management tasks of the previous Secretariat in Montpellier are currently mainly taken care of by the President. A better relationship has developed with publisher of BioControl and a new agreement has been signed resulting in benefits of about 25,000 Euro per year instead of losses in the order of 5 - 10,000 Euro. New activities of the Executive Committee, like the writing partnership and the IOBC internet book have been positively received. The 50th anniversary of IOBC has been celebrated by EPRS, NRS, NTRS and WPRS, and is foreseen to be celebrated by ATRS in 2008. Another activity related to celebration of the 50th anniversary is the publication of this book.

Global Working Groups

During the six years to the present day, most of the IOBC Global WGs have continued their activities. It is expected that new WGs will be created in 2007 and 2008. The Executive Committee was asked by members to think about the formation of WGs in the several areas. One request concerns environmental risk assessment of exotic natural enemies. There are about 30 regulations for import and release of natural enemies worldwide and they differ greatly in their approach. IOBC could play an important role in harmonisation of these regulations. Another current request relates to the complex, but very interesting field of landscape ecology, functional biodiversity and conservation biological control. IOBC WPRS has a WG on this topic, but the theme is of worldwide interest. A third request refers to the issue of creating thelytokous natural enemies by infecting arrhenotokous strains with *Wolbachia* bacteria. Such thelytokous strains produce only females, are easier to mass produce and form field populations without the need of mating.

Regional Sections

Four of the six Regional Sections function well. WPRS and NRS have always been active. EPRS encountered some problems since the political changes in 1989 in this area, but has recovered, and is organizing meetings regularly, producing many proceedings. APRS covers a large area with the largest membership in Japan, and it appears difficult to involve other countries in this region. NTRS saw an active period after its inception but needed to be reactivated by 2004. The Executive Committee of IOBC Global organised several meetings

with previous and potentially new board members of NTRS, proposed a new Governing Board, prepared the election for this new Board and discussed a strategy for NTRS. This resulted in a number of new activities in this region, as well as in a strong increase of membership. ATRS did not show many activities, but the current Executive Committee will work on a reactivating this Regional Section and will use the occasion of the XIII International Congress of Entomology in Durban, South Africa to organise a number of activities related to biological control in ATRS. Several Regional Sections have organised festivities to celebrate the 50th anniversary of IOBC.

Relationships with other international organisations

As in the previous decade, IOBC has collaborated on several issues with FAO. The main collaboration was the revision of the Code of Conduct for the Introduction and Release of Imported Biological Control Agents. The Code of Conduct was substantially changed and approved in 2005 as the International Standards for Phytosanitary Measures 3 (ISPM 3): Guidelines for the export, shipment, import and release of biological control agents and other beneficial organisms. ISPM 3 can be found on the IPPC website (www.ippc.int/).

IOBC was also involved in the development of methods and guidelines for risk assessment of exotic natural enemies. IOBC contributed, for example, to the formulation of the OECD document on Guidance for Information Requirements for Regulation of Invertebrates as Biological Control Agents (IBCA), Series on Pesticides No. 21, ENV/JM/MONO(2004)1: 22 pp. IOBC members were also contributing to chapters in Bigler F., Babendreier D., Kuhlmann U., (Eds.) 2006. *Environmental Impact of Invertebrates for Biological Control of Arthropods: Methods and Risk Assessment*. Wallingford, UK: CAB Int.

Another important global issue in which IOBC Global played a leading role was the development of quality control guidelines for mass produced arthropods. This work was initially coordinated by the Global WG, then funded by an EC grant and coordinated by the Global WG, resulting in the book *Quality Control and Production of Biological Control Agents: Theory and Testing Procedures*. CABI Publishing, Wallingford, UK, edited by J.C van Lenteren, in 2003. Quality control guidelines for the 30 most produced natural enemies are presented in this book, as well as pure scientific and applied knowledge concerning rearing and maintenance of laboratory colonies. While developing these guidelines, IOBC kept in close contact with IBMA (see above) and ANBP (the Association of Natural Biocontrol Producers; a North America-based non-profit organisation formed in 1990 by commercial insectaries to provide representation for the commercial biocontrol industry).

The relationships with FAO/IAEA have been intensified in the field of area wide IPM programmes since 2005. It is foreseen that closer collaboration will develop between IOBC and IAEA in the coming years.

The relationship with CILBA Agropolis was dissolved on request of CILBA Agropolis as per June 2004.

II.5 Overview of membership, finances, BioControl and various activities of IOBC Global

Membership

It is not easy to trace the exact number of members of IOBC Global, because these numbers are often not reported in the newsletters or in material related to the functioning of Executive

Committees. The numbers presented in Figure 2 have been deduced from reports and refer to the total estimated number of individual members, hence it includes the entire membership of institutional members as well as supporting and individual members. If all participants of Working Group meetings would be added, the total number of members and persons active within IOBC Global would be about 5500 in 2006, instead of 3300.

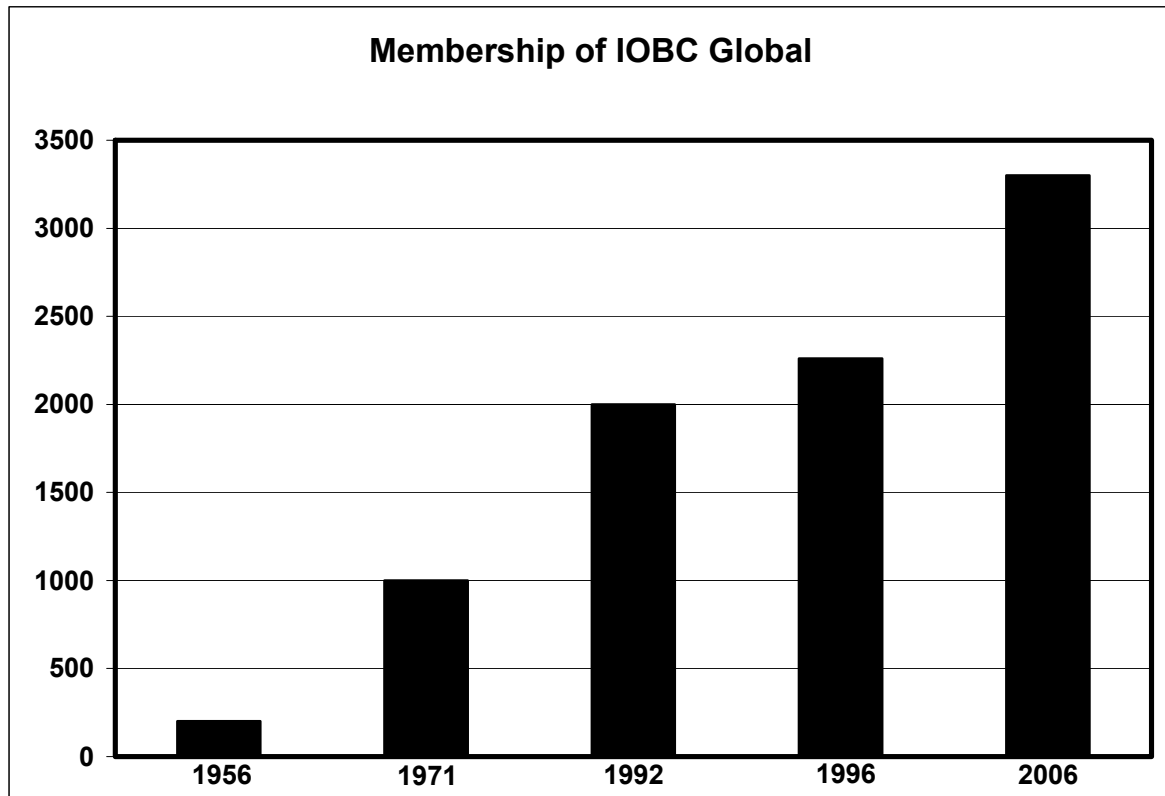


Figure 2. Total estimated membership of IOBC over time

Finances

IOBC Global has seen a strongly fluctuating financial situation during its existence (Figure 3). In the first year of IOBC Global, the assets were about 10,000 Euro (= at that moment 10,000 US\$) and the Treasurer made clear that measures were needed to improve the situation. During the first ten years, IOBC Global was able to improve its financial situation and by 1981, the assets were about 100,000 Euro. However, this had gone down to about 6,000 Euro by 1984 because of poor financial management. The Executive Committee 1984-1988 critically analysed the situation, increased membership and Entomophaga subscription fees. Although this Executive Committee spent quite some money on working group activities, they were still able to improve the financial situation, reaching assets in the order of 35,000 Euro in 1988. During the next 12 years the situation further improved, but from 2000 to 2004 assets strongly decreased again, mainly due to losses on IOBC's journal BioControl, insufficient management of membership fees and high costs for the Permanent Secretariat. This forced the Executive Committee 2004-2008 to apply a strict financial management, to temporarily reduce the contribution to WG meetings and to adjust the subscription fee for BioControl. By mid 2006 the assets has increased to 85,000 Euro (105,000 US\$). How the income of IOBC was exactly spent before 1996 could not be traced clearly from newsletters

or reports, but most money was spent on the Newsletter, support for WGs and management of IOBC Global.

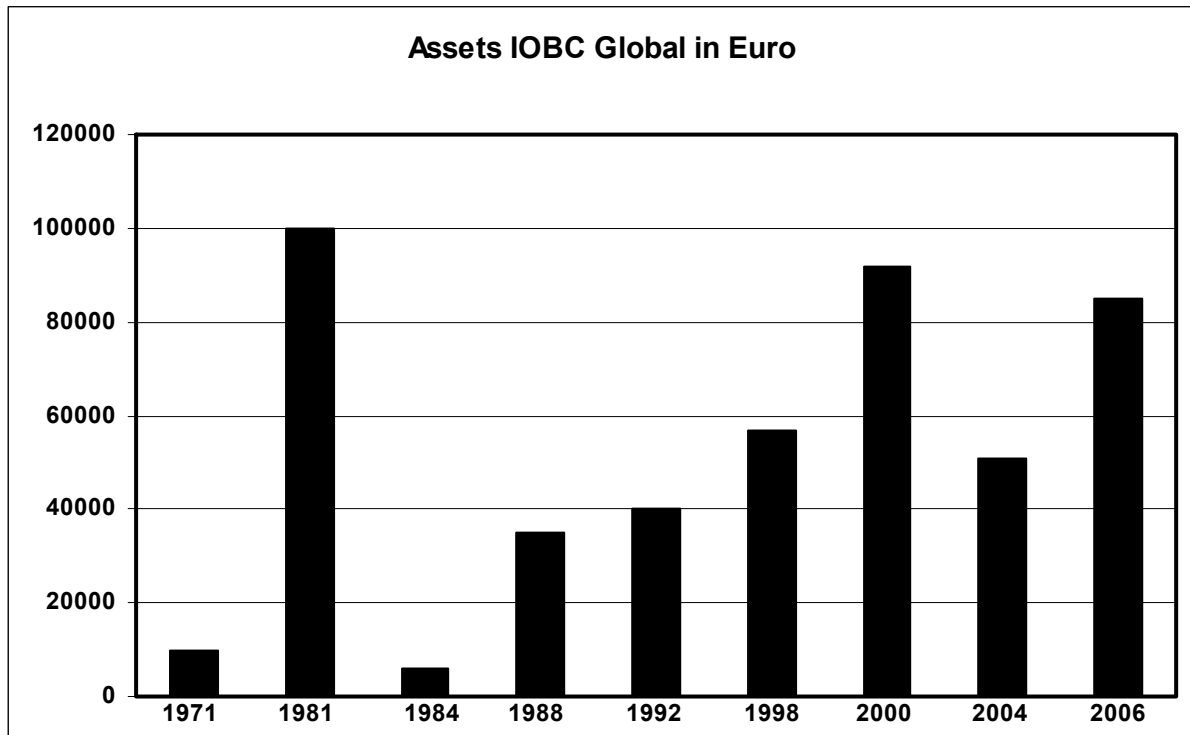


Figure 3. Financial developments of IOBC over time

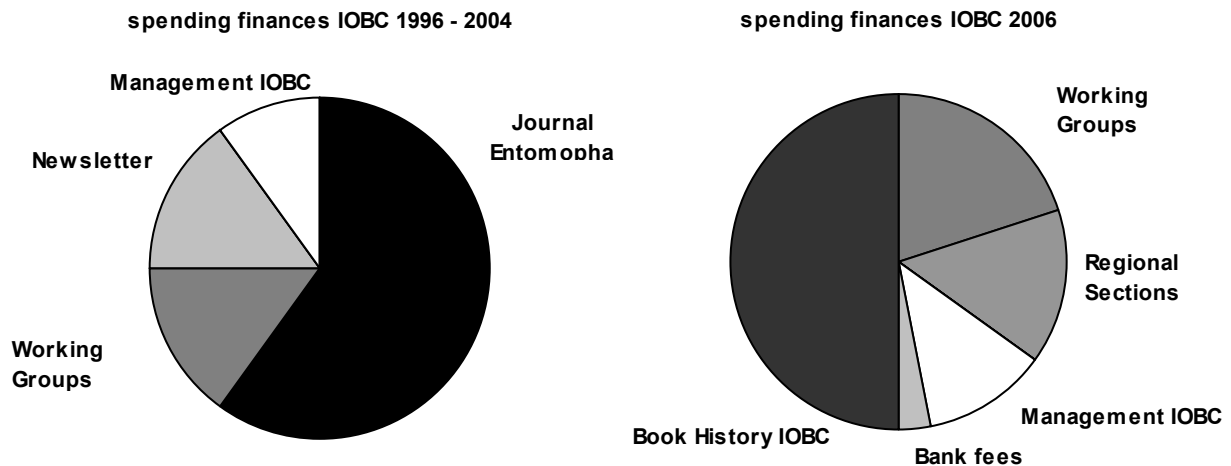


Figure 4. Spending of IOBC finances in the period 1996 – 2004 (left) and in 2006 (right)

During the period 1996 – 2004, annual spending was quite similar, with most of the money being paid to the publisher of the journals Entomophaga / BioControl (Figure 4). Due to a new contract with the publisher which is more profitable for IOBC, and as a result of strict financial management, this situation could be changed after 2005. More money can now be

given to WGs, and in exceptional cases some financial help can be provided to Regional Sections for reactivation. Further, a quite large sum has been spent on the printing of the book about the history of IOBC Global. It is expected that as a result of the better financial situation more money will become available for WG activities after 2006, but first a strategy will be developed to reserve a considerable and fixed amount of money in order to create a stable financial basis for the future of IOBC Global.

IOBC Journal BioControl

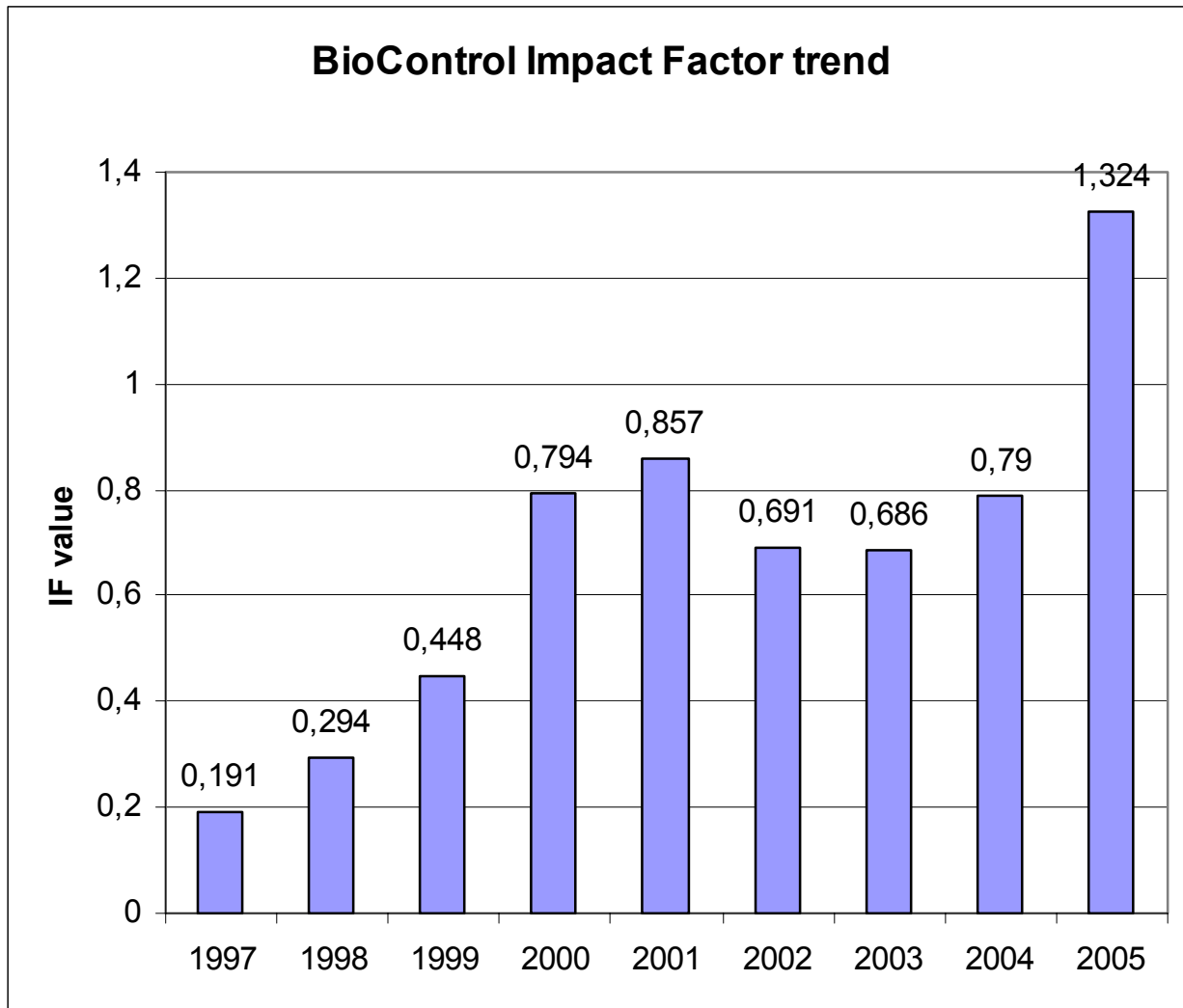


Figure 5. Impact factor of the journal BioControl during the period 1997 - 2005

Since the initiation of CILB/OILB/IOBC in 1956, the organisation has had its own scientific journal, first named *Entomophaga* which changed after 42 volumes into *BioControl* in 1998 with volume 43 (for detailed information about *Entomophaga*, see Appendix III). A Management Board of 6 members was appointed and Heikki Hokkanen (Finland) was appointed as Editor in Chief. The Editorial Board consisted of 8 associated editors covering different areas of biological control. A contract with Kluwer Academic Publishers (Dordrecht, The Netherlands) was finalised. During the General Assembly of 2004 it was decided that

IOBC Global would not sell the journal to the publisher, a question that had come up several times during the existence of *Entomophaga* and *BioControl*. The Management Board of *BioControl* has met on average every 2 years. In 2005 a new agreement was signed with Kluwer/Springer after a process of consultation with the Regional Sections, the Executive Committee of Global and the management board. From January 2007, a new Editor in Chief (Eric Wajnberg, France), will replace Hokkanen, who deserves IOBC'S gratitude for making *BioControl* a first class peer reviewed international scientific journal.

The current situation of *BioControl* is very healthy. Many manuscripts of excellent quality are submitted, the rate of rejection of manuscripts is in the order of 65% and the number of pages per volume has been increased several times. A system of "publication on line first" will soon be in place and authors can publish additional material related to an article on the website of *BioControl*. One of the most important achievements of the Editor in Chief and his team of associate editors is to have increased the Citation Index of the journal strongly during the 8 years history of *BioControl* (Figure 5).

General Assembly, Council and Executive Committee meetings

The first five General Assemblies took place in Europe as CILB/OILB/IOBC, and were mainly European events. The issues discussed at these General Assemblies can be found in Part I of this book. After 1971, when IOBC Global was founded, the General Assembly meetings were usually held concurrently with the International Congresses of Entomology (see Appendix I). Thus the meetings occur with a four-year interval. Usually, the Executive Committee would meet once or twice per year, and the Council would meet every two years (one meeting concurrently with the International Congress of Entomology and one meeting in between). The main issues discussed at these meetings have been reported above and can be found in even more detail in IOBC Global newsletters (see www.IOBC-Global.org).

Regional Sections and Working Groups of IOBC Global

The history, activities and publications of the Regional Sections are presented in Part III-VII of this book. The history, activities and publications of the Global Working Groups are presented in Appendix II of this book

IOBC Global Symposia

During the time that IOBC was member of CILBA Agropolis (Complex International de Lutte Biologique Agropolis), several Symposia were organised in Montpellier, France.

The 1st IOBC Global International Symposium was held from 8-16 September 1996 and dealt with "Technology Transfer in Biological Control: from Research to Practice. Case studies for many biological control and IPM programmes illustrated how in different types of agriculture and at many locations in the world implementation of sustainable forms of pest, disease and weed management have been realised.

The 2nd IOBC Global International Symposium took place from 17-20 October 2000 and had as its title "Evaluating Indirect Ecological Effects of Biological Control". The leading theme was how the introduction of biological control agents was affecting ecosystems. The symposium resulted in a publication (Wajnberg, E., J.C. Scott & P.C. Quimby (Eds.) 2000. *Evaluating Indirect Ecological Effects of Biological Control*. CABI, Wallingford).

The 3rd IOBC Global International Symposium was entitled "The role of genetics and evolution in biological control", and was held in October 2002. The symposium addressed recent developments in genetics and evolutionary biology, and their relevance to biological

control. This symposium also resulted in a publication (Ehler, L., R. Sforza and T. Mateille (Eds.), 2003. Genetics, Evolution and Biological Control. CABI, Wallingford).

Organisation of symposia during International Congresses of Entomology

Since the initiation of IOBC Global, IOBC has always co-organised one or more symposia during the International Congresses of Entomology. The initiative to organise these symposia was usually taken up by the Executive Committee of Global, by a Regional Section and/or by Working Groups.

Co-organisation, financial support of and participation in non-IOBC biological control activities

IOBC Global has taken part in, financed and co-organised many meetings in the field of biological control and IPM. Not all the meetings can be mentioned here. Some examples of important meetings supported and co-organised are listed here:

- IOBC Global supported and participated in the Weed Biological Control symposia 1 (1969), 2 (1971), and 3 (1973).
- IOBC Global supported the Bruchid Ecology Meeting in Pau, France 1980
- IOBC Global co-organised the Bellagio Conference on Constraints to Implementation of IPM, Bellagio, Italy, 1980
- IOBC Global supported several IWGO *Ostrinia* meetings before IWGO became a Global WG
- IOBC Global supported several Ecology of Aphidophaga meetings before it became a Global WG
- IOBC Global supported and co-organised the IOBC-Gerdat Colloquium on Crop Loss Assessment and Economic Threshold Evaluation in Cotton, Rice and Maize, Paris, France, 1982
- IOBC Global supported and co-organised the IOBC-INRA International Symposium on *Trichogramma*, Antibes, France, 1982
- IOBC Global supported the International Meeting for the Strengthening of Regional Plant Protection Organizations with special emphasis on Latin America and the Caribbean, Costa Rica, 1983
- IOBC Global and WPRS co-organised the International Training Course and Workshop on Evaluation of Pesticide Effects on Natural Enemies and its Implications in Pesticide Regulation, Serdang, Malaysia, 1995
- IOBC Global supported a number of Regional Section meetings and publications, particularly of NTRS, ATRS and EPRS

Newsletter of IOBC Global

At the establishment of IOBC Global, it was planned to produce 2 Newsletters per year. This goal was realised, but with some ups and downs. Since the start of IOBC Global in 1971 until July 2006 a total 79 Newsletters have been produced, i.e. about 2.3 newsletters per year. Distribution increased from 800 copies during the first 10 years to more than 2000 in the year 1996. Initially, the Newsletter was printed and distributed by mail. Later, it was both distributed by mail and email. Due to very high printing and distribution costs, and the fact that almost all IOBC members have access to internet, printing and distribution by mail was terminated in 2004 and currently pdf version are distributed via email.

All Newsletters have been transferred into PDF files and can be found at the website of IOBC Global. The Newsletters contain news about IOBC Global meetings and decisions, regional and WG activities, meetings organised by others in the field of biological control and IPM, references and summaries of articles on biological control and IPM, and abstracts of articles published in the most recent issues of *Entomophaga/BioControl*. Initially, the activities of all Regional Sections and WGs were reported in the Newsletter. Since 1984, the majority of the activities of WPRS were published in its own newsletter, *Profile*. Several other Regional Sections and Working Groups are also producing newsletters and these can usually be accessed via the IOBC Global website.

IOBC Global Internet Book of Biological Control

The first version of the IOBC Internet Book of Biological Control appeared in September 2005 and the fourth version in October 2006. The aim of this book, which is available to anyone interested in biological control, is to show how important biological control is on a worldwide scale. Examples are provided for different forms of natural and biological control, the history of biological control for various world regions is presented, the discovery of natural enemies is described, a number of theoretical and practical aspects of biological control are discussed and many links to the literature and biological control information is provided. With this internet book IOBC hopes to assist members in obtaining information for training, information and education, and hence it partially fulfils the objectives of the former WG on Training, Information and Education. The book will be extended step by step and many IOBC members have already provided material for it.

IOBC Global Writing Partnership

The proposal to develop an IOBC partnership for writing articles was warmly welcomed at the General Assembly in August 2004. For scientists beginning careers in biological control but not born in an English speaking country, it is often very difficult and frustrating to prepare an article for a leading biological control journal. The idea is to help IOBC members from developing countries where English is not the first language, one time with the writing of a research paper. Several IOBC members from English-speaking countries spontaneously volunteered to take part in this partnership. During the two years that the writing partnership has existed, more than 30 manuscripts have been edited for authors originating from Central Europe, the Mediterranean, the Near and Middle East, Asia and Latin America.

Website IOBC Global (www.IOBC-Global.org)

The first IOBC Global website was put on internet in 1994 and hosted by the USDA (Washington DC, USA). This site was transferred in 1999 to the Secretariat at CILBA Agropolis (Montpellier, France). In 2004 it was redesigned with many additions and transferred to the University of Palermo (Italy). Based on the many reactions and contributions, it fulfils an important function for members and others interested in IOBC. The website provides an overview of, and links to, all Regional Sections and Global Working Groups, a news section, a section on the organisation of IOBC, its statutes and bylaws, and a section with publications including the IOBC Internet Book of Biological Control and pdf files of all newsletters.

Networking and information

In addition to the information provided on the IOBC website, in the newsletters and in the internet book of biological control, the officers of IOBC Global are helping on a daily basis to find contacts or to obtain information in order to respond to requests that they receive via internet or mail. This is a task which is seldom mentioned and easily forgotten, but it has had a substantial impact on development of biological control projects, and assistance and improvement of international collaboration.

IOBC Global Honorary members

IOBC Global has currently 2 honorary members: Prof.dr. Vittorio Delucchi (1925, Switzerland; honorary member since 1996) and Prof.dr. Robert Luck (1941, Canada; honorary member since 2005). Several IOBC Regional Sections have also appointed honorary members (see the respective histories of the regions in this book).

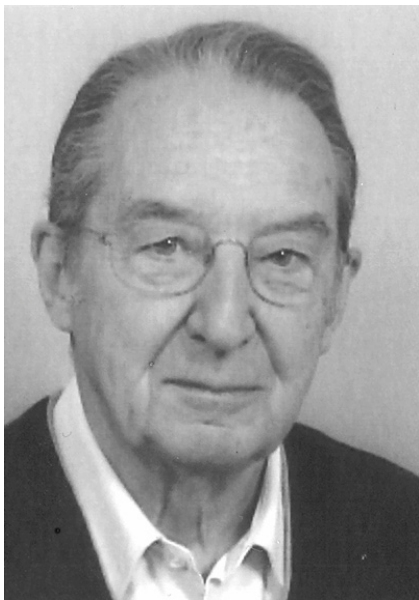


Figure 6. V. Delucchi (left) and R.F. Luck, honorary members of IOBC Global

It is foreseen that, related to the celebrations of the 50th Anniversary of IOBC, a number of important previous IOBC officers will be appointed Posthumous Honorary and Honorary members at the Council meeting in 2007. Information about all honorary members will be published on the IOBC website.

IOBC Archive

Until 2006, IOBC Global had not kept an official archive of reports of General Assemblies, Council and Executive Committee meetings. This weakness became obvious during the preparation of this book. Ernst Boller proposed in 2005 to set-up an archive to be maintained at the Swiss Federal Research Station of Horticulture (Agroscope ACW Wädenswil) CH-8820 Wädenswil, Switzerland, which was gratefully accepted by the Executive Committee of IOBC Global. Since 2006, an intensive search for IOBC relevant documents has been

initiated and incoming material is archived. The aim is also to create a digital archive of the most important documents (including photographs) concerning the history of IOBC.

II. 6 The future of IOBC Global

When IOBC was young, the idea of developing and implementing large-scale biological control and IPM projects seemed rather utopian. However, through the excellent work of the many IOBC WPRS working groups, several important European biological control and IPM projects were developed by combining the skills of relatively small national research groups. As a result of the WPRS network and these achievements, the critical mass and visibility of biological control and IPM increased dramatically, and many governments inside and outside Europe, adopted IPM strategies that included a strong biological control component in the 1980s and 1990s.

IOBC Global has most definitely profited from this European experience, and has assisted in developing and implementing IPM programmes worldwide. The activities of the various Regional Sections are rather different, but experiences in certain regions have helped developments in others. The same can be said about the Working Groups. As a result of the global collaboration, IOBC has the status of a reliable organisation providing objective information about biological control and IPM.

Due to the facts that (1) earth will have to feed about 11 billion human beings in the near future, (2) fossil energy is running out, and thus are conventional synthetic pesticides, and (3) man cannot continue to pollute the environment and reduce biodiversity at the same dramatic rate as during the past 100 years, agricultural research needs to be redirected to a systems approach. In such an approach, pest management will be a guiding theme instead of being the marginal issue it was during the past 60 years. Guiding, because methods to prevent or reduce pests influence all agronomic methods from the design of cropping systems to the harvest of crops. Modern pest management will strongly depend on biological control, because it is a sustainable, cheap and clean pest management method. Biological control is expected to make up a considerable part of all crop protection methods in the coming decades.

IOBC intends to continue to play its role and will do this by adhering to the original mission of the organisation (see start of this chapter), but there are additional challenges concerning pest management that IOBC needs to meet in order to remain an important partner in biological control. These challenges can be translated in the following tasks.

Illustrate continuously and everywhere how good biological control is.

First of all, IOBC will have to keep making clear to many different stakeholders that biological control is often the most successful, most cost effective and environmentally safest way of pest management. Also, IOBC cannot stress sufficiently often that biological control is nature's own way to keep numbers of pest organisms at low levels, that biological control is present in all ecosystems, both natural and man-made, and is always active. As a result of natural biological control, the earth is green and plants can produce sufficient biomass to sustain other forms of life. Without biological control, the production of energy by plants would be a tiny fraction of what it is now. This ecosystem function of natural biological control is estimated to have an annual minimum value of \$US400 billion per year (Costanza et al., 1997. The value of the world's ecosystem services and natural capital. *Nature* 387: 253-260). This compares with the only \$US8.5 billion annually spent on insecticides. Classical biological control is estimated to be applied on 350 million hectares (10% of land under

culture) and augmentative, commercial biological control is estimated to be applied on 16 million hectares (0.046% of land under culture).

Make clear that sustainable pest management should be the basis of food production systems

Now that chemical pesticides are no longer seen by many as the major solution for lasting pest control, we cannot simply return to pre-pesticide pest management methods, as the crops that we currently grow are too weak to survive without pesticides, the natural enemies are no longer present in sufficiently high numbers and too many farmers remain “addicted” to pesticide use. So we need to restore previously-used natural, classical, inundative and conservation biological controls, as well as using other alternatives for conventional chemical pest control such as host plant resistance and mechanical, physical, genetic, pheromonal and semiochemical control methods. In addition, we may manipulate the environment to make it more advantageous to natural enemies. Thus, we need to return to a systems approach in which the influence of all farming activities on pest development is considered. The aim of such an approach is to create a food production system that is inherently resistant to many pests and, thus, needs fewer or no treatments with conventional synthetic pesticides.

Treasure biodiversity and its contribution to biological control

Biological control will be a key element of future sustainable crop production. But when we consider the landscape in which agriculture currently takes place, we may conclude that agroecosystems can be characterised by having (1) a low species diversity, (2) plants with little architectural complexity, and (3) species of plants and animals with a relatively good dispersal ability that are short-lived, produce a large number of offspring and are relatively poor competitors. As a consequence, agroecosystems frequently have highly impoverished natural enemy communities when compared with natural ecosystems. Semi-natural “extra-field” communities, adjacent to crop land are generally less disturbed, architecturally more complex and have a much higher biodiversity than those in fields with crops. These richer extra-field communities provide source populations of beneficial arthropods that facilitate pest management. Sustainable pest management must, therefore, be based on an appreciation for how landscape structure can influence the interactions of extra-field and within-field processes. An understanding of the interchange of organisms and materials between landscape elements and the influence of landscape structure on these interchanges is critical for predicting and managing pest populations in agricultural fields.

Acknowledgements

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Part III. The history of the West Palaearctic Regional Section (WPRS) of IOBC: from Biological Control to Integrated Production.

Ernst F. Boller, Franz Bigler, Albert K. Minks and Joop C. van Lenteren

Introduction

Writing the history of WPRS¹ is a real challenge. The fact that the loose organisational structure of the organisation did not allow official records to be kept, did not facilitate the work. Since the early days of IOBC¹ (1948 – 1971), WPRS began to publish relevant information in its Bulletin series and since 1984 also in the internal Newsletter PROFILE. Even so, Working Groups and Commissions continued to circulate their internal information in unpublished documents. The IOBC/WPRS Bulletins, with up to ten published issues per year, contain a wealth of information covering WPRS strategies, concepts, activities and many published and unpublished research data of the Working Groups (WG).

Of special interest for a historical analysis are the Proceedings of the General Assembly. While the Presidential Addresses often contain interesting historic information and provide insight into strategic considerations, the reports of the Secretary General and the Treasurers enable the developments of Commissions and Working Groups to be followed. The recommendations and requests to Council, formulated in successive General Assemblies, not only reflect the general atmosphere prevailing in the audience but also function as indicators of current problems. The reports of Convenors of Commissions and Working Groups presented to the General Assembly and the published proceedings of WG meetings contain a rich source of information that would highly justify a future historical in-depth analysis. Part of this accumulated knowledge is expanded in the short histories of individual Commissions and WGs compiled in Appendix III of this book. For a complete list of the WPRS publications published between 1968 and 1993, see the excellent compilation by A. K. Minks & D. Degheele (1993). For later compilations, we refer to the official WPRS website www.iobc-wprs.org.

The WPRS timescale 1971 – 2005 and important milestones

It is a long-standing tradition of our organisation to base its timescale on the dates and locations of the successive General Assemblies that take place at 3-4 year intervals (Figure 1). Each of the periods between the individual General Assemblies has its own flavour, achievements and problems, to a large extent determined by the officers of Council, Commissions and WGs but also by external developments. The individual WGs, on the other hand, have a different historic timescale usually based on the dates and locations of their own meetings (see Appendix III).

¹We use the terms WPRS and IOBC Global throughout this chapter when addressing aspects that concern exclusively these individual bodies. The term IOBC is used in situations where the authors refer to the entire organisation as perceived by third parties.

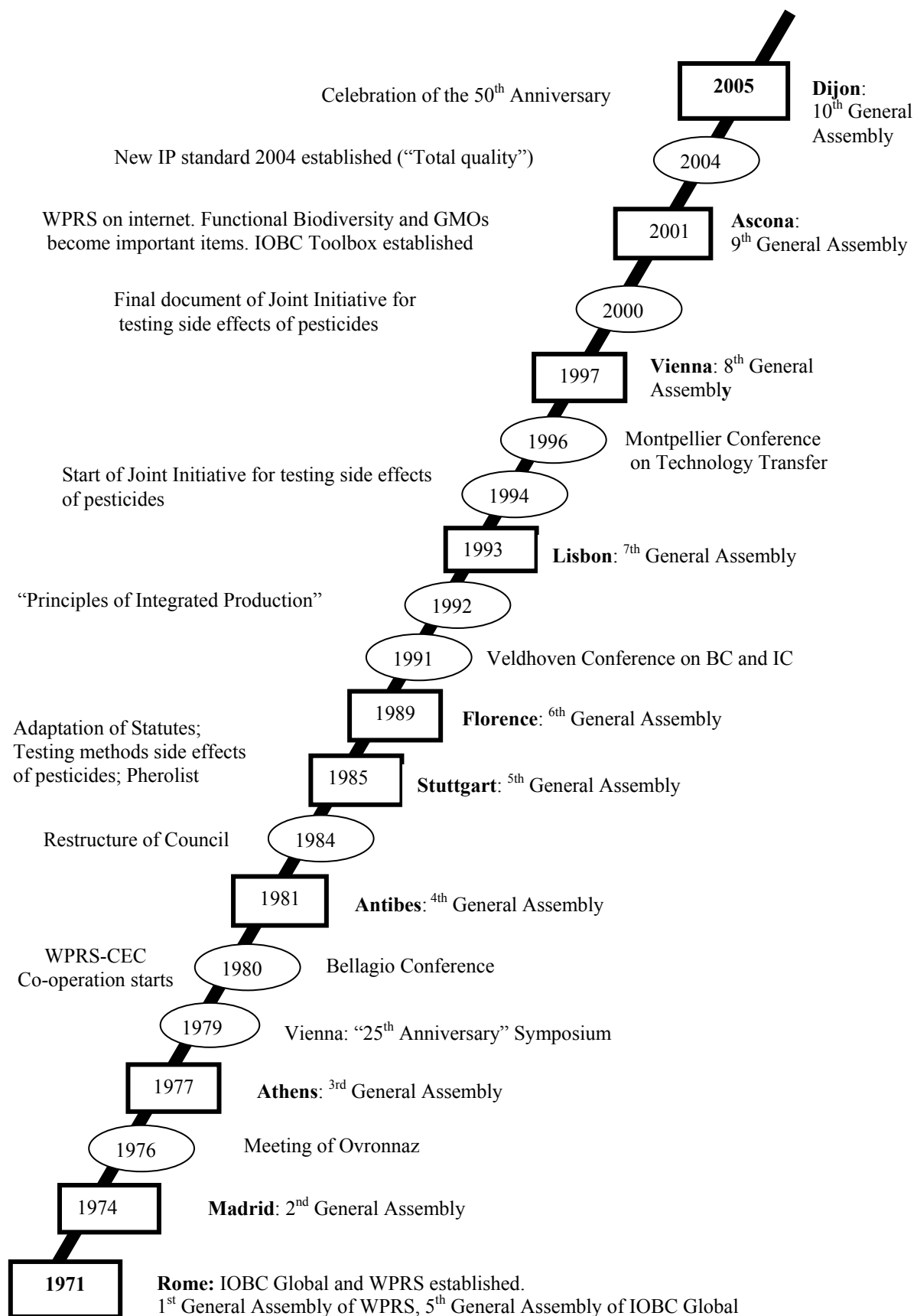


Figure 1. WPRS Timescale 1971 - 2005

With these time markers, the 35 years of WPRS can be envisaged within time-slots of 3-4 years as follows:

- 1971-1974: “From Rome to Madrid”. First years of consolidation. The new WPRS continued business as usual.
- 1974-1977: “From Madrid to Athens”: Period of high innovation at the level of WGs. Six new WGs started their activities and increased the WPRS field of competence (“Viticulture”, “Pesticides & Beneficials”, “Pheromones“, “Cereals in Mediterranean regions”, “Modelling”, “Breeding for resistance”).
- 1977-1981: “From Athens to Antibes”. Comprehensive systems approaches in plant protection started to shape up. WPRS celebrated in 1979 its “25th anniversary”. Certain traditional working policies of Council showed signs of wear and tear and faced internal pressure for improvement. Beginning of a period of intensive WPRS-European Community (EC) cooperation. WPRS activities attracted the attention and participation of scientists from countries outside the WPRS region, especially North America.
- 1981-1985: “From Antibes to Stuttgart”. Turning point in official WPRS positions and working procedures. The objectives of WPRS, as defined by the statutes, were updated and accepted by the General Assembly of 1985 (Stuttgart). Most intensive period of WPRS-EC cooperation. Publication of testing methods for side-effects of pesticides (Hassan et al. 1985) and of first pheromone list (Minks 1984).
- 1985-1989: “From Stuttgart to Florence”. Dormant stage in many respects. The WPRS-EC cooperation in joint projects and events slowed down and terminated by the end of 1989. Signs of emerging interdisciplinary projects in Central Europe failed to stimulate strong responses within WPRS nor IOBC Global.
- 1989-1993: “From Florence to Lisbon”. The international scene signalled imminent fundamental changes in European agricultural and environmental policies. The term “sustainability” gained increased attention. WPRS re-activated the Commission on “Integrated Production Guidelines and Endorsement” and became the international front-runner in defining international standards and technical procedures in Integrated Production.
- 1993-1997: “From Lisbon to Vienna”. The validity of the traditional IOBC concepts was confirmed by international developments such as the Common Agriculture Policy (CAP) of the European Union. WPRS expertise was strongly involved in the definition of European standards for testing side-effects of pesticides (Joint Initiative).
- 1997-2001: “From Vienna to Ascona”. Early WPRS activities continued to show tangible results. The WPRS-input on EU pesticide side effect testing procedures continued. Genetically Modified Organisms (GMOs) became an important issue. Functional biodiversity emerged as an important theme. In 1998 first IOBC endorsement of IP programs of a label organisation in the fruit sector, followed by the first endorsement of a grape growers’ association in 1999. WPRS established its homepage www.iobc-wprs.org in 2001.
- 2001-2005: “From Ascona to Dijon”. In 2003 the new Commission on “Harmonised Regulation of Invertebrate Biological Control Agents” was established. IOBC published in 2004 its new standards for Integrated Production and celebrated in 2005 its 50th anniversary at the 10th General Assembly (Dijon; Figure 14).

The first years of WPRS

After the official establishment of IOBC Global in 1971 (see Part I) and the transfer of the West European and Mediterranean elements of the former IOBC to WPRS, the activities in Europe continued without major disturbance. At the level of the WGs business was as usual. The geographic region of WPRS covering West Europe and the Mediterranean region remained the same. The composition of the new Council promised continuity: The last President of the old IOBC - E. Biliotti – stayed in office and became the first President of WPRS (Figure 2). Other familiar faces were G. Mathys (EPPO), H. Steiner (D), M. Pavan (I) acting as Vice-presidents and W. van den Bruel (B), as Treasurer. The other members were new. V. Delucchi had left and became the first Secretary General of IOBC Global. He was replaced by L. Brader (NL; Figure 2) who was actively involved in the WPRS orchard group. J. Bergerard (F), C. Dafaucé-Ruiz (E), M. Hafez (Egypt), J. S. Kennedy (UK) and P. A. Mourikis (GR) represented quite well the geographic range of WPRS (see Part I).



Figure 2. E. Biliotti, the first President of WPRS (left) and L. Brader, his Secretary General (right)

Working units of the old IOBC that became part of WPRS in 1971 (In chronological order of establishment)

5 Commissions (and their Convenors):

- Taxonomy of entomophagous arthropods (1956; C. Besuchet/F, V. Delucchi/CH & P. Bovey/CH);
- Publication and information (1956; B. Hurpin/F);
- Integrated control (1958; J. de Wilde/NL);
- Insect pathology and microbial control (1958; C. Vago/F);
- Genetic control (1968; J. Ticheler/NL).

18 Working and Study Groups (and their convenors)

- Integrated control in Mediterranean pine forest (1956; C. Dafaucé Ruiz/E);
- Biological control of olive pests (1956/1967; Y. Arambourg/F);
- Biological control of borers of gramineous crops/sugar cane in the tropics (1956; J. van Dinther/NL & J. Brenière/F);
- Microbial control of *Lymantria dispar* (1957/1968; L. Vasiljevic/YU);
- Integrated control in orchards (1959; H. Steiner/D);
- Biological control of citrus scales (1962; C. Benassy/F);
- Biological control of *Saperda* (1962; G.M. Arru/I);
- Genetic control of *Carpocapsa* and *Adoxophyes* (1968; Th. Wildbolz/CH);
- Genetic control of *Rhagoletis cerasi* (1968; E. Boller/CH);
- Genetic control of *Ceratitidis capitata* (1968; L. Mellado/E);
- Integrated control in glasshouses (1968; L. Bravenboer/NL);
- Integrated control in Brassica crops (1970; T. Coaker/UK);
- Biological control in soil pests (1970; R. Bardner/UK);
- Genetic control of *Hylemia* (1970; C. Pelereyts/B);
- Integrated control in cotton growing (1970; M. Karman/Eg);
- Study Group on genetic manipulation (C. Curtis/UK)
- Study Group on integrated control in cereals (G. Latteur/D)
- Study Group on microbial control of *Carpocapsa* (G. Benz/CH)

New statutes and changing strategies

A major re-orientation of the working philosophy had already taken place in 1968 (see Part I). It found its precipitation in the new statutes of Global IOBC and hence of WPRS. However, a closer examination of the new statutes adopted by both bodies in 1971 reveals that the WPRS statutes were not a mere copy of those of the Global organisation but showed distinctly different descriptions of the objectives. These are outlined in article II (“Functions”) of all IOBC statutes at the level of the Global body and of its regional sections (see Appendix I). It is noteworthy that the definition of the main objectives of IOBC Global, as defined in 1971, has not changed ever since:

“Article II Functions

The Organization shall:

- a) *promote the development of biological control and its applications in integrated control programs, and international cooperation to these ends. In these Statutes the term “biological control” means the use of living organisms or their products to prevent or reduce the losses or harm caused by pest organisms;*
- b) *collect, evaluate and disseminate information about biological control;*
- c) *promote national and international action concerning research, the training of personnel, the coordination of large-scale application and the encouragement of public awareness of the economic and social importance of biological control;*
- d) *arrange conferences, meetings and symposia, and to take any other action to implement the general objectives of the Organisation.*

Of interest is the link between biological control and integrated control occurring for the first time since 1956 in IOBC statutes. The persons who had formulated in 1969 the future statutes

of IOBC Global were fully aware of the importance to place biological control into a larger context. They had decided to abandon the almost exclusive focus on biological control that had dominated the IOBC strategy before (see Part I).

The WPRS statutes request an organisation of volunteers

With the new statutes of 1971, IOBC has clearly established the principle of voluntary cooperation of its members. The Global statutes concerning this aspect – unaltered up to now – declare explicitly in article 16:

Article XVI Status of personnel

- 1. Members of the statutory bodies shall receive no payment for services.*
- 2. Members of the statutory bodies attending official meetings (...) may receive travelling expenses and daily subsistence allowance.*
- 3. The Council may engage appropriate staff and services.*

The Europeans, however, formulated a more restrictive article with respect to permanent staff and age limit of WPRS officers. This should have certain consequences in due time. In the WPRS statutes of 1971 this article reads, unaltered up to now, as follows:

Article XVII Status of Personnel

- 1. Members of statutory bodies of the Regional Section shall receive no payment for services, except the allowances cited in Article XVIII.*
- 2. The Regional Section **may recruit no permanent personnel** but may appoint temporary workers, whose appointment and payment shall be decided by Council.*
- 3. The **age limit** for members of statutory bodies, except the Regional General Assembly, shall be fixed by the bye-laws established by Council.*

The words in bold have been highlighted by the authors of this chapter. IOBC representatives, actively involved in 1968-1969 in the preparation of a new IOBC, drew their conclusions from weaknesses occurring in the old IOBC system (e.g. paid personnel for certain services while IOBC income showed decreasing tendencies). They designed the future WPRS statutes accordingly but could apparently not reach agreement among the parties involved in the 1969 negotiations (see Part I) to impose these rules on an international scale (i.e. on the IOBC Global statutes).

The paramount importance of individual persons devoting on a voluntary basis their time to common goals has already been described by V. Delucchi in his last report as Secretary General of the old IOBC as follows (IOBC 1971):

” This (coordination of efforts) asks for the help of everybody, for – even if an international non-governmental organisation is very little hampered by politics and does not know the administrative heaviness of big governmental organisations – she has been built almost exclusively on the goodwill of those people who will collaborate, and these are generally very few and consequently always the same.”

The composition of the WPRS Councils from 1971 until 2005 is shown in Appendix I.

1971 – 1974: “From Rome to Madrid”.

The first 3 years of WPRS were relatively quiet and saw the establishment of two new WGs: the Study Groups on “Integrated Control in Cereals (G. Latteur/D)” and on “Genetic Manipulation (C. Curtis/UK)” became WGs in 1972.

1974 – 1977: “From Madrid to Athens”.

The period following the 2nd General Assembly of 1974 in Madrid was characterised by highly creative activities of WPRS members who generated six new WGs: in 1974 “Integrated control in viticulture (M. Baillod/CH)”, in 1975 “Integrated control in cereals of the Mediterranean region (M. Lairichi/Maroc)”, “Pesticides and beneficial arthropods” (J. Franz/D)”, “Use of pheromones in integrated control” (A. K. Minks/NL)” and in 1976 “Use of models in integrated control” (J. Kranz/D)” and “Breeding for plant resistance (O.M.B de Ponti/NL)”.

The establishment of the crop specific viticulture group was inspired by M. Baggiolini (CH) as member of the active orchard group and exhibited right from the beginning a strong multidisciplinary working pattern. The groups dealing with pesticides/beneficials, pheromones, modelling, breeding for resistance as well as the group on genetic manipulation are the first “vertical” WPRS WGs addressing specific tasks. They were usually proposed and initiated by WPRS experts who were in their field of competence either confronted with specific professional problems or observing and anticipating emerging trends in their scientific work. For a more detailed background we refer to the short histories of the individual WGs in Appendix II of this book.

The reports of that time reveal the first signs of internal frictions between WPRS members pursuing the traditional biological control activities of the early period of IOBC (“traditionalists”) and a strong group of members who adopted with the term “integrated control” a wider approach (“modernists”).

1977 – 1981: “From Athens to Antibes”

This period can be characterised best by five important trends and events

- Development of holistic (comprehensive) concepts of integrated plant protection (IPP) leading to the concept of Integrated Production (IP). Increasing interest in systems approaches;
- Growing internationalisation of WPRS activities preparing the ground for the establishment of Global IOBC WGs;
- Celebration of the “25th anniversary” (Vienna, 1979);
- Establishment of institutional working relations between WPRS and the European Community (EC later EU) (1980 – 1989);
- Open confrontation between “traditionalists” and “modernists”.

The existing WGs were highly productive and developed novel concepts in integrated plant protection/production, in quality control of mass-reared arthropods and in measuring the impact of pesticides on natural enemies. New technologies were developing at a high speed and the level of sophistication in the plant protection area increased rapidly.

The working philosophy of the WPRS Council did not quite follow these dynamic developments but did – fortunately – not interfere too much with the highly successful activities of its WGs.

This period saw little effort to establish new WGs. A WG on “Specificity of entomopathogens” survived for 3 years, and another one on “Use of Entomophthoraceae in biocontrol” for one year only.

1976-1977: Ovronnaz, an important historic landmark for Integrated Production

A meeting of the WPRS orchard group held in January 1976 at Stuttgart (Germany) adopted the first recommendations to be used for the development of guidelines for “integrated pest control”. They proposed to Council to prepare guidelines on the application of integrated pest control with reference to three categories:

- a) General guidelines applicable to all crops in all countries;
- b) General crop specific guidelines;
- c) Regional guidelines to be applied to one type of crop as locally cultivated in a given region. *“In the preparation of such (regional) guidelines, initiative should be taken by those locally responsible in the region concerned, with subsequent submission to IOBC/WPRS for approval, preferably by a national committee”* (IOBC/WPRS Bull 1977/1, p. 23-25). The idea of an IOBC endorsement system was born.

Table 1. The evolution of plant protection methods (IOBC/WPRS 1977; Baggiolini 1998)

1. Blind chemical control (Lutte chimique aveugle)	General, schematic and routine applications of the most potent pesticides; advice from industry
2. Chemical control based on advice (Lutte chimique conseillée)	Application of usually broad spectrum pesticides after consultation with an official advisory service
3. Guided control (supervised control) (Lutte dirigée) <i>Transitory phase</i>	Introduction of the concept of "economic threshold levels"; application of pesticides with no negative side-effects on natural enemies; protection of beneficial organisms
4. Integrated plant protection (Protection intégrée) <i>Dynamic phase</i>	Similar to guided control, but in addition integration of biological and biotechnical methods and methods of good agricultural practice; chemical control strongly regulated
5. Integrated agricultural production (Production agricole intégrée) <i>Open dynamic phase, further development possible in the whole world</i>	Similar to integrated plant protection, but in addition observation, integration and exploitation of all positive factors in the agro-ecosystem according to ecological principles

A second meeting organised by M. Baggiolini and H. Steiner on July 9-11, 1976 at Ovronnaz became a famous WPRS landmark and led to the establishment of the WPRS Commission of Integrated Production. The visions about the place of integrated plant protection measures in the context of the entire farm operations found their precipitation in the historic “Message of Ovronnaz”. A group of five entomologists met in the Alpine village of Ovronnaz in Switzerland, discussed and reviewed the situation, sorted out the important essential elements and produced a document that can still be considered the corner stone of modern Integrated Production (Steiner, ed. 1977; Baggiolini, 1998; Table 1). Key element of their conclusions

was the necessity to remove the isolated view of plant protection and to place all plant protection aspects in the context of the entire farm operations. Valid up to date, with minor adaptations, is their table of evolutionary steps in plant protection shown below. We are grateful to the late M. Baggiolini, promoter and participant of that meeting, for providing the historic picture taken at that occasion (Figure 3).



Figure 3. Participants of the meeting at Ovronnaz, July 9 – 11, 1976. From left to right: G. Altner, H. Steiner, G. Celli, F. Schneider and M. Baggiolini

H. Steiner (D) and M. Baggiolini (CH) were not only among the most prominent WPRS pioneers of Integrated Plant Protection (IPP) and Integrated Production (IP), but were also strong professional and personal partners complementing each other in an almost perfect way. F. Schneider (CH), being just before his retirement; represented the Swiss Federal Research Station of Wädenswil. An interesting and colourful participant of the Ovronnaz meeting was G. Celli of the University of Bologna, probably invited by M. Baggiolini. He was (and still is) not only a most innovative entomologist but also a gifted author, writer of theatre plays and painter. When this picture was taken, he just had received the important Italian Pirandello award for his latest theatre play called “Le Tentazioni del Dottore Faust” (The temptations of Dr. Faust), a play that he had written for and dedicated to WPRS (Figure 4). The play deals with the negative effects of pesticides in modern agriculture and was translated by M. Baggiolini into French in 1978. That French version was distributed to the participants of the 6th General Assembly held at Florence. Two scenes of the play were read by V. Delucchi at the General Assembly.

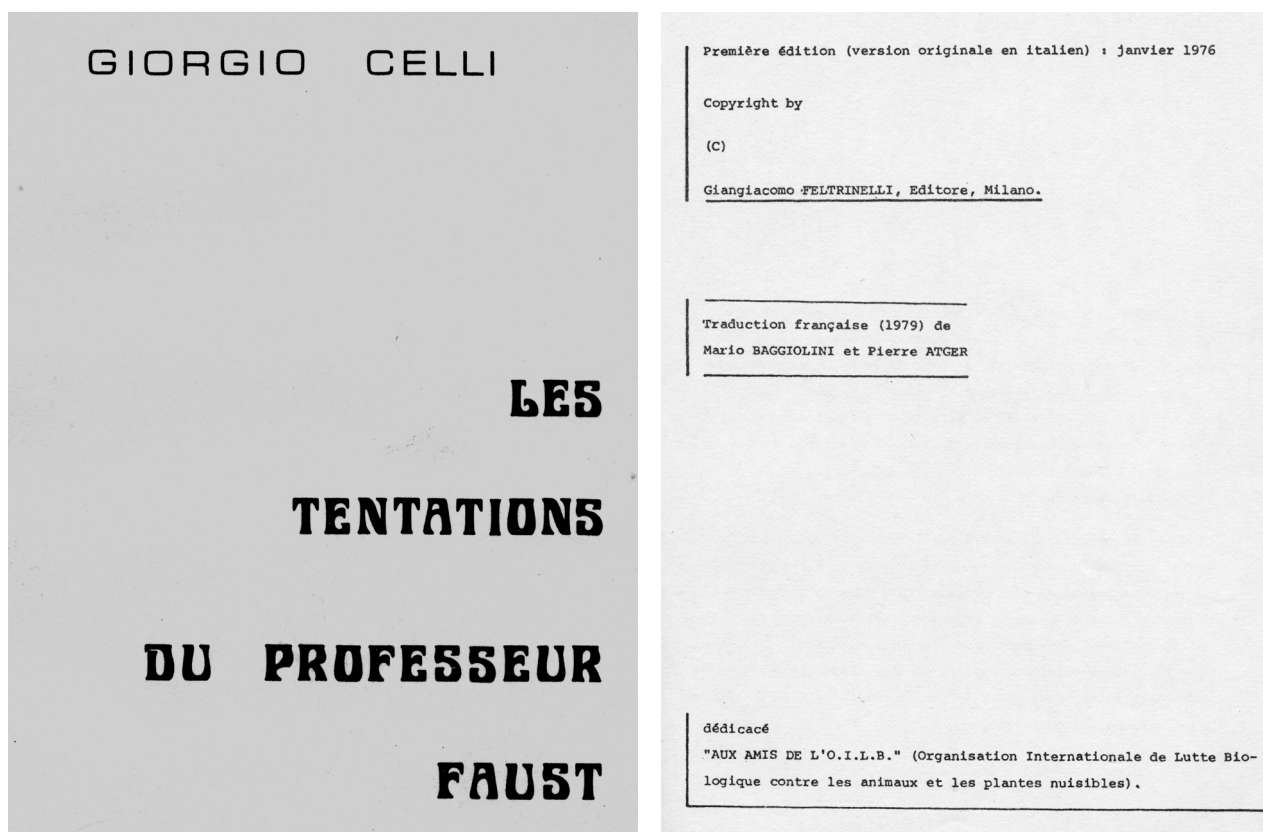


Figure 4. The drama of Giorgio Celli dedicated to IOBC in 1976

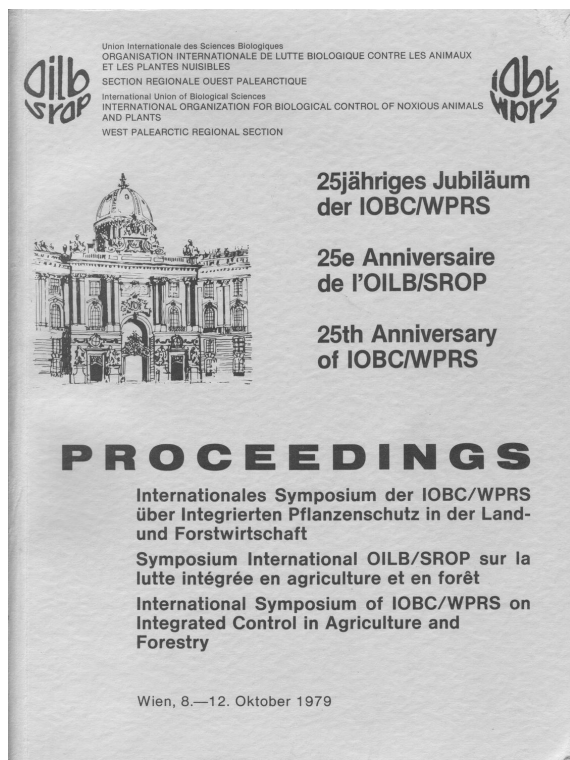
The difficult birth of the first Integrated Production project

The history of the WPRS Commission of Integrated Production is long and meandering (see history in Appendix III). The report of the 6th Council meeting (IOBC/WPRS 1977) provides an interesting insight into the important events that took place in November 1976 and into the reaction of the Council. A first informal “Commission” had been established in 1974 by M. Baggiolini as subgroup of the orchard group. It organised five meetings in 1975 and 1976 discussing the need to regulate the rapid developments in Integrated Plant Protection by designing adequate guidelines and labels. At the same time the participants of the “Ovronnaz meeting” identified the need for a holistic systems approach for which they had coined the term “Integrated Production”. The Council discussed during that November meeting the various developments in 1976 and the recommendations submitted by H. Steiner and M. Baggiolini. These recommendations confirmed the necessity to prepare guidelines not only for IPP, but also in the wider context for Integrated Production. The report of that particular Council meeting suggests that at that time Council was not yet ready to comprehend the importance of the emerging field of sustainable agriculture and of Integrated Production at the farm level. So it decided to establish a Commission *ad hoc* “*Directives lutte intégrée*” (“*Guidelines for Integrated Control*”) and appointed M Baggiolini as convenor and the Secretary General as member of the Commission.

Indeed, the Council members had only taken a short look at the draft of the unpublished “Ovronnaz Message” and asked the Executive Committee “...to analyse at its next meeting in detail the manifesto of Ovronnaz. This manifesto must not move WPRS into a

direction that is scientifically not justified” (“*Ce manifeste ne devra pas engager l’OILB/SROP dans une direction qui n’est pas scientifiquement justifiée*”. IOBC 1977, p. 10). Steiner and Baggiolini hastened to write a detailed report on their «Ovronnaz» conclusions and recommendations (Steiner 1977). At the 3rd General Assembly of 1977 M. Baggiolini and J. Thiault delivered a sound report on the objectives and conceptual basis of the new Commission. Baggiolini had also given the Commission a more appropriate name: “Commission Valorisation Qualitative de la Production Intégrée” (IOBC/WPRS 1978). The Commission remained focussed on apple production, changed its name several times, ran a first set of experiments on integrated fruit production on 300 ha in the Lake Geneva area in Switzerland and designed an IOBC label for endorsed organisations in 1979. Despite these new developments, WPRS Council followed the activities of the Commission with reservation. Only in 1981 and by request of the 4th General Assembly the *ad hoc* Commission of M. Baggiolini and J. Thiault was given the official status of a Commission.

1979: IOBC celebrates its “25th Anniversary”



IOBC has always been flexible with its birthdays. For whatever reasons, in October 1979 the situation was ripe to celebrate its 25th anniversary. Perfectly organised by K. Russ and his team, IOBC/WPRS celebrated its silver jubilee with pomp and circumstance in the impressive atmosphere of the Viennese Hofburg - the former residence of the Austrian-Hungarian Emperors. Not less impressive is the coverage of all the WPRS activities by the “Proceedings of the International Symposium of IOBC/WPRS on Integrated Control in Agriculture and Forestry”, Vienna, 8-12 October 1979 (Figure 5). This book, now more than 25 years old, provides on 650 pages not only surprisingly modern and still valid wisdom, but is also the most complete overview and testimony of successful WPRS achievements ever published.

Figure 5. The “Anniversary Book 1979”

1980: Establishing working relations with the Commission of the European Community (CEC)

Early attempts of WPRS to open a dialogue with the European Community can be traced back to 1973 when E. Biliotti (then WPRS President) prepared a first study for the European Commission entitled “Conditions et possibilités de développement des méthodes de lutte intégrée et de lutte biologique en agriculture (Conditions and possibilities for development of biological and integrated control methods in agriculture)”. L. Brader, his Secretary General

prepared in 1976 a follow-up report for the CEC entitled “Modalités pratiques d’application de methods de lutte intégrée (Practical aspects of the application of integrated pest control methods)” (No.24 in the CEC series “Informations sur l’agriculture”; L. Brader, pers. communication). It seems that these documents opened the door for the dialogue that led in 1980 to the establishment of institutional contacts with the Directorates General 6 (Agriculture) and 12 (Environment and Consumer Safety). WPRS Council designated C. Pelerents (Figure 6), acting WPRS treasurer in Gent (Belgium), as WPRS representative and counterpart of R. Cavalloro (Figure 7), entomologist active in EURATOM at Ispra (Italy) and coordinating at Bruxelles the emerging CEC programs on “Integrated Plant Protection” (Cavalloro, 1982). R. Cavalloro knew IOBC through his first contacts with the WPRS fruit fly groups in 1971. He became Vice-President in 1985 and President of WPRS in 1989. The tandem Pelerents - Cavalloro, nicknamed “le pont” (“the bridge”), co-ordinated between 1980 and 1989 13 joint EC/WPRS symposia, conferences, experts’ meetings and international training courses (see Table 2). Most of them found their precipitation in joint publications prepared and printed by CEC (Minks & Degheele, 1993).



Figures 6 and 7: The institutional “bridge” between IOBC/WPRS and the Commission of the European Community operated in the 1980s by C. Pelerents (WPRS, left) and his CEC counterpart R. Cavalloro (CEC, right)

WPRS activities attract international attention and participation

The WPRS activities attracted the attention and participation of scientists from many countries outside the WPRS region, especially from North America, and international organisations. Two new WGs (“Specificity of entomopathogens”, “Use of Entomophthoracea”) survived only for 1 and 3 years, respectively.

Unsuccessful attempts to transform WPRS Council from a top-down to a bottom-up organisation

Certain traditional policies and working procedures of Council showed signs of wear and tear and caused internal pressure. The transition of WPRS Council from a top-down, strongly centralised management (that was characteristic for IOBC up to 1968) to a bottom-up, participatory system was slow. At the 3rd General Assembly of 1977 (Athens) a group of young Convenors requested from the Executive Committee that Convenors of Commissions and WGs should have more influence on the closed decision making system of Council. As a

result, the General Assembly (IOBC/WPRS 1978) formulated a strong recommendation to organise a meeting of Convenors which should take place prior to the General Assembly. In addition, it recommended to Council to establish an effective liaison system to foster a smooth information exchange between Commissions and WGs. Council and the Executive Committee changed their working procedures only reluctantly. and many convenors of the WGs were not happy with the situation.

1981: The General Assembly at Antibes: an important turning point

The proceedings of the 4th General Assembly of 1981 at Antibes (IOBC/WPRS 1982) are of special interest for the analysis of the general strategy of IOBC/WPRS in this transient period. They also provide insight into the internal frictions between the “traditionalists” and “modernists” within WPRS (IOBC/WPRS 1982). The report of the Secretary General contains an analysis of the situation, probably reflecting the opinion of a group of Council members involved in forestry projects. Referring to former statements of E. Biliotti, the Secretary warned against a declining attention for biological control by the WPRS. “...*Il ne s’agit certes pas de renier une orientation pour laquelle nous avons tant œuvré, mais au contraire d’examiner objectivement les conséquences de l’adoption finalement trop facile d’un concept sans pour autant en avoir pleinement tirés les conséquences. Dans certains cas extrêmes, il advient même que les principes de la lutte biologique soient rejetés par les nouveaux défenseurs de la lutte intégrée. (...). La ligne générale que nous devons suivre est la mise en œuvre du concept de lutte intégrée, sans toutefois tomber dans l’excès qui pourrait à terme transformer notre Organisation de Lutte Biologique en une Organisation de lutte intégrée...* » (IOBC/WPRS 1982, p.74).

Apparently this view was not entirely shared by other Council members. It was a WPRS novelty that the agenda of a General Assembly showed – after the usual opening speeches and presentations of invited speakers – two “unscheduled communications”. The first was presented by M. Pavan (1982) entitled “Intervention concernant l’histoire, les réalisations et les perspectives de la lutte biologique et de l’OILB-SROP, au nom du Ministère de l’agriculture et des forêts de Rome» and was a strong plea for focussing WPRS activities on biological control. The second presentation by M. Baggiolini (1982) was a reply entitled «Lutte biologique – lutte intégrée – production intégrée» emphasising a broader field of attention. The original texts do not only provide interesting reading but also give an impression of the quite tense atmosphere at the Assembly of 1981.

A first meeting of convenors was organised prior to the 4th General Assembly at Antibes and was chaired by H. Steiner. It opened the door for fruitful, but critical internal discussions and innovations.

1981- 1985: “From Antibes to Stuttgart” - A period of change

This period can be characterised by three major developments:

- The implementation of new working procedures by Council (1984);
- The modification of Article II (“Functions”) of the statutes (1985) and
- A period of intensive cooperation with the EC.

The time following the memorable 4th General Assembly of 1981 (Figure 8) at Antibes was fruitful with respect to WG activities and measures taken by Council. At the level of the WGs intensive co-operations took place with EC (eight joint events) and IOBC Global

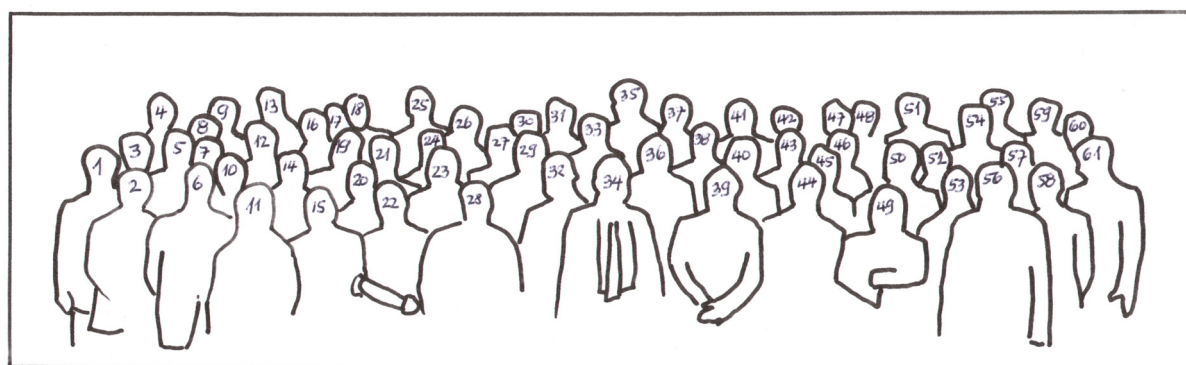


Figure 8. Participants of the 4th General Assembly of 12-14 October 1981 at Antibes

Names in **bold** indicate persons who have held the position of WPRS President or Secretary General; names in *italics* indicate Convenors of WPRS Commissions or WGs: 1. Milaire (F); 2. *Baggiolini* (CH); 3. *Thiault* (F); 4. Audemard (F); 5. Zocchi (I); 6. **Bassino** (F); 10. *Lairichi* (Maroc); 12. Figiani (I); 13. Onillon (F); 15. Pal (WHO); 18. *Rabbinge* (NL); 20. *Franz* (D); 21. *Boller* (CH); 22. *Pavan* (I); 23. **Cavalloro** (I/CE); 24. *Schmid* (CH); 25. Vasiljevic (YU); 26. *Hurpin* (F); 27. Russ (A); 28. Mamoud Hafez (Eg); 29. Salama (Eg); 32. **Ferron** (F); 34. **Mathys** (CH/EPP0); 35. **Brader** (NL/FAO); 36. *de Wilde* (NL); 37. Feron (F); 38. *Hassan* (D); 39. *Edwards* (UK); 40. Arroyo (E); 41. Touzeau (F); 42. Morales; 44. *Ellis* (UK); 45. Piedade Guerriero (P); 46. Garrido Vives (E); 48. **Grison** (F); 49. *Hussey* (UK); 50. Labeyrie (F); 51. **Way** (UK); 54. Jourdeuil (F); 56. *Coker* (UK); 57. Iperti (F); 58. *Benassy* (F); 59. Klingauf (D); 61. Blaisinger (F). Not present on picture: *Minks*, *Pelerents*, *Steiner*.

(establishment of the Global WGs “Trichogramma” and “Bruchids” in 1983). Council established in 1981 three new Study Groups (“Farming systems”, “Plant Pathology”, and “Weed Science”) indicating a strong intention to strengthen a multidisciplinary approach in future WPRS activities.

However, only the Study Group on “Management of farming systems” survived and became a WG in 1982 whereas the other two did not succeed. It seems that the still entomology-dominated organisation was not yet ready to expand its area of interest to plant pathology and weed science.

IOBC-EC activities:

The cooperation between the EC and WPRS was positive, but also created some problems. Positive was the professional EC organisation of the joint EC-WPRS events with

simultaneous translation, excellent logistics and the possibility to publish the proceedings entirely paid by the EC (see Table 2). WPRS members got admission to an international platform with different persons. Somewhat problematic for WPRS was that the EC-organised and financed projects, usually running for 5 years, covered traditional WPRS fields of activity. The existing WPRS WGs were basically operating in the same professional environment but with very modest financial resources. That is the reason that many WPRS

Table 2. Joint EC-WPRS activities and events in 1980 – 1988

Year	Event and location	Topic	Proceedings
1980	EC-WPRS Experts' meeting San Giulian (F)-Siniscola (I)	Standardization of biotechnical methods of integrated pest control in citrus orchards	R. Cavalloro & R. Prota, 1981; 206 pp.
1982	EC-IOBC Experts' meeting Siniscola (I)	Integrated control in citrus orchards: Sampling methodology and threshold for intervention against the principal phytophagous pests	R. Cavalloro & R. Prota, 1983; 64 pp.
1982	EC-IOBC Int. Symposium Athens	Fruit flies of economic importance	R. Cavalloro, 1983; 642 pp.
1983	EC-IOBC; Int. Training Course; Bologna (I)	Biological and integrated pest control.	G. Brignolini & R. Cavalloro; unpublished
1984	EC-FAO-IOBC Int. Joint Conference; Pisa (I)	Integrated pest control in olive groves	R. Cavalloro & A. Crovetto, 1985; 512 pp.
1984	EC-IOBC Experts' meeting Hamburg (D)	Fruit flies of economic importance	R. Cavalloro, 1986; 221 pp.
1984	EC-IOBC-EPPO Int. Joint Conference; Brussels (B)	Integrated crop protection: from principles to practical implementation	R. Cavalloro & M.J. Way, 1988; 162 pp.
1985	EC-IOBC Experts' meeting Rennes (F)	Progress on pest management in field vegetables	R. Cavalloro & C. Pelerents; 302 pp.
1985	EC-IOBC; Int. Training Course; Ascot (UK)	IPM in cereals	M.Way & R.Cavalloro
1986	EC-IOBC; Int. Training Course; Gent (B)	Integrated control in protected vegetable crops	R. Cavalloro & C. Pelerents, 1988; 238 pp.
1987	EC-IOBC; Int. Symposium; Rome (I)	Fruit flies of economic importance	R. Cavalloro, 1989; 626 pp.
1987	EC-IOBC; Experts' Meeting; Cabrils (E)	Integrated pest management in protected vegetable crops	R. Cavalloro & C. Pelerents, 1989; 395 pp
1988	EC-IOBC; Int. Symposium; Lisbon – Vila Real (P)	Plant protection problems and prospects of integrated control in viticulture	R. Cavalloro, 1989; 834 pp.

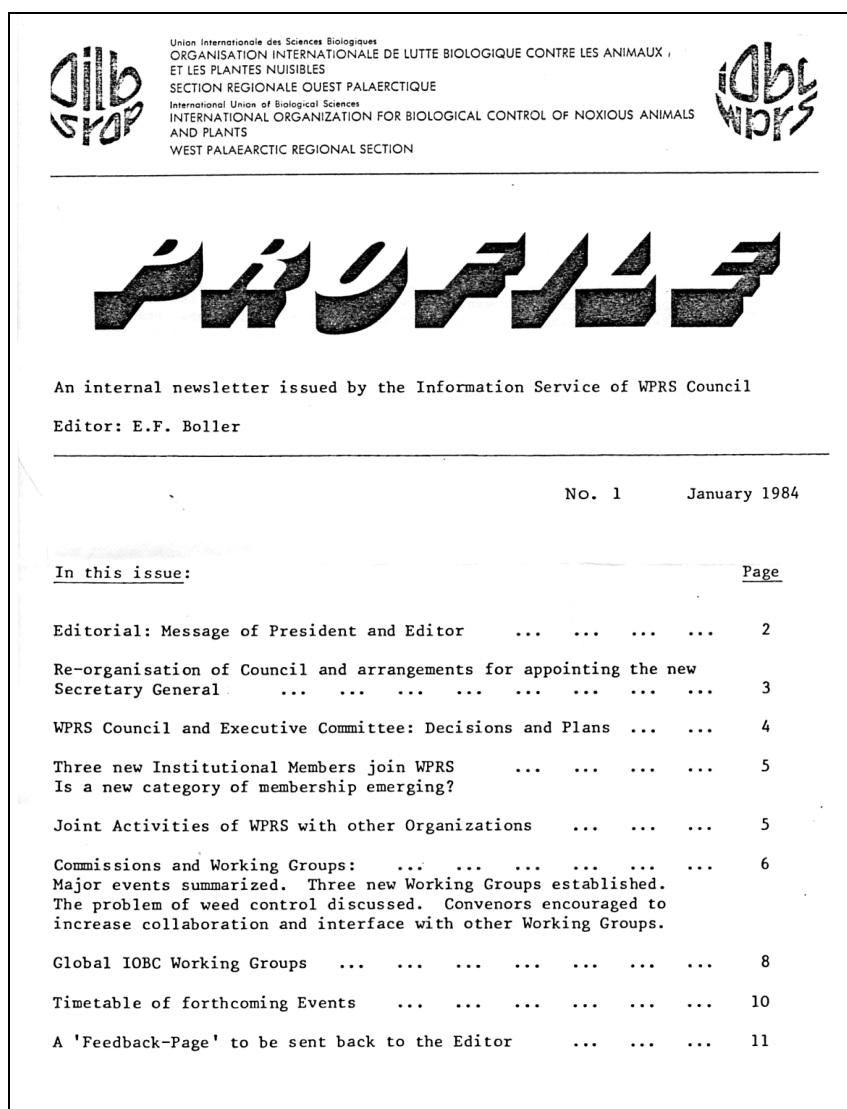


Figure 9.
Front page of the first
issue of PROFILE

The first issue appeared in January 1984. The front page of this “handmade” newsletter and its table of contents give an impression of the pressing matters discussed by Council of that period.

The confrontations and discussions about the future objectives of WPRS, as witnessed during the 4th General Assembly, were history and the new working style of Council opened the door for the pending adjustment of the objectives as defined in article II of the statutes.

members from EC countries preferred to participate in EC-sponsored research and development programs, whereas members from non-EC countries had no direct access to these EC activities. The organisation of joint EC-WPRS symposia and experts’ meetings could only partly compensate for these problems. However, this somewhat painful separation into two categories of scientists within WPRS lasted only as long as the particular EC program was running. It can be concluded that both sides gained from this cooperation, and in many later projects scientists involved in either EC or WPRS activities, joined forces again in WPRS WGs. Today, many WPRS WGs form the basis of new networks for EC activities.

1984: Council improves its working modus

With respect to the pending improvements of the internal working modus of Council two years passed without visible changes but with constantly increasing internal pressure to take action. The breakthrough came by the end of 1983 with the appointment of J. P. Bassino (ACTA France) as Secretary General.

The working relations between Council and Convenors of the WGs were substantially improved in early 1984 by designating individual Council members as liaison officers between Council and specific WGs and Commissions. The information-flow between Council, Commissions, WGs and Institutional Members was further improved by the creation of *PROFILE*, an internal newsletter to appear at least twice a year (Figure 9). E. F. Boller (CH) was appointed as first editor.

1985: Adjusting the statutes with respect to WPRS objectives

Identical wordings describe the IOBC objectives (“functions”) in the actual statutes of all regional sections and also in the first statutes of WPRS of 1971. In 1985 WPRS Council had widened the objectives further as follows:

“Art. II Functions

The Regional Section shall:

- a) promote the development of biological control of **pests and diseases and, in a more general way, integrated protection in the context of integrated crop production**; also to promote international cooperation to these ends;*
- b) collect, evaluate and disseminate information on biological and **integrated** controls;*
- c) promote national and international research, training, coordination of large-scale applications and maintain public awareness of the **economic, ecological and social** importance of new developments in plant protection;*
- d) arrange conferences, meetings and symposia, and take any other action to implement the general objectives of the Organization . “*

The triplet of “economic, ecological and social” introduced in paragraph c) shows clearly, that the Council of the period 1981 – 1985 was fully aware of the internationally accepted definition of sustainability.

The 5th General Assembly at Stuttgart accepted the proposed adaptation of the statutes. Many guests attended the meeting. It was also a farewell to two pioneers of the early days of WPRS, H. Steiner and M. Baggiolini (Figures 10 and 11).



Figures 10 and 11. Two pioneers of WPRS retired from the organisation after the 5th General Assembly of Stuttgart. Hans Steiner (left) and Mario Baggiolini (right).

1985-1989: “From Stuttgart to Florence”

The new Council established in 1985 a Study Group on “Insect pathogens and entomoparasitic nematodes” (C. Payne/UK) receiving WG status in 1986, and published the 2nd pheromone list (Arn et al. 1986).

The period after “Stuttgart” can be characterised as uneventful. Was WPRS tired from the struggles of the previous years or just taking a breath and saving energy for new developments? The Commission on “Promotion de la production intégrée” (IP Commission) died a silent death and three forestry oriented WGs terminated their activities (“*Formica rufa*”, “*Saperda* in Eucalyptus” and “Insect feeding vertebrates”). The WPRS-EC cooperation produced four joint events, but slowed down and terminated by the end of 1988. Whether this was related to the retirement of R. Cavalloro from the EC is an open question. But it may well be the case. Anyway, R. Cavalloro became WPRS President in 1989 and would probably have kept the EC-WPRS working relations alive if an adequate program would have existed at the EC side. Strong signals of successful interdisciplinary projects in Central Europe (e.g. run by several national societies of phytomedicine) did apparently not generate, as yet, clear responses within WPRS, probably due to the continuation of the traditional entomology-dominated activity pattern.

However, in 1989 Convenors of certain WGs became restless and unhappy with the dormant stage of WPRS. This led to the initiative of a number of individual members - and not of the WPRS as such - to organise a conference on “Biological control and integrated crop protection: towards environmentally safer agriculture” held in 1991 at Veldhoven (The Netherlands) (van Lenteren, et al 1992). This meeting was eventually placed under the auspices of WPRS. It produced a review of the state of the art including a set of recommendations concerning the practical implementation of integrated crop protection. Developments taking place outside IOBC became more and more visible and started to exert their influence on IOBC as an organisation.

1989 – 2005: “From Florence to Lisbon to Vienna to Ascona to Dijon”.

In this period fundamental changes took place in European agricultural and environmental policy. The term “sustainability” gained increased attention. “Integrated Plant Protection” and “Integrated Production” had become popular topics at many universities and agricultural colleges and entered now into the vocabulary and documents of European politicians. The validity of traditional IOBC concepts was confirmed by international developments such as the Common Agriculture Policy (CAP) of the EU.

The early 1990s

After the 7th General Assembly of 1989 at Lisbon WPRS suddenly woke up, put its feet on the gas pedal, re-activated the IP-Commission in 1990 and became the international front-runner in defining the international standards and technical procedures of Integrated Production. WPRS also became actively involved in the definition of European standards for testing the side-effects of pesticides on non-target arthropods.

In 1989 WPRS established two new WGs (“Pathogenic fungi/bacteria”, and “Stored products”). In 1990 the activities of two WGs were terminated (“Modelling”, “Cotton”).

Integrated Production becomes one of the key issues in the 1990s

In the early 1990s sustainable production systems (such as organic farming and IP) and food safety aspects were becoming important components of the agricultural policy of most European countries. Quality labels for agricultural produce appeared on the market.

The recommendations of the WPRS conference at Veldhoven (van Lenteren, et al 1992) focussed on the implementation of integrated crop protection, but also topics like integrated farming or -production and the agricultural policy supporting these developments are discussed in the proceedings of this conference. In 1993 WPRS was able to regain its traditional leadership in Integrated Production by formulating and publishing the modern conceptual umbrella of Integrated Production and, as important part of it, of Integrated Plant Protection (El Titi, et al, 1993; Boller et al. 1998). The IP guidelines, established by the WPRS Commission “IP Guidelines and Endorsement” in close collaboration with crop specific WGs, are divided into four categories of documents (see also Boller et al. 2004; www.iobc.ch):

- The basic IOBC concept and principles of IP including the short definition of IP;
- Technical guidelines I defining the requirements as to organisation, inspection system, list of sanctions and duties of the individual members;
- Technical guidelines II covering the basic agronomic aspects concerning all crops;
- Technical guidelines III: crop specific guidelines specifying the additional requirements of individual crops.

Based on these documents, farmers’ organisations (label organisations) can establish their specific regional guidelines according to IOBC standards. Organisations operating their IP program successfully for at least two years and seeking recognition of their activities by IOBC can apply for IOBC endorsement (for procedures see Boller et al. 2004 and www.iobc.ch). The WPRS Commission on “IP Guidelines and Endorsement” has received the mandate of IOBC Global to operate this endorsement system world-wide.

Again, orchard specialists were the first within WPRS to prepare the first modern version of an IP guideline III for pome fruits in 1991 (Dickler and Schäfermeyer 1991). They incorporated into its 2nd edition of 1994 the new IOBC concept and standards (published in 1993) and in its 3rd edition of 2002 additional features (Cross and Dickler 1994; Cross 2002). These crop specific guidelines for pome fruits were followed in 1996 by guidelines for viticulture and arable crops. By the end of 2004 WPRS had published crop specific guidelines III for all major crops in the WPRS region, i.e. pome fruits, stone fruits, grapes, arable crops, soft fruits, olives, citrus and field grown vegetables. WPRS started in 1996 its international endorsement activities leading in 1998 to the endorsement of a Spanish fruit cooperative (TRECOOP), followed in 2000 by a French grape growers’ association (TYFLO) and an Italian fruit cooperative (APOFRUIT). In 2001 a first organisation in North America (LIVE, Oregon) received IOBC endorsement. Several IP-organisations in Australia, New Zealand, South America and Eastern European countries apply IOBC IP concepts and some of them have announced their interest in an IOBC endorsement of their labels.

Definition of European standards for testing side-effects of pesticides

The activities of the WG “Pesticides and beneficial organisms” continued to show tangible results. It had not only initiated in the 1970s the development of procedures for testing the side-effects of pesticides on non-target arthropods for the registration authorities but also maintained technical cooperation with industry and registration officers to this end. Since the publication of the WPRS testing concept and a first list of approved testing methods in 1985

(Hassan et al. 1985) the WG had published its testing results regularly. In 1994 the Joint Initiative of WPRS, BART (Beneficial Arthropod Regulatory Testing Group) and EPPO was established. It started its work in 1995 under WPRS leadership and produced a final document in 2000 (Candolfi et al. 2000). These guidelines are now official EPPO testing standards and also included in the EU testing schedule for the registration of chemical pesticides.

Late 1990s and the new millennium



In 2001 WPRS established its homepage on www.iobc-wprs.org. The establishment of three new Study Groups was accepted by the 9th General Assembly of 2001 at Ascona (“Genetically Modified Organisms in Integrated Plant Protection”, “Landscape management for functional biodiversity” and “Induced resistance in plants”). One of the oldest WGs, “Fruit flies of economic importance”, terminated its activities. At the 9th General Assembly Vittorio Delucchi became the first Honorary Member of WPRS (Figure 12). He had received Honorary Membership in 1996 by IOBC Global

Figure 12. Prof. Vittorio Delucchi (Switzerland), Honorary Member of IOBC/WPRS (2001)

Additional dimensions added to Integrated Production concepts

WPRS added in 2001 and 2004 extra dimensions to its Integrated Production concept. In 2001 the IP Commission established its new homepage on www.iobc.ch. It has become an important platform for the publication (in full text) of all documents relevant to Integrated Production (e.g. guidelines) as well as the “IOBC Toolbox”. The toolbox is considered as a further step to assist growers’ associations and farm advisers with practical and field tested methods in their efforts to apply and implement sustainable production programs in practice. The most recent tools are:

- The IOBC Idea Book entitled “Ecological Infrastructures and Functional Biodiversity at the Farm Level” (Boller, et al 2004);
- The WPRS “Green List of Plant Protection Measures”;
- “SESAME”: a slim, robust but still sensitive inspection software, being field-tested in 2006 and implemented by IOBC endorsed organisations in 2007.

In 2004 WPRS published the 3rd revision of the basic document on “Integrated Production: Principles and Technical Guidelines” and introduced in its “IP standard 2004” the aspect of total quality (i.e. Product quality/food safety; ecological, social and ethical quality of production) (Boller et al. 2004). The IOBC Standard 2004 was made compatible with the

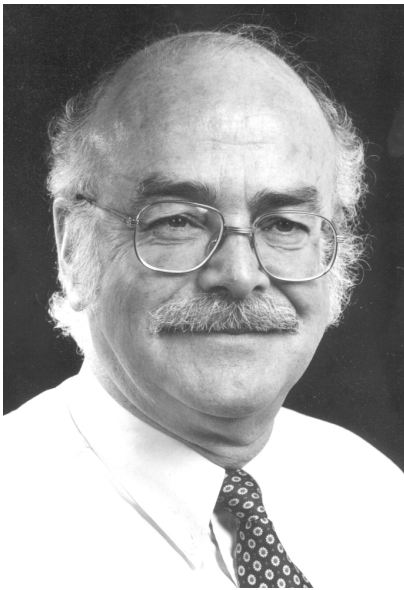
inspection criteria of other international food standards to avoid multiple inspections at the farm level.

Functional biodiversity

The emerging field of functional biodiversity as important component of conservation biological control (habitat management) was discussed by Council in 1999. The WGs were encouraged to consider the relevance of this topic in their activity programs. The establishment of the new WG on "Landscape management for functional biodiversity" in 2001 and the international interest in the IOBC "Idea book on ecological infrastructures" (Boller et al. 2004) reflect the importance given to this topic.

GMOs (Genetically modified organisms) became an important issue.

GMOs became an important issue in the public debate in Europe involving consumers, politicians and the farming community. WPRS members anticipated at an early stage a serious impact of this emerging field on plant protection concepts and proposed to the Council the establishment of a Study Group on "GMO's in Integrated Plant Protection". This was approved in 2001 and the unit received the status of a WG in 2003.



2005: IOBC celebrated in 2005 its 50th anniversary at the 10th General Assembly of WPRS (Dijon). The participants of this historic meeting are shown in Figure 14. The General Assembly gave Honorary Membership to Ernst F. Boller (Switzerland) (Figure 13).

**Figure 13. Dr. Ernst Boller (Switzerland)
Honorary Member of IOBC/WPRS (2005)**

Conclusions

WPRS is extraordinary in many respects. It is an international non-governmental organisation without permanent staff, without permanent headquarters, without permanent offices and archives. WPRS is financed by institutional, individual and supporting members whilst maintaining its full independence. It is an organisation with a high international reputation and a low budget, operated on a voluntary and honorary basis by a motivated community of independent scientists and extension specialists. It is an international organisation with a long tradition and reputation as trend-setter, identifying, addressing and developing emerging fields of interest in the context of a sustainable agriculture, forestry and weed management. It resembles a migrating circus with frequently changing artists.

Why has WPRS been so successful? The analysis of our history reveals certain elements that provide answers. They concern personalities and their visions, the bringing

together of different disciplines in working towards common goals and the development of a modern view on the management of pests, diseases and weeds, which can be defined as “holistic” or as “systems-approach”. All these components seem to be closely related.

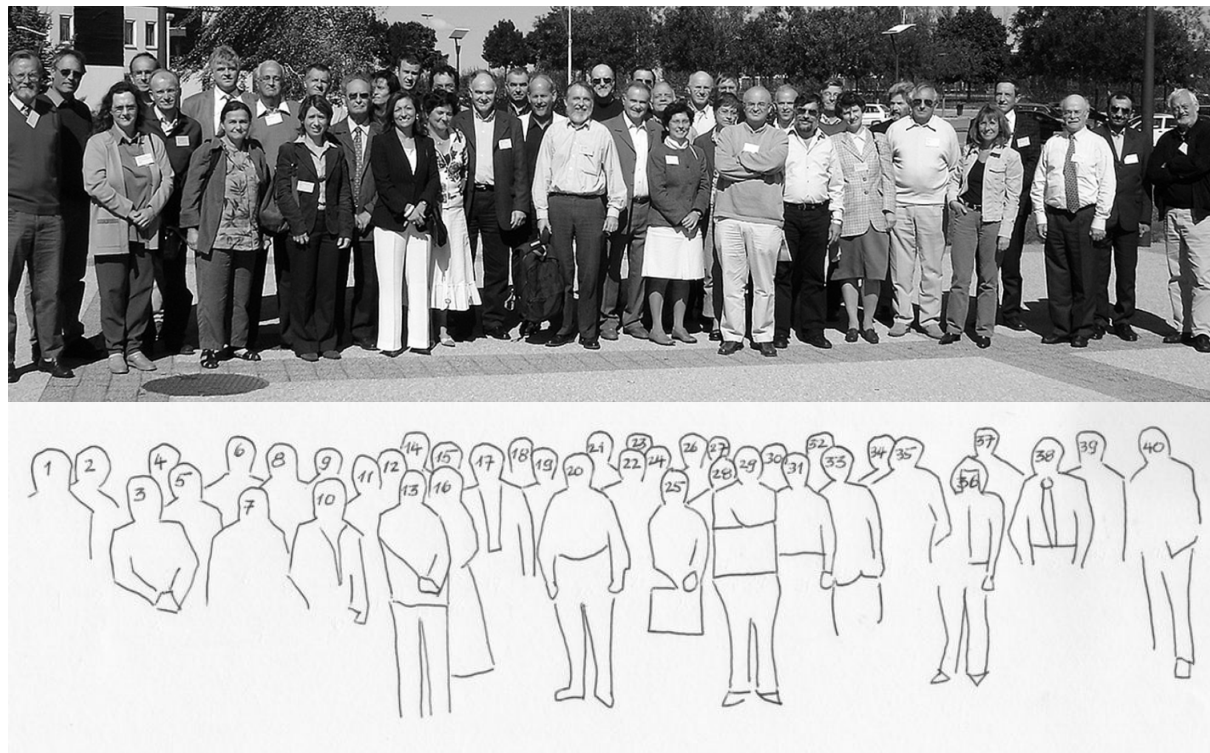


Figure 14. Participants in the 10th General Assembly 2005 at Dijon celebrating the 50th anniversary.

1. Papierok (F); 2. Elad (Isr); 3. Fassotte (B); 4. Steinberg (F); 5. Garcia-Marí (E); 6. Ehlers (D); 7. Villemant (F); 8. Besri (Mar); 9. Malavolta (I); 10. Karamaoura (GR); 11. Malathrakis (GR); 12. Collier (UK); 13. n.i.; 14. Romeis (CH); 15. Jermini (CH); 16. Vieira (P); 17. Bigler (CH) 18. n.i.; 19. Esbjerg (DK); 20. Nicot (F); 21. Ehlers (USA); 22. n.i.; 23. Avilla (E); 24. Navarro (Isr); 25. Castane (E); 26 Rosing (NL); 27. Cross (UK); 28. Vogt (D); 29. Albajes (E); 30. Birch (UK); 31. Gessler (CH); 32. Kerry (UK); 33. Blümel (A); 34. Bathon (D); 35. Huber (D); 36. Mrs. Sikora (D); 37. Freuler (CH); 38. Boller (CH); 39. Rezapanah (Iran); 40. Sikora (D). Not on picture: Alabouvette (F) and Schmitt (D).

Personalities, their visions and teamwork

A particular characteristic of WPRS is that the most important work is done in the WGs and Commissions. Here specialists collaborate on a voluntary basis and can participate in the development of visions and projects without being limited or even paralysed by directions given by political or scientific institutions. No doubt, this unique situation is one of the keys to the success of WPRS as J. P. Bassino described in his report as Secretary General when he addressed the 5th General Assembly at Stuttgart (IOBC/WPRS 1986):

“Our organisation, exerting without doubt a stimulating effect, has as most important characteristic the function of transporting ideas. The basic element is the promotion of integrated plant protection systems by a true teamwork that allows a highly efficient use of resources by pooling individual contributions”.

The creation of new WGs has always been proposed by WPRS experts facing certain professional problems or anticipating emerging trends in their scientific work. Indeed, major

developments and changes within WPRS have always been triggered and driven by individual personalities rather than by institutional structures and procedures.

In retrospect, we can conclude that the WPRS structure without permanent staff and logistic bases have positive sides. Actually, this apparent weakness is stimulating the development of a highly independent and flexible organisation, not influenced, ruled, directed or even paralysed by a dominant administration. This feature, unique for an international organisation, has certainly been an important factor in generating the high international credibility and reputation of WPRS and in stimulating over decades the active involvement of many scientists. In a professional environment, where visions are increasingly replaced by computer simulations, where open dialogues are replaced by strongly focussed discussions and where working time spent is considered above all a cost-benefit problem...in these situations WPRS meetings have always provided refreshing discussion and action platforms. Hence they retained a high degree of attractiveness. Where else can a motivated person, young student as well as senior scientist, listen to or talk about work in progress or even discuss just ideas (visions), and actively contribute to the solution of problems addressed by an international organisation?

One or more scientific disciplines in WG activities

The early days of IOBC up to 1968 focussed entirely on biological control of arthropod pests and was therefore dominated by entomologists. This situation continued after 1971 but was slightly changed by the increasing emphasis on an integrated approach. President and Secretary General acknowledged in their addresses at the 3rd General Assembly of 1977 at Athens (IOBC/WPRS 1978) the importance of integrated pest control but emphasised the key role of biological control as important prerequisite of success. The dominance of the entomologists was a topic at most General Assemblies and was addressed in 1985 by V. Delucchi, as President of Global IOBC, as follows (IOBC/WPRS 1986):

“The IOBC remains basically an organisation of entomologists. The 6 Global WGs address exclusively entomological problems. However, the topics of biological (and integrated) control in plant pathology and weed science are numerous. This unilateral focus is one of the major weaknesses I see here that need to be solved at the level of the regional sections and then followed-up by IOBC Global. Presently we identify a lack of equilibrium between the different disciplines in plant protection. Also, we should try to start discussions with representatives of plant pathology and weed science to find a common language that can be understood by everybody”.

These remarks were taken up seriously. Currently WPRS has WGs dealing with plant pathology, while IOBC Global now has several WGs dealing with biological control of weeds. The focus of WPRS activities after 50 years of successful history can probably best be identified by examination of the existing working units (see list below). At the 10th General Assembly in 2005 there were four permanent Commissions and 18 WGs. Nine of them are “horizontal” groups dealing with integrated protection of specific agricultural crops, in forestry or stored products. The majority of them look back at a long history. They are the backbone of WPRS and continue the traditional and effective IOBC working pattern. Six WGs address specific methods or techniques that are used in integrated plant protection, namely: pesticides and beneficial organisms; breeding for plant resistance; pheromones and other semiochemicals; induced resistance in plants; integrated control of fungal and bacterial plant pathogens; insect pathogens and entomoparasitic nematodes. And finally, at least three

groups cover multidisciplinary topics: e.g. multitrophic interactions in soil; landscape management for functional biodiversity and GMO's in integrated plant protection.

Working units of WPRS in 2005

(between brackets year of establishment and their present convenor)

4 Commissions (in chronological order of establishment)

- Determination and identification of entomophagous insects and insect pathogens (1956; H. Baur/CH)
- Publications (1956; H. Bathon/D & L. Tirry/B);
- Integrated production guidelines and endorsement (1974/1990; J. Avilla/E & E. Boller/CH)
- Harmonized regulation of biological control agents (2003; J. Bale/UK)

18 Working Groups (in chronological order of establishment)

- Integrated protection of fruit crops (1959; J. Cross/UK);
- Integrated protection of citrus crops (1962; F. Garcia-Mari/E);
- Integrated protection of olive crops (1965; A. Kalaitzaki/GR);
- Integrated control in protected crops: temperate climate (1968/1985; A. Enkegaard/DK);
- Integrated control in protected crops: Mediterranean climate (1968/1985; C. Castane/E);
- Integrated protection in field vegetables (1970; R. Collier/UK);
- Multitrophic interactions in soil and integrated control (1970; C. Steinberg/D);
- Integrated protection in viticulture (1974; C. Lozzia/I);
- Pesticides and beneficial organism (1975; H. Vogt/D)
- Pheromones and other semio-chemicals in integrated production (1975; P. Witzgall/S);
- Breeding for plant resistance to pests and diseases (1976; N. Birch/UK)
- Integrated control in oilseed crops (1979; B. Koppmann/D);
- Insect pathogens and entomoparasitic nematodes (1985; R. U.Ehlers/D)
- Integrated control of plant pathogens (1989; Y. Elad/IL)
- Integrated protection of stored products (1991; S. Navarra/IL);
- Integrated protection in oak forests (1993; E. Sousa/P);
- Induced resistance in plants against insects and diseases (2001; A. Schmitt/D)
- GMOs in integrated plant production (2001; J. Romeis/CH)
- Landscape management for functional biodiversity (2001; W.H. Rossing/NL & H.M. Poehling/D).

The situation described by V. Delucchi at the 1st General Assembly of WPRS (IOBC 1971) is strikingly similar to the present one:

“The list of the new Working and Study Groups established since 1968 contains only three Groups of pure biological control; the others are based on programs of integrated control, reinforced by specific Groups (...).This internal evolution of IOBC is in accordance with the general trend in Europe, that is the feeling that an optimal solution of phytosanitary problems

can only be found if the whole environment is considered. This environment is dynamic by definition. Consequently, even if the present day problems will probably not be the same as the future ones, as problems they will stay, and with them the Working Groups on integrated control, enlarging their activities”.

A closer look at the papers published in the proceedings of the crop-oriented WPRS WG meetings in the last 5 years (Figure 15) confirms this situation. It is evident that the WGs dealing with perennial agro-ecosystems (i.e. fruit orchards and vineyards) operate at a considerable level of multidisciplinaryity, whereas entomological topics still prevail in most annual crops.

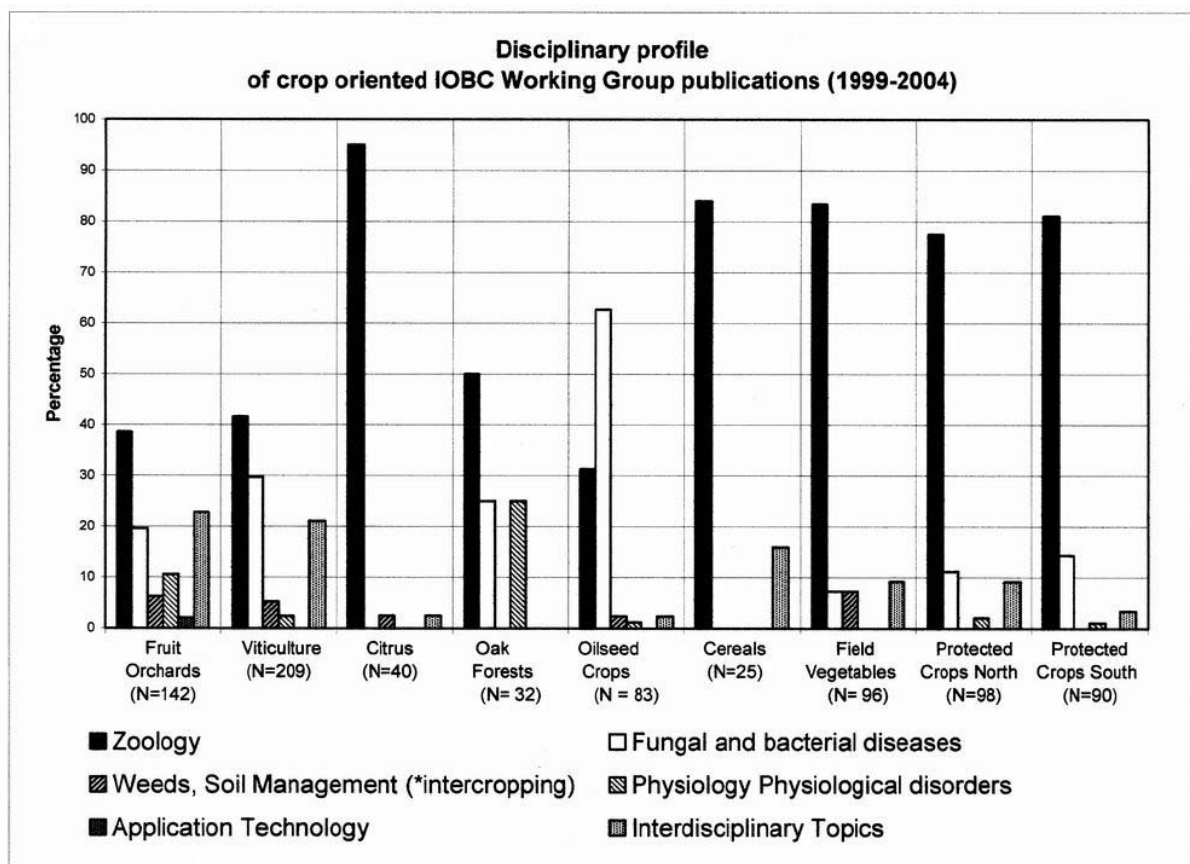


Figure 15. Disciplinary profile of crop oriented working groups

In retrospect, it can be concluded that the consideration of several scientific disciplines in certain WPRS WGs is documented since the late 1960s. There is no doubt that the fruit orchard entomologists around Gruys, Steiner, Baggiolini and Milaire (to name a few), followed in 1974 by entomologists active in viticulture, have been the pioneers in promoting multidisciplinary teamwork. It seems that on the European scene outside IOBC multidisciplinary activities in plant protection started to emerge only in the early 1980s under the label of phytomedicine. It did generate an active information flow, teamwork and field projects, which were more visible and efficient within national professional associations dealing with applied problems than at the majority of the scientific institutions (universities,

national research centres etc.). In 1985 D. J. Royle was the first phytopathologist to be elected as Council member, and as Vice President in 1989 and President in 1993.

However, it should not be overlooked that since 1977 the increase of new topics is reflected in the increasing number of new “vertical” WGs addressing specific methods such as breeding for resistance, pheromones, side effects of pesticides, functional biodiversity, GMOs etc.

A holistic systems approach complements the former taxonomic finesse of biological control and opens the door for a modern plant protection concept

The origins of modern concepts of plant protection and first notions of sustainability in agricultural production can probably not be defined by a particular event or by a specific date. It seems that sometime between the early 1960s and the early 1970s the time became ripe for pioneers to step forward with new ideas and first field experiments. FAO expert panels, the International Biological Programme (IBP) and visionary discussions in IOBC WGs had provided an excellent forum for the creation of new ideas. The Council reports of 1975 and 1976 refer to international discussions conducted by WPRS, OECD, EEC and EPPO about the creation of “Integrated Control Labels” (Paris 1974, Wageningen 1975).

However, the historic WPRS landmark of the “Message of Ovronnaz” and strong pleas for a broader context of “Integrated Control”, presented repeatedly at General Assemblies, did obviously not trigger immediately profound changes in the activities of most WGs. The increasing urgency to discuss the future of WPRS, as was witnessed e.g. during the 9th General Assembly of 2001 at Ascona, revealed among other factors the need for a more comprehensive approach in WPRS activities. In this perspective it was no surprise, that in 2001 the decision was taken to adjust the names of WGs by replacing “Biological Control” by “Integrated Protection” or “Integrated Production”. It can be taken for granted that the term of “Integrated Control” appearing in the report of the 9th General Assembly was an involuntary slip of the pen and should actually read “Integrated Protection”. Already in 1974 the orchard group changed its former name “Integrated Control in Orchards” to “Integrated Protection in Orchards” – a decision that is in line with the present WPRS concept of plant protection in the context of a sustainable agricultural production.

Impact of WPRS on agriculture

What has been the impact of WPRS on important developments in agriculture? Certain significant contributions of WPRS activities can be documented; but the overall impact is less easy to assess. Recommendations of most NGOs (Non-Governmental Organisations), including WPRS, addressed directly to politicians and important decision makers have rarely produced visible and directly measurable results or effects in governmental documents. But the WPRS activities have certainly been instrumental to get biological control, IPM and IP concepts on the agenda of several national and international agricultural organisations.

A more visible success of WPRS was and still is that it provides, at the appropriate time and circumstances, practical, scientifically sound and field tested solutions for important and urgent problems in crop protection and production. Good examples are the series of WPRS Brochures, produced and published by the orchard specialists between 1968 and 1988 (Minks & Degheele, 1993), the testing methods published by the WG “Pesticides and Beneficial Arthropods”, and last but not least the practical tools of the “IOBC Toolbox” that helps farmers and their associations in applying IPM and IP.

Table 3. Guided and integrated control programmes applied in Europe (after van Lenteren et al., 1992 and van Lenteren, 1993)

Crop	Type	Elements	Area under IPM in Europe/ Reduction in pesticides
field vegetables	guided	monitoring - sampling - warning host-plant resistance diseases/pests	5% of total area/ 20-80% reduction
cereals	guided	monitoring - sampling - forecasting host-plant resistance diseases	10% of total area/ 20-50% reduction
maize	integrated	mechanical weeding - host-plant resistance diseases - biocontrol of insects	4% of total area/ 30-50% reduction
vineyards	integrated	biocontrol of mites - host-plant resistance diseases, pheromone mating disruption	20% of total area/ 30-50% reduction
olives	integrated	cultural control - biocontrol insects host-plant resistance diseases/pests monitoring - sampling - pheromones	very limited
orchards	guided	monitoring-sampling	15% of total area
apple/pear	integrated	selective pesticides monitoring - sampling – pheromones biocontrol - selective pesticides host-plant resistance diseases	30% reduction/ 7% of total area 50% reduction
greenhouse vegetables	integrated	monitoring - sampling - biocontrol pests and diseases, host-plant resistance diseases	30% of total area/ 50-99% reduction

Table 4. Most important augmentative biological control programmes in Europe (these programmes are included in the table above, and are completed with data from Sigsgaard, 2006)

Crop	Pest	Natural enemy	Area under biological control in hectares	Reference
maize	<i>Ostrinia nubilalis</i>	<i>Trichogramma brassicae</i>	100,000	van Lenteren et al., 1992; Smith, 1996; Sigsgaard, 2006
orchards apple /pear	various	various	30,000	Blommers, 1994; van Lenteren et al., 1992; Sigsgaard, 2006
greenhouses	many	many	15,000	van Lenteren, 2000
strawberries	<i>Tetranychus urticae</i>	<i>Phytoseiulus s persimilis</i>	20,000	Sigsgaard, 2006
vineyards	<i>Tetranychus urticae</i>	<i>Typhlodromus pyri Amblyseius andersoni</i>	40,000	van Lenteren et al., 1992; Sigsgaard, 2006

Finally, the success of WPRS can also be expressed by the implementation rate of practical biological and integrated crop protection methods (Table 3 and 4). Key examples are the use of *Trichogramma* for control of the European cornborer, natural and biological control of several pests in fruit orchards and vineyards, and the use of a series of successive introductions of natural enemies in combination with other IPM methods for control of all major pests and several diseases in greenhouses.

Outlook

The long tradition of WPRS, to extract with much expertise the relevant information from the gigantic pile of available scientific data and to make sound judgments with regard to the feasibility of this information for the farmer's practice has always been one of the WPRS specialities and an important factor of its good reputation.

There are plenty of international platforms for exchange of scientific information that compete with each other to get attention from their participants. Therefore, it can be anticipated that the successful existence of WPRS will continue if the activities are not only restricted to the organisation of conferences and symposia thus focussing on the internal exchange of information. Since its establishment in 1971 WPRS has always encouraged its WGs to facilitate the participation of young colleagues, to exchange and discuss published and unpublished progress in biological control and integrated plant protection, and to establish collaborative research projects that are essential for the development of efficient IPP and IP programs. The development and publication of simple, scientifically sound and field tested tools for the successful application of sustainable plant protection and production procedures at the farm level will be one of the major challenges faced by WPRS.

Finally, the general public, policy makers and players on the agricultural market need to be better informed about the many successes achieved in conservation biological control and integrated plant protection thus, at the same time, supporting and strengthening the biodiversity.

Acknowledgments

We extend our sincere thanks to all colleagues who have made valuable comments and contributions during the preparation of the manuscript. Vittorio Delucchi and the late Mario Baggiolini assisted us not only with their long expertise in IOBC matters but provided also historical information, pictures and documents that were unknown to us. The colleagues who prepared the short histories of their Commissions and Working Groups provided interesting and often new insight into the activities and working philosophy of our organisation.

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Part IV. History of the Nearctic Regional Section (NRS)

Joop C. van Lenteren, based on material written by F. Bennett, R. Baranowski and R. Wiedenmann

From the Western Hemisphere Regional Section (WHRS, 1971-1984) to the Nearctic Regional Section (NRS, 1985 onwards)

The formation of IOBC in the Western Hemisphere was formally approved at the 5th General Assembly of the old OILB/IOBC, held in Rome, March 30, 1971. At that time, both the Western Hemisphere Regional Section (WHRS) and the South East Asian Regional Section (SEARS) were approved. The WHRS initially included North, South and Central America, as well as the Caribbean.

The initial WHRS Executive Committee met for the first time just weeks after its appointment at the First Latin American Congress of Entomology in Cuzco, Peru, April 12-18, 1971. In December, 1971, the Executive Committee met during the annual meeting of the Entomological Society of America, which has been followed ever since for both WHRS and NRS.

By the end of the first year, there were 307 individual memberships, 10 institutional memberships and 2 supporting memberships. The first regional newsletter was prepared by J. S. Kelleher in October 1971. Numbers of newsletters produced per year have ranged from one to four per year. In some years, both English and Spanish versions were produced. The first Working Groups were established in 1973; those early Working Groups included Citrus Pests (C. W. McCoy, chair), *Diatraea* and allied graminaceous borers (F. D. Bennett, chair), Integrated Control (R. L. Ridgway, chair), Microbial control (J. McB. Cameron, chair), Soybean pests (L. D. Newsom, chair) and Weeds (P. Harris, chair).

The WHRS was split into two distinct regional sections after discussion at the International Roundtable Conference on Biological Control held in Santiago, Chile, in July 1984. At that time, Canada, the United States and Bermuda formed the Nearctic Regional Section, whereas Mexico, and countries in Central America, South America and the Caribbean formed the Neotropical Regional Section.

WHRS (through 1984) and NRS (1985 – present) officers

1971-1973

President	Fred D. Bennett (Trinidad)
President Elect	O. Beingolea (Peru)
Vice Presidents	J. B. McCameron (Canada) and C. B. Huffaker (USA)
Secretary-Treasurer	W. H. Whitcomb
Corresponding Secretary	R. I. Sailer (USA) / J.S. Kelleher (Canada)

1973-74

President	O. Beingolea
President-Elect	C. M. Ignoffo
Past President	F. D. Bennett
Vice Presidents	C.H.W. Fletchmann and P. S. Messenger
Secretary-Treasurer	W. H. Whitcomb
Corresponding Secretary	J. S. Kelleher

1975-76

President	C. M. Ignoffo
President-Elect	Robert van den Bosch
Past President	O. Beingolea
Vice Presidents	K. D. Biever and J. L. Carillo
Secretary-Treasurer	G. E. Allen
Corresponding Secretary	R. I. Sailer
Members-at-Large	H. C. Coppel, C.H.W. Fletchmann, P. S. Messenger

1977-78

President	R. van den Bosch
President-Elect	J. S. Kelleher
Past President	Carlo Ignoffo
Vice Presidents	D. E. Bryan and L. E. Caltagirone
Secretary-Treasurer	George E. Allen
Corresponding Secretary	K. D. Biever
Members-at-Large	J. R. Coulson, K. S. Hagen, W. H. Whitcomb

1979-80

President	J. S. Kelleher
President-Elect	George E. Allen
Past President	Robert van den Bosch
Vice Presidents	J. R. Quezada and H. C. Chiang
Secretary-Treasurer	R. M. Baranowski
Corresponding Secretary	K. D. Biever
Members-at-Large	R. N. Williams, F. E. Gilstrap, C. J. DeLoach

1981-82

President	George E. Allen
President-Elect	H. C. Chiang
Past President	J. S. Kelleher
Vice Presidents	Americo Ciociola and R. D. Eikenbary
Secretary-Treasurer	R. M. Baranowski
Corresponding Secretary	Frank E. Gilstrap
Members-at-Large	Evaneo Berti-Filho, E. G. King, M. J. Tauber

1983-84

President	H. C. Chiang
President-Elect	R. M. Baranowski
Past President	George E. Allen
Vice Presidents	Evaneo Berti-Filho and Alfonso Garcia-Escobar
Secretary-Treasurer	Frank E. Gilstrap
Corresponding Secretary	L. T. Kok
Members-at-Large	L. E. Caltagirone, G. L. Cunningham, R. J. Dysart

1985-86 (began NRS)

President	R. M. Baranowski
President-Elect	Jack R. Coulson
Past President	H. C. Chiang
Vice Presidents	Robert V. Flanders and Marjorie A. Hoy
Secretary-Treasurer	Frank E. Gilstrap
Corresponding Secretary	J. C. Miller

Members-at-Large	James R. Cate, Lawrence R. Charlet, Lester E. Ehler
1987-88	
President	Jack R. Coulson
President-Elect	Frank E. Gilstrap
Past President	R. M. Baranowski
Vice President	L. E. Ehler
Secretary-Treasurer	John J. Obrycki
Corresponding Secretary	J. C. Miller
Members-at-Large	E. Alan Cameron, D. L. Dahlsten, J. J. Drea
1989-90	
President	Frank E. Gilstrap
President-Elect	L. E. Ehler
Past President	J. R. Coulson
Vice Presidents	D. L. Dahlsten
Secretary-Treasurer	J. J. Obrycki
Corresponding Secretary	L. D. Charlet
Members-at-Large	G. R. Buckingham, J. R. Cate, R. J. Dysart
1991-92	
President	L. E. Ehler
President-Elect	Gary R. Buckingham
Past President	F. E. Gilstrap
Vice President	E. A. Cameron
Secretary-Treasurer	J. J. Obrycki
Corresponding Secretary	L. D. Charlet
Members-at-Large	Dan Gonzalez, Richard S. Soper, Maurice J. Tauber
1993-94	
President	G. R. Buckingham
President-Elect	John J. Obrycki
Past President	L. E. Ehler
Vice President	L. D. Charlet
Secretary-Treasurer	James R. Nechols
Corresponding Secretary	Roy Van Driesche
Members-at-Large	Timothy J. Kring, J. E. Laing, Daniel L. Mahr
1995-96	
President	J. J. Obrycki
President-Elect	T. J. Kring
Past President	G. R. Buckingham
Vice President	Fred Pettit
Secretary-Treasurer	Doug Landis
Corresponding Secretary	R. Van Driesche
Members-at-Large	Charles Pickett, Sandy Smith, Tom Unruh
1997-98	
President	T. J. Kring
President-Elect	L. D. Charlet
Past President	J. J. Obrycki
Vice President	Robert J. O'Neil
Secretary-Treasurer	Robert N. Wiedenmann

Corresponding Secretary Lindsey Milbrath
Members-at-Large Molly Hunter, Nick Mills, Charles Pickett

1999-2000

President L. D. Charlet
President-Elect D. L. Mahr
Past President T. J. Kring
Vice President M. S. Hunter
Secretary-Treasurer R. N. Wiedenmann
Corresponding Secretary L. Milbrath
Members-at-Large Ann Hajek, Keith Hopper, John Ruberson

2001-02

President D. L. Mahr
President-Elect M. S. Hunter
Past President L. D. Charlet
Vice President J. Ruberson
Secretary-Treasurer R. N. Wiedenmann
Corresponding Secretary Susan E. R. Mahr
Members-at-Large Jacques Brodeur, Stefan Jaronski, Peter Mason

2003-04

President M. S. Hunter
President-Elect R. N. Wiedenmann
Past President D. L. Mahr
Vice President N. Mills
Secretary-Treasurer S. Jaronski
Corresponding Secretary S. E. R. Mahr
Members-at-Large J. Brodeur, George E. Heimpel, Sujaya Rao

2005-06

President R. N. Wiedenmann
President-Elect Marshall Johnson
Past President M. S. Hunter
Vice President G. E. Heimpel
Secretary-Treasurer S. Jaronski
Corresponding Secretary S. E. R. Mahr
Members-at-Large D. Landis, Megha Parajulee, Les Shipp

Current situation of NRS

NRS has more than 150 individual members and several institutional members. This Region holds a business and scientific meeting during the Annual Entomological Society of America meeting. The region currently has one working group, the one on Greenhouse, Nursery, and Ornamental Landscapes. This WG cooperates closely with the WPRS WGs on Integrated Protection in Protected Cultivation and these WGs usually coorganize their WG meetings.

IOBC-NRS recognizes a Distinguished Scientist in Biological Control each year. This award honors someone who has dedicated their career to the discipline of biological control and has made a significant contribution to its development and implementation. Nominees must have spent most of their career in the Nearctic Region (essentially Canada and the U.S.), and have made significant contributions to biological control, but need not be members of IOBC.



IOBC-NRS Distinguished Scientist Award winners since 1995:

- 1995 Ken Hagen
- 1996 Fred Bennett
- 1997 Vern Stern
- 1998 Peter Harris
- 1999 Joseph Maddox
- 2000 Richard Goeden
- 2001 James McMurtry
- 2002 Maurice & Catherine Tauber
- 2003 Robert Luck
- 2004 Marjorie Hoy
- 2005 William Murdoch

IOBC-NRS also has presented an award for Outstanding Graduate Student in Biological Control to a deserving graduate student each year since 2002.

IOBC-NRS appointed Prof.dr. R.F. Luck to honorary member in 2005.

Photograph. Combined meeting of IOBC NRS and BioControl Network Canada, May 2005, Magog, Canada

Part IVa. Neotropical Regional Section (NTRS): History, Perspectives and Challenges

Miguel C. Zapater and Joop C. van Lenteren



Logotype

In 1990, a call for bids was carried out for the selection of a logotype for the NeoTropical Regional Section. The one chosen and voted at that time still represents us. This logo was designed by Carlos Martinez Rey.

Formation of NTRS

The 1^{ra}. *Mesa Redonda* on Biological Control held in Santiago de Chile in July 1984, organized by Mario Vaughan (FAO), provided an excellent opportunity for discussions about to the formation of the Latin American Section of the International Organization for Biological Control (IOBC). In 1988, in Vancouver, Canada, IOBC-Global President Jack Coulson, and IOBC-Global Secretary Jean-Paul Aeschlimann simultaneously started to contact regional biological control specialists to facilitate the establishment of the Neotropical Regional Section (NTRS). Over this time span a group of stakeholders analyzed different types of structure and drew up a draft if the Statutes and Bylaws. In September 1989, during the 2^{da}. *Mesa Redonda* that was attended by a large audience and organized by FAO, CIRPON (Centro de Investigaciones sobre Regulaciones de Poblaciones de Organismos Nocivos) and IOBC held in the province of Tucumán, Argentina, Jack Coulson (IOBC president) and Mario Vaughan proposed the creation of NTRS (Figure 1).

After an election process, the first Governing Board (GB) was elected and the Statutes and Bylaws were accepted, and approved later that month (Sept. 27, 1989) by the Executive Committee of IOBC-Global in Florence, Italy. A few months later, the Regional Section started up formal operations. For additional information concerning establishment and functions, see Zapater (1992) and Zapater (1996).



Figure 1. Participants at the Latin American Biological Control Course held in Chile, 1988.

Governing Boards

Since its formation, several GBs have been designated by the vote of its members (see list below). In 2003, the 3rd GB temporarily passed on its functions to the 4th, reassuming its functions in 2005 in order to continue with the designation process of its successors. The latest GB was elected in May 2006.

1st Governing Board (1989-94)

President: M. C. Zapater, Argentina
Secretary: P. Baker, Trinidad & Tobago
Treasurer: E. Botto, Argentina
1st Vice-President: J. Parra, Brazil
2nd Vice-President: P. Liedo, Mexico
3rd Vice-President: R. Cave, Honduras

2nd Governing Board (1994-1998)

President: F. Ferrer, Venezuela
Secretary: M.C. Zapater
Treasurer: V. Paes Bueno, Brazil
1st Vice-President: E. Berti Filho, Brazil
2nd Vice-President: R. Cave, Honduras
3rd Vice-President: R. Ripa, Chile
Former President: M. C. Zapater

3rd Governing Board (1998-2003)

President: R. Alatorre, Mexico
Secretary: H.C.A. Bernal, Mexico
Treasurer: J.F.B. Gaytan, Mexico
1st Vice-President: R. R. Vergara, Colombia
2nd Vice-President: J. Jimenez, Colombia
3rd Vice-President: E. Botto, Argentina
Former President: F. Ferrer, Venezuela

4th Governing Board (2003-2005) (ad hoc)

President: O. Fernandez-Larrea, Cuba
Secretary: E. Rijo Camacho, Cuba
Treasurer: L. Vazquez Moreno, Cuba

5th Governing Board (2005-2006) (ad hoc)

President: R. Alatorre, Mexico
Secretary: H.C.A. Bernal, Mexico
Treasurer: J.F.B. Gaytan, Mexico
1st Vice-President: R. R. Vergara, Colombia
2nd Vice-President: J. Jimenez, Colombia
3rd Vice-President: E. Botto, Argentina
Former-President: F. Ferrer, Venezuela

6th Governing Board (2006-2010)

President: Vanda .H.P. Bueno, Brazil

President-Elect: F. Consoli, Brazil

Secretary: William Cabrera, Argentina

Treasurer: Luis Devotto, Chile

1st Vice-President: Maria Manzano, Colombia

2nd Vice-President: Mary M. Whu Paredes, Peru

3rd Vice-President: Leopoldo Hidalgo, Cuba

Former-President: R. Alatorre, Mexico

Members

Soon after NTRS was set up, membership rapidly increased, reaching nearly 120 members in 1994. Thereafter, the number of members began to decrease, possibly because the organization's expectations were not fully met and payment of membership fees by checks drawn in US\$ faced serious difficulties. During the early stages of NTRS, most membership fees were paid in cash whenever members met at any international event that might take place. Recently, new activities were started to revitalize NTRS and the first successes have been obtained with the election of a new GB and an increase of membership .

Newsletters

Newsletters captured a high level of interest as they became a real means of communication. At first they were published regularly, distributed to all members and potentially interested individuals. Newsletters included Regional Section news, articles, publications, briefs, and upcoming events such as symposia, conferences and WGs activities. It is planned to have a full set of PDF files of these newsletters on the IOBC Global website by the end of 2006.

Newsletters published by NTRS:

No. 1 May 11, 1990 edited by Peter Baker, 12 pages.

No. 2 December, 1 1990 edited by Peter Baker, 10 pages.

No. 3 July 1, 1991 edited by Peter Baker, 11 pages.

No. 4 December 31, 1991 edited by Peter Baker, 15 pages.

No. 5 December 31, 1992 edited by Peter Baker, 19 pages.

No. 6 October 15, 1993 edited by Peter Baker & Miguel Zapater, 11 pages.

No. 7 November 15, 1994 edited by Miguel Zapater, 9 pages.

No. 8 August 1, 1995 edited by Miguel Zapater, 9 pages.

No. 9 December 10, 1995 edited by Miguel Zapater, 13 pages.

No. 10 December, 1996 edited by Francisco Ferrer & Miguel Zapater, 10 pages.

No. 11 (1) June 1999 edited by Hugo Cesar Arredondo & Marco Antonio Melin, 14 pages.

No. 12 (2) June 2001 edited by Hugo Cesar Arredondo, 9 pages.

No. 13 (1) December 2004 edited by Orieta Fernández –Larrea & Luis Vazquez, 6 pages.

No. 14 June 2004 edited by Vanda Bueno and Joop van Lenteren, 9 pages.

Working Groups

Working Groups (WGs) are a clear example of how members can become actively engaged. The purposes of these working are to encourage small groups of people to do specific research on a common interest issue, to draft newsletters or bulletins and to hold meetings to

analyze common concerns. WGs have their own operative rules and partial autonomy in decision making. Guidelines for their creation are listed in Zapater (1996).

The first WG was that of *Trichogramma*, coordinated by E. Botto, and comprised several members whose duties involved the publication of newsletters. Activities of this working group continued for several years. Later, most members of this WG became member of the Global WG egg parasitoids.

Another WG, coordinated by Aldo Malavasi, was that of the Fruit Flies of the Western Hemisphere. This WG turned out to be very dynamic and organized meetings and published proceedings. Also several members of this WG became member of the Global WG fruit flies of economic importance. Currently NTRS does not have WG, but there are plans for new WG to be established by the recently elected GB.

Representatives

Due to the vastness of the region, the appointment of members representing their countries is relevant. Their responsibility involves gathering information about Biological Control in their home countries and submitting it to the Regional Section secretary twice a year to be included in the newsletters. Their duties also include promoting the objectives of the organization and facilitating payment of membership fees whenever members attend conferences or other events. Said representatives are appointed by the GB for variable terms of office and, when necessary, more than one representative is on duty. For information regarding these representatives, see Zapater (1996).

Meetings

Initially, one of the objectives was to foster contact and communication among BC specialists in the region at times when airmail here was slow and unreliable, the use of telephones was awfully restrained, and only very few institutions could afford availability of databases and access to literature.

Since 1984, IOBC Global and NTRS have participated in the organization of numerous meetings and conferences, among which:

1^{ra} *Mesa Redonda* on Biological Control in the Neotropical Region, Santiago, Chile, 1984. Organized by FAO and IOBC-Global. FAO report (Proveg-1, RLAC/84/37).

2^{da}. *Mesa Redonda* on Biological Control in the Neotropical Region, S. M. de Tucumán, Argentina, 1989. Organized by FAO & CIRPON. Meeting involved 114 participants from 14 countries. Reports in Spanish and English as FAO reports (Proveg-26, RLAC/90/18). Proceedings were edited by CIRPON, 379 pages.

3^{ra}. *Mesa Redonda* on Biological Control in the Neotropical Region, Rio de Janeiro, Brazil, 1991. Organized by FAO and IOBC-NTRS. Meeting involved 184 participants from 19 countries. Proceedings were edited by Zapater M., *El control biológico en América Latina*.

Workshop on “Opportunities for Implementation of Biocontrol in Latin America” organized by IOBC-Global & NTRS. Rio de Janeiro, August 12, 1991- 130 participants. Proceedings were published by Coulson J. & Zapater M., Opportunities for implementation of biocontrol in Latin America.

1st International Workshop on Biological Control and Integrated Pest Management on Banana, Costa Rica, November 1997, 24 presentations.

1st Latin American Congress on IPM and Biological Control of IOBC-NTRS, 18-22 May, 1998, Lima, Peru.

2nd Latin American Congress on IPM and Biological Control of IOBC-NTRS, Varadero, Cuba, 2000.

3rd Latin American Congress on IPM and Biological Control of IOBC-NTRS, Havana, Cuba, 2004. The meeting involved 84 participants from 14 countries, 53 papers were presented and 55 posters were displayed.

4th Latin American Congress on IPM and Biological Control of IOBC-NTRS, Cali, Colombia, 2006. The meeting involved 150 participants from 14 countries. In total 39 papers were presented and 20 posters displayed.

Publications

The Regional Section has published two proceedings:

Coulson J.R. & Zapater M.C. (editors) 1992. Opportunities for Implementation of Biocontrol in Latin America. IOBC-Global & IOBC-SRNT, Buenos Aires, 71 pages.

Zapater M.C. (editor) 1996. *El control biológico en América Latina*. IOBC-SRNT, Buenos Aires, 142 pages.

Perspectives

The perspectives for the revitalization of NTRS are very promising due to several factors, some of which are external to biological control.

Firstly, the advances made in rearing, field efficiency, quality control and commercialization of beneficial insects in Latin America will generate added value to the organization. This, in combination with the demand of food produced with less or no content of pesticide residues is becoming a mandatory requirement from society and from profitable markets. In a framework of integrated pest management programs, biological control offers a sound and effective alternative for pesticides.

Secondly, the advent of e-mail and Internet has generated a genuine revolution in communication. To keep pace with ongoing activities carried out by NTRS members and its GB, fast communication is crucial: it will contribute to optimal management of the Regional Section.

Thirdly, the implementation of payment of fees by credit card makes it possible for members to easily and promptly pay membership fees. It is noteworthy that managing foreign currency in most countries of the region is still a problem.

Last but not least, the increasing general popular awareness and support for biological control. Biological control through commercial insectaries has allowed farmers to observe its efficacy in practice.

In view of all the above, the renowned and striking examples of classic biological control set by most countries of the region and the large areas under successful augmentative biological control create the driving force to fuel new NTRS activities.

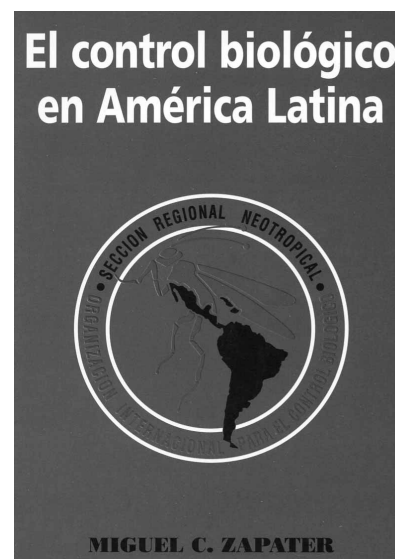
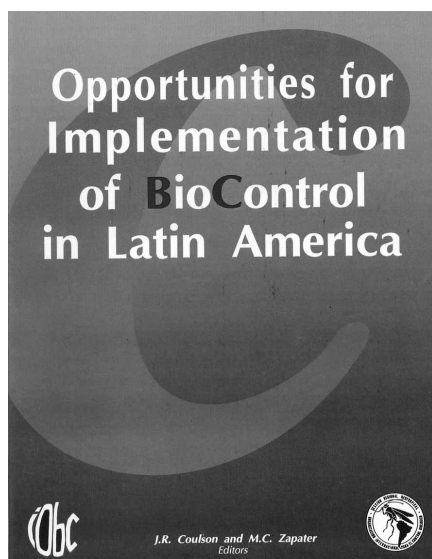
Challenges

One of the most important challenges that the new GB will face is to make IOBC members as well as the scientific community understand what the organization is about (see NTRS newsletter No. 8), what its philosophy is and how “being one of its members” can help us in our activities. The Regional Section future depends on the capability of the successive GBs to maintain and increase the frequency of a series of activities over time. Participating in WGs involves team work spirit that needs to be constantly encouraged in the region. This will not be an overnight accomplishment. It should also be understood that involvement and participation in WGs is an enriching experience for each and all members.

Another challenge - in an environment such as the NTRS - is to analyze different ways to promote biological control, such as showing more successful examples, encouraging commercial insectaries and supporting academic education in biological control. As for regulations regarding imports and commercialization of beneficials, current legislation among countries should be updated and harmonized as insects know nothing about barriers like country frontiers. A up to date database, including names of specialists, projects and other items, continues to be as effective and operational as when it was first proposed in 1995 (NTRS newsletter No. 9). During a workshop organized by IOBC Global and NTRS in Rio de Janeiro in 1991, certain restraints, guidelines and ways to promote biological control in the region were analyzed and reported by Coulson & Zapater (1992).

References

- Zapater M.C. 1992. IOBC's Neotropical Regional Section (NTRS), pages1-6. *In*: Coulson J.R. & Zapater M.C. (eds.) 1992. Opportunities for Implementation of Biocontrol in Latin America. IOBC-Global & IOBC-SRNT, Buenos Aires, 71 pages.
- Coulson J.R. & Zapater M.C. (eds.) 1992. Opportunities for Implementation of Biocontrol in Latin America. IOBC-Global & IOBC-SRNT, Buenos Aires, 71 pages.
- Zapater M.C. (ed.) 1996. *El Control Biológico en América Latina*. IOBC-SRNT, Buenos Aires, 142 pages.



Part V. History of the Asia and the Pacific Regional Section (APRS)

Eizi Yano & Joop C. van Lenteren

Start of Region and current situation

SEARS (South and East Asian Regional Section) and PRS (Pacific Regional Section) were established in 1971 at the 5th General Assembly of IOBC held in Rome and approved in 1972 at the 6th General Assembly of IOBC held in Canberra. . SEARS covers an area of South and East Asia and includes 23 countries. SEARS started in 1971 with 63 individual members and 5 institutional members. In 1988, there were 120 individual members and two institutional members. PRS covered the many islands of the Pacific. Very limited information could be found about PRS, though some activities of this region were reported in the newsletter of IOBC Global. The proposed fusion of the two sections resulted in a change of name into Asia and the Pacific Regional Section (APRS), which was approved by the Global Council at a meeting in Montpellier (France) in 1999. APRS covers the earlier area of SEARS and PRS, including Australia and New Zealand. APRS started with 108 individual members and two institutional members. In 2004, there were 77 individual members and two institutional members. Because of difficulties and costs of international payment of fees, membership went down. To date, APRS members are mainly located in Japan, China and Thailand; the number of members from Australia and New Zealand has strongly decreased. The number of Japanese members has always been stable and forms the largest group in APRS.

Characterization of the Asia and the Pacific Regional Section

This region covers a vast area, with enormous differences in climates and cultures, which complicates the coordination of biological control activities. As said above, most members in this region are found in Japan, but intensive biological control activities are also taking place in many other countries. For example, China has the second largest area under augmentative biological control (more than 2 million hectares) of the world. And Australia and New Zealand are known for many excellent examples of classical biological control of weeds and insects. Various other countries are known for large scale IPM projects that have been realized during the past two decades, partly with the Farmers Field School approach. This means that there is an enormous potential for growth of IOBC in this region.

Governing Boards

1st Governing Board (1972-1977)

President: K. Yasumatsu (Japan)

Vice-President: V.P. Rao (India)

Vice-President: M.A. Ghani (Pakistan)

Secretary-Treasurer: K. Aizawa (Japan)

2nd Governing Board (1977-1980)

President: M.A. Ghani (Pakistan)

Vice-President: H. Mori (Japan)

Vice-President: T. Sankaran (India)

Secretary-Treasurer: A.I. Mohyuddin (Pakistan)

Honorary President: K. Yasumatsu (Thailand)

3rd Governing Board (1980-1984)

President: T. Sankaran (India)

Vice-President: Banpot Napompeth (Thailand)

Vice-President: Ahmad Yunus (Malaysia)

Secretary-Treasurer: S. Nagarkatti (India)

4th Governing Board (1984 -1988)

President: Banpot Napompeth (Thailand)

Past-President: T. Sankaran (India)

Vice-President: A.I. Mohyuddin (Pakistan)

Vice-President: Yoshimi Hirose (Japan)

Secretary-Treasurer: Wiwat Suasa-ard (Thailand)

5th Governing Board (1988-1993)

President: Yoshimi Hirose (Japan)

Past-President: Banpot Napompeth (Thailand)

Vice-President: G.S. Lim (Malaysia)

Vice-President: H. Mori (Japan)

Secretary-Treasurer: M. Takagi (Japan)

6th Governing Board (1993-1997)

President: R. Muniappan (Guam, USA)

Past-President: Yoshimi Hirose (Japan)

Vice-President: T.M. Manjunath (India)

Vice-President: A.I. Mohyuddin (Pakistan)

Secretary-Treasurer: M. Marutani (Guam, USA)

7th Governing Board (1997-2002)

President: Rachel E. McFadyen (Australia)

Past-President: R. Muniappan (Guam, USA)

Vice-President: R. Wang (China)

Vice-President: Md. Y. Hussein (Malaysia)

Secretary-Treasurer: D. Holdom (Australia)

8th Governing Board (2002-2006)

President: Eizi Yano (Japan)

Past-President: Rachel E. McFadyen (Australia)

Vice-President: Fang-Hao Wan (China)

Vice-President: Wiwat Suasa-ard (Thailand)

Secretary-Treasurer: Takeshi Shimoda (Japan)

Newsletters

Since 1993, SEARS/APRS has published a newsletter. It is planned to have a full set of PDF files of these newsletters on the IOBC Global website by the end of 2006.

No.1 March 1993 edited by R. Muniappan, 4 pages.

No.2 July 1993 edited by R. Muniappan, 4 pages.

No.3 September 1993 edited by R. Muniappan, 4 pages.

No.4 December 1993 edited by R. Muniappan, 4 pages.

No.5 April 1994 edited by R. Muniappan, 4 pages.

No.6 July 1994 edited by R. Muniappan, 4 pages.

- No.7 September 1994 edited by R. Muniappan, 4 pages.
No.8 December 1994 edited by R. Muniappan, 8 pages.
No.9 March 1995 edited by R. Muniappan, 4 pages.
No.10 June 1995 edited by R. Muniappan, 2 pages.
No.11 September 1995 edited by R. Muniappan, 2 pages.
No.12 December 1995 edited by R. Muniappan, 2 pages.
No.13 March 1996 edited by R. Muniappan, 2 pages.
No.14 in 1997 edited by R.E. McFadyen
No. 15 October 1997 edited by R. McFadyen, 6 pages.
No.16 January 1998 edited by R. McFadyen, 4 pages.
No.17 May 1998 edited by R. McFadyen, 8 pages.
No. 18 in 1998 edited by R.E. McFadyen
No. 20 December 1998 edited by R. McFadyen, 2 pages.
No. 21 in 1999 edited by R.E. McFadyen
No. 22 July 1999 edited by R. McFadyen, 4 pages
No. 23 November 1999 edited by R. McFadyen, 4 pages
No. 24 March 2000 edited by R. McFadyen, 6 pages
No. 25 December 2000 edited by R. McFadyen, 4 pages
No. 26 December 2002 edited by E. Yano, 4 pages
No. 27 December 2004 edited by E. Yano, 4 pages.

Meetings

SEARS/APRS has organized the following regional meetings where activities for and problems of this section were discussed.

- The first regional meeting, Kuala Lumpur, Malaysia, 3 March 1982. Organized by Dr. T. Sankaran
- The second regional meeting, Bangkok, Thailand, 7 September 1984. Organized by Dr. Banpot Napompeth
- The third regional meeting, Tsukuba, Japan, 2 October 1989. Organized by Dr. Yoshimi Hirose
- The fourth regional meeting. Fukuoka, Japan, 17 October 2004. Organized by Dr. E. Yano and Dr. M. Takagi (figure 1)

Other meetings (co-)organized by SEARS/APRS:

- International Seminar on “Biological Control and Integrated Management of Paddy and Aquatic Weeds in Asia”, Tsukuba, Japan, 19-25 October 1992
- First International Conference on “Parthenium Management”, Dharwad, India, 6-8 October 1997
- International Symposium on “Biological Control of Insect Pests”, Suwon, Korea, 13-14 November 1997. Organized by the Korean Society of Applied Entomology. This meeting involved more than 100 participants from 7 countries
- International Conference on “IPM – Theory and Practice: developing sustainable agriculture”, Guangzhou, China, 15-20 June 1998. Organized by Guangdong Association for International Science and Technology Cooperation and the Guangdong Entomological Society. This meeting involved more than 360 participants from 24



countries

- International Symposium on Biological Control of Aphids and Coccids, Tsuruoka, Japan, 25-29 September 2005. Co-organized by the IOBC Global Working Group of Biological Control of Aphids and Coccids. This symposium involved 82 participants from 19 countries. There were two plenary lectures, 37 invited talks in six sessions and 33 poster presentations

Publications

In addition to the newsletters, APRS/SEARS has published the following papers and reports:

- Muniappan, R., (ed.), 1988. Proceedings 1st International Workshop on Biological Control of *Chromolaena odorata*, 85 pp.
- Amendments to the Statutes of SEARS, 1989.
- Hirose, Y. (ed.), 1992. Biological Control in South and East Asia. Kyusyu University Press, IOBC/SEARS, 68pp.

Perspectives

The vast area that APRS represents makes it difficult to organize meetings of common interest. An idea to increase participation in APRS might be to hold APRS meetings in the national annual entomological society meetings and invite APRS members from other countries to take part in symposia of mutual interest. Another idea is to divide APRS in several subregions that organize their own activities according to a similarity in biological control problems.

Figure 1. Participants at IOBC APRS meeting 2004

Part VI. History and Activities of the East Palearctic Regional Section of IOBC

Danuta Sosnowska, Jerzy J. Lipa and Joop C. van Lenteren

The start of IOBC/EPRS, its General Assemblies and Councils



In 1974, the President of IOBC Global received a proposal from members of the Council of Mutual Economic Cooperation (SEV) to establish an East Palearctic Regional Section (EPRS) of IOBC. In October 1974, the Council of IOBC Global decided to support the proposal to establish this new regional section of IOBC. After this decision, and according to the statutes of IOBC Global, a draft of the statutes of EPRS were prepared and sent to the secretary general of IOBC Global for approval. During the VIIth General Assembly of IOBC Global in Washington DC (USA) in 1976, the Statutes of EPRS were approved and they were ratified in 1977 during the first General Assembly of EPRS in Moscow (USSR). The main goal of EPRS as defined in the statutes is to promote research and introduction of biological control methods into plant protection practices.

The *1st General Assembly* of EPRS was held from 18 to 22 April 1977 in Moscow at which representatives from Bulgaria, Czechoslovakia, East Germany, Hungary, Poland, Rumania and the USSR participated. The first Council was elected and was composed as follows: President: Yu. N. Fadeyev (USSR); Vice-President: J. J. Lipa (Poland); Secretary-General: V. A. Lebedev (USSR). At the First General Assembly, the following EPRS Standing Commissions were established:

1. Editing and Publishing. Convenor: G. A. Beglarov (USSR)
2. Insect Pathogens and Phytophagous Organisms of Weeds. Convenor: A. I. Kaytazov (Bulgaria).
3. Microbiological Plant Protection Agents. Convenor: J. Weiser (Czechoslovakia)
4. Integrated Control in Protected Crops. Convenor: T Baicu (Rumania)
5. Genetic Methods of Plant Protection. Convenor: B. Nagy (Hungary).



Figure 1. Participants at an IOBC/EPRS meeting in Kiev, 1979.

The **2nd General Assembly** was held from 17 to 19 November 1980 in Moscow, at which the Council was reelected.

At the **3rd General Assembly** in April 1984 in Moscow, a new Council was elected for the period 1984–1986, which was composed as follows: President: N. M. Golyshin (USSR); Vice-President: D. Benke (Hungary); Secretary-General: V. Y. Martynenko (USSR). A new standing commission was established during this 3rd Assembly, namely the “Commission on Biological Protection of Forest Trees” with G. Tzankov (Bulgaria) as a convenor. The following honorary members were elected at the 3rd General Assembly: Yu. N. Fadeev (USSR), G. Polyanov (Bulgaria), V. A. Lebedev (USSR), B. Nagy (Hungary), A. Kaytazov A. (Bulgaria) (see IOBC/EPRS Bulletin, No 11, 1985).

The **4th General Assembly** was held from 26 to 29 May 1987 in Moscow, at which a new Council was elected for the period 1987–1989, which was composed as follows: President: N. M. Golyshin (USSR); Vice-President: V. Landa V. (Czechoslovakia); Secretary-General: V. Y. Martynenko (USSR). From this period onwards, a stronger cooperation between EPRS and WPRS developed. Three examples illustrate this. First, the EPRS and WPRS Working Groups on Integrated Control of Pests in Protected Crops co-organized a meeting in Hungary in 1987 with more than 100 participants from all over the world; EPRS and WPRS published the proceedings of this meeting together. Secondly, during a conference in 1988 in Batumi (USSR) on “Introduction of beneficial organisms”, scientists from France and Switzerland participated. Thirdly, at a conference in 1989 in Borzhomi (USSR) of the Working Group “Biological control of forest trees” scientists from Canada, the USA and West Germany participated.

The **5th General Assembly** of IOBC/EPRS was held in May 1990 in Uzhgorod (USSR). A new Council was elected for the period 1990–1992, which consisted of: President: A. I. Smetnik (Russia); Vice-President: T. Baicu (Rumania); Secretary-General: S. S. Izhevsky (Russia)

The **6th General Assembly** took place from 5 to 9 April 1993 in Smolenice (Slovenia). At this meeting, ten new scientific organisations and biological control companies were accepted as new members. A new Council was elected for the period 1993–1996, which was composed as follows: President: A. I. Smetnik (Russia); Vice-President: S. Pruszyński. (Poland); Secretary-General: G. A. Beglyarov (Russia). During this term a joint meeting of IOBC/EPRS and IOBC/WPRS working groups of “Insect Pathogens and Insect Parasitic [Nematodes]” took place in Poznań (Poland) from 27 August to 1 September 1995, which was attended by more than 100 scientists from 21 countries, equally divided between East and West. Nearly 80 papers/posters were presented on insect pathogenic bacteria, viruses, fungi, nematodes and protozoa, and the results were published in IOBC/WPRS Bulletin/Bulletin OILB/SROP 19(9)1996.

The **7th (May 12–16, 1997) and the 8th (July 2–6, 2001) General Assemblies** were held in Poznań (Poland). The following council was elected: President: A. I. Smetnik (Russia); Vice-Presidents: I. Eke (Hungary) and S. Pruszyński (Poland); Secretary-General: A. A. Orłowski (Russia). Prof. J. J. Lipa was awarded an Honorary Membership for the outstanding contribution to the establishment and activities of IOBC/EPRS and the development of science and technology of biological control.

The **9th General Assembly** – celebrating 25th anniversary of the East Palearctic Regional Section - was held during from 7 to 11 June 2005 in Budapest (Hungary) (Figure 2). A new Council was elected: President: I. Eke (Hungary); Vice-Presidents: D. Sosnowska

(Poland) and V. Nadykta V. (Russia); Secretary-General: Yu Gninenko (Russia). Prof. S. Pruszyński was awarded an Honorary Membership for his contributions to the activities of EPRS.



Figure 2. Participants at the 9th General Assembly of IOBC/EPRS, May 2005, Budapest, Hungary

Activities of IOBC/EPRS

IOBC/EPRS consists mainly of Institutional Members (see table 1). These institutional members are paying an annual contribution to the EPRS Secretariat to support secretarial activities and the printing of bulletins. Because of economic and political problems in countries of this region, the institutional memberships of EPRS diminished since 1990. Contact with colleagues from Kirghizia, Uzbekistan, Tajikistan, Azerbaijan, Turkmenistan, Armenia, Slovakia, Slovenia, Bosnia and Herzegovina, Albania, Mongolia and Rumania has been lost. The Secretariat of EPRS now undertakes attempts for the renewal of old relationships.

Until now, six Standing Commissions and sixteen Working Groups have been actively working within the framework of EPRS. More than 150 scientists from Belorussia, Bulgaria, Georgia, Hungary, Kazakhstan, Kirgizia, Macedonia, Moldavia, Poland, Rumania, Russia, Ukraine, and the former Yugoslavia took part in the work of IOBC/EPRS. There are about 30 scientific and applied organisations that also collaborate within IOBC/EPRS. EPRS annually publishes an “IOBC/EPRS Information Bulletin” dedicated to the results of scientific research and applied work in the field of biological control in the IOBC/EPRS member countries. In addition, every year a number of bulletins have been published containing the proceedings of scientific meetings.

Among the six Standing Commissions there is the Standing Commission on Microbiological Means of Plant Protection, being the most active ones, and which organised seven symposiums on the following subjects: (1) September 1978 (Prague, Czechoslovakia) on “Guidelines of Registration and Evaluation of Entomopathogens”. (2) May 1981 (Prague, Czechoslovakia) on “Technical characteristics of microbial preparations”; (3) November 1980 (Moscow, USSR) on “Insect viruses and perspectives of their practical use for protection of plants against pests in member countries of IOBC/EPRS”; (4) October 1983 (Sofia, Bulgaria) on “Ecological basis and principles of use of biopesticides”; (5) October 1985 (Kiev, Ukraine, USSR) on “Microbiological control of the Colorado potato beetle within an integrated system

of potato protection”; (6) April 1987 (Poznan, Poland) on “Persistence of effectiveness of entomopathogens in plant protection” (7) October 1989 (Hodmezevasharhely, Hungary) on “Biotechnological aspects of microbial control”. Also, a large number of research and applied projects have been carried out on the biological control of pests in glasshouses using predators and pathogenic microorganisms.

Currently, IOBC/EPRS member-countries pay special attention to several new aspects of biological control e.g. on use of naturally occurring biological control agents and edaphic microflora including antagonistic microbes that are characterised by a polyfunctional action. The aim of such studies is the augmentation of floral diversity in agro-ecosystems. Another activity concerns the selection and introduction of entomophagous arthropods and entomopathogenic microorganisms that are specially adapted to particular local climate conditions.

IOBC/EPRS has published circa 40 Bulletins with proceedings of scientific meetings. This region also published a number of books:

- Chenkin, A.F., 1995. Phytosanitary diagnostics.
- Korol, I.T., 1993. Microbiological plant protection.
- Korol, I.T., 1994. Pesticides for plant protection.
- Sorokina, A.P., 1993. Key for species of *Trichogramma*.
- Tverdjukov, A.P., Nikonov, P.V., Yuschenko, N.P., 1993. Biological control of pests and diseases in greenhouses.

Table 1. Institutional members of IOBC/EPRS (January 2006)

Country	Organisation
Belorussia	Plant Protection Institute, Priluki
Bulgaria	Plant Protection Institute Plant Protection, Quarantine and Agrochemistry Service of Ministry of Agriculture
Georgia	Kanchaveli's Plant Protection Institute Institute of Mountain Forestry
Hungary	Plant Protection Service of the Ministry of Agriculture and Regional Development Plant Protection Institute, Budapest
France	European and Mediterranean Plant Protection Organisation
Macedonia	Ministry of Agriculture, Forestry and Water Management
Poland	Institute of Plant Protection, Poznan
Russia	All-Russian Plant Protection Institute, St. Petersburg All-Russian Research Institute for Sylviculture and Mechanization of Forestry Moscow State University of Forestry Research Center for Toxicology and Hygiene Reglamentation of Pesticides Novosibirsk Agricultural University All-Russian Research Institute of Biocontrol Editor's office of the Journal "Plant Protection and Quarantine" Innovation Center of Plant Protection ZAO "Agrocompany Gingo" OOO "Sibbiopharm"
Serbia and Montenegro	Plant Protection Society of Serbia
Ukraine	Plant Protection Institute, Kiev Institute of Engineering and Technology "Biotechnica", Odessa Research Station of Quarantine OOO "Center Biotechnica" Research Quarantine Station of Vineyards and Orchards

Part VII. History of the AfroTropical Regional Section TARS - ATRS

Joop C. van Lenteren, with help from Peter Neuenschwander

Start of Region and current situation

Though very large and successful biological control programmes have been executed in Africa (Greathead, 2003; Neuenschwander et al., 2003), the establishment and functioning of the AfroTropical Regional Section of IOBC encountered many problems. Initially, Drs. H. Herren and P. Neuenschwander of the International Institute for Tropical Agriculture (IITA) were asked in 1990 to assist in the creation of this section. Dr. J. Boussienguet from Gabon, who was then the national biological control program coordinator of the Africa-wide Biological Control Program (ABCP), accepted the invitation to try to start ATRS. In order to stimulate adherence, the ABCP for some time was paying the IOBC fees for the participating members. J. Boussienguet wrote H.R. Herren in September 1990 that it was difficult to find sufficient candidates for the Executive Committee, but by the end of that year, a first Executive Committee of ATRS was elected. This first Executive Committee announced in the newsletter of IOBC Global (Issue 52, April 1991) that they envisage to create Working Groups on stem borers, banana pests and weeds.

Apparently, very few things were organized by this first Executive Committee, because H.R. Herren wrote in August 1993 to J. Boussienguet as a follow up of a discussion with J.P. Aeschlimann in Montpellier, and suggested a restart of ATRS by organizing a special IOBC meeting during a workshop on *Chromolaena* in Côte d'Ivoire. J. Boussienguet reacted positively to this request and proposed to appoint a new Executive Committee. He also remarks that “with the exception of South Africa the experiences in Africa in biological control are recent and all linked with the well organized ABCP, which seems to make an IOBC section redundant.” He would like to discuss a kind of link between ABCP and IOBC. In the meantime, the Vice Presidency had moved to Dr. Des Conlong, who replaced Dr. P.M. Samways. In December 1993 the treasurer, Dr. A. Wodageneh wrote to H.R. Herren that apart from a payment from South Africa, no money had been paid into the IOBC account. Shortly afterwards, A. Wodageneh left Bénin and was no longer ATRS treasurer. At that moment ATRS had 28 individual members and 11 institutional members.

Early in 1995 J. Boussienguet informed IITA of a new Executive Committee of ATRS: which remained in function until 2001. In 1995 the Secretary General of IOBC Global met with the new President of ATRS to discuss how the situation could be improved. It was concluded that a newsletter, a database of African biological control workers and finding sources for funding activities were essential for survival of this Region. In 2001, a new Executive Committee was appointed, which is still in function.

Executive Committees ATRS

First Executive Committee 1990-1995

President: Dr. J. Boussienguet (Gabon)
Vice President: Dr. P.M. Samways (South Africa)
Secretary General: Dr. N.T.C. Echendu (Nigeria)
Treasurer: Dr. A. Wodageneh (Bénin).

Second Executive Committee 1995-2001

President: Dr. H.G. Zimmermann (South Africa)
Past President: J. Boussienguet (Gabon)
Vice President: Dr. B. Ouayagodé (Ivory Coast)
Secretary General: Dr. G. Bani (Congo)
Treasurer: Dr. A. Paraiso (Bénin)

Third Executive Committee 2001- 2006

President: Dr. J. A. Ogwang (Uganda)
Past President: Dr. H.G. Zimmermann (South Africa)
Vice-President: Dr. C. O. Omwega (Kenya)
General Secretary: Dr. M.P. Hill (South Africa)
Treasurer: Dr. J. A. Agona, Post Harvest Program (Uganda)

Perspectives

J. Boussienguet, during his term as President, experienced that setting up an active Regional Section for the AfroTropical area was difficult, because most biological control work in this regions was coordinated by the Africa Wide Biological Control Project of IITA. Today the situation is somewhat different, because also ICIPE is engaged in biological control and a number of National Agricultural Research Stations have projects related to biological control and Integrated Pest and Disease Management. But due to limited funding for biological control at a national level, and great differences in cultures it seems to remain difficult to arrive at an active AfroTropical section. Still, there are many important areas in which the region would profit from research collaboration and networking. First, there are several large scale biological control projects in progress that may serve as examples for countries that wish to develop biological control. Examples of such projects are (1) the use of phytoseiid mites and pathogens against cassava green mite, a vast and unique project that needs further expansion, (2) biological control of the coconut mite, (3) control of *Maruca* on cowpeas, a fascinating project with exotic parasitic wasps, attractants, and resistant varieties, (4) biological control of the recently invaded tephritid fruitfly *Bactrocera invadens*, (5) biological control of floating water weeds (water hyacinth, water lettuce and water fern), (6) biological control of grasshoppers and locusts through spores of the fungus *Metarhizium anisopliae*, and (7) biological control of weeds and parastic plants (*Imperata* and *Striga*) with pathogens. An overview of these and other biological control and IPM projects can be found in Neuenschwander et al., 2003. Then there are also exiting new possibilities for biological

control that can only be executed with good international collaboration. An example is the recent finding that the malaria vector *Anopheles* may be controlled by application of entomopathogenic fungi. Many other possibilities for biological control are available in Africa which need and would profit from a continent-wide approach and in which IOBC ATRS could play an important role.

IOBC Global will collaborate with IOBC ATRS in the organization of symposia during the 2008 Congress of Entomology in Durban (South Africa). We hope to present a number of excellent examples of biological control in Africa, as well as to discuss the needs for and the profits of improved networking in the AfroTropical region.

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Appendix I. Facts and Figures

Ernst F. Boller and Joop C. van Lenteren

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I.1 General Assemblies of CILB/OILB/IOBC and IOBC Global

- 1st General Assembly, Paris, France, 1958
- 2nd General Assembly, Tunis, Tunisia, 1962
- 3rd General Assembly, Montreux, Switzerland, 1965
- 4th General Assembly, Paris, France, 1968
- 5th General Assembly, Rome, Italy, 1971, formation of IOBC Global
- 6th General Assembly, Canberra, Australia, 1972
- 7th General Assembly, Washington DC, USA, 1976
- 8th General Assembly, Kyoto, Japan, 1976
- 9th General Assembly, Hamburg, Germany, 1984
- 10th General Assembly, Vancouver, Canada, 1988
- 11th General Assembly, Beijing, China, 1992
- 12th General Assembly, Montpellier, France, 1996
- 13th General Assembly, Iguazu , Brazil, 2000
- 14th General Assembly, Brisbane, Australia, 2004
- 15th General Assembly, Durban, South Africa, 2008

I.2 Composition of CILB-OILB-IOBC Councils from 1956 till 1971

	CILB: Commission Internationale de Lutte Biologique			OILB/IOBC: Organisation Internationale de Lutte Biologique		
	Antibes 1956	Paris 1958	Tunis 1962	Montreux 1965	Paris 1968	Rome 1971
	First official plenary session of CILB	1 st General Assembly of CILB	2 nd General Assembly of CILB	3 rd General Assembly of CILB new name OILB/IOBC	4 th General Assembly of OILB/IOBC	5 th General Assembly of IOBC Establishment of IOBC Global
President	Balachowsky (F)	Balachowsky (F)	Balachowsky (F)	Balachowsky (F)	Biliotti (F)	DeBach (USA)
Vice Presidents	Vayssière (F) van den Bruel (B) Franz (D)	van den Bruel (B) Franz (D) Davatchi (Iran)	Franz (D) Davatchi (Iran) de Fluiter (NL)	J. Franz (D) Davatchi (Iran) de Fluiter (NL)	Castel-Branco (P) de Wilde (NL) Benvenuti (I)	Biliotti (F) Wilson (AUST)
Secretary General	Grison (F)	Grison (F)	Grison (F)	Grison (F)	Delucchi (CH)	Delucchi (CH)
Treasurer	Bovey (CH)	Bovey (CH)	Bovey (CH)	Bovey (CH)	Mathys (CH)	Simmonds (Trinidad)
Members		Castel-Branco (P) Morales (E) Tadic (YU) Russo (I) Jamoussi (TUN) Schneider (CH)	Morales (E) Jamoussi (TUN) Pavan (I) Trabulsi (LEB)	Morales (E) Jamoussi (TUN) Pavan (I)	Arroyo (E) Steiner (D) Düzgüneş (TUR)	

I.3 Composition of IOBC Global Councils 1971 – 2008

	1971 Rome 5th General Assembly Establishment of Global IOBC	1972 Canberra 6th General Assembly	1976 Washington 7th General Assembly	1980 Kyoto 8th General Assembly	1984 Hamburg 9th General Assembly
President	P. DeBach (USA)	C.B. Huffaker (USA)	E. Biliotti (F) (1976-78) C.B. Huffaker (1978-80)	K.S. Hagen (USA)	V. Delucchi (CH)
Secretary General	V. Delucchi (CH)	V. Delucchi (CH)	G. Mathys (EPPO)	G. Mathys (EPPO)	J.P. Aeschlimann (CSRIO)
Treasurer	F.J. Simmonds (Trinidad)	F.J. Simmonds (Trinidad)	V. Delucchi (CH)	F.D. Bennett	K. Carl (CABI)

	1988 Vancouver 10th General Assembly	1992 Beijing 11th General Assembly	1996 Florence 12th General Assembly	2000 Montpellier 13th General Assembly	2004 Iguaçu 14th General Assembly
President	J.R. Coulson (USA)	E.S. Delfosse (USA)	J. Waage (CABI)	L. Ehler (USA)	J.C. van Lenteren (NL)
Secretary General	J.P. Aeschlimann (CSRIO)	F. Bigler (CH)	E. Wajnberg (F)	A. Gassmann (CABI)	S. Colazza (I)
Treasurer	J. Freuler (CH)	E. Hoebaus (A)	H. Berger (A)	F. Polesny (A)	L. Stengard Hansen (DK)

1.4 Composition of WPRS Councils 1971 – 1985 (continued on next page)

	Rome 1971 1st General Assembly of IOBCwprs	Madrid 1974 2nd General Assembly	Athens 1977 3rd General Assembly	Antibes 1981 4th General Assembly	Stuttgart 1985 5th General Assembly
President	Biliotti (F)	Biliotti (F)	Mathys (CH)	Way (UK)	Pelerents (B)
Vice Presidents	Mathys (CH) Steiner (D) Pavan (I)	Mathys (CH) Steiner (D) Way (UK)	Brader (NL) Way (UK) Jourdheuil (F)	Jourdheuil (F) Pelerents (B) Mellado (E)	Cavalloro (I) Klingauf (D) Russ (A)
Secretary General	Brader (NL)	Brader (NL)	Ferron (F)	Ferron (F) (84) Bassino (F)	Bassino (F)
Treasurer	v. d. Bruel (B)	Pelerents (B)	Pelerents (B)	Freuler (CH)	Freuler (CH)
Members	Bergerard (F) Dafauce-Ruiz (E) Mostafa Hafez (Eg) Kennedy (UK) Mourikis (GR)	Bergerard (F) Morales (E) Mostafa Hafez (Eg) Pavan (I) Sipahi (TUR)	Franz (D) Chodjai (Iran) Mahmoud Hafez (Eg) Pavan (I) Morales (E) Mourikis (GR)	Boller (CH) Mahmoud Hafez (Eg) Klingauf (D) Martelli (I) von Rosen (S) Russ (A)	Castañera (E) Poitout (F) Royle (UK) Zocchi (I) Minks (NL) von Rosen (S) Arroyo (E) Vasiljevic (YU)

1.4 Composition of WPRS Councils 1989 – 2005

	Florence 1989 6th General Assembly	Lisbon 1993 7th General Assembly	Vienna 1997 8th General Assembly	Ascona 2001 9th General Assembly	Dijon 2005 10th General Assembly
President	Cavalloro (I)	Royle (UK)	Esbjerg (DK)	Esbjerg (DK)	Bigler (CH)
Vice Presidents	Minks (NL) Royle (UK) Castañera (E)	Minks (NL) Castañera (E) Degheele (B)	Huber (D) Lavadinho (P)	Huber (D) Tirry (B) Albajes (E)	Tirry (B) Blümel (A) Vogt (D)
Secretary General	Poitout (F)	Poitout (F)	Alabouvette (F)	Alabouvette (F)	Nicot (F)
Treasurer	Huber (D)	Huber (D)	Gessler (CH)	Gessler (CH)	Albajes (E)
Members	Freuler (CH) Jarraid (TUR) Höbaus (A) Dickler (D) Degheele (B) Yamvrias (GR) Esbjerg (DK) Frazao (P)	Afella (Maroc) Esbjerg (DK) Frazao (P) Gessler (CH) Kozar (H) Masutti (I) Petterson (S) Yamvrias (GR)	Afella (Maroc) Albajes (E) Baayen (NL) Bathon (D) Bigler (CH) Blümel (A) Buchelos (GR) Kerry (UK) Tirry (B)	Bathon (D) Besri (Maroc) Bigler (CH) Blümel (A) Kerry (UK) Malathrakis (GR) Malavolta (I) van Lenteren (NL)	Besri (Maroc) Ekbohm (S) Huber, J. (D) Sigsgaard (DK) Weintraub (Isr) Whipps (UK)

1. 5 Composition of Boards of WHRS (1971- 1984) and NRS (1985 – present)

	President	President-Elect	Vice President (s)	Secretary - Treasurer	Corresponding Secretary
1971-73	F. D. Bennett	O. Beingolea	J. B. McCameron C. B. Huffaker	W. H. Whitcomb	R. I. Sailer J.S. Kelleher
1973-74	O. Beingolea	C. M. Ignoffo	C.H.W. Fletchmann P. S. Messenger	W. H. Whitcomb	J. S. Kelleher
1975-76	C. M. Ignoffo	R. van den Bosch	K. D. Bieber , J. L. Carillo	G. E. Allen	R. I. Sailer
1977-78	R. van den Bosch	J. S. Kelleher	D. E. Bryan , L. E.Caltagirone	G. E. Allen	K. D. Bieber
1979-80	J. S. Kelleher	G. E. Allen	J. R. Quezada, H. C. Chiang	R. M. Baranowski	K. D. Bieber
1981-82	G. E. Allen	H. C. Chiang	A. Ciociola, R. D. Eikenbary	R. M. Baranowski	F. E. Gilstrap
1983-84	H. C. Chiang	R. M. Baranowski	E. Berti-Filho, A. Garcia-Escobar	F. E. Gilstrap	L. T. Kok
1985-86	R. M. Baranowski	J. R. Coulson	R. V. Flanders, Marjorie A. Hoy	F. E. Gilstrap	J. C. Miller
1987-88	J. R. Coulson	F. E. Gilstrap	L. E. Ehler	J. J. Obrycki	J. C. Miller
1989-90	F. E. Gilstrap	L. E. Ehler	D. L. Dahlsten	J. J. Obrycki	L. D. Charlet
1991-92	L. E. Ehler	G. R. Buckingham	E. A. Cameron	J. J. Obrycki	L. D. Charlet
1993-94	G. R. Buckingham	J. J. Obrycki	L. D. Charlet	J. R. Nechols	R. Van Driesche
1995-96	J. J. Obrycki	T. J. Kring	Fred Pettit	D. Landis	R. Van Driesche
1997-98	T. J. Kring	L. D. Charlet	R. J. O'Neil	R. N. Wiedenmann	L. Milbrath
1999-00	L. D. Charlet	D. L. Mahr	M. S. Hunter	R. N. Wiedenmann	L. Milbrath
2001-02	D. L. Mahr	M. S. Hunter	J. Ruberson	R. N. Wiedenmann	Susan E. R. Mahr
2003-04	M. S. Hunter	M. S. Hunter	N. Mills	S. Jaronski	S. E. R. Mahr
2005-06	R. N. Wiedenmann	M. Johnson	G. E. Heimpel	S. Jaronski	S. E. R. Mahr

1.6 Composition of Governing Boards of LARS/NTRS 1984 – 2010

	1984-89	1989-94	1994-98	1998-03	2003-05	2005-06	2006-10
	1 st Governing Board	2 nd Governing Board	3 rd Governing Board	4 th Governing Board	5 th ad hoc Governing Board	6 th ad hoc Governing Board	7 th Governing Board
President	F.Moscardi (Brazil)	M. Zapater (Argentina)	F. Ferrer (Venezuela)	R. Alatorre (Mexico)	O. Larrea (Cuba)	R. Alatorre (Mexico)	V. Bueno (Brazil)
Secretary	R.Gonzales (Chile)	P. Baker (Trinidad & Tobago)	M. Zapater (Argentina)	H. Bernal (Mexico)	E.Camacho (Cuba)	H. Bernal, (Mexico)	W. Cabrera (Argentina)
Treasurer	R.Gonzales (Chile)	E. Botto (Argentina)	V. Bueno (Brazil)	J. Gaytan (Mexico)	L. Moreno (Cuba)	J. Gaytan (Mexico)	L. Devotto (Chile)
1st Vice- President	F. Garcia (Columbia)	J. Parra (Brazil)	E.Berti Filho (Brazil)	R.Vergara (Colombia)		R.Vergara (Colombia)	M.Manzano (Colombia)
2nd Vice- President	P. Aguilar (Peru)	P. Liedo (Mexico)	R. Cave (Honduras)	J. Jimenez (Colombia)		J. Jimenez (Colombia)	M. Whu (Peru)
3rd Vice- President	A. Nasca (Argentina)	R. Cave (Honduras)	R. Ripa (Chile)	E. Botto (Argentina)		E. Botto (Argentina)	L. Hidalgo (Cuba)
Former President		F.Moscardi (Brazil)	M. Zapater (Argentina)	F. Ferrer (Venezuela)		F. Ferrer (Venezuela)	R. Alatorre (Mexico)

I.7 Composition of APRS Boards 1972 – 2006

Governing Board	President	Secretary - Treasurer	Vice President	Vice President	Past President
1 st 1972-1977	K. Yasumatsu (Japan)	K. Aizawa (Japan)	V.P. Rao (India)	M.A. Ghani (Pakistan)	
2 nd 1977-1980	M.A. Ghani (Pakistan)	A.I. Mohyuddin (Pakistan)	H. Mori (Japan)	T. Sankaran (India)	K. Yasumatsu (Japan)
3 rd 1980-1984	T. Sankaran (India)	S. Nagarkatti (India)	Banpot Napompeth (Thailand)	Ahmad Yunus (Malaysia)	M.A. Ghani (Pakistan)
4 th 1984 -1988	Banpot Napompeth (Thailand)	Wiwat Suasa-ard (Thailand)	A.I. Mohyuddin (Pakistan)	Y. Hirose (Japan)	T. Sankaran (India)
5 th 1988-1993	Y. Hirose (Japan)	M. Takagi (Japan)	G.S. Lim (Malaysia)	H. Mori (Japan)	Banpot Napompeth (Thailand)
6 th 1993-1997	R. Muniappan (Guam, USA)	M. Marutani (Guam, USA)	T.M. Manjunath (India)	A.I. Mohyuddin (Pakistan)	Y. Hirose (Japan)
7 th 1997-2002	R. E. McFadyen (Australia)	D. Holdom (Australia)	R. Wang (China)	Md. Y. Hussein (Malaysia)	R. Muniappan (Guam, USA)
8 th 2002-2006	E. Yano (Japan)	T. Shimoda (Japan)	Fang-Hao Wan (China)	Wiwat Suasa-ard (Thailand)	R. E. McFadyen (Australia)

1.8 Composition of Governing Boards of EPRS 1977 – 2009

	1977	1984	1990	1994	1997	2001	2005
President	Y.N. Fadev (USSR)	N.M. Golishin (USSR)	A. Smetnik (USSR)	A. Smetnik (Russia)	A. Smetnik (Russia)	A. Smetnik (Russia)	I. Eke (Hungary)
Vice Presidents	E.J. Lipa (Poland)	D. Benke (Hungary)	T. Baicu (Romania)	-	S. Pruszynski (Poland)	S. Pruszynski (Poland)	D. Sosnowska (Poland) V. Nadykta (Russia)
Secretary	V. Lebedev (USSR)	V.I. Martinenko (USSR)	S. Izhevsky (USSR)	Journal Plant Protection, Moscow	A. Orlinski (EPPO)	A. Orlinski (EPPO) E. Sodomov (Russia)	Y. Gninenko (Russia) E. Sodomov (Russia)
Members	G. Polyanow (Bulgaria) A. Smetnik (USSR)	T. Baicu (Romania) K.V. Novozhilov (USSR)					

I.9 Composition of Executive Committees ATRS 1990 – 2006

	1 st Executive Committee 1990 - 1995	2 nd Executive Committee 1995 - 2001	3 rd Executive Committee 2001 - 2006
President	J. Boussienguet (Gabon)	H.G. Zimmermann (South Africa)	J. A. Ogwang (Uganda)
Secretary General	N.T.C. Echendu (Nigeria)	G. Bani (Congo)	M.P. Hill (South Africa)
Treasurer	A. Wodageneh (Bénin)	A. Paraiso (Bénin)	J. A. Agona (Uganda)
Vice President	P.M. Samways (South Africa)	B. Ouayagodé (Ivory Coast)	C. O. Omwega (Kenya)
Past President		J. Boussienguet (Gabon)	H.G. Zimmermann (South Africa)

I.10 Statutes and by-laws of IOBC Global

The present statutes have been adopted at the foundation meeting of IOBC Global on 30 and 31 March, 1971 in Rome, Italy at the General Assembly meeting where IOBC Global was established. The only change that has occurred after 1971 was the amendment of Article XII.1 in July 1988 during the General Assembly in Vancouver, Canada, where institutional members were given 10 votes each, instead of only 1 vote.

Preamble

These Statutes apply only to the global organization of the International Organization for Biological Control of Noxious Animals and Plants except where specific reference is made to Regional Sections. Any statutes or By-laws of Regional Sections must be compatible with these Statutes.

Article I

Name and seat

1. The name of the Organization, which is an association affiliated to the International Union of Biological Sciences (IUBS), shall be "The International Organization for Biological Control of Noxious Animals and Plants" (IOBC), hereinafter referred to as "the Organization".
2. The seat of the Organization shall be in Zurich, Switzerland. The Secretariat of the Organization may be in any country.
3. The Organization is a legal entity pursuant to Art. 60 of the Swiss Civil Code.

Article II

Functions

1. The Organization shall
 - (a) promote the development of biological control and its application in integrated control programmes, and international cooperation to these ends. In these Statutes the term "biological control" means the use of living organisms or their products to prevent or reduce the losses or harm caused by pest organisms;
 - (b) collect, evaluate and disseminate information about biological control;
 - (c) promote national and international action concerning research the training of personnel, the coordination of largescale application and the encouragement of public awareness of the economic and social importance of biological control;
 - (d) arrange conferences, meetings and symposia, and take any other action to implement the general objectives of the Organization.
2. The Organization may consult, collaborate, or make agreements with international or national governmental or non-governmental organizations.

Article III

Membership

1. Membership of the Organization shall be open to all individuals and all organizations, public or private, that desire to promote the objectives of the Organization.
2. There shall be four categories of membership, individual, institutional, supporting and honorary. Individual membership is open to all individuals engaged or interested in biological control. Institutional membership is open to any institution, including government departments, academies of science, universities, institutes and societies, participating in biological control activities. Supporting membership is open to any person or institution interested in promoting the objectives of the Organization. Honorary membership may be conferred by Council upon anyone who has made outstanding contributions to biological control.

Article IV

Application for membership

1. Application for individual or supporting membership shall be made, either directly or through the appropriate Regional Section, to the Secretary-General of the Organization. The applicant may request affiliation to any Regional Section.
2. Application for institutional membership shall be made to the appropriate Regional Section. Where no Regional Section exists the applicant shall apply to the Secretary-General of the Organization.
3. The Council decides on the admission and shall determine the appropriate category of membership, if any, of each applicant.

Article V

Withdrawal of Membership

1. Members may resign by giving notice to the Council or the Regional Section before June 30. The withdrawal shall become effective on December 31 of the same year up to which date the contribution must be paid.
2. The Council or the Regional Section, whichever is appropriate, may deprive of benefits any Member whose contribution is one year in arrears, and may expel any Member whose contribution is two years or more in arrears.

Article VI

Budget

1. The total revenue available to the Organization shall be derived from the annual contributions paid by Members and funds from other sources.
2. The membership contribution shall be determined by the Council for each category of members. Payment of these contribution shall be made to the Council directly or through the appropriate Regional Section.

3. Upon agreement between the Council and a Regional Section, contributions may be made by the Regional Section to the global Organization.
4. The financial period shall of four years terminating on December 31 of the year preceding that in which a General Assembly is held. The Treasurer shall report on the financial period to the General Assembly.
5. The funds of the Organization are exclusively liable for the obligations of the Organization. Any personal liability of the members is excluded.

Article VII

General structure

The Organization shall comprise the Members and the following statutory bodies:

- (a) the General Assembly;
- (b) the Council;
- (c) the Executive Committee
- (d) the Regional Sections;
- (e) other bodies that the Council deems necessary.

Article VIII

General Assembly

1. The General Assembly, which is open to all Members, shall meet approximately every four years, preferably in conjunction with international congresses. The General Assembly may meet in special session if at least one fifth of the Members so request or if the Council so decides.
2. The place and date of the General Assembly shall be fixed by the Council and announced at least one year in advance. The agenda shall be prepared by the Council.
3. The General Assembly elects for a term of four years the President the two Vice-Presidents, the Treasurer and the Secretary-General. Not more than two of these shall be of the same country. With the exception of the Secretary-General they are not eligible for a second consecutive term in the same office.
4. The General Assembly decides on any modification to the Statutes.
5. The purposes of the General Assembly are the provision of information on the affairs of the Organization, and the provision of opportunities for Members to express opinions on the activities of the Organization and to make recommendations to the Council.
6. Non-member organizations with an interest in biological control may be invited to send observers to the General Assembly, but such observers shall have no vote.
7. Voting by postal ballot is permitted and is obligatory for elections, changes of Statutes and the dissolution of the Organization.

Article IX

Council

1. The Council shall consist of the members of the Executive Committee and one representative from each Regional Section, all of whom shall be Members of the Organization.
2. The Council may invite any expert to participate in its meetings in an advisory capacity.
3. The Council shall be convened as appropriate and preferably at least once every two years.
4. The Council shall be responsible for the functioning of the Organization, and in particular for:
 - a) stimulating international cooperation;
 - b) providing advice and information;
 - c) promoting and approving the establishment of Regional Sections and coordinating interregional activities;
 - d) developing cooperative programs with other international organizations;
 - e) presenting progress reports and programmes of activity annually to Members and to each General Assembly;
 - f) preparing the budget;
 - g) preparing the agenda of the General Assembly;
 - h) organizing votes by postal ballot.
5. The Council may establish services of general interest to Members, particularly relating to documentation, information and publication, and may act in such other ways as will promote the objectives of the Organization.
6. The Council shall formulate and amend By-laws.
7. All decisions of the Council shall be taken by a majority of the votes cast. In the event of a tie, the Chairman of the meeting may cast the deciding vote.
8. The Council adopts its own rules of procedure and designates the persons entitled to sign on behalf of the Organization.

Article X

Executive Committee

1. The Executive Committee shall consist of the President, the immediate Past-President, the two Vice-Presidents, the Treasurer and the Secretary-General.
2. Should a position become vacant between elections, the Executive Committee may appoint a Member to serve in that position for the unexpired period.
3. The Executive Committee shall be responsible for implementing the decisions of the Council and shall meet when necessary and convenient. The Executive Committee shall account for its actions to the Council, and shall seek its approval for any emergency action taken.

Article XI**Regional Sections**

1. The establishment of a Regional Section shall be considered by the Council for any part of the world on the request of at least three institutional Members or of at least 15 individual Members from more than one country, located in the region concerned. Insofar as proves practicable, Regional Sections shall be based on biogeographical zones. However, community of interests, scientific and economic resources, and other aspects may influence decisions as to the number and size of Regional Sections.
2. Regional Sections shall be autonomous in respect of structure, finance, procedure and activities, subject only to compatibility with the Statutes of the Organization and the general policy of the Council.
3. The Statutes and By-laws of Regional Sections and amendments to them shall be submitted to Council for approval.
4. Each Regional Section shall appoint a representative to the Council. The cost of attendance of such a representative or proxy at Council meetings shall be borne by the Regional Section.

Article XII**Votes**

1. Individual and honorary Members shall have one vote each. Institutional Members shall have 10 votes each. Supporting Members shall have no vote.
2. Voting Members may exercise their right to vote only if they have met their financial obligations towards the Organization.
3. At Council meetings all voting Members (Executive Committee and Representatives of Regional Sections) shall have one vote each.
4. Results shall be determined by a simple majority of votes cast, except for changes in the Statutes and the dissolution of the Organization for which a two-thirds majority of the votes cast shall be required.

Article XIII**Quorum**

1. A quorum at Council meetings shall consist of not less than half the Members of the Council.
2. At meetings of the Executive Committee, three Members (normally including the President and the Secretary-General) constitute a quorum.

Article XIV**Decisions on matters of basic importance**

1. Matters of basic importance to the Organization, including the election of the officers of the Organization and amendments to the Statutes are to be determined by the General Assembly. Unless otherwise stated (Art. XV) such matters with any recommendations and/or relevant documents including the

ballot paper are to be submitted to the Members for consideration at least four months before the General Assembly or before the ballot is closed.

Article XV

Amendments to Statutes

1. Proposed amendments to the Statutes may be initiated by the Council, and may be suggested to Council by any Regional Section or any 15 members.
2. Proposed amendments to the Statutes shall be communicated with any recommendations and/or relevant documents by the Council to the Members at least one year before the General Assembly or the close of the postal ballot.

Article XVI

Status of personnel

1. Members of statutory bodies shall receive no payment for services.
2. Members of statutory bodies attending official meetings of the Organization or of other organizations on behalf of the Organization may receive travelling expenses and a daily subsistence allowance.
3. The Council may engage appropriate staff and services.

Article XVII

Dissolution of the Organization

1. On the dissolution of the Organization its assets shall be assigned to the International Union of Biological Sciences.

Article XVIII

Adoption of Statutes

1. The present Statutes have been adopted at the foundation meeting on March 30 and 31, 1971 in Rome. They become effective on March 31, 1971. The English text shall be authoritative in respect of any disputes arising from interpretation of the Statutes. The Statutes have been deposited in the Federal Archives of the Swiss Confederation under number J.11.75.

By-laws of IOBC Global

The latest version of the by-laws dates from 1 February 1990

1. The annual contributions to the global body shall be determined each year by the Executive Committee of the global body and shall remain as stable as possible for each category of membership. They are payable during the first half of the current year.
2. Treasurers of the Regional Sections shall transfer the contributions due to the Treasurer of the global body before the end of each year, a list of all regular members being sent to the Secretary-General as soon as feasible.
3. Disbursements shall be made over the signature of the Treasurer, and/or the President and the Secretary-General where necessary.
4. A statement of accounts ending each 31st December shall be prepared by the Treasurer for submission to the Council.
5. The accounts shall be scrutinized by a Verification Committee consisting of 2 regular members (no member of the Council) before each General Assembly.
6. Actually incurred travel expenses only shall be reimbursed to those concerned.
7. The Council shall propose a list of candidates to the Executive Committee. Other nominations supported by 10 regular members may be sent with the written consent of the nominee to the Secretary-General at least 1 month before the dispatch of the voting documents. All nominations shall be submitted by postal ballot to all regular members by the Secretary-General at least 3 months before the closing date.
8. Two regular members (no member of the Council) shall open the ballot envelopes, determine the results of the election, and report to the Council.
9. Between Council meetings, the President, the Secretary-General, and the Treasurer shall expedite affairs and decide upon urgent actions, the Secretary-General keeping members of the Council informed between meetings.
10. Activities between Regional Sections, and relations with international bodies shall be coordinated by the President or the Secretary-General of the global body.
11. An ad hoc Committee shall decide upon all aspects relating to the Journal ENTOMOPHAGA.
12. It is an obligation to the Regional Sections to further policy and objectives of the Organization, and to secure the largest possible membership.

I.11 Comparison of objectives of IOBC Global and its Regional Sections

IOBC Global 1971 Version 1998	IOBC/WPRS 1971 Version 2003	IOBC/APRS 1972 Version 1989
Art. II Functions	Art. II Functions	Art. III Functions and Objectives
<p>1. The Organization shall:</p> <p>a) promote the development of biological control and its applications in integrated control programs, and international cooperation to these ends. In these Statutes the term “biological control” means the use of living organisms or their products to prevent or reduce the losses or harm caused by pest organisms;</p> <p>b) collect, evaluate and disseminate information about biological control;</p> <p>c) promote national and international action concerning research, the training of personnel, the coordination of large-scale application and the encouragement of public awareness of the economic and social importance of biological control;</p> <p>d) arrange conferences, meetings and symposia, and to take any other action to implement the general objectives of the Organisation.</p> <p>2. The Organization may consult, collaborate, or make agreements with international or national, governmental or non-governmental organizations.</p>	<p>1. The Regional Section shall:</p> <p>a) promote the development of biological control of pests and diseases and, <i>in a more general way, integrated protection in the context of integrated crop production</i>; also to promote international cooperation to these ends.</p> <p>b) collect, evaluate and disseminate information on biological <i>and integrated</i> controls;</p> <p>c) promote national and international research, training, coordination of large scale application <i>and maintain public awareness of the economic, ecological and social importance of new developments in plant protection</i>;</p> <p>d) arrange conferences, meetings and symposia, and to take any other action to implement the general objectives of the Organisation.</p> <p>2. The Regional Section may consult, collaborate, or make agreements with international or national, governmental or non-governmental organisations.</p>	<p>The Regional Section through its activities shall</p> <p>a) promote the development of research and an appreciation of biological control and its application in integrated control programs within South and East Asia.</p> <p>b) further communication among those interested in biological control and integrated control;</p> <p>c) arrange conferences, meetings and symposia, and to take any other similar action to facilitate communication within the Region;</p> <p>d) facilitate the training of specialists in biological control and integrated control and the education of the general public;</p> <p>e) support and participate in the activity of the global organization.</p>

I.11 Comparison of objectives of IOBC Global and its Regional Sections

IOBC/NRS 1971/84 Version 1984	IOBC/NTRS 1971/84 Version 2006	IOBC/ATRS 1972 Version 1989	IOBC/EPRS 1977 Version 1984
<p>Art. III Functions and Objectives The Regional Section through its activities shall:</p> <ol style="list-style-type: none"> 1) publish a newsletter to provide information and further communication among members of the Region; 2) promote the development of research and an appreciation of biological control and its application in integrated control programs within the Region and between Federal, State, University, and private individuals working in biological control; 3) further communication among those interested in biological control and integrated control in entomology, acarology, nematology, plant pathology, weeds science, and other disciplines; 4) arrange conferences, meetings and symposia, and to take any other similar action to facilitate communication within the Region; 5) facilitate the training of specialists in biological control and integrated control and the education of the general public; 6) support and participate in the activity of the global organization; 7) Develop, sponsor, and support Working Groups focusing on biological control and its application within the Region; 8) sponsor a Distinguished Achievement Award in Biological Control to recognize significant research achievements in biological control and to encourage excellence in research on the development and use of biological agents for control of noxious animals and plants. 	<p>Art. III Functions and Objectives The Regional Section through its activities shall:</p> <ol style="list-style-type: none"> 1) Promote the development of research on, and implementation of biological and integrated control within the Regional Section by Universities, Institutes, Foundations, Private Individuals and others; 2) Facilitate the training of specialists in biological, integrated and genetic control in entomology, acarology, nematology, plant pathology, weed science and other disciplines; 3) Facilitate the education and interest of the general public in biological, integrated and genetic control; 4) Arrange conferences, meetings and symposia, and take any similar action to facilitate communication within the Regional Section; 5) Promote an active interchange of information and researchers with all the other Regional Sections of IOBC; 6) Support and participate in the global organization of IOBC; 7) Publish a newsletter to provide information and to further communication among members of the Regional Section. 	<p>Art. III. Objectives The Regional Section shall:</p> <ol style="list-style-type: none"> 1) promote the development of biological control and its applications in integrated control programs. In these Statutes, the term “biological control” means the use of living organisms to prevent or reduce the damage or harm caused by pest species. 2) Promote national and international cooperation and communication between those interested in biological control and integrated control in entomology, acarology, nematology, plant pathology, weeds science, and other disciplines; 3) arrange conferences, meetings and symposia, and take any other action to disseminate information about biological control and to implement the general objectives of the Organization. 4) facilitate the training of specialists in biological control and the education of the general public. 	<p>Art. II Aims and purposes of the Section § 1. The Section shall:</p> <ol style="list-style-type: none"> a) promote the development of biological control and its applications in integrated control programs, and international cooperation to these ends. <p>In these Regulations the term “biological control” means the use of living organisms, their products and analogues to prevent or reduce the losses or harm caused by pest organisms;</p> <ol style="list-style-type: none"> b) collect, review and disseminate information about biological control; c) promote national and international activities, concerning research work, coordination of joint efforts in practical application of biological control on a large scale, and the encouragement of public awareness of the economic and social importance of biological control; d) arrange conferences, meetings and symposia, and to take any other action to implement the general objectives of the Section. <p>§ 2. The Section shall be autonomous in respect of structure, finance, activity procedure and follows the present Regulations, The Regulations of IOBC, and the decisions of the Administration of the Section as well;</p> <p>§ 3. The Section may consult and collaborate with other regional sections of IOBC and non-governmental international organizations concerned with biological control.</p>

I.12 Honorary members of CILB/IOBC, IOBC Global and IOBC WPRS

Honorary members of CILB/OILB/IOBC during the period 1956-1971

The statutes of 1956 do not mention honorary titles and honorary memberships. The topic was probably raised for the first time during the 1st General Assembly taking place 1958 in Paris. The title of an **Honorary President**, given to Prof. P. Vayssière (France), appears in 1959 for the first time in an IOBC document. The report of the 4th General Assembly of 1968 mentions that the members of the outgoing Executive Committee, having served for more than 10 years in the preparation and establishment of CILB, proposed to be awarded with the honorary title of „Conseillers scientifiques permanents“ („Permanent scientific advisors“) with the right to participate (without voting right) in future meetings of the Council. This title was given to: Prof. A.S. Balachowsky (France), Dr. M. P. Grison (France), Prof. P. Bovey (Switzerland), Prof. J. Franz (Germany) and Prof. W.E. van den Bruel (Belgium). In 1977 the title of “Conseiller scientifique permanent” was given for the last time to the outgoing president of IOBC WPRS, Prof. E. Biliotti (France). However, this honorary title was never introduced in any IOBC statutes and by-laws and was not used by IOBC any further after 1977.

Honorary memberships after 1971

The status of honorary membership is defined by Article III of IOBC Global and of Regional Sections as follows:

Article III: Membership

1. ...2. There shall be four categories of membership, individual, institutional, supporting and honorary..... Honorary membership may be conferred by Council upon anyone who has made outstanding contributions to biological (and integrated) control.

The following honorary titles have been awarded by CILB/IOBC:

Name	Honorary title	Year	Awarded by
Prof. P. Vayssière (France)	Honorary President	1958	CILB/IOBC
Prof. Vittorio Delucchi (Switzerland),	Honorary Member	1996 2001	IOBC Global WPRS
Prof. Robert Luck (Canada)	Honorary Member	2005	IOBC Global, NRS
Prof. Stefan Pruszyński (Poland)	Honorary Member	2005	EPRS
Prof. Jerzy J. Lipa (Poland)	Honorary Member	2005	EPRS
Dr. Ernst F. Boller (Switzerland)	Honorary Member	2005	WPRS

It is foreseen that, related to the celebrations of the 50th Anniversary of IOBC, a number of important previous IOBC officers will be appointed Posthumous Honorary Member and Honorary Member at the Council meeting of IOBC Global in 2007. Information about all Honorary Members will be published on the website of IOBC Global.

Appendix II. Histories of IOBC Global Working Groups

Overview

E. F. Boller and Joop C. van Lenteren

Working Groups (WGs) of IOBC can be formed when members find it relevant to collaborate on a certain topic or when Executive Committees/Governing Boards take the initiative to establish a WG.

In a number of cases, the activities of WGs were no longer needed and their work was terminated. Sometimes the WG became too large and was split up in other WGs, or WGs moved from Global to a Regional Section or vice versa.

Most of the short histories, published here for the first time, have been prepared jointly by founding members and acting Convenors. Some have been compiled based on the data of the IOBC archive established in 2006. The editors of this book have decided not to modify content or style of these individual contributions. Since most of the authors do have other mother tongues than English, many of these historic abstracts are written in “IOBC English” providing the specific and interesting flavour of the respective geographic region. This linguistic peculiarity characterises many of the IOBC publications.

The sequence of the Working Group is arranged according to the time of their establishment as follows:

Working Groups of IOBC Global		Page
II.1	WG <i>Ostrinia</i> and other Maize Pests (IWGO) (1968 – present)	125
II.2	WG Arthropod Mass Rearing and Quality Control of (1980 – present)	129
II.3	WG Egg Parasitoids (1982 – present)	135
II.4	WG Fruit Flies of Economic Importance (1986 – present)	137
II.5	WG Ecology of Aphidophaga (1988 – present)	141
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II.7	WG Biocontrol of <i>Chromolaena odorata</i> (Siam weed) (1993 – present)	147
II.8	WG Biocontrol and Integrated Control of Water Hyacinth (1997 – present)	151
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II.10	WG Ecology of Bruchids (1981 - 1994)	157
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II.1 Global Working Group on *Ostrinia* and other maize pests (IWGO) (1968 – present)

Harald K. Berger and Ulrich Kuhlmann

Start and current status of Working Group

The International Working Group on *Ostrinia* (IWGO) is one of the oldest Working Groups within Global IOBC. The group was founded during the XIIIth International Entomological Congress in Moscow in 1968, but its roots go back to the USA regional project on *Ostrinia*, which began in 1951. IWGO was established through this USA regional project. The founders of the group were D. Hadzistevic (Yugoslavia), whose original idea it was to establish a group for international cooperation, H.C. Chiang (USA), who brought ideas from the USA regional project to the group, I.D. Shapiro (USSR), T. Perju (Romania), C. Kania (Poland), B. Dolinka and B. Nagy (Hungary) (Figure 1). All were well known entomologists or maize breeders. The group was originally organized so that each member country had an official “member” representative and all other participants were classified as "associate members." Researchers who took part in meetings from time to time were called “guest members."



Figure 1. Founders of the IWGO working group in 1968

The original idea of IWGO was to exchange maize inbred lines within the group and test these lines for resistance / tolerance against the world's most important maize pest at that time, the European corn borer (ECB), *Ostrinia nubilalis* Hubner. The results of this breeding program were to be made available to all member countries. Up until now, three synthetic breeding lines resistant to ECB have been developed and released (IWGO 1, 2, and 3, both late and early). Most of the results of this testing program were published by IWGO. As the membership of the group increased, interests expanded into other areas of ECB research. France (INRA), for example, established a pheromone project. Furthermore, the influence of other maize pests became increasingly important over time and thus, colleagues from Asia wanted to include problems with *Ostrinia furnacalis*. Southern European members also brought research work concerning *Sesamia nonagroides* into the group.

The appearance of *Diabrotica virgifera virgifera* in Europe (Serbia) in 1992 became a further matter of discussion within the group. This appearance was so important that even a subgroup within IWGO was founded in 1995. In response to the enormous problems caused by the Western Corn Rootworm (*Diabrotica virgifera virgifera* LeConte), several meetings were held by the IWGO - *Diabrotica* subgroup (Table 1). In order to coordinate research activities on this pest, the European Union (EU), the Food and Agricultural Organization of the United Nations (FAO) and the European and Mediterranean Plant Protection Organization (EPPO) joined the IWGO – meetings or coorganized meetings. Focusing research activities and cooperating with US scientists, who were already much more acquainted with this pest, has already helped to improve the “fight” against this new, dangerous pest in Europe. IWGO members also took part in an EU research project on *Diabrotica* (EU – Research Project QLRT-1999-1110: “The threat to maize production in the EU by the exotic corn rootworm pest *Diabrotica virgifera virgifera*: sustainable pest management approaches and ecological background”).

Additionally, *Elateridae* (wireworms) were a topic of discussion by several member countries. Subsequently, corn borer biology and host response were also studied. More recently biological control has been emphasized. Therefore, within the last several years, IWGO has increasingly become a working group on all maize pest problems.

Table 1. Meetings of the *Diabrotica* Subgroup 1995 - 2005

1995	I st IWGO - <i>Diabrotica</i> Workshop in Graz, Austria
1995	II nd IWGO - <i>Diabrotica</i> Workshop in Gödöllő; Hungary
1996	III rd IWGO - <i>Diabrotica</i> Workshop in Zagreb, Croatia
1997	IV th IWGO - <i>Diabrotica</i> Workshop in Gödöllő, Hungary
1998	V th IWGO - <i>Diabrotica</i> Workshop in Rogaska Slatina, Slovenia
1999	VI th IWGO - <i>Diabrotica</i> Workshop in Paris, France
2000	VII th IWGO - <i>Diabrotica</i> Workshop in Stuttgart, Germany
2001	VIII th IWGO - <i>Diabrotica</i> Workshop in Venice, Italy
2002	IX th IWGO - <i>Diabrotica</i> Workshop in Belgrade, Serbia
2004	X th IWGO - <i>Diabrotica</i> Workshop in Engelberg, Switzerland
2005	XI th IWGO - <i>Diabrotica</i> Workshop in Bratislava, Slovak Republic

The IWGO group – initially affiliated with Global IOBC and established in 1979/80 as an official Global IOBC Working Group - has held 20 annual (until 1980) meetings in Europe, USA and Asia (Table 2). Several publications have been released and some are still partly available. Since 1981, the "IWGO - NEWSLETTER" has been published. This has been a way to link the members and to establish a permanent record of the activities of the working group, distribute information about the members, and to publish the abstracts of papers presented at the congresses. After several meetings, proceedings of the papers presented were issued. While the first IWGO meetings (until the late eighties) were attended by about 10 – 15 participants, the number of attendants increased steadily. Around 130 participants attended the IWGO Meeting in Venice (2001). The number of attendants at the IWGO-*Diabrotica* Subgroup meeting increased from 25 (1995, Graz) to 120 (2004, Engelberg).

Table 2. IWGO – Meetings 1968 – 2006

1968	Foundation of IWGO during the International Entomological Congress in Moscow by H.C. Chiang (USA) D. Hadzistevic (Yugoslavia) B. Dolinka & B.Nagy (Hungary), N. Shapiro (Soviet Union), A. Perju (Romania) and C. Kania (Poland). W.Faber (Austria), M.Hudon (Canada), P. Anglade (France), D. Mustea (Romania) and A. Monteagudo (Spain) joined the group later in the year. Prof. Huai C. Chiang 1 st elected president of IWGO
1969	I st meeting in Vienna, Austria
1970	II nd meeting in Zemun, Yugoslavia
1971	III rd meeting in Bordeaux, France
1972	IV th meeting in Martonvasar, Hungary
1973	V th meeting in Zagreb, Yugoslavia
1974	VI th meeting in St. Paul, Minnesota, USA
1975	VII th meeting in Leningrad (St. Petersburg), Soviet Union
1976	VIII th meeting in Madrid, Spain
1977	IX th meeting in Wroclaw, Poland
1978	X th meeting in Bergamo, Italy
1980	XI th meeting in Vienna, Austria
1982	XII th meeting in Pistany, CSSR
1984	XIII th meeting in Colmar, France
1986	XIV th meeting in Beijing, China
1989	XV th meeting in Varna, Bulgaria
1991	XVI th meeting in Martonvasar, Hungary
1993	XVII th meeting in Volos, Greece;
1995	XVIII th meeting in Turda, Romania
1997	XIX th meeting in Braga, Portugal
1999	XX th meeting in Adana, Turkey
2001	XXI th meeting in Venice, Italy
2006	XXII th meeting in Vienna, Austria

Leadership of and future perspectives of IWGO

Prof. Dr. H.C. Chiang (St. Paul, Minnesota, USA) was the first convenor of the group in 1968 and held this position until 1982. The group elected Dr. P. Anglade (Bordeaux, France) as the new president in 1982 and he served until 1993. Since 1994, Harald K. Berger (Vienna, Austria) has been the convenor of this international group. As the group expanded and the topics discussed and researched diversified, it became necessary to nominate co-convenors. Prof. Dr. Les Lewis (Iowa State University; USA) became co-convenor for a number of years and Prof. Dr. Rich Edwards (Purdue University, Lafayette) became co-convenor of the *Diabrotica* subgroup, which was established in 1996. After the retirement of Harald K. Berger in 2005, Dr. Ulrich Kuhlmann (Delemont, Switzerland) was elected unanimously as new

IWGO - convenor at the meeting of the *Diabrotica* Subgroup in Bratislava.

IWGO, which was one of the first Global-IOBC Working Groups, is now a well-established, large international working group dealing with all matters of maize pests and pest resistance. The group is open to all scientists with an interest in working within an international group. Since 2006 IWGO has its own website: [www: http://www.iwgo.org](http://www.iwgo.org).

IWGO publications

From 1980 – 2006: 27 Issues of „IWGO NEWSLETTER“ (Over 500 copies from each issue were distributed to scientists all over the world.). [published by H.K.Berger, Vienna]

- Dolinka, B. (Ed.), 1973. Report of the International Project on *Ostrinia nubilalis* Phase I; Results 1969 – 1970. Agric. Res. Inst. Hungarian Acad. of Sciences; Martonvasar; 168 p.
- Dolinka, B. (Ed.), 1975. Report of the International Project on *Ostrinia nubilalis* Phase II; Agric. Res. Inst. Hungarian Acad. of Sciences; Martonvasar; 138 p.
- Dolinka, B. (Ed.), 1976. Report of the International Project on *Ostrinia nubilalis* Phase III; Agric. Res. Inst. Hungarian Acad. of Sciences; Martonvasar.
- Mustea, D. (Ed.), 1980. Twelve Years Results (1969 - 1980) of IWGO issue of „Probleme de Protectia Plantelor“ 9 (2); Agricultural Research Station; Turda, Romania.
- Janda, J., (Ed.), 1984. Proceedings of the XIIth Symposium of the International Working Group on *Ostrinia*; Proroda, Bratislava pre vyskuminy ustov kukurice v. Trnave; 146 p.
- Anglade, P. & C. Cortez (Eds.), 1986. Proceedings of the XIIIth Symposium of the International working Group on *Ostrinia*; Colmar - Bordeaux, France; 116 p.
- Zhou, D. (Ed.), 1986. Proceedings of the XIVth Symposium of the International Working Group on *Ostrinia*; Beijing, Peoples Republic of China; 181 p.
- Georgiev, T. (Ed.), 1989. Proceedings of the XVth Symposium of the International Working Group on *Ostrinia*; Technical University „A. Kanchev“; Rousse, Bulgaria; 172 p.
- Tsitsipis, J. (Ed.), 1993. Proceedings of the XVIth Symposium of the International Working Group on *Ostrinia*; University of Thessalia; Volos, Greece; 72
- Mustea, D. (Ed.), 1993. Proceedings of the XVIIth Symposium of the International Working Group on *Ostrinia*; Agricultural Research Station Turda, Romania; 133 p.
- Pego, E-S., (Ed.), 1997. Proceedings of the XVIIIth Symposium of the International Working Group on *Ostrinia*; DRAED – NUMI; Braga, Portugal; 341 p.
- Kornosr, S., (Ed.), 1997. Proceedings of the XIXth Symposium of the International Working Group on *Ostrinia*; Cukurova University; Adana, Turkey; 197 p.
- Carollo, G., (Ed.), 2001. Proceeding of the XXIst IWGO Conference; Giorgio Carollo (Edit.) Padova, Legnaro – Padova; Italy; 437 p

II.2 Global Working Group on Arthropod Mass Rearing and Quality Control (1968 – present)

Ernst F. Boller and Norman C. Leppla

This history is based of historic reviews published by Ernst Boller (1986) and Norm Leppla (2002). Some of the information and literature used in this history are described in more detail on the website of the Working Group (www.amrqc.org).

Early traces of quality control in arthropods

The widely used ratio test to measure the competitiveness of sterile and fertile insects was probably developed in the 1950s by Hawaiian fruit fly specialists and others who were developing sterile insect technique (SIT) programs. An important source of information about international developments in the field of SIT and mass-rearing operations are the IAEA/FAO Panel Proceedings on SIT problems (e.g., 1962, 1964, 1966, 1967). Analysis of these documents, especially of the list of participants at a given meeting and their recommendations to the IAEA/FAO and governmental agencies, reveals that this was the period of great success in eradicating the screwworm, *Cochliomyia hominivorax* (Coquerel). Until the eradication effort began to decline, there was little interest in the deteriorating quality of the sterile insects and need for quality control.

Period 1969 – 1975: Quality control becomes an issue

The history of this working group, established by the Global IOBC Council on October 13, 1980 as the second working group of Global IOBC, is closely linked to developments in the fruit fly sector that took place between 1969 and 1979. The numerous SIT projects emerging in the 1960s triggered among other events the establishment of the IOBC/WPRS working groups on “autocidal control” of the European cherry fruit fly, *Rhagoletis cerasi* L. and Mediterranean fruit fly, *Ceratitis capitata* Wied. These working groups merged in 1978 into the WPRS Working Group on “Fruitflies of Economic Importance” (see Period 1976 – 1979). These IOBC working groups together with IAEA/FAO expert panels provided important international platforms for the development of quality control concepts in mass-reared insects.

The IAEA/FAO panel on SIT in fruit flies held in 1969 in Vienna is one of the important turning points in the history of developing quality control for mass reared arthropods. Not only did the vast majority of presented papers address the aspect of competitiveness (i.e., ratio-test data), but a paper presented by Chambers et al. (1970) covered for the first time research activities in the field of product quality assessment (e.g., flight mill, assortative mating experiments in field cages). Haisch (1970) presented at that meeting a formula for the calculation of a competitiveness-index measuring the fitness of fertile and irradiated fruit flies.

The 1971 symposium of IOBC in Rome on implications of mass-rearing operations, held in conjunction with the 5th General Assembly and the formal establishment of IOBC Global, was probably the first international event addressing genetic (Mackauer, 1972) and behavioral aspects (Boller, 1972) of insect mass-rearing. Boller proposed at that occasion a division of quality assessment and monitoring into production and product quality control. Another relevant IAEA/FAO fruit fly panel took place in 1973 (IAEA/FAO 1975). Papers presented by various authors included aspects of genetic variation in insect populations as

measured by the isozyme technique (Bush), mating propensity tests (Boller and Remund), comparative behavior of laboratory-reared and wild-type fruit flies (Prokopy et al.) and practical problem analysis in SIT programs (Butt). Prominent among the papers was the one given by Derrell Chambers on definitions and evaluation in quality control that are still valid today.

At the end of this period, many laboratories and individual scientists were independently generating methods and concepts to measure and control insect quality with the inherent risk of creating a “Babylonian” confusion. These tendencies culminated in 1976 with the development of two separate symposia on quality control held at the 15th International Congress of Entomology in Washington, D.C. One symposium, “Characterization and Evaluation of Insect Colonies” was moderated by Norm Leppa and the other on “Natural Enemies” included contributions on “Genetic Aspects” of mass rearing by Manfred Mackauer and “Quality Considerations” by Ernst Boller. This separation of symposia was an alarm signal indicating that further developments in the field of quality control could be hampered if the scientific community split into diverging and competing “schools.”

Period 1976 – 1979: International concepts of quality control are shaping up

After the Congress in Washington DC, an active exchange of letters initiated by Ernst Boller led in November 1976 to the important decision to join forces and create a global organization. In retrospect, it is obvious that this decision taken jointly on both sides of the Atlantic was the point of departure of the quality control concept that provided the working platform of this IOBC Working Group for many years. Efforts were undertaken to combine the diverging components and to merge them into mutually accepted concepts, terminology and methodology. This process included a request from the IOBC fruit fly working group to 52 fruit fly specialists for them to prepare short contributions for a compilation of available concepts and methods of measuring and evaluating quality in fruit flies. Boller and Chambers (1977) were able to publish and distribute 10 months later the IOBC/WPRS Bulletin No. 5/1977 entitled “QUALITY CONTROL: An Idea Book for Fruit Fly Workers.” The book introduced for the first time elements of statistical quality control techniques utilized by industry, such as the Shewhart Control Charts and process capability analyses. In 1977-78 some of the published techniques were tested as potential monitoring and evaluation tools in the IAEA medfly mass-rearing facility at Seibersdorf, Austria. This international project led to the development and publication of the RAPID Quality Control System (Boller et al., 1981).

In November-December 1978, an international team of fruit fly specialists assembled by Ernst Boller and Derrell Chambers cooperated under a joint IOBC-USDA/ARS-IAEA/FAO umbrella during several weeks of field-experimentation in Guatemala and developed the first prototypes of field tests for the medfly to complement the laboratory-based RAPID system (Chambers et al., 1983). This action was followed in September 1979 by an international workshop and training course on quality control of fruit flies conducted in Castellon de la Plana, Spain (Figure 1). The 10-day program was organized by the IOBC/WPRS Working Group on Fruit Flies of Economic Importance in collaboration with various national and international organizations, including the USDA-ARS, IAEA/FAO, Spanish Plant Protection Service, and Swiss Federal Research Station-Wädenswil. Three different medfly strains of various quality levels were evaluated by the simultaneous application of the RAPID Quality Control System in the laboratory and the field tests that had been developed in Guatemala. These activities resulted in production of a manual on standardized laboratory and field tests for mass-reared Mediterranean fruit flies (updated by

FAO/IAEA/USDA, 2003) and set the stage for establishing an international body for systematically addressing quality control matters.

Activities of the new IOBC Working Group starting in 1982

The proposal to establish a formal quality control working group was accepted by the Global IOBC Council in October 13, 1980 and Ernst Boller and Derrell Chambers were designated as the first co-chairmen. The new working group organized approximately biannual workshops starting in 1982 (Table 1).

Table 1. Meetings of the IOBC Global WG on quality control

Year		Location	Chairmen
1982	1 st	Gainesville, Florida	E. F. Boller and D. L. Chambers
1984	2 nd	Wädenswil, Switzerland	E. F. Boller and D. L. Chambers
1986	3 rd	Guatemala City, Guatemala	C. O. Calkins
1988	4 th	Vancouver, Canada	C. O. Calkins
1991	5 th	Wageningen, The Netherlands	F. Bigler and J. C. van Lenteren
1992	6 th	Horsholm, Denmark	F. Bigler
1993	7 th	Rimini, Italy	M. Benuzzi and N. C. Leppla
1995	8 th	Santa Barbara, California	R. F. Luck and N. C. Leppla
1998	9 th	Cali, Colombia	N. C. Leppla and T. R. Ashley
2003	10 th	Montpellier, France	P. De Clercq, S. Grenier and N.C. Leppla

The first workshop held in Gainesville, Florida in 1982 focused on pests of man and animals, (i.e., biting flies, such as screwworm), fruit flies and Lepidoptera. A post-meeting excursion was conducted to visit mass rearing facilities in Mexico for the screwworm at Tuxtla Gutierrez and the medfly at Metapa. Tours of operational pest management programs based on mass-produced arthropods were important to maintain a practical orientation. Encouraged by Manfred Mackauer, natural enemies were featured for the first time at the 2nd workshop held at Wädenswil, Switzerland in 1984. At Guatemala City, Guatemala, in 1986, the 3rd meeting was organized by subject rather than taxonomic group: insect colonization and strain development, colony maintenance, quality control of production and products (laboratory bioassays), irradiation, shipment and distribution, field assessment and management of quality control systems. Colonization and strain development, critical subjects that receive minimal attention, were also emphasized. Tom Ashley (1987) developed a computerized quality control system at Guatemala following the meeting.

A total quality control concept extending from planning a pest management program based on mass reared arthropods through production and use to feedback and optimization began to take shape after the workshop in Guatemala. This holistic approach was applied to both SIT and biological control at the 4th meeting held at Vancouver, Canada in 1988 (Bigler 1988). It was divided into two sections, "Quality Control of Pestiferous Insects" and "Quality Control of Entomophagous Arthropods." In addition to the topics discussed at Guatemala, behaviour of entomophages was added by Joop van Lenteren and the genetics of colonization

by Manfred Mackauer. IOBC Global was represented by the Secretary General, Jean Paul Aeschlimann.

The next workshop held at Wageningen, The Netherlands in 1991 concentrated completely on entomophagous arthropods and resulted in a very important proceedings that described specific quality control tests for natural enemies (Bigler 1991). This workshop produced the 6th special subject meeting at Horsholm, Denmark in 1992 where additional guidelines were developed for product control of natural enemies in anticipation of a requirement for European Community labels (Bigler 1992).

For the first time, at the 7th workshop in Rimini, Italy, specialists in augmentative biological control were brought together collaboratively with experts in arthropod colonization and mass production (Nicoli et al., 1993). Increasing regulation of the fledgling international biological control industry was a critical issue.

The 8th workshop was held in 1995 at Santa Barbara, California. One of the four sessions at this workshop addressed quality control procedures based on total quality management (TQM) and International Standards (ISO-9000). Considerable attention was again focused on risk assessment and regulation of commercially produced biocontrol agents.

The 9th workshop was conducted in 1998 at the International Center of Tropical Agriculture (CIAT) near Cali, Colombia. The meeting was held in conjunction with the IOBC Working Group on "*Trichogramma* and Other Egg Parasitoids" chaired by Sherif Hassan. During the meeting, self-regulation capacities for the international biological control industry were advanced, as well as some general principles and practices in large-scale rearing as they relate to quality control. At the conclusion of the Cali meeting, the IOBC Working Group on Quality Control was merged with a newly formed group emphasizing the rearing of entomophagous insects on artificial diets. This amalgamation, named the IOBC Arthropod Mass Rearing and Quality Control Working Group (AMRQC), is presently under the leadership of Simon Grenier (France), Patrick De Clercq (Belgium) and Norm Leppla (USA).

They organised the 10th workshop of the group in September 2003 at the Agropolis in Montpellier, France. The working group recommitted itself to addressing quality control and the associated rearing of both entomophagous and phytophagous, as well as haematophagous arthropods (Grenier et al. 2003).

Accomplishments

The accomplishments of this Global IOBC Working Group extend far beyond its initial goal of institutionalizing quality control in arthropod mass rearing programs. Today, unlike prior to about 1980, quality control is an accepted practice throughout the world for both SIT and biological control (Leppla, 2005). Quality control of mass-reared arthropods has evolved from product control (monitoring the outputs) to production and process control (precisely controlling the inputs). Production control has the greatest effect on the quality of mass-produced organisms and it is often combined with process control to form a set of standard operating procedures. Concurrently, members of the working group have published quality control tests and standards for phytophagous and haematophagous arthropods, and quality control guidelines for more than 20 natural enemies (van Lenteren, 2003). Additionally, the proceedings of workshops and organism-specific publications form a useful body of literature on the subject. Quality control is now an integral part of the curriculum in training courses on insect rearing.

It is essential that the IOBC Working Group on Quality Control, now Working Group on Arthropod Mass-Rearing and Quality Control (AMRQC), retain its broad base of activities

and flexibility to address opportunities in the production and use of mass-reared arthropods. For this reason that the initial coalition has been expanded to include new partners and the membership has grown to more than 100 worldwide. The need for this broad foundation has been reinforced over the years because of unforeseen issues. The pioneers of this working group never imagined the excessive amount of time that would be spent on regulatory issues, such as risk assessments and efficacy trials. Nor did they anticipate requirements for international shipment of natural enemies and the advent of genetically modified organisms. Thus, the IOBC Global WG AMRQC has an expanded mission, “to facilitate and advance cost-effective rearing of high-quality insects and other arthropods in support of biological control and integrated pest management.”

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Figure 1. The participants in the first international training course on quality control of fruit flies held September 1979 in Castellon de la Plana, Spain

II.3 Global Working Group on Egg parasitoids (1982 - present)

Joop C. van Lenteren, based on material published in proceedings and newsletters

Start, scope and activities of Working Group on Egg Parasitoids

During the XVth International Congress of Entomology, J. Voegelé (Fr) after consultation with K. Hagen (IOBC), L. Brader (FAO), G. Mathys (EPPO, IOBC) and F. Bennett (CABI) initiated the idea to form an IOBC Global Working Group on “*Trichogramma* and other egg parasitoids”, which is now called simply “Egg parasitoids”. The idea was supported by the Executive Committee and Council of IOBC Global and the WG held its first meeting from 20-23 April 1982 in Antibes, France. Since then another 5 meetings followed (see below) and the next meeting is planned for August 2007 in Brazil.

The WG currently consists of about 200 researchers from more than 70 countries. The aims of the WG are to bring egg parasitoid researchers into contact, and to promote research and application of egg parasitoids. The group has certainly succeeded in realizing these aims. The first two meetings had a very strong influence on coordination of research on egg parasitoids and also those that work in application of egg parasitoids in biological control benefitted a lot from this WG. After that meeting, the group continued to have regular meetings and produced a very informative newsletter.

Convenors

1982 - 1990: J. Voegelé, France; J.C. van Lenteren, The Netherlands; S.A. Hassan, Germany
 1990 - 1997: S.A. Hassan, Germany; G.A. Pak, The Netherlands; E. Wajnberg, France
 1997 - onwards: F. Bin, Italy; E. Wajnberg, France; G. Boivin, Canada

Meetings of Working Group

- 1st International *Trichogramma* Symposium, Antibes, France, 20-23 April 1982
- 2nd International Symposium on *Trichogramma* and other egg parasitoids, Guangzhou, China, 10-15 November 1986
- 3rd International Symposium on *Trichogramma* and other egg parasitoids, San Antonio, USA, September 23-27, 1990
- 4th International Symposium on *Trichogramma* and other egg parasitoids, Cairo, Egypt, 4-7 October 1994
- 5th International Symposium on Egg Parasitoids, Cali, Colombia, 1998
- 6th International Symposium on Egg parasitoids, 15-18 September 2002, Perugia, Italy
- 7th International Symposium on Egg parasitoids, August 2007, Brasilia, Brazil

The working group also organized egg parasitoid symposia at the following International Congresses of Entomology

- 1984 XVII International Congress of Entomology, Hamburg, Germany
- 1988 XVIII International Congress of Entomology, Vancouver, Canada
- 1992 XIX International Congress of Entomology, Beijing, China
- 1996 XX International Congress of Entomology, Firenze Italy
- 2000 XXI International Congress of Entomology, Iguacu Brazil
- 2004 XXII International Congress of Entomology, Brisbane Australia

II.4 Global Working Group Fruit Flies of Economic Importance (1986 – present)

Ernst F. Boller and Martin Aluja

Key data of the Working Group

Year	Name of Working Group and Convenor	Important events
1968		First meeting of IBP* fruit fly experts in Rome.
1969		Initiation of coordinated IBP fruit fly activities. First issue of FRUIT FLY NEWS (IBP) published. First IAEA-FAO** meeting of fruit fly experts.
1978		15-20 May Sassari/Sardegna: Joint session of 4 WPRS Working Groups and merging 3 of them into a new WPRS Working Group on “Fruit flies of economic importance (E.F. Boller, CH)”
1982		16-19 November: First Joint EC***-IOBC International Fruit Fly Symposium, Athens
1985		Formal application to Global IOBC for establishing a Global fruit fly group
1986	Fruit flies of economic importance E.F. Boller, CH	September: Global Executive establishes formally the WG and nominates E.F. Boller as acting coordinator, B.S. Fletcher as Convenor.
1987	B.S. Fletcher (AUST) E.F. Boller (CH)	7-10 April: First meeting of Global WG “Fruit Flies of Economic Importance” in conjunction with 2 nd Joint EC-IOBC International Fruit Fly Symposium, held at Rome.
1989	P. Liedo (Mexico)	
1990		October 14-20: 3 rd International Fruit Fly Symposium, Antigua, Guatemala
1992		<i>Ad hoc</i> Fruit Fly Symposium organised at International Congress of Entomology in Beijing.
1994	M. Aluja (Mexico)	June 5-10: 4 th International Fruit Fly Symposium, Sand Key, Florida
1998	M. Aluja (up to June 98) B.A McPherson (USA) (June 98 -present)	February 16-21: International Symposium on Phylogeny and Evolution of Fruit Fly Behaviour, Xalapa, Mexico. June 1-5: 5 th International Fruit Fly Symposium, Penang, Malaysia

*) International Biological Programme; **) Joint division of International Atomic Energy Agency – Food and Agriculture Organization of the United Nations; ***) European Community (later EU).

The history of this Global IOBC Working Group is closely linked to the histories of the WPRS Working Group on “Fruit Flies of Economic Importance” and of the Global WG on “Quality Control of Mass-reared Arthropds”(see Appendix II.2).

1968 – 1969: There are probably two main events that triggered the initiation of co-ordinated international fruit fly research activities and influenced indirectly the development and activities of IOBC fruit fly Working Groups: The first IBP meeting of fruit fly specialists of September 1968 in Rome, and the first IAEA-FAO fruit flies experts’ meeting taking place in

1969 in Vienna.

The role of **IBP** on the future developments in the international community of fruit fly workers cannot be overestimated. The IBP meeting of 1968 in Rome was convened by V. Delucchi as chairman of the International Biological Programme 9 on “Biological control” and attended by fruit fly specialists from 12 countries (Delucchi, 1976). It was the first international expert meeting where fruit fly specialists throughout the world were welded into a single cohesive entity with agreed aims and common goals. Of particular importance was the bringing together of the two major groups of workers concerned with the temperate and tropical tephritids. This event stimulated collaborative fruit fly research throughout the world (Bateman 1976). The IBP fruit fly group (Convenor M.A. Bateman, Australia) initiated coordinated research programs (1969-1973) on life-table studies and pupal mortality factors (coordinated by E. Boller, CH), on colour attraction (V. Moericke & A. Economopoulos, GR), on marking pheromones (R. J. Prokopy, USA) and conducted joint experiments on adult movements (D.L. Chambers, USA & M.A. Bateman, Australia), sexual behaviour (B.S. Fletcher, Australia) and population genetics (G.L. Bush & M.D. Huettel). The IBP group established in 1969 the FRUIT FLY NEWS, intended to be a temporary internal information document. It became in 1974, when IPB expired, the international IOBC communication platform for fruit fly workers.

The IAEA/FAO expert panel on “The application of the sterile male technique for control of insects with special reference to fruit flies” held September 1-5, 1969, in Vienna was the other event where fruit fly workers from different parts of the world met for the first time (IAEA-FAO 1970). This particular meeting is probably a historic landmark in the development of quality control procedures for mass reared arthropods. Not only did the vast majority of presented papers address the aspect of competitiveness (i.e., ratio-test data), but a paper presented by Chambers et al. covered also for the first time research activities in the field of product quality assessment (e.g., flight mills, assortative mating experiments in field cages). Haisch presented at that meeting for the first time the formula for the calculation of a competitiveness-index measuring the fitness of fertile and irradiated fruit flies.

1978: A major event took place in May 1978 when three IOBC WGs on “Genetic control of *Rhagoletis cerasi* (E. Boller, CH), “Genetic control of *Ceratitidis capitata* (L. Mellado, E)” and “Genetic methods in pest control (R.J. Wood, UK)” met jointly in Sassari, Sardegna and decided to pool their resources by merging into one single WG on “Fruit Flies of Economic Importance” (Prota, ed.1979). The WPRS Council approved this proposition in November 1978 and appointed E. Boller as first Convenor of this new WG.

The period of 1978-85 was characterised by an increasing international participation of fruit fly specialists from regions outside WPRS (especially North America) and increasing pressure on the limited resources of the WPRS Working Group. Specialists from the following countries and international institutions participated in IOBC coordinated projects: Austria, EURATOM/Ispra, Germany, Greece, Guatemala, IAEA/FAO Seibersdorf, Italy, Japan, Mexico, Portugal, Spain, Switzerland, Tunisia, Turkey, USA and the former Yugoslavia. This situation led in 1980 to the formation of a Global WG on “Quality Control of Mass-reared Insects”. In **1982**, a 1st joint EC/IOBC International Fruit Flies Symposium took place in Athens (Cavalloro, ed. 1983).

1985-1988: In 1985 R. Cavalloro and E.F. Boller submitted an application to Global IOBC to establish a Global fruit fly group. Global IOBC established in September 1986 the new WG on “Fruit Flies of Economic Importance”, nominated E.F. Boller (Switzerland) as acting coordinator and designated B.S. Fletcher (Australia) as future convenor. The 2nd joint EC/IOBC International Fruit Fly Symposium held April 1987 in Rome provided the platform for the first meeting of the new Global unit. Unfortunately, on short notice Fletcher was unable to attend this meeting and E. Boller had to step in as acting coordinator. The participants discussed the future working modus, to some extent inspired by the WPRS approach of action focussed activities. They decided on the following 8 topics: Leeking behaviour; feeding behaviour; biotechnical control; oviposition deterring pheromones; demography; genetic variation in *Ceratitidis capitata*; insecticide resistance; taxonomy. A meeting was planned for 1988 in conjunction of the International Congress of Entomology but did not leave any traces nor report.

1989 – 1998

Already by March 1, **1989** P. Liedo-Fernandez (Mexico) became new Chairman of the group and nominated M. Aluja (Mexico) and G. Delrio (Italy, Convenor of the WPRS fruit fly group) as co-chairmen.

The group organised in **1990** the 3rd International Fruit Fly Symposium in Antigua, Guatemala with 120 participants from 28 countries (Aluja and Liedo, eds., 1993) and in 1992 an *ad hoc* meeting in conjunction with the Internat. Congress of Entomology in Beijing.

The 4th International Symposium took place in **1994** in Sand Key, Florida with 283 participants from 33 countries (McPheron, B.A. and Steck, G. (eds.) 1996). In October **1994** M. Aluja (Mexico) became new Chairman and nominated J. Piedade-Guerreiro (Portugal) and B.A. McPheron (USA) as co-chairmen.

In February **1998** M. Aluja and A. Norrbom (USA) organised an “International Symposium on Phylogeny and Evolution of Fruit Fly Behaviour” held in Xalapa (Veracruz), Mexico with 34 participants from 12 countries. The end result of the symposium was a 963 page, edited book that contained 33 chapters written by the world authorities in the fields being addressed (Aluja and Norrbom (eds.) 2000). M. Aluja commented this event as follows “Given their economic importance, the study of fruit flies (Tephritidae) has been traditionally biased towards applied aspects (e.g. management, monitoring, mass rearing). Nevertheless, their ecological and behavioural plasticity render them ideal study objects to address basic biological and evolutionary questions of general interest to a wide audience. Fruit flies have been used as models for the development of general theories on, e.g. speciation processes, mating behaviour and demography. This symposium represented the first attempt ever to formally discuss the evolution of fruit fly behaviour and at the same time review the state of the art in the arenas of phylogeny and behaviour” (Aluja 1998).

The 5th (and so far last) International Symposium was held 1-5 June, **1998**, in Penang, Malaysia. It was also the occasion to transfer the chairmanship of the Working Group from M. Aluja to B.A. McPheron (USA). The theme of the symposium was “Current Global Scenario” and attracted over 200 scientists from over 40 countries. The fact that the first two days of the symposium overlapped with an IAEA/FAO-sponsored international conference on “Area-wide control of insect pests integrating the sterile insect and related nuclear and other techniques” increased the exchange of information beyond just the Community of fruit fly workers.

Is it more than a coincidence that this special setting reminds us on a similar situation

as observed in 1968 and 1969 (see above)?

Achievements, impact and outlook

We believe that the Global Working Group “Fruit Flies of Economic Importance” has produced, over its entire history, the most updated books on the state-of-the-art of fruit fly biology, ecology, behaviour and management. This, together with the fact that the WG has been able to keep together a highly mobile and productive community of fruit fly experts over almost 40 years of existence are two of the major achievements. The influence of the WG has been wide-ranging, but as noted before, we believe that having consistently produced the most updated reference books and also organized the biggest fruit fly meetings worldwide, has represented the biggest impact. Given a past full of achievements there is no doubt that the WG has a bright future ahead. But for its full potential to be realized, it is necessary to inject new blood into the group and also renovate the current leadership. Based on this, the next goal should be a call for elections.

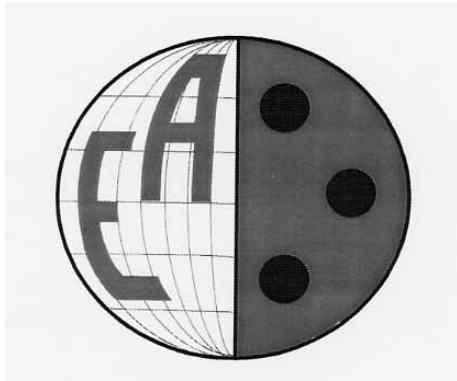
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II.5 History of the Global Working Group on Ecology of Aphidophaga (1988 – present)

Joop C. van Lenteren, based on material published in proceedings and newsletters

Start, scope and activities of Working Group on Ecology of Aphidophaga



A proposal of a WG devoted to the study of natural enemies of aphids was finalized in 1987, and approved at the General Assembly of IOBC Global in Vancouver in 1988. The first convenors were Y. Hodek (CZ) and R.J. Chambers (UK). It was the continuation, but now under the wings of IOBC Global, of a group that had started long ago on the initiative of Dr. Yvo Hodek, who had organized three very successful meetings, and published books on scientific and applied aspects of aphid – natural enemy relationships. The first symposium on Aphidophaga took place at Liblice in 1965 in Czechoslovakia (Figure 1). The symposium was a success and the Proceedings (1966; all lectures translated to English) have since been often cited. The second meeting took place in Zvikov Czechoslovakia (1984) and the third in Teresin, Poland (1987). Next followed 5 working group meetings under the wings of IOBC Global: Gödölö, Hungary 1990, Antibes, France 1993, Gembloux, Belgium 1996, Bromont, Canada, 1999 (Figure 2), Azores, Portugal, 2003. All these meetings attracted between 70 and 110 participants from up to 30 countries.

After the meeting in Bromont, Canada, some problems occurred. Due to the fact that the meeting took place in Canada (1999), it was difficult for scientists from central Europe to take part because of high travel costs. The same problem occurred with the meetings on the Azores in Portugal (2002) and in Japan (2005). As a result, the central European scientists working on Aphidophaga organized a meeting in their region. Another problem was that the IOBC Global WG changed its area of attention and included biological control of coccids since 2004. These problems have led to a temporary separation, but the next meeting will reunite the workers on Ecology of Aphidophaga in Greece from 5-10 September in 2007. The scope of the WG is basic and applied research on aphidophagous insects. Usually the focus of the meetings is on fundamental studies, but presentations of an applied nature are also welcome, as are those addressing alternative food of aphidophaga, non-aphid prey, and the impact of aphidophaga in biological control.

Convenors

1965 – 1988: I. Hodek (CZ)
 1988 – 1995: I. Hodek (CZ) and R.J. Chambers (UK)
 1995 – 1999: D. Horn (USA)
 1999 – 2005: J.L. Hemptinne (B)
 2005 - present: N. G. Kavallieratos (GR)

Meetings of Working Group

- Ecology of Aphidophaga 1, Liblice near Prague, Czechoslovakia, 27 September – 1 October 1965
- Ecology of Aphidophaga 2, Zvikovske Podhradi, Czechoslovakia, 2 – 8 September 1984
- Ecology of Aphidophaga 3, Teresin, Poland, 31 August – 5 September 1987
- 1st meeting of IOBC Global WG Ecology of Aphidophaga (4th Meeting on Ecology of Aphidophaga) Gödölö, Hungary, 2-7 September 1990
- 2nd meeting of IOBC Global WG Ecology of Aphidophaga (5th Meeting on Ecology of Aphidophaga) Colle-sur-Loup, France, 6-10 September 1993
- 3rd meeting of IOBC Global WG Ecology of Aphidophaga (6th Meeting on Ecology of Aphidophaga) Gembloux, Belgium, September 1996
- 4th meeting of IOBC Global WG Ecology of Aphidophaga (7th Meeting on Ecology of Aphidophaga) Bromont, Canada, 31 August – 4 September 1999
- 5th meeting of IOBC Global WG Ecology of Aphidophaga (8th Meeting on Ecology of Aphidophaga) Ponta Delgada, Azores, Portugal, 1-6 September 2002
- Ecology of Aphidophaga 9, Ceske Budejovice, Czech Republic, 6 – 10 September 2004
- 6th meeting of IOBC Global WG Biological Control of Aphids and Coccids, Yamagata, Japan, 24-28 September 2005
- 7th meeting of IOBC Global WG Ecology of Aphidophaga, Athens, Greece, 5-10 September 2007.

Publications of Working Group

- Hodek, I. (Ed.) 1966. Ecology of Aphidophagous Insects. Academia Prague and Junk, The Hague, 360 pp.
- Hodek, I. (Ed.) 1986. Ecology of Aphidophaga. Academia Prague and Junk, The Hague,
- Niemczyk, V.E., A.F.G. Dixon (Eds.) 1988. Ecology and Effectiveness of Aphidophaga. SPB Academic, The Hague, 341 pp.
- Polgar, L, R.J.Chambers, A.F.G. Dixon & I. Hodek (Eds.) 1991. Behaviour and impact of Aphidophaga. SPB Academic, The Hague, 350 pp.
- Chambers, R.J., A.F.G. Dixon, I. Hodek & J.M. Rabasse (Eds.) 1993. Behavioural ecology of aphidophagous insects. European Journal of Entomology 90 (4): 365-476.
- Aeschlimann, J.P., D.J. Horn, M. Mackauer & P. Wellings (Eds.) 1995. Augmentation and Enhancement of Aphidophaga, Agriculture, Ecosystems and Environment, 52(1): 1-128.
- Dixon, A.F.G., J.L. Hemptinne, I. Hodek, A. Honek, D. Horn, M. Mackauer & P. Wellings (Eds.) 1997. Biological Control and Management of Aphids. Entomophaga 42 (1/2): 1-293.
- Vincent, C., D. Coderre & I. Hodek (Eds.) 2000. Proceedings 7th International Symposium of Aphidophaga, Bromont, Canada, 31 August – 4 September 1999. European Journal of Entomology 97 (4): 441-566.
- Soares, A.O., M.A. Ventura, V. Garcia & J.L. Hemptinne (Eds.) 2003. Proceedings of the 8th International Symposium on Ecology of Aphidophaga, Ponta Delgada, Azores, Portugal, 1-6 September 2002. Aquipelago, Life and Marine Sciences, 1-112.

Website

www.aphidophaga10.gr



Figure 1. Participants at 1st meeting of the WG Ecology of Aphidophaga, Liblice near Prague, Czechoslovakia, 27 September – 1 October 1965 (left to right: Ken Hagen, Vince Stern and Robert van den Bosch)



Figure 2. Participants at 4th meeting of IOBC Global WG Ecology of Aphidophaga (7th Meeting on Ecology of Aphidophaga) Bromont, Canada, 31 August – 4 September 1999

II.6 History of the Global Working Group on Biological Control of *Plutella* (1990 – present)

Joop C. van Lenteren, based on material published in proceedings and newsletters, and the Diamondback moth website

Start, scope and activities of the Working Group on Biological Control of *Plutella*

In 1990 a formal proposal to establish a Working Group on Biological Control of *Plutella xylostella* (= Diamondback moth = DMB) was received by IOBC Global, which was approved under the name of Biological Control of *Plutella*. The WG aims at helping to organize and disseminate information on the biology, ecology and management of the diamondback moth, *Plutella xylostella* (L.). The WG started to compile a database of researchers on *Plutella* biological control. During the first years of the WG, a newsletter was published, later a website fulfilled this goal (<http://www.nysaes.cornell.edu/ent/dbm/>). The WG organized four workshops and will have its 5th WG meeting in October 2006.

Convenors

1990 – 1996: N.S. Talekar (Taiwan)

1997 – present: A.M. Shelton (USA)

Meetings of the Working Group

1st International Workshop on the Management of Diamondback Moth, Tainan, Taiwan, March 1985.

2nd International Workshop on the Management of Diamondback Moth, Tainan, Taiwan, December 1990 (First IOBC Global WG meeting).

An International Workshop on the Management of Diamondback Moth was also organized during the International Congress of Entomology in Beijing, PRC, August 1992.

3rd International Workshop on the Management of Diamondback Moth and Other Crucifer Pests, Kuala Lumpur, Malaysia, October-November 1996 (Second IOBC Global WG meeting).

4th International Workshop on the Management of Diamondback Moth and Other Crucifer Pests, November 2001, Victoria, Australia 2001 (Third IOBC Global WG meeting).

5th International Workshop on Management of the Diamondback Moth and Other Crucifer Pests, Beijing, China, October 2006 (Fourth IOBC Global WG meeting)..

Publications of the Working Group

Talekar, N.S. (ed.) 1986. Diamondback Moth Management: Proceedings of the First International Workshop. The proceedings of an international workshop conducted in 1985 to discuss diamondback moth (DBM) and its control. Research papers from numerous scientists are presented on a wide range of IPM strategies, which include chemical control, cultural control, host-plant resistance, and biological control. 471 pp. Full texts of all papers are available on the website of the WG (see below).

Talekar, N.S. (ed.) 1991. Diamondback Moth and Other Crucifer Pests: Proceedings of the Second International Workshop, Tainan, Taiwan, 10-14 December 1990. The proceedings were published by The Asian Vegetable Research and Development Center in Shanhua, Taiwan. It is listed as AVRDC Publication No. 92-386, ISBN 92-9058-042-

2. An "Annotated Bibliograph of Diamondback Moth, Vol. 2" was also published for the proceedings and this is listed as AVRDC Publicaton No. 90-334, ISBN 92-9058-044-5. Full texts of all papers are available on the website of the WG (see below).

Sivapragasam, A. (ed) 1996. The Management of Diamondback Moth and Other Crucifer Pests: Proceedings of the Third International Workshop. The proceedings were published by the Malaysian Agricultural Research and Development Institute (MARDI) in Kuala Lumpur, Malaysia, Publication ISBN 967-936-355-X.

Website

The WG maintains a website at <http://www.nysaes.cornell.edu/ent/dbm>. A lot of information on Diamondback moth can be found at this site, as well as the full texts of papers presented at WG meetings and an overview of Diamondback moth researchers. Results from new research are constantly being published and citations can be found in the DBM literature section of this site. Other site sections include abstracts of recent DBM publications and research updates by DBM scientists.

II.7 IOBC Global Working Group on Biological Control of *Chromolaena odorata* (Siam Weed) (1993 – present)

Joop C. van Lenteren, with the help of R. Muniappan

Start, scope and activities of Working Group on Biological Control of *Chromolaena odorata* (Siam Weed)

The First International Workshop on Biological Control of *Chromolaena odorata* was held from 29 February to 4 March 1988 in Bangkok, Thailand. *Chromolaena odorata* is a Neotropical plant that has become an invasive weed in the Old World. It invaded pastures, vacant lands, roadsides, plantation crops, disturbed forests and wildlife reserves. It suppresses local fauna, restricts wildlife movement, interferes in cultivation and reduces biodiversity. The workshop was jointly organized by the University of Guam (UOG), National Biological Control Research Center (NBCRC), and the South and East Asia Regional section of the International Organization for Biological Control (SEARS/IOBC). There were 17 participants from Australia, France, India, Philippines, South Africa, Thailand and Guam. This workshop provided a forum for the scientists involved in research on biological control of *C. odorata* to exchange views, update research activities, plan for future research programs and above all for active collaboration in the international arena. One recommendation of this first workshop was to produce a '*Chromolaena odorata* Newsletter'. The first issue of this newsletter was published in June 1988 with important information on the biology of *Chromolaena* and a listing of many references on this weed. Another recommendation was to establish an International Working Group on Biological Control of *C. odorata* in affiliation with the International Organization for Biological Control.

The Second International Workshop on Biological Control of *C. odorata* was held in Bogor, Indonesia, February 4 - 8, 1991. During the meeting the need was felt for information on different aspects of the biology of the weed and its biological control agents to tackle it effectively and economically without endangering the environment. It was also hoped that the meeting would induce further research in multi-disciplinary areas not only to suppress this weed but also to tackle problems associated with it.

In 1992 IOBC formally decided at its General Assembly in Beijing (China) to support the establishment of the Global *Chromolaena* working group.

The Third International Workshop was held in Abidjan, Côte d'Ivoire, from 15-19 November 1993. During this workshop, the IOBC Global Working Group on Biological Control of *Chromolaena odorata* was established under the auspices of IOBC. The 3rd Workshop strongly recommended, among others, that where biological control of *C. odorata* is found necessary in Africa and elsewhere, it should be conducted according to the FAO Code of Conduct for the Importation and Release of Biocontrol Agents. In particular, Article 3 which stipulates that importation can be made only with governmental consent from the importing country, that other countries in the region concerned be consulted, and that introductions should only be made when it is in the best interest of the public. Article 4 which stipulates that the host range of any potential agents must be adequately investigated before release should also be followed. Since conflicts of interest are likely to occur, the Workshop also recommends that the different viewpoints and arguments expressed in the Proceedings of the 3rd Workshop be considered before any permits to import are issued.

The fourth International Workshop was held at Bangalore, India, from 14-18 October

1996. An important recommendation reached at this meeting was that: “In view of the serious problems caused by *C. odorata* in developing countries in Asia and Africa to the livelihood of small- and medium-scale farmers, and the threat to biodiversity in natural ecosystems, countries of origin of the plant (tropical Americas from Argentina to the USA) are requested to assist researchers from affected countries and their agencies by allowing exploration for, and collection and export of promising candidate organisms for biological control of the weed, without imposing administrative and other barriers to the export of live materials.”

The fifth International Workshop was held in Durban, South Africa, from 23-25 October 2000. The workshop included a trip to the north coast of KwaZulu-Natal province, to view *Chromolaena* infestations and clearing operations, was organized in part by the KwaZulu-Natal Nature Conservation Service.

The Sixth International Workshop was held in Cairns, Australia from 6-9 May 2003. At this meeting the status of the weed and its control in the Asian area was presented, as well as biological data about the weed. Further, talks with surveys, rearing, mass production, establishment and spread of several biological control agents were given. It was proposed to develop a website that should contain all important information about weed and its natural enemies. Also proposed was to expand the focus of the WG to include other invasive Eupatorieae

The Seventh International Workshop will be held at the National Pingtung University of Science and Technology, Pingtung, Taiwan, Republic of China in September 2006. The purpose of this workshop is to facilitate dissemination of information on the management and control of *Chromolaena* and a new weed, *Mikania micrantha*, to identify areas in which new research is needed, and to foster global cooperation.

Meetings of Working Group

- 1st International Workshop on Biological Control of *Chromolaena odorata*, 29 February – 4 March 1988, Bangkok, Thailand
- 2nd International Workshop on Biological Control of *Chromolaena odorata*, 4 – 8 February 1991, Bogor, Indonesia
- 3rd International Workshop on Biological Control of *Chromolaena odorata*, 15-19 November 1993, Abidjan, Côte d’Ivoire.
- 4th International Workshop on Biological Control of *Chromolaena odorata*, 14-18 October 1996, Bangalore, India
- 5th International Workshop on Biological Control of *Chromolaena odorata*, 23-25 October 2000, Durban, South Africa
- 6th International Workshop on Biological Control of *Chromolaena odorata*, 6-9 May 2003, Cairns, Australia
- 7th International Workshop on Biological Control of *Chromolaena odorata*, 12-15 September 2006, Pingtung, Taiwan

***Chromolaena odorata* Newsletters**

- No. 1 May 1988, edited by R. Muniappan, 15 pages
- No. 2 October 1988, edited by R. Muniappan, 23 pages
- No. 3 March 1990, edited by R. Muniappan, 8 pages
- No. 4 May 1991, edited by R. Muniappan, 8 pages
- No. 5 January 1992, edited by R. Muniappan, 7 pages
- No. 6 October 1992, edited by R. Muniappan, 6 pages

No. 7 June 1993, edited by R. Muniappan, 4 pages
No. 8 January 1994, edited by R. Muniappan, 4 pages
No. 9 November 1994, edited by R. Muniappan, 4 pages
No. 10 April 1996, edited by R. Muniappan, 4 pages
No. 11 December 1996, edited by R. Muniappan, 2 pages
No. 12 May 1998, edited by R. Muniappan, 6 pages
No. 13 June 1999, edited by R. Muniappan, 4 pages
No. 14 December 2000, edited by R. Muniappan, 6 pages
No. 15 May 2002, edited by R. Muniappan, 8 pages
No. 16 December 2004, edited by R. Muniappan, 7 pages
Important sections of most newsletters are available on the website of the WG

Other publications of the Working Group

Proceedings 1st International Workshop on Biological Control of *Chromolaena odorata*, 29 February – 4 March 1988, Bangkok, Thailand
Proceedings 2nd International Workshop on Biological Control of *Chromolaena odorata*, 4 – 8 February 1991, Bogor, Indonesia
Proceedings 3rd International Workshop on Biological Control of *Chromolaena odorata*, 15-19 November 1993, Abidjan, Côte d'Ivoire.
Proceedings 4th International Workshop on Biological Control of *Chromolaena odorata*, 14-18 October 1996, Bangalore, India
Proceedings 5th International Workshop on Biological Control of *Chromolaena odorata*, 23-25 October 2000, Durban, South Africa
Proceedings 6th International Workshop on Biological Control of *Chromolaena odorata*, 6-9 May 2003, Cairns, Australia
The proceedings of the Working Group meetings are available on the website of the WG

Website <http://www.ehs.cdu.edu.au/chromolaena/index.html>

The WG has its own website with the proceedings of working group meetings, the newsletters, general information about the weed and its natural enemies, and news about recent developments and future meetings.

Impact and future of the Working Group

Due to the coordinating activities of R. Muniappan since the initiation of this working group in 1988, the international network of those working on biological control of *Chromolaena* has strongly grown and is collaborating on a regular basis. Biological information on the weed and its natural enemies is well documented in newsletters, proceedings of WG meetings and on the website of the WG. An important activity of the international WG network was to carry out pre-release and post-release evaluations of biological control agents to assess the agent's effectiveness. Based on these evaluations, recommendations could be given for use of certain biological control agents in specific areas. Also, the WG has stimulated organizations and countries to apply the FAO Code of Conduct for the Importation and Release of Biocontrol Agents. The activities of the WG have (1) certainly improved general knowledge of the weed and its biological control agents, and (2) stimulated the application of biological control of *Chromolaena*.

Future aspects of work are interactions with relevant organisations in neotropical countries to allow for country-of-origin contract work like exploration surveys for new

species or biotypes of agents and host-specificity testing. Also the study of biological control of another weed species, *Mikania micrantha*, will be taken up by this WG.

II.8 IOBC Global Working Group on Biological Control and Integrated Control of Water Hyacinth (1997 – present)

Joop C. van Lenteren, with the help of Martin P. Hill

Start, scope and activities of Working Group on Biological Control and Integrated Control of Water Hyacinth

Water hyacinth is the worst water weed in the world. It has spread from its area of origin in the Amazon basin over the past 115 years to infest the great majority of the world's major tropical and subtropical water bodies. It grows extremely rapidly in nutrient rich conditions, forming uniform mats of weed many hundreds of hectares in area. Water hyacinth disrupts all normal activities associated with water body use, and causes substantially increased water losses through transpiration. If left uncontrolled, it can destroy fishing grounds, prevent ships from docking, cause rapid siltation of water bodies, block irrigation channels and hydro-electric turbine coolant intakes. It can completely disrupt the lives of riparian communities in developing countries by blocking access to the water.

The Global Working Group for the Biological and Integrated Control of Water Hyacinth was established in 1997. Researchers in the field of water hyacinth had met before at several meetings (see below) and decided to propose an IOBC WG on this topic.

The mission of the working group is to promote better management of water hyacinth through facilitation of interactions, dissemination of information and identification of research needs.

The objectives of the working group are to facilitate the flow of information between researchers and practitioners engaged in projects to control water hyacinth. The working group is primarily concerned with integrated and biological control of the weed, but is open to anyone interested in its control by any means. The working group has held two workshops. The first was in November 1988 in Harare, Zimbabwe, and the second in October 2000 in Beijing, China. These workshops brought together people from all over the world to discuss the most effective, long-term control options for the weed. Each of the first two workshops attracted some 50 delegates. The proceedings of both workshops were published and are available on the working group website (www.waterhyacinth.org).

Meetings of Working Group

First IOBC Global Working Group meeting for biological and integrated management of water hyacinth, Harare, Zimbabwe, November 1998.

Second IOBC Global Working Group meeting for biological and integrated management of water hyacinth, Beijing, China, October 2000.

Meetings related to Working Group activities

International Conference on Water Hyacinth, Hyderabad, India, February 1983 (8 papers on BC). Published

Informal meeting on Water Hyacinth control at Lincoln University, New Zealand, 1992 during 8th Int Symp BC Weeds

Meeting on Water Hyacinth control at University of Cape Town, Stellenbosch, South Africa, 1996, during 9th Int Symp BC Weeds

Meeting on Water Hyacinth control at World Bank, Washington DC, USA, 1997.

Workshop on the Capability of Communities, Authorities and Organisations to handle problems of Water Hyacinth in Africa and the Middle East, Nairobi, Kenya, 17-19 September 1997. Proceedings published

Meeting on Water Hyacinth control at University of Montana, 1999 during 10th Int Symp BC Weeds

Publications of the Working Group

Hill, M.P., M.H. Julien, T.D. Center (eds.), 1998. Proceedings of the 1st IOBC Water Hyacinth Working Group meeting, Harare, Zimbabwe, November 1998.

Julien, M.H., M.P. Hill, T.D. Center and Ding Jianqing. (eds.), 2001. Biological and Integrated Control of Water Hyacinth, *Eichhornia crassipes*. ACIAR Proceedings 102. ACIAR, Canberra, Australia.

The working group published six issues of a biannual newsletter between 2000 and 2002, in collaboration with CABI through funding from the IMPECCA (International Mycoherbicide Programme for *Eichhornia crassipes*) project.

The proceedings of the Working Group meetings are available on the website of the WG

Website www.waterhyacinth.org

The WG has its own website with the proceedings of working group meetings, general information about the weed and its natural enemies, and news about recent developments and future meetings.

Working group committee

The committee for the working group comprises since its initiation in 1997:

Chairperson: Martin Hill (South Africa); Committee: Ted Center (USA), Ding Jianqing (China), Mic Julien (Australia) and James Ogwang (Uganda)

II.9 Global Working Group Transgenic Organisms in IPM and Biological Control (1998 – present)

Joop C. van Lenteren, based on material published in IOBC Global Newsletters and reports of the Working Group

Start, scope and activities of Working Group Transgenic Organisms in IPM and Biological Control

Jeff Waage, IOBC Global President 1996-2000 motivated the need of this WG as follows (IOBC Global Newsletter 67, summer 1998: “Few developments in pest management and biological control have attracted more attention in the past year than the development of transgenic crops, particularly the use of genes from *Bacillus thuringiensis* (Bt) to protect crops against lepidopterous pests. Most new crop protection methods, such as pesticides, have a period of open discussion and field experimentation in which scientists from governments, universities and international research institutions participate in refining and adapting technologies to crop protection systems. Transgenic crops, by contrast, have been developed with relatively little involvement of this crop protection community and are now being deployed so rapidly as to make such research difficult....

If these transgenic crops are to realise their full potential in crop protection, there is a need to treat them as components of integrated pest management (IPM) systems and to engage the scientists working in these systems. Anyone experienced in crop protection today will be concerned about the presentation of new technologies as stand alone solutions to problems, and in this context transgenic crops are no different than chemical pesticides or resistant crop varieties. The risk of resistance development to transgenic crops has already been the subject of some discussion. Other areas deserving research, which have recently come to light, are the impact of transgenic crops on the natural enemies of pests, their effect on changing the pest complex on crops (and the emergence of new pest problems requiring IPM solutions), and their overall impact and value in IPM systems on crops like rice, cotton and maize.

IOBC is in a unique position to help new, transgenic crops for crop protection find useful application in agriculture. As an authoritative, impartial and international body of experts on biological control and integrated pest management, IOBC can help small and widely scattered research initiatives to communicate, to share information and to develop common methods and approaches. It can encourage new research initiatives, and help to form links between researchers in developed and developing countries and between the public and private sector. IOBC members from a number of Regional Sections are presently discussing the development of a Global Working Group on Transgenic Crops in IPM, the objective of which would be to promote and progress scientific research on the impact and role of transgenic crops for crop protection as components of IPM systems around the world.” (End of quote.)

During the September 1998 meeting of the IOBC Global Executive Committee in Montpellier, France, the creation of this new WG was approved. The convenor of the WG, Dr. Angelika Hillbeck, formulated the scope and activity of the WG in the IOBC Global Newsletter 68 (Winter 1998): “With the rapid recent development and deployment of transgenic organisms in agriculture comes a need for greater involvement of scientists from public sector institutions, including universities and government agencies, in the study of

these organisms and their use in IPM and biological control. As with all crop production methods, their use and development should meet the needs of farmers and consumers while providing for a more environmentally friendly agriculture to the benefit of society. This WG is a new initiative designed to engage and bring together scientists from public sector institutions in developed and developing countries around the world. It will encourage scientific studies and multidisciplinary cooperation in areas outlined below. While the WG is intended for scientists from public sector institutions, it will establish mechanisms to regularly exchange information and ideas with private industry and non-governmental organisations. Among other, the activities of the WG will:

- Provide a network for information exchange between scientists. This WG will provide a forum for disseminating information on published and ongoing research, and for discussion on scientific issues relating to transgenic organisms in IPM and biological control.
- Identify research needs for understanding the efficacy and environmental impact of transgenic plants, and develop methods and protocols for their evaluation. Methods for measuring non-target effects of transgenic organisms need to be improved upon and related to the impact on the field and landscape level.
- Develop methods and protocols for resistance management. Resistance to transgenic organisms is a potential constraint in their deployment and effective resistance management strategies are an important component of the use of transgenic organisms in IPM and biological control.
- Develop methods and protocols for monitoring. There is a need to develop scientifically sound monitoring systems for early detection of resistance and all other environmental changes arising from the release of transgenic organisms.
- Provide a scientific basis for making decisions about the value of deploying or developing transgenic organisms for particular IPM systems. Successful IPM involves the participation and cooperation of farmers, extensionists, researchers, regulatory authorities and policy makers in designing and implementing appropriate local IPM systems. All of these stakeholders need to be empowered and involved in the process of deciding whether and how to use transgenic organisms as components of IPM.
- Advocate the role of scientific information as a basis for policy making. The working group is committed to rapid and extensive communication of scientific information and progress to the public, and to the proper use of scientific information in developing policy on the use of transgenic organisms in IPM and biological control. Its outputs, in the form of publications and protocols will be made available to all.” (End of quote.)

Summary of activities of WG since 1999 (based on report of Dr. A. Hilbeck)

The first WG meeting on ‘Effective and sustainable use of agricultural biotechnology in integrated pest management in developing countries’ was held in association with a related meeting organized by the Rice IPM Network from November 27-30 in Hangzhou. The WG meeting focused discussion on evaluating pre-commercialization analysis of non-target risks, separating several categories of non-target effects. We also discussed the contrasting strategy of using indicator species versus an approach designed to investigate identifiable risks. The WG agreed that developing improved methodologies for biosafety assessment and environmental monitoring would be a good focus for future working group activities and that outside funding should be sought to allow the group to pursue this international undertaking.

The the WG prepared a project proposal on “Development of International Scientific

Biosafety Testing Guidelines for Transgenic Plants”, which was funded by the Swiss Agency for Development and Cooperation (SDC) by the end of 2001. The project aimed at developing comprehensive, transparent scientific guidelines for pre-release biosafety testing of GM plants that could serve as an international standard, as called for in the Cartagena Protocol. Work related to this proposal was done within the GMO Guidelines Project, in which many WG members took part. Information about the GMO Guidelines Project including publications (e.g. Hilbeck et al., 2004; 2006) can be found on www.gmo-guidelines.info.

An ad-hoc WG meeting was held during the IOBC International Symposium on ‘The Role of Genetics and Evolution in Biological Control’ in Montpellier, 14 – 16 October 2002, at which project progress was discussed.

During the period 2001 – 2005 WG members contributed to the GMO Guidelines Project and since October 2005 to the GMO Environmental Risk Assessment Methodologies Project.

By the end of 2005, the leadership of the WG was enlarged due to the many activities taking place in this WG. The leadership then consisted of the following convenors: Dr. S. Arpaia (Italy), Dr. N.A.E. Birch (UK), Dr. A. Hilbeck (Switzerland), and Dr. G. Lovei (Denmark).

In June 2006, the WG organized a meeting on “Environmental Risk Assessment of GM plants: discussion for consensus” in Italy (Figure 1).

References

- Hilbeck, A. and Andow, D.A. (eds.), 2004. Environmental Risk Assessment of Genetically Modified Organisms Volume 1: A Case Study of Bt Maize in Kenya. CABI Publishing, Wallingford, UK.
- Hilbeck, A., Andow, D.A. and Fontes, E.M.G. (eds.), 2006. Environmental Risk Assessment of Genetically Modified Organisms Volume 2: Methodologies for Assessing Bt Cotton in Brazil. CABI Publishing, Wallingford, UK



Figure 1. Participants Workshop “Environmental Risk Assessment of GM plants: discussion for consensus”, Rotondella, Italy, June 2006

II.10 – 13 History of former Working Groups of IOBC Global

Joop. C. van Lenteren

Working Groups (WGs) of IOBC Global and Regions can be formed when members find it relevant to collaborate on a certain topic (e.g. the Global WG on Biological Control of the Weed *Chromolaena*) or when Executive Committees take the initiative to establish a WG (e.g. the Global WG on Transgenic organisms in IPM and Biological Control). In a number of cases, the activities of WGs were no longer needed and their work was terminated. Sometimes the WG became too large and split up in other WGs, or WGs moved from Global to a Regional Section or vice versa.

II.10 WG Ecology of Bruchids (1981 – 1994)

The IOBC Global WG on Ecology of Bruchids, met for the first time in 1981 in Paris under the convenorship of Prof.dr. V. Labeyrie. A one-day meeting of the group was held in Pau, France. In 1986, the council observed that this WG was not active and looked for possibilities to reactivate the group. The General Assembly and several researchers interested in Bruchid biological control announced another call for ideas to reactivate this group after the General Assembly in Vancouver 1988. A meeting of the WG was planned to be held during the 2nd International Symposium on Bruchids in Japan, Okayama, September 1989, but did not result in activities. New convenors appointed in 1989 by Executive Committee of IOBC Global and these convenors (Dr. A. van Huis (NL) and Dr. Ph. Monge (F)) produced a first newsletter in 1990 and an organizational meeting in Tours (1990) to plan future activities. A 2nd newsletter was released in January 1991, but request to indicate interest in this WG apparently remained without reaction. The Council of Global decided in 1994 to dissolve this WG and proposed that activities of this WG could be continued in the WPRS WG on stored product pests (see Part III).

II.11 WG Biological Control of *Heliothis* (1982 – 1991)

The WG on Biological Control of *Heliothis* was endorsed by IOBC Global in 1982, following a proposal that was formulated after an international workshop on *Heliothis* management in Hyderabad, India, November 1981. The first convenor of this WG was Dr. E.G. King, USA. Objectives of the WG are to facilitate exchange of natural enemies of *Heliothis* and information on biological control of *Heliothis*. The WG started immediately with the production of a newsletter which appeared in November 1983 and reported progress in biological control research and application of *Heliothis*, and a list of researchers working on *Heliothis* control. Later, newsletters appeared about annually. The 1st workshop of this WG was organized during the International Congress of Entomology, Hamburg, Germany, 1984, with 27 research workers of 12 countries in attendance. No proceedings were produced of this meeting. The 2nd Workshop on “Biological Control of *Heliothis*: Increasing the Effectiveness of Natural Enemies” was held in New Dehli, India, in 1985, and proceedings of this meeting appeared in 1989 (Increasing the Effectiveness of Natural Enemies. New Dehli, November 1989, 550 pp. published by FERRO, USDA, New Dehli). The 3rd workshop of this WG was held during the International Congress of Entomology, Vancouver, Canada, 1988 on Biosystematics of *Heliothis* and Natural Enemies. In 1990, the convenor announced that he would like to resign, and in newsletter 52 of IOBC Global of December 1990, the Secretary

General asked for ideas on how to continue with this group. By mid 1991 hardly any reactions to the request had been received. There was apparently no more interest in this group and it was unofficially considered dissolved by the end of 1991. It will officially be dissolved during an IOBC Global Council meeting in 2007.

II.12 WG Training, Information and Education (1994 – 1996)

The idea to form a WG on Training, Information and Education was expressed during the General Assembly of 1992. The proposal resulted in many positive reactions, and the formation of the WG was approved by the Council of IOBC Global in 1994, Montpellier, France. The potential tasks of this WG were the following: (1) make a world wide database of biological control workers and (2) a database of books, videos and other material on biocontrol, (3) develop bibliographies on specific topics of interest for members, (4) provide training courses in biological control and IPM, (5) establish information material on benefits cost ratios in biological control, (6) make track records of biological control and reductions in pesticide use due to the implementation of biological control, (7) help in educating the world (s children) about ecology and biological control by producing material for teachers, e.g. by producing an IOBC educational workbook. The first convenor of this WG was Re Wang (PRC), and he was involved in the organization of a training course on side effects of pesticides on natural enemies in Malaysia in 1995. A new convenor, M. Orazé (USA), was appointed in 1996 but apparently no further activities were developed. The WG is, therefore, unofficially considered dissolved by the end of 1996. It will officially be dissolved during an IOBC Global Council meeting in 2007.

II.13 WG Biological Control of Coffee Berry Borer (1998 – 2004)

In 1998 the Executive Committee of IOBC Global accepted a proposal from IOBC NTRS to form a WG on Biological Control of Coffee Berry Borer. As no activities were carried out by the convenor, the WG was proposed to be dissolved by the Executive Committee of IOBC Global in October 2004 which will have to be approved by the Council in 2007.

Appendix III. Histories of IOBC WPRS Commissions and Working Groups

Overview

Ernst F. Boller

Commissions are permanent working units of WPRS. Their establishment is initiated by WPRS Council but most of the existing Commissions have their roots at the very beginning of CILB in 1956.

Working Groups (WGs) of IOBC can be formed when members find it relevant to collaborate on a certain topic or when Executive Committees/Governing Boards take the initiative to establish a WG.

In a number of cases, the activities of Commissions and WGs were no longer needed and their work was terminated. Sometimes the WG became too large and was split up in other WGs, or WGs moved from Global to a Regional Section or vice versa.

Most of the short histories, published here for the first time, have been prepared jointly by founding members and acting Convenors. Some have been compiled based on the data of the IOBC archive established in 2006. The editors of this book have decided not to modify content or style of these individual contributions. Since most of the authors do have other mother tongues than English, many of these historic abstracts are written in “IOBC English” providing the specific and interesting flavour of the respective geographic region. This linguistic peculiarity characterises many of the IOBC publications.

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III.1 Commission of Taxonomy of Entomophagous Species (1956 – present)

Vittorio Delucchi, assisted by H. Baur and E. F. Boller

Key data about commission of taxonomy from IOBC WPRS archive 2006

Year	Name of Commission	Convenors and Members
1956	Service d'identification des entomophages (Headquarters at Geneva, Switzerland)	Ch. Ferrière, L. P. Mesnil, V. Delucchi
1958		Ch. Ferrière, L. P. Mesnil, C. Besuchet
1960		P. Bovey, C. Besuchet
1964	Commission et Centre d'identification	C. Besuchet, V. Delucchi
1965	Commission d'identification et de taxonomie	
1968	Commission taxonomie des entomophages	C. Besuchet, P. Bovey
1971		V. Delucchi, C. Besuchet, P. Bovey
1974	Commission transferred to Germany with two centres at Ludwigsburg and Munich	V. Delucchi, B. Herting (Ludwigsburg), F. Bachmeier (Munich)
1981		F. Klingauf, E. Haeselbarth, B. Herting
1990		S. Vidal, H. Tschorsnig
1997		H. Baur, H. Tschorsnig

To carry out projects on biological control of insect pests it is essential to know the correct identity of the parasitoids and of the predators that have to be introduced in a given area or which should be saved through appropriate management of crop protection measures. In Europe, 50 years ago, the only institution which identified the complex of the entomophagous species was the Commonwealth Institute of Entomology in London. In continental Europe, most of the identifications of entomophagous species were made, at that time, by a few taxonomists working in museums and most of them were unknown to plant protection specialists. This is one of the reasons why biological control projects leaders became sometimes, by necessity, taxonomists for a small group of entomophagous species. Furthermore, identifications made by museum's taxonomists were not published and these data were lost for the entomologists' community.

For these reasons, the first "service" established by the "executive bureau" of the CILB in 1956 was the "identification service", with headquarters at the Natural History Museum of Geneva. An agreement was signed with the town of Geneva to place the identification center at the Museum and use its infrastructures; the agreement was renewable every 3 years. On the other hand, CILB provided the center with a modern stereoscopic binocular to facilitate the identification of insects. The responsibility of the "service" was committed to Ch. Ferrière (Hymenoptera), Geneva, and to L. P. Mesnil (Dipt. Tachinidae), Commonwealth Institute of Biological Control (CIBC), Feldmeilen (Switzerland); the secretariat of the "service" was assigned to V. Delucchi, CIBC, Mendrisio (Switzerland), who had to obtain the collaboration of the taxonomists from different European countries and to collect the identification data for publication in the journal *Entomophaga*. Only specimens obtained from a known host and provided with the date of emergence and the origin were identified by the collaborators of the "service". In addition to the identification of entomophagous species, the "service" had to provide field entomologists with information on the biology, the host complex, the economic importance, and the mass rearing possibilities. For their collaboration, the taxonomists received the journal *Entomophaga* free of charge and

were remunerated for the services rendered, as practiced in other museums. With the restructuring of CILB the “service” became later on a Commission because of its permanent character.

Delucchi retired from the secretariat in 1958 and was replaced by C. Besuchet (Coleopterologist), Natural History Museum, Geneva. In 1960, Ferrière also retired from the direction of the center (he was 72 years old) and was substituted by P. Bovey, Entomology Dept., Swiss Federal Institute of Technology, Zurich. The same year, Bovey organized a meeting in Zurich and Munich (11-16 August) of the taxonomists collaborating with the identification center, to discuss problems of taxonomy in relation to biological control and also problems related to nomenclature. In 1964 the direction of the identification center was committed to Besuchet and Delucchi took up again the secretariat of the Commission. In 1974 the center was transferred to the Federal Republic of Germany. During the period 1956-1974, 8 lists of identification of entomophagous species were published, namely: *Entomophaga* 1, 113-127, 1956; 2(4), 313-332, 1957; 5(4), 337-353, 1960; 6(3), 211-231, 1961; 8(4), 335-373, 1963; 11(1), 115-134, 1966; 11(1), 135-151, 1966; the 8th list was published separately in 1971 (64 pp).

With the transfer of the Commission to the Federal Republic of Germany, the center of identification was split into two: one center at the Staatliches Museum für Naturkunde, Ludwigsburg, under the responsibility of B. Herting (Dipt. Tachinidae), the other center at the Zoologische Sammlung des Bayerischen Staates, Munich, under the responsibility of F. Bachmaier (Hymenoptera). The team Herting/Bachmaier remained in charge until 1981, when Bachmaier was replaced by E. Haeselbarth, Institut für angew. Zoologie, University of Munich. The same year, F. Klingauf, Institut für biologische Schädlingsbekämpfung der BBA, Darmstadt, accepted to replace Delucchi as convener of the Commission. During this period 1974-81 no identification lists were published.

Haeselbarth and Herting directed the two centers from 1981 until 1991; during this period 3 identification lists were edited by Haeselbarth and published in the Bulletin of the Western Palaearctic Regional Section of IOBC: Bull. WPRS 6(1), 49 pp., 1983; 8(4), 61 pp., 1985; and 12(7), 63 pp., 1989.

In 1991, Haeselbarth was substituted by S. Vidal, Institut für Pflanzenschutz, University of Hannover and Herting by H.-P. Tschorsnig, Museum für Naturkunde, Stuttgart. During the period 1991-1997, the centers were under the responsibility of Vidal/Herting. Two identification lists were edited by Vidal: Bull. WPRS 16(3), 56 pp., 1993 and 20(2), 53 pp., 1997.

In 1997 Vidal was replaced by H. Baur, Naturhistorisches Museum, Bern. The 14th identification list was edited by Baur in the Bull. WPRS 28(11), 71 pp., 2005.

The Commission has been functioning during 50 years without serious problems. Problems occurred, of course, mainly related to the fact (a) that the old structures of the museums and the lack of flexibility do not always allow the development of IOBC activities, (b) that the collaboration of the taxonomists has been on a voluntary basis, again depending on the their institutions, and (c) that it has always been difficult to find appropriate personnel for the preparation of the material received for identification. From the beginning the offered services were much appreciated and in 1960 the “executive bureau” of the CILB expressed “ses félicitations aux responsables des centres d’identification, de publication et de documentation pour leur grande activité et leur bonne gestion” (*Entomophaga* 5(4), 262, 1960). At that time, the material sent to the center for identification was quite abundant. For instance, during the triennium 1962-65 the center of Geneva received about 16000 specimens

from 124 institutions of 27 countries and the material was identified by 20 taxonomists collaborating to the center (*Entomophaga* 11(1), p.4, 1966). However, some years later the secretary general of IOBC indicated in the Newsletter Nr 1 that the Commission of taxonomy of entomophagous insects “is anxious about the continuing decrease since 1969 in the number of insect samples sent to the identification center”.

Working conditions at the center of Geneva became unsatisfactory at the beginning of the seventies and further deteriorated with the resignation of several taxonomists and of the person charged with the preparation of the insects to be identified. This may be the reason why an ad hoc committee of 4 members (D. Rosen, chairman; R.I. Sailer; T. Tachikawa; and V. Delucchi) was established by the council of IOBC in order to define the taxonomic problems in relation to biological control and indicate action to be taken (Newsletters Nr 2, p. 4, 1972). There is no reference in subsequent IOBC documents about a report presented by the committee. In any case, the mentioned problems persisted during the following years, so that it was necessary to transfer the center to the Federal Republic of Germany.

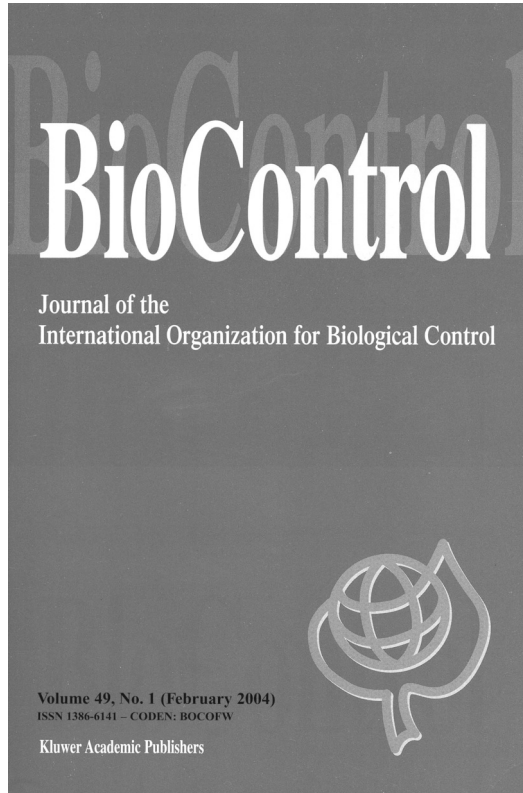
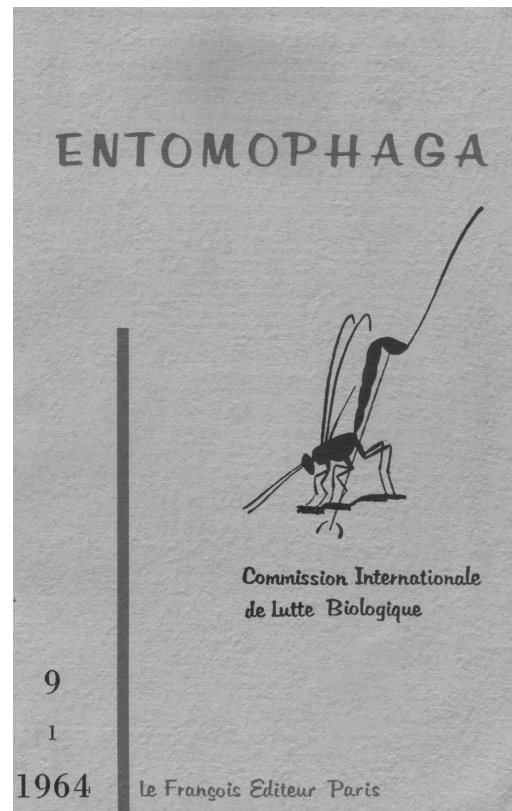
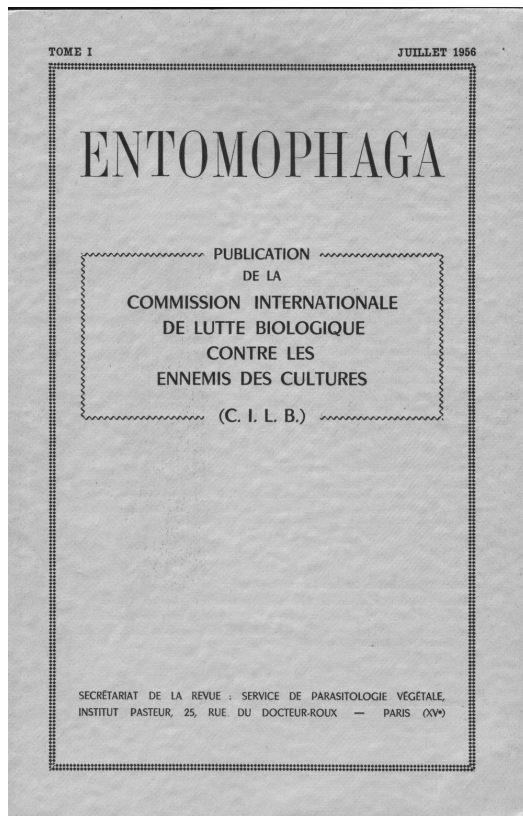
Unfortunately, problems were not over with the transfer: in 1975 the Director of the museum of Munich retired and during the following 11 months of vacancy the ad interim direction prohibited the exit from the museum of the identified material. Furthermore, the person in charge of the preparation of the insects moved to another section of the museum, so that the whole IOBC activity was slowed down considerably. With the collaboration of taxonomists from German Universities the situation could be soon ameliorated. Since 1997 the number of insect samples sent for identification further decreased. One reason might be that a number of applied entomologists already know the relevant taxonomists of their study group(s) and thus send them directly to those specialists. Some groups are now also much better known than before and new keys allow the identification of certain species even for non-taxonomists. Hence, there is possibly a tendency to avoid difficult taxa for biological control programs.

Publications

To create a valuable tool for the biological control of agricultural and forest pests, IOBC sponsored the publication of the “Index of entomophagous insects”, which was edited by V. Delucchi and G. Remaudière and published by Le François, Paris. From 1966 to 1971 the following volumes were published:

- Domenichini, G. 1966. Palaearctic Tetrastichidae (Hym. Eulophidae), 101 pp.
- Mackauer, M. and Sary, P. 1967. World Aphidiidae (Hym. Ichnneumonidae), 195 pp.
- Boucek, Z. and Askew, R. R. 1968. Palaearctic Eulophidae (excl. Tetrastichinae) (Hym. Chacidoidea), 254 pp.
- Boucek, Z. and Askew, R. R. 1968. World Tetracampidae (Hym. Chacidoidea), 19 pp.
- Fischer, M. 1971. World Opiinae (Hym. Braconidae), 189 pp.

Each publication was at the same time a taxonomic revision and included all data concerning the hosts and the geographic distribution of the parasitoids. The publication of the Index was discontinued in 1971.



In 1956 IOBC, then CILB, started with the publication of the scientific journal Entomophaga. The upper left picture shows the front page of issue 1. Later, a new design was used for the front page (upper right picture). In 1998, Entomophaga was replaced by BioControl (lower left picture).

III.2 Commission of Publication and Information (1956 – present)

Vittorio Delucchi (section 1) and Ernst F. Boller & Albert K. Minks (sections 2-5)

The history of the Commission can be divided into the early part (1956 – 1971) and the WPRS period (1971 – present). The first period was dominated by the establishment of ENTOMOPHAGA serving both for the publication of scientific papers but also of reports of the Executive Committee and Working Groups of the old CILB/OILB/IOBC. The WPRS period starting in 1971 is characterized by the regular publication of the IOBC/WPRS Bulletins, of the internal newsletter *PROFILE*, of the specific Brochures Series, and of WPRS symposia proceedings. In both periods the Commission played an important role in the internal exchange of information and in documenting IOBC activities to the outside.

The following persons acted as chairmen of this important Commission: G. Remaudière (F) 1956- 1969; B. Hurpin (F) 1969 – 1985, C. Pelereys (B) 1985 – 1987; A. K. Minks 1987 – 1997; H. Bathon (D) 1997 – present.

The official journal of IOBC

The official journal of IOBC is BioControl: its name was adopted in 1998 and replaced ENTOMOPHAGA, known since 1956.

One of the first decisions made by the “executive bureau” of CILB in 1956 was the issue of a journal that was named ENTOMOPHAGA. This name was proposed by the CILB president, A.S. Balachowsky. The journal was printed by Librairie Le François, Paris, which was also the owner of the journal (CILB had only the responsibility for its content). This aspect is very important, because it helps to understand certain situations which came up after the globalisation of OILB in 1971, also why the journal was published in France during about 40 years and remained during this long period under the responsibility of the WPRS.

In addition to original articles on biological control research and field applications (almost exclusively related to entomophagous species), the journal published activity reports of CILB/IOBC (General assemblies, council meetings, executive committee meetings), the lists of biocontrol bibliographies prepared by the documentation service, the lists of bibliographies on the taxonomy of entomophagous species and the lists of identifications of entomophagous species (prepared by the identification service), and also the lists of strains of entomopathogens available at European laboratories (prepared by the Commission of insect pathology and microbial control). Five languages were admitted: French, Italian, German, English and Spanish. Each institutional member of the organization received 6 copies of the journal free of charge. G. Remaudière (F) was responsible for the scientific content of the journal and E. Morales (E) was in charge of the Mémoires hors série. Starting with volume 9 (1964) the cover of the journal was changed. In 1969 the two editors were replaced by a publication committee of 3 members (B. Hurpin, chief editor, G. Remaudière and P.A. van der Laan) and an editorial board of 14 members.

With the adoption of a publication committee it was decided that the future issues of the journal would accept only original articles related to biological control of agricultural and forest pests. Activity reports of IOBC structures (Council, Executive committee, Commissions, Working groups, Study groups, etc.) were transferred to the Bulletins of the

regional sections (WPRS, EPRS, NRS), to Profile (WPRS) and also to the Newsletters of the global organisation.

From 1969 to 1984 the publication committee often changed its composition and the number of its members, but B. Hurpin remained chief editor during 16 years until his retirement from the direction of the zoology department of INRA. Hurpin had to face important problems, especially in 1980, when Librairie Le François gave up the publication activity because of the financial situation. In fact, at the end of the seventies, the income from the subscriptions just covered the printing costs and the expenses for the commercialisation and the distribution of the journal were at the charge of Le François (Bull. WPRS 1(1), 46-9, 1978). Starting with volume 20 (1975) the cover of the journal was changed for the second time and the new subtitle "A journal of biological and integrated control" reflected a broadened scope.

The publisher Le François ceded the journal ENTOMOPHAGA to the enterprise Balthazar Publications, which was, however, unable to secure the edition and the commercialisation of a scientific journal. Two years later, in 1982, the publisher went bankrupt, so that the issue of volume 27 of the journal was considerably delayed and caused some discontent among authors and subscribers. For this reason, the proceedings of the IOBC/GERDAT colloquium on crop loss assessment and economic threshold evaluation in cotton, rice and maize were edited by the Secretary General as a special issue to vol. 27.

In 1983 the publication of the journal was taken up by Librairie Lavoisier, Paris. Starting with volume 28 the cover was modified for the third time. The year after, C. Benassy (INRA Antibes, F) succeeded B. Hurpin as chief editor and the editorial board was increased to 16 members from all over the world (Newsletter 36, 1985). To maintain the publication of ENTOMOPHAGA it was necessary to introduce in January 1986 a page charge. Members of the organisation had up to 10 printed pages/volume free of charge, whereas non-members had to pay 20 US\$ for each of the first 10 pages; for extra pages, the publisher Lavoisier charged 48 US\$ per page to all authors, whether members of IOBC or not (Newsletter 36, 1985). Fifty reprints per author were provided free of charge. In spite of the introduction of the page charge, the chief editor received more manuscripts during the following months. In 1987 the number of the pages free of charge was reduced from 10 to 8 (Newsletter 42, 1987).

Although after 1971 the Secretary General of IOBC Global was in charge of ENTOMOPHAGA, the administration of the journal remained in the hands of the WPRS Commission of publications and information. The appointment of a management committee by IOBC Global in May 1985 initiated a new period for the journal. The Commission of publication continued its activity within the WPRS with the supervision of the Bulletin, Technical brochures and Profile.

The management committee was established with the purpose of re-defining the general policy of ENTOMOPHAGA, in particular of characterising those scientific areas (entomophagous species, entomopathogens, weeds, IPM, etc.) which should be supported with priority, in order to create more interest for the journal and a much larger circulation in the world (Bull. WPRS IX/5, p. 59, 1986).

In 1990 a new contract was signed with the publisher for another period of 4 years (Newsletter 48, 1989). The same year, C. Benassy resigned as chief editor of ENTOMOPHAGA. During his 6 years leadership both the number of printed pages per volume and the number of subscribers increased. M. Rabasse (INRA Antibes, F) succeeded to C. Benassy.

The management committee of ENTOMOPHAGA had a meeting in May 1992 in Montpellier (F) and recommended to change the title of the journal. Several options were proposed and the President of IOBC Global decided to submit the proposals to the regional sections (Newsletter 57, 1993). It was thought that another name of the journal would attract more papers by authors representing a wider range of disciplines of biocontrol and IPM. The proposals of the management committee were rejected; the main opposition came from the WPRS, which had initiated the journal.

The management committee met again in April 1993 in Avignon-Montfavet (F) and decided (a) that English will be the recommended language, French being still accepted, and that Spanish and German will not be accepted anymore (the committee forgot that Italian was admitted right from the beginning!); (b) that page charges for non-members will be increased from 20 to 30 US\$ per printed page (Newsletter 58, 1993).

Because of the existence of two other new journals on biological control (“Biological control” and “Biocontrol science and technology”) the management committee re-examined the competitive ability, quality and value of ENTOMOPHAGA. The committee felt that ENTOMPHAGA may not represent all IOBC interests and that the name excludes non-entomology disciplines. For this reason an independent *ad hoc* review committee was set up in 1994 with representatives of WPRS and NRS and the President of IOBC Global to conduct the reappraisal. The task of the *ad hoc* committee was “to determine what an appropriate IOBC journal should be in the broad sense (including the possibility of a new journal, financial, editorial, publishing and potential transitional aspects) and deliver a final report to the President of IOBC Global by April 1996 for presentation to the General Assembly at the 1996 meeting” (Newsletter 59, 1994). The *ad hoc* review committee convened the first time in August 1994 in Montpellier, published a brief summary of the main discussion points and invited IOBC members to send their ideas and comments. The committee met again in Zürich (CH) in May 1995 to discuss the suggestions obtained and to reach tentative conclusions as a basis for its final report. One of the main conclusions was that IOBC needs its own journal (remember that Lavoisier was still the owner of ENTOMOPHAGA) and that a recommendation about the name of the journal will be made to the Global Council (Newsletter 62, 1995). The final report of the *ad hoc* review committee appeared in the Newsletter 64, 1996. As a follow-up, the Executive Committee of IOBC Global decided to terminate the contract with Lavoisier with volume 42 at the end of 1997. The official IOBC journal changed the name with volume 43 (1998) and ENTOMOPHAGA was replaced by BioControl. A management board of 6 members was appointed and H. Hokkanen (Finland) was selected as chief editor. The editorial board consisted of 8 associated editors covering different areas of biological control. A contract with Kluwer Academic Publishers (NL) was finalized. For developments with regard to BioControl since 1998, see Part II History IOBC Global, section Journals Entomophaga and BioControl.

The publications of IOBC/WPRS published between 1971 and 1993 have been compiled by A. K. Minks and D. Degheele in 1993. An updated list of publications since 1994 is in preparation and is in parts available on the homepage www.iobc-wprs.org.

The IOBC/WPRS Bulletins

The IOBC/WPRS Bulletin was edited for the first time in 1971. At the beginning most of its issues were dedicated to internal reports of meetings of the WPRS administrative structures (executive committee, council, general assembly, etc.), list of bibliographies, lists of

identification of entomophagous species and of pathogens, etc. which were previously included in the journal ENTOMOPHAGA. Later on, more space was devoted to the publication of proceedings of Commissions and Working groups meetings. This created more interest for the bulletin, which was more and more requested, even by readers not belonging to WPRS or IOBC at all.

PROFILE

This internal newsletter of WPRS was established in 1983 and is published twice per year. The first issue was published in January 1984 (see front page in Part III). E.F. Boller was the first editor, followed in 1988 by A. K. Minks and in 1997 by H. Bathon.

Technical Brochures

These IOBC manuals are devoted to specific topics. Most of the 16 brochures were prepared by the Working Group on Integrated Protection in orchards. Brochure no. 1 covered the topic of Integrated plant protection in apple orchards (H. Steiner & M. Baggiolini 1968. *Anleitung zum integrierten Pflanzenschutz im Apfelanbau*. 64 pp.; C. Bénassy & H.G. Milaire 1969. *Introduction à la lutte intégrée en vergers de pommiers*). Brochure no. 2 carried the title « Contrôle visuelle en verger de pommier (1971, M. Baggiolini, E. Keller, H.G. Milaire & H. Steiner, 62 pp). Brochure no. 3 covered « Les organismes auxiliaires en verger de pommier » (1974, H.G. Milaire, M. Baggiolini, P. Gruys & H. Steiner, 242 pp). Brochure no. 5 contains the « List of sex pheromones of Lepidoptera and related attractants » (1986, H. Arn, M. Toth & E. Priesner, 123 pp), and Brochure no. 6 covers « L'analyse du sol et du végétal dans la conduite de la fertilisation. Le contrôle de la qualité des fruits » (1988, J. Gagnard, C. Huguet & J.-P. Ryser, 87 pp.). Most of the Brochures were translated, as second printings, either into German or French. After 1988 WPRS has not expanded nor up-dated its valuable Brochure series.

Achievements of the WPRS Commission

Since 1971 the Commission has published a large number of documents that are precious tools to trace the former activities and events of WPRS. The IOBC/WPRS Bulletins, prepared by the individual working units of WPRS contain a wealth of information, many of them of preliminary nature and indicating interesting emerging trends of research. They provide a most important source of information on the history of our organisation and have, in fact, the function of an IOBC archive. Thanks to the enormous and continued dedication of the Commission members and the possibilities offered by the University of Gent (Belgium) to print the bulletins at low cost, IOBC can be proud to possess such a unique collection of documents.

Literature

Minks, A.K. & Degheele, D. 1993. List of IOBC/WPRS publications 1968-1993. IOBC/WPRS Bull. Vol. 16 (6), 51 pp.

III.3 Commission of Insect Pathology and Microbial Control (1958-1976)

Vittorio Delucchi

The Commission of insect pathology and microbial control started its activity as a working group, which held a preliminary meeting in Darmstadt (FRG), 13-14 February 1956, to inform participants on the progress made in the field of insect pathology and to discuss techniques for the utilization of entomopathogens in biological control of pests. It is only in 1965, when the CILB was renamed as IOBC at the 3rd General Assembly, held in Montreux (CH), that the WG became a "Commission of insect pathology and microbial control".

From 1956 to 1972 the WG resp. the Commission held biennial meetings almost regularly and part of its activity occurred during international conferences and symposia. The first important events at which the WG participated were the 1st International conference on pathology of insects and biological control, held in Prag, 13-18 August 1958 (organized by Czecho-Slovak insect pathologists, among them J. Weiser and Huba) (*Entomophaga* 3(4), 282-3, 1958), and the International Colloquium on insect pathology and biological control held in Paris, 16-24 October 1962 (organized by CILB) (*Entomophaga*, Mém. hors série no. 2, 566 pp.). At the Colloquium in Paris, a scientific committee of 8 entomopathologists (among them E.A. Steinhaus, USA, as editor of the *Journal of Insect Pathology*) was established with following main objectives: (a) to promote international cooperation, (b) to create WG to study special problems, (c) to facilitate the exchange of strains between laboratories concerned, (d) to give greatest consideration to problems of taxonomy and nomenclature, (e) to pay more attention to the etiology of diseases occurring in the field, and (f) to increase basic knowledge on the conditions resulting in epizootics.

Important decisions were taken at the 2nd meeting of the WG held at INRA, Jouy-en-Josas and at Pasteur Institute, Paris, 22-24 October 1958. At this meeting it was decided to send to the "Centre de collection de types microbiens" in Lausanne (CH) the strains of entomopathogens after isolation and identification, and to publish periodically the list of strains in the journal *Entomophaga*. Some years later, in 1965, the Pasteur Institute in Paris was recognized as identification center for *Bacillus thuringensis* strains (*ENTOMOPHAGA* 11(1), p. 5, 1966).

The first list of entomopathogens (fungi, virus, rickettsia, bacteria) was edited in *ENTOMOPHAGA* 4(3), 285-9, 1959, by C. Vago, Laboratoire de cytopathologie, Saint-Christol-les-Alès (F) and E. Müller-Kögler, Institut für biologische Schädlingsbekämpfung der BBA, Darmstadt.

In 1960, a second list of entomopathogens was edited in *Entomophaga* 5(4), 355-357, by E. Müller-Kögler, A. Krieg (same address as Müller-Kögler) and C. Vago; in 1966 the 3rd list of entomopathogens was edited by A. Huger, A. Krieg and E. Müller-Kögler in *Entomophaga* 11 (1), 155-6.

In 1971 a joint meeting of the commission with the Society of Invertebrate Pathology (SIP) was held in Montpellier (F). The central theme of the meeting was "Eoizootiology and ecology of entomopathogens". Conveners of the commission were at that time P. Ferron, E. Müller-Kögler and C. Vago. The same year the IOBC Council suggested to establish an ad hoc committee on microbial control with the purpose of creating possible WGs; members of the committee were C. Ignoffo (USDA, chairman), K. Aizawa (J) and C. Ferron (F) (*Newsletter* Nr. 2, 1972).

Two years later the commission participated in the 5th International Colloquium on invertebrate pathology, held in Oxford in September. To avoid duplication of efforts with SIP it was decided that IOBC should concentrate on the application of microbial control strategies in agriculture and forestry, and that meeting of SIP should deal with fundamental research on invertebrate pathology (IOBC/WPRS Bull. 2, 1973).

The last list of strains of entomopathogens in the collections of West European institutions was published in the WPRS Bull. 3, 1973 by M.G. Injac and L.A. Vassiljevic (for Yugoslavia), W.A. David and N. Wilding (for UK), M.F. Michel, G. Remaudière, A. Bonnefoi, H. de Barjac, A. Bourgerjon, P. Ferron, B. Hurpin, C. Vago and S. Meynadier (for France), and by J. Franz, A.M. Huger, A. Krieg and E. Müller-Kögler (for FRG).

The 2nd General Assembly of WPRS, held in Madrid (E) in October 1974, “accorded as priorities to the commission on insect pathology and microbial control the creation of study groups, and subsequently of WGs, to deal with techniques of producing pathogenic microbial preparations and testing of the innocuousness of these microorganisms for vertebrate” (IOBC/WPRS Bull. 1, p. 22, 1976). It became evident that some efforts should be made to clarify the toxicology of microorganisms to be used in biological control of insect pests. As stated in the IOBC/WPRS Bull. 2, 1975, the “lack of legislative standards in matters concerning the toxicology of entomopathogenic germs constitutes a brake on the development of these methods of control”. Conveners of the commission in 1975 were P. Ferron, W.A.L. David, and C. Vago. In 1975, P. Ferron published a review of the entomopathogenic fungi, with particular reference to the research carried out during the period 1965-75 (IOBC/WPRS Bull. 3, p.54, 1975).

At its annual meeting in Paris (November 1976) the council of WPRS proposed to dissolve the commission and to transform it in a WG which could develop direct actions in the field of microbial control. The name of the WG was “Safety of insect pathogens for vertebrate” (IOBC/WPRS Bull. 1, p. 7, 1977). The responsibility of this WG was taken by P. Ferron, who described the future WG activities in the IOBC/WPRS Bull. 1, p.153-4, 1978. In subsequent documents the WG is mentioned as Study Group under the responsibility of H.D. Burges (UK) (WPRS Bull. 5, 125-30, 1980) and later on of R.A. Hall (UK) (IOBC/WPRS Bull. IV,4, p. 55, 1981).

III.4 Commission Integrated Production Guidelines and Endorsement (1976 – present)

Ernst F. Boller and Jesús Avilla

The evolution and history of the Commission and of Integrated Production in Europe have been described in greater detail in “Integrated Production in Europe: 20 years after the declaration of Ovronnaz” (Baggiolini 1998; Boller et al. 1998; Poitout, S. 1998). The history of this Commission is closely linked with the activities of the WPRS Working Group “Integrated protection of fruit crops”. An earlier IOBC/WPRS Commission on “Integrated Control” established in 1958 (H. J. de Fluiter/NL) had been terminated in 1973 “because matters concerning integrated control were now adequately covered by the Working Groups”. Key data and events of the Commission are summarised in table 1; the members of the Commission since its establishment in 1976 are listed in table 2.

The history of the “first” Commission (1973 – 1987)

Important events had taken place in 1973, 1974 and 1976 paving the way to the establishment of an ad hoc Commission on Integrated Production in 1976 (Steiner et al. 1977).

1973: The old IOBC Commission on “Integrated Control” (established in 1957) was terminated by Council because their activities were adequately covered by Working Groups. An important meeting took place 12-15 June at Vienna: The “International Conference on Integrated Plant Protection”. Seventy five participants from 21 countries, EPPO, IOBC, FAO, FAO/IAEA reached conclusions and recommendations that anticipated a broadening of the integrated control concept: *“The new concept based on ecological principles may be explained as the optimum integration of all suitable techniques to achieve economical control with minimum ill effects on non-target species, the food-chain and the environment. To achieve this, emphasis is laid on: - consideration of economic thresholds;- deliberate safeguard and development of antagonisms, including habitat management; - increased use of resistant varieties (...). Special attention must be given to a multidisciplinary approach involving all relevant scientific fields.....”* (IOBC 1974).

In November IOBC Council adopted a modified version of the FAO definition 1967 of “Integrated Control”.

1974: Three important meeting took place:

1. 22-23 January: IOBC meeting of the WG “Integrated Plant Protection in Orchards” in Wageningen preparing the ground for discussions with European partners concerning guidelines and labels for fruits produced with integrated control methods. The participants decided to establish an *ad hoc* Commission attached to the orchard group with the mandate to study and coordinate developments with labels and guidelines in the fruit sector. Its members were H. Steiner (D), P. Gruys (NL), H. Milaire (F) and M. Baggiolini (CH).

2. 2 April: IOBC-OECD-CE-EPPO Conference in Paris. The participants recommended that IOBC prepared for OECD documentation on integrated control and on the possible creation of a label to be discussed at the September meeting.

3. 30 September: OECD-IOBC meeting in Paris. Again, it was pointed out that the introduction of a label would necessitate production guidelines that should not be restricted to an improved plant protection but also include agronomic aspects such as pruning, fertiliser use, fruit thinning and optimisation of the intrinsic fruit quality.

Appendix III

Key data of the Commission

Year	Name of Commission (Chairman , Co-Chairman)	Important events
1973		Joint EPPO ¹ -IOBC-FAO ² -IAEA ³ meeting in Vienna on Integrated Plant Protection.
1974	<i>ad hoc</i> Commission “Guidelines for Integrated Control” (H. Steiner)	22-23 January: Meeting in Wageningen. Decision to establish an <i>ad hoc</i> IOBC-EPPO Commission on guidelines attached to orchard group. 2 April: IOBC-OECD ⁴ -CE ⁵ -EPPO Conference in Paris. 30 September: OECD-IOBC meeting in Paris.
1976	<i>ad hoc</i> Commission “Valorisation qualitative de la production intégrée” (M. Baggiolini)	22-23 January: Joint IOBC-EPPO-EC-Meeting in Stuttgart on international and regional guidelines for Integrated Plant Protection. 9-11 July: Meeting and message of Ovronnaz. The term “Integrated Production” is coined. 23-24 September: Formulation of general, crop specific and regional IP guidelines. 24-25 November: Council decision to establish an <i>ad hoc</i> Commission attached to the orchard group.
1977		Council decides that the endorsement of potential candidate producers’ organisations with IOBC labels (“marque informative OILB”) be handled by a specific IOBC “Comité International”.
1978		Formal establishment of International Committee (M.J. Thiault coordinator). Switzerland establishes a national “Comité” and obtains (on experimental basis) first IOBC label for GALTI ⁶
1979		France establishes a national “Comité” seeking the IOBC label for COVAPI ⁷ operating in the lower Rhône valley.
1981	Commission pour la promotion technique et scientifique de la production agricole intégrée (J. P. Bassino - A. Stäubli)	4 th General Assembly (Antibes) gives status of a statutory Commission. The “Comité International” terminates its activities.
1984	(A. Stäubli - J. P. Gendrier)	
1987		Commission terminated.
1990	Integrated Production Guidelines and Endorsement	Commission reactivated by Council.
1991	(A. El Titi - E.F. Boller)	First IP guidelines for pome fruit published by orchard group. March 12: First meeting of Commission
1992		Concept, basic principles and technical guidelines for IP established.
1996	(E.F. Boller)	
1998		First IOBC endorsement of a fruit cooperative (TRECOOP, Spain).
2000		IOBC endorsement of a viticultural (TYFLO, France) and a stone fruit cooperative (APOFRUIT, Italy)
2001	(J. Avilla - E. F. Boller)	Establishing internet homepage www.iobc.ch, publishing concept of “Total Quality” and IOBC “Tool Box”. IOBC endorsement of the first viticultural organisation in North America (LIVE, Oregon)
2004		Publication of new IOBC standard for Integrated Production.
2005		Workshop “Tool development for IOBC endorsed and candidate organisations” (“Green lists”, SESAME inspection software)
2006		Field testing and adaptation of novel tools of workshop 2005

1) European Plant Protection Organisation; 2) Food and Agriculture Organization of UN; 3) International Atomic Energy Agency; 4) Organisation of Economic Co-operation and Development 5) European Community (later EU); 6) Groupement des Arboriculteurs Lémaniques pratiquant les Techniques Intégrées; 7) Comité national pour la Valorisation de la Production fruitière Intégrée, France

Members of the Commission in chronological order of membership

M. Baggiolini (CH, founding chairman, 1976-1981)
 M. J. Thiault (F, 1977-1981, coordinator of the “Comité International”)
 J. P. Bassino (F, chairman 1981 – 1983)
 J. P. Gendrier (F, 1984 – 1987, 1991- 2000)
 A. Stäubli (CH, 1981 – 1987, chairman 1984 - 1987)
 E. F. Boller (1990 – 2006, chairman 1996 - 2001)
 A. El Titi (chairman 1991 – 1995)
 J. Avilla (E, 1992 – present, chairman 2001 - present)
 G. Briolini (I, 1992-1993); S. Finch (UK, 1992-1993)
 H. Oberhofer (I, 1993 – 1995)
 C. Malavolta (I, 1996 – present)
 E. Jörg (D, 1997 – 2004)
 F. Wijnands (NL, 2004 – present)
 R. Baur (CH, 2006 – present).

1976 can be considered a landmark in the evolution of Integrated Production (see also Part III). Up to now the discussions had focussed on the practical problems connected with the implementation of Integrated Plant Protection and the establishment of commercial labels. The breakthrough for Integrated Production occurred during a meeting in Ovronnaz, taking place on 9-11 July. Five entomologists (Steiner, Baggiolini, Celli, Schneider and Altner) sorted out the facts and elements generated by the various meetings held in 1973 – 1976. Their conclusions, published in 1977 (Steiner et al. 1977) became known as the “Message of Ovronnaz”. Steiner summarised the outcome of the meeting in his report to the 3rd General Assembly 1977 as follows: *“The Message of Ovronnaz is a statement on guidelines desirable for plant protection and production in the future. It became obvious that plant protection could not be regarded isolated, but should be examined within the whole context of production, marketing, food-industry and the consumer. The production and protection methods to be used should take into account both the quality of the products and the effects on the ecosystem”*.

The Council discussed during the November meeting the proposal of Steiner to establish a Commission for the endorsement of regional guidelines. However, since the “Message of Ovronnaz” had not yet been published and had been sent to the Council members only as draft document, the Council was apparently not fully aware of the important conceptual change from “Integrated Control” to “Integrated Production”. It decided on the establishment of an *ad hoc* Commission on “Integrated Pest Control Guidelines” and nominated M. Baggiolini (CH) as chairman. Baggiolini changed immediately the name to Commission “Valorisation qualitative de la production intégrée” and Steiner hastened to publish the Ovronnaz report without further delay (Steiner et al. 1977).

In **1978** the Council established a “Comité international” for the actual endorsement procedures with J. M. Thiault (F) as president. A Swiss (GALTI) and a French (COVAPI) growers’ association qualified for the use of the IOBC label “on an experimental basis”.

In **1981** Baggiolini retired from the Commission and delivered at the 4th General Assembly a strong plea in favour of Integrated Production (Baggiolini 1982). The General Assembly gave the Commission now to the status of a statutory Commission, nominated J. P. Bassino (F) as

new chairman and closed down the “Comité international”. The Commission remained focussed on fruit production and gradually slowed down its activities. It was terminated by Council in 1987.

The history of the „second“ Commission“ (1989 – present)

The agropolitical scenery changed drastically and got new momentum towards the end of the 1980s. Within IOBC the orchard group remained the core unit with respect of continued preoccupation with Integrated Production. But it was now paralleled with similar activities in the field of viticulture and – on the market – by the appearance of first IP labels for both fruits and vegetables. Discussions inside and outside IOBC early in 1989 identified a serious lack of leadership and absence of a mature conceptual scientific frame with the imminent danger that politics and commercial channels were going to push the developments alone. In this situation IOBC Council was approached to consider a re-activation of its IP Commission. In 1990 the new Council (R. Cavalloro, President, and S. Poitout, Secretary General) took action, decided positively on this proposal, established a Commission on “Integrated Production Guidelines and Endorsement” and nominated A. El Titi and E. F. Boller as chairman and co-chairman, respectively. They received the mandate:

- to define the conceptual frame for IP and describe the underlying strategy,
- to establish technical guidelines and standards for implementation,
- to provide technical assistance and services for regional IP organisations, and
- to operate in behalf of IOBC an international endorsement procedure.

The first meeting was held on March 12, 1991 at Wädenswil, Switzerland where A. El Titi and E. Boller identified the essential elements of the future working policy of the Commission and of the conceptual frame.

The conceptual frame ready by end 1992

1991 and 1992 were vital for the formulation of the basic IOBC document on the definition, principles and technical guidelines of Integrated Production. The texts were finalised and signed by a panel of experts and representatives of Council in a historic act taking place on March 6, 1992 at Wädenswil. The final content of this basic document (including now Technical Guidelines I and II) was approved by the Executive Committee on May 16, 1992, by Council in November 1992 and published in 1993 (El Titi, Boller and Gendrier, eds. 1993).

1993 – 2001: Crop specific guidelines and the development of endorsement procedures. From 1993 up to the 8th General Assembly of 1997 (Vienna) emphasis was placed on the establishment of crop specific guidelines III. The 2nd edition of the pome fruit guidelines (IOBC 1994) served as model for the development of the other IP guidelines and respective endorsement procedures. The cases of pome fruits, of arable crops and of grapes showed clearly the heterogeneity of various working groups and the necessity of a strong mandate given to the Commission to ascertain uniformity of IOBC standards in politically and legally sensitive documents. Since then, and as a result of the excellent collaboration among the Commission and the Working Groups, 8 guidelines III have been published under the conceptual umbrella of the basic document. They cover most of the worldwide important crops of the temperate zones. In 1998 the first regional IP-organisation, the cooperative Trecoop in Spain, obtained IOBC endorsement.

The IOBC Concepts receive world-wide recognition

The first publication of the basic document on concept and technical guidelines of 1993 and its 2nd and 3rd edition published in 1999 and 2004, found interest not only in Europe but also in other continents (South America, Australia, New Zealand, partly North America). IOBC standards are often referred to in other international projects to define Integrated Production and are mentioned in various national IP guidelines. Based on the world-wide interest in the IOBC endorsement procedure, IOBC Global gave the Commission in 2000 the mandate to expand its endorsement activities world-wide. A first IP organisation outside the WPRS region was a grape-grower association in Oregon (LIVE) receiving IOBC endorsement in 2001.

2001- 2005: Implementation, new quality of sustainable food production, and tools

During the period 2001 – 2005 the focus of the Commission's attention changed from the establishment of new crop specific guidelines to the practical implementation of IP and the development of tools for communication and knowledge transfer.

In 2001 three important events took place: The establishment of the Commission website www.iobc.ch, the first publication of the IOBC concept of total quality in food production, and the establishment of an "IOBC Toolbox" on internet.

The homepage on internet allowed now to publish all IP relevant IOBC documents as full text versions of the English texts and their available translations into French, German, Italian, Spanish, Portuguese, Greek and Arabic. By 2005 the Commission had covered all major European crops with respective IP guidelines that are to be up-dated in intervals not shorter than 5 years. So far published and available on internet (www.iobc.ch) as down-load documents are: IP guidelines for pome fruits, stone fruits, grapes, soft fruits, arable crops, citrus, olives and field grown vegetables

Total quality: The basic IP philosophy of IOBC remained unchanged since its re-formulation in 1992. However, in 2001 the Commission re-examined the traditionally holistic aspect of quality as promoted by IOBC and published the updated concept in April 2001 on internet. Quality as seen by IOBC does contain besides the visible external quality parameters basically 4 additional important quality traits that are invisible for the consumers: internal product quality, ecological quality of production procedures, ethical quality of production procedures (especially animal production), and social quality of production following the international charta of the International Labour Organisation of the UN. These elements found their precipitation in the new IOBC standard for IP published in 1994 (Boller et al. 2004).

The "IOBC Toolbox" was established in 2001 to help the growers' organisations to prepare their documents and to run their IP programs according to the IOBC concept. It contains now the following items: "How to prepare regional IP programs", "Ideabook on ecological infrastructures at the farm level (Boller, Häni & Poehling 2004)", "IOBC database on side-effects of pesticides on beneficial organisms", "The Green List of plant protection measures", and "SESAME" – a novel inspection software that also allows the endorsed organisation to measure their degree of success and improvement, both as individual members and as an organisation.

2004 is an important milestone in the history of the Commission. In close collaboration with the Executive Committee, Working Groups and experts outside IOBC the well established IP concept of 1992 remained unchanged in its basic definition and principles but was updated and modernised in its technical guidelines. The major adaptations concerned

a compatibilisation of the IOBC implemented inspection systems with other major international standards established in 2004 by the food market. In addition to the traditional IOBC components (agronomic and ecological aspects of IP) the new IOBC standard 2004 incorporated now elements addressing aspects of food safety, social and ethical standards already postulated in 2001 by the IOBC concept of Total Quality.

Outlook

Having covered the most important crops by IP guidelines, the Commission felt that it was necessary to put emphasis of work on the transfer of this published knowledge into practice. Therefore, the Commission seeks active collaboration with the relevant working units inside and outside IOBC enhancing the development of practical tools (“IOBC Toolbox“) addressing the immediate needs at the farm level.

Today concepts, technologies and practical know-how are available to apply sustainable farming systems at the farm level. However, the Commission is aware of the fact that out of each Euro spent on food by the consumers only some 20-30 cents reach the farm irrespective of high IP standards applied. Therefore, IOBC and its partners should investigate and support all possibilities to increase the farmers’ income by added value given to high quality products. Such products produced by IOBC endorsed standards merit to be placed in the premium food segment of the food market. On the other hand, growers may be subjected to different impositions from the governments and the different components of the food chain and, in consequence, to different inspection schemes. The cost of such procedures could be decreased by making the highest standards as compatible as possible.

Selected publications (those marked with * are available on internet www.iobc.ch and can be downloaded)

Baggiolini, M. 1982. Lutte biologique – lutte intégrée – production intégrée. Proceedings of the 4th General Assembly of WPRS, Antibes (France), 12-15 October 1981. IOBC/WPRS Bull. 1982/V/3, 61-63.

*Baggiolini, M. 1998. Historique: 50 ans de souvenirs. Pages 5 – 11 in: Boller, E.F., Avilla, J., Gendrier J.P., Jörg, E.& Malavolta, C. (eds.). Integrated Production in Europe – 20 years after the declaration of Ovronnaz. IOBC/WPRS Bull. Vol. 21(1) 1998, 41 pp. www.iobc.ch.

*Boller, E.F., Avilla, J., Gendrier J.P., Jörg, E.& Malavolta, C. (eds.). 1998. Integrated Production in Europe – 20 years after the declaration of Ovronnaz. IOBC/WPRS Bull. Vol. 21(1) 1998, 41 pp. www.iobc.ch.

*Boller, E.F., Avilla, J., Joerg, E., Malavolta, C., Wijnands, F.G. & Esbjerg, P. (eds). 2004. Integrated Production: Principles and Technical Guidelines. 3rd edition. IOBC/WPRS Bull. 27 (2) 2004, 49 pp.

Boller, E.F., Häni, F. and Poehling, H.M. (eds.), 2004. Ecological infrastructures: Ideabook on functional biodiversity at the farm level. ISBN 3-906776-07-7, LBL Lindau, Switzerland, XV + 211 pp.

El Titi, A., Boller, E.F. & Gendrier, J.P. 1993. Integrated Production: Principles and Technical Guidelines. IOBC/WPRS Bull. 16 (1) 1993, 96 pp.

IOBC, 1974. Activity report 1973. IOBC/WPRS Bull. 1974/2, p. 54-60.

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- IOBC, 1991. General principles, guidelines and standards for Integrated Production of pome fruits in Europe. Dickler, E. and Schäfermeyer, S. (eds.), IOBC/WPRS Bull. 14 (3).
- IOBC, 1994. Guidelines for Integrated Production of pome fruits in Europe. Technical Guideline III. 2nd edition, Cross, J.V. and Dickler, E. (eds.), IOBC/WPRS Bull. 17 (9) 1994, 40 pp.
- *IOBC, 1997. Guidelines for Integrated Production of Arable Crops in Europe. Technical Guideline III. 115 pp. 1st edition 1997. Edited by E.F. Boller, C. Malavolta & E. Jörg. IOBC/WPRS Bull. Vol. 20 (5), 1997. ISBN 92-9067-090-8.
- *IOBC, 1999. Guidelines for Integrated Production of Grapes. Technical Guideline III. 75 pp. 2nd edition 1999. Edited by C. Malavolta & E.F. Boller. IOBC/WPRS Bull. Vol. 22 (8), 1999. ISBN 92-9067-113-0.
- *IOBC, 2000. Guidelines for Integrated Production of Soft Fruits. Technical Guideline III. 51 pp. 1st edition 2000. Edited by E. Jörg & J.V. Cross. IOBC/WPRS Bull. Vol. 23 (5), 2000. ISBN 92-9067-088-6.
- *IOBC 2002. Guidelines for Integrated Production of Pome Fruits in Europe. Technical Guideline III. 45 pp. 3rd edition 2002. Edited by J.V. Cross IOBC/WPRS Bull. Vol. 25 (8), 2002. ISBN 92-9067-145-4.
- *IOBC, 2002. Guidelines for Integrated Production of Olives. Technical Guideline III. 67 pp. 1st edition 2002. Edited by Malavolta, C, Delrio, G. and Boller, E. F. IOBC/ WPRS Bull. Vol. 25 (4), 2002. ISBN 92-9067-141-4.
- *IOBC, 2003. Guidelines for Integrated Production of Stone Fruits. Technical Guideline III. 71 pp. 2nd edition 2003. Edited by Malavolta, C., Cross, J.V., Cravedi, P. and Jörg, E. IOBC/WPRS Bull. Vol. 26 (7), 2003. ISBN 92-9067-155-4.
- *IOBC, 2004. Guidelines for Integrated Production of Citrus. 10 pp. www.iobc.ch.
- *IOBC, 2005. Guidelines for Integrated Production of Field Grown Vegetables. Technical Guideline III. 24 pp., 1st edition 2004. Edited by Malavolta, C, Boller, E.F. and Wijnands, F. G., IOBC/WPRS Bull. Vol. 28 (5), 2005. ISBN 92-9067-177-5.
- *Poitout, S. 1998. L'OILB/SROP et la production intégrée. Pages 13 – 18 in : Boller, E.F., Avilla, J., Gendrier J.P., Jörg, E.& Malavolta, C. (eds.). Integrated Production in Europe – 20 years after the declaration of Ovronnaz. IOBC/WPRS Bull. Vol. 21(1) 1998, 41 pp. www.iobc.ch.
- Steiner, H. (Ed.) 1977. Vers la production agricole intégrée. IOBC/WPRS Bull. 1977/ 4, 153 pp.

III. 5 Commission on Harmonized Regulation of Biological Control Agents (2003 – present)

Franz Bigler

Rationale

Regulations for introductions and release of biological control agents differ between WPRS countries and many have yet to establish these. Obligations in international laws and agreements, such as the IPPC/FAO code of conduct for import and release of biological control agents, the EPPO guidelines on import and release of biological control agents (BCA) and the OECD guidance document on regulation of biological control agents, as well as an increasing interest in the import and release of exotic biological control agents calls for harmonized regulation between countries in the IOBC/WPRS region. In many countries, introductions of BCA are administered under regulations which were established for other purposes, such as plant quarantine, wildlife conservation and genetically modified plants.

Producers and distributors of natural enemies were concerned when the different international guidance documents were released, and the International Biocontrol Manufacturers Association (IBMA) approached the Executive Committee of IOBC/WPRS in spring 2003 by submitting the request that IOBC would harmonize regulation in the WPRS area. After discussions between IBMA, represented by its Vice-President B. Bluhm, and Council members of the IOBC/WPRS at the Council meeting in Nice in September 2003, the Commission on ‘Harmonized Regulation of Invertebrate Biological Control Agents’ (IBCA) was established by the Council. Franz Bigler, who was a Council member, was asked to act as Chair person of the Commission. The following members were elected: Claude Alabouvette, Horst Bathon, Sylvia Blümel, Josep-Anton Jacas Miret and Joop C. van Lenteren. The Commission was asked to consider only Invertebrate Biological Control Agents, i.e. Macroorganisms (predators, parasitoids and nematodes) because Microorganisms were ruled in the European Union under the Directive 91/414.

Objectives

- To collect information on the status of regulation requirements for IBCAs in countries of the WPRS and to compile an overview
- To organize a workshop with countries that have participated in the data compilation together with stakeholders, such as the biocontrol industry and regulators
- To produce a document that gives detailed guidance on regulation procedures and data requirements for non-native and native IBCAs based upon grounds of existing international documents (e.g. FAO, EPPO, OECD).
- To up-date and improve EPPO’s list of safe and widely used organisms
- To propose a consultation procedure that will allow exchange and use of information and data on IBCAs between WPRS countries
- To propose a permanent expert group for giving advise in the regulation of IBCAs

Activities

In early 2004, three questionnaires with questions related to the status of regulation of IBCAs were sent to representatives of 23 WPRS member countries. We addressed either regulatory bodies or scientists involved in regulation of IBCAs in order to receive the answers as precise as possible. The questionnaires were returned by 19 countries.

In July 2004, a meeting was held in Zürich, Switzerland. Thirty one persons (on invitation only) coming from 16 European countries attended. Most countries were represented by one regulator and one biological control scientist. The biological control companies were represented by three members of IBMA. The main purpose of the meeting was to discuss and propose a „Guideline on Information Requirements for Import and Release of IBCAs in WPRS Countries” in which the procedures and data requirements needed by the Competent National Authorities to perform an environmental risk assessment are laid down. Five mixed working groups developed guideline proposals for the following topics: a) first import of non-native candidate IBCAs for research, b) information requirements for release of non-native IBCAs, c) information requirements for inundative release of native IBCAs, d) list of safe and widely used native and non-native IBCAs in European countries (positive list). Reports of the five working groups were condensed in one report which was published as an IOBC/WPRS guideline in *Biocontrol News and Information* in December 2005 (Bigler et al, 2005).

Under the framework of the 6th EU research programme, a call for Scientific Support of Policies (SSP) had been released by the end of October 2004. The objective of the EU call is to fund a project on “Developing a Balanced System for Registration of Macroorganisms, Microbial Biopesticides, Plant Extracts and Semiochemicals”. A workshop with the objective to discuss and prepare a project proposal was held in November 2004 in Kiel, Germany under the auspices of an ongoing COST action. Participants of the meeting in Zürich were invited to attend the Kiel meeting and to prepare the part on ‘Invertebrate Biological Control Agents’ in the proposal. The project, coordinated by R.U. Ehlers, University of Kiel, was submitted in January 2005 and approved by the EU soon later. Activities of the EU project and the IOBC/WPRS Commission are now coordinated in order to prevent overlapping actions.

Recent developments

Since Franz Bigler was elected as President of IOBC/WPRS during the General Assembly in September 2005, Jeffrey Bale (University of Birmingham) was elected by the Council in January 2006 as new Convener of the Commission. On request of Commission members to include Microorganisms into the Commission’s activities, the name was changed by the Council in January 2006 in “Harmonized Regulation of Biological Control Agents”.

Activities during the years 2006 and 2007 are determined to a great extent by the EU project development and results as most objectives of the Commission are also goals of the EU project. There is a close collaboration between the two, given that most of the experts joining the Commission’s activity are members of the EU project as well. Two major points should be considered in the future: 1) The geographic range of the WPRS extends to many more countries than the EU and affiliated nations. WPRS countries without access to the EU project activities should therefore be invited to attend the Commission’s activities, 2) As the EU project lasts two years only, it is necessary to plan those measures of harmonization within the Commission which should go beyond the two years.

Value statement

Regulation of import and release of BCA has become an integral part of Biological Control in some parts of the WPRS without any harmonization between countries. The Commission offers the right platform for all stakeholders to facilitate regulation, to implement expert knowledge and to support industry and regulatory authorities in risk assessment and decision making. The published guidelines is the first comprehensive document giving detailed information on what data are needed for a regulatory dossier.

Reference

Bigler, F., Bale, J.S., Cock, M.J.W., Dreyer, H., Greatrex, R., Kuhlmann, U., Loomans, A.J.M., and van Lenteren, J.C., 2005. Guidelines on information requirements for import and release of invertebrate biological control agents in European countries. *Biocontrol News and Information*, 26 (4), 115N-123N.

III.6 Working Group Fruit Flies of Economic Importance (1956 – 2001)

Ernst F. Boller

Key data of the Working Group

Year	Name of Working Group	Convenor	Important events and spin-offs
1956	Biological control of <i>Dacus oleae</i> and <i>Ceratitidis capitata</i>	M. Féron	Established in November 1956 by Council at its first meeting in Antibes.
1965	<i>Dacus oleae</i> and olive pests	Y. Arambourg	
1967	“Olive pests”		Active until 1971, then became dormant
1968	New WG: Genetic control of <i>Rhagoletis cerasi</i>	E. Boller	First meeting of IBP* fruit fly experts in Rome.
1969	New WG: Genetic control of <i>Ceratitidis capitata</i>	L. Mellado	Initiation of coordinated IBP fruit fly activities. First issue of FRUIT FLY NEWS (IBP)
1971			Joint IOBC/IBP fruit fly meeting Wädenswil, CH
1972			New WG “Genetic methods “ (Curtis & Wood)
1976			IOBC-coordinated SIT** eradication program for <i>Rhagoletis cerasi</i> starts in Switzerland. Agreement between European and Northamerican partners to join forces in Quality Control research
1977	“Integrated Control of <i>Rhagoletis cerasi</i> ”		Publication of IOBC Bulletin “Quality Control – An Ideabook for Fruit Fly Workers”
1978	Fruit flies of economic importance	E. Boller	May Sassari/Sardegna: Joint session of 4 WGs and merging 3 of them the new WG. November: International field experiments on QC in Guatemala
1979			Local eradication of <i>R. cerasi</i> achieved in Switzerland and project terminated. First International Training Course on Quality Control in Castellón de la Plana, Spain (1979).
1980			Establishment of Global WG on “Quality Control of mass-reared insects”
1981		R. Cavalloro	
1982			16-19 November, Joint EC***-IOBC International Fruit Fly Symposium, Athens
1985		G. Delrio	
1987			Joint EC-IOBC Fruit Fly Symposium at Rome. Formal establishment of Global WG “Fruit Flies of Economic Importance” at Rome (B.S. Fletcher & E. Boller)
1989		J. Piedade-Guerreiro	1990 “Open Meeting”, Sassari, 1993 “Open Meeting”, Lisbon
1997		H. Afellah	“Open Meeting”, Lisbon
2001			9 th General Assembly terminates WG

*) International Biological Programme, **) Sterile Insect Technique, ***) European Community (later EU)

1956: The earliest traces of this Working Group go back to the very beginning of IOBC in 1956. Tephritid fruit flies are key pests of many fruit species in tropical, subtropical and temperate zones and have always played an important role in international research and plant protection activities. Therefore, it is not surprising that the CILB Council, at his first meeting of 20 November 1956 in Antibes, decided to establish the Working Group on “Biological control of *Dacus oleae* and *Ceratitidis capitata*” as one of its first „Comités de travail“. The first projects of this group were apparently planned and initiated by M. Féron (INRA Montfavet, France). Activities of the first few years focussed on the olive fly. Under the supervision of Y. Arambourg (INRA, Antibes) and P. Genduso (Palermo) IOBC carried out a joint French-Italian project involving the mass-release of the parasitoid *Opius concolor* on the Eolian Islands north of Sicily. Although interesting results were achieved, in retrospect it can be concluded that complete economic control of fruit flies by the use of parasitoids cannot be assured. This is a main reason why genetic control methods (sterile insect technique SIT) have found quite early great support and enthusiasm among fruit fly specialists (Delucchi 1976). In 1967 the topics of the WG were expanded to the entire pest complex of the olive tree and the name was converted into WG on “Olive pests”.

1968: The year 1968 can be considered as a historic landmark. It is the start of co-ordinated international fruit fly research activities that were triggered by three important events taking place: The first IBP (International Biological Programme) meeting of fruit fly specialists of September 1968 in Rome and the establishment of two new IOBC fruit fly WGs in November 1968, i.e. the WG on “Genetic control of *Rhagoletis cerasi* (E.Boller, CH)” and the WG on “Genetic control of *Ceratitidis caitata* (L. Mellado, E)”. All three events were strongly interlinked.

The role of **IBP** on the future developments in the international community of fruit fly workers cannot be overestimated. It had for the IOBC coordinated fruit fly research of the 1970s probably the same importance as the 1948 Stockholm meeting for IOBC. The IBP meeting in Rome, convened by V. Delucchi as chairman of the International Biological Programme 9 on “Biological control” and attended by fruit fly specialists from 12 countries, was the first international expert meeting where fruit fly specialists throughout the world were welded into a single cohesive entity with agreed aims and common goals. Of particular importance was the bringing together of the two major groups of workers concerned with the temperate and tropical tephritids. This event stimulated collaborative fruit fly research throughout the world (Delucchi 1976; Bateman 1976). The IBP fruit fly group (Convenor M.A. Bateman, Australia) initiated coordinated research programs (1969-1973) on life-table studies and pupal mortality factors (coordinated by E.Boller, CH), on color attraction (V. Moericke, D & A. Economopoulos, GR), on marking pheromones (R. J. Prokopy, USA) and conducted joint experiments on adult movements (D.L. Chambers, USA & M.A. Bateman, Australia), sexual behaviour (B.S. Fletcher, Australia) and population genetics (G.L. Bush & M.D. Huettel). The IBP group established the FRUIT FLY NEWS as internal, later international communication platform (first issue of 1969 prepared by A. Myburgh, South Africa, then continued by E. Boller until 1987).

1974: IBP activities expired and produced a final report (Delucchi 1976). The IOBC *Rhagoletis* group continued to maintain the international contacts and to coordinate certain projects (e.g. the development of Quality Control; see Appendix 2).

1976: Start of an IOBC coordinated eradication program of the European cherry fruit fly

(*Rhagoletis cerasi* L.) in Northwest Switzerland on 2.4 km² with 1400 cherry trees. The release of up to 1 million sterile flies per season, derived from field-collected larvae and pupae, relied on the strong logistic collaboration between the Swiss and Austrian partners. The research and development activities on quality control procedures for sterile flies, both *Rhagoletis cerasi* and *Ceratitidis capitata*, reached its peak and initiated an international cooperation to this end. The international team produced within 12 months an IOBC “Ideabook on Quality Control” (Boller and Chambers, eds. 1977; see also Appendix 2).

1977: The “Rhagoletis” group proposed to Council to change the name into “Integrated control of *Rhagoletis cerasi*” taking into account the broader context of the group’s activities and to allow the admission of new members not working on genetic control procedures. The activities included now – besides the core topics of SIT application in practise – the development of biotechnical tools such as trapping systems and marking pheromones.

1978: A major event took place in May 1978 when the 3 IOBC WGs on “Genetic control of *Rhagoletis cerasi* (E.Boller, CH), “Genetic control of *Ceratitidis capitata* (L. Mellado, E)”, and “Genetic methods in pest control (R.J. Wood, UK)” met jointly in Sassari, Sardegna and decided to pool their resources by merging into one single WG on “Fruit Flies of Economic Importance” (Figure 1). Participating in this meeting was also the WG on “Olive pests (U. Cirio, I)” and showed strong interest in a continued collaboration (Prota, ed.1979). The Council approved this proposition in November 1978 and appointed E. Boller as first Convenor of this new WG.

A first coordination meeting was organised in December 1978 (Madrid) to discuss the internal organisation and working procedures. Five persons were elected as core members for the period 1979-81 to coordinate the activities of 5 subunits: “Genetic Control”, “Biotechnical Methods”, “Quality Control”, “Implementation” and “Fruit Fly Information Service”. The WG introduced also of the principle of job rotation (changes to be made at each General Assembly), whereby the outgoing Convenor assisted the new one as co-convenor, hence ascertaining continuity.



**Figure 1. Joint fruit fly meeting of 1978 in Sassari/Sardinia, Italy.
From left to right: L. Mellado (E), E.F. Boller (CH), R.J. Wood (UK), R. Prota (I)**

The period of 1978-81 was characterised by an increasing international participation of fruit fly specialists from regions outside WPRS (especially North America). Specialists from the following countries and international institutions participated in IOBC coordinated projects: Austria, EURATOM/Ispra, Germany, Greece, Guatemala, IAEA/FAO Seibersdorf, Italy, Japan, Yugoslavia, Mexico, Portugal, Spain, Switzerland, Tunisia, Turkey, USA. In 1979 IOBC organised in Castellón de la Plana (Spain) jointly with IAEA/FAO, Servicio Plagas España and the USDA the first international training course for fruit fly specialists in quality control (30 participants from 8 countries). This situation led in 1980 to the formation of a Global WG on “Quality Control of Mass-reared Insects” and should also prepare the ground for the establishment of a Global WG on “Fruit Flies of Economic Importance” in 1986.

1981-85: In 1981 R. Cavalloro (EURATOM, CEC) became new convenor. He continued the action-oriented structure with the following subunits “Information service and new substances (E. Boller, CH)”, “Biotechnical methods: *Ceratitidis capitata* (G. Delrio, I), *Dacus oleae* (A. Economopoulos, GR)”, “Entomophagous species (A. Jimenez, E)”, “Genetic aspects (A. Robinson, NL)”, “Implementation of research data in IPM programmes (R. Prota, I)” and “Nutrition, physiology and behaviour (G. Tsiropoulos, GR). He organised in 1982 a joint CEC/IOBC International Fruit Flies Symposium in Athens (Cavalloro, ed. 1983) and in 1984 in conjunction with the XVII Int. Congress of Entomology in Amsterdam a fruit fly meeting (Cavalloro, ed. 1986). IOBC published the 2nd review of the fruit fly literature (Zwölfer, ed. 1985).

1985-1989: G. Delrio (Sassari) new convenor. He maintained basically the same working procedures, whereby G. Gasperi (I) replaced A. Robinson in the genetics unit, the former information and new substances unit was now reduced to “Behavior Modifying Chemicals (E. Boller) and R. Cavalloro acted as liaison officer for coordination with international organisation. He and Cavalloro organised in 1987 a joint CEC/IOBC International Fruit Fly Symposium in Rome (Cavalloro, ed. 1989). This meeting provided the occasion to establish officially the Global WG on “Fruit Flies of Economic Importance” (see also Appendix 2).

1989-1997: The WG was directed by J. Piedade-Guereiro (Portugal) who retained 5 subunits: “Genetic Control (J. Piedade, P)”, “Biological control (G. Delrio, I)”, “Biotechnical methods (D.M. Habib, TU)”, “Micro-organisms (C. Louis, F)” and “Bioinsecticides (R. Jimenez, E)”. Meetings were organised in 1990 (Sassari, 50 participants), 1993 (Lisbon, 80 participants) and 1997 (Lisbon, 60 participants). The project oriented work slowed down and was increasingly replaced by “open meetings”.

1997-2001: After 1997 the WG developed no activities. The General Assembly of 2001 at Ascona decided to terminate this oldest IOBC WG.

Achievements, impact and end

The history of this Working Group shows a similar evolutionary pattern as observed in other working units, both within and outside IOBC. The special circumstances of the late 1960s and early 1970s were characterised by the arrival of novel strategies and concepts, in our case genetic control of fruit fly populations. SIT was not only large in its spatial dimensions but also in the complexity of procedures and open problems. This situation was highly

challenging and required special research efforts.

When individual fruit fly specialists met in 1968 for the first time other colleagues, in the process of leaving harbour to navigate to unexplored scientific destinations, the time was just ripe for the successful formation of a most active, innovative and stimulating community of fruit fly workers. The existing European IOBC WGs handling fruit fly matters became most convenient platforms to channel many of these activities. The impact on fruit fly research was significant and the developments and international broadening of the projects exceeded soon the available resources. This triggered the successful spin-off of new Global WGs such as “Quality Control” in 1980 and “Fruit Flies of Economic Importance” in 1986, respectively. When solutions were in sight, when the activities started to lose the excitement of novel discoveries and became routine, when fast movements had to be replaced by finer-tuned and less spectacular research efforts, many of the original driving forces started to weaken. The activities of this WG mutated slowly but steadily from action driven projects towards meetings and symposia focussing on information exchange – exciting, interesting and attracting big audiences at the beginning (Cavalloro, ed. 1983, 1986, 1989) but facing later constantly decreasing attention. The group had achieved what was hoped for at the onset; the time was ripe to terminate its activities completely.

Selected publications

Up to 1977, most information was circulated by internal documents no longer available. Interesting information can be found in the reports of the convenors published in the Proceedings of the IOBC General Assemblies since 1968).

- Bateman, M.A. 1976. Fruit flies. In: Delucchi, V. (ed.). 1976. International Biological Programme 9: Studies in biological control. Cambridge University Press, ISBN 0 521 20910 2, p. 11 - 49.
- Boller, E.F. and Chambers, D.L. (eds.). 1977. Quality control: an idea book for fruit fly workers. IOBC/WPRS Bull. 1977/5, 162 pp.
- Boller, E.F., Katsoyannos, B.I., Remund, U. and Chambers, D.L. 1981. Measuring, monitoring and improving the quality of mass-reared Mediterranean fruit flies, *Ceratitidis capitata* Wied. 1. The RAPID quality control system for early warning. J. appl. Entomol. 92, 67-83.
- Cavalloro, R. (ed.). 1983. Fruit flies of economic importance. Proc. joint EC/IOBC-WPRS International Symposium, Athens (Greece), 16-19 November 1982. A.A. Balkema, Rotterdam, XII + 642 pp.
- Cavalloro, R. (ed.). 1986. Fruit flies of economic importance 84. Proc. joint EC/IOBC-WPRS “ad hoc” Meeting, Hamburg, 23 August 1984, A.A. Balkema, Rotterdam/Boston, IX + 221 pp.
- Cavalloro, R. (ed.). 1989. Fruit flies of economic importance 87. Proc. joint EC/IOBC-WPRS International Symposium, Rome (Italy), 7 – 10 April 1987, A.A. Balkema, Rotterdam/Brookfield, XIV + 626 pp.
- Chambers, D.L., Calkins, C.O., Boller, E.F., Ito, V., and Cunningham, R.T., 1983. Measuring, monitoring and improving the quality of mass-reared Mediterranean fruit flies, *Ceratitidis capitata* Wied. 2. Field tests for confirming and extending laboratory results. J. appl. Entomol. 95, 285-303.
- Delucchi, V. (ed.). 1976. International Biological Programme 9: Studies in biological control. Cambridge University Press, ISBN 0 521 20910 2, 304 pp.
- Haisch, A. (ed.). 1978. *Rhagoletis cerasi* L.: Bibliography. Publication of the Working Group “Integrated Control of *Rhagoletis cerasi*”, IOBC/WPRS Bull. 1978/I/3, 83 pp.
- Prota, R. (ed.). 1979. Proceedings of the joint meeting of the Working Groups: “Biological Control of Olive Pests”, “Integrated Control of *Rhagoletis cerasi*”, “Genetic Control of *Ceratitidis capitata*” and “Genetic Methods of Pest Control”, Sassari (Italy), 15 – 20 May 1978, IOBC/WPRS Bull. 1979/II/1, 156 pp.
- Zwölfer, H. (ed.). 1985. Bibliography of fruit fly literature: A review of recent publications (1977 – 1983). IOBC/WPRS Bull. 1985/VIII/2, 35 pp.

III.7 Working Group Integrated Protection of Fruit Crops (1959 - present)

Ernst F. Boller, based on information from IOBC archive

The fruit entomologists can be considered the pioneers within WPRS with respect to the expansion of biological control via integrated control and integrated plant protection to the comprehensive concept of integrated production (Baggiolini 1982, 1998; Minks et al. 1998; Steiner (ed.) 1977; see also Part I and III of this book).

The developments occurring during the early 1970s brought a change in the general concept reflected in the change of the name in 1974 from “Integrated control in orchards” to the broader term “Integrated plant protection in orchards”. A further milestone was the step from “integrated protection” to “integrated production” as described in the “Message of Ovronnaz” (Steiner 1977) providing a historic landmark for the entire organisation (see also the history of the Commission “IP Guidelines and Endorsement” in Appendix 2)

The expansion of the groups activities in the 1970s and the establishment of subgroups to address specific topics led to the decision, to have the subgroups organised their meetings individually and to organise symposia in 4-years-intervals as plenary meeting of the entire group (Steiner 1982). The first meeting and colloquium of the WG took place in 1961 with 36 participants from 9 countries (NL 15, Germany 5, France 5, Switzerland 4, Belgium 3, Denmark, Egypt, Italy and UK 1 each).

Publications

As was the case with most WPRS WGs the information of the group circulated for a long time as internal documents distributed by the Convenor to the Secretary General and participants of meetings. The proceedings of the first six symposia organised by the group were published in *Entomophaga* or special booklets (de Fluiter and Steiner 1962; de Fluiter et al. 1964; IOBC 1969, Brader 1974) and starting with the 7th symposium of 1985 as IOBC/WPRS Bulletins (Dickler et al. 1986; Müller et al. 2000; Avilla and Polesny 2001; Cross and Ioratti 2005).

The WG and its subgroups published between 1968 and 1980 some 14 brochures and since 1977 over 40 Bulletins. For a detailed list of IOBC/WPRS publications up to 1993 see Minks and Degheele 1993, and from 1994 to present the homepage www.iobc-wprs.org.

Selected publications

Avilla, J. and Polesny, F. (eds.), 2001. Proceedings of International Conference on Integrated Fruit Protection. Lleida (Spain) 22-26 October 2000. IOBC/WPRS Bulletin 24 (5), 410 pp.

Baggiolini, M. 1982. Lutte biologique – lutte intégrée – production intégrée. Proceedings of the 4th General Assembly of WPRS, Antibes (France), 12-15 October 1981. IOBC/WPRS Bull. 1982/V/3, 61-63.

Baggiolini, M. 1998. Historique: 50 ans de souvenirs. Pages 5 – 11 in: Boller, E.F., Avilla, J., Gendrier J.P., Jörg, E. & Malavolta, C. (eds.). Integrated Production in Europe – 20 years after the declaration of Ovronnaz. IOBC/WPRS Bull. Vol. 21(1) 1998, 41 pp. www.iobc.ch.

Appendix III

Key data

Year	Name of Working Group (Convenor)	Important events, spin-offs or mergers
1959	Lutte intégrée dans les vergers/ Integrated control in orchards (H.J.de Fluiter/NL)	February: Establishment of WG
1961		First meeting and colloquium on integrated control in orchards at Wageningen, NL, 5-9 September.
1962		First trace of WG in an IOBC document (Grison 1962).
1963		2 nd colloquium at Stuttgart, Germany, 11-13. September.
1964		Week of applied research in Saxon (CH) on faunistic monitoring
1965		3 rd Symposium at Montreux, 13-15 September.
1968	(H. Steiner/D)	Establishment of WG on “Genetic Control of <i>Carpocapsa & Adoxophyes</i> ” (Th. Wildbolz/CH). J. de Wilde/NL becomes chairman of Commission “Integrated Control”.
1969		4 th Symposium at Avignon
1974	Integrated plant protection in orchards	5 th Symposium at Bolzano. Establishment of <i>ad hoc</i> “Commission” on “Guidelines for integrated control” (H. Steiner) as subunit of the WG (transformed in 1976 with new topics).
1975		Establishment of WG “Pheromones” (A. Minks/NL)
1976		Important meetings on potential labels for fruits. Meeting and message of Ovronnaz. Establishment of <i>ad hoc</i> Commission on “IP endorsement” (M. Baggiolini) as subunit of WG. WG on “Genetic Control of <i>Carpocapsa & Adoxophyes</i> ” merged again with orchard group.
1979		6 th Symposium at Vienna in the frame of the 25 th anniversary celebration.
1981		Meeting Colmar: proposal to produce a list of selective pesticides for orchards. The IP Commission becomes independent of the WG (J.P. Bassino/F & A. Stäubli/CH)
1984		New Subgroup “Pear” (T. X. Nguyen/F)
1985	(E. Dickler/D)	7 th Symposium at Wageningen. New Subgroup “Diseases” (D. Butt);
1986		New Subgroup “Package-apple” (L. Blommers/B) recommending choice of pesticides for IPP.
1988		New Subgroup “Peach” (H. Audemard/F).
1989		New Subgroup “Integrated Fruit Production Guidelines” (E. Dickler /D).
1990		8 th Symposium at Gödöllő (Hungary).
1991		1 st edition of “Guidelines for IP of Pome Fruits in Europe”.
1993	(F. Polesny/A)	Division of WG: Transformation of “peach” subgroup into independent WG “Stone fruits”. 2 nd edition of pome fruit IP guidelines
1995		9 th Symposium at Cedzyna (Poland)
1996		New Subgroups “Arthropod Pests” (M. Solomon/UK), “Soft Fruits” (D. Gajek/PL)
1998		10 th Joint IOBC-ISHS International Conference at Leuven (B)
2000		11 th Symposium at Lleida (Spain); 1 st edition of Guidelines for IP of Soft Fruits
2001	(J. Cross/UK)	
2002		3 rd edition of IP guidelines of Pome Fruits.
2003		WG “Stone fruits” (P. Cravedi/I) merged again with orchard group.
2004	Integrated Protection of Fruit Crops	12 th Symposium at Baselga di Piné (Italy)

- Brader, L. (ed.) 1974. Integrated control in orchards. Proceedings 5th Symposium, Bolzano (Italy), 3-7 September 1974, 369 pp.
- Cross, J. V. (ed.), 2002. Guidelines for Integrated Production of Pome Fruits in Europe. Technical Guideline III. 45 pp. 3rd edition. IOBC/WPRS Bull. Vol. 25 (8), 2002. ISBN 92-9067-145-4.
- Cross, J.V. and Dickler, E. (eds.), 1994. Guidelines for Integrated Production of pome fruits in Europe. Technical Guideline III. 2nd edition, IOBC/WPRS Bull. 17 (9) 1994, 40 pp.
- Cross, J.V. and Ioriatti, C. 2005. Proceedings of the 6th International Conference on Integrated Fruit Production. Baselga di Piné (Italy), September 26-30, 2004. IOBC/WPRS 28 (7), 485 pp.
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- de Fluiter, H. J. et al. (eds.) 1964. Deuxième colloque sur la lutte intégrée dans les vergers. Stuttgart, 11-213 septembre 1963. Entomophaga 9 (3), 215 – 280.
- Dickler, E., Blommers, L.H.M., and Minks, A. K. (eds.), 1986. Proceedings of the 7th Symposium “Integrated Plant Protection in Orchards”. Wageningen (The Netherlands), 26-29 August 1985, IOBC/WPRS Bulletin 1986/IX/4, 247 pp.
- Dickler, E. and Schäfermeyer, S. (eds.), 1991. General principles, guidelines and standards for Integrated Production of pome fruits in Europe. IOBC/WPRS Bull. 14 (3).
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- Malavolta, C., Cross, J.V., Cravedi, P. and Jörg, E. (eds.), 2003. Guidelines for Integrated Production of Stone Fruits. Technical Guideline III. 71 pp. 2nd edition. IOBC/WPRS Bull. Vol. 26 (7), 2003. ISBN 92-9067-155-4.
- Minks, A.K. & Degheele, D. 1993. List of IOBC/WPRS publications 1968-1993. IOBC/WPRS Bulletin Vol. 16 (6), 51 pp
- Minks, A.K. et al. 1998. Fifty years of biological and integrated control in western Europe : Accomplishments and future prospects. Med.Fac.Landbouw.Univ. Gent. 63/2a: 165-185.
- Müller, W., Ploesny, F., Verheyden, C. and Webster, A.D. (eds.), 2000. Proceedings of the International Conference on Integrated Fruit Production (10th IOBC Symposium on Integrated Plant Protection in Orchards), Leuven (Belgium), July 27 – August 1, 1998. IOBC/WPRS Bulletin 23 (7), 512 pp.
- Steiner, H. (ed.) 1977. Vers la production agricole intégrée par la lutte intégrée. IOBC/WPRS Bulletin 1977/4, 163 pp.
- Steiner, H. 1982. Report of the Working Group “Integrated Plant Protection in Orchards”. Pages 103-108 in: Proceedings of the 4th General Assembly, Antibes 12 – 15 October 1981. IOBC/WPRS Bulletin 1982/V/3, 228 pp.

III.8 Working Group Integrated protection of citrus crops (1962 -2006)

Ferran Garcia Mari

The origins of the Citrus Working group of the IOBC/WPRS goes back to the early days of the organization, when it was still called Commission Internationale de Lutte Biologique (CILB). During the second General Assembly of 1962 held in Tunis, R. Traboulsi, entomologist at the Fanar- Mais (Lebanon) laboratory asked for the creation of a Working Group under the name “Biological control in citrus scales (Lutte biologique contre les cochenilles des agrumes)”. The establishment of this group was approved and C. Benassy was appointed as Convenor. At that moment there were not many entomologists interested and the group started its activities a few years later, at the first meeting held in Rabat (Morocco) in 1970. Previously, in 1968, C. Benassy had travelled to several Mediterranean countries recruiting entomologists interested in participating in the activities of the group.

The participants at the first meeting held in October 1970 in Rabat, established two priorities. First, the harmonization of methodologies for studying the population dynamics of pests and natural enemies, and second, the rearing, release and evaluation of introduced biological control agents. It was decided to organize meetings every two years. Soon it became evident that scales (diaspidids and lecanids) were a too limited range for the scope of the group and even at this first meeting the additional pests discussed were whiteflies (Aleyrodidae). Two years later, in 1972, the group changed name and became “Biological control of citrus scales and whiteflies (Lutte Biologique contre les cochenilles et aelurodes des agrumes)”. As for the scales, the main interest at that moment was *Aonidiella aurantii* (this was the main citrus pest in Morocco) and an insectary facility was starting its activity at Ksiri for rearing *Aphytis melinus*. Other parasitoids already being reared at Antibes (France) were *Comperiella bifasciata*, *Prospaltella perniciosi* and *Aphytis lepidosaphes*. Concerning the whiteflies, those were the initial years of the woolly whitefly *Aleurothrixus floccosus*, a very aggressive invader from America of the citrus crops of France and Spain. Its future successful biological control agent imported from Chile, *Cales noacki*, was already being reared at the insectary of Antibes. Participants of this meeting were, among others, C. Benassy, J.C. Onillon and A. Panis (France), S. Inserra, G. Liotta and G. Viggiani (Italy), M. Tuncyurek (Turkey), A. Jarraya (Tunis), G. Euverte (Morocco) and L.C. Argyrou (Greece). Papers presented in this first meeting were published in the number 37 of the journal “Al Awamia”.

The second meeting was held in Athens, Greece, on 18-22 September 1972 (Figure 1). There were participants from eight countries, France (E. Biliotti, C. Benassy, J.C. Onillon, A. Panis and A. Vilardebo), Greece (K. Pelekasis, M. Tzanakakis, Th. Bouchelos, E. Psarros and L.C. Argyrou), Italy (G. Liotta, G. Viggiani, S. Inserra and E. Tremblay), Morocco (A. Abbassi, M. Madkouri, G. Euverte), Israel (D. Rosen), Tunis (A. Jarraya), Turkey (M. Tuncyurek), Egypt (M. Hafez), Netherland (L. Brader) and Belgie (J. Bernard), together with two FAO representants (Y. Arambourg and B. Sigwalt). The main citrus producing countries of the Mediterranean, except Spain, were represented. The absence of Spain was regretted by the convenor of the group, as Spain was at that moment the main partner of France addressing the problem of *A. floccosus*. The scope of topics of the group increased to other scales as pseudococcids. Several parasitoids were being introduced in insectaries of different countries, most of them originating in the Antibes facilities. The meeting followed the two main lines defined in the previous meeting, namely: methods of sampling populations of pests and

natural enemies, and rearing, release and efficacy evaluation of beneficials, complemented by studies on the impact of pesticides on these beneficials (Benassy et al, 1973). Despite efforts to harmonize methodologies, which was recognized as the main objective of the working group, the activity of the researchers appeared rather disperse. The Convenor attributed these difficulties to the geographic distance and different status of pest species depending on the countries. *Saissetia oleae* was of interest to most countries, but *A. aurantii* was important only to Morocco, and *A. floccosus* to Spain and France, respectively. Papers of this meeting were published in the Annales de l'Institut Phytopathologique Benaki and also in the WPRS Bulletin (Benassy, 1974). In April, 1973, there was a joint EPPO/IOBC conference in Nicosia (Cyprus) on citrus pests. There, C. Benassy presented a paper with the title "Progrès réalisé au sein du groupe de travail OILB/SROP pour l'étude des cochenilles des agrumes".



Figure 1. C. Benassy, D. Rosen and L.C. Argyrou (from left to right) at the second meeting in Athens

To the third meeting in Palermo (Italy), on 24-27 September 1974 assisted, among others, C. Benassy and J. C. Onillon from France, L. C. Argyrou, M. Pappas and P. Katsoyannos from Greece, G. Liotta and G. Viggiani from Italy, M. Tuncyurek from Turkey and M. Abbassi from Morocco. Presentations were published as 17 full papers in the journal Fruits and also in the WPRS Bulletin (Benassy, 1975). Papers were grouped in three topics following the three lines defined in previous meetings: ecology of pests, releases of natural enemies and impact of chemical sprays. Two pests were reported in this meeting as new introductions, *A. floccosus* in Morocco and *Coccus pseudomagnoliarum* in Turkey and Greece (Benassy and Onillon, 1975).

The fourth meeting in Antibes (France), on 20- 24 of September 1976, was characterized by the increase of participants (32), presentations (28) and countries represented (11). Spain, the main citrus producer and exporter of the Mediterranean region, was present for the first time (J. M. Carrero, C. Gallego, A. Garrido, L. de la Puerta, R. Moreno and F. Limón). Other countries were France (Y. Arambourg, C. Benassy, E. Biliotti, P. Brun, M. Hurpin, M. Jourdheuil, J. C. Onillon, A. Panis and A. Vilardebo), Italy (M. Tranfaglia and G.

Viggiani), Greece (L. C. Argyrou, P. Katsoyannos, Y. Laudeho, C. Louskas, S. Michelakis and P. Neuenschwander), Cyprus (A. Krambias), Turkey (M. Soydanbay), Israel (U. Gerson), Tunis (A. Jarraya), Morocco (M. Abbassi, G. Cultrut and R. Devaux), Iran (M. Safavi), Cuba (G. Mora Morin) and Portugal (M. Garcia Vasco). Most participants from Greece were delegates from a F.A.O. project on Olive pests. The topics were the same as of previous meetings: ecology of pests and sampling methods, biology of pests and rearing methods, efficacy of natural enemies (rearing, release and efficacy evaluation methods) and impact of chemicals on beneficials (integrated control). For the first time a list of recommendations was agreed upon by several participants at the end of the scientific journey in Corsica (Benassy et al, 1977). It was decided, among other things, to expand the scope of the working group to all citrus pests, and to begin publishing an internal Newsletter (every three months) to promote the rapid flow of information between all members. The following year, on 29-30 of June 1977, a seminar on Biological Control was organized in Castellón (Spain), with C. Benassy, U. Gerson, E. Klein, J. C. Onillon and A. Panis as foreign researchers. This was the definitive boost of the insectary of Almassora (Castellón), directed in its initial years by F. Limón and which is still active in rearing and releasing biological agents in Spanish citrus crops. On those years, other insectaries were also active in rearing, exchanging, testing and field releasing beneficial insects in Italy (in Cagliari, Catania and Napoli).

Four years later, on 11-13 of March, 1980, the fifth meeting was held in Valencia (Spain), with participants from five countries, Spain (with L. de la Puerta as local organizer and J.M. Carrero, C. Garijo, A. Garrido, G. Morales, A. Meliá, J.P. Moner, R. Moreno and E. Santaballa), Morocco (M. Abbassi, M. Afellah), Italy (G. Liotta, G. Viggiani, A. Barbagallo, A. Tranfaglia), Greece (V. Alexandrakis, L.C. Argyrou) and France (P. Brun, C. Benassy, J. C. Onillon, A. Panis, A. Vilardebo). After ten years of activity the interest and focus of the group evolved progressively. If initially, since the first meeting of 1970, the introduction of exotic natural enemies of defined species of scale insects or whiteflies, together with the protection of indigenous beneficial insects and the impact of chemical treatments on predators and parasites, were the main concerns, emphasis was shifting now to a new strategy of protection against the pest problems of citrus orchards as a whole, with harmonized use of biological, chemical and other methods, within the frame of IPM. The extension and generalization of results obtained from integrated pest control programmes in citriculture broadened the group's scope of activities and led to the decision of transforming the group on "scales and aleurodids on citrus" into a group on "Integrated control in citriculture". Romulo Prota, from the University of Sassari, Sardinia (Italy) was elected in 1981 as new Convenor. The group entered a new period after ten years of intense activity under the leadership of C. Benassy and the Antibes researchers in biological control.

Towards the end of the 1970's the Commission of the European Communities (CEC) set up important research programmes on Integrated protection of several Mediterranean crops such as olives, vineyards, and citrus, and permanent consultation was established between CEC and IOBC/WPRS to exchange information and optimize the use of available resources. The close relationship between the group convenor, Romulo Prota, and Raffaele Cavalloro, the entomologist responsible for the CEC programmes, facilitated the financial CEC support of joint meetings and periodic meetings identifying coordinated projects and aimed at developing common methodologies of sampling, establishing economic thresholds for the main pests and implementing IPM programs in citrus crops. (Cavalloro and Prota, 1981, 1983). The main event of this period was a joint CEC/IOBC meeting held in Acireale (Italy) on 26-29 March 1985 (Cavalloro and Di Martino, 1986). This was perhaps the major

event of the group in its history, with 100 participants, 80 contributions (71 of them published as full papers) from nine countries and three international organizations. The scope of the meeting was considerably increased compared with the previous period, as it included not only other insects apart from homoptera, but also mites, nematodes, weeds, and fungal, bacterial and virus diseases.

The next meeting on 6-11 March, 1988, was held as a joint session inside the sixth International Citrus Congress organized by the International Society of Citriculture (ISC) in the middle-east (Tel Aviv, Israel). Only Italian researchers participated, with 12 presentations published as full papers in three main topics, ecology of citrus pests, ecology and biological control, and citrus diseases. Gavino Delrio, entomologist working with R. Prota at the University of Sassari (Sardinia, Italy), acted as convenor during this meeting in absence of R. Prota. The same organization inside the ISC congress was selected for the next meeting in Acireale (Italy) on 11-12 of March, 1992. There, 16 full papers were published both in the proceedings of the ISC and the IOBC/WPRS bulletin (Vacante, 1993), with six countries (Italy, Israel, Brazil, Tunisia, France and Greece), and a considerable number of communications on citrus mites. The meeting was divided into three sections: biological and integrated control of citrus insects and mites, natural enemies of mites, and integrated management of bacterial and fungal diseases. One year earlier, in 1991, Vincenzo Vacante, acarologist from the University of Catania (Italy), had been elected new Convenor of the Citrus working group.

Two more meetings were held with V. Vacante as Convenor. On 27-28 October, 1994, a meeting was organized in Antibes (France), with 28 participants and 23 scientific contributions, all of them published as full papers in the IOBC/WPRS Bulletin (Vacante, 1995). In 1996 the Citrus WG meeting was held on 29 August in Florence (Italy), inside the International Entomology Congress. There were 19 participants, and 17 contributions were published as full papers in the IOBC/WPRS bulletin (Vacante, 1997). R. Barbagallo presented the meeting in absence of V. Vacante. The most important topic of the meeting was the citrus leafminer *Phyllocnistis citrella*, which had appeared as a new pest in the Mediterranean three years earlier.

The citrus leafminer caused an intense exchange of information and parasitoids among citrus researchers in the Mediterranean region and around the world, with several international meetings outside the IOLB/WPRS citrus group. The activity of the group decreased, and in 2001 the General Assembly of IOBC/WPRS decided to start a new period of activity, initially as study group, appointing F. Garcia Mari as Convenor. A meeting on 6-8 November 2002 in Valencia followed, with 64 participants, 41 communications (26 oral and 15 as posters) and seven countries represented. The two most reported single pests were the citrus leafminer (mostly on biological control) and the medfly *Ceratitis capitata* (mostly dealing with traps and alternatives to chemical control) (Garcia Mari, 2003). Three years later, after regaining its status as working group in 2003, the citrus WG met on 26-27 September 2005 in Lisbon (Portugal), followed by a scientific trip to Madeira on 28-30 of September. This meeting experienced a considerable increase in the number of participants and presentations. There were 106 participants from 15 countries and 27 oral papers and 38 posters were presented. Again, an introduced pest was one of the main focus of attention during the meeting, the brown citrus aphid *Toxoptera citricida*, recently identified in Portugal and Spain. The medfly *Ceratitis capitata* was the single pest most frequently addressed in presentations, with recent developments and new techniques for its monitoring and control (Garcia Mari, 2006).

Achievements and outlook

The IOBC/WPRS citrus working group has enjoyed 35 years of activity with several periods or stages with different ways of organization and changing members. Prof. G. Liotta from Palermo (Italy), was the only founding member (present at the first meeting in 1970 in Rabat) participating in the 2003 meeting held in Valencia (Spain). The impact of the group in citrus plant protection in the Mediterranean region has been considerable, fostering the biological control, especially in the first period in the 1970's with outstanding activity of exchange of natural enemies to improve biological control. It followed a period of setting standards for sampling methodologies and economic thresholds in the 1980's which paved the way and served as founding stone for the development and introduction of IPM or Integrated Production programs in most citrus producing countries in the 1990's. Implementation and diffusion of this programs to the farmer level is not always easy and the introduction of new pests keep raising challenges to researchers trying to foster and popularize the techniques of biological and integrated pest management in Mediterranean citrus crops.

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III.9 Working Group Integrated Protection of Olives (1956 - present)

Ernst F. Boller, based on information from IOBC archive

Key data

Year	Name of Working Group (Convenor)	Important events
1956	Biological control of <i>Dacus oleae</i> and <i>Ceratitidis capitata</i> (M. Féron/F)	Established in November 1956 by Council at its first meeting in Antibes.
1965	<i>Dacus oleae</i> and olive pests (Y. Arambourg/F)	
1967	Biological control of olive pests	
1969		IBP ¹ projects start with participation of Y. Arambourg
1971	(Y. Arambourg)	Last report at General Assembly of Rome, then WG became dormant
1975	(U. Cirio/I)	Reactivation of WG
1978		May Sassari/Sardegna: Joint session of 4 WGs and merging 3 of them the new WG. <i>Dacus</i> matters transferred to WG Fruit flies of economic importance (E. Boller) established in 1978.
1980	(M. Alexandrakis / GR)	
1984		Joint EC/FAO/IOBC-WPRS International Meeting on Integrated pest control in olive groves, Pisa (Italy), 3-6 April 1984.
1989		No activities. WG suspended
1997	SC Integrated control in olive crops (G. Delrio)	Group reactivated as Study Group
2003	Integrated protection of olive crops (A.Kalaitzaki)	Meeting in Chania/Crete. Group given status of WG.

¹ International Biological Programme

The earliest traces of this Working Group go back to the very beginning of IOBC in 1956. Tephritid fruit flies are key pests of many fruit species in tropical, subtropical and temperate zones and have always played an important role in international research and plant protection activities. Therefore, it is not surprising that the CILB Council, at his first meeting of 20 November 1956 in Antibes, decided to establish the Working Group on “Biological control of *Dacus oleae* and *Ceratitidis capitata*” as one of its first „Comités de travail”. The first projects

of this group were apparently planned and initiated by M. Féron (INRA Montfavet, France; Entomophaga Vol.2 (2) 1957). Activities of the first few years focussed on the olive fly. Under the supervision of Y. Arambourg (INRA, Antibes) and P. Genduso (Palermo) IOBC carried out a joint French-Italian project involving the mass-release of the parasitoid *Opius concolor* on the Eolian Islands north of Sicily. Although interesting results were achieved, in retrospect it can be concluded that complete economic control of fruit flies by the use of parasitoids cannot be assured. In 1967 the topics of the WG were expanded to the entire pest complex of the olive tree and the name was converted into WG on “Olive pests” (Arambourg and Genduse 1968; Arambourg 1971).

A major event took place in May 1978 when the 3 WPRS WGs on “Genetic control of *Rhagoletis cerasi* (E.Boller, CH), “Genetic control of *Ceratitidis capitata* (L. Mellado, E)”, “Genetic methods in pest control (R. J. Wood, UK)” met jointly in Sassari, Sardegna and decided to pool their resources by merging into one single WG on “Fruit Flies of Economic Importance”. Participating in this meeting was also the WG on “Olive pests (U. Cirio, I)” and showed strong interest in a continued collaboration (Prota 1979). The Council approved this proposition in November 1978 and appointed E. Boller as first Convenor of this new WG.

The WG participated in 1984 in a joint EC/FAO/WPRS meeting on integrated pest control in olive groves, held in Pisa, Italy (Cavalloro and Croveti 1985). Later the activities of the WG became dormant for more than a decade. The group was reactivated by G. Delrio (Italy) in 1987 as Study Group. Activities intensified in 2003 when the new Convenor, A. Kalaitzaki (Greece), organised a meeting in Chania, Crete (Kalaitzaki, Alexandrakis and Varikou 2005). The first edition of the IOBC guidelines for integrated production of olives were published in 2002 and have been translated, as first IOBC guideline, into Greek and Arabic (Malavolta, Delrio and Boller 2002; full texts on www.iobc.ch).

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III.10 Working Groups Integrated protection in protected crops (1968 - present)

Joop C. van Lenteren, Annie Enkegaard and Cristina Castañé

Introduction

The IOBC/WPRS working group "Integrated Control in Glasshouses" is coordinating fundamental and applied ecological research for development of IPM programs, and it has realized large scale practical use of biological control through intensive advisory and public relations work. Commercial producers of biocontrol agents have cooperated with the WG since its initiation. Most biological control is still applied in vegetable crops, but commercial application is now strongly increasing in floriculture. In addition to pests, also several diseases are now under biological control.

Aims of the working groups

The general aim of our WGs is to promote the research, development, implementation of, and training in biological control and Integrated Pest Management (IPM) in protected crops, as well as promoting cooperation between scientists, advisors and beneficial producers working in this field. Our WGs have realised large-scale practical use of biological control through intensive advisory and public relations work. The specific aims of the WGs are:

- to (assist in the) design commercially applicable IPM programmes based on biological control of pests and diseases in combination with host-plant resistance and other non-chemical control methods.
- to initiate, coordinate, and evaluate fundamental and applied research for the development of biological and integrated control programmes.
- to develop scientific criteria for the selection of natural enemies, assists in the development of mass production methods for natural enemies, and devises quality control methods for natural enemies.
- to contribute to national and international courses where IPM and biological control is taught.

Main activities of the working groups

During the first phase of the WG (the 1960s and the 1970s) coordination of experimentation and building up a cooperative research network in Europe was the first priority of the WG. In this way unnecessary overlap in research was prevented and results obtained with a new natural enemy in one country could be implemented in other countries.

As a second phase, fine tuned IPM programmes were realized for different cropping systems in a number of European countries in the 1980s. A growing number of natural enemy producers established and an important activity of the WG was to act as liaison between researchers, advisory workers, producers of natural enemies and growers. Coordination of research remained high on the agenda. Due to the fact that the pest and disease spectrum in greenhouses differed a lot between northern and southern WPRS countries, it was decided to create two working groups, one for the temperate zone and another for the Mediterranean subtropical area.

The third phase, during the 1990s, consisted of building a scientific background for the

evaluation of natural enemies and to develop quality control criteria for the natural enemies which are commercially produced in order to be able to guarantee a certain basic quality of the marketed products.

While working during the fourth phase of the WG's existence, we concentrate on the following issues:

- (a) to develop biological control of pests and diseases in ornamentals,
- (b) to develop strategies for use of biocontrol agents (banker plants, push-pull-strategy, supplement of alternative food, vectoring insect pathogens with pollinators, etc.) and their integration with other methods (selective pesticides, plant extracts, netting, host plant resistance, mating disruption, etc.),
- (c) to determine the influence of biotic and abiotic factors (host plants, fertilisation, cultural practice, etc.) on biocontrol and IPM,
- (d) to study possibilities for manipulating direct and indirect chemical plant defence reactions as an IPM-strategy,
- (e) adaptation of IPM-programs to incorporate the newest greenhouse technologies (e.g. new strategies for climate control, photosynthesis enhancement manipulations, etc.)
- (f) to stimulate and integrate biological control of diseases in current IPM programmes,
- (g) to devise quality control methods for the most important natural enemies presently used in greenhouses (particular attention will be paid to flight-tests and performance tests of natural enemies in greenhouses), and
- (h) to contribute to environmental risk analyses concerning the import and release of exotic natural enemies.

Recently, new categories of protected crops are also being considered for biological control and IPM, like herbs, berries, medicinal plants, nursery stock. The working group is, next to its applied work, also paying attention to areas of pure science that may contribute to a better functioning of biological control, like intraguild predation and interactions between beneficials in multi-species cropping systems.

Cooperation within Europe between the two greenhouse WGs has been very good: members from each group attended the meetings of the other groups, and helped with the organization and teaching of courses on IPM in greenhouses. Many WG members of the northern and southern greenhouse group have collaborated in writing chapters for a book on Integrated Management of Pests and Diseases in Protected Cultivation (Albajes et al., 1999), and a book on Quality Control and Production of Biological Control agents (van Lenteren et al., 2003). Cooperation with several other IOBC/PWRS WGs as well as with our sister greenhouse IPM groups in EPRS and NRS, has been intensive and productive (e.g. Plant Pathogens, Breeding for Resistance to Insects and Mites, Pesticides and Beneficial Organisms, Quantitative Approaches in IPM, IOBC/EPRS and IOBC/NRS WGs Biological Control in Greenhouses, and IOBC-Global WG "Quality Control of Mass-reared Arthropods). WG members contributed to training courses in IPM in Protected Cultivation organized in Spain, Italy and The Netherlands. WG members also collaborated in a number of EC funded research projects. The WGs were represented at many international meetings, like the International Congresses of Entomology and national/regional meetings on biological control worldwide, and presented the biological and integrated control successes at these meetings.

Contrary to other WPRS WGs, the greenhouse WGs have, with the exception of the EC funded projects on quality control of natural enemies and on risks of releasing exotic natural enemies, never worked with projects aimed at joined experiments to compare situations in different European countries. Instead, most of the activities were geared towards stimulating

and coordinating research, and preventing overlap in research. This attitude has resulted in a fast screening and development of a number of different natural enemies in different participating countries. After screening, the natural enemies became available for all participating countries.

Important data related to the WGs are given in Table 1. In 2006, the two WGs together had about 250 members representing 35 countries. In order to coordinate activities, the WGs are (1) producing the newsletter *Sting* of which the 28th issues was published in 2005, (2) maintains a website (http://www.agrsci.dk/plb/iobc/iobc_home.htm) that has, among others, a membership list, news items and the earlier published *Sting* newsletters, (3) a list server, “GoodBugs-L” (<http://www.agrsci.dk/plb/iobc/goodbugs-l.htm>), which is an open e-mail based discussion list service on the Internet (hosted by Research Group Entomology, Department of Crop Protection, Danish Institute of Agricultural Sciences).

As a result of the 26 meetings held by the WGs (Table 2), 25 bulletins reporting research progress have been produced. The WGs have the habit to publish precedings about one month before its meetings, so that most of the time at the meetings can be spent on discussions of progress based on a number of talks reviewing the contents of the bulletin.

Table 1. Information about the development of the WG Integrated Control of Protected Crops

1968	Creation of WG Integrated control in glasshouses/Lutte integree en cultures sous verre in Naaldwijk, The Netherlands, convenor: L. Bravenboer (The Netherlands; 1968-1974)
1974	New convenor: N.W. Hussey (United Kingdom; 1974-1985)
1983	Division of WG into 2 WG according to climate and appointment of new convenors: Integrated Control of Protected Crops, Temperate Climate, convenor: J.C. van Lenteren (The Netherlands; 1983-1999) Integrated Control of Protected Crops, Mediterranean Climate, convenor: A. Nucifora (Italy; 1983-1990)
1990	New convenor Integrated Control of Protected Crops, Mediterranean Climate: R. Alabajes (Spain; 1990-2003)
1999	New convenor Integrated Control of Protected Crops, Temperate Climate: A. Enkegaard (Denmark; 1999)
2003	New convenor Integrated Control of Protected Crops, Mediterranean Climate: C. Castane (Spain; 2003)

Impact of Working Groups on biological control in protected crops

At this moment, almost 40 years after commercial biological control was started in greenhouses, about 100 species of natural enemies/antagonists are commercially available for control of more than 50 species of pests and diseases. The greenhouse area on which biological and integrated control is used has increased from 400 hectares in 1970 to 30,000 hectares in 2006. This figure is quite astonishing considering that many previously regarded biocontrol in ornamentals as a complete utopia due to the extremely low damage threshold of these cultures and the zero tolerance status for many pests. The IOBC/WPRS greenhouse working groups have played an important role in stimulating development of biological and integrated control worldwide, and have always collaborated with greenhouse WGs in other Regional Sections of IOBC. The excellent commercial results with biological control of pests and diseases in greenhouses in Europe have shown to be a firm and reliable basis for research and application elsewhere in the world.

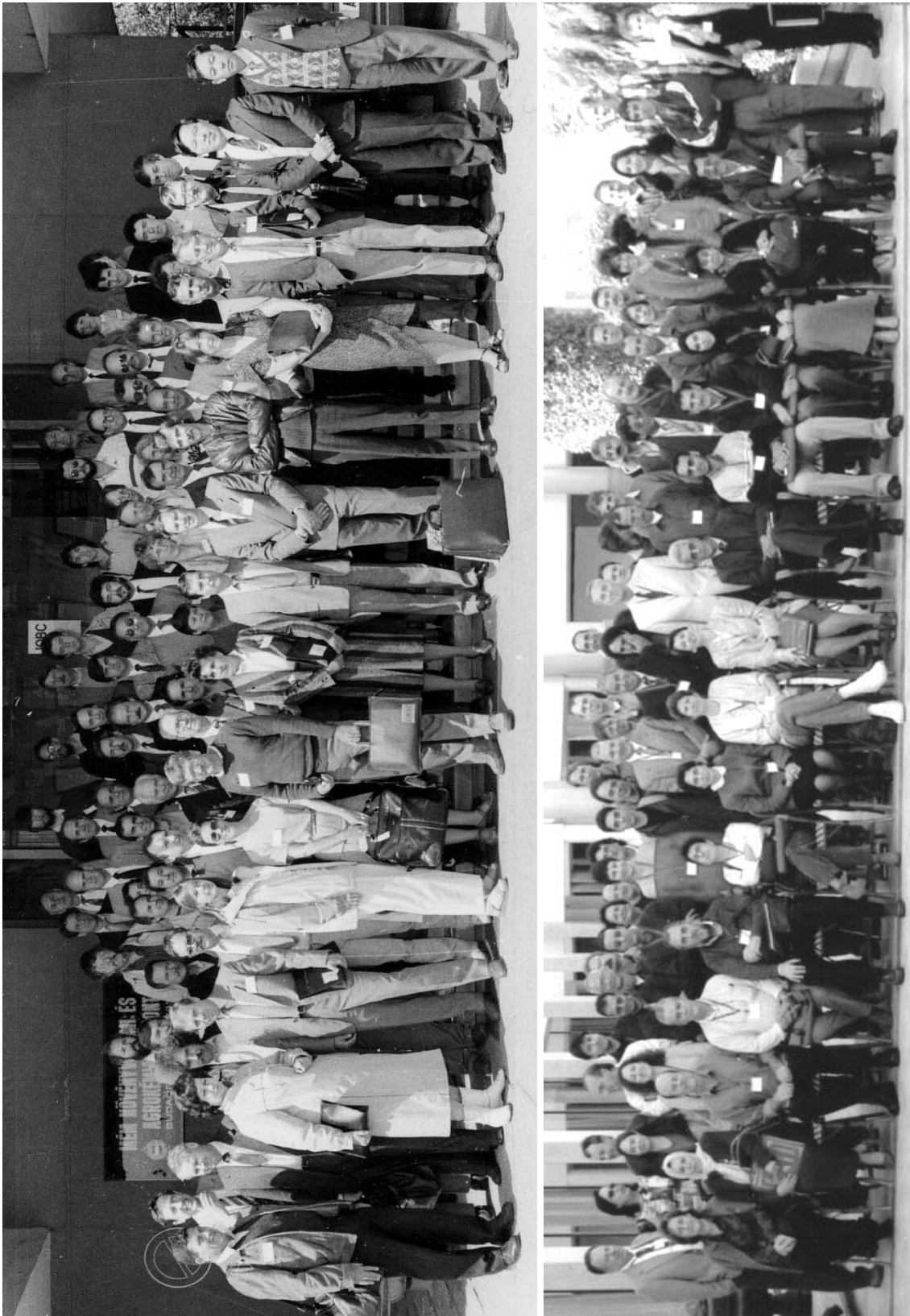


Figure 1. Participants at a combined WPRS-EPRS meeting in Budapest, Hungary 1987 (left) and a WPRS meeting in Agadir, Morocco 2003 (right)

Table 2. Meetings held by the Working Groups Integrated Control of Protected Crops, Temperate Climate and Mediterranean Climate.

Meetings in bold resulted in the publication of a WPRS Bulletin

1970 Naaldwijk, The Netherlands
1973 Littlehampton, United Kingdom
1976 Antibes, France
1978 Littlehampton, United Kingdom
1979 Vantaa, Finland
1981 Naaldwijk, The Netherlands
1982 Darmstadt, Germany
1984 Catania, Italy (Mediterranean Climate)
1985 Heraklion, Greece (Mediterranean Climate)
1987 Budapest, Hungary (Temperate Climate, with EPRS)
1987 Aalsmeer, The Netherlands (Temperate Climate)
1987 Cabrils, Spain (Mediterranean Climate)
1989 Antibes, France (Mediterranean Climate)
1990 Copenhagen, Denmark (Temperate Climate)
1991 Alassio, Italy (Mediterranean Climate)
1992 Cambridge, United Kingdom (Temperate Climate)
1993 Asilomar, USA (Temperate Climate, with NRS)
1994 Lisboa, Portugal (Mediterranean Climate)
1996 Vienna, Austria (Temperate Climate)
1997 Tenerife, Spain (Mediterranean Climate)
1999 Brest, France (Temperate Climate)
2000 Antalya, Turkey (Mediterranean Climate)
2002 Victoria, Canada (Temperate Climate, with NRS)
2003 Agadir, Morocco (Mediterranean Climate)
2005 Turku, Finland (Temperate Climate)
2006 Murcia, Spain (Mediterranean Climate)

Selected publications of the WGs Integrated Control of Protected Crops

- Albajes, R., Gullino, M.L., van Lenteren, J.C. and Elad, Y. (Eds.) 1999. Integrated Pest and Disease Management in Greenhouse Crops. Kluwer Academic Publishers, Dordrecht.
- Hussey, N.W. and Bravenboer, L., 1971. Control of pests in glasshouse culture by the introduction of natural enemies. In „Biological Control“ (C.B. Huffaker, Ed.), pp. 16-67. Plenum, New York.
- Hussey, N.W., and Scopes, N.E.A. (Ed.) 1985. Biological Pest Control, the Glasshouse Experience. Blandford Press, Poole, Dorset.
- Lenteren, J.C. van and Woets, J., 1988. Biological and Integrated Pest Control in Greenhouses. Annual Review of Entomology 33, 239-269.
- Lenteren, J.C. van (Ed.), 2003. Quality Control and Production of Biological Control Agents: Theory and Testing Procedures. CABI Publishing, Wallingford.
- 25 Bulletins IOBC/WPRS with precedings/proceedings of WG meetings
- 28 Issues of the WG newsletter Sting (all are available on the WG website: http://www.agrsci.dk/plb/iobc/iobc_home.htm)

III. 11 Working Group Integrated Protection in Field Vegetables (1970 - present)

Ernst F. Boller, based on information from the IOBC archive and assisted by Peter Esbjerg

Key data

Year	Name of Working Group (Convenor)	Important events, spin-offs or mergers
1970	Integrated control in Brassica crops (T.H. Coaker)	1970: WG "Genetic control of Hylemia" (C. Pelerents. Merged in 1974 with Brassica group
1975		Meeting at Gent (Belgium)
1979		1979: Splitting-off of Study Group "Oil seed rape" (B. Bromand). Became in 1982 WG "Oil seed crops"
1985	Integrated control in field vegetable crops	EC-IOBC Experts' meeting Rennes (France) on Progress on pest management in field vegetables
1987	(S. Finch)	Meeting at Tune (Danmark)
1991		Meeting at Vienna (Austria)
1993		Meeting at Einsiedeln (Switzerland)
1995		Meeting at Guitteé (France)
1997	Integrated Protection in Field Vegetables (S. Vidal)	Meeting at Chania, (Crete)
1999		Meeting at Gödöllö (Hungary)
2001		Meeting at Krakow (Poland)
2003		Meeting at Deinze (Belgium)
2004	(R. Collier)	Guidelines for Integrated Production of Field Grown Vegetables;
2005		Meeting at Ljubljana (Slovenia)

Achievements

While the attempt to introduce genetic control of the cabbage root fly (CRF) never became successful the early intercropping of Brussel sprouts and beans produced results with some promise.

The WG 's focus of the 1970's period was biological control of CRF using the staphylinid beetle *Aleochara bilineata*. The principle function of the control was demonstrated but the major trouble of reaching a stable mass production was never overcome. However, the first link of mass production, flies as host, was very successful. This included onion fly and particular Dutch work linked to the WG has brought one of the few successes on Sterile Insect Technique: the control of onion fly in parts of the polders.

Parallel with the biological control attempts a major coordinated project work was carried out with the aim of establishing damage thresholds using number of CRF larvae per plant as the scale. This methodological input was linked to the collaboration with the WPRS WG of "Breeding for Resistance" which produced a few carrot varieties with some level of resistance to carrot fly while CRF resistance was more problematic.

The damage threshold work opened a door for the next period.

During the 1980's and until the mid 1990's members of the working group in common undertook the task of developing monitoring-forecasting systems for several vegetable pests.

Major efforts were devoted to developing traps for the carrot fly and a cross country system was developed. For the CRF both yellow traps and felt traps were developed and for cut worm forecasting pheromone traps were developed. These traps have been widely used for a long period and some of them are still the backbone in forecasting work. Also simplified counting systems for larvae in cabbages were developed successfully.

From the mid 1990's the WG gradually turned its focus towards thrips in leek and onion crops. Again coordinated project work took place with the aim of developing thresholds and control through under sowing with clover. Good practical results have been obtained in both areas and now further work is devoted to sorting out the background for both thrips on leek and aphids on lettuce on a landscape scale.

Outlook

Indications are that the landscape aspect will play a major role for a number of years but much interest is also pointed towards the future production of field vegetables in the light of larger farms, abandoning of a number of pesticides and the emerging change of pest distribution and abundance linked to global climate change.

This WG is rather old but has maintained its capability of renewal and discussion instead of a conservative conference style.

Selected publications:

- Cavalloro, R. and Pelereys, C. (eds), 1988. Progress on pest management in field vegetables. Proc. EC/IOBC-WPRS Experts' Group Meeting, Rennes (France), 20-22 November 1985, AA.Balkema, Rotterdam/Brookfield, X + 302 pp.
- Coaker, T. (ed.). 1980. Integrated control in Brassica crops. Review of the activities between 1972 and 1978 of the Working Group: "Integrated Control in Brassica Crops". IOBCwprs Bull. 1980/III/1, 144 pp.
- Coaker, T.H. and Finch, S. 1988. Proceedings of a meeting of the Working Group "Integrated Control in Field Vegetable Crops", Tune (Denmark), 21-23 September 1987. IOBCwprs Bull. 1988/XI/1, 149 pp.
- Finch, S. and Freuler, J. (eds.), 1992. Proceedings of a meeting of the Working Group "Integrated Control in Field Vegetable Crops", Vienna, (Austria), 28-30 October 1991. IOBCwprs Bull. 1992/XV/4, 193 pp.
- Finch, S. and Brunel, E. (eds.), 1994. Proceedings of a meeting of the Working Group "Integrated Control in Field Vegetable Crops", Einsiedeln, (Switzerland), 1-3 November 1993. IOBCwprs Bull. 17 (8) 1994, 206 pp.
- Finch, S. and Brunel, E. (eds.), 1996. Proceedings of a meeting at Guitteé, France, 6-8 November, 1995. IOBCwprs Bull. 19 (11) 1996, 215 pp.
- Finch, S., Hartield, C. and Brunel, E. (eds.), 1999. Proceedings of a meeting of the Working Group "Integrated control in field vegetables", Chania, (Crete), 6-8 October, 1997. IOBCwprs Bull. 22 (5) 1999, 240 pp.
- Finch, S., Freuler, J. and Collier, R.H. (eds.), 2000. Monitoring Populations of the Carrot Fly *Psila rosae*. IOBC Brochure, VIII + 108 pp., 27 Figures, 28 Tables. ISBN 92-9067-110-6
- IOBC, 2005. Guidelines for Integrated Production of Field Grown Vegetables. Malavolta, C., Boller, E.F. and Wijnands, F.G. (eds), IOBCwprs Bull. 28 (5), 24 pp.
- Vidal, S. (ed.), 2003. Proceedings of meetings of the Working Group "Integrated Protection in Field Vegetables", Gödöllő (Hungary), 31.10. - 3.11.1999 and Krakow (Poland), 15. - 17.10.2001. IOBCwprs Bull. 26 (3) 2003, XIV + 379 pp.
- Vidal, S. (ed.), 2005. Proceedings of a meeting of the Working Group "Integrated Protection of Field Vegetables", Deinze (Belgium), 12.-16.10.2003. IOBCwprs Bull. 28 (4) 2005, V + 160 pp.

III.12 History of the Integrated Control of Soil Pests Working Group and the Evolution of the Working Group on Multitrophic Interactions in Soil.

Brian R. Kerry & Richard A. Sikora

Changes in the Structure of the Working Group.

Within the IOBC WPRS, the Soil Pests Working Group (WG) was the first to bring together scientists with an interest in crop protection in the soil ecosystem. Soil borne pests and diseases are often highly aggregated with populations that are difficult to measure and control. Some of the most toxic compounds used in crop protection are applied to soil and as a consequence the WG, throughout its history has had a strong focus on the reduction of pesticide use, integrated pest management and the measurement of the impacts of treatments on pest and non-target populations. For most of the history of this WG, it has been led by Convenors from Rothamsted Research in the UK (Table 1). However, the subdivision of the WG into several active sub groups with their own leaders from other organisations ensured that the activities have not been dominated by one organisation.

Table 1. Convenors and structure of the WG on soil pests and diseases 1970-2006

Year	Name of Working Group	Convenor	Sub groups
1970	Integrated control of soil pests	R. Bardner, Entomology Department, Rothamsted, UK	Study Group
1974		C. Edwards, Entomology Department, Rothamsted, UK	a) The role of soil organisms on seedling establishment, b) The role of organic matter in pest and disease problems in arable soils, c) Pathogens of soil pests and d) Biological control of plant parasitic nematodes
1985		B. Kerry, Nematology Department, Rothamsted, UK	a) Seedling pests of sugar beet, b) Pathology of nematodes, c) Organic matter in pest and disease problems
1988			a) Seedling pests of sugar beet and b) Pathogens of nematodes
1996			a) Integrated Control of Insect and Slug Pests and b) Pathology of Nematodes, c) <i>Melolontha</i>
1997		R. Sikora, University of Bonn, Germany	a) Nematode management and biological control, b) Slugs and snail pests and c) <i>Melolontha</i>
2001	Multitrophic interactions in soil		Single group
2005		Ch. Steinberg, Dijon, France	

A key meeting for the WG was held in Zeist, The Netherlands in April, 1975 at which 3 study groups were formed (Table 1) and a fourth, to evaluate the importance of entomophilic nematodes was planned to be established at the next meeting. This structure dominated the organisation of the WG for the next decade. The meeting also established a collaborative project on “The role of soil organisms in the establishment of sugar beet seedlings”. For several years the WG focused on the integrated control of soil pests of sugar beet and developed a close association with the IIRB, arranging joint meetings. At a meeting in

Göttingen, Germany one year later, discussions were held on: Seedling Pests of Sugar Beet, and Organic Matter with both groups establishing significant collaborative experiments; few nematologists attended this meeting and there was a split between those interested in nematodes as biological control agents for insect pests and those interested in the biological control of nematode pests. Pioneering work began on the use of nematodes as biological control agents and their impact on non-targets, some time before the first commercial products based on these organisms were produced in the 1980s. Interest in entomopathogenic nematodes increased and eventually led to the formation of a dedicated WG in 1986. An additional sub-group on the Pathology of Nematodes was established following a meeting of the WG in December, 1977, held at the University of Cambridge, England, at which a workshop was organised to demonstrate methods for isolating fungi from cyst nematodes, organised by Dr Henry Tribe, one of the pioneers of the biological control of nematodes.

At the 1988 WG meeting in Leuven, Belgium, the number of sub-groups had been reduced to two: Seedling Pests of Sugar Beet and Pathogens of Nematodes. It was decided that the activities of the seedling pests of sugar beet subgroup should not continue to concentrate on only one crop and that collaborative research on slugs should also be included. The sugar beet group increasingly involved entomologists more interested in the cereal phases of the crop rotations than in the sugar beet crops and so the group decided in 1996 to join the IPM in Cereals WG; two other sub-groups on slugs and *Melolontha* joined the nematologists but these soon began to meet separately as there were few common research links to integrate their activities. For some time the nematologists had invited soil microbiologists to their meetings who provided important inputs to meetings on the ecology and epidemiology of the microorganisms that attacked nematodes in the rhizosphere. This important interaction was formally recognised in 2001 with the formation of a new WG on Multitrophic Interactions in Soil, which has met twice and attracted many more participants than the former WG, and importantly brought a significant number of soil microbiologists into the activities of the IOBC/WPRS. The other two subgroups moved to join the Pathogens of Insects WG.

A Changing Scientific Research Focus in the Working Group

Because the control of soil-borne pests and diseases has exploited some of the most toxic compounds used in crop protection, the activities of the WG have focused on reducing the use of such pesticides and the development of less hazardous products and/or alternative technologies, especially the use of biological control. The major research teams in Europe working on soil pests were represented within the WG, which has brought together scientists from both northern and southern Europe long before the European Community research frameworks promoted such links. The management of soil pests presents some especial problems that are caused by their aggregation and by the large mass of material (soil) in which they are active. The management of soil pests has rarely been achieved with the application of a single measure and the activities of the WG have focused on the development of IPM strategies and especially the impact of biotic and abiotic factors on the success of such strategies. Initially, efforts were concentrated on the direct and indirect effects of herbicides and insecticides such as BHC and aldicarb on pests of sugar beet such as *Onychiurus* sp. and *Atomaria* sp. and their carabid predators. However, soon attention concentrated on reduced chemical inputs, initially through seed treatments, and more benign chemicals such as Tefluthrin, which applied as a seed treatment had little effect on ground beetles. Early collaborative experiments on tillage, straw incorporation, disposal of farm wastes and crop

cycles pioneered a much more holistic view of pest management and led on to a systems approach. Similarly, the widespread cropping of oilseed rape in northern Europe in the mid 1970s and the ban on straw burning in many countries in the late 1980s resulted in much more organic matter in the surface layers of soil and a large increase in slug activity and the use of molluscides, such as Methiocarb in arable fields. Again, European scientists were able to come together rapidly within the WG to collaborate in the development of management strategies for slug pests and evaluate nematodes, which were being developed as a biological control product in the UK.

The WG scientists also played a key role in the development of methodologies for the extraction and sampling of soil pests. The first suggestion that soils suppressive to plant parasitic nematodes were caused by the presence of large densities of nematophagous fungi was made in the early 1970s and in response the Nematode Pathology sub-group was formed in 1977. Nematologists within the WG collaborated in the conduct of surveys and provided evidence of the widespread suppression of cereal cyst nematodes in cereal monocultures and identified a range of obligate and facultative parasites throughout northern Europe. Members of the WG developed a range of techniques for the isolation and evaluation of potential microbial agents for nematode control at an early stage of research on the biological control of plant and animal parasitic nematodes.

Nematode biological control has concentrated on the use of microbial agents that occur in the rhizosphere or as endophytes within crop roots and members of the sub-group have taken an holistic view of the role of microbial biodiversity around and within plant roots on the regulation of nematode pest populations. Biological control agents on their own are generally inadequate to control nematode pests with high multiplication rates, such as *Meloidogyne* spp., and their use must be integrated with other control measures. Much knowledge has been developed by plant pathologists that have studied the use of antagonists for the biological control of damping off caused by a range of fungi and of the cereal root-disease, Take All, *Gaeumannomyces graminis*. Commercial products have been developed for the biological control of damping-off diseases and it was felt that the nematologists needed to engage much more with the plant pathology community. As a result, the Multitrophic Interactions in Soil WG was established to bring together soil nematologists, entomologists and plant pathologists; a sound decision as the number of participants of the WG has tripled compared to that for the more focused group of nematologists.

The Guiding Principles of the Working Group's Activities

The ability to conduct collaborative research projects, which was a feature of the activities of the WG in the 1970s and mid 1980s was lost with the advent of competitive tendering for research contracts and the difficulties in conducting research that was not specifically funded. However, the WG groups formed well established networks that were exploited in the application of funds from the European Community. Successful EU projects on the management of root-knot nematodes in vegetables in southern Europe and on the integrated management of mollusc pests in less-intensive agricultural heavily involved scientists from the WG. Although extensive collaborative research was often difficult to support through lack of finance, the WG proved an excellent forum for testing new techniques and products in different laboratories and surveys of pests and natural enemies were enhanced by the geographic range of its participants.

The WG under the leadership of all its convenors has managed to retain an informal atmosphere and has given a high priority to the participation of students. Many students gave their first scientific paper at a meeting of the WG and it was always recognised that an emphasis should be placed on training opportunities for young scientists and there have been many scientific exchanges between laboratories.

The Future

There are relatively few scientists studying the biology and management of soil pests and diseases and the WG has had a significant rôle in bringing researchers and representatives from industry together to develop understanding and to evaluate environmentally benign strategies and products. The concerns over climate change and especially water-use efficiency of plants is likely to keep the root-health of crops at the top of the agenda for applied biologists. We trust that the members of WG on Multi-trophic Interactions in Soil will continue to play a key role in the development of sustainable methods for the management of soil pests and diseases but to achieve this they will need to involve policy makers and socio-economics in their activities to ensure the impact of their research.

Selected Publications

- IOBC/WPRS 1976. Working Group "Integrated Control of Soil Pests". Proceedings of the 4th meeting at Zeist (The Netherlands), 17– 21 March, 1975. IOBC/WPRS Bulletin Vol. 1976/3, 78 pp.
- Keller, S. (ed.) 1996. Working Group "Integrated Control of Soil Pests", Subgroup "Melolontha". Proceedings of the meeting at Freiburg, Germany, 23-25 October, 1995. IOBC/WPRS Bulletin Vol. 19(2) 1996, 114 pp.
- Sikora, R. (ed.) 2001. "Tri-trophic interactions in the rhizosphere and root-health nematode-fungal-bacterial interrelationships". Study Group "Integrated Control of Soil Pests", Proceedings of the meeting at Bad Honnef (Germany), 3-5 November, 1999. IOBC/WPRS Bulletin Vol. 24 (1) 2001, 172 pp.
- Keller, S. (ed.) 2002. Working Group "Integrated control of soil pests", Sub Group "Melolontha", Proceedings of the meeting at Aosta (Italy), 24-26 September 2001. IOBC/WPRS Bulletin Vol. 25 (7) 2002, 125 pp.
- Kerry, B. R. and Bourne, J. M. (eds.) 2002. 'A Manual for research on *Verticillium chlamydosporium*, a Potential Biological Control Agent for Root-Knot Nematodes'. ISBN 92-9067-138-2. [xiii + 84pp.]
- Sikora, R. A., Gowen, S., Hauschild, R. and Kiewnick, S. (eds.) 2004. Working Group "Multitrophic Interactions in Soil and Integrated Control". Proceedings of a Meeting at Bad Honnef (Germany), June 1-4, 2003 combined with selected papers from the meetings "Thinking in Lines - From Research to Market Products" in Einsiedeln (Switzerland), November 2-4, 2000 and "Biological Mechanisms Affecting Nematode Management" in Reading (England), September 5-6, 2001. IOBC/WPRS Bulletin Vol. 27 (1) 2004, 302 pp.
- Raaijmakers, J. M. and Sikora, R. A. (eds.) 2006. Working Group „Multitrophic interactions in soil and integrated control“, Proceedings of the meeting at Wageningen (The Netherlands), 5 - 8 June 2005. IOBC/WPRS Bulletin Vol. 29 (2) 2006, 197 pp.

III.13 Working Group Integrated control in cereals (1971 – 2001)

Hans Michael Poehling

Key data of working group

Year	Name of Working Group	Convenor	Important events
1971	Integrated control in cereals	G. Latteur	Status of Study Group
1972			Status of Working Group
1975		F. Schütte	WG “IC in cereals of the Mediterranean region” (M. Laraichi) is established. It becomes in 1984 a subgroup of the WG “IC in cereals”.
1977		F. Schütte	Joint meeting in Versailles of 4 WGs: Cereal aphid ecology (H. Suter) Losses and economic strategies (K. George) Host plant resistance (H.B.J. Lowe) Soil fauna and crop manipulation (R. Bardner)
1978		F. Schütte	Meeting in Zürich-Reckenholz WG cereal aphid ecology
1979		F. Schütte	Meeting in Colmar WG cereal aphid ecology : C.A. Dedryver co-convenor
1981		F. Schütte	Meeting in Rennes WG cereal aphid ecology
1982		C.A. Dedryver	
1984		C.A. Dedryver	Meeting in Wageningen (4 WGs); 1 bulletin
1986		C.A. Dedryver	Meeting in Gembloux; 1 bulletin
1988		C.A. Dedryver	Meeting in Antibes; 1 bulletin
1990			Meeting in Göttingen; 1 bulletin
1992		C.A. Dedryver H.M. Poehling	Meeting in Rennes H.M Poehling elected as convenor; 1 bulletin
1995		H.M. Poehling	Meeting in Hannover; 1 bulletin
1997		H.M. Poehling	Meeting in Lleida; 1 bulletin
1999		H.M. Poehling	Meeting in Gödöllő; 1 bulletin
2001			Working Group terminated and merged with other WGs to Study Group “Landscape management for Functional Biodiversity”

The group consisted regularly of about 50 participants from 8 – 10 European countries. Since 1969 cereal pests, particularly cereal aphids, increased in importance in Western Europe. Consequently, the working group first focused on studies dealing with the principal biology

and ecology of cereal aphids, with damage (direct, honeydew, vector of BYDV) as well as forecasting and control options.

Most important topics of the regular meetings for scientific exchange mainly were:

- Biology and population dynamics of cereal pests, mostly cereal aphids and their natural enemies;
- Cereal aphids as vectors of BYDV;
- Resistance of cereals to aphids;
- Side effects of pesticides to natural enemies in the cereal ecosystem;
- Development of integrated control (forecasting systems, thresholds).

From the meetings in Gembloux onwards the role of habitat diversity and the role of farming systems gained increasing importance. After the Göttingen meeting in 1995, a shift in the group members could be observed. The scientific groups in Western Europe (e.g. UK, The Netherlands, Sweden, Germany, France, Spain) reduced their activities on search for chemical based control options including forecasting and thresholds. These questions still remained important for eastern European countries and with the political changes more members from that part of Europe joined the group. Later on, starting with the Hannover and Lleida meetings, conservation biocontrol with alterations in culture practices in the cereal ecosystems became the main topics of the meetings such as:

- role of refuge areas (field boundaries, set aside areas);
- spatial and temporal synchronisation of aphids and natural enemies;
- low input farming;
- effects of biodiversity at different scales (from field to landscape).

The increasing interest of the cereal ecosystems as a self regulating system at different levels (field, farm, landscape) led in 2001 to the closure of the group (9th General assembly at Ascona) and to the formation of a new study group “Landscape management for functional biodiversity” with a first meeting in Bologna in 2003, then upgraded to a Working Group. The follow up meeting took place in Zürich 2006. This new group took over the scientists still working in the cereal ecosystems but emphasises the new trend of research on the basic mechanisms of pest – beneficial interactions at different habitat scales.

III.14 Working Group Integrated Protection in Viticulture (1974 -present)

Ernst F. Boller

Sources of information

The evolution and historical chronology of the working group presented in Table 1 illustrates that the information available on our past has different qualities. The year 1984 marks an important step in the working group's records because the proceedings of the meeting held in 1983 at Toulouse were for the first time published as IOBC-WPRS Bulletin. The examination of the early phase of the groups' history has to be based on unpublished internal reports and testimonies of eye witnesses that participated in the decision making processes (Boller 2003).

The preparatory phase 1973

The first initiative for the establishment of an IOBC working unit dealing with viticulture was taken by an entomologist already involved in the dynamic IOBC working group in orchards but covered in his professional activities also viticulture: Mario Baggiolini at the Swiss Federal Research Station at Changins/Nyon. Baggiolini's activities IOBC were instrumental for the organisation of the historic preparatory meeting at Changins in February 1973 resulting in the submission of a proposal to IOBC Council for the establishment of a Study Group. He was supported by a young acarologist in the same laboratory who became later the first convenor of the working group: Marc Baillod.

Since most of the IOBC activities at that time were almost exclusively in the hands of entomologist, the discussions and conclusions of the first preparatory reflection group (with 5 entomologists) can be considered as extraordinary. They emphasised right from the beginning a multi-disciplinary approach so far only practised by the orchard group. Their agenda listed 4 points: 1. Situation of plant protection (in viticulture) in Europe; 2. Potentials of establishing an IOBC working unit for viticulture; 3. Inventory of major problems and research topics; 4. Conclusions and proposals.

The protocol of the preparatory meeting shows that in point 2 some basic principles of a future working unit were laid down: The group should be as open as possible and hence not be limited to a single discipline (e.g. entomology). The activity should not replace or limit the work carried in each participating country. The main objective would be an international podium for the exchange of information between members but also to act as catalyst in the relevant fields of research (i.e. to encourage and accelerate, but not impose rules). It was concluded that at the beginning the group should not be too large but be flexible to grow according to needs. Best format to start and evolve was the Study Group with the objectives (i) to act as liaison between countries, exchange of documents, harmonising working methods, (ii) to act as liaison between researchers, co-ordination of research avenues even in a bilateral way where only 2 countries were interested; and (iii) regular meetings of scientists working in the same subject area.

Interested countries. It was decided to start with France, Germany and Switzerland as core countries but it was also deemed highly desirable to identify the interest of the immediate neighbour countries, i.e. Austria, Italy and Spain. Other countries (e.g. eastern Europe) to be handled case by case.

Disciplines concerned. Having accepted *in principle* that the group should have a large scope it was deemed important to associate mycologists as well as generalists right from the beginning.

Table 1. Chronology of events of the Working Group Integrated Control in Viticulture

Year	Date & Location	Convenor	Type of Meeting	WPRS Bulletin
1973	20 - 21 February Changins/CH		<i>Preparatory meeting</i> Baggiolini/CH, Baillod/CH, Guignard/CH, Milaire/F, Schruft/D	Report*
1973	May	<i>Council decision to establish Study Group</i>		
1974	27 - 28 February, Lausanne/CH	Baillod/CH	<i>First meeting of Study Group</i> with 35 participants from A (1), CH (9), D (4), E (4), F(9), I (6), Ru (1). Establishment of 5 subgroups: Grape moths/ SIT (Roehrich/F); Mites (Baillod/CH); Side effects of pesticides (Touzeau/F); <i>Sparganothis</i> (Russ/A); Fungal Diseases (Gärtel/D)	Report*
1975		Transformation into Working Group by Council		
1976	Changins/CH	Baillod/Schmid	<i>Plenary meeting</i> with 32 participants	Report*
1979	Beaune/F	Baillod/Schmid	<i>Plenary meeting</i> with 35 participants	Report*
1981	Gargnano/I	Schmid/CH & Baillod/CH	<i>Plenary meeting</i> with 51 participants. Five Subgroups redefined: Grape moths and chewing insects; Mites and sucking insects; Fungal and bacterial diseases; Side-effects of pesticides; Practical application.	Bulletin hors serie
1983	Toulouse/F	Schmid/CH & Bassino/F	Plenary meeting with 81 participants New SG on Physiological disorders	1984/VII/2
1985	Bernkastel/D	Schmid	Plenary meeting (Figure 1)	none
1987	Logrono/E	Schmid	Plenary meeting	none
1988	6 – 9 June, Lisbon-Vila Real	Cavalloro/CCE & Schmid	<i>Joint symposium CCE/IOBC on Integrated Protection in Viticulture</i>	Cavalloro 1989 CEE Publication
1989	Sion/CH	Schmid	Plenary meeting with 77 participants. New SG on soil management	1990/XIII/7
1991	Conegliano/I	Schmid	Plenary meeting with 87 participants	1992/XV/2
1993	Bordeaux/F	Dubos/F	Plenary meeting with ca. 160 participants	none
1995	Freiburg/D	Dubos	Plenary meeting	none
1997	Gödöllo/H	Dubos	Plenary meeting (ca. 70 participants)	21 (2) 1998
1999	Firenze/I	Lozzia/I	Plenary meeting with 122 participants	23 (4) 2000
2001	Ponte de Lima/P	Lozzia	Plenary meeting with 138 participants. Decision to reorganise meeting structure	24 (7) 2001
2003	Volos/GR	Lozzia	Plenary meeting with 141 participants	26 (8) 2003
2005	Boario Terme/I	Lozzia	Plenary meeting with 75 participants	in print

*) Unpublished internal reports distributed only to IOBC secretariat and participants of the respective meeting.
Copies are deposited in the IOBC-WPRS archives at Wädenswil, Switzerland.

For the start it was not considered to be of priority to associate virology, breeding and clone selection in order to avoid overburden of the vehicle. It was discussed whether 1-2 representatives working in cultural technologies were important at the beginning; they would be most welcome if the group was not too heavy. The Council of IOBC gave green light for the establishment of the proposed Study Group in spring 1973.

The first meeting in 1974

This meeting was a full success with 35 participants from 7 European countries and the presence of the IOBC Secretary General Lukas Brader. Interesting to note that 10 participants were phytopathologists. This was new in IOBC since the phytopathologists were traditionally meeting in other international frames. Conclusions and decisions taken:

- The establishment of subgroups was accepted and 7 units defined (see also table): Grape moths (Roehrich F), Mites (Baillod CH), Side-effects (Touzeau F), Sparganothis (Russ A), Autocidal control (Arroyo E; this subgroup was for the start integrated in the grape moth subgroup), Fungal diseases (Gärtel D) and “Representation of the group” Baillod (CH), Milaire (F), Gärtel (D), Martelli (I) and Carceles (E).
- The chairpersons of the subgroups were requested to proceed with the development of the unit and to seek the membership of scientists not yet present. Each subgroup had to define by end 1974 its objectives and to prepare a working plan for 1975.

By the end of 1974 the priorities for each subgroup were defined as follows:

- *SG Grape moths*: Relation grape moths – botrytis; damage thresholds; harmonising trapping systems; examination of antagonists; distribution maps of the 2 species; basic control technology and especially the use of *Bacillus thuringiensis*
- *SG Autocidal (genetic) control and use of pheromones*: Research and development of a sex pheromone for *Eupoecilia ambiguella*; investigation on confusion technology; relation between trap catches and actual activity of the moths.
- *SG Mites*: Sampling methods; tolerance levels; importance of antagonists especially typhlodromid predatory mites.
- *SG Fungal diseases*: biology in view of integrated protection; influence of cultural practices; simultaneous control of *Plasmopora* and *Botrytis*; measures to increase plant resistance; improvement of forecasting and possibilities of warning systems.
- *SG Side-effects*: Influence of pesticides on phytoseiid mites and the acarocenose in general; possibilities of foliar analyses to show and investigate trophic effects of pesticides; inventory of most evident trophic effects; side-effects of fungicides on other fungi.
- *Meeting frequency*: It was decided that for the beginning meetings would take place in the framework of the subgroups in order to allow a rapid exchange of information between specialists interested in particular problems and to accelerate the development of working concepts.

1975: The sub-groups start their work

Between 1975 and 1980 the main activities were carried out at the subgroup level. This period was characterised by a general feeling of satisfaction with the new working platform, of innovation and of visions, since the amount of open questions and unsolved problems was

gigantic. The main working tools applied were mutually developed in joint project protocols by participants especially interest in the respective topic. The working atmosphere was open, carried by mutual support and remained untouched by institutional barriers and secrecy. It took more time for the pathologists to find a mutual basis of straightforward collaboration that changed later with the organisation of plenary meetings where the subgroup of pathologists became a most viable and stimulating platform that prevails up to the present.

1979: Plenary meetings become the standard format

With the organisation of the second plenary meeting in 1979 the working group initiated its traditional biannual schedule of full meetings that has been continued up to the present. The meeting of 1981 at Gargnano / Italy can possibly be considered a further milestone in the history of this working group where the subgroups were redefined and the working group adopted the present structure. The number of participants in the plenary meetings fluctuated between some 30 persons and large audiences of some 160 persons participating in the Bordeaux meeting in 1993.



Figure 1. Meeting at Bernkastel 1985.
From right to left: Roehrich, Milaire, (back) Guignard, Baillod, Touzeau, Boller, Cabazuelo

2001: Working strategy discussed

The former project-oriented approach was more and more replaced by a symposium type of presentations given in the subgroups that were meeting in parallel, obviously eroding the initial vision of an interdisciplinary platform. This aspect was discussed in the meeting of

2001 taking place in Ponte do Lima where the question was raised whether this IOBC working group should not consider re-introducing in a modest way the notion of plenary sessions focussing on a few common topics while still providing ample space for the important discipline oriented discussions in the subgroup environments. In the 2003 meeting (Volos) a plenary session with a round table discussion at the 3rd day was organised and generated a number of ideas for the future meetings with interdisciplinary workshops on specific topics. Unfortunately, a first attempt made in this direction in 2005 by combining 6 general workshop themes (of 2 hours each) with half-day sessions of the subgroups could not be realised for organisational reasons.

Achievements of the working group

The multi- and sometimes even trans-disciplinary activities of this working group have certainly stimulated to a large extent the development of integrated plant protection and integrated production in European viticulture (IOBC 1999; Lozzia 2001). The exchange of information - in the specific subgroup meetings and especially in the plenary sessions- has generated for more than 30 years new ideas and insight of the participants of the meetings. We can anticipate the continued progress in sustainable viticulture by scientific and technical support given by this working group to the different clients of all these activities: the farming community, the extension people and, last but not least, students and colleagues of the scientific community. There is no doubt that this working group can be proud of its passed activities conducted in a unique atmosphere of friendship. The traditional sing-song "Alouette" being celebrated under the direction of Claude Duvernay at the traditional farewell dinners of each meeting has not found equal expressions anywhere else.

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III.15 Working Group Pesticides and beneficial Organisms (1974-present)

Sherif A. Hassan and Heidrun Vogt

Start and meetings of the Working Group

The inauguration meeting of the Working Group “Pesticides and beneficial Organisms” was held in May 20 – 21, 1974 in Zürich-Reckenholz, Switzerland. Sixteen participants from 9 countries attended the first meeting, namely: M.C. Benassy (Antibes/F), P. Blaisinger (Colmar/F), H. Bogenschuetz (Wittenta/DI), J. Bosch (Stuttgart/D), L. Brader (Wageningen/NL), J. Coulon (Versailles/F), C. Edwards (Harpenden/UK), J. M. Franz (Darmstadt/D), S.A. Hassan (Darmstadt/D), J.A. Jobsen (Wageningen/NL), E. Kirknel (Lyngby/DK), J.F. Newman (Bracknell/UK), A. Schmid (Nyon/CH), H. Steiner (Stuttgart/D), H. Suter (Züric/CHh), G. Vanwetswinkel (Sint-Truiden/B).

On behalf of the IOBC/WPRS the Secretary General L. BRADER opened the meeting. The corresponding German working group that had the same name was seen as the origin of the present one. He emphasized the special role of this group compared to existing working groups of the international organization, mainly: (1) Activities were not to be restricted to a specific group of plants and (2) Its openness to the direct participation of scientist from registration authorities and from pesticide industries. Main objectives would be to select candidate beneficial arthropods for selectivity tests and to develop international standard testing methods. J. FRANZ, acting as the first convenor of the group, led the discussion and emphasized that, simple methods to test the side effects of pesticides on parasitoids and predators should be developed. The acute as well as the slow and cumulative effects of pesticides should be detected in the laboratory and the results verified in the field. A network of specialized testing laboratories should be formed in the framework of the WPRS. This way, the results obtained would be accepted by the cooperating countries. Two advantages were emphasized: (1) Growers would be able to identify pesticides for use in integrated control programs which do the least harm to beneficial arthropods; and (2) Pesticide industries would have an incentive to develop selective preparations, particularly if this would be an aspect considered for registration. Work of the corresponding German Working Group “Pesticides and Beneficial Arthropods” of the Biological Research Centre was presented and discussed at the inaugural meeting. This included draft guidelines for three laboratory and three field testing methods which were in development at the time.

The second meeting was held at Colmar, France in March 1975. Most of the participants that were in Zürich also attended the Colmar meeting with the following additions, Delorme (Versailles), E. Dickler (Dossenheim), P. Fels (Zürich), J.C. Felton (Sittingbourne), W. Herfs (Braunschweig), G. Iperti (Antibes), T. Kock (Freiburg), G. Mineo (Palermo), K. Russ (Wien), M. Stengle (Colmar), J.H. Stevenson (Harpenden), G. Viggiani (Portici), J. Zeleny (Prag). The convener, FRANZ defined the following working steps: (1) Develop standard principles for the test methods, (2) Develop and evaluate methods for selected arthropods, (3) Exchange information on results, (4) Provide results, also to pesticide registration authorities.

The following years brought thorough discussions on the methodology and the role of the different types of test methods. The limitations of individual methods led to attempts to define the role of the different laboratory methods in general and the possibility of including extended laboratory, semi-field and field tests to a sequential scheme. The discussion on mode

of exposure to pesticides in the laboratory proved to be crucial. The alternatives were, among others: topical application, dipping or exposure to residual film. At each meeting, trials with newly developed methods were presented and different approaches were compared. Interpretation of the results, the role, reliability and practicability of the laboratory tests were intensively discussed and data compared with those from the field. Colleagues from the pesticide industry actively participated in these discussions. The policy of the group was to find consensus between governmental and industrial research workers as well as to find a balance between cost and value.

At the meeting in Vienna (1979), Austria, S. HASSAN was nominated new convenor of the group, upon retirement of J. FRANZ. Work continued and after many years of careful trials and evaluations, important decisions regarding standardization were taken. After laboratory test methods for a number of natural enemies had been developed, the first joint testing programs were conducted. For the first time, comprehensive results became available. The group also reached agreement on the general characteristics of the initial toxicity laboratory test: The natural enemy in its most susceptible development stage was exposed to fresh applied pesticide film at its highest recommended concentration. This approach gained support and realistic results were obtained. In parallel, deep discussions on the nature of the target surface to be sprayed led to a clear recommendation: An inert surface (glass) should be used as spray target rather than absorbent surface, e.g., paper which was used in the bee test, or plastic foil. Glass keeps the spray film available longer and does not chemically alter it.

To avoid an inflation of written testing guide lines, no publications on the methodology were made until the methods had been thoroughly developed, carefully tested and accepted by an *ad hoc* committee of the group. Whereas other working groups were producing WPRS Bulletins with papers presented at meetings, our group did not produce any in the first few years. At the same time, the selection of candidate beneficial arthropods for the tests was a continuous point of discussion. Natural enemies that play an important role in the biological control of major pests should have priority. The candidate beneficial should also be easy to rear in the laboratory in good and uniform quality. Because it was felt that pesticides should only be tested on natural enemies that are relevant to the crops on which they are to be used, test methods for a number of arthropods (about 12) would be needed in order to cover major agricultural crops, orchards and forest.

Whereas most other IOBC/WPRS working groups were meeting every 2 to 4 years, ours was organizing annual meetings for many years (Table 2). The reason was the speed with which test methods were developed in the different countries and the urge to standardize. The working group provided a fast, convenient and democratic forum for exchanging ideas. The number of participants ranged from 20 to 30 in the 1980s and went up to 60 to 100 in the 1990s and continued at this level till now.

International standard methodology

Standard guidelines to test the side effects of pesticides on natural enemies were published by the group in the EPPO¹ Bulletin (HASSAN 1985) and in IOBC Bulletins (HASSAN 1988 and 1992). These were multi-author documents including 19, 16 & 21 authors, respectively. Species and the testing members are listed in Table 1. The methods include laboratory, semi-field and field tests.

¹ European and Mediterranean Plant Protection Organisation

Table 1. Organisms tested and guidelines developed from 1974 to 1992
Parasitic insects:

- | | |
|--|------------------------|
| 01. <i>Trichogramma cacoeciae</i> : | Hassan, Germany. |
| 02. <i>Encarsia formosa</i> : | van de Veire, Belgium. |
| 03. <i>Leptomastix dactylopii</i> : | Viggiani, Italy. |
| 04. <i>Cales noacki</i> : | Vivas, Spain. |
| 05. <i>Aphidius matricariae</i> : | Polgar, Hungary. |
| 06. <i>Phygadeuon trichops</i> : | Moreth, Germany. |
| 07. <i>Coccycgomimus turionellae</i> : | Bogenschütz, Germany. |

Predatory mites:

- | | |
|--------------------------------------|--|
| 08. <i>Phytoseiulus persimilis</i> : | Calis & Bakker, Netherlands; Blümel & Stolz, Austria. |
| 09. <i>Amblyseius andersoni</i> : | Calis, Netherlands. |
| 10. <i>Amblyseius finlandicus</i> : | Sterk, Belgium. |
| 11. <i>Typhlodromus pyri</i> : | Calis, Netherlands; Englert, Germany; Baillo, Guignard & Boller, Switzerland |

Predatory insects:

- | | |
|--|--|
| 12. <i>Chrysoperla carnea</i> : | Bigler, Switzerland; Vogt, Germany. |
| 13. <i>Aphidoletes aphidimyza</i> : | Helyer, United Kingdom. |
| 14. <i>Syrphus vitripennis</i> : | Rieckmann, Germany. |
| 15. <i>Hippodamia 11-notata</i> : | Brun, France. |
| 16. <i>Coccinella septempunctata</i> : | Brun, France. |
| 17. <i>Aleochara bilineata</i> : | Samsoe-Petersen, Denmark; Moreth, Germany. |
| 18. <i>Pterostichus melanarius</i> : | Lewis, United Kingdom. |
| <i>Poecilus cupreus</i> : | Heimbach, Germany. |
| 19. <i>Forficula auricularia</i> : | Sauphanor, France. |
| 20. <i>Anthocoris nemoralis</i> : | Schaub, Switzerland |
| 21. <i>Orius niger/laevigatus</i> : | van de Veire, Belgium |

Spiders:

- | | |
|------------------------------------|------------------|
| 22. <i>Cheiracanthium mildei</i> : | Mansour, Israel. |
|------------------------------------|------------------|

Fungi:

- | | |
|-------------------------------------|------------------------------|
| 23. <i>Verticillium lecanii</i> : | Tuset, Spain. |
| 24. <i>Beauveria bassiana</i> : | Hokkanen, Finland. |
| <i>Beauveria brongniartii</i> : | Coremans-Pelseneer, Belgium. |
| 25. <i>Metarhizium anisopliae</i> : | Hokkanen, Finland. |

Nematodes:

- | | |
|----------------------------------|------------------|
| 26. <i>Steinernema feltiae</i> : | Vainio, Finland. |
|----------------------------------|------------------|

When testing the side effects of pesticides on beneficial organisms became obligatory in several countries, there was urgent demand for the development of internationally approved guidelines. The use of standard methods would allow applying test results from one country to another and economize the cost of repeated testing. The major aims of the group were therefore to coordinate international activities and to intensify the cooperation with international organizations such as EU, EPPO, BART² and SETAC³. Attending international

² Beneficial Arthropod Regulatory Testing Group

³ Society of Environmental Toxicology and Chemistry Europe

congresses and taking part at the workshop ESCORT 1 (European Standard Characteristics of Beneficials Regulatory Testing) in Wageningen, the Netherlands 1994, was important to gain international support. In addition, the group organized a joint conference with BART and EPPO at Cardiff in 1996. In these two meetings, testing in relation to registration was discussed and recommendations were made that later had direct impact on the present regulatory system for registration in EU countries and beyond. The number of the natural enemies to be tested for registration was to be reduced; however the methodology that was developed by our working group was largely adopted. The outcome of the ESCORT 1 meeting was published as “Guidance document on regulatory testing procedures for pesticides and non-target arthropods” (BARRETT et al. 1994). The Cardiff meeting was summarized in a book, including the state of art of the method validation at this time (Haskell & McEwen, 1998). In 1996, three subgroups were formed to cope with the increased demand for coordination: Subgroup “Development of New Methods” (U. HEIMBACH/D); Subgroup “Validation of Methods” (S. BLUEMEL/A); Subgroup “Joint Pesticide Testing Programmes” (G. STERK/B).

At the meeting in Tunis, 1997, Heidrun VOGT was recommended as new convenor of the working group and later nominated by the IOBC/WPRS council. Proceedings of this meeting were published in an IOBC/WPRS Bulletin (HASSAN 1998). In the following years, the development and validation of methods for selected organisms was intensified and the joint pesticide testing programs were continued. The number of preparations jointly tested was reduced and more rates relevant to the usages of the pesticides were included.

The cooperation with the EU, EPPO, BART, OECD⁴ and SETAC Europe was intensified and in the year 2000 the group participated and played a major role at the workshop ESCORT 2 in Wageningen, Netherlands, which discussed the role of beneficial arthropod testing in registration. The BART, EPPO, OECD & IOBC “Guidance document on regulatory testing and risk assessment procedures for plant protection products with non-target arthropods”, edited by CANDOLFI et al., was published in 2001. The IOBC booklet “Guidelines to evaluate side-effects of plant protection products to non-target arthropods – IOBC, BART and EPPO Joint Initiative”, edited by CANDOLFI et al. (2000) was published. This guidance document was the result of 5 years intensive work of ring-testing, optimizing and validating test methods and includes guidelines for the following test organisms: *Aleochara bilineata*, *Aphidius rhopalosiphi*, *Chrysoperla carnea*, *Coccinella septempunctata*, *Orius laevigatus*, *Pardosa*, *Poecilus cupreus*, *Trichogramma cacoeciae* & *Typhlodromus pyri*. Each guideline includes details on the treatments, procedures, conditions, biological observations, validity criteria, data analysis, reporting, information on the test organism, data on natural mortality, reproduction as well as results on the effects of toxic reference compounds.

Information on the working group can also be seen in the proceedings of the group meetings. Proceedings in IOBC/WPRS Bulletins were edited after the meetings in: Versailles (France) by VOGT & HEIMBACH (2000), Castelló de la Plana (Spain) by VOGT, VINUELA & JACAS (2001), San Michele Alt'Adige, Trento (Italy) by VOGT & HEIMBACH (2002) and Avignon (France) by VOGT, HEIMBACH & VINUELA (2003), Ponte de Lima (Portugal) by VOGT (2004) and Dębe (Poland) by VOGT & BROWN (2006), respectively. These Bulletins include papers on the methodology and validation of test methods for different beneficial arthropods from laboratory to field with experimental results.

⁴ Organisation for Economic Co-operation and Development

In addition, and in cooperation with the commission on IP guidelines & endorsement, the working group brought out the IOBC/WPRS database www.iobc.ch to the internet.

Table 2. Localities of meetings in the past 28 years

Convenor	Year	Town	Country
J. Franz	1974	Zürich	Switzerland
	1975	Colmar	France
	1976	Darmstadt	Germany
	1978	Brussels	Belgium
S. Hassan	1979	Vienna	Austria
	1980	Wageningen	The Netherlands
	1981	Sint Truiden	Belgium
	1982	Copenhagen	Denmark
	1984	Zürich	Switzerland
	1985	Darmstadt	Germany
	1986	Amsterdam	The Netherlands
	1987	München	Germany
	1988	Balatonalmadi	Hungary
	1989	Antibes	France
	1990	Pforzheim	Germany
	1991	Southhampton	United Kingdom
	1992	Gent	Belgium
	1993	Wien	Austria
	1994	Sierre	Switzerland
	1995	Amsterdam	The Netherlands
1996	Cardiff	United Kingdom	
1997	Tunis	Africa	
H. Vogt	1998	Braunschweig	Germany
	1999	Versailles	France
	2000	Castelló de la Plana	Spain
	2001	Trento	Italy
	2002	Avignon	France
	2003	Ponte de Lima	Portugal
	2005	Debe, Warsaw	Poland

Joint testing of pesticides

Joint pesticide testing programs were organized to support the development of standard test methods and to provide information on the selectivity of pesticides. Selected chemicals were tested on different natural enemies by various laboratories using methods based on standard principles. An international net of laboratories conducted tests in 13 countries. Testing within these joint programs provided valuable information to users of integrated control and gave the testing members opportunity to improve their techniques and develop better testing

guidelines. Joint testing programs, each including 20 chemicals, were organized every two years since 1977. The chemicals were selected by the members. BLAISINGER (1977-1991), STERK (1992-1996) and SCHIRRA (1997-2002), respectively ordered and distributed them to the testing laboratories. All the pesticides included in these programs were registered in at least one WPRS member country. For example, the 20 pesticides in the 6th joint testing program were tested on 22 beneficial organisms in the laboratory (7 parasites, 3 predatory mites, 1 spider, 8 predatory insects, 3 fungi), 7 under semi-field conditions (5 initial toxicity, 3 persistence) and 4 in the field. The results of these tests were published in multi-author papers in international journals and were cited by registration authorities and biological control companies in many countries. The publications by FRANZ et al. (1980), HASSAN et al. (1983, 1987, 1988, 1991 and 1994) and STERK et al. (1999) involved 7, 14, 21, 20, 22 and 32 authors, respectively. Of the 124 pesticides tested to this point, at least 35 compounds were found to be relatively harmless to the natural enemies tested. Comparisons of laboratory, semi-field and field results were published in an IOBC/WPRS Bulletin (VOGT, 1994; 26 authors).

Achievements

Standard guidelines developed by the Working Group “Pesticides and Beneficial Organisms” to test side effects of pesticides on natural enemies are now being used by the EU countries for the regulatory registration of pesticides. IOBC validated and ring tested methods are being used world-wide to assess the side effects of pesticides on natural enemies.

The results of testing the side-effects of about 140 pesticides on 20 beneficial organisms within the Joint Pesticide Testing Programmes were essential for the establishment of integrated control programs around the world. They have helped to enhance biological control schemes which are now being recommended by extension services and companies in a large number of countries.

All side effect results of the WG's Joint Pesticide Testing Programs were compiled and are available on internet <http://www.iobc.ch/news.html> (IOBC Toolbox: Selectivity of pesticides). Standard methodology, data on the selectivity of pesticides, relevance to integrated control in different crops, rearing methods for beneficial arthropods, comparison of results from laboratory, semi-field and field experiments were published in international journals, IOBC/WPRS Bulletins and in the EPPO Bulletin.

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III.16 Working Group Use of Pheromones and Other Semiochemicals in Integrated Control (1975 – present)

Albert K. Minks, Heinrich Arn and Peter Witzgall

Aim

Development and promotion of the use of pheromones and other semiochemicals for monitoring and detection, and for environmentally safe control of harmful insects

Introduction

How did it all start? The idea to create a working group on pheromones was born at a meeting of another IOBC/WPRS Working Group, held at Wädenswil (Switzerland) in November 1973. The programme dealt with IPM in fruit orchards and at least one third of the contributions was devoted to pheromones. Pheromone researchers assembled at this meeting realized the great significance of their field and decided to found ‘their own’ group. So, after approval of the IOBC/WPRS Council the Working Group ‘Use of Pheromones in Integrated Control’, later renamed as ‘Use of Pheromones and Other Semiochemicals in Integrated Control’ was established. Its first meeting was held in 1975 at Wageningen (The Netherlands) with 32 participants from eight different countries.

Since then the Working Group has met at 19 other occasions, including the 25th anniversary meeting at Samos (Greece) in September 2000 (Table 1). The group has served as an important forum for basic and applied research. Pheromone research is typically multidisciplinary. To make quick progress towards practical applications it is essential to bring together colleagues from academic and governmental research institutions, from plant protection industry and extension services, who have knowledge of insect behaviour and sensory physiology, of chemistry and formulation technology, and of applied entomology and integrated pest management. The Working Group meetings appeared to be very successful and were often attended by more than 100 participants. Not only European specialists found the meetings useful, but also colleagues from outside the WPRS-region, such as the USA, Canada, Australia and Japan were among the regular participants.

Summary of Activities

Table 1 presents a short summary of the Working Group activities under the guidance of three convenors, Albert Minks (The Netherlands), Heinrich Arn (Switzerland) and Peter Witzgall (Sweden), successively. Throughout the years, two major areas were prominent on the agenda: (1) The use of pheromone and attractant traps for detection and monitoring; (2) the use of pheromones for mating disruption or ‘attract-and-kill’ to control insect pests.

At present, pheromone-baited monitoring traps are available for virtually all insects of economic importance. Pheromone-based population control is used against ca. 20 species important in horticulture, agriculture and forestry on ca. 1.000.000 ha. A great advantage of pheromones is that they are species-specific, besides being non-toxic: only the behaviour of the target organism is being manipulated, while all other animals, including beneficial insects, are not affected.

Earlier, most research focused on moths, as this group contains many economically important species. In addition, lepidopteran pheromones turned out to be relatively easy to identify and the compounds were suitable chemicals for application in agricultural practice. Techniques and know-how have evolved through the years, and current research concerns mostly insects from other groups such as Coleoptera, Diptera and Heteroptera.

Detection and Monitoring

Since more than 30 years, pheromone traps are widely used for detection and monitoring. Lures in combination with sticky traps are easy and inexpensive tools to detect harmful insects. They often play a crucial role in spring phenology by catching the first emerging insects and to follow flight periods throughout the season. This information is used to time insecticide sprays. Pheromone traps are very effective, particularly at low populations, when other sampling techniques cannot be applied. This includes area-wide programs for detection of quarantine species.

Table 1. Meetings of the IOBC/WPRS Working Group on pheromones and other semiochemicals since 1975 (updated from Minks, 2002)

* = IOBC/WPRS Bulletins of these meetings available.

Convenor: <i>Albert Minks (1975-1985)</i>			
Wageningen	NL	1975	Introductory meeting, various topics
Harpenden	UK	1977	Chemistry and biological activity
Wädenswil	CH	1979	Fundamental and applied aspects
Nyon	CH	1982	Mating disruption in fruit and grapes
Hamburg	D	1984	Pheromone and attractant chemistry
Balatonalmádi	H	1984	Joint meeting with the EPRS Working Group
Convenor: <i>Heinrich Arn (1985-1995)</i>			
Neustadt/Weinstrasse *	D	1986	Mating disruption in grapes, behaviour
Avignon *	F	1988	Insect monitoring and attractants
Granada	E	1990	Pheromones in Mediterranean pest management
San Michele all'Adige	I	1992	Mating disruption
*	UK	1993	Basic and applied aspects
Chatham *	CH	1994	Use of mating disruption in practice
St. Peters Insel			
Convenor: <i>Peter Witzgall: (since 1995)</i>			
Montpellier *	F	1996	Technology transfer in mating disruption
Budapest	H	1997	Pheromone lures for detection and monitoring
Dachau *	D	1998	Scents in orchards
Hohenheim *	D	1999	Pheromones and other biological techniques
Samos *	GR	2000	Pheromones and other biological techniques in
Sicily	I	2002	IPM
Baselga di Pine *	I	2004	Chemical ecology
			As mating disruption gains ground

More information from trapping data can be obtained by correlating trap captures with absolute data sets, such as egg or larval counts, or infestation rates. Once such a relationship

has been determined, it is possible to use trapping data for quantitative monitoring of population densities or to forecast the degree of damage. Trapping data can thus be used to decide whether insecticide sprays are necessary.

Members of the Working Group, including leading European pheromone chemists, have made a tremendous effort in the development of these monitoring tools. An important element in this has been the Working Group mediating exchange and interaction between public and private sector. This collaboration between chemists and biologists from universities, government organizations and commercial companies has been necessary to ensure rapid dissemination of new results. Consequently, pheromone trapping is now well established and very widely used.

Nowadays, pheromone traps are available for virtually all economically important lepidopteran species (see 'The Pherolist'). The Working Group plays a stimulating role in the ongoing effort to ensure the availability of reliable lures. Pheromone lures are marketed by many companies, but not all products undergo sufficient quality control, according to regular complaints from the clients. Main problems are a varying degree of chemical purity of the starting materials as well as inadvertent changes in the dispenser components, lure composition and dose from year to year. Chemists and entomologists collaborate in establishing standards for the chemical composition and behavioural activity of lures, and in assuring their availability. Current development concerns lures for non-lepidopteran insects, and lures based on plant volatiles which attract egg-laying females. The economic importance of this work is ever increasing.

Mating disruption

Insects use minute amounts of sex pheromones to communicate for mating. Olfactory communication and mating can be prevented by permeating the atmosphere over a crop with synthetic pheromones. Slow-release formulations are an absolutely essential ingredient for the practical use of pheromones in mating disruption. They are to ensure long-term release of the highly volatile pheromone compounds and to provide in-field stabilisation of pheromone remaining in the formulation. Inexpensive, large-scale synthesis is required for cost-effective products which are to compete with cheap and well-established insecticide products.

The most widely used commercial formulations are designed for hand application by clipping, hanging or twisting them around stems or branches of the crop. They include: polyethylene ropes (sealed tubes containing pheromone that diffuses through the tube wall), hollow fibres, rubber septa or PVC beads impregnated with pheromone. An everlasting challenge which has been approached by many companies over three decades is a sprayable formulation. It is yet too early to tell whether the latest products are efficient enough and commercially viable.

It is important to note that cost-effective commercial products became available only during the late eighties and early nineties. The surfaces treated against the key European orchard and vineyard pests have been increasing ever since, fuelled by severe problems with insecticide resistance and deregulation of the most toxic compounds. Implementation of mating disruption has been most successful in the orchards and vineyards of Northern Italy and Switzerland, and in German vineyards. However, pioneering efforts have been made in many other European countries, including The Netherlands. Today, applications increase all over, also in the new EU countries.

Crop protection and chemical industries have obviously made a major contribution to the development of the mating disruption technique. The ‘cross-talk’ between representatives of these industries and academic researchers has been particularly productive and has helped members of the Working Group to shape goal-oriented application-relevant research. Our meetings have thus become increasingly attractive for international participants, owing also to the fact that pheromone industries operate on a world-wide basis. The Working Group has nonetheless always kept an emphasis on research done by WPRS participants.

Mating disruption is a most successful use of insect pheromones and has often appeared to be the right solution when pests have become resistant to conventional pesticides. While mating disruption can be very effective, it is still unclear how exactly it works. Potential behavioural mechanisms include: a) sensory overload, including peripheral sensory adaptation or habituation of the nervous system; b) false-trail following, i.e. competitive attraction to plumes of natural and synthetic pheromone; c) camouflage or “masking” of the female signal by synthetic pheromone and d) the effects of pheromone antagonists and mimics. Once these mechanisms and their combined effect are better understood it might be possible to explain why some formulations are successful while others are not, and why results vary between places and years. Therefore, we want to make a strong plea to strengthen rather than to neglect fundamental research in this area. In particular we welcome the recent efforts to measure airborne pheromone concentrations in the field, and the study of pheromone-mediated behaviour in the field.

Attract-and-Kill

The idea of ‘attract-and-kill’ (also called ‘lure-and-kill’ or ‘attracticide’) is to reduce the population by attracting insects and to then kill the responders. The attractant source is either a pheromone or a kairomone, for example plant volatile compounds which attract egg-laying females. The insects are attracted to the source where they pick up a lethal dose of pesticide, usually a pyrethroid, or an insect pathogen. Here again, the method is species-specific since only the target insect is attracted, while beneficial insects are saved. The insecticide is applied in point sources and does not contaminate the crop, and the overall amount used is greatly reduced compared to a regular insecticide spray.

The effectiveness of ‘attract-and-kill’ depends on several factors such as which sex is attracted, the proportions of the population that can be attracted and eliminated, the mating system of the pest, their dispersal patterns, and their fecundity. If the lure attracts only males, which is the case with lepidopteran pheromones, a very high percentage of the male population must be caught, because the remaining males can mate with several females. Kairomone lures attracting males and females must be powerful enough to attract insects from a distance.

As with mating disruption, the formulation appears to be the key factor for successful application of the ‘attract-and-kill’ technique. In the early nineties, two commercial products were introduced in Europe: both are viscous pastes, containing codling moth pheromone as the attractive ingredient and permethrin, respectively cyfluthrin as the killing agent. Since then promising results have been reported from a series of field trials, but so far breakthrough has not been achieved.

The Pherolist

By the mid-eighties, almost 700 lepidopteran pheromones had been identified. Heinrich Arn and colleagues took the initiative to collect and classify these compounds in a database. They published the first edition in 1986 as an IOBC/WPRS Brochure entitled: "List of Sex Pheromones of Lepidoptera and Related Attractants" This was followed by a 2e edition in 1992 and a digital version in 1995, called "The Pherolist", which is available at www-pherolist.slu.se. An update is planned, including pheromones of other insect orders.

Registration of pheromones

Registration of pheromone products for insect control has been a major hurdle. In the early years, pheromones were classified as pesticides. Later on, registration officers became more flexible, but it still took much effort and money to fulfil their demands. An extra problem is that the specificity of pheromones, which is their strength for minimal ecological impact, is an important financial disadvantage since each species has its own pheromone. The relationship between marketing prospects and registration costs is therefore unfavourable.

There have been attempts to facilitate registration procedure in the EU, but products still need to be registered in each member country. It is also quite unclear whether the registration of pheromones will benefit from a harmonized EU procedure. 'Group'-registration of pheromones with related chemical structures should become possible, thus improving their marketing potential.

Conclusion and outlook

Detection and monitoring with pheromones is widely used since the mid-seventies, and insect control by pheromone-mediated mating disruption has become an established method. The importance of pheromones is increasing since conventional insecticides are being deregulated and fewer compounds are available to the growers.

Successful control applications relate today mainly to lepidopteran insects, and a current challenge is to explore semiochemicals from other insect orders and to design novel techniques for their practical use. Identification of ovipositional cues for manipulation of egg-laying females is part of this ongoing effort to extend the database of behaviour-modifying chemicals. The application of pheromones concerns mainly horticultural crops in Europe, and is expected to grow in storage facilities and households, forests and agricultural crops. Semiochemicals are ideal tools also for monitoring and control of invasive species, as well as the management of blood-feeding arthropods, which further contributes to the significance of our field.

A most exciting aspect of our research is that the results can be immediately brought to practical application. This is an increasingly important issue in our efforts to motivate and to finance our work, and to illustrate its impact in public newsmedia. The goal of the Working Group to "stimulate further developments by enhancing communication and collaboration between the academic circuit, extension services and plant protection industry" continues to be relevant and timely.

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III.17 Working Group Breeding for plant resistance to pests and diseases (1976 - present)

Ernst F. Boller, based on information from the IOBC archive

Key data

Year	Name of Working Group (Convenor)	Important events, spin-offs or mergers
1976	Breeding for Resistance to Insects and Mites (O. M.B. de Ponti/NL)	1 st joint EUCARPIA ¹ /IOBC-WPRS meeting, Wageningen
1980		2nd joint EUCARPIA/IOBC-WPRS meeting, Canterbury (Maidstone, UK),
1981	(P.R. Ellis/UK)	
1983		3rd joint EUCARPIA/IOBC-WPRS meeting, Capbreton (France),
1986		4 th joint EUCARPIA/IOBC-WPRS meeting, Hundesyted (Denmark),
1989		5 th joint EUCARPIA/IOBC-WPRS meeting, Marcelin (Switzerland),
1992		6 th joint EUCARPIA/IOBC-WPRS meeting, Coventry (UK),
1995		7 th Meeting at Arnhem (The Netherlands)
1998	(A. Birch/UK)	8 th Meeting at Dundee (Scotland)
2001	Breeding for Resistance to Pests and Diseases	9 th Meeting Rostanga (Sweden)
2004		10 th Meeting Bialowieza (Poland)

1) European Association of Plant Breeders

Selected publications:

Anonymous, 1976. Proceedings of the 1st joint EUCARPIA/IOBC-WPRS meeting of the Working Group “Breeding for Resistance to Insects and Mites”, Wageningen (The Netherlands), 7-9 December 1976. IOBC/WPRS Bulletin 1977/3, 165 pp.

Anonymous 1981. Proceedings of the 2nd joint EUCARPIA/IOBC-WPRS meeting of the Working Group “Breeding for Resistance to Insects and Mites”, Canterbury (Maidstone, UK), 9-11 April 1980. IOBC/WPRS Bulletin 1981/IV/1, 156 pp.

Anonymous 1984. Proceedings of the 3rd joint EUCARPIA/IOBC-WPRS meeting of the Working Group “Breeding for Resistance to Insects and Mites”, Capbreton (France), 6-9 April 1983. IOBC/WPRS Bulletin 1984/VII/5, 388 pp.

Anonymous 1988. Report of the 4th joint EUCARPIA/IOBC-WPRS meeting of the Working Group “Breeding for Resistance to Insects and Mites”, Hundested (Denmark), 23-25 September 1986. IOBC/WPRS Bulletin 1988/XI/3, 103 pp.

Birch, N. E. (ed.) 2004. Proceedings of the Meeting “Breeding for Resistance to Insects and Mites” at Rostanga (Sweden), 8-12 December 2001. IOBC/WPRS Bulletin Vol 27 (7), 58 pp.

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III.18 Working Group Use of Models in Integrated Crop Protection (1977-1990)

David Royle

Introduction

This Group arose out of discussions at a joint EPPO/IOBC conference on “Systems Modelling in Modern Crop Protection”, held in Paris in 1976. At a time of uncertainty about the role of mathematical modelling in the practice of crop protection, the Group was established at a first meeting in Giessen, Germany in 1977. The meeting was attended by 17 participants representing entomology, plant pathology, plant protection, mathematics and physics, a multidisciplinary mix which was extended later to include agronomy, weed science and computer specialisms. Eleven countries were eventually represented within the Group. Its objective was to explore the nature and development of models, to evaluate their use in crop protection and to make recommendations as to their future role as part of integrated crop protection strategies. The Models Group was therefore a “horizontal” group within IOBC/WPRS and was seen function as a bridge between different “vertical” (commodity-based) groups and to be methodology-oriented. Ten meetings were held during the life of the Group, co-ordinated by 4 convenors:

1977-82	Jurgen Kranz
1982-86	Rudy Rabbinge
1986-90	Rudy Rabbinge and David Royle (joint convenors)

Three periods of activity

Period 1977-1983. The initial meeting in Giessen defined a scenario in which the use of models should relate to agro-ecosystems and attention was primarily directed at resolving problems of definition (what kinds of model?) and purpose, (why model?). The contribution to crop protection of both complex simulation models, (e.g. EPIDEM, EPIVEN) and simple statistical statements, (e.g. regression equations) was recognised to explain mechanisms and for pest and disease management, respectively. In compiling an analytical inventory of crop protection models for the Group, Jeger & Tamsett (1983) concluded that “...*few models are being developed to practical ends in crop protection. Those which have found use are for forecasting...and mainly based on regression equations...which have a good deal of biological sense... There are few examples ...of comprehensive explanatory models that are developed, evaluated and simplified to some practical form*”.

Between 1981-83 a project to analyse European epidemics of *Septoria* in wheat crops was carried out within the Group. Standardised biological data were matched with meteorological information from a wide range of sites in five countries. The results gave new insights into the ways in which epidemics develop and were published by Royle et al. (1986) and Shaw & Royle (1987).

This first period was characterised by mutual instruction, training courses in modelling, (at the Agricultural University, Wageningen), an active exchange of ideas and a growing awareness of the complexities involved in putting models into agricultural practice. Conclusions from the first period were published in an IOBC/WPRS Bulletin (Jeger, 1983).

Period 1983-1987. A more pragmatic view was adopted. Implementation of supervised pest and disease control systems based on models was addressed and test cases in a number of crops examined in depth. Ways were considered in which models were being applied to monitoring, forecasting, (including population dynamic studies of predator-prey interactions), damage relations, and in putting decision aids into practice. The use of simplified models for practical use was emphasised and notable examples of successful use were recorded. A great deal of attention was given to evaluating the success in the Netherlands and elsewhere of EPIPPE, a Dutch supervised pest and disease control system. Its performance for rationalised control of pests and diseases in wheat was compared in different countries represented in the Working Group. Recognition was also given to more sophisticated simulation modelling of pest population dynamics and crop/pathogen interactions. This second period ended with a further Bulletin (Royle et. al., 1988).

Period 1987-1990. Focus continued to be given to modelling applied to forecasting, crop damage relations and implementation whilst recognising that better economic damage levels were urgently needed. It was also clear that progress in applying models successfully to advance integrated control practices was still slow. Even though particular successes could be identified, many attempts at practical use still failed. The Group listed the vital elements required for implementation, notably adequate sampling and monitoring techniques, reliable forecasts, accurate yield:loss estimates and good cost: benefit analysis, not all of which are available for every crop/pest system. It also acknowledged the need for modest expectations of modelling and for developing models adequately evaluating their use in real crop systems.

At the final meeting of the Group in Toulouse in 1988 it became clear that the interests of participants had become polarised loosely into two sub-groups, one primarily interested in the construction of explanatory models and the other more in the evaluation of the practicability of models to meet modern concerns for better crop protection. Further, universal objectives for the future of the Group as it stood could no longer be found. It was, therefore, judged appropriate to recommend to IOBC/WPRS Council that the Group had more than achieved its original aims and that it was time for it to cease in its present form.

Conclusions

The Models Group achieved a great deal in its 12 years of existence. It was very successful in providing a regular forum for mutual contact and scientific exchange. Interdisciplinary exchanges and contacts with the crop protection industry had ensured that modelling had been firmly considered within realistic pest and disease frameworks. The Group played a key role during a critical time when there was much debate globally about the conception and use of crop protection models and in modelling techniques. As a consequence, the Group was recognised to be an expert guiding influence in this field. Regretfully, even though some members of the Group were also active in other IOBC/WPRS crop-oriented working groups, difficulties nevertheless persisted in establishing working links with these groups.

As has been demonstrated since 1990, modelling retains its important role in research on biological and integrated control. There have been some major new initiatives in decision-support systems based on modern communication technology and, looking back now in 2006, it seems entirely appropriate that we chose to recommend to Council in 1990 that new directions and objectives related to models and decision-support should in future be incorporated within the IOBC/WPRS framework of working/study groups. Apart from a

short-lived study group, convened by Dr W Rossing, no subsequent working group appears to have been proposed.

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III. 19 Working Group Integrated Control in Oilseed Crops (1979 - present)

Birger Koopmann, Sam M. Cook, Ingrid H. Williams & Volker H. Paul

Introduction

The history of the working group 'Integrated Control in Oilseed Crops' (ICOC) goes back to the seventies of the last century. In 1979, a study group split away from the working group '*Integrated Control in Brassicas*', led by Tom Coaker, which focussed mainly on the cabbage root fly (*Delia radicum*). Bent Bromand, a Danish entomologist (Danish Research Centre for Plant Protection), tried together with his Swedish colleague, Christer Nilsson (Swedish University of Agriculture), to establish a separate working group on '*Integrated Control in Oilseed Rape*'. This working group was founded in 1982. In the meantime (1979-1982), it had the status of a study group. Both study and working group were led by Bent Bromand. During 1979-1988, Bent Bromand organised four workshops of the group (Table 1). He resigned his convenorship in 1988 and was followed by Volker Paul (University of Paderborn, Germany). The new convenor Volker Paul was in held his position between 1988 and 2003. He was assisted by Ingrid Williams (Rothamsted Research, United Kingdom), who led the entomology subgroup, which was established during this time. Ingrid Williams and Volker Paul organised twelve group/subgroup meetings within this time period (Table 1). In 1990, the group decided to expand its activities from oilseed rape to other oilseed crops and to change its title to the '*Working Group on Integrated Control in Oilseed Crops*'. During 1988-2003 Volker Paul and Ingrid Williams edited seven IOBC/WPRS Bulletins together with assisting colleagues. They resigned their convenorships in 2003 (Volker Paul) and 2004 (Ingrid Williams), respectively. They were followed by Birger Koopmann (University of Göttingen, Germany) and Samantha Cook (Rothamsted Research, United Kingdom), elected in 2003 and 2004, respectively. During this time, two workshops were organised. One IOBC/WPRS Bulletin was published and another summarising the most recent meeting is in preparation.

Working group aims

The working group was established to encourage and coordinate research on integrated disease and pest management systems in oilseed production. Through its regular meetings, it is also intended to serve as a platform to gather and exchange fundamental knowledge and expertise on diseases and pests. Major areas of focus for the group have been:

- Occurrence and distribution of diseases and pests (monitoring work)
- Integrated pest and disease management
- Establishment of damage thresholds
- Development of decision support systems
- Disease resistance
- Use of trap crops for pest control
- Biology of pest and beneficial insects
- Biological control (predators, parasitoids and antagonists)
- Seed pathology in oilseed crops
- Gene technology in oilseed crops – significance, economics and environment

Recently, the group has encouraged participation of Central European scientists at its meetings. This was initiated by organising meetings in Poznan (1997, 2005) and Prague (1999). The success of this integration is documented by the high proportion of Central European colleagues who attended the last WG-ICOC meeting. From a total number of 76 who attended, 55% were from central European countries, including Belarus, Czech Republic, Estonia and Poland. Scientists from these countries are now attending our meetings regularly and are actively contributing to our discussions and collaborative projects.

Table 1. Overview of WG meetings

Year	Location	Country	Convenor/s*	Remarks
1982	Paris	France	BB	Status: Study Group
1984	Copenhagen	Denmark	BB	Status: Working Group, WG name: Integrated Control in Oilseed Rape
1986	Braunschweig	Germany	BB	
1988	Malmö	Sweden	BB	
1990	Harpden	United Kingdom		Change of WG name to <i>Integrated Control in Oilseed Crops</i>
1991	Braunschweig	Germany	VP, IW	Pathology (P) & Entomology (E) subgroup meetings
1992	Le Rheu	France	VP, IW	P & E subgroup meetings
1993	Cambridge	United Kingdom	VP, IW	P & E subgroup meetings
1993	Paderborn	Germany	VP, IW	P & E subgroup meetings
1994	Zürich	Switzerland	VP, IW	P & E subgroup meetings
1995	Cambridge	United Kingdom	VP, IW	P & E subgroup meetings <i>Informal meeting and contact meeting with non-IOBC/WPRS members at the 9th International Rapeseed Congress of the GCIRC</i>
1995	Paderborn	Germany	VP, IW	P & E subgroup meetings
1997	Poznań	Poland	VP, IW	P & E subgroup meetings
1999	Prague	Czech Republic	VP, IW	P & E subgroup meetings
2001	Soest	Germany	VP, IW	P & E subgroup meetings
2003	Copenhagen	Denmark	VP, IW	P & E subgroup meetings <i>Informal meeting and contact meeting with non-IOBC/WPRS members at the 13th International Rapeseed Congress of the GCIRC</i>
2004	Harpden	United Kingdom	BK, IW	P & E subgroup meetings
2005	Poznań	Poland	BK, SC	P & E subgroup meetings <i>Supported by the EU project PAGEN</i>

* Convenor abbreviations: BB-Bent Bromand, BK-Birger Koopmann, IW-Ingrid Williams, SC-Samantha Cook, VP-Volker Paul

Achievements and publications

The emphasis of the working group has always been the networking of scientists working towards improved integrated pest and disease management of oilseeds, particularly the oilseed rape crop. Collaborative field experiments have been conducted on specific questions and joint projects established. Among these are included four large international projects funded

by the European Union. These projects were conceived, are coordinated and executed mainly by members of the working group. These EU-Projects are:

- BORIS
- IMASCOPE
- MASTER (<http://www.rothamsted.bbsrc.ac.uk/pie/master/master.htm>)
- SECURE (<http://www.secure.rothamsted.ac.uk/>)

Further information about the projects can be found on their respective websites.

In 2004, we decided to establish a Working Group webpage, which is intended to announce meetings, meeting contributions, reports of past meetings and news. Information is available under: <http://wwwuser.gwdg.de/~instphyt/app/koopmann/eng-dateien/iobc2004-bulletin.htm>.

Papers presented at Working Group meetings are published in the IOBC/WPRS Bulletin series. Altogether, the group has published 8 Bulletins comprising a total number of 2277 pages. A further Bulletin is in preparation (Table 2). Also, a book was published in 2003 as a result of information gathered as part of the EU-funded BORIS Concerted Action. This was entitled: *Biocontrol of oilseed rape pests* edited by DV Alford, Oxford, UK: Blackwell Publishing. 355 pp.

Table 2. Overview of IOBC Bulletins published by the WG

Publication	Year	Number of pages
IOBC/WPRS Bulletin Vol. 13 (04)	1990	308 pp
IOBC/WPRS Bulletin Vol. 14 (06)	1991	308 pp
IOBC/WPRS Bulletin Vol. 16 (09)	1993	234 pp
IOBC/WPRS Bulletin Vol. 18 (04)	1995	133 pp
IOBC/WPRS Bulletin Vol. 21 (05)	1998	239 pp
IOBC/WPRS Bulletin Vol. 23 (06)	2000	211 pp
IOBC/WPRS Bulletin Vol. 25 (02)	2002	151 pp
IOBC/WPRS Bulletin Vol. 27 (10)	2004	302 pp
IOBC/WPRS Bulletin Vol. 29 (<i>in print</i>)	2006	391 pp.

Future

We have our next meeting in France, which will be organised by CETIOM colleagues in 2007/2008. We also look forward to developing new work programmes and strengthening links between the pathology and entomology sub groups in the future. One step in this direction may result from a potential case study in oilseed rape under the new European Network of Excellence 'ENDURE' (European Network for the DURable Exploitation of crop protection strategies) which involves institute partners of several members of this working group.

III.20 Working Group Management of Farming systems (1981 - 2001)

Frank Wijnands

Origin of the working group

The history of the Working Group (WG) 'Farming Systems' goes back to the seventies of the last century. In the late seventies it became evident, at least in the orchard WG of the IOBC (meeting 1976, publication Steiner 1977), that it is irrational and ineffective to consider crop protection isolated from all other major farming system components such as crop rotation, cultivar choice, soil cultivation and fertilisation. So a more integral approach was advocated to design integrated farming systems (IFS) with a maximum of "resistance" to pests and diseases. The concepts of this farming systems approach were elaborated by Steiner and his colleagues for orchards. End of the seventies two farming systems experiments started in Europe that adopted this view. The Lautenbach project in the South of Germany and the Development Farming Systems experiment (DFS) in Nagele, the Netherlands, both dealing with arable farming systems. The first project was run on a commercial farm developing IFS while comparing it with a reference conventional system (CFS). On the Nagele experimental farm three systems were run: IFS, CFS and an organic mixed system.

In 1981 a small group of interested persons came together in a preliminary IOBC meeting in Wageningen to examine the full potential of this approach for arable farming (Table 1). They recommended starting an IOBC study group (SG) on this topic. The IOBC Council agreed and from 1982 on this SG worked under the temporary convenorship of Clive Edwards (members: Hans Steiner, Michael Way, Andre Fougeroux and Pieter Vereijken). They published in 1986 the IOBC Bulletin "*farming systems for integrated control*", which emphasised the necessity to involve the whole farming system in designing effective crop protection strategies and defined integrated farming in terms of ecosystem-stability with a minimum input and dependence on external, often polluting, resources.

IOBC decided in 1986 to transform the SG into a WG. The first convenor was Pieter Vereijken. Over the years to follow the group attracted more and more international attention, mainly through the two large scale farming systems experiments in Lautenbach (now run by Adel El Titi) and Nagele. The concept Integrated Production, Integrated Agriculture developed into an integral concept towards sustainable farming next to the organic farming vision on sustainability. The study group started meeting annually which would last until 1999 (see Table 1). Its objective has always been to offer a platform to support, stimulate and coordinate research on Integrated and later also Organic Farming Systems. In order to encourage an effectively functioning group, in general the attendance to the meetings was limited to those who were actively involved in research to IFS, preferably in designing or coordinating roles.

Period 1986-1993

In this period the WG grew to a membership of some 11 European countries (NL, CH, UK, BRD, I, AU, DK, F, PL, N, S) reflecting the interest in the concept Integrated Farming Systems as an answer to the ever increasing and deepening agricultural crisis in Europe. Yearly one of the members' experiments was visited and thoroughly evaluated, while the other group members presented their progress. The meetings were completed with in depth

discussions on some specific themes, often on the basis of the input of external, local, experts. The meetings took place at Long Ashton Research Station (UK), Lautenbach (BRD), Research Centre Foulum (DK), Seeland (CH), and Gottingen (BRD). In 1989 the IOBC Bulletin “*Current status of integrated farming systems research in western Europe*” was published. The extent of the research efforts varied from ongoing, fairly large research programmes to groups that were in the design phase of their experiments.

Table 1. Overview of /WG Meetings

Year	Location	Country	Convenor/s*	Remarks
1981	Wageningen	Netherlands		Preliminary Study Group
1982	Lautenbach	Germany	CE	Study group (SG) meeting
1983	Nagele	Netherlands	CE	SG meeting
1985	Cambridge	United Kingdom	PV	SG meeting
1987	Bristol	United Kingdom	PV	WG meeting: Long Ashton Research Station. LIFE project
1988	Lautenbach	Germany	PV	WG meeting: Lautenbacher Hof
1989	Viborg	Denmark	PV	WG meeting: Research Centrum Foulum
1990	Seeland	Switzerland	PV	WG meeting: The third way project
1991	Boigneville	France	PV	WG meeting: ITCF
1992	Gottingen	Germany	PV	WG meeting: Intex project
1993	Wageningen	Netherlands	PV	EU concerted action 1
1994	Wageningen	Netherlands	PV	EU concerted action 2: Nagele project
1995	Bristol	United Kingdom	PV	EU concerted action 3: Long Ashton Research Station
1996	Heilbron	Germany	PV	EU concerted action 4: AKIL project
1997	Louvain la Neuve	Belgium	PV	WG meeting
1998	Esbjerg	Denmark	PV, FW	WG meeting
1999	Valencia	Spain	FW	WG meeting
2001	Amsterdam	Netherlands	FW	Workshop Vegineco

* Convenor abbreviations: CE-Clive Edwards, PV-Pieter Vereijken, FW-Frank Wijnands

The EU concerted action period 1993-1996

In 1991-1992 the EU challenged the convenor of this WG to expand the effort to initiate and coordinate research into Integrated and Organic Farming Systems in Europe. This resulted in a 4 year European Union Concerted Action proposal (EU funded) that was accepted in Brussels and launched in 1993. Main objective was to elaborate the methodology of designing, testing, improving and disseminating Integrated and Ecological Farming Systems for arable farming interactively with the different research groups.

The first meeting took place in Wageningen, The Netherlands. Research groups participated from 11 EU countries and 5 non EU members (CH, P, No, S, FIN). Over the next 4 years, attendance varied, however the interest from Eastern Europe grew. The methodology was called prototyping and can be characterised as a synthesising research/development effort starting off with a profile of demands (objectives) in agronomic, environmental and economic terms for a more sustainable farming and ending with tested, ready for use prototypes to be disseminated on a large scale. This in contrast to the common analytical research that starts with a problem or a question and generates, often through single-factorial research, knowledge. The results of the meetings were published in a series of reports documenting every aspect of the methodology and the state of the art of the participating research teams

(Vereijken, 1994, 1995, 1996 and 1998). In this period also substantial experience was gained with developing the prototype systems in co-operation with commercial farms: innovative pilot farms as a step towards the introduction of these systems in practice.

Final period 1996-2001

By 1996 the WG area focused on the development of more sustainable farming systems for arable crops and outdoor vegetables, as represented by two major production directions, Integrated and Organic. The group shared the concept of prototyping as developed in the former EU concerted action. Meetings took place in Louvain la Neuve (B) and Esbjerg (DK). In this meeting Pieter Vereijken ended his long, enduring effort as a convenor. Frank Wijnands was his successor.

In this period some EU projects were realised drawing upon the basis of the experiences in the WG, notably the research project that focussed on elements of the Integrated approach entitled; *'Development of innovative strategies & technologies in evolving low input farming systems that minimize environmental pollution and secure product quality'*, and the *Vegineco* project that realised farming systems research for as well integrated as organic farming systems in European vegetable growing areas (NL, CH, I, Sp). These projects were conceived, coordinated and executed mainly by members of the WG.

The next meeting in 1999 took place in Valencia. Focus was on vegetable growing systems (IVIA from Valencia participated in *Vegineco*) and the further elaboration of the methodology. Participation and interest was gradually diminishing since the concerted action was ended. Partly this can be attributed to the life cycle of the first wave of projects, that already started in the eighties. Most of these, often additionally financed, projects were ended without being followed up or the approach becoming an integral part of the research strategies of the involved organisations. The 'system-oriented' way of thinking, however found some solid ground in most countries. The WG asked the convenor to apply for an EU concerted action again. A programme was elaborated with the focus on the final step: the introduction of feasible more sustainable farming systems in practice. However the effort was not successful. The interest in future meetings was decreasing rapidly pushing the group into a dormant status. The closing workshop of the *Vegineco* project in Amsterdam in 2001 became the last meeting, discussing on the implications of Integrated farming Systems for the markets and the policy makers. The group was closed by IOBC in 2001.

Impact, evaluation and retrospective

The impact of the farming systems approach that emerged from the IOBC working groups of the seventies, can hardly be underestimated. This approach connected scientific research efforts to the economic and social reality of European farming. Integrated and organic farming systems can substantially contribute to a more sustainable agriculture, if all relevant problems are addressed in a comprehensive and integral way. During the years many research groups were member of the WG and worked with this farming systems approach.

Supported by the work of this WG Integrated farming Systems or Integrated production systems (see also Commission on IP Guidelines in Appendix 2) became an internationally acclaimed "trademark" of modern farming systems integrating methods and techniques at the farm level aiming at sustainable agro-ecology based production systems.

System research is complex, difficult and takes a long breath. This is one of the reasons for the limited contributions to scientific papers from the work of the group members. Nationally however the publications based on the research were numerous (practical implications).

System research continues, however the subject choice for new IOBC study groups evolves. As a sort of next step in the development, a new study group was formed in 2001: Landscape Management for Functional Biodiversity. This group attracts large attention.

Publications

In the nineties the efforts of the IOBC WG were mainly documented through the EU concerted action reports. Since the *Vegineco* project was, to our knowledge, the only intereuropean collaboration based on the prototyping methodology, their publications are included here.

IOBC WG

- Vereijken, P., Edwards, C., El Titi, A. , Fougeroux, A. , Way, M. (1986). Report of the study group 'Management of farming systems for integrated control'. *IOBC/WPRS Bulletin*, 1986/IX/2, 34 p.
- Vereijken, P. & Royle, D.J. (1989). Current status of integrated arable farming systems research in Western Europe, *IOBC/WPRS Bulletin* **1989/XII/5**.
- Hani, F. & Vereijken, P. (eds). 1990. The development of eco-system oriented farming *Schweizerische landwirtschaftliche forschung / La Recherche Agronomique en Suisse* 29(4): 436 pp.

EU concerted action

- Vereijken, P. (1995). 1. Designing prototypes. Progress reports of research network on integrated and ecological arable farming systems for EU- and associated countries (concerted action AIR3-CT927705). AB-DLO, Wageningen, 87 pp.
- Vereijken, P. (1995). 2. Designing and testing prototypes. Progress reports of research network on integrated and ecological arable farming systems for EU- and associated countries (concerted action AIR3-CT927705). AB-DLO, Wageningen, 76 pp.
- Vereijken, P. (1996). 3. Testing and improving prototypes. Progress reports of research network on integrated and ecological arable farming systems for EU- and associated countries (concerted action AIR3-CT927705). AB-DLO, Wageningen, 69 pp.
- Vereijken, P. (1998). 4. Improving and disseminating prototypes. Progress reports of research network on integrated and ecological arable farming systems for EU- and associated countries (concerted action AIR3-CT927705). AB-DLO, Wageningen, 55 pp.

Vegineco project

- Sukkel, W. & Garcia Diaz, A. (eds), (2002). Final report on the VEGINECO project. VEGINECO Project Report No. 1, 77 pp, PPO Lelystad. Netherlands. With the following contributions:
- de Haan, J.J. & García Díaz, A. (eds), (2002). Manual on prototyping methodology and multifunctional crop rotation. VEGINECO Project Report No. 2 . 83 pp. PPO Lelystad. Netherlands.
- de Haan, J.J. (ed.), (2002). Integrated and ecological nutrient management. VEGINECO Project Report No. 3, 58 pp., PPO Lelystad. Netherlands.
- Sukkel, W & Garcia Diaz, A. (eds), (2002). Integrated and ecological crop protection. VEGINECO Project Report No. 4, 91 pp. PPO Lelystad. Netherlands.
- Hopster, G. K. & Visser, A. J. (eds), (2002). Ecological infrastructure management. VEGINECO Project Report No. 5, 41 pp. 2002, PPO Lelystad. Netherlands.
- de Haan, J. J & García Diaz, A. (eds), (2002). Proceedings Vegineco-workshop 20-21 June 2001, Amsterdam. VEGINECO Project Report No. 6, 71 pp. PPO Lelystad. Netherlands.

III.21 Working Group Insect pathogens & insect-parasitic nematodes (1985 - present)

Jürg Huber

Key data of WG

Year	Name of Working Group	Convenor	Important events
1985	Insect pathogens & insect-parasitic nematodes	C.C. Payne	Status of Study Group
1988			Status of WG
1989		J. Huber	
1991		P. Smits	
1999		B. Papierok	
2005		R.U. Ehlers	

Introduction

The Working Group on Insect Pathogens and Insect-parasitic Nematodes was first established as a Study Group in summer 1985. Following discussions with the President, Michael Way, and with the other members of the Executive Committee of IOBC/WPRS, Chris C. Payne from the Glasshouse Crops Research Institute (later HRI), Littlehampton, convened a group of nine scientists from seven European countries to a meeting at the GCRI, 20 to 22 June, 1985. Since the Society of Invertebrate Pathology as a the world organisation for insect pathologists, being predominately US-based, had at that time most of its annual meetings in North-America, it was felt that there was a need for a forum for scientists in the field of insect pathology in Europe to meet regularly. The nine participants invited to attend the initial meeting, amongst them Katalin Deseö (Italy), Jacques Fargues (France), Jürg Huber (Germany), Guy Latteur (Belgium), Jerzy Lipa (Poland), Hugh Evans (Great Britain) and Peter Smits (The Netherlands), were selected as representing scientific expertise across the range of insect pathogens and nematodes, as well as reflecting both the geographic and agricultural diversity of the WPRS. The members of this steering committee felt strongly that there was a need for a co-ordinating group within WPRS to deal with insect pathogens and insect-parasitic nematodes and recommended that a Commission for Microbial Control should be established within the WPRS. Though the Executive Committee of IOBC/WPRS did not follow the recommendation, it recognised that there was a need for information exchange and collaborative research on pathogens and nematodes in a number of general areas which could not be dealt with adequately within the existing frame-work of IOBC/WPRS Working Groups and Commissions. Therefore, in 1988, it approved Working Group status of the group, Chris Payne serving as the first Convenor.

Overview of WG meetings

The first major scientific meeting organised by the group was held at the INRA Centre at Versailles, 2nd to 4th September, 1987. Local organiser was Jacques Fargues. The meeting focused on two main topics: (1) Biological control of weevils and (2) Environmental persistence of insect pathogens. A total of 69 scientists from 15 countries attended and presented more than thirty papers. At the end of the meeting, the delegates divided into three

discussion groups to identify areas where further work was needed and where there were possibilities for future collaborative research projects. The three discussion group topics were: (a) Insect-parasitic nematodes, (b) Insect-pathogenic fungi, (c) Foliar persistence of insect pathogens.

The second meeting of the WG was organised by Katalin Deseö from 6 to 8 March, 1989 in Rome. It was attended by 70 scientists from 13 different countries. Over 40 papers were presented, concentrating on the following themes: (1) Current status of microbial control in practice and the registration of insect pathogens and entomoparasitic nematodes (2) The future use of genetically manipulated or non-indigenous insect pathogens and entomoparasitic nematodes. Furthermore, there were round table discussions on the topics: (a) Microbial control of *Othiorhynchus spp.* and other soil pests, (b) Particular aspects of entomogenous nematodes, (c) Discussion on the applicative aspects of *Bacillus thuringiensis*, and (d) Environmental persistence of pathogens and nematodes.

In September 1989, Chris Payne handed over convenor-ship to Jürg Huber from the BBA-Institute for Biological Control, Darmstadt, Germany. Due to a commitment in the Executive Committee of IOBC/WPRS, he could serve only for two years and was succeeded in September 1991 by Peter Smits from the DLO-Research Institute for Plant Protection, Wageningen, The Netherlands. The latter had already been local organiser of the third bi-annual meeting of the WG, held 24 to 27 February, 1991 at Wageningen. The meeting was held in conjunction with a meeting of the EC COST Action 812 (Cold active lines of insect parasitic nematodes) and, with this, started a long tradition of joint meetings of the WG and many different COST Actions. The meeting had as major themes: (1) Diagnosis of insect diseases, with particular emphasis on neglected groups of micro-organisms and (2) "Behaviour" of insect pathogens in the environment, i.e. their persistence, ecology and epizootiology. Furthermore, in two parallel sessions, the insect mycologists and the colleagues working on insect-parasitic nematodes discussed their specific problems and, in order to be able to solve them better, organised themselves in two formal subgroups of the WG. They elected Bernard Papierok from the Institute Pasteur, France, as convenor of the Subgroup Fungi and Ralf-Udo Ehlers from the University Kiel, Germany, as convenor of the Subgroup Entomopathogenic Nematodes. Already in May 1992, this new Subgroup organised a workshop on Nematode Taxonomy in Raisdorf near Kiel, Germany, which was attended by 50 scientists and in which morphological characteristics as well as novel techniques for DNA-analyses were demonstrated.

The fourth major meeting of the whole WG was held 5 to 9 September, 1993 at the ETH Zurich, Switzerland. It was organised by and held in honour of Georg Benz from the Entomological Institute, one of the "fathers" of insect pathology in Europe, who retired immediately after the meeting, after 33 years of research at the ETH. Again, the meeting was devoted to two special topics: (1) Insect pests difficult to control with microbials and (2) Interaction between pathogens and host defence mechanisms. 78 papers or posters were presented during the meeting, which was attended by 117 participants. After the meeting, Siegfried Keller from the Federal Research Institute Reckenholz organised a 1-day workshop on *Entomophthorales* at his institute near Zurich. In October of the same year, Ann Burnell and other members of the Subgroup Nematodes organised a 4-day meeting in Maynooth, Ireland. Over 60 people attended the meeting which had as topics: genetics of insect parasitic nematodes, cryo-preservation techniques, symbiotic bacteria; bioassays, and DNA-analysis, using PCR and Rapids.

The next bi-annual meeting of the WG was for the first time a joint meeting with the Working Group on Insect Pathogens of the East Palaearctic Regional Section (EPRS). It was organised and hosted by Jerzy Lipa and his team of the Institute of Plant Protection at Poznan, Poland and took place 27 August to 1st September, 1995. The meeting was attended by 50 scientists from WPRS and the same number from EPRS, presenting 75 papers or posters. It was a historic meeting in that for many scientists from the East, it was the first time they met colleagues they had known so far only by name from the literature. The two main themes of this meeting were: (1) General insect pathology and (2) Microbial control of forest pests

In 1997, the sixth general meeting of the WG was organised 10 to 15 August by Jørgen Eilenberg at the Royal Veterinary University of Frederiksberg, Copenhagen, Denmark. The theme of this meeting was the role of insect pathogens in sustainable agriculture. In addition to that, special sessions on nematodes and fungi were organised by the two Subgroups. With 115 scientists from 29 different countries, the meeting was very well attended.

The seventh meeting of the whole WG was held 22 to 26 March, 1999 at Vienna, Austria. It was hosted and organised by Rudolf Wegensteiner and his team from the Institute of Forest Entomology, Forest Pathology and Forest Protection, University for Bodenkultur (BOKU), Vienna. The meeting was running under the title “Capturing the Potential of Biological Control” and had, besides a general session on biological control, several sessions on the different groups of insect pathogens as fungi, bacteria, viruses, protozoa, and nematodes, organised partly by the two Subgroups. The meeting was accompanied by several workshops, e.g. on identification of pathogens in locusts. Vienna had been selected as site for this meeting with the intention to attract again colleagues from Eastern Europe. This concept proved to be very successful, the meeting being attended by close to thirty participants from the area of the EPRS. During the meeting, Bernard Papierok from Institute Pasteur, Paris, France, was elected as new convenor for the WG. Subsequently, he was replaced as convenor of the Subgroup Fungi by Gisbert Zimmermann.

Athens, Greek, was the site of the eighth general meeting of the WG which was organised 29 May to 2nd June, 2001, by Marie Anagnou-Veroniki from the Benaki Phytopathological Institute together with colleagues from the Agricultural University of Athens. In spite of the fact that SIP had its annual meeting in the same year also in Europe, the meeting was with more than 100 participants and more than 60 presented papers very well attended. It included a full day workshop on the sampling of Entomophthorales and a professional meeting on technical development, production, quality, registration, and marketing of entomopathogenic nematodes.

In January 2002, the Council of IOBC/WPRS decided to restructure or close some of the working groups. As a consequence, the WG welcomed two new Subgroups: “Melolontha” (Convenor Siegfried Keller) and “Slugs and Snails” (Convenor William Symondson). Both subgroups had their first individual meetings under the new umbrella in October 2004 at Innsbruck, Austria and Stuttgart, Germany, respectively. During this meeting, the Subgroup Melolontha elected Jürg Enkerli, Switzerland, as new convenor and decided to change its name to Subgroup Soil Insect Pests.

The ninth meeting of the entire WG was held 23 to 29 May, 2003, at Salzau near Kiel, Germany. It had as title and general topic: “Growing Biocontrol Markets Challenge Research and Development” and was organised by Ralf-Udo Ehlers from the Institute of Phytopathology, Christian-Albrechts-University, Kiel. As most meetings of the WG before, it was held together with EU-COST meetings: this time COST Action 842 “Biocontrol of pest

insects and mites, with special reference to Entomophthorales” and COST Action 850 “Biocontrol Symbiosis”. The two new Subgroups organised special sessions on microbial control of *Melolontha* and other Scarabaeidae and on control of slugs and snails.

During the tenth general meeting, which was held 10 to 15 June, 2005 at Locorotondo near Bari, Italy, the WG celebrated its twentieth anniversary. The meeting was organised by Oreste Triggiani and his colleagues from the Faculty of Agriculture, University of Bari. It had about 175 participants which presented more than 120 oral papers and posters under the general theme of the meeting: “Invertebrate Pathogens in Biological Control: Present and Future”. Because of the many presentations, the group sometimes had to split up into three parallel sessions. In addition, three practical workshops on nematodes, microsporidia, and fungi were organised, which were so well attended that the number of participants was limited by the availability of microscopes. The main focus in these workshops was put on diagnosis and identification of insect pathogens, a field which has been identified as a major need by most participants. At the end of the meeting, Ralf-Udo Ehlers was elected new convenor of the WG. As convenor of the Subgroup Nematodes he was succeeded by Itamar Glaser. Because of his retirement, Gisbert Zimmermann stepped back as convenor of the Subgroup Fungi and was replaced by Cezary Tkaczuk from Poland. The virologists in the WG organised themselves in a fifth Subgroup Viruses (Convenor Miguel Lopez-Ferber, France).

Achievements

During the more than twenty years of its existence, the Working Group Insect Pathogens and Insect-parasitic Nematodes was very successful in amalgamating scientist working in the field of insect pathology all over Europe. The personal contacts during the regular meetings of the WG led to collaborative proposals for common research projects. Many of them have been accepted by the CE or other funding organizations, thus multiplying the seed money invested by WPRS. Another strong point of the WG is its excellent contacts with the manufacturers of biocontrol products, reflected in the number of representatives from these companies regularly attending the meetings. Though the WG became bigger during the years, it was able to maintain the very open and sociable atmosphere of the early meetings, making it particularly easy for students and post-docs to get in personal touch with the “big shots” in insect pathology.

Selected publications

Proceedings of the biannual meetings of the entire Working Group:

- Versailles meeting (C.C. Payne, Ed.): IOBC/WPRS-Bulletin 12(4), 1989, 108 pp.
- Rome meeting (H.F. Evans, Ed.): IOBC/WPRS-Bulletin 14(1), 1991, 88 pp.
- Wageningen meeting (P.H. Smits, Ed.): IOBC/WPRS-Bulletin 14(7), 1991, 218 pp.
- Zurich meeting (P.H. Smits, Ed.): IOBC/WPRS-Bulletin 17(3), 1994, 307 pp.
- Poznan meeting (P.H. Smits, Ed.): IOBC/WPRS-Bulletin 19(9), 1996, 295 pp.
- Copenhagen meeting (P.H. Smits, Ed.): IOBC/WPRS-Bulletin 21(4), 1998, 289 pp.
- Vienna meeting (P.H. Smits, Ed.): IOBC/WPRS-Bulletin 23(2), 2000, 334 pp.
- Athens meeting (B. Papierok, Ed.): IOBC/WPRS-Bulletin 26(1), 2003, 278 pp.
- Salzau meeting (B. Papierok, Ed.): IOBC/WPRS-Bulletin 28(3), 2005, 214 pp.

Proceedings of meetings of Subgroups:

- *Melolontha* Subgroup (S. Keller, Ed.): IOBC/WPRS-Bulletin 28(2), 2005, 192, pp.
- Slugs & Snails Subgroup (D.A. Bohan, Ed.): IOBC/WPRS-Bulletin 28(6), 2005, 134, pp.

III. 22 Working Group Biological Control of Fungal and Bacterial Plant Pathogens (Phytopathogens) (1989 - present)

Yigal Elad and Nyckle J. Fokkema

Introduction and overview of WG meetings

Following the establishment of the Study Group by Nyckle Fokkema in 1989 (Convenor 1989-1998), several workshops were held under his leadership. In 1990 the status of the group was changed from a Study Group to a Working Group. In 1998 Yigal Elad was elected as the second convenor. The activities of the WG will be summarized by presenting the WG meetings in chronological order.

New Approaches in Biological Control of Soil-borne Diseases – 1st workshop (Copenhagen, Denmark, July 1991, Local organizers Dan Funk Jensen and John Hockenhull). It was attended by 67 persons. Subjects that were discussed were non-pathogenic fusaria, pseudomonads, *Trichoderma* spp., and mycoparasites as antagonists in biological disease control; the improvement of biological control agents (BCAs) by genetic manipulations; delivery systems. It was concluded that in spite of some research that is going on, commercialization of BCAs is at its infancy because of lack of information about formulation and mass production. Inconsistency was regarded as a problem in development of commercial BCAs (Funk-Jensen et al., 1992). The group suggested to continue its activity, and since it at that time started also as an EFPP WG, a management committee was established with C. Alabouvette (France), G. Défago (Switzerland), Y. Elad (Israel), N.J. Fokkema (The Netherlands), J. Hockenhull (Denmark), J.M. Whipps as members. D. Funck Jensen (Denmark), J. Köhl (The Netherlands) succeeded N. Fokkema and J. Hockenhull at a later stage, during the nineties.

Biological Control of Foliar and Post-Harvest Diseases – 2nd workshop (Wageningen, The Netherlands, December 1992, Local organizers Nyckle Fokkema, Jürgen Köhl and Yigal Elad; Figure 1). It was attended by 59 persons. It was felt that the public attitude towards the use of chemical fungicides was changing and the EC encouraged research into the reduction of chemicals use in agriculture. The meeting themes were strategies of biocontrol of foliar diseases; biocontrol of post-harvest diseases; ecology of BCAs; mode of action of BCAs and biorational control and commercialization of BCAs. Discussions focussed on the reliability of the reported BCAs and ecological constraints for optimal performance of BCAs (Fokkema et al., 1993).

Biocontrol of Sclerotium-Forming Pathogens – 3rd workshop (Wellesbourne, UK, December 1994, local organizer J. Whipps). Attended by 32 persons. It emphasized the life cycle of sclerotium-forming pathogens, crop management practices and the ecology of BCAs. The need to improve selection, inoculum production and delivery systems of antagonists to achieve cost effective control were highlighted. Soil solarization in areas of high insolation and plants molecular biology were marked as having potential (Whipps and Gerlagh, 1995)

Biological and Integrated Control of Root Diseases in Soil-less Cultures – 4th workshop (Dijon, France, September 1995, Local organizer C. Alabouvette). It was attended by 36 persons. Subjects presented included characteristics of root diseases specific to soilless cultures; screening of BCAs; study of their mechanisms, population dynamics of pathogens and BCAs; interactions with the host plants; problems linked with production, formulation and application of BCAs in soilless cultures (Alabouvette, 1996).

Role of Molecular Methods in Disease Control – 5th workshop (Belemont Zurich, Switzerland, 1996, local organizer Genevieve Défago).

Biocontrol of Plant Diseases – (Edinburgh, Scotland, UK, August 1998, organizer - N. Fokkema). During the 7th International Congress of Plant Pathology, an evening session, open to all congress participants (c 250 attended), was dedicated to presentation of several successful biocontrol systems including commercialized *Trichoderma harzianum* products that control soil borne and foliar diseases and *Ulocladium* based biocontrol of pathogen conidiation.

Biocontrol of Foliar Pathogens – (Taormina, Sicily, Italy, September 2000, organized by Y. Elad). A day session that was open to the entire EFPP congress participants, attracted c 400 people. Highlights mentioned: recent achievements in biocontrol of foliar pathogens include the test and use of several good BCAs (filamentous fungi, bacteria and yeasts); integrated management of foliar pathogens; some unique modes of action of the BCAs e.g. induced resistance for foliar pathogens control by root-system microbial inoculants; strategies and application of BCAs in stone fruits; possibilities to cope with variability and inconsistency of biocontrol; the reliability of bioassays to predict biocontrol success, and the use of in-planta systems was recommended to replace BCAs-pathogens dual cultures (Elad et al., 2001).

Biocontrol agents modes of action and their interaction with other means of control – 6th workshop (Sevilla, Spain, November 2000, local organizer E. Monte). Thanks to a widespread announcement system the workshop was attended by an increased number of people (180). Presentations included the use of BCAs against soilborne and foliar pathogens in open field or in greenhouse crops and at post harvest stages, in the roots, stems, leaves, flowers, fruits and wood; implementation of BCAs some of which recently introduced into the market. Highlights included: the nature and use of BCAs genes; involvement of mycorrhizae and improvements of biocontrol activity; modes of action e.g. competition for space and nutrients, parasitism including phages that are hosted by bacteria, antibiosis, induced resistance, restraining the pathogen-pathogenicity enzymes and its antigens, arresting the production of multiplication pathogen-propagules. In many systems multiple modes of action are involved; improvement of efficacy, integration of BCAs among themselves and with other means of control were discussed for the improved BCAs implementation and for the reduction of their inconsistent performance (Elad et al., 2001).

Influence of A-Biotic and Biotic Factors on Biocontrol – 7th workshop (Kusadasi, Turkey, May 2002, local organizer N. Delen). Attendance reached 130 people. It was mentioned the number of people who study the interactions between plant pathogens and bacteria, fungi, phages or viruses and the number of publications increased steadily with time. It was felt that the number of commercial preparations was yet small and much more is expected from us before significant phytopathological problems could be solved by biological means. One of the reasons that preclude implementation of BCAs on a large scale is the large variability in control efficacy. The assumption underlying this meeting was that one of the obstacles on the way of reliable field conditions biocontrol is the effect of biotic or a-biotic factors. These factors affect the activity, survival and interaction of the BCAs with the plant pathogens or with plants. We discussed the possibilities to overcome deleterious effects on the implementation of plant disease biocontrol. We emphasized aspects of micro-climate, soil/ substrate/ crop/ fertilization, chemicals, saprophytes / non-target micro-organisms effect on and interaction with population dynamics/ survival of antagonists, on their biocontrol activity and the economical feasibility of the BCA (Elad et al., 2002).

Management of plant diseases and arthropod pests by BCAs and their integration in agricultural systems - 8th workshop (S. Michele all'Adige, Trentino, Italy, June 2004, local organizer I. Pertot). This meeting was held in cooperation with the 'Integrated Control In Protected Crops, Temperate Climate' and 'Mediterranean Climate' WGs. A big number of participants (164) from 24 countries participated. Specific topics included: integrated plant disease and arthropod pest management: possibilities for integration, problems with interactions between different tools of pest and disease management, positive and negative side effects on non-target organisms; multi target agents, including both microbial and those derived from natural substances, i.e. targeting several diseases or targeting disease(s) and pest(s); side effects of arthropod pest management tools on disease development and control; side effects of disease control on beneficials; case studies of implementation of integrated disease and pest management; successes and problems encountered; integrated disease management; integration of microbials and management of the greenhouse for IPM of pests and diseases according to decision support systems; commercial use of microbials for pests and diseases management - present situation and prospects, including new/near registration products; application of natural substances/microbials against diseases; role of host plant resistance in IPM of pests and diseases; induced resistance towards diseases and pests. Discussion between entomologists, plant pathologists and other plant protection experts were held. In order to fill gaps that are evident in the field of true integrated disease and pest management. A round table discussion was one of the highlight of the meeting (Moderator: Cesare Gessler). During the round table discussion and throughout the meeting a major concern was expressed regarding the difficulties in commercialization of microbial biocontrol and other alternatives and the delay in implementation of friendly means of control. Missing information about the behavior of BCAs in production scaled up stages, during storage and the distribution chain stages and the usually short shelf life of these products were described as a drawback. The severe EU regulations for registration of microbials and the fact that the regulations are somewhat not clear at present, pose major difficulties in placing BCAs in the market. The companies involved are usually small or medium enterprises and have no strong enough financial backbones to withstand the demands. The public ignorance regarding biocontrol was also highlighted as a reason for concern among the scientists. Nevertheless, in spite of the existence of gaps of knowledge on the way to implementation of alternative control measures the support for research and development in this direction is poor. The need for more work on integration of control methods for real life management of diseases and arthropod pests was widely expressed. Questions such as the following were raised: is there a possibility of multiple effects on targets that occur simultaneously? Is there enough knowledge regarding conflicting results - control of one problem but increase of another problem, the risk of emerging problems, the possibility of minor pathogens and pests to become important and the limited information about the effect of alternatives on non target organisms. A call for more research on these subjects was raised (Elad et al., 2004).

Fundamental and practical approaches to increase biocontrol effect – 9th workshop (Spa, Belgium, September 2006, Local organizers: Monica Höfte, Hissam Jijakli). The following themes are emphasized: understanding/stimulating naturally occurring antagonists in soil, substrate, rhizosphere and phyllosphere; understanding/stimulating the modes of action and ecological suitability of introduced antagonists in soil, substrate, rhizosphere and phyllosphere; influence of plant species/cultivar on natural or introduced

antagonists; production and formulation to increase biocontrol efficacy; use of BCAs in integrated disease management.

General overview and achievements

Vast experience has been gained in biocontrol of soil-borne and foliar diseases of fruits, grain, fibre and wood products at pre-planting, during cultivation or at post-harvest. Infection by pathogens can be reduced under controlled or field conditions by pre-inoculation of the plant surfaces with filamentous fungi, bacteria, yeasts or viruses. Biocontrol offers attractive alternatives or supplements to the use of conventional methods for disease control. The interest in biocontrol is reflected in the number of scientific publications that relate to this subject. The number of scientific publications that relates to pathogen biocontrol increased during the eighties and the nineties by approximately 11 fold (Elad and Freeman, 2002). However, few products for managing diseases have been developed, registered and successfully marketed. Chemical fungicides still dominate the market. However this is in a stage of change now because of a significant pressure from the market to develop alternatives. The Phytopathogens WG was established to promote the implementation of biological and integrated control of plant diseases. During the period of activity the subject was followed and discussed and it is evident that in the recent years more and more commercial products are presented. An increase in the involvement of growers' organizations and producers of biocontrol products in our working group is noticed. A major obstruction in the implementation of microbial BCAs are the costs related to meeting the requirements for registration as (bio)pesticide.

Although in many cases modes of action of BCAs were studied and elucidated and biocontrol is working under controlled conditions, many systems are not yet functioning well under field conditions. Therefore we have initiated meetings and encouraged research not only into pure biocontrol activity and modes of action but also into the environment effect on biocontrol and on integration of biocontrol in agricultural systems. Collaboration between scientists is crucial in order to develop biocontrol products and contacts between the industry and scientists are necessary from the outset of the development of a microbial product. Research is needed in integration of BCAs among themselves, taking into account the effect of environmental factors on the activity of BCAs and integration with other control strategies. It is likely that in the future we will face microbial products with longer shelf life, better survival in the plant environment and higher efficacy. Much has also been learned looking at the chemical world regarding formulation and marketing of new products. Real progress nevertheless, will occur when registration is harmonised and the market demands non-synthetic chemical solutions for the production of food.

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Figure 1. Participants WG meeting December 1992, The Netherlands

III.23 Working Group Integrated Protection in Stored Products (1991 - present)

Shlomo Navarro and Cornel Adler

Convenors

Giorgio Domenichini. G. Domenichini former Director of the Istituto di Entomologia e Patologia Vegetale, Università Cattolica del Sacro Cuore, Piacenza, Italy was the founder of the study group under the name "**Integrated and biological control of stored products and other commodities**", in 1991. Then the group met the first time in Piacenza in 1992.

Cornel Adler. C. Adler of the Institute for Stored Product Protection, Federal Biological Research Centre for Agriculture and Forestry (BBA), Berlin (Dahlem), Germany, is a biologist and deputy director of the institute. C. Adler was the second convenor elected by the members of the study group during the XX International Congress of Entomology in Florence, Italy in 1996. During the conference organised by him and Mrs Silvia Dorn at the ETH in Zurich 1997 he proposed changing the name of the WG to "Integrated Protection of Stored Products". The study group was turned into a regular working group by the IOBC council in 1998. Since 2001 Cornel Adler serves as a co-convenor together with Dr. Jordi Riudavets, IRTA, Cabrils, Spain.

Jordi Riudavets (co-convenor). J. Riudavets of the Department of Plant Protection, Institut de Recerca i Tecnologia Agroalimentàries (IRTA), Centre de Cabrils, Barcelona, Spain, was elected as co-convenor during the meeting in Berlin in 1999.

Shlomo Navarro. S. Navarro of the Department of Food Science, Agricultural Research Organization (ARO), the Volcani Center, Bet Dagan, Israel, was elected by the members of the WG as convenor during the meeting in Lisbon in 2001.

Venues of the Working Group, places, and dates

Piacenza, Italy, 23-25 September 1992. *Local organizing committee* G. Domenichini, there were 20 participants from five countries.

Milano, Italy, 13-14 May 1993. *Local organizing committee* G. Domenichini, there were 16 participants from five countries.

Prague, Czech Republic, 29-30 September 1994. *Local organizing committee* G. Domenichini, there were 12 participants from four countries.

Firenze, Italy, 25-31 August 1996. *Local organizing committee* G. Domenichini, C. Adler was elected as convenor.

Zurich, Switzerland, 31 August –2-September 1997. *Local organizing committee* Mrs Silvia Dorn and Felix Wäckers, Institute of Plant Sciences, Applied Entomology, Eidgenoessische Technische Hochschule (ETH, Swiss Federal Institute of Technology), Zurich, Switzerland. A total of 25 papers were presented. There were 37 participants from 12 countries.

Berlin, Germany, 22-24 August 1999. *Local organizing committee* Cornel Adler and Mrs Catharina Hild. There was a participation of 64 delegates from 16 countries. Total 36 oral presentations were made during two days of the meeting. A tour to the laboratories of the Institute for Stored Product Protection and a field trip to an organic bakery using

integrated pest management was accompanied by a touristic visit on a river cruise, the new center of Berlin and the Reichstag.

Lisbon, Portugal, 3-5 September 2001. *Local organizing committee* Mrs Paula Pereira, Mrs Maria Otilia Carvalho, and Antonio Meixa of the Instituto de Investigacao Cientifica Tropical, Centro de Estudos de Fitosanidade do Armazenamento (CEFA), Lisbon, Portugal. There was a participation of 60 delegates from 20 countries. Total 43 papers were presented during two days of the meeting. A field trip to a local tobacco producer and a food processing and storage company was accompanied by a late afternoon cruise on the Tejo river.

Kusadasi, Turkey, 16-19 September 2003. *Local organizing committee* Mevlut Emekci and Ahmet Guray Ferizli of the Department of Plant Protection, Faculty of Agriculture, University of Ankara, Turkey with the collaboration of Neset Kilincer, The Scientific and Technical Research Council of Turkey (TUBITAK), Sezmen Alper, the Secretary General of Aegean Exporters' Union. There was a participation of delegates from 16 countries. Total 43 papers were presented during two days of the meeting. A morning guided visit to archaeological site of Ephesus was accompanied by an afternoon field trip to GABAY fig processing factory demonstrated the importance of pest problems in the dry fruit industry of Turkey.

Prague, Czech Republic, 21-23 September 2005. *Local organizing committee* Vaclav Stejskal, Mrs Zuzana Pažourková, and Mrs Zuzana Kučerová of the Research Institute of Crop Production, Prague, Czech Republic. There was a participation of delegates from 18 countries. Total 52 papers were presented during two days of the meeting. A field trip was organized to a government run experimental winery, which was accompanied by sightseeing to Karlštejn and Plzeň., Plzensky Prazdroj, the leading brewery in central and Eastern Europe.

Changing objectives of the WG on Integrated Protection of Stored Products

The WG has devoted much of the attention on biological control of insects in stored products. Over the years, the activities of the WG participants were influenced by the changing realities in the field of stored products protection. The major changes can be grouped under the following subjects: phase out of MB in developed countries by 2005; concerns of developing countries about future treatments without MB and availability of fewer fumigants; development of insect resistance to phosphine; consumer demand for high quality products; consumer concerns to the presence of chemical pesticides and biological contaminants in food. There is an increasing interest of participants from developing countries from outside WPRS that necessitated early preparations to guide the potential participants to the IOBC meetings. During the last IOBC meeting held in Prague it was decided to enlarge the scope of the WG to include fungal infection and mycotoxin issues.

Projects developed in collaboration within the WG on Integrated Protection of Stored Products

Proposals submitted to the EC:

- Shared Cost RTD. 'Alternatives to methyl bromide for control of flour mill pests'.
Coordinator: S. Navarro (ARO, Israel), 10 participants.

- Specific Targeted Research or Innovation Projects. 'Biological Resources for control of flour mill pests'. Coordinator: S. Navarro (ARO, Israel), 17 participants.
- EUREKA project: 'Integrated pest management on rice for consumption'. Main country: Portugal, in collaboration with five EU countries.
- COST Action no. 842 on Biological Control of Stored Products, coordinated firstly by Eva Zdárková, and later by Lise S. Hansen. The group consisted of about 25 people and met in Portugal, Prague, Berlin, Athens, Barcelona, and Locorotondo over the years 2001-2005.

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III.24 Working Group Integrated protection in oak forests (1968 – present)

Claire Villemant

Key data of WG

Year	Name of Working Group	Convenor	Important events
1968	Microbial control of <i>Lymantria dispar</i>	L.Vasiljevic	1 st meeting: Tempio Pausania (Italy), 16-17 October 1969 2 nd meeting : Belgrade (Yugoslavia), 9-12 September 1971
1971	Biological control of <i>Lymantria dispar</i>	L.Vasiljevic	3 rd meeting: Madrid (Spain), 1974 4 th meeting: Bucarest (Romania), 26-30 September 1977
1977	Integrated control in Mediterranean oak forests	L.Vasiljevic	No known activities
1993	Integrated protection in cork-oak forests	P. Luciano	Status of Study Group 1 st meeting: Tempio Pausania (Italy), 1994
1997	Integrated protection in oak forests	C.Villemant	Status of Study Group 2 nd meeting: Rabat-Salé (Morocco), 1998
2001		C.Villemant	Status of WG 3 rd meeting: Oeiras (Portugal), 1-4 October 2001 4 th meeting: Hammamet (Tunisia), 4-8 October 2004
2005		E. Sousa	5 th meeting scheduled in Tlemcen (Algeria) in 2007

Microbial Control of *Lymantria dispar*

The origin of the working group, in the Sixties, came from the necessity to integrate and coordinate the methods and results of scientists performing microbial control of the gypsy moth, *Lymantria dispar*, the main defoliator of oak forests in the Northern hemisphere. The creation of the group was proposed by the Commission of Insect Pathology and Microbial Control at its symposium in Darmstadt (March 1968). It was accepted by the 4th IOBC General Assembly in Paris (March 1968).

The working group “Microbial Control of *Lymantria dispar*” was founded during the next IOBC Council meeting in October 1968, with representatives of Italy, Spain, France and Yugoslavia as founder members. The first meeting of the group, held in 1969 at Tempio Pausania in Sardinia, was attended only by a few members of the founder countries: L. Vasiljević (convenor, Institut of Plant Protection, Belgrade, Yugoslavia), P. Grison and A. Burgerjon (INRA, La Minière, France), A. Magnoler and P. Palma (Cork-oak experimental Station, Tempio Pausania, Italy). They decided to maintain the specificity of the group in the context of an integrated protection of oak forests but to extend the participation to a greater number of specialists implied in gypsy moth microbiological control.

The second meeting took place in Belgrade in 1971. It was attended by 27 scientists: L. Vasiljević, M. Maksimović, B. Lazarević, M. Injac, M. Tadić, K. Vasić, S. Todorović, L. Janković, P. Sisojević, Z. Gradojević, M. Vasić and C. Sidor (Yugoslavia), P. Grison, A. Burgerjon, C. Vago (France), P. Palma, Z. Zanardi (Italy), A. Rupérez (Spain), T. Cabral, F. Heitor (Portugal), L. Brader (Netherlands), G. Mihalache, A. Simionescu, D. Pirvescu (Romania), P. Lewis, W.E. Waters (USA). Whereas the 1st meeting focused on the use of polyhedrosis viruses, this meeting also concerned *Bacillus thuringiensis* and the parasitoid-predator complex of *L. dispar*. The aim of the group became thus extended to biological

control of gypsy moth (Vasiljević, 1973). It was also decided to publish the proceedings in a special issue of *Zaštita Bilja* (Plant Protection, Belgrad).

From gypsy moth biological control to integrated control in oak forests

Biological Control of *Lymantria dispar*

The 3rd meeting of the group was held in Madrid (Spain) in 1974 but no proceedings were published and no archive seems to be preserved. The 50 scientists, who attended to the 4th meeting in Bucarest (Romania) in 1977, came from 6 countries (Yugoslavia, Romania, Poland, Italy, France, USA). Their communications focused not only on gypsy moth population dynamics, natural enemy impact and biological control but also on the influence of oak defoliators and human exploitation on forest ecosystem balances. The participants decided to further take into account the other forest pests and imply scientists of a greater number of Mediterranean countries (Vasiljević, 1978). However, the new group “Integrated control in Mediterranean oak forests” apparently never met and remained dormant until the foundation of a new group in 1993 by Pr. P. Luciano (Sassary University, Sardinia).

Integrated Protection in Oak Forests

The formation of the current study group and its direction by Pr. Luciano was approved by the IOBC Wprs Council in early 1993. The first meeting, held in Sardinia in 1994, was attended by 22 scientists of 6 countries (Italy, France, Spain, Portugal, Morocco and Algeria). It focused on cork-oak stands which are one of the most fragile Mediterranean forest ecosystems, largely due to its high anthropisation (Luciano, 1995).

From 1997 to 2005, three meetings were held under my direction: 1998 in Morocco (Villemant, 1999), 2001 in Portugal (Villemant & Sousa, 2002), 2004 in Tunisia (Villemant & Ben Jamaa, 2005). Participant number increased from 36 (8 countries) in 1998, to 80 (7 countries) in 2001 and 120 (9 countries including Iran) in 2004. A new convenor E. Sousa, from the National Forest Station (Oeiras, Portugal), was elected during the last meeting.

Since 1993, our group encouraged multidisciplinary research and integrated protection projects between European and North African scientists who attempted to evaluate the importance of oak forest decline, and to better recognize its inducing factors (notably phyllophagous and xylophagous pests, pathogenous fungi, human pressure) and their complex interactions. We promoted the elaboration of common sampling methods and collective management strategies. Studies mostly concerned cork-oak and holm oak in Sardinia, Corsica, South of France, Spain, Portugal and North Africa, and deciduous *Quercus* species in other countries as Austria, North of France or Iran.

The group played an important role in making both the authorities and the public aware about the serious and widespread decline of cork-oak forests and the urgency of ensuring an effective and efficient integrated protection to preserve this precious natural resource.

Selected publications

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- Vasiljević, L. (Ed.) 1973. Plant Prot. 24(124-125), 159-293.
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- Villemant, C. (Ed.) 1999. Integrated protection in oak forests. IOBC/WPRS Bull. 22 (3).
- Villemant, C. and Sousa E. (Eds.) 2002. Integrated protection in oak forests. IOBC/WPRS Bull. 25 (5).
- Villemant, C. and Ben Jamaa, M.L. (Eds.) 2005. Integrated protection in oak forests. IOBC/WPRS Bull. 28 (8).

III.25 Working Group Induced Resistance in Plants against Insects and Diseases (1999 – present)

Annegret Schmitt

History and Events

Following a suggestion of Jürg Huber, Federal Biological Research Centre for Agriculture and Forestry (BBA), Darmstadt, Germany, the IOBC/WPRS study group “Induced resistance in plants against insects and diseases” was established in 1999 under the convenorship of Annegret Schmitt, BBA, Darmstadt, Germany. In the same year, the first meeting of the steering committee of the group took place at BBA in Darmstadt, where aims were discussed and arrangements for the first international meeting were made. The steering committee consisted of the following members:

- Ian T. Baldwin, Max Planck Institute for Chemical Ecology, Jena, Germany
- Marcel Dicke, Wageningen University, Wageningen, The Netherlands
- Erkki Haukioja, Turku University, Turku, Finland
- Brigitte Mauch-Mani, University of Neuchâtel, Neuchâtel, Switzerland

Since induced resistance is a phenomenon which concerns the plants defence against both, insects and diseases, a major goal of this IOBC group was set on fostering the exchange between scientists of different areas, which usually would rarely be in contact.

On the first meeting in Wageningen, The Netherlands, in 2001, under the local organisation of Marcel Dicke, for the first time a large number of scientists from the different induced-resistance-related research fields such as entomology, plant pathology and plant physiology met and discussed their common subject: the reaction that herbivore arthropods and plant pathogens induce in attacked plants. In the conference fundamental, as well as applied aspects of induced resistance were covered and fruitful discussions on the understanding of the general and causal processes involved in induced defence reaction as well as the potential for practical plant protection took place. In 2003 the study group was given the status of a Working Group.

The second meeting of the group, in the meantime changed to a working group, was held in Delémont, Switzerland, in 2004. Topics to be addressed were jointly prepared by the steering committee, and the local organisation was arranged by Brigitte Mauch-Mani. That workshop entitled „Methods in research on induced resistance and tolerance“ comprised of 50 participants from 10 European countries, and USA and Russia. The workshop was used as platform to (i) exchange methodological approaches, (ii) augment the understanding of the general and causal processes involved in induced defence reactions of plants against insects and plant pathogens and (iii) discuss their potential for practical plant protection. Again, the participating senior and younger scientist were originating from many different fields, and consisted of e.g. entomologists, plant pathologists, physiologists, molecular biologists and physicists, thus enhancing interdisciplinary exchange among the participants, leading to fruitful discussions within the group.

The third meeting was organised as a joint event together with the IOBC/WPRS working group “Breeding for plant resistance to pests and diseases” convened by Nick Birch, (Scottish Crop Research Institute, LEAF Innovation Centre, Invergowrie, Dundee, United Kingdom). Accordingly, the title of the workshop was linking both groups, namely “Breeding for inducible resistance in plants against insects and diseases”. The workshop took place in

Heraklio, Crete, under the local organisation of Nikolaos Malathrakis and Nikolaos Fanourakis (Technological Education Institute, School of Agriculture, Heraklion, Greece) As in the workshop before, the number of participants was around 50, with the majority of participants originating from the “Induced resistance” working group. Several experts in the different fields (from fundamental molecular biology to applied plant breeding) were invited as keynote speakers, followed by oral and poster presentations from the participants. As in the previous meetings the diversity of working fields formed an excellent basis for interdisciplinary discussions and inspired different scientific approaches.

The next meeting is already foreseen for 2007 and will be hold as a joint meeting with the non-IOBC “PR-proteins Workshop”. The meeting will be held in Doorn, The Netherlands and local organisers will be Marcel Dicke, Wageningen University, and Corné Pieterse, Utrecht University, The Netherlands. The date is set to 10 – 14 May 2007.

In the short time, in which the working group “Induced resistance in plants against insects and diseases”exists, the concept of bringing together scientists from diverse fields of expertise, which are all concerned with one common topic, namely the induction of resistance or tolerance in plants, proved to be a well accepted and successful approach. Consequently, the group will continue to eventually hold joint events with related working groups from inside and if appropriate also from outside of IOBC.

Selected publications

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III. 26 Working Group GMOs in Integrated Plant Production (2001- present)

Jörg Romeis

Introduction

Genetic engineering is increasingly used to develop improved crop varieties. The two traits most widely adopted on a global scale to date are resistance to insect pests and tolerance to herbicides. While a number of WPRS countries are already growing transgenic crops on a commercial scale, their use and potential impact on the environment is intensely debated. In January 2002, Franz Bigler had therefore been invited by the IOBC/WPRS Council to establish a study group on “Non-Target Effects of Genetically Modified Organisms” with the following mission:

By the establishment of a study group, IOBC/WPRS fosters scientific studies, exchange of information and knowledge transfer related to non-target effects of GMOs [Genetically Modified Organisms] and its impacts on biological control and integrated production. A case-by-case impact assessment on non-target organisms based on scientific criteria, will be the baseline for an objective evaluation of the compatibility of GMOs with biological control and integrated production. The management of resistance to GMOs of herbivorous arthropods and diseases is of primary importance in the context of biological control and integrated production and will therefore be considered in this study group. The development of tools and methods for the impact assessment and risk evaluation of GMOs on non-target organisms will contribute to the judgement of whether GMOs could be used in sustainable agriculture. Plant engineering for breeding and production of GMO is not a subject of this study group.

The kick-off meeting of this study group was held in January 2003 at the formerly called Swiss Federal Research Station for Agroecology and Agriculture (FAL-Reckenholz) in Zurich, Switzerland. 17 participants from 8 WPRS countries attended the meeting and agreed that there is a need for a WPRS working group (WG) to cover issues surrounding the development and deployment of genetically modified organisms (Profile Nr. 34, pp. 22-24).

The group defined the following objectives:

1. Exchange and dissemination of scientific knowledge on the ecological impact of genetically modified organisms;
2. Evaluate the compatibility and integration of genetically modified organisms with biological control and IPM;
3. Resistance management of the target organisms;
4. Development and harmonisation of methods for testing the ecological impact of genetically modified organisms.

In September 2003, the Council changed the status of the study group into a WG. At the same occasion, Jörg Romeis was elected by the Council as the first Convenor of this group.

Working group meetings, workshops and activities

Since its establishment, the WG has held two full meetings. The first meeting took place in November 2003 in Prague, Czech Republic. The interest in this event was overwhelming with more than 100 participants from 23 countries attending. In total, two keynotes, 32 oral contributions and more than 40 posters were presented. The second meeting was held in June 2005 in Lleida (Catalonia), Spain. The meeting was attended by 80 participants from 20 countries. In total, three keynotes, 31 oral contributions and 25 posters were presented. Contributions from both meetings have been published in IOBC/WPRS Bulletins (Romeis & Bigler, 2004; Romeis & Meissle, 2006). In addition a short report from the first meeting has been published (Romeis, 2004).

At the meeting in Prague, seven half-day workshops on specific topics were organized: (i) Hybridisation/fitness of hybrids, (ii) Monitoring/bioindicators, (iii) Biodiversity implications – off crop, (iv) Impact of GM crops on natural enemies, (v) Impact of GM crops on soil organisms/functions, (vi) Resistance management, and (vii) GM crops and pollinators. The aim of these workshops was to discuss the state of the art, identify areas of future research and the role of the WG. A protocol of each workshop has been included in the proceedings from this meeting.

At the second WG meeting in Lleida, a satellite workshop on non-target risk assessment and regulation was organized. The workshop was attended by participants from public research institutes, private industry and regulatory authorities. The participants were invited based on their long standing experience in (GMO) risk assessment and regulation. The aim of the workshop was to identify areas where members of the WG could facilitate the development of guidelines related to non-target risk assessment. It appeared that there is a clear need to focus the activities on the following three areas:

- (i) Development of a generic risk assessment process for non-target organisms;
- (ii) Definition of criteria for the selection of non-target organisms to be assessed;
- (iii) Development of standard test methods for selected non-target species.

A workshop protocol with a list of participants has been included in the proceedings from the Lleida meeting. Shortly after the workshop, an expert group was established and the initiative on “Non-target risk-assessment and regulation” was formally accepted by the IOBC/WPRS Executive Committee in December 2005. A first workshop was organized in Engelberg, Switzerland in May 2006. The outcome was a draft document that describes a generic, pragmatic and feasible non-target risk assessment methodology that can be adopted by different countries after adaptation to their specific regulatory needs and local circumstances. It will form a basis for the future work of the WG.

Steering committee

Since the WG is working in a highly political and polarized field of research, a steering committee was established in 2005 to support the WG convenor (Profile Nr. 39, pp. 8-10). Besides public research scientists, it is the committees’ intention to include representatives of regulatory authorities and the biotech industry to help balancing the group.

Value Statement

This WG is very active and received considerable attention due to the meetings and workshops that were organized. The interest in the WG activities indicates that it provides a good platform for scientific communication among the different stakeholders dealing with GM crops, namely public research scientists, representatives from the biotech industry and from regulatory authorities. By this, the WG meetings and activities can help to bridge the gap between research, regulation and application, and might affect in a positive way the highly polarized discussions about the risks and benefits of genetic engineering.

Publications

Romeis, J., 2004. Conference report - IOBC/WPRS working group meeting ‘Ecological Impact of Genetically Modified Organisms’. *Biocontr. News Info.* 25, 15N-16N.

Romeis, J., and Bigler, F. (Eds.) 2004. Ecological Impact of genetically modified organisms. *IOBC/WPRS Bulletin* 27(3), pp. 215.

Romeis, J., and Meissle, M. (Eds.) 2006. Ecological Impact of genetically modified organisms *IOBC/WPRS Bulletin* 29(5), pp. 208.

III.27 Working Group Landscape Management for Functional Biodiversity (2001 - present)

Walter Rossing and Hans Michael Pehling

Start and activities of Working Group

The origins of this youngest Working Group of IOBC/WPRS date back to the 9th General Assembly in Ascona, Switzerland in 2001. A number of convenors expressed the interest in a group that would address the scales above the field and farm, which were already covered in other working groups. Among them were the convenors of the Cereal Aphids Working Group and the Quantitative Approaches Study Group which saw the need for their groups to 'move on'. This bottom-up call met with a similar intention of the Council, resulting in general consensus on the need for a group addressing functional biodiversity at the landscape scale. The two founder groups were merged with a new mission, which was tested in the first meeting in Bologna, in 2003. This meeting hosted by the University of Bologna and organized by Giovanni Burgio, attracted some 75 participants and a suite of high-quality papers were presented. The apparent enthusiasm for the topic resulted in a very fast upgrading within IOBC hierarchy from Study Group to Working Group. The next meeting was held at Agroscope Zürich-Reckenholz, organized by Dr. Lisa Eggenschwiler and her team. The number of participants was similar to the first meeting, and papers of high quality were presented. A special topic had been prepared on Success Stories in Functional Biodiversity, which will be published in *BioControl*. The working group will further on meet every two years and, considering the big interest in functional biodiversity, a long term fruitful activity can be expected of this youngest of the IOBC/WPRS Working Groups.

Publications of Working Group

Rossing, W.A.H., Poehling, H.-M. and Burgio, G. (Eds), 2003. Proceedings of the 1st meeting of the Study Group. IOBC/WPRS Study Group Landscape management for functional biodiversity. IOBC/WPRS Vol 26(4), 220 pp.

Rossing, W.A.H., Eggenschwiler, L. and Poehling, H.-M. (Eds), 2006. Proceedings of the 2nd Working Group meeting Landscape management for functional biodiversity. IOBC/WPRS Vol 29(6), 168 pp.

III. 28 Former WPRS Commissions and Working Groups

Ernst F. Boller, , based on information from the IOBC archive

Former WPRS Commissions (in sequence of their establishment)

Documentation Service (1956 – 1968).

Had status of a Commission but retained its original name. Established in 1956 as one of the first three services of CILB, it operated two documentation centres. J. Franz (D) was responsible for the compilation and dissemination of information on biology and application, V. Delucchi on the systematics of entomophagous species. The service was terminated by the new Council in 1968 as it absorbed too much of the financial resources.

Commission of Integrated Control (1959 – 1973).

H.J. de Fluiter (NL) 1959 – 1968, followed by J. de Wilde (NL) 1968 – 1973. It focussed up to 1968 on the aspects of IPM in fruit orchards, but had, by recommendation of Council, to expand its range of interest into annual crops. Terminated by Council in 1973 because the crop oriented WGs were now adequately covering the subject.

Commission of Autocidal/genetic Control (1968 – 1973). Chairman J. Ticheler (NL).

Commission of Mediterranean forests (1979 – 1981). Chairman M. Pavan (I). Was established as attempt to coordinate and, ultimately, to safe the forest activities of WPRS.

Commission of Promotion and extension of WPRS activities (1990 – 2001).

1990-1993 H. Audemard/F (chairman), A. K. Minks/NL, J. Huber/D and J. Freuler/CH (members) ; 1994-2001 J. Freuler (chairman), J. Huber, P. Castanera/E, C. Gessler/CH (members).

The aim of the Commission was to make the activities of WPRS better known within and outside the organisation. For that purpose all means of communciation including electronic media were explored. Major achievements : WPRS internet homepage, overhead sheets of the organisation, posters, new logo, leaflets, updated collection for the presentation of the Commissions, Working and Study Groups, press folders. As the main goals of the Commission were achieved and new tasks could be handled more easily and rapidly by the Executive Committee, the Commission was dissolved after the 9th General Assembly IOBC/WPRS at Ascona in 2001.

Former WPRS Working Groups (in sequence of their establishment, and their Convenors)

WG Biocontrol of Diatraea saccharalis (1956 – 1974). J. van Dinther (NL) 1956 – 1968. In 1968 it became ***WG on BC of Tropical Pests***: J. Brenière (F) 1969 – 1974.

WG BC of San José Scale (1956 – 1968). First Convenor W. Klett (D) 1956 - ca. 1960, followed probably in 1960 by G. Mathys (CH).

WG BC of *Leptinotarsa decemlineata* (1956 – 1969). J. Franz (D).

WG BC of *Lepidopteran pests of Mediterranean Forests* (1957 –1981). First Convenor probably E. Biliotti (F), followed by C. Dafaucé-Ruiz (E) 1969 – 1977 and R. Montoya (E) 1977 – 1978. Transformed in 1978 into **Commission on Mediterranean Forests**.

WG BC of *Hyphantria cunea* (1957 – 1969). Joint project with FAO and EPPO. Convenor probably P. Grison (F).

WG *Formica rufa* (1962-1971, 1977-1985). M. Pavan (I). Activities stopped between 1972 and 1976 but were re-activated in 1977.

WG BC *Insectes xylophages forestiers, Saperda* (1962 – 1968). Probably established in 1962. G. Arru (I) 1962 – 1968. Activities stopped in 1968 and attempts to re-establish activities by opening study groups in 1977 and 1985 were not successful.

WG *Coordination of forestry projects* (1966 – 1977). E. Biliotti (F) 1966 – 1969, P. Grison (F) 1969 – 1977. The multitude of forestry projects called for closer coordination that could be maintained up to 1977. The activities were then transferred to the new **Commission of Mediterranean Forests** established in 1979.

WG IC in cotton (1970 – 1989). M. Karman (Egypt) 1970 – 1975, J. Dincer (Turkey) 1975 – 1977. Activities stopped between 1977 and 1980. El Sayed Nasr (Egypt) 1980 – 1987, H.S. Salama and M. H. Hafez (Egypt) 1987 – 1989. WG dissolved in 1989.

WG *Use of insect feeding vertebrates in forests* (1976 – 1985). A. Ceballos (E) 1976 – 1985.

WG *Specificity of Entomopathogens* (1977 – 1979). M. Féron (F) 1977 – 1979.

Appendix IV**Glossary of Acronyms (Abbreviations)**

ABCP - Africa-wide Biological Control Programme

AMRQC – Arthropod Mass Rearing and Quality Control

APRS - Asia and Pacific Regional Section of IOBC

ATRS - AfroTropical Regional Section of IOBC

BART - Beneficial Arthropod Regulatory Testing group

BBA - Biologische Bundesanstalt (D)

BC - Biological Control

BCA – Biological Control Agent

CABI - Commonwealth Agricultural Bureau International

CAP - Common Agriculture Policy of EU

CEC - Commission of European Communities

CIBC - Commonwealth Institute of Biological Control (now IIBC)

CILB – Commission Internazionale de Lutte Biologique

CILBA - Complex International pour la Lutte Biologique, Agropolis (F)

CIRPON - Centro de Investigaciones sobre Regulaciones de Poblaciones de Organismos Nocivos

COST – Cooperation in the field of Scientific and Technical research (EU)

CSIRO - Commonwealth Scientific and Industrial Research Organization

EC - European Community

EEC - European Economic Community

EPPO - European Plant Protection Organization (French: OEPP)

EPRS - East Palearctic Regional Section of IOBC

ETH - Eidgenössische Technische Hochschule (Zürich, CH)

EU - European Union

EUCARPIA – European Association of Plant Breeders

FAO - Food and Agriculture Organization of the UN

GA - General Assembly

GB - Governing Board

GMO - Genetic Modified Organism
IACBC - International Advisory Committee for Biological Control
IAEA - International Atomic Energy Agency
IBCA - Invertebrate Biological Control Agent
IBMA - International Biocontrol Manufacturers Association
IBP - International Biological Programme
IC - Integrated Control
ICIPE - International Center of Insect Physiology and Ecology
IFCC - Institut Français du Café et du Cacao et autres plantes stimulantes
IFS – Integrated Farming Systems
IIBC – International Institute of Biological Control
IITA - International Institute of Tropical Agriculture
INRA - Institut National de la Recherche Agronomique
IP - Integrated Production
IPCC - Intergovernmental Panel on Climate Change
IPM - Integrated Pest Management
IPP - Integrated Plant Protection
IRAT - Institut de Recherches Agronomiques Tropicales et des culture vivrières
IRCT – Institut de Recherches du Coton et des Textiles exotiques
IRHO – Institut de Recherches des Huiles et Oléagineux
ISPM – International Standard for Phytosanitary Measures
IUBS – International Union of Biological Sciences
MB – Methly bromide
NAPPO – North Amercian Plant Protection Organization
NGO – Non-Governmental Organization
NRS – Nearctic Rergional Section of IOBC
NTRS – NeoTropical Regional Section of IOBC
OECD – Organization for Economic Cooperation and Development
OILB – Organisation Internationale de Lutte Biologique
PRS – Pacific Regional Section of IOBC
SEARS – South East Asia Regional Section of IOBC

SETAC – Society of Environmental Toxicology and Chemistry Europe
SG – Study Group
SIP – Society of Invertebrate Pathology
SIT – Sterile Insect Technique
SRNT – see NTRS
TARS – Tropical Africa Regional Section of IOBC
UNDP – United Nations Development Programme
UNESCO – United Nations Educational, Scientific and Cultural Organization
USDA – United States Department of Agriculture
WG – Working Group
WHO – World Health Organization
WHRS – Western Hemisphere Regional Section of IOBC
WPRS – West Palearctic Regional Section of IOBC

The following country codes have been used:

A - Austria	H - Hungary
AUST – Australia	I – Italy
B – Belgium	ISR - Israel
CAN - Canada	NL – The Netherlands
CH – Switzerland	P – Portugal
D – Germany	PL - Poland
DK - Denmark	S - Sweden
E – Spain	UK – United Kingdom
EG - Egypt	USSR – Sowjet Union
F – France	TUR - Turkey
GR – Greece	YU - Yugoslavia



The IOBC promotes the development of biological control and its application in integrated plant protection and production programmes. Biological control is the use of living organisms to prevent the losses caused by pest organisms or, more succinctly, the use of biota to control biota. The IOBC coordinates biological control activities worldwide in six regional sections (Africa, Asia and the Pacific, East Europe, West Europe and the Mediterranean, North America, and Central, Caribbean and South America) and working groups. This book describes the origin and development of the organisation and gives a historical overview of its activities.



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