IWGO – NEWSLETTER XXIII 1

Editorial

Dear Colleagues,

While the pure Diabrotica papers having been presented at the Meeting in Venice - Legnaro, have been published already in IWGO – NERWSLETTER XXII/1 –2 in December 2001, the rest of the papers presented at that meeting are published in this issue.

You find also the list of participants of the XXI IWGO Meeting (and the 8th Diabrotica Subgroup Meeting).

Never before so many papers have been presented at a IWGO meeting and never before so many participants took part in an IWGO meeting. Again I want to thank all of you who have attended the meeting and especially those who have presented a paper.

But the next meeting is already ahead of us: the 9th Diabrotica Subgroup meeting will take place in Belgrade, Yugoslavia end of this year. I think it is a good idea to come to the core of our European Diabrotica problem. I am sure we will get authentically information form the concerned scientists and farmers.

Harald K. BERGER
(IWGO – Convenor)

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List of Participants of the

6th FAO/TCP Meeting
7th EPPO ad hoc Panel
8th International IWGO – Workshop
XXIth IWGO - MEETING

Venice – Legnaro – Padua, Italy; October 27 - November 4, 2001

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ABSTRACTS OF THE PAPERS PRESENTED AT THE

EU – Research Project Meeting on *Diabrotica*)*
6th FAO/TCP Meeting *)
7th EPPO ad hoc Panel on *Diabrotica *)*
8th International IWGO – *Diabrotica* **Subgroup Meeting** *)
XXIth IWGO - Conference

*) The papers of the EU – Research Project Meeting on *Diabrotica*, of the 6th FAO/TCP Meeting, of the 7th EPPO ad hoc Panel on *Diabrotica* and of the 8th International IWGO – *Diabrotica* Subgroup Meeting have been published already in IWGO-NEWSLETTER XXII/ 1-2; Dec. 2001

III. XXIth - IWGO Conference

FINAL RESULTS ON ESTIMATION OF IWGO INBREDS RESISTANCE TO BORERS *Ostrinia nubilalis* Hbn. AND *O. furnacalis*

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The fundamental intention of establishing the IWGO program in 1968 was to standardize methodology on resistance testing of maize inbred lines to both, European (ECB - *Ostrinia nubilalis* Hbn.) and Asian Corn Borers (ACB - *Ostrinia furnacalis*). In order to achieve set goals, the work of maize breeders and entomologists was united and performed through several stages.

The 14-year results obtained in 14 countries of Europe, Asia and North America are discussed in this paper. As the testing stage is finished, data are unified and some questions important for maize selection can be answered.

Resistance tests were performed by plant artificial infestation with ECB/ACB egg masses. In some countries, wild population egg masses were used, while in others, egg masses of populations artificially fed were used. Depending on a country, resistance estimations data on stalk dissection. Inbreds, selected as checks, were evaluated under different encompassed

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leaf feeding scores, general damage rating, grain yield, yield response and agroecological conditions over years. According to results of resistant and susceptible standards, complexity of ECB/ACB dependence on agroecological conditions and inbred responses to larvae causing damage to them are the best observable.

The overall estimation can be determined on the basis of resistance parameters and their correspondence to yield response to damages caused by ECB larvae obtained in Zemun Polje. Significant differences were observed in all registered resistance parameters over investigation years. Inbred responses to larval damages and pest responses to agroecological conditions were also determined. Results obtained in different countries varied not only over years, but also over inbreds, signifying that the final inbred estimation should been done with caution.

Data on over 360 inbreds were catalogued according to their breeding value and shall be presented in the IWGO Newsletters.

Key words: European corn borer (ECB – *Ostrinia nubilalis* Asian corn borer (ACB - *Ostrinia furnacalis*)., inbred lines, resistance, productivity.

BEHAVIOUR OF A MONSANTO MAIZE HYBRID - DEKALB 512 Bt TO THE EUROPEAN CORN BORER (*Ostrinia nubilalis*) ATTACK IN ROMANIA

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European Corn Borer (ECB) is one of the most important pests of maize in Romania, having an unique significant generation per year. This insect can cause high yield losses, by its attack on the late whorl stage of leaves, and especially on panicle, stem and ear. Maize hybrids resistant to ECB being of economic interest, as the best method for prevention of the pest attack, mainly in USA, an experiment regarding the behavior of a Monsanto genetically modified maize hybrid (Dekalb 512 Bt) in Romanian conditions was carried out.

The experiment was performed under artificial infestation with egg-masses, usually 20 egg-masses/plant, at different vegetation stages of plants, and different climatic conditions, which generally correspond to the female egg-laying period under natural conditions. Beside the Dekalb 512 Bt hybrid two well-known Romanian hybrids, Fundulea 376 and Olt, characterized by a smaller ECB attack have been used. Separately, Dekalb 512 Bt hybrid was compared with a Romanian tolerant hybrid HSF 1071-96 and with a susceptible one HSF 1147-96. The attack estimation was done by splitting plants in autumn, during harvest, and the registration of both the length of tunnels bored in plants (cm), and the alive and dead larvae number and pupae exuviae/plant.

The results showed that, although the ECB attack was diminished because of unfavorable climatic conditions for pest during the experimental period, the registered attack values gave the possibility of a categorical differentiation regarding the tested hybrids reaction. The Dekalb 512 Bt hybrid has a very good resistance to the ECB attack in all the cases, irrespective of the vegetation stages of plants, the attack values having sporadic traces. The Dekalb 512 Bt hybrid resistance was satisfying for all infested vegetation stages, including

panicle appearance, which correspond with the evolution period of the single generation with economic importance in Romania. Although the Romanian experimental hybrid HSF 1071-96 had a decreased attack level, the genetically modified hybrid Dekalb 512 Bt was not practically attacked by ECB.

MONITORING OF CORN BORERS RESISTANCE TO Bt - MAIZE IN SPAIN: FORECAST OF RESISTANCE

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Maize is the main summer cereal crop in Spain with a cultivated area of about 450,000 ha. The Mediterranean corn borer (MCB), *Sesamia nonagrioides* Léfèbvre, and the European corn borer (ECB), *Ostrinia nubilalis* (Hübner), are key pests in most of the Spanish maize growing regions.
The commercialization of transgenic maize expressing the Cry1Ab toxin from *Bacillus thuringiensis* (Bt-maize) provides a new tool for an effective control of these two major maize pests. However, the development of resistance in target pests to Bt plants has been considered the main risk for the success of this control strategy. So far, field resistance to Bt-maize has not been documented, but it is expected that large-scale planting could result in rapid selection for resistance in field populations of corn borers.
A surface ranging from 20,000 to 25,000 ha of Bt-maize (event 176, cv. Compa CB, Syngenta) has been grown annually in Spain since 1998. Accordingly, a monitoring research project was established (funded by the Spanish Ministry of the Environment) to detect changes in susceptibility of corn borers through regular monitoring on Bt-maize fields.
Baseline susceptibility to the Cry1Ab toxin was determined for Spanish populations of MCB and ECB from larvae collected on non-transgenic maize in the most important growing areas (Galicia, Ebro, Madrid, Andalucía, Badajoz and Albacete). Annual monitoring of field populations of both species collected on Bt-maize in the same geographical areas has not revealed changes in susceptibility after three years of Bt-maize cultivation in Spain.
The expression of the toxin in Compa CB tissues is not maintained all season and, therefore, laboratory selection to induce resistance might be more relevant than in other cultivars where high expression of Bt toxin is maintained throughout the maize cycle. Laboratory selection for eight generations yielded ECB and MCB strains 5.0- and 2.2-fold less susceptible to Cry1Ab than unselected populations, respectively.

IMPACT OF Bt- MAIZE ON NON-TARGET ARTHROPODS IN CENTRAL SPAIN

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The greater specificity of Cry1Ab toxin with respect to conventional insecticides to control corn borers, and the likely reduction of the latter under a transgenic crop system should

result in a more favorable environment for the non target-arthropods in the crop. However, it has been reported from laboratory experiments that Bt-maize may have a negative impact on some natural enemies by a combined effect of Bt exposure and nutritional deficiency caused by a reduction in the quantity and quality of their food supply. Laboratory experiments are very useful to point out possible deleterious effects of Bt-maize, but they must be verified with field experiments.

In 2000 we have started a three years field-study to assess, in a commercial field (about 5 ha) near Madrid (Spain), the potential impact of Bt-maize on the abundance and diversity of non-target arthropods. Three treatments with three replicates (˜ 0.6 ha/plot) were arranged in a completely randomized block design: Bt-maize (cv. Compa CB) was compared with the isogenic cv. Dracma under conventional farm practices, with or without Imidacloprid treatment. Two sampling techniques (visual counts and pitfall traps) were used to compare their effects on non-target arthropods that comprise maize-based food webs from late June to the end of September.

Visual surveys reveal that *Orius* spp. and spiders were the most abundant predators on the maize plants. A common pattern of the frequency of *Orius* on plants was found in both years, with few specimens at the beginning of the summer and a big increase in September. Conversely, spiders were present in the plant all through the summer.

Ground beetles and spiders were the most abundant poliphagous predators found in pitfall traps in all treatments. Five carabid species accounted for 98% of the total beetles collected. Similarly, six species of spiders accounted for 97% of their total number.

No detrimental effects associated with the transgenic cultivars have been detected so far, although no firm conclusions can be drawn until these studies are completed.

THE PROJECT TO IMPLEMENT IPM STRATEGIES AGAINST *Agriotes* - SPECIES IN EUROPE: WHAT HAS BEEN DONE - AND WHAT IS STILL TO BE DONE

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In Europe many farmers apply a soil insecticide to maize at planting without any evaluation of the actual presence of an economically-damaging wireworm population. Effective, easy and inexpensive tools are needed to identify the soils that have high wireworm populations in order to ensure that treatments are only applied where necessary or to enable infested fields to be avoided. Pheromone traps might represent a solution as they monitor the only stage that lives outside the soil: the adults.

A specific project to develop effective *Agriotes* sex pheromone traps was begun in 1995. It has been developed through the following phases:

1) Collation of available information on: a) the most important *Agriotes* species that damage maize in Europe; b) the pheromones of these species;
2) Rearing of the species for which no or not enough information were available (*Agriotes brevis*, *Agriotes sordidus*, *Agriotes litigiosus* (different varieties), *Agriotes lineatus*) in order to obtain sufficient numbers of experimental insects to study;
3) Extraction of the pheromones from female's gland; gas chromatography and mass spectrometry analyses to characterize them;
4) Synthesis of components identified;
5) Field optimization (components ratio, dosage, dispenser type, etc.) of baits prepared from synthetic pheromone components;
6) Development of a trap model suitable for catching the different species;
7) Evaluation of the effectiveness of the traps in different areas with different populations.

Phase 5 to 7 were sometimes carried out concurrently. To ensure rapid development of new materials, protocols were often modified during the season in the light of results obtained. After seven years work, a non-saturable trap and different lures suitable for monitoring all the most important European *Agriotes* species (*A. brevis*, *A. lineatus*, *A. litigiosus*, *A. obscurus*, *A. rufipalpis*, *A. sordidus*, *A. sputator*, *A. ustulatus*) have been made available for all the European countries. A description of the main features of the new materials is given.

The cost to realize the phases one to six was about 300.000,-- € not including overheads and amortization of the facilities used.

What has to be done to complete the work:

- To discover the biological significance of the pheromone trap catches; determination of the actual range of attractiveness, and the relationship between males captured and level of female population.
- To establish a reliable correlation between adult trap catches and subsequent larval populations for all the species and varieties in different climatic and agronomic (mainly rotation) conditions. For both these aspects, studies have already started and the first encouraging data have been obtained. Replications in many different conditions are needed to meet the practical requirements of the effective implementation of an IPM strategy.

FIRST RESULTS OF CLICK BEETLE TRAPPING WITH PHEROMONE TRAPS IN HUNGARY 1998 - 2000

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Pheromone traps for *Agriotes* click beetle pests were operated at several sites in Hungary in 1998 - 2000 with the principal aim of determining the key pest species and to obtain information on their seasonal occurrence.

MATERIALS AND METHODS

Trials were carried out from 1998 to 2000; in the first 2 years YATLOR and VARb traps were used while in 2000 a trap design suitable for both flying and crawling species (YATLORfunnel) was used. The traps were baited with the lures for *A. lineatus, A. obscurus, A. sputator, A. sordidus, A. brevis, A.litigiosus* and *A.ustulatus*. The areas of the regions where the experimentation was carried out have the following characteristics:

Agárd, Fejér county; weedy edge of fields; latitude: 48°51'; ph: 7.3, kind of soil: brown chernozyom, yearly average temperature: 11.1°C (1998); 11.2°C (1999); 12.2°C (2000), total rainfall: 697 mm (1998); 795 mm (1999); 403 mm (2000), common cultures: maize, sunflower, wheat, rape, sugar beet, alfalfa.

Tedej-Hajdúnánás, Hajdú-Bihar county; alfalfa fields; latitude: 48°29'; ph 7.3, kind of soil: brown chernozyom; yearly average temperature 9.8°C; average rainfall 556 mm, common cultures: wheat, maize, sugar beet, alfalfa.

At each site two traps of each bait type were operated.

RESULTS

During the tests at both sites regular catches of *A. sputator, A. lineatus, A. rufipalpis* and *A. ustulatus* were observed in traps baited with the respective baits. Catches in these traps were highly selective; only in traps baited with the *A. lineatus* bait were sporadic catches of *A. sputator* observed. In the course of our trappings the pheromone traps could readily follow seasonal occurrence of all four species captured in greater numbers.

No catches were observed in traps baited with *A. litigosus* or *A. obscurus* baits. In traps baited with *A. brevis* baits all specimens captured proved to be *A. sputator*, evidently coming to the one component of the *brevis* bait.

The results suggest that the most abundant and economically important click beetle species in Hungary include *A. sputator, A. lineatus, A. rufipalpis* and *A. ustulatus.* From these the importance of *A. sputator, A. lineatus* and *A. ustulatus* has been realized in earlier plant protection literature. *A. rufipalpis*, although known to be present in Hungary, so far has not been thought to be an important pest. Based on our results its pest status should be reconsidered.

The conspicuous absence of *A. obscurus* from the present trappings is highly interesting as this species was listed as one of the most abundant pest elaterid in earlier literature. The cause of this discrepancy has to be the subject of further studies.

In soil samplings performed at Debrecen in 1999 and 2000 at the sites of the trappings no or negligible numbers of click beetle larvae were found, suggesting that numbers trapped in the present study still do not represent an economically important population level.

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SEASONAL FLUCTUATION OF ADULT AND LARVAE *Agriotes* spp. (COLEOPTERA: ELATERIDAE) IN CENTRAL GREECE.

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The seasonal abundance of adults and larvae of five wireworm species (Coleoptera: Elateridae) was examined in Velestino, Magnesia, Central Greece (latitude 39°22', yearly average rainfall 450 mm, yearly average temperature 14.37° C) during years 1999-2001. Sex pheromone (YATLOR (2000), YATLOR funnel (2001) and VARb (1999, 2000)) and soil bait traps were used and soil samplings were made. Different combinations of the various types of traps were installed each year in the experimental field. Sex pheromone traps operated from April to September. Soil bait traps were installed for 15 days in April (covered soil). October and November (bare soil) respectively. Soil samplings were performed in April and October-November every year at a depth of 30 cm. The species *Agriotes rufipalpis* Brullè and *Agriotes litigiosus* Rossi were examined in all three years, while *Agriotes lineatus* L., *Agriotes brevis* Càndeze in 1999, and *Agriotes obscurus* L. in 2000. The swarming period of *A. rufipalpis* and *A. litigiosus* lasted from late March to mid September and from early May to early July with two peaks in late April and early June and one peak in late May, respectively in all three years. In 1999, 660.5 and 256.5 adults per pheromone trap of *A. rufipalpis* and *A. litigiosus* were captured, respectively. Adults of *A. brevis* were not caught and only three adults of *A. lineatus* were captured. During 2000, 2443.8 and 248.7 adults per trap of *A. rufipalpis* and *A. litigiosus* were captured, respectively. No *?. obscurus* insects were caught in the pheromone traps. In 2001, 6721.8 adults of *?. rufipalpis* and 218.8 adults of *A. litigiosus* were captured. In 1999, no larvae were found in both soil bait traps and soil sampling. In 2000, larvae of *A. rufipalpis* only were captured in soil bait traps, three, six and eight all out of 33 traps/month, in April, October, and November, respectively. In March 2001, 12 larvae *A. rufipalpis* and one *Melanotus* sp. were found out of 44 soil bait traps. In soil samples, four larvae *A. rufipalpis* were found, two in November 2000 and two in April 2001 out of 33 and 44 samples respectively.

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FIRST PRACTICAL RESULTS OF CLICK BEETLE TRAPPING WITH PHEROMONE TRAPS IN ITALY

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The potential suitability of sex pheromone traps for implementing IPM strategies against *Agriotes* populations was first suggested at XIX IWGO Conference in Portugal. Later on the efficacy of the new *Agriotes* sex pheromone traps in detecting different species and populations was demonstrated at XX IWGO Conference in Adana. The first practical implications of the use of the new traps in Italy are described.

MATERIALS AND METHODS

From 1999 to 2001 trials were done in six different Italian regions: Veneto, Piemonte, Emilia Romagna, Lazio, Calabria, Sicilia. The areas studied have very variable climatic and agronomic conditions. Latitude ranged from 37°- 39°C of the Southern regions (Sicily and Calabria) to 45 – 46°C of the Northern regions (Veneto and Piemonte). Acid soils are present in Piemonte (North) and Southern regions while in the other ones basic soils are prevalent. All trials were done using a common protocol. In the first 2 years YATLOR and VARb traps were used while in 2001 a trap design suitable for both flying and crawling species (YATLORfunnel) was used. Individual traps were baited with the lures for one of the following species: *Agriotes lineatus, A. obscurus, A. sputator, A. sordidus, A. brevis, A.litigiosus, A.ustulatus*. Larval population was estimated by using bait traps and soil sampling.

RESULTS

Detection of the key species in the different areas: as to the regions in Northern Italy data were completely in agreement with those regarding the larvae found damaging crops in Po Valley over an eighteen years study. In the Eastern part (Veneto and Friuli) only larvae of 3 species (*A. ustulatus*, *A. sordidus*, *A. brevis*) were found damaging the main herbaceous crops and only the pheromone traps for these 3 species captured conspicuous numbers of adults. In Emilia Romagna only adults of *A. litigiosus*, *A. brevis* and *A. sordidus* were captured in high numbers and only larvae of these 3 species were reported as damaging maize and other crops. In Piemonte, besides the species above mentioned, also *A.lineatus* larvae were found damaging maize seedlings and this was the only region where *A. lineatus* click beetles were captured. Also few specimens of *A. obscurus* were captured in the area where one larva of the species was found in a maize field damaged.

No reliable information regarding the *Agriotes* larvae damaging crops in central and south Italy was available so far. The pheromone traps allowed understanding that the same species present in Northern Italy are the key soil pests also in these regions with the exception of *A. ustulatus*. All the other species are present everywhere; *A. sordidus* conspicuous populations were recorded at almost all the sites studied. *A. sputator* and *A.*

rufipalpis were not found in any of the areas while males of minor species were found in some traps (*Agriotes acuminatus* both in Northern and Southern regions).

Traps sensitivity and relationship between pheromone trap catches and wireworm population levels: the sex pheromone traps proved to be much more sensitive than the tools used to monitor larval populations; numbers of click beetles generally appear to be in correlation with the larval populations estimated by soil sampling and bait trapping both in Northern and Southern regions. For example in Calabria example conspicuous numbers of *A. lineatus* males were caught in fields where only larvae of this species had been found in bait traps and damaged plants. Regional differences in swarming patterns of the same species were clearly detected. In Veneto and Emilia Romagna first studies to forecast the wireworm damage on maize were done by using the pheromone traps.

Acknowledgements: we thank very much Dr Giuseppe Platia who gave very helpful support to identifying the specimens and Dr Giancarlo Bourlot and Annalisa Turchi who organized and carried out the work in Piemonte.

TWO – YEARS RESULTS OF MONITORING OF CLICK BEETLES AND WIREWORMS IN SLOVENIA

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Ten species belonging to the genus *Agriotes* has been reported present in Slovenia so far: *A. atterimus* L., *A. acuminatus* Steph., *A. ustulatus* Schall., *A. litigiosus* Rossi, *A. pilosellus* Schönh., *A. lineatus* L., *A. obscurus* L., *A. sputator* L., *A. medvedevi* Dolin, *A. brevis* Cand. Wireworms are reported to damage the small plants of maize, sugar beet, vegetables and potato. Estimation of larval population in the soil is difficult and time consuming but it is needed to identify the soils that have high wireworm populations in order to ensure that treatments are only applied where necessary or to enable infested fields to be avoided. In order to find an easier tool to sample wireworm populations Biotechnical Faculty of Slovenia decided to participate to the international project "The effectiveness of *Agriotes* sex pheromone traps in implementing IPM strategies" from 2000. In the first year YATLOR and VARb traps were used while in 2001 a trap design suitable for both flying and crawling species (YATLORfunnel) was used. Individual traps were baited with the lures for one of the following species: *A. lineatus*, *A. obscurus*, *A. sputator*, *A. sordidus- A. rufipalpis* (the same pheromone compound can capture *A. sordidus* males), *A. brevis*, *A.litigiosus*, *A.ustulatus.* In both years the monitoring period was from March (from May for *A. ustulatus* in *A. litigiosus*) to the end of August. Larval population was estimated by using bait traps and soil sampling. Bait traps were placed out in April and September, before and after the swarming period. In 2000 monitoring was carried out in two locations: one in central Slovenia in Ljubljana and one in Eastern Slovenia, in Lendava. In year 2001 the number of locations was increased to five in Central and Eastern Slovenia: Ljubljana, Komenda, Žalec, Zagorje, Lendava). At all sites soils are acid. The traps appeared to be selective enough to distinguish *A. sputato*r and

A. brevis despite these two species being systematically very close. *A. litigiosus, A. sordidus* and *A. rufipalpis* were not found in any of the locations studied. The dominant species were: *A. lineatus* in Ljubljana - high population level (more than 500 specimens per trap per season, 1743 specimens in 2000 and 474 in 2001); *A. obscurus* and *A. sputator* in Lendava – medium population level (247/18 specimens *A. obscurus*, 263/470 specimens *A. sputator* in 2000/2001*); A. ustulatus* in Komenda high population level (1117 specimens in 2001); *A. sputator* in Zagorje – high population level and *A. sputator* in Žalec - medium population level (261 specimens in 2001). The efficacy of the pheromone traps in detecting the regional variations of swarming patterns of the species is discussed too.

THE EFFICACY OF THE NEW AGRIOTES SEX PHEROMONE TRAPS IN DETECTING WIREWORM POPULATION LEVELS IN DIFFERENT EUROPEAN COUNTRIES

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First data on the effectiveness of the new *Agriotes* sex pheromone traps in different European countries with different species and populations were presented at XX IWGO Conference in Adana, Turkey (1999). In subsequent years traps were tested in new countries throughout Europe, enabling the relationship between pheromone trap catches and wireworm population levels to be studied under a range of climatic and agronomic conditions.

MATERIALS AND METHODS

From 1999 to 2001 trials were done in the United Kingdom (5 different localities), Eastern Croatia, Central Romania; in 2000 - 2001 in Bulgaria. In 2001 only, additional trials were done in Central Eastern Romania, Germany and Central Croatia. All trials were done using a common protocol. In the first 2 years YATLOR and VARb traps were used while in 2001 a trap design suitable for both flying and crawling species (YATLORfunnel) was used. Individual traps were baited with the lures for one of the following species: *A. lineatus*, *A. obscurus*, *A. sputator*, *A. sordidus*, *A. rufipalpis*, *A. brevis*, *A.litigiosus*, *A.ustulatus*. The areas of the regions where the experimentation was done have very variable climatic and agronomic characteristics. Latitude ranged from 42° in South eastern regions to 56° in the most northern region of the UK. In most cases the soils were acid. Larval population was estimated by using bait traps and soil sampling.

RESULTS

In all regions conducting studies the pheromone traps were confirmed to be a sensitive tool for detecting the key wireworm species present. At all sites in the United Kingdom only three species (*A. lineatus, A. obscurus, A. sputator*) were captured. *A. obscurus* was the dominant species. In acid fields of the other nations a different species range was found. In Bulgaria *A. brevis* and *A. lineatus* appeared the dominant species while *A. ustulatus* was dominant in Germany and Eastern Croatia. The traps appeared to be selective enough to distinguish *A. sputato*r and *A. brevis* despite these two species being systematically very close. *Agriotes litigiosus* and *Agriotes sordidus* were not found in any of the nations studied while males of minor species (also not *Agriotes*) were found in some traps (for example *Cydnopus pilosus* in Bulgaria). The response of the different species to the different monitoring tools was very variable; for example very high numbers of *A. lineatus* males were captured by the sex pheromone traps at sites (e.g. Croatia, Romania) where bait traps for larvae and soil sampling recovered few or no larvae specimens. In contrast traps for *A. ustulatus* caught 2-3 times less adults than the *A. lineatus* traps cited above in fields with conspicuous *A. ustulatus* larval populations. Generally the sex pheromone traps proved to be a much more sensitive tool than soil sampling and bait traps for larvae. For all species traps were able to detect wireworm populations below those that can be reliably detected using soil sampling and bait trapping. In addition pheromone traps proved to be effective in detecting the regional variations of swarming patterns of the same species.

Acknowledgements: we thank very much Dr Giuseppe Platia who gave very helpful support to identifying the specimens.

MONITORING OF *Agriotes* spp. WITH COMPONENTS OF SEX-PHEROMONES MAINLY IN SEVERAL ARABLE CROPS

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Wireworms are the main soil pest in many arable and vegetable crops. Current chemical protection is primarily based on soil treatment with chlorpyrifos and ethoprophos, which are in general discussed as environmentally usable products. This type of soil protection depends on presence or absence of wireworms by baiting, a hardly accurate and very laborious method. PPO is developing a new strategy to control wireworms by monitoring the adult clickbeetles. The clickbeetles were trapped by pitfalls covered by a lid added with pheromone dispensers. The main components of species dependent sex pheromones were used to monitor five *Agriotes* spp. in different vegetation. *A. lineatus*, *A. obscurus* and *A. sputator* were highly present, whereas no *A. brevis* and *A. ustulatus* were caught. *A. sputator* were most caught in the verge, only a few number were found in fields for arable production. *A. lineatus* and *A. obscurus* were common in grass seed, barley and the verge. All three species were caught in potato fields but in much smaller numbers. The component mixture of 95 % geranyl octanoate and 5 % geranyl butanoate attracted nearly 100 % *A. lineatus*. The mixtures used to attract *A. obscurus* (50 % geranyl octanoate and 50 % geranyl hexanoat) and *A. sputator* (80 % geranyl butanoate and 20 % farnesyl hexanoate) were rather species specific. Possibilities of practical implementation in integrated farming of sex-pheromones as a supervised control system in crop protection are discussed.

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OBJECTIVES OF THE RESEARCH ON CLICK BEETLE SPECIES IN KUBAN REGION

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Wireworm species has been regarded as a danger for the crops in Kuban region (Southern Russia) for many years. Over the past years wireworm outbreaks were observed mainly in fields where high amounts of soil insecticides had been applied to crops in the previous years. The main click beetle species detected in Kuban region are: *Agriotes tauricus Heyd.*, *A. gurgistanus Fald*. and, usually less harmful, *A. sputator L*, *A*. *lineatus L*, *A. ponticus Step*., *A. obscurus L*., and *Melanotus fusciceps Gyll*., whose pheromones have not been completely studied yet.

The current main objectives of the research on click beetles in Kuban region are the following:

- synthesis of click beetle pheromones attracting females;
- designing a new pheromone trap for monitoring and mass trapping for integrated pest management; these traps not catch useful insects;
- field optimization of pheromone baits for *Agriotes* populations occurring in Kuban region;
- detection of repellent to wireworms substances derived from tartaric acid to be used as seed dressing;
- creating pheromone analogues for click beetles. For example thiogeranyl butyrate, *trans* - geranyl crotonoate or L - α - alanine geranyl ester, reconstructed forms of a single pheromone substance of *A. gurgistanus* Fald. might be added to synthetic pheromones to obtain synergistic effects and therefore a more effective tool for mass trapping or mating disruption.

Acknowledgment: the study was partly supported by RFBR – south grant ? 00-04-96032.

FUTURE EUROPEAN PRIORITIES FOR WIREWORM RESEARCH

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INTRODUCTION

The basis for the intensive use of insecticides for the control of wireworms is largely unsubstantiated, and may well have negative economic and environmental effects. Despite this, basic research on *Agriotes* species has been neglected for many years. However, in recent years, a number of European countries have initiated research programs on wireworms covering topics such as biology, novel risk assessment techniques, thresholds and chemical and non-chemical control. This reflects growing concerns about wireworms in Europe, and the relative lack of current research effort on wireworms in North America,

where such work is no longer seen as a priority. The results from recent work done on wireworm biology and new monitoring devices are described in other presentations of the XXI IWGO Conference. Nevertheless, active wireworm researchers in Europe are not fully aware of the efforts of scientists in other countries. There is therefore a lack of standardization or comparison of experimental techniques, and no overt prioritization and co-ordination of research goals. Some 'unofficial' co-ordination of work has been done under the auspices of the IWGO, but this needs to be extended into all areas of European wireworm research.

RESEARCH PRIORITIES

As a starting point for formulating a bid to the European Commission (assuming a suitable theme is identified under the Framework VI Program or LIFE), we propose that the following research themes are those which have the highest priority in terms of preventing over-use of insecticides for wireworm control:

Theme 1: Biology of wireworms of agricultural importance
Completing studies on the biology of the key wireworm species through controlled experimental studies, particularly the duration of the larval (wireworm) phase of the life-cycle; comparative work on the same species in different countries to determine the extent to which life-cycle duration is innate or governed by climatic factors.

Theme 2: Development and validation of novel risk assessment techniques
The evaluation of the relationship between catches of click beetles recorded by using the new sex pheromone traps and the level of wireworm infestation in the soil.

Theme 3: Development of sustainable control techniques
Determine of the level of damage caused by different population of wireworms to crops grown in participating countries. This work will improve the scientific basis of predicting damage caused by wireworms, and will enable those fields unlikely to benefit from insecticide treatment to be identified reliably.

EXTENSION PRIORITIES

Specific efforts must also be made to transfer the information gathered to farmers in all participating countries. This will be done by writing a booklet on best practice in wireworm management that can be posted on a web-site, translated into the languages of participating countries, and used as a resource by national extension agencies from which to produce local promotional material.

GENETICS OF RESISTANCE TO PINK STEM BORER ATTACK IN FLINT MAIZE POPULATIONS

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The most important maize pest in northwestern Spain is the pink stem borer (*Sesamia nonagrioides* Lef.). Evaluations under infestation conditions have revealed that some maize inbreds and populations could bring resistance genes to pink stem borer attack. More studies, however, should be addressed to look for new sources of resistance and to know

how to manage those materials in a selection program to develop varieties resistant to *Sesamia nonagrioides*. The objective of this work was to know the genetic effects involved in the resistance to *Sesamia nonagrioides* in a diallel among diverse flint maize populations. That knowledge will allow us to design the most suitable selection program to develop resistant varieties. Ten flint maize populations, seven of them from diverse areas of Spain, two from Argentina and one from United States, were crossed following a diallel design. The diallel was analyzed following Gardner and Eberhart's design. The 45 crosses, plus ten populations, plus a check hybrid were evaluated under infestation with *Sesamia nonagrioides* at Pontevedra (northwestern Spain) in 1998 and 1999. Tunnel length and general appearance of the ear were recorded as estimates of damage produced by the pink stem borer larvae on stems and ears, respectively. There were significant differences among genotypes and non significant genotype × environment interactions for tunnel length and general appearance of the ear. Variety effects were the only significant effects for tunnel length. Variety and average heterosis effects were significant for general appearance of the ear. Therefore, the additive gene action was the most important in the inheritance of the resistance to *Sesamia nonagrioides*. The population Basto/Enano levantino (Ba/El) showed the best variety effect for tunnel length and was among the populations with the most favorable variety effects for general appearance of the ear. Ba/El could be the base material in a recurrent selection program to develop flint maize resistant varieties.

YIELD LOSSES CAUSED BY LEPIDOPTEROUS PESTS ON SECOND CROP MAIZE IN ÇUKUROVA REGION OF TURKEY[*)]

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Lepidopterous pests, *Spodoptera exigua* Hbn. *Sesamia nonagrioides* Lef., *Ostrinia nubilalis* Hbn., *Pseudaletia unipuncta* Haw., *Heliothis armigera* Hbn. and *Spodoptera littoralis* (Boisd.) cause yield losses in economically significant level in second crop maize in Çukurova Region of Turkey. The yield losses caused by the lepidopterous pests on the most common hybrids, Pioneer P-3394™, DeKalb DK-698™, Funks G-4207™, Cargill C-7993™, Limagrain LG-60™ and Sandoz PX-9540™, were studied in Dogankent Agricultural Research Institute between 1995 and 1996.

Experiments were set up in a randomized complete block design with in a split-plot arrangement with 5 replications. Hybrid varieties were main plots and insecticide application (applied or non applied) was the sub plots.

Interactions among varieties, insecticide applications and variety by insecticide applications were found statistically significant at 0.01 and 0.05 levels in both years. Yield was higher at pesticide-applied plots comparing to non-pesticide applied plots. In 1995, yield increase due to pesticide application was over 30 % for P-3394, DK-698, PX 9540, and LG-60; but about 20 % for two other varieties. However, yield increase did not exceed 20 % in 1996 for any

[*)] not presented at the meeting

varieties, even it was as less as 10 % for P-3394. These data showed that yield losses due to the lepidopterous pests could reach 40 % in varieties and years.

Key words: Yield losses, maize varieties, lepidopterous pests, second maize crop

THE EFFECTS OF DIFFERENT IRRIGATION SYSTEMS ON INUNDATIVE RELEASE OF *Trichogramma evanescens* Westwood (Hymenoptera: Trichogrammatidae) AGAINST *Ostrinia nubilalis* Hübner (Lepidoptera: Pyralidae) IN THE MEDITERRANEAN REGION OF TURKEY[*)]

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This study was conducted to determine the effects of different irrigation systems on inundative releasing the egg parasitoid, *T. evanescens* against *O. nubilalis* in maize in Çukurova Region of Turkey in the years of 1999-2000.*O. nubilalis*, *Ephestia kuehniella* Zeller (Lepidoptera: Pyralidae) and *T. evanescens* were reared in a climatic room under constant temperature (25±1ºC), relative humidity (65±10 %) and appropriate light regime for three species.

T. evanescens was applied two times at a rate of 75.000 parasitoid/ha with 10 days interval at the beginning of the oviposition period of third generation of *O. nubilalis* in the second crop maize. It was found that irrigation was an important factor for effectiveness of *T. evanescens* and significant differences in two irrigation systems were obtained. The efficiency of *T. evanescens* was higher in the flooding irrigation than the sprinkle irrigation. Egg parasitism was 81.06% and 84.31% in the flooding irrigation; 66.37% and 69.26% in the sprinkle irrigation in 1999 and 2000 respectively. The reduction of infested plant with *O. nubilalis* was 80.00% and 88.31% in the flooding irrigation, 60.71% and 68.85% in the sprinkle irrigation respectively. Also, the yield was increased approximately 150-200 kg/per ha in the flooding irrigation system than the other one. In conclusion, maize is a very important and widely planted agriculture product in the Çukurova Region. Especially, *O. nubilalis* is a main pest on the second crop. So far, it was controlled at least three application in 10 days interval by chemicals. After this research, for releasing *T. evanescens* to *O. nubilalis* showed that the better control than the insecticides. Because of these, in near future to conduct the biological control against *O. nubilalis* with egg parasitoids will be effective in this region of Turkey.

[*)] not presented at the meeting

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METHODS FOR ASSESMENT THE EFFIENCY OF CHEMICAL AND BIOLOGICAL TREATMENTS IN THE REDUCTION OF ECB (*Ostrinia nubilalis* Hbn.) IN TRANSYLVANIA

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In this paper are presented some methods for estimating of yield losses caused by European Corn Borer (*Ostrinia nubilalis* Hbn.) to maize crops. All the methods are based on a large number of weighing and notations during 1998-2000. The 4 methods presented are: frequency of damages plants (K=0,219), mean number larvae of plants damaged (K=0,180 for one larva), degree of damaged plants in according to rating scale (1-5): (2=0,15; 3=0,30; 4=0,50; 5=0,80). In maize crops from Transylvania, the yield losses depending on attack frequency, attack degree and the number of larvae were between 15,4-23,7%, at 10 maize hybrids created at Agricultural Research Station Turda.

This damages caused by *Ostrinia nubilalis* Hbn. at maize crops, determinates the application of some biological and chemical methods unpolluting the medium and the feeding products. Such as biological methods in this pest control, were used a few species of *Trichogramma,* the biological products, the chitin inhibitory and the some chemical selective products. The efficiency of chemical products was between 25-71%, of biological products was between 40-65% and of *Trichogramma* species between41-75%, regarding the reduction attack of *Ostrinia nubilalis* Hbn.

Key words: Maize*, Ostrinia nubilalis* Hbn., the yield losses, the treatments

IL FEROMONE SESSUALE DI POPOLAZIONI ITALIANE DI *Sesamia cretica* (LEDERER) (LEPIDOPETRA: NOCTUIDAE).*)

Sex pheromone of the Italian population of *Sesamia cretica* (Lederer) (Lepidoptera: Noctuidae).

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RIASSUNTO

Sesamia cretica (Lederer) è uno dei principali fitofagi dannosi alle coltivazioni di mais delle aree circum-mediterranee e dell'Africa centro-settentrionale.
Studi di campo hanno evidenziato che cis-9-tetradecenolo e cis-9-tetracedecenil acetato, nel rapporto di 3:1, sono in grado di catturare intensamente i maschi di popolazioni africane di *S.*

*) only available in Italian

cretica. Tuttavia, gli attrattivi sintetici utilizzati in campo hanno mostrato una ridotta attività attrattiva efficace, si è ritenuto opportuno identificare i composti presenti nella ghiandola verso i maschi della popolazione italiana.Allo scopo di individuare una miscela feromonica delle femmine.

Sono state effettuate diverse estrazioni (in solvente e dall'aria) dagli apici addominali di femmine vergini. L'analisi degli estratti, mediante gascromatografo abbinato ad elettroantennografo (GC-EAD) o spettrometro di massa (GC-MS), ha confermato la presenza di Z9-14:OH e di Z9-14:Ac nel blend feromonico della popolazione italiana di *S. cretica*. Tali composti hanno evocato, nei maschi, le risposte elettroantennografiche più elevate allorché confrontati con gli isomeri (cis e trans) di alcoli ed acetati monoinsaturi a 14 e 16 atomi di carbonio. Analisi quantitative, mediante gascromatografia, hanno permesso di determinare le quantità e i rapporti con cui i composti sono rilasciati da singole femmine vergini.L'attività biologica delle sostanze identificate è stata esaminata in campo utilizzando trappole ad olio innescate con i composti singoli e in miscela.Gli autori hanno contribuito in parti uguali.

Ostrinia nubilalis POPULATION LEVELS IN NORTH EASTERN ITALY: LONG PERIOD DATA AND PRACTICAL CONSIDERATIONS

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In Northeastern Italy *Ostrinia nubilalis* (ECB) is usually present at high levels and regarded as a main problem by most farmers. Therefore ECB population levels and behavior have been studied for many years. A summary of data collected from 1982 to 2001 is given.

MATERIALS AND METHODS

The swarming period of ECB has been studied by using light traps and Hartstack traps baited with Isagro E/Z caps placed in large maize field. The numbers of moths caught have been compared with the presence of egg clusters that was estimated by observing 1000 plants twice per week. At harvest time the number of larvae and tunnels per plant were recorded. In addition in 2000 the effect on ECB populations of insecticides treatments was evaluated; three theses were compared: insecticide (Decis 1 Kg/ha) treatment every 8 – 10 days, insecticide treatment at the peak of egg hatching, untreated.

RESULTS

First generation damage was usually low while all the plants after the second generation were injured by the larvae. The highest eggs parasitization rate (by *Trichogramma* spp.) was observed in 1982: 33% while in other years ranged between 11 to 24%. The number of larvae and tunnel per plant ranged from 0.5 (2000) to 2-3 in most of the other years. At the highest one *Lydella thompsoni* pupae out of 5 plants was observed. The peak of eggs presence usually occurred in the second ten days of August, about 15 days later from the peak of moth presence and several days after the period when most of treatments in normal farms had been done. Light traps only recorded conspicuous captures while the sex pheromone traps gave no reliable data (no more than 10 moths per season).

Many treatments only slightly improved crop protection in comparison with one treatment in the appropriate period.
Light traps and observation of the eggs only gave reliable information about ECB population development.

The research was partly funded by HGD S.r.L.

A NEW PRODUCT - CRUISER 350 FS® FOR MAIZE AND SUNFLOWER SEED TREATMENT AGAINST *Tanymecus dilaticollis* Gyll.

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Maize leaf weevil *Tanymecus dilaticollis* is the most dangerous soil pest of maize and sunflower, the first ranged spring field crops in Romania. This pest is able to induce high yield losses and even compromise crops. The seed dressing with carbofuran products provide satisfactory protection of these crops against the pest. This method replaced the use of organochlorine insecticides applied, for many years, as dusts, which contributed to environmental pollution and the destruction of useful fauna. However, the very high toxicity of carbofuran to man and animals, as well as a tendency for *T. dilaticollis* to develop tolerance to this compound, necessitated the development of seed treatments using less toxic products, such as Cruiser 350 FS®.

The experiments were done in the laboratory, under artificial infestation, and in the field, in plots cropped successively over the last three years with maize, thus favoring pest reproduction. The efficacy of the Cruiser 350 FS®, a thiamethoxam - based product, was compared with a carbofuran - based product, as a standard. Evalution of chemicals was done in relation to values of attack intensity, and the percentage of plants escaping pest attack for field trials only. The behavior of maize and sunflower hybrids to Cruiser 350 FS® was examined in several localities under field conditions. The percentage of emerged plants was assessed in treated and untreated plots.

Trials performed revealed very good results obtained by the use of Cruiser 350 FS®, providing satisfactory protection of maize and sunflower crops against *T. dilaticollis.* As differences between the rates are not high, that means from economic standpoint the doses of 315 g a.i./100 kg seed for maize, and 350 g a.i./100 kg seed for sunflower are most interesting. Being a product with much lower toxicity than older alternatives it is possible for unauthorized persons to apply this seed treatment, which is not permitted when using carbofuran. All maize and sunflower hybrids trials showed good tolerance to the Cruiser 350 FS®, at the experimental rates used.

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CONTROL OF WIREWORMS *(Agriotes spp.)* IN SOME FIELD CROPS BY SEED TREATMENT IN ROMANIA

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The main poliphagous pests of almost all field crops in Romania, are wireworms which belong to *Elateridae species.* The significant species are: *Agriotes ustulatus* (40.1%), *A. obscurus* (17.3%), *A. sputator* (11.3%), *A. flavicornis* (10.9%), *A. pilosus* (6.9%). Annually, the wireworms attack 800.000 ha. approximately. The recorded densities in different crops vary from 5-10 larvae/mp up to 70-100 larvae/mp, which can induce attack levels up to 25-30% in wheat and barley crops, and 40-65% in maize and sunflower crops. The researches regarding the utilization of seed treatment are very important now, when organochlorine insecticides applied, for many years, as dusts have been prohibited.

The experiments were performed in the field, in plots cropped with wheat, barley, maize and sunflower. The efficacy of the chemicals was established on the basis of the attack frequency. The seed treatment of the winter spiked cereals, was realized with lindan-based products. The efficacy of the different formulations against wireworms was about 85%. Due to the good experimental results, numerous insectofungicide mixtures based on lindan and one or more fungicides (carbendazim, carboxin, diniconazol, miclobutanil, prochloraz, tebuconazol, thiophanate methyl, thiram, triadimenol) were obtained, and registered in Romania. Using one of these mixtures, a good simultaneous protection against both wireworms and some specific pathogens (*Tilletia spp., Fusarium spp.* in wheat, and *Ustilago nuda, Pyrenophora graminea* in barley) was assured.

For maize and sunflower seed treatment, different active ingredients (acetamiprid, bifenthrin, carbofuran, fipronyl, furatiocarb, imidachlopride, thiamethoxam) have been experimented. As a result of their good efficacy, up to 80%, many products were registered and promoted into production.

The seed chemical treatment method represents the most important, efficient, economic and almost unpolluted measure for the control of wireworms in various field crops, and for the prevention of the diseases spreaded by seed and soil, in wheat and barley crops only.

Acknowledgments: The authors thank to I.Voinescu, E.Trotus, E.Bucurean, S.Vasilescu, L.Petcu, T.Manole, V.Brudea for their contribution to this work.

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RESEARCHES REGARDING INFLUENCE OF ROUNDUP TREATMENT AND ROUNDUP READY® CORN CULTIVATION ON USUAL FAUNA

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The new technology of corn cultivation, based on using of genetically modified corn hybrids, through inducing herbicides (glyphosate) resistance, have offered to us the possibility to observe if there are some influence of this new technology on *Lumbricus terestris* L. or on surface fauna captured in Barber traps in field.

Experiences have had 2 objectives: - Studying, in 2000, of ROUNDUP® treatment influence in plots with ROUNDUP READY® corn (AW 661–RR) and check (AW 661) on night crawler, by sampling at 25 and 50 cm deepest; -Evaluation of epigeal fauna, captured in Barber soil traps/plot, in experimental plots cultivated with ROUNDUP READY® corn (AW 661–RR) and check (AW 661) in an usual technology and minimum tillage technology.

Evaluation of epigeal fauna, captured in 10 barber soil traps/plot, by 9 times weekly opened for 24 hours, during May 23 –September 15 IX – 2000, in plots with ROUNDUP READY® corn (AW 661–RR) and check (AW 661) and 8 times biweekly opened for 48 hours, during June 6- September 10 in plots with the same hybrids but cultivated with minimum tillage, after two times disk harrowing, in stubble field and lawn field, comparative with usual cultivation after ploughing.

The number of *Lumbricus terestris* L. in field was between 22.25 - 70.25/square meter at depth of 25 cm and between 4 and 29/square meter at depth of 50 cm, depending of time.

Captured species in Barber traps has shown that taking into consideration number of Arachnids, Miriapoda or Insects there are not significant differences between these taxons in experimental plots. Also for the main useful Coleopteran species *Harpalus distinguendus*, *Pterostichus cupreus*, *Pterostichus vulgaris*, *Pterostichus melas* and neutral Heteropteran *Pyrrochoris apterus* there are no significantly differences between different corn cultivation techniques.

It was concluded that herbicide treatment or cultivation of Roundup Ready® corn, genetically modified, has no influence on *Lumbricus terrestris* or main species captured on Barber traps.

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ABUNDANCE AND SPATIAL DISTRIBUTION OF SPIDER MITES (ACARI: TETRANYCHIDAE) POPULATIONS ON CORN FIELDS (PORTUGAL)*)

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Some species of spider mites (*Tetranychus* spp.) are maize pests in some areas of Europe where corn is an important food source. Those species have the potential to develop high populations that may result in significant yield reductions. Feeding damage is therefore cumulative; mite feeding reduces chlorophyll content of leaves and may interfere with vascular tissue.

In 1998, a field survey was conducted, at Baixo Alentejo (Portugal), in order to evaluate abundance and spatial distribution of mites in 3 maize fields. These maize fields were sampled on a weekly basis, from tassel to grain-filling growth stages, when mites densities can increase rapidly and the crop is the best (and probably the only one) host for this pest.

Each field sampling consisted of 3 groups of fifty leaves and the maize growth stage was recorded each week. The leaves were randomly selected and removed from each third of the plants (lower, middle and upper thirds); the samples were identified with the field, date and the third of plant which was sampled. Each leaf was carefully observed under a dissecting microscope and the number of mites (females and males) per leaf and the number of infested leaves were recorded.

The average rate of plant damage was also determined, for each field under study, and for each plant third, using a 1-10 rating scale: 1= 1-10 % of the leaf area damaged by mite feeding to 10= 91-100 % of the leaf area damaged.

The abundance and the within-plant distribution of these spider mites were described and the average plant damage rating was determined for each field.

Index terms: *Tetranychus* spp., spider mites, special distribution, plant damage rating, maize.

*) not presented at the meeting

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SEASONAL APPEARANCE OF CEREAL AND MAIZE APHIDS IN GREECE AND FACTORS ASSOCIATED WITH BYDV EPIDEMIOLOGY IN MAIZE

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The epidemiology of BYDV in Greece and its economic importance in cereal crops have not been studied in detail. In this study, the seasonal appearance of aphid species, the life cycle category of *Rhopalosiphum padi* and *Sitobion avenae* and various factors affecting the virus epidemiology were examined. Aphid population monitoring was done by means of suction traps in four regions of Greece (Thessaloniki, Velestino, Kopaida and Koroivos) during 1996-98. The species *R. padi, Rhopalosiphum maidis*, *Metopolophium dirhodum* and *Sitobion avenae*, major pests of maize and known vectors of BYDV, were captured in all regions and years. Higher aphid populations were observed in Thessaloniki than in other regions with an outbreak during 1997 (12433 alatae captured). Differences as well as similarities were observed in the pattern of captures. However, in all regions a peak in flight intensity of aphid vectors was observed during May and June. Probably, this suggests a migration from wheat and/or barley to maize crops. Flight activity was observed during the whole summer period suggesting a high risk of virus spread. In addition, a significant number of alatae was captured during August and September probably due to the aphid migration to winter crops. The life cycle category of the examined clones originated from northern Greece contributes to the former. All clones of *R. padi* and *S. avenae* were examined were found non-holocyclic and overwintered in weeds or winter cereal crops. This also suggests a high risk for summer maize crops. However, BYDV incidence in maize crops was rather low. In addition, all clones of *R. padi* examined were able to transmit BYDV. However, a considerable interclonal variation in vectoring ability was observed at low temperatures. An important factor affecting BYDV spread is aphid movement. Drought stress and high temperatures were found to promote aphid dispersal and virus transmission. Moreover, the predator *Coccinella septempunctata* had a similar effect on aphid movement and virus transmission. On the other hand, the parasitoid *Aphidius rhopalosiphini* did not affect aphid movement and virus spread. Lastly, the effect of BYDV on growth and yield of the maize varieties Manelis, Polaris, Oulis, Maltos, Atlantis and Damon was examined. Virus infection did not affect growth and yield of the varieties Manelis, Polaris, Oulis, and Maltos.

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BLACK CUTWORM ALERT PROGRAMME IN ITALY

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Agrotis ipsilon (black cutworm) has caused severe damage to maize and other crops (thousands of hectares were destroyed) in some years; in Italy particularly in 1971, 1983 and 1994. Anyway almost in each year local outbreaks can cause reductions of corn stand or even the need of replanting. Usually the farmers realize the extent of the damage too late and rescue treatments become ineffective. Therefore a black cutworm alert program that can inform the farmers about the presence of black cutworm economic populations in time has been tested in Veneto region.

MATERIALS AND METHODS

The procedure suggested by Iowa University and Extension Service has been implemented in Veneto region since 1991. Sex pheromone traps (Hartstack baited with lures prepared by INRA and Plant Protection Institute of Budapest) were placed out in maize fields of Veneto provinces since late February of each year. Air and soil temperatures, information about direction and strength of the winds were supplied by A.R.P.A.V. Degree days (development zero = 10.4 °C) were calculated since the first conspicuous captures recorded by the traps just after strong winds coming from Southern regions. Tens of maize fields, in the area where males had been captured, were investigated every 2 days from late April of each year to observe in open field when really the 4^{h} instar larvae started damaging the small maize plants.

RESULTS

Moth captures greatly varied between different years. No or very low numbers of moths were observed in years when no or weak Southern winds occurred; in these years no conspicuous black cutworm damage on maize plants was observed. In other years the first captures were recorded 1-2 days after strong Southern winds had occurred. The alert program gave reliable results by using soil surface temperatures in calculating Degree Days accumulation, while the use of air temperatures underestimated the DDA. The first fourth instars larvae were observed 2-4 days before the date forecast by the model (176 DDA for 50% of 4^{h} instars larvae in the population); it was possible forecast the period of maximum larval presence with an error of plus or minus 1-2 days making effective the rescue treatments where threshold had been overcome. Information was sprayed through the specific bulletin issued by A.R.P.A.V., Internet, newspapers and television channels.

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IWGO - ITEMS

It is a great pleasure for me, to inform you, that the predecessors in my job as IWGO – Convenor, **Prof. H.C. CHIANG** and **Dr. Pierre ANGLADE** are both in good mood and good health.

Prof. Chiang (already 87 years old) and his wife Zoe moved from St. Paul, Minnesota to Ithaka, New York. Now they are closer to their children. He still shows interest in our group – which is in fact HIS child; he was the first convenor of IWGO and he led the group for over 14 years.

Dr. Pierre ANGLADE – the predecessor of Prof. Chiang, having led the group from 1982 to 1983 - is still travelling around together with his wife Micheline in France and in whole Europe. He is always glad to hear from IWGO and its members.

Our member in China, **Prof. ZHOU Darong**, who attended several meetings in the eighties is now head of the organizing committee of the International Plant Protection Congress in Beijing in 2003. He invited IWGO to have its meeting within the IPPC. Due to an inquiry among IWGO – members, we had to decide not to follow his invitation, as it seems the costs will be too high and only very few would attend such a meeting. I am sorry for this, because remembering the IWGO – Meeting in Beijing in 1986 I am sure we are missing a lot.
So we will decide later on where and when the next IWGO – Meeting will take place. But we have very promising negotiations with **Prof. Dr. Pedro CASTANERA** to have the next meeting in Madrid, Spain.

As mentioned in the Editorial, the next meeting (9^{th}) of the *Diabrotica* subgroup will be held in Belgrade, Yugoslavia. After having had the 2^{nd} IWGO in 1970 and the 3^{rd} meeting of the "Technical and Publication Committee" in 1980 in Belgrade, it will be the third time an IWGO – Meeting takes place in Yugoslavia. The meeting will be organized by our member (member of the 1^{st} IWGO-generation) **Franja BACA.** I am sure it will be a very interesting meeting as we are coming to the core of our problem, and we can see how this problem is handled in Yugoslavia.

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Until now the meeting is scheduled to be in Belgrade beginning of October (two or 2 ½ days in the 40th week of the year which means **between Sept. 30 and Oct. 5, 2002** [Please mark this date in your calendar !!!]). At that time our Yugoslavian colleagues can show us still some fields with damage of *Diabrotica*, and we can go to Crepaja to see the trials with effect of the time of planting and FAO maturity group on hybrids on WCR larvae damage.

More details will be distributed later on. This is just to inform you about the approximate time of the meeting.

WISHING YOU A SUCCESSFULL CORN GROWING SEASON !

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Following a wish of several IWGO members, I am giving an historical review of all IWGO – Meetings having taken place since the foundation of IWGO in 1968, for your personal information:

IWGO - Meetings

1968	Foundation of IWGO in Moscow by H.C. CHIANG (USA), D. HADZISTEVIC (Yugoslavia), B. DOLINKA (Hungary), D.I. SHAPIRO (Soviet Union), T. PERJU (Romania) and C. KANIA. Prof. H.C. CHIANG became 1st elected president of IWGO. Austria (W. FABER), Canada (M. HUDON), France (P. ANGLADE) and Spain (A. MONTEAGUDO) joined the group later in the year.
1969	Ist Meeting in Vienna, Austria
1970	IInd Meeting in Zemun, Yugoslavia / Serbia
1971	IIIrd Meeting in Bordeaux, France
1972	IVth Meeting in Martonvasar, Hungary
1973	Vth Meeting in Zagreb, Yugoslavia / Croatia
1974	VIth Meeting in St. Paul; Minnesota; USA
1975	VIIth Meeting in St. Petersburg; Soviet Union / Russia
1976	VIIIth Meeting in Madrid, Spain
1977	IXth Meeting in Wrozlaw, Poland
1978	Xth Meeting in Bergamo, Italy
1980	XIth Meeting in Vienna, Austria Foundation of IWGO-NEWSLETTER ; Editor Harald K. BERGER (A)
1982	XIIth Meeting in Pistany, CSSR / Slovakia Retirement of Prof. H. C. CHIANG (USA) as IWGO President Election of Pierre ANGLADE (F) as new IWGO President
1984	XIIIth Meeting in Colmar, France
1986	XIVth Meeting in Beijing, China
1989	XVth Meeting in Varna, Bulgaria
1991	XVIth Meeting in Martonvasar, Hungary
1993	XVIIth Meeting in Volos, Greece
1994	Retirement of P. ANGLADE; election of Harald K. BERGER as IWGO President
1995	XVIIIth Meeting in Turda, Romania
1997	XIXth Meeting in Braga, Portugal
1999	XXth Meeting in Adana, Turkey
2001	XXIth Meeting in Venice , Italy
2003	? ? ? (Madrid ?)

DIABROTICA-Subgroup Meetings
(Subgroup – Convenor: Prof. Dr. C. Richard EDWARDS; (USA)

1995	1st Meeting in Graz, Austria
1995	2nd Meeting in Gödöllö, Hungary
1996	3rd Meeting in Zagreb, Croatia
1997	4th Meeting in Gödöllö, Hungary
1998	5 th Meeting in Rogaska Slatina, Slovenia
1999	6 th Meeting in Paris, France
2000	7 th Meeting in Stuttgart, Germany
2001	8 th Meeting in Venice, Italy
2002	*9th Meeting in Belgrade, Yugoslavia*