



**IOBC / WPRS
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PROFILE

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IOBC/wprs Council and Executive Committee

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**International Organization for Biological and Integrated Control of
Noxious Animals and Plants – West Palearctic Regional Section
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The Presidents Page

For the Council and members of IOBC/WPRS one of the recurrent questions is the role of the organisation and the research included. In January this year I took the opportunity to convey some considerations about the importance of Biological and Integrated Control to buffer pesticides due to EU's lowered ambitions.

Since that we have experienced another change which call for us. That change is linked to global warming, and the point is that across contrasting views about causes the majority of climatological researchers are now in agreement about the general rise of temperature.

Global warming including a temperature rise of 1-5° C and various changes in precipitation during the next 10-20-50 years will have major influence on all sorts of plant based productions and the connected problems. Already now changes in time of starting flowering etc. are reported. Also distribution of mobile insects reflect climatical changes, and certainly distribution and importance of a number pest insects, plant diseases and weeds are in many cases undergoing changes. Eg. it appears that some insects move some 50 km per annum northwards in Europe.

This situation is an enormous challenge to IOBC/WPRS simply because the most sustainable and intelligent response is further development and adjustment of biological and integrated control rather than "chemical panic" at a later stage.

An area calling for special attention may be pests and diseases with low natural dispersal capability. Such organisms are by experience assisted by human activities as soon as new potential is opening. It is likely that early transfer of their natural enemies will be an activity of vital importance.

It may seem a little early but the growing acceptance of global warming as a fact may me suggest to WPRS members and participants in our Working Group meetings to consider and discuss the potential influence on pest, disease and weed distribution, performance and importance in the near future.

Peter Esbjerg

IOBC/ WPRS
Commissions, Working Groups
 December, 2003

Commissions	Convenor	Liaison- Officer
Publications	BATHON H. TIRRY L.	–
Determination and identification of entomophagous insects	BAUR H.	–
Guidelines for integrated production	AVILLA J.	ALBAJES R.

Working Groups

Integrated protection of fruit crops	CROSS J.	MALAVOLTA C.
Pesticides and beneficial organisms	VOGT H.	BIGLER F.
Breeding for plant resistance to pests and diseases	BIRCH A.N.	TIRRY L.
Pheromones and other semio-chemicals in integrated production	WITZGALL P.	BATHON H.
Multitrophic interactions in soil	SIKORA R.	KERRY B.
Integrated protection in viticulture	LOZZIA C.	GESSLER C.
Integrated protection of oilseed crops	KOOPMAN B.	ALABOUVETTE C.
Integrated protection of field vegetables	VIDAL S.	ESBJERG P.
Integrated control in protected crops, temperate climate	ENKEGAARD A.	BLUEMEL S.
Integrated control in protected crops, mediterranean climate	CASTAÑÉ C.	BLUEMEL S.
Insect pathogens and entomoparasitic nematods	PAPIEROK B.	HUBER J.
Integrated control of fungal and bacterial plant pathogens	ELAD Y.	ALABOUVETTE C.
Integrated protection in oak forests	VILLEMANT.C.	VIEIRA M.M.
Integrated protection of stored products	NAVARRO S.	BATHON H.

Integrated protection of olive crops	(KALAITZAKI A.)	MALATHRAKIS N.
Integrated protection of citrus crops	(GARCIA-MARI F.)	BESRI M.
Induced resistance in plants against insects and diseases	SCHMITT A.	HUBER J.
GMO's in integrated plant production		BIGLER F.
Landscape management for functional biodiversity	(POEHLING H.M. / ROSSING W.)	VAN LENTEREN J.

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IOBC/wprs COMMISSIONS AND WORKING GROUPS

Working Group

„Use of Pheromones and other Semiochemicals in Integrated Control“

Utilisation des phéromones et autres médiateurs chimiques
en lutte intégrée

Convenor

Peter Witzgall, Dept. of Crop Science, Swedish University of
Agricultural Sciences, 230 53 Alnarp, Sweden

The Pherolist

<http://www-pherolist.slu.se/>

The *Pherolist* is a database of chemicals identified from sex pheromone glands of female Lepidopteran insects and other chemicals attractive to male moths. This database was compiled by HEINRICH ARN, ERNST PRIESNER and MIKLÓS TÓTH and was first published in 1986 as the book: "List of Sex Pheromones of Lepidoptera and Related Attractants" by IOBC/wprs.

HEINRICH ARN then created a web version in 1995 to facilitate updates. The *Pherolist* was indeed one of the first scientific databases on the web and it was maintained and updated until September 2000. The *Pherolist* reflects the widespread use of sex pheromones, and attracts between 50 and 100 unique visitors per day. The *Pherolist* has now been reprogrammed to facilitate updates. Since HEINRICH ARN retired, this work is continued by PETER WITZGALL, MARIE BENGTTSSON, and MIKLOS TÓTH.

Future versions of the *Pherolis* will also contain pheromones of other insect orders. This work is in progress and a new version, including an improved interface, should be online by the end of 2004.

The *Pherolist* can be browsed by taxonomic and trivial names of insects, by chemical compounds, as well as by authors. Compound names and insects are interconnected, a mouseclick shows, for example, all species using a particular chemical. The *Pherolist* contains images of the most important species and their trivial names in several languages which makes it a useful tool, not only for people working with pheromones.

Working Group Meeting

A joint meeting with the WG "Integrated Protection of Fruit Crops" will be held in Trento, Italy, September 26 – 30, 2004. Please consult our website for details (<http://www.phero.net/iobc/trento/announc5.html>).

Working Group "GMOs in Integrated Production" Convenor Jörg Romeis

The first meeting of this new Working Group entitled 'Ecological Impact of Genetically Modified Organisms' was held in Prague, Czech Republic, from November 26-29, 2003. Local organizer was František Sehnal. More than one hundred participants from 23 countries attended the meeting. After two days of presentations, one day was reserved for half-day long workshops in which specific topics were addressed (workshop organiser in parentheses):

- Hybridisation/fitness of hybrids (Detlef Bartsch & Hans C.M. den Nijs)
- Monitoring/bioindicators (Salvatore Arpaia)
- Biodiversity implications – off crop (Andreas Lang)
- Impact of GM crops on natural enemies (Jörg Romeis)
- Impact of GM crops on soil organisms/functions (Wolfgang Büchs)
- Resistance management (Achim Gathmann)
- GM crops and pollinators (Stefan Kühne & Dirk Babendreier)

A large portion of the presentations and discussions was about the impact of *Bt*-transgenic maize on non-target arthropods, especially biological control agents. This was due to the fact that (i) most participants had a background in entomology, (ii) there is a vast amount of published and unpublished information available on this GM crop, and (iii) and *Bt*-maize is the only insect-resistant GM crop that is currently grown commercially in Europe. In addition to laboratory studies, results from a number of field experiments with *Bt*-crops were presented. Another area that was well presented were studies concerning the impact of herbicide tolerant crops such as the UK farm-scale evaluation project. Other topics that were addressed included: (i) the potential for gene flow from GM crops to non-GM plants and the possible consequences of this event, (ii) unintended effects of GM crops such as probiotic effects on

non-target herbivores and (iii) regulatory issues especially the importance of post-release monitoring.

A detailed report of the meeting has been published in *Biocontrol News and Information* 25(1), 15N-16N. The proceedings of the meeting including short workshop reports will be published in 2004 as an IOBC/WPRS Bulletin.

The next full meeting of the working group will take place in the first half of 2005. If you wish to actively participate in the WG, please get in contact with the convenor.

Commission on IP Guidelines and Endorsement

The Executive Committee has appointed Dr. Frank Wijnands (Applied Plant Research, PPO, The Netherlands), an expert on Integrated Arable Farming Systems, as new member of the Commission. He was welcomed at the last meeting of the Commission. The most important achievement of the Commission was the approval of the 3rd edition of the IOBC/WPRS Basic Document on Integrated Production, which contains the Definition and Principles, as well as the Guidelines I and II. Due to the high importance of this document, which states the point of view and the policy of IOBC/WPRS regarding Integrated Production, the IOBC/WPRS President (Dr. Esbjerg) and the liaison officer (Dr. Albajes) also attended the meeting.

It was agreed that IOBC IP standards must be in the upper part of the total quality pyramid. The document will be available soon at the internet site. The Experts' Panel in charge of the production of the Guidelines for outdoor Vegetables under Northern and Southern conditions have already met and produced a first draft. The four endorsed IP organizations got their renewal.

All the information on the activities of the Commission is available at the internet site:

<http://www.iobc.ch>

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**Joint meeting of the Working Groups
"Biological Control of Fungal and Bacterial Plant
Pathogens", "Integrated Control In Protected Crops,
Temperate Climate" and "Integrated Control in Protected
Crops, Mediterranean Climate".**

San Michele (Italy), 9-12 June 2004: Management of plant diseases and arthropod pests by BCAs and their integration in agricultural systems'

The meeting of the WGs 'Biological Control of Fungal and Bacterial Plant Pathogens', 'Integrated Control In Protected Crops, Temperate Climate' (Convenor: Annie Enkegaard) and 'Integrated control in Protected Crops, Mediterranean Climate' (Convenor: Cristina Castañé) was held in S. Michele all'Adige, Trentino, Italy (9-13 June 2004), locally organized by Ilaria Pertot, Daniele Barbacovi and Manuela Malavolta. The meeting took place in the *Instituto Agrario di San Michele all' Adige* and was hosted by the *SafeCrop Research Center*.

The specific topics of the workshop were:

- 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.

A big number of participants (164) from 24 countries participated in the meeting. 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, we allocated significant time to discussions on integration, holistic approaches and gaps in information and knowledge. A round table discussion was one of the highlights 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 behaviour of biocontrol agents 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 biocontrol agents 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.

The next meeting of the WG "Integrated Control of Fungal and Bacterial Plant Pathogens" will be organized by Monica Höfte and Haïssam Jijakli in Spa, Belgium in the Sol Cress congress centrum from 6-10 September, 2006. The theme of this meeting will be "Fundamental and practical approaches to increase biocontrol effects".

The next meeting in the WG "Integrated Control in Protected Crops, Temperate Climate" will be organized by Irene Vänninen and co-workers in Naantali, Finland from 10-14 April 2005 with themes relating to integrated pest and disease management in glasshouses and in outdoor and hardy nursery stocks.

Yigal Elad (Bet Dagan)

Working Group "Insect Pathogens and Insect Parasitic Nematodes", Next Meeting 2005

Entitled "*Invertebrate Pathogens and Biocontrol: Present and Future*", the 10th European meeting of the Working Group will be held in Locorotondo, near Bari, Italy, 10-15 June 2005, in cooperation with the COST Actions 842 "Entomophthorales" and 850 "Biocontrol Symbiosis". The Local Organizer is Oreste Triggiani, from the Facoltà di Agraria, Università degli Studi di Bari.

The meeting will include oral and poster contribution sessions as well as workshops (dedicated to entomopathogens: fungi, protozoa...), owing to local facilities (laboratory rooms, microscopes, binoculars...).

Further informations are given on the homepage created for this event:

<http://www.agr.uniba.it/iobc>

Interested people are invited to fill in the pre-registration form available on the website and to send it to the

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Working Group “Integrated Protection of Olive Crops” Next meeting 2005

The next meeting of the Working Group “Integrated Protection of Olive Crops” will be held in October 2005 at Florence, Italy. The meeting will be organized by Dr Antonio Belcari (Chairman) (Department of Agricultural Biotechnologies, University of Florence). The first announcement will be sent from the chairman, soon.

Full articles of the 1st Meeting (29-31 May 2003) will be published in the IOBC/WPRS Bulletin until the end of October 2004. Informations in the 1st Meeting website:

www.maich.gr/iobc

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Working Group “Protected Crops, Mediterranean Climate” – Next Meeting, 2006

The next meeting of the working group will take place in May 2006 hosted by Dr. Juan Antonio Sánchez from Instituto Murciano de Investigación y Desarrollo Agrario (IMIDA). It will be held in the city of Murcia (Spain) that is located in the center of an important greenhouse production area that comprises the southeast Mediterranean coast of Spain. During the meeting we will have the opportunity to visit the area and see the situation of biological control strategies in such a production region. For further information, please contact:

Convenor:
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Working Group, 'Integrated Control in Protected Crops, Temperate Climate'

Next Meeting "Integrated Control in Glasshouses and Outdoor Nursery Stocks" 10-14 April 2005, Naantali, Finland

The IOBC/WPRS Working Group "Integrated Control in Protected Crops, Temperate Climate" will meet on the 10-14 April 2005, in Naantali, Finland (Local organizer: Irene Vanninen). The meeting will feature 4 days of presentations and workshop discussions on integrated pest and disease management in glasshouses, and will include a research tour of the glasshouse industry in the Turku area.

In addition, the last day of the meeting (14 April) will be dedicated to the topic "IPM in outdoor and hardy nursery stocks". This topic will encompass pests, diseases and weeds.

It will be possible to participate in 1) the part of the meeting dealing only with IPM in glasshouses (10-13 April), 2) the part of the meeting dealing only with IPM in outdoor nursery stocks (14 April), or 3) the whole meeting (10-14 April). Expected maximum costs for these three types of attendance are 1) 600 Euro, 2) 115 Euro, or 3) 720 Euro. Costs include accommodation, meals, conference facilities and excursion.

The meeting will be organised like the previous meetings of our WPRS working group, including sending out the Bulletin to all participants before the meeting. There will be relatively few presentations at the meeting, with most of the time being devoted to discussions. Topics will, among others, include:

- Integrated pest and disease management in greenhouse crops (ornamentals, vegetables)
- Important and/or new pests and diseases; and beneficials
- Emerging tools of crop and herbivore manipulation
- IPM in greenhouses with artificial lighting
- Need of new biocontrol agents in protected crops
- Pesticide resistance and its management in greenhouses
- Registration and quality control
- Decision support systems (remove??)

New ideas are welcome, please contact Annie Enkegaard

Articles for the "Preceedings" have to be prepared before December 2004. Details for preparation will be sent to you later in the autumn. Contributions will be limited to 4 pages maximum.

Further specifications re. cost for the meeting, application forms, travel instructions, etc. will be sent to you later in the autumn.

To be placed on the mailing list to receive further details, please contact: Irene Vanninen.

Local organiser

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IOBC/WRPS WG Convenor

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Working Group “Integrated Protection of Citrus Crops”, Next Meeting, 2005

The next meeting of the IOBC/wprs Working Group “Integrated Protection of Citrus Crops” will take place in Lisbon (Portugal), June 6-7, 2005, at the Instituto Superior de Agronomia (Universidade Técnica de Lisboa). The organization is considering a post-congress tour to Madeira Islands, to visit the Madeira-Medfly facilities and project and to watch new exotic pests as *Toxoptera citricida* and *Trioza erythrae*.

The organizer of the meeting is:

Prof. José Carlos Franco
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Working Group “Integrated Protection in Oak Forests”, Next Meeting, October, 2004

The 4th meeting of the WG “Integrated Protection in Oak Forests” will be held from 05 - 08 October, 2004, in Hammamet (Tunisie). We already have about 80 inscriptions and 45 propositions of oral communications. One participant comes from Canada and another one from Iran.

The following sessions are planned:

- Phytosanitary status of oak forests in the Mediterranean region.
- Biology and impact of xylophagous insects.
- Biology and impact of phytophagous fungi.
- Biology and impact of phytofagous pests.
- Natural enemies, biological and integrated control.
- Forest management
- Forest regeneration.

Additional details see “Time-table of forthcoming events”, p. ????

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New IOBC/wprs Publications

Individual Members: Important !

Individual members receive the Bulletins produced by **5 Working Groups or Commissions** of their choice. They may order additional Bulletins by the treasurer:

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cesare.gessler@ismaa.it

New IOBC/wprs Bulletins

The Publication Commission of the IOBC/wprs has issued the following Bulletins in 2004 (including the Contents of the Bulletins); see also *Profile* **36**: 28-37 for IOBC/wprs Bull. **26**(8-11), 2003 or visit the IOBC/wprs homepage.

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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. Edited by: Richard A. Sikora, Simon Gowen, Rüdiger Hauschild and Sebastian Kiewnick. ISBN 92-9067-162-7 [x + 302 pp.].

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* papers presented at the Einsiedeln-meeting, Switzerland, 2000;

** papers presented at the Reading-meeting, England, 2001

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Commission on "IP Guidelines and Endorsement". – **This Bulletin will be edited later in 2004.**

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Working Group "GMOs in Integrated Production". Proceedings of the Meeting "Ecological Impact of Genetically Modified Organisms" at Prague (Czech Republic), 26-29 November 2003. Edited by: Jörg Romeis & Franz Bigler. ISBN 92-9067-164-3 [xv + 215 pp.]

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Working Group "Integrated Plant Protection in Fruit Crops"
Subgroup "Soft Fruits". Workshop on "Integrated Soft Fruit
Production" at Conthey (Switzerland), 14-16 October 2003. Edited
by: Ch. Linder & J. V. Cross. ISBN 92-9067-165-1 [x + 176 pp.]

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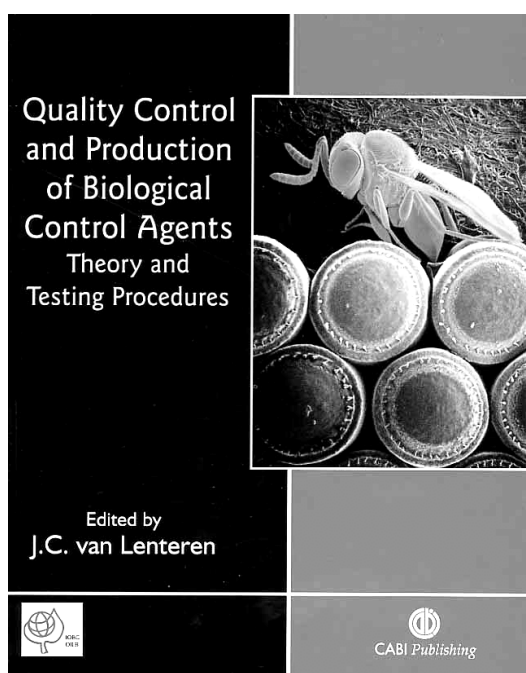
Working Group "Integra Integrated plant protection in stone fruit".
Proceedings of the Meeting at Opatjia (Croatia), 14-16 October 2002.
Edited by: Piero Cravedi & Emanuele Mazzoni. ISBN 92-9067-167-8
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The regular prices for the Bulletins are:

- up to 100 pages: 10 EURO per copy
- up to 300 pages: 15 EURO per copy
- > 300 pages: 30 EURO per copy



J. C. van Lenteren (ed., 2004): *Quality Control and Production of Biological Control Agents. Theory and Testing Procedures*. – 327 pp., Wallingford (UK) (CABI Publishing), £ 65.00 (US\$ 120.00), ISBN 0 85199 688 4

This book addresses the following topics: Mass production and artificial rearing of natural enemies; Pathogens of mass produced natural enemies and pollinators; Quality control of natural enemies used for pest control; Guidelines and statistical methods for quality control; Natural enemy behaviour; Parasitoids, predators, microbial pesticides; Population ecology and genetics; Management of small populations; Risk assessment of natural enemies

Description: The use of biological control agents has been increasing worldwide and there are now many companies mass-producing such organisms, particularly for the control of insect pests. However, there is a great need for quality control in the production and use of these natural enemies, which include insect parasitoids and predators, fungi and viruses. This book has been written to provide both background theory and practical guidance on this subject.

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- A variable-response model for parasitoid foraging behaviour.
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- Variations in natural enemy foraging behaviour: essential element of a sound biological control theory.
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- Pathogens of mass-produced natural enemies and pollinators.
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- Regulation of import and release of mass produced natural enemies: a risk assessment approach.
J C van Lenteren, D Babendreier and F Bigler, Swiss Federal Research Station, Switzerland, et al
- Quality assurance in North America: merging customer and producer needs.
C S Glenister, IPM Laboratories, Inc, USA, A Hale, Nature's Alternative International, Canada and A Luczynski, Biobugs Consulting Ltd, Canada

State of affairs and future directions of product quality assurance in Europe.
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The relationship between results from laboratory product control tests and large cage tests where dispersal of natural enemies is possible: a case study with *Phytoseiulus persimilis*.
S Steinberg and H Cain, Bio-Bee Biological Systems, Sde Eliyahu, Israel

Quality of augmentative biological control agents: A historical perspective and lessons learned from evaluating *Trichogramma*.
R F Luck and L D Forster, University of California, USA

Towards the standardisation of quality control of fungal and viral biocontrol agents.
N E Jenkins and D Grzywacz, CABIBioscience, UK

Guidelines for quality control of commercially produced natural enemies.
J C van Lenteren, A Hale, Nature's Alternative International, Canada, J N Klapwijk, Berkel and Rodenrijs, The Netherlands, et al

Basic statistical methods for quality control workers.
E Wajnberg, INRA, France

Other interesting publications brought to attention of Profile

Neuenschwander, P., C. Borgemeister & J. Langewald (2003): Biological Control in IPM Systems in Africa. – 448 pp., Wallingford (UK), CABI Publishing, \$ 140,00 (ISBN 0851996396).

Zhi-Qiang Zhang (2003): Mites of Greenhouses: Identification, Biology and Control. – 240 pp., CABI Publishing £45.00 (US\$80.00) (ISBN 085199590X).

Loomans, A.J.M. (2003): Parasitoids as Biological Control Agents of Thrips Pests. – 200 pp., Thesis Wageningen University (with summaries in English, Dutch and Italian)

The thesis presented here is the result of a joint European Research project “Biological Control of Thrips Pests”. Specific aims of the project were to collect, evaluate, mass produce and commercially apply natural enemies of thrips species. To evaluate natural enemies we applied specified selection criteria, which had proven its value in previous pre-introduction selection of natural enemies of several other greenhouse pests. In my part of the evaluation programme, I studied what prospects hymenopterous parasitoids might have as biological control agents of thrips, in particular the western flower thrips, *Frankliniella occidentalis* (Pergande).

First (**Chapter 1**) I summarised available information on the thrips pests which currently play a key role in protected cultivation in Europe. In particular I looked into *F. occidentalis*, *Thrips tabaci* Lindeman and two other species that I studied: *Frankliniella schultzei* Trybom and *F. intonsa*

(Trybom) and reviewed their geographical distribution, economic impact, followed by additional information on thrips biology, ecology and ways of control. Then the state of the art is discussed of the most important groups of natural enemies that are currently evaluated and/or applied as biological control agents: predatory mites, pirate bugs, entomopathogenic fungi and entomophilic nematodes. Specific emphasis is put on the current status of hymenopterous parasitoids attacking thrips, their biology, ecology and life-history and the prospects they might have for thrips control in European greenhouses. Finally, I present the aim of my research project and the outline of this thesis.

When the research project started, no parasitoid of western flower thrips was known. In our search for parasitoid candidates, presented in **Chapter 2**, a sampling programme was developed, surveying *F. occidentalis* populations in its original area of distribution (USA) and newly invaded areas (South of Europe). Parasitoids of closely related thrips species, distributed worldwide, preferably from areas with climatically conditions similar to northwest European glasshouses were collected as well. Based on the host and geographic distribution records in the literature, mainly species were collected within the genus *Ceranisus* (Walker), solitary larval endoparasitoids of thrips species closely related to *F. occidentalis*. Our collection efforts resulted in a number of parasitoid species and various geographical strains, the most important being *Ceranisus menes* (Walker) and *Ceranisus americensis* (Girault) (Hymenoptera: Eulophidae). Both are solitary koinobiont endoparasitoids of thrips larvae that reproduce asexually.

A critical phase in any evaluation programme, is the development of an adequate and reliable rearing procedure, allowing a standardised supply of insects of a constant quality and large enough quantities. For laboratory bioassays on thrips and parasitoids, and eventually mass-production, it is essential that large cohorts of even aged groups of larvae are available. In **Chapter 3** we describe and evaluate laboratory methods for rearing various species of thrips, such as *Frankliniella occidentalis*, *F. intonsa*, *Thrips palmi* (Karny) and *Thrips tabaci* Lind. (Thysanoptera: Thripidae) and their parasitoids. When using a method based on honey-solution and pine pollen, large numbers could be produced of high quality, with relatively little time investment. For rearing parasitoids the method proved adequate as well, but less efficient in yield and time.

A number of basic evaluation criteria for pre-introduction selection of useful natural enemies, is based on the outcome of behavioural and developmental interactions with their target host in laboratory experiments. Specific aspects of the parasitoid's host selection process are evaluated in **Chapter 4** (host age selection) and **Chapter 5** (host

species selection). Results presented in **Chapter 4** show that host acceptance by *C. menes* and *C. americensis* was negatively correlated with size, age and stage of the larval host. Observations on the parasitoid's behaviour showed that the extent to which a wasp could complete and attack and oviposit significantly decreased with increasing size (age) of host larvae. The apparent preference for small sizes of larvae is largely caused by defensive reactions (walking away, wagging the abdomen, anal exudate production) upon an encounter to vehement resistance (wriggling, dragging) of the larvae when attacked and stung. In larvae smaller or equal to her own size, a wasp could manage its victim, whereas larvae larger than herself managed to escape prior or during an attack. The apparent preference for small and young host larvae is valuable for developing a mass-production system for thrips parasitoids, for the timing of releases in the greenhouse and, because only a small part of the population is prone to attack, has consequences for the population dynamics of the host and the parasitoid.

Although in a greenhouse grown crop *F. occidentalis* often is the major, but not the only thrips species around it is important to know the host preference of the parasitoids with respect to different species. No-choice tests, presented in **Chapter 5** show that differences in the behaviour and biology of both the host and the parasitoid species strongly influenced their development and fitness. On the species level as well as on the population level parasitoids differed in host acceptance behaviour, parasitoid developmental time and size of their offspring. *C. americensis* performed best on its original co-evolved host *F. occidentalis*. *C. menes* consists of a large complex of regional populations, that either reproduce sexually or asexually. They differ morphologically, geographically, behaviourally and physiologically in their response to different geographical populations of thrips species, each of them having its unique characteristics.

Life-history studies performed on *C. menes* and *C. americensis* in the laboratory (**Chapter 6**) shows that developmental and reproductive biology were significantly affected by temperature and characteristic for each species / strain. It was found that immature developmental time took much longer when temperature decreased, in particular for *C. americensis*. Pupal development times in *C. menes* varied greatly at both temperatures for certain types (yellow) but not for others (brown). Both species have different reproduction strategies: *C. americensis* has a higher daily reproduction, but a shorter reproduction period, compared to various strains of *C. menes*, that reproduce less during a longer period. The population growth rates differed per species / strain and temperature, but where in almost all cases lower than (literature) data of *F. occidentalis*.

In **Chapter 7** it is shown that short-range host location by *C. menes* and *C. americensis* is positively affected by visual and chemical stimuli. Both species are attracted to yellow colours and were arrested on sites where larvae had been feeding. Wasps did react to the presence or damage inflicted by feeding of non-hosts, but arrestment did not seem to be very host specific: within a parasitoid species no difference was found in reaction to feeding spots of one host species, *Thrips tabaci* or another *F. occidentalis*. Parasitoid females were not attracted to the synthetic compounds of the alarm pheromone (decylacetate plus dodecylacetate) of western flower thrips in short-range flight tests, indicating a non-volatile effect.

In **Chapter 8** evaluation studies were performed on a larger scale: experimental and commercial greenhouses. In spite of repeated introductions in infested crops, either vegetables like sweet pepper and cucumber, or ornamentals like rose and potted plants, very low levels of parasitism were found. Searching efficiency and dispersal ability in a greenhouse crop were very low and parasitoids performed poorly under (temperate) greenhouse conditions. Both parasitoid species could maintain themselves, dispersed and reproduced at Dutch glasshouse conditions, but they were unable to reduce thrips populations to sufficiently low levels.

Finally, in **Chapter 9**, I summarise and discuss the main results of my research, placed in perspective of the pre-introduction criteria we used. It is concluded that, based on behavioural (host selection and searching efficiency), biological (climatic adaptation, development and reproduction capacity) and practical (mass-production) characteristics, thrips parasitoids have very limited prospects for greenhouse biological control for both seasonal inoculative and inundative release programmes in temperate and in Mediterranean greenhouses.

A pdf version of this thesis can be obtained from:

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Bukovinszky, T. (2004): Tailoring complexity: Multitrophic interactions in simple and diversified habitats. – PhD Thesis, Wageningen University, Laboratory of Entomology

Increasing vegetation diversity in agro-ecosystems by using plant-species mixtures, may suppress herbivore populations by reducing the apparency and quality of crop plants and increasing the success of natural enemies.

Unfortunately, as the mechanisms of pest-suppression at the behavioural level is largely untested, there is insufficient information to explain the variable responses of herbivores and natural enemies to plant-species mixtures. The aim of my thesis project was to understand the cause(s) of lower herbivore numbers in vegetationally diversified cropping systems compared with monocultures and to study the behavioural responses of natural enemies to vegetation diversity. The studied system included Brussels sprout (*Brassica oleracea gemmifera*), its herbivores, and *Dia-degma semiclausum*, a parasitoid of the diamondback moth. Vegetational diversity was characterised by mixing Brussels sprout with either barley (*Hordeum vulgare*) or mustard (*Sinapis alba*). Numbers of several herbivore species were reduced when Brussels sprout was mixed with barley. A study showed that the plant competition in the species mixture influenced herbivore responses by altering plant quality compared with the monocrop. Field and simulation studies showed that responses of herbivores in diversified habitats were influenced by species-related differences in foraging behaviour. Behavioural and analytical studies showed the importance of inter- and intraspecific variation in volatiles of both damaged and undamaged plants in the attraction of the parasitoid *D. semiclausum*. Plant mixtures interacted with the searching behaviour and time-allocation of wasps. Compared with pure sprout patches, mustard attracted and retained individuals longer, whereas barley reduced their tendency to enter the plant patch. Although both mustard and barley reduced the tendency of wasps to locate hosts on Brussels sprout, parasitoids improved their foraging efficiency through oviposition experiences and became equally efficient in finding further hosts. In conclusion, the results reported in my thesis demonstrate the importance of foraging behaviour in explaining variable responses of herbivores and parasitoids to plant-species mixtures.

A pdf-version of this thesis can be obtained at:

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Reorganisation of the Austrian Agency of Health and Food Safety

The former **Institute of Phytomedicine** at the Austrian Agency of Health and Food Safety in Austria has been reorganised in autumn 2003 and was substituted by the **Institute of Plant Health**.

The main activities of the Institute of Plant Health focus on:

- phytosanitary aspects (phytosanitary control, monitoring of quarantine pests, inclusive diagnostics for relevant pests),
- the evaluation of plant protection products for the implementation into integrated and biological production systems,
- R & D and consulting (e.g. efficacy testing of plant protection products, side effect testing of PPPs, phytotoxicity tests, forecasting, pest resistance; IP production systems)

More Information:

<http://www13.ages.at/servlet/sls/Tornado/web/ages/content/C8C0A6C5A58420CEC1256E24006AC48D>

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Time-Table of forthcoming events

For the Meetings of the IOBC/wprs Working Groups see also the IOBC/wprs homepage: <http://www.iobc-wprs.org>

01 - 06 August, 2004: 37th Annual Meeting of the Society for Invertebrate Pathology, Helsinki (Finland). – Mark Goettel, e-mail: goettel@em.agr.ca

07 - 12 August, 2004: 12th International Symposium on Insect-Plant Relationships, Berlin (Germany). – Prof. Dr. Monika Hilker, FU Berlin, Biologisches Institut (Angewandte Zoologie / Tierökologie), SIP Conference Bureau, Haderslebener Str. 9, 12163 Berlin, Tel 030/8385-3918, Fax 030/8385-3897, e-mail: sip12@zedat.fu-berlin.de, <http://www.biologie.fu-berlin.de/SIP12-Berlin>

15 - 21 August, 2004: 22nd International Congress of Entomology „Strength in Diversity“, Brisbane (Australien). – Carillon Conference Mgmt., POBox 177, Red Hill, QLD 4059, Australia, Tel. +61-7-3368-2644, e-mail: ice2004ccm.com.au, <http://www.ICE2004.org>

- 06 - 10 September, 2004: 9th International Symposium "Ecology of Aphidophaga", Ceske Budejovice, Czech Republic. – Dr. Ivo Hodek, Institute of Entomology, Academy of Sciences, Branisovska 31, Ceske Budejovice, 370 05 Czech Republic. e-mail: hodek@entu.cas.cz, http://www.entu.cas.cz/conf_pages.phtml?confid=4
- 16 - 19 September, 2004: IOBC Conference on "Breeding for Plant Resistance to Insects, Mites and Pathogens", Białowieża, Poland. – http://www.iobc-wprs.org/wg_sg/index.html – see also *Profile* 36: 17-21.
- 26 - 30 September, 2004: IOBC/wprs Working Group "Integrated Plant Protection in Fruit Crops", Baselga di Piné, (Italy: Trento). – Jerry Cross, Entomology and Plant Pathology, Department, East Malling Research, East Malling, West Malling, Kent, ME19 6BJ, UK, e-mail: jerry.cross@emr.ac.uk
- 26 - 30 September, 2004: IOBC/wprs Working Group "Pheromones and other semio-chemicals in integrated production", Baselga di Piné (Trentino, Italy). – Peter Witzgall, SLU, Box 44, S-230 53 Alnarp, Sweden, <http://www.phero.net/iobc/index.html>
- 26 - 30 September, 2004: 8th International Symposium on the Biosafety of GMOs, Montpellier (France). – Mark.Tepfer@versailles.inra.fr
- 30 September, 2004: EU – RAFBCA – IBMA – IOBC Workshop „New Insights into Risk Assessment and Registration of Microbial Biocontrol Agents in Europe“, Brussels (Belgium). – Dr. Anke Skrobek, School of Biological Sciences, UWS Swansea, Singleton Park, Swansea, SA2 8PP, UK, Tel +44/(0)1792 295362, Fax +44/(0)1792 295447, e-mail: a.skrobek@swansea.ac.uk, Web: www.rafbca.com
Dr. Stephan Brückner, Prophyta GmbH, Inselstrasse 12, 23999 Malchow / Poel (Germany), Tel: +49 38425 2324, Fax: +49 38425 2323, e-mail: sbrueckner@prophyta.com
- 30 September - 1 October, 2004: 3rd International Conference on Biological Invasions "Neobiota". From Ecology to Control. Bern (Switzerland). – Wolfgang Nentwig and Sven Bacher (Bern), Matthew Cock and Rüdiger Wittenberg (Delémont), Hansjörg Dietz, Andreas Gigon and Ewald Weber (Zürich), www.neobiota.unibe.ch
- 05 - 09 October, 2004: 2nd European Whitefly Symposium, Cavtat, Croatia. – H. Aras, Inst. for Adriatic Crops and Karst Reclam., PO Box 288, 21000 Split, Croatia. Tel ++385-213-16579, Fax ++385-213-16584, e-mail: Helenka@krs.hr. Web: <http://www.whitefly.org/EWSII-info.htm>.
- 11 - 13 October, 2004: Working Group "Entomopathogens and Entomoparasitic Nematodes", Sub Group *Melolontha*, Innsbruck (Austria). – Dr. Hermann Strasser, Institut für Mikrobiologie, Leopold-Franzens-Universität, Technikerstrasse 25, 6020 Innsbruck (Austria), Tel: +43 (0)512 507 6008 (H. Strasser), Fax: +43 (0)512 507 2938, e-mail: hermann.strasser@uibk.ac.at, <http://bipesco.uibk.ac.at/iobc/> – see also *Profile* 36: 22, 2004.

- 05 - 08 October, 2004: IOBC/wprs Working Group "Integrated Protection in Oak Forests". 4th Meeting, Hammamet (Tunisie). – Mohamed El Habib BEN JAMAA, Unité de Gestion et de Valorisation des Ressources Forestrières, INRGREF, B.P. 10, 2080 Tunis (Tunisie), Fax ++216-71717951, e-mail: benjamaa.lahbib@iresa.egrinet.tn, for details visit the IOBC/wprs website: <http://www.iobc-wprs.org>
- 05 - 10 October, 2004: 2nd European Whitefly Symposium, Cavtat (Croatia). – H. Aras, Institute for Adriatic Crops and Karst Reclm., PO Box 288, 21000 Split, Croatia. Tel ++385-213-16579, Fax ++385-213-16584, e-mail: Helenka@krs.hr, Web: <http://www.whitefly.org/EWSII-info.htm>.
- 25 - 31 October, 2004: 13th Botrytis Symposium, Antalya (Turkey). – Dr. Yigal Elad, e-mail: elady@volcani.agri.gov.net.il

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Workshop on induced resistance, 2-4 November 2004

The IOBC/wprs working group "Induced resistance in plants against insects and diseases" is organising a workshop dedicated to **methods in research on induced resistance**, which will be held from 2nd to 4th November 2004 in Delémont, Switzerland. The workshop can host up to 100 participants and is aimed at fostering cross-disciplinary communication and exchange between scientists of different disciplines, including entomologists, plant pathologists and plant physiologists.

The following topics will be addressed:

1. Methods on induced resistance/tolerance against insects
2. Methods on induced resistance/tolerance against diseases
3. General aspects of induced resistance/tolerance

Arrangements have been made in the centre St. Francois in Delémont, which offers meeting room, lunches and dinners and overnight accomodation at a very reasonable price. Additional hotel rooms nearby in Delémont have also been reserved.

For further details and for registration, please visit our website at:

<http://www.unine.ch/bota/IOBC/>

22 - 26 November, 2004: International Conference on Cereal Stem and Cob Borers in Africa, "Achievements and Perspectives," Nairobi, Kenya. – ICCBA Secretariat, International Centre of Insect Physiology and Ecology, PO Box 30772, Nairobi, Kenya. Fax: +254-2-860110, e-mail: ICCBA@icipe.org, <http://www.icipe.org/iccba/>

2005

30 January - 03 February, 2005: International Symposium „Ecology and Management of *Lygus* Plant Bugs“, Ottawa (Canada). – e-mail: Lygus_Symposium@hotmail.com, additional informations in the Web: www.Lygus-Symposium.org

21 - 24 March, 2005: German Congress of Entomology, Dresden. – Dr. U.M. Ratschker, TU Dresden, Forstzoologie, Pienner Str. 9, 01737 Tharandt, Tel 035203/38-31351, Fax 035203/38-31317, e-mail: dgaae@snsd.de, <http://www.snsd.de/dgaae/>

10 - 14 April, 2005: IOBC/wprs WG “Integrated Control in Protected Crops, Temperate Climate”, Naantali (Finland). – Irene Vanninen, Agrifood Research Finland (MTT), Plant Production Research, Plant Protection, 31600 Jokioinen, Finland, tel. +358-3-4188 2580, fax +358-3-4188 2584, e-mail: Irene.Vanninen@mtt.fi

01 - 03 June 2005: IOBC/wprs WG “GMOs in Integrated Production”: “Ecological Impact of Genetically Modified Organisms”, Lleida (Spain). – Dr. Jörg Romeis, Agroscope FAL Reckenholz, Eidgenössische Forschungsanstalt für Agrarökologie und Landbau, Reckenholzstr. 191, 8046 Zürich (Switzerland), Tel: +41-1-3777299, Fax: +41-3777201, e-mail: joerg.romeis@fal.admin.ch

09 - 11 June, 2005: 1st International Conference of Plant Protection and Plant Health in Europe „Introduction and Spread of Invasive Species“, Berlin (Humboldt University). – DPG and BCPC, e-mail: DPG-BCPC@dpg.phytomedizin.org

12 - 16 September, 2005: International Symposium on Biological Control of Arthropods, Davos, Switzerland. – ISBA-Sekretariat: e-mail: ISBCA@bluewin.ch, additional informations: www.cabi-bioscience.ch/ISBCA-DAVOS-2005/

17 - 21 September, 2005: **IOBC/wprs General Assembly**, Dijon (France). – Dr. Claude Alabouvette, UMR INRA Université de Bourgogne, Microbiologie, Géochimie des Sols (MGS), 17 rue Sully, BP 86510, F-21065 DIJON CEDEX, tel: +33 (0) 380693041, fax: +33 (0) 380693224, e-mail: ala@dijon.inra.fr, Web: <http://www.iobc-wprs.org>

October 2005: IOBC/wprs WG "Integrated Protection of Olive Crops", Florence (Italy). – Dr Antonio Belcari, Department of Agricultural Biotechnologies, University of Florence.

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May, 2006: IOBC/wprs WG "Protected Crops, Mediterranean Climate", Murcia (Spain). – Dr. Juan Antonio Sánchez, Instituto Murciano de Investigación y Desarrollo Agrario (IMIDA).

06 - 10 September, 2006: IOBC/wprs WG "Integrated Control of Fungal and Bacterial Plant Pathogens": "Fundamental and Practical Approaches to Increase Biocontrol Effects", Spa (Belgium). – Monica Höfte and Haïssam Jijakli.

Next Issue of Profile

The winter-issue of *Profile* (number 38) will be edited in January 2005. Please send your contributions for this issue of *Profile* to me at the latest:

3 January, 2005

but don't hesitate to contact me long before this deadline! Please send your contributions by e-mail (preferably), mail or fax to:

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