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Pest management and contemporary entomology (review of ECE 2010)

The IXth European Congress of Entomology was held in Budapest, beautiful capital of Hungary during 22-27 August 2010. According to concluding remarks of Dr. Tamás Vásárhelyi, Chairman of the Organizing Committee ECE 2010, Honorary Presidium Member, there were near 600 participants (532 registered participants, and some short time guests). More than 300 oral and more than 300 poster as well as 7 plenary presentations gave the scientific content of the Congress. Participants celebrated the 100th anniversary of the Hungarian Entomological Society (fig. 1) in the exhibition Hexapod Empire of the Hungarian Natural History Museum.

ECE was of an interdisciplinary character involving a wide range of research directions. ECE attracted taxonomists, systematics, ecologists, physiologists, toxicologists, biochemists, ethologists, experts of biocontrol. Plenary speakers were invited by the NOC (National Organizing Committee). ECE 2010 featured 7 plenary talks and 37 symposia, held in 3-5 parallel sessions, together with an Exhibition of 4 world's foremost scientific publishers (Brill, Elsevier, Wiley-Blackwell, Pensoft Publishers) and Noldus Information Technology.

Update problems and aims of pest management investigations have been elucidated in presentations and posters at the set of symposia: "Biocontrol in crops and storage"; "Biorational control of arthropod pests: mechanism and application"; "IPM challenges and prospects in annual and perennial crops"; "Role of biodiversity in pest management"; "Semiochemicals in agroecosystems"; "Xenobiotic effects and side-effects on arthropods". Symposia and poster sessions "Invasive species" and "Genetically modified plants – effects on insects" also were dedicated mainly to the pest management. 20 oral presentations and 35 posters were presented at the symposium "Biorational control of arthropod pests: mechanism and application", alike the 14 oral presentations and 30 posters presented at the symposium "IPM challenges and prospects in annual and perennial crops", the most plentiful symposia of the Congress.

In the first plenary talk of ECE (Sylvia Dorn, Switzerland, Elected Presidium Member and Deputy Chair) ecological consequences and implications of orchard pests adaptations for integrated pest management have been discussed. A. R. Horowitz, P. Ellsworth and Isaac Ishaaya briefly summarized various new environmentally friendly approaches for pest management in the presentation "Biorational control of arthropod pests: an overview". One such approach is based on disrupting the activity of specific hormones and other signaling molecules acting on specific insect receptors. Another approach is the potential use of natural products of plant origin for pest control. Novel biotechnology control strategies ("the genetic approach") were discussed. New term "Biorational control" has been proposed to replace the term "Integrated pest management". Dr. Isaak Ishaaya presented new chemical tools of pest management in his talk. Dirk Babendreier on behalf of group of Switzerland researchers presented "Framework for sustainable use of pesticides across the EU Member States: challenges and opportunities for implement IPM", about new Directive 2009/128/EC of the European Parliament. Member States must develop a National Action Plan, including targets, measures and timetables to reduce pesticide risks and hazards, as well as dependence on pesticides. An important but challenging task is the harmonization of IPM across Europe, while ensuring the environmental and economic sustainability of food production in each Member State. An example of pesticide-free pest control has been presented by Hungarian specialists, A. Pinter and F. Toth.

An important sign of ECE 2010 was the comprehension of pest resistance-susceptibility monitoring necessity.

Attempts of entomopathogenic fungi, bacteria and viruses use for pest control were presented in 12 submitted abstracts. For the most part investigations carried out in Turkey, Iran and India. Primary set of entomopathogenic fungi was little: there were *Lecanicillium muscarium*, *L. lecanii*, *Paecilomyces lilacinus*, *Beauveria bassiana* and *Metharizium anisopliae*. Their strains can infect the wide spectrum of insect species. Some results were dedicated to the

prospective investigations of synergistic effects of different origin pathogens, including joint effect of *Bacillus thuringiensis* and *Metharizium anisopliae*.

In 26 posters and presentations application for pest control of pest's parasitoids and predators examined. Various ways of biological pest control were presented in several sections: "Role of biodiversity in pest management", "Biocontrol in crops and storage", "Landscape ecology and management", "IPM challenges and prospects in annual and perennial crops, Carabid ecology". There were reports in the sections of "Role of biodiversity in pest management" and "Landscape ecology and management" which described the effect of biodiversity on pests and presented researches of methods to increase biodiversity, investigations including the impact of fertilizers, plant communities near the fields and modern agricultural technologies. Negative influence of intraguild relations is proved for small and large predators. Significant differences of species composition and number of pest's predators in plant communities of different ages, positive relationship of biodiversity and the number of flowering plants has been showed. Also results presented of a studies showing influence of the type and quantity of fertilizers on the number of entomophagous species. Increase of the number is proved for using of organic fertilizers. Laboratory researches of dependence of *Grafosoma* fecundity from application of fertilizers are presented.

Classical works on studying of biology and phenology of kinds of agents of the biocontrol: predatory beetles, parasitoids of eggs and larvae, and pathogenic nematodes have been presented in the section "Biocontrol in crops and storage". Investigations of the behavioral characteristics of parasitoids are considered. There were works generalizing experience on introduction of methods of the biocontrol in production with reception of positive results at commercial operation. Successful examples of biological control based on integrated application of entomophagous: predators and parasitoids or pathogens. For example, at cultivation of tomatoes on the closed ground high efficiency of simultaneous use predatory ground beetles and parasitoids eggs is shown. Also the problem of the most effective entering pathogenic nematodes in soil for decrease in number of *Diabrotica* has been studied.

The problems of attracting entomophagous on the field and influence of the insecticides for the ratio of pests and predators are discussed in the section IPM challenges and prospects in annual and perennial crops.

Problem of availability of pest for mass predators was announced in the section "Carabid ecology". It is a new problem and its resolve may be very important for improve methods of the biocontrol.

Although wide coverage of biological control and a large number of reports were presented at the conference, but it did not work, there were not any investigations using the methods of detection of new significant predators. Studies showing the influence of individual species on pest populations in natural conditions aren't presented at the conference.

It remains open questions about the commercial importance of biocontrol methods, reducing costs and developing new approaches.

Remarkable that in IXth European Congress of Entomology it was presented many reports based on such molecular methods, as polymerase chain reaction (PCR) and sequencing.

Some results for several insects species. was shown in separate symposia "RNA interference, a novel tool in analyzing hormone function". So, this methods was used for research in insect phylogeny, phylogeography, population polymorphism, divergence of close related species, in study of insect vector-disease transmission, insecticide resistance researches, create and investigations of transgenic plants and insects.

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Fig. 1. A bronze medal commemorating IXth European Congress of Entomology (top) and the centenary of the Hungarian Entomological Society (below).