

The role of the IOBC for research and implementation of biological and integrated crop protection

Die Bedeutung der IOBC für die Forschung und Umsetzung des biologischen und integrierten Pflanzenschutzes

Abstract

The International Organization for Biological Control of Noxious Animals and Plants (IOBC) was founded in 1956 in Europe under the auspices of the International Union of Biological Sciences (IUBS). In 1971, IOBC Global was established with six Regional Sections that represent the world's major biogeographical zones. The main objective of IOBC is to promote the development of biological control and its application in integrated pest management programs and integrated production. The West Palearctic Regional Section of the IOBC (IOBC/WPRS) which covers the EU region, North Africa and the Near East has at present 20 Working Groups (WG) and four Commissions which are categorised in crop, method and pest focused groups. The role of the WG and Commissions is to offer platforms that bring biocontrol, IPM/IP and other crop protection stakeholders together to foster collaboration, exchange of information and knowledge, to initiate cooperation for research and implementation of sustainable crop protection methods and strategies. WG and Commissions are open to any person, institution and organization, public or private, that desire to promote the objectives of IOBC. Three examples of WG are discussed in more detail in the paper showing how activities are developed and outcomes implemented in biocontrol and Integrated Pest Management.

Key words: International Organization for Biological Control, integrated pest management, integrated production, biological control

Zusammenfassung

Die „International Organization for Biological Control of Noxious Animals and Plants (IOBC)“ wurde 1956 in Europa unter der Schirmherrschaft der „International Union of Biological Sciences (IUBS)“ gegründet. Durch „IOBC Global“ wurden 1971 sechs regionale Sektionen etabliert, die die wichtigsten biogeographischen Zonen repräsentieren. Das Hauptziel der IOBC ist die Förderung und Entwicklung des biologischen Pflanzenschutzes und seine Anwendung im integrierten Pflanzenschutz und der integrierten Produktion (IP). Die „West Palearctic Regional Section“ der IOBC (IOBC/WPRS), die das Gebiet der EU, Nord-Afrika und den Nahen Osten umfasst, hat zur Zeit 20 Arbeitsgruppen (WG) und vier Kommissionen, die kultur-, methoden- und schädlingsspezifisch gegliedert sind. Die Aufgabe der Arbeitsgruppen und Kommissionen ist es, Plattformen zu bieten, die den biologischen Pflanzenschutz, IPM/IP und andere mit dem Pflanzenschutz befasste Akteure zusammenbringen, um so die Kooperation und den Wissens- und Informationsaustausch zu fördern und eine Zusammenarbeit im Bereich der Forschung und Umsetzung nachhaltiger Pflanzenschutzmethoden und -strategien in Gang zu setzen. Die Arbeitsgruppen und Kommissionen sind offen für alle Personen, Institutionen und Organisationen – öffentlich oder privat –, die die Ziele der IOBC fördern wollen. Beispielhaft werden in diesem Beitrag drei Arbeitsgruppen genauer vorgestellt um zu zeigen, wie Aktivitäten entwickelt und Ergebnisse im biologischen Pflanzenschutz und IPM umgesetzt werden.

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Historical background

IOBC is the acronym of the International Organization for Biological Control of Noxious Animals and Plants. The organization was founded in 1956 in Europe under the auspices of 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 alternative for pesticides. Biological control was of course not new to science. The beginning of “modern” biological control and the first great success dates back to 1888, when entomologists from California brought back the *Vedalia* beetle from Australia, propagated them and released about 10 000 beetles against the invasive cottony cushion scale insect in citrus. After this project, many successes followed and several large national organizations for the development of biological control programmes were created. In continental Europe, biological control was practised in few countries and by a small number of researchers. Therefore, it was only a handful European scientists that started to prepare the grounds already in 1948 to create an organization for biological control of pests. This resulted in 1956 in the IOBC, which was originally mainly a European affair. In 1971, IOBC Global was established and the European and Mediterranean region became one of the Six Regional Sections which represent the world’s major biogeographical zones. The first technical bodies of IOBC were created immediately after the organization was founded. In 1956, the Commission for “Determination and Identification of Entomophagous Insects” and the “Publication Commission” were established, followed by many Working Groups (WG) and Commissions in the coming years (for details see BOLLER et al., 2006). It is noteworthy that the first WG on “Integrated Protection of Fruit Crops” was already created in 1956, and this WG continues to be very active until today.

Objectives of the IOBC

The objectives of the Organization are laid down in the statutes and in the mission statements of IOBC Global (<http://www.iobc-global.org>) and of the Regional Sections e.g. of the West Palaearctic Regional Section (<http://www.iobc-wprs.org>) which includes Western Europe, the Mediterranean countries and countries of the near East and Asia up to Iran. These objectives are:

- IOBC promotes the development of biological control and its application in integrated pest management programs and integrated production.
- IOBC collects, evaluates and disseminates information about biological control and IPM/IP. It promotes

national and international research actions, training and implementation of scientific results. It advocates for public awareness of the economic and social importance of biological control.

- IOBC organizes conferences, meetings and symposia, and undertakes other actions to increase public awareness to promote the general objectives of the organization.
- As an independent professional organization, IOBC is an effective advocate for biological control, and it can influence policy makers and governments.
- IOBC assists in the communication among biological control workers, through dissemination of information (Bulletins, books, newsletters, websites, etc.).
- IOBC publishes the peer reviewed journal *BioControl* (www.wkap.nl/journalhome.htm) that publishes basic and applied research on biological control of animal pests, plant diseases and weeds.

Geographic range of the six Regional Sections of the IOBC

The geographic range of the six regional sections is presented in Fig. 1. The umbrella of the Regional Sections (RS) is given by IOBC Global which has a coordinative function between activities of the RS. The total estimated membership of all RS of IOBC was approximately 3300 in the year 2006 (BOLLER et al., 2006). Each RS has its own governing bodies (e.g. Executive Committee, Council) and structures serving best the purpose of the Section. Major activities are provided by Commissions and Working Groups of RS and of IOBC Global.

The role of IOBC/WPRS for the European and Mediterranean crop protection

The West Palaearctic Regional Section of the IOBC (IOBC/WPRS) has at the present time 20 Working Groups (WG) and four Commissions which are listed below. The WG can be categorised in crop, method and pest focused groups with some thematic overlaps between groups. WG and Commissions can be established and dissolved by the Council according to the needs and depending on the WG activities and outputs. A full list of all presently existing and former WG and Commissions of IOBC/WPRS is given by BOLLER et al. (2006).

Crop focused WG:

- Integrated protection of fruit crops (soft fruits, pome fruit arthropods, integrated fruit production guidelines, pome fruit diseases, stone fruits)
- Integrated protection in viticulture (insects, fungal, bacterial and physiological diseases, Integrated pest management)
- Integrated control in oilseed crops (Pathology, Entomology)

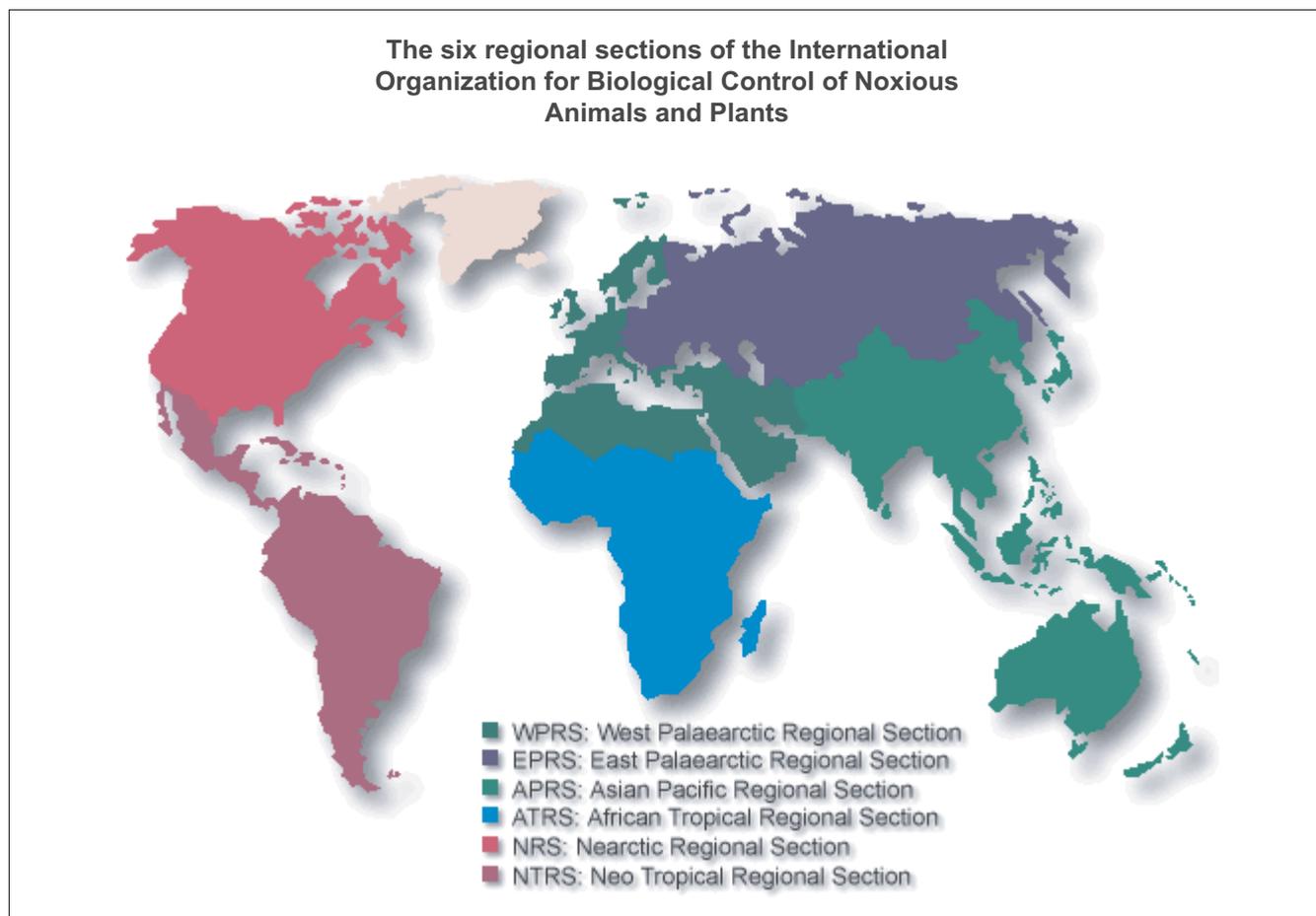


Fig. 1. Geographic range of the six Regional Sections of the IOBC.

- Integrated protection of field vegetables
- Integrated control of protected crops (Mediterranean climate)
- Integrated control of protected crops (temperate climate)
- Integrated protection in oak forest (fungi, forest management)
- Integrated protection of stored products
- Integrated protection of olive crops
- Integrated protection of citrus fruits

Method focused WG:

- Pheromones and other semio-chemicals in integrated production
- GMO in integrated plant production
- Pesticides and beneficial organisms
- Multitrophic interactions in soil
- Induced resistance in plants against insects and diseases
- Landscape management for functional biodiversity
- Benefits and risks of exotic biocontrol agents

Pest focused WG:

- Insect pathogens and entomoparasitic nematodes
- Integrated control of plant pathogens
- Integrated control of mite pests

Commissions:

- Publications
- Determination and identification of entomophagous insects and insect pathogens
- Guidelines for integrated production
- Harmonized regulation of invertebrate biological control agents

The role of the WG and Commissions is to offer platforms that bring biocontrol, IPM/IP and other crop protection stakeholders together to foster collaboration, exchange of information and knowledge, to initiate cooperation for research and implementation of sustainable crop protection methods and strategies. This is achieved by organizing workshops, conferences and trainings, by publishing reports on new findings and by disseminating new and innovative results elaborated in common activities. With the assistance of a number of WG, the Commission on Guidelines for Integrated Production develops principles and crop specific guidelines for IPM and IP. Results and any other outcome of WG and Commission activities are regularly published in 10–12 issues of Bulletins comprising 2000 – 2500 pages per year of scientific and practical information on biological control and IPM/IP.

WG and Commissions are open to any person, institution and organization, public or private, that desire to

promote the objectives of IOBC. IOBC/WPRS has a long standing tradition to cooperate with public and private research institutions, industry (producers of biocontrol agents and pesticide companies) advisory organizations, regulatory authorities and other international organizations such as FAO (Food and Agricultural Organization of the United Nations) and EPPO (European and Mediterranean Plant Protection Organization).

Three examples of implementing Working Groups' and Commissions' activities into practice

Commission on guidelines for integrated production

This Commission was founded in 1976. The first principles of Integrated Production (IP) taking into account IPM within the whole context of production, marketing and consumer's demands were formulated for the first time ever. Activities of the first years were focused on orchard IP. Conceptual frameworks for IP and the underlying principles and strategies were defined and a number of fruit producers' organizations adopted the IP concept and created the first labels based on IOBC IP guidelines in some European countries. The definitions, principles and crop specific IP guidelines were published in 1993. Endorsement of producers' organizations followed later (since 1998), and a toolbox to facilitate endorsed and candidate organizations was developed. IP Guidelines for perennial and all major annual crops were developed in collaboration with crop focused WG and they are periodically revised. These IOBC documents receive world-wide international recognition as they serve as standards that are often cited and referred to in Europe and in other continents. IP Guidelines are often used as a baseline to define Integrated Production. A very recent example of recognition and value of the IOBC IP principles and crop specific technical guidelines is the prominent citation in a study carried out for the European Commission by BiPRO (Beratungsgesellschaft für integrierte Problemlösungen) and JKI (Julius Kühn-Institut, Germany) in which the development of guidance for establishing IPM principles was analyzed and evaluated. Based on this study, it is expected that many of the IP principles and concepts generated by IOBC will be taken-up and implemented in future national IPM action plans.

Working Group on pesticides and beneficial organisms

As a consequence of observed adverse effects of pesticides, a group of scientists proposed this WG which was approved by the IOBC/WPRS Council in 1974. The first period was marked by the development of international standard test methods with common principles that allowed for evaluating effects of pesticides on a range of predators and parasitoids. These methods were applied in joint testing programs in which hundreds of active ingredients and products were tested and effects compared among the test organisms. Based on this information, recommendations on the use of pesticides were made and given to advisory services and growers. Especially

greenhouse vegetable producers with biological control programs were very receptive to such information and later, biocontrol companies produced their own recommendations based on the WG data. Standard guidelines with laboratory, semi-field and field methods to test the side-effects of pesticides on more than 20 natural enemies were published in many IOBC Bulletins and in an EPPO Bulletin. The work of the WG and its publications had a great impact on regulatory authorities in many European countries and regulators attended the annual meetings regularly. The cooperation with national and EU regulatory authorities and the close contact with the pesticide industry lead to common activities that attracted other international organizations such as SETAC (Society of Environmental Toxicology and Chemistry Europe), EPPO and the OECD. A joint meeting of these organizations in 1994 was the starting point to discuss side-effect testing on predators and parasitoids in the regulation of pesticides in Europe. Intensive cooperation resulted from this meeting and carried on for the next six years with a number of joint meetings, ring testing and validating of test methods and of the production of joint publications in 2000 and 2001. As a consequence of these activities, side-effect testing of natural enemies has become a part of the eco-toxicological testing and evaluation of pesticides in Europe and elsewhere.

Working Group on integrated protection in protected crops

This WG started its activities in 1968 and remained as such until 1983 when the WG divided into two WG according to climate (one for temperate climate and one for Mediterranean climate). Cooperation between the two greenhouse WG has been very good from the start and members from each group attend the meetings of the other group and help teaching and organizing training courses on IPM in greenhouses. During the first phase of the WG, coordination of experimentation and cooperative research on natural enemies and IPM was the first priority and results obtained with new natural enemies in one country were quickly implemented in other countries. Later in the 1980s, fine tuned IPM programs were established for different greenhouse crops in a number of European countries. An important activity was to act as liaison between researchers, advisory services, producers of natural enemies and growers which allowed the recognition of the needs of coordinated research. During the 1990s, the evaluation of natural enemies and the development of quality control criteria and methods for the most important commercially produced natural enemies was the focus. Nowadays, the work of both greenhouse WG encompasses studies on new pests and the search for appropriate natural enemies, on the development of new strategies for the use of biological control agents, on the influence of biotic and abiotic factors on biological control, on adaptation of IPM programs to incorporate new greenhouse technologies, etc. The two greenhouse WG offer regular platforms where scientists and biocontrol industry meet to exchange information, discuss new

control strategies and initiate joint activities to solve new pest and disease problems in greenhouses.

The three examples cannot cover the full spectrum of activities of IOBC WG and Commissions, but they show to some extent what they all have in common. Stakeholders, from scientists to practitioners, from industry to regulators use these platforms to address crop protection and problem solving in its largest sense. There is an intensive exchange of scientific and practical knowledge, and many ideas that lead to new control methods and strategies were born at WG meetings and through regular contacts between the WG members. WG and Commissions constitute a “think-tank” for innovation and implementation of feasible solutions extracted from the pile of scientific information.

Conclusions

IOBC is the only international organization to permanently promote biological control and IPM/IP since over

50 years and to advocate and strengthen its use in crop protection systems. The organization was founded in 1956 and the first crop specific WG with the aim to develop IPM in orchards was established as early as 1959. Many more IPM and IP strategies and systems were developed in IOBC/WPRS WG since, and it is with great satisfaction that IOBC sees policy finally adopting ideas and principles of IPM/IP created to a great extent in IOBC WG and Commissions. IOBC/WPRS has a long standing tradition to collaborate with all stakeholders that endorse biological control and IPM/IP, and it is through the many WG and Commissions that innovation of crop protection strategies are generated and implemented into practice.

Literature

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