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EDITORIAL

Dear Colleagues,
Dear IWGO – Members

After having published the first part of the abstracts of the IXth IWGO Diabrotica Subgroup Meeting in Belgrade you find in this issue the rest of the abstracts. Some of the abstracts published have not been presented at the meeting, but have been sent to the organizer previously. For different reasons the none or the other author of this not presented papers could not come to the meeting. Nevertheless we publish these papers as well; in case of further interest you can contact the author directly.

In the meantime (between the Belgrade meeting and the publication of IWGO – NEWSLETTER XXIV / 1-2 another Diabrotica meeting took place. Approximately 80 scientists working on Diabrotica met on from January 19 to 23, 2003 in Göttingen, Germany. The meeting was organized by the University Göttingen, Institute for Plant Pathology and Plant Protection as the final meeting of the EU – Project " The threat to maize production in the EU by the exotic corn rootworm pest *Diabrotica virgifera virgifera*: sustainable pest management approaches and ecological background" in which also several IWGO member took part (S. Vidal, Göttingen, H. K. Berger, Vienna P. Baufeld, Berlin, S. Derridj, Paris, L. Furlan, Padova, H. Hummel, Giessen, J. Kiss, Gödöllö and U. Kuhlmann, Delemont.) The meeting was on a very high level, in which a large number of US – experts on *Diabrotica* took part and presented papers.

Although the last IWGO – Meetings took place only 5 month ago in Belgrade we are already thinking (and planing) the next (10th) meeting. It will take place in Engelberg, Switzerland from January 14 - 16, 2003., organized be Uli KUHLMANN and Mario BERTOSSA. The organizer took the opportunity of hosting the group in a village in the

heart of the Swiss alps to invite for a post – congress Tour. So take the chance to stay some more days longer in this marvelous area by skiing and discussion further *Diabrotica* matters with colleagues in a most enjoyable way. An outline of the program you find at the end of this issue with more details about the meeting.

Although we have already distributed a “First Information” about this meeting to all participants who have attended at leasrt one of the last three meetings you find additionally also in this issue of the IWGO – NEWSLETTER an attached “Registration Form” for this meeting.

The Organizing committee took all efforts to manage a “post congress seesion” in Engelberg which will give us better possibilities for more scientific (and of course social) contacts. Please use this possibility and stay some days more in Engelberg.

Looking forward to seeing all of you next January in Switzerland

Harald K. BERGER
(IWGO – Convenor)

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ABSTRACTS OF THE PAPERS PRESENTED AT THE

7th FAO/TCP Meeting *)

8th EPPO ad hoc Panel on *Diabrotica* *)

9th International IWGO – *Diabrotica* **Subgroup Meeting** *)

(Contd. from IWGO –NEWSLETTER XXIII / 2)

IS THE DEVELOPMENT OF WESTERN CORN ROOTWORM POSSIBLE IN CORN/SOYBEAN AND CORN/ALFALFA ROTATION SYSTEMS?

JUDIT KOMÁROMI[1], BAYAR KHOSBAYAR[1], JOZSEF KISS[1], C. RICHARD EDWARDS[1], ENDRE SZÉLL[3]
1) Szent István University, Department of Plant Protection, Gödöllo, Hungary
2) Department of Entomology, Purdue University, W. Lafayette, Indiana, USA
3) Cereal Research Non-Profit Company, Szeged, Hungary

Western corn rootworm, *Diabrotica virgifera virgifera* LeConte, (WCR) females lay their eggs in the soil of corn fields and their larvae damage the succeeding year's corn crop. Therefore, rotation of corn to other crops was the most important non-insecticide control strategy to control WCR larvae in the USA. A rotation resistant WCR strain has been developed in the 90's in the USA (Indiana, Illinois). Females of this strain lay their eggs in different crops, like soybean and alfalfa (Sammons, et al., 1997 and Edwards, et al., 1997). Adaptation of WCR or change of its egg laying preference will greatly impact management options in Europe, where rotation systems consist of more crop species compared with those in the corn belt in the USA.

Within the range of FAO WCR Network an alfalfa/corn rotation field trial was established to assess the egg laying of WCR females in alfalfa in Hungary. Additional field sampling for WCR was done in soybean/corn rotation field.

2001: Gara, South Hungary, large corn field and adjacent soybean field;
2001 and 2002: Szeged, South Hungary, alfalfa corn rotation trial on small plots. In order to follow and quantify WCR adult activity in corn and soybean fields, Pherocon AM traps were placed in the corn field and adjacent soybean field. Nine Pherocon AM yellow sticky traps were placed in the corn field 15 m from the field edge in one line in 2001 in Gara. Pre-crop of the corn was soybean in 2000. Possible egg laying in previous year soybean field, larval feeding on 2001 year corn root system and WCR adult emergence from the soil was assessed by placing nine (9) emergence cages along Phercone AM trap line. In addition to this, nine Pherocon AM traps were placed in one line in the adjacent soybean field, 15 m from the border. In Szeged, the rotation system consisted of 1st year, 2nd year alfalfa and corn plots in 6 replications each. 2nd year alfalfa plots were rotated to corn and corn to 1st year alfalfa. The presence of WCR adults were quantified by Pherocon AM traps and emergence cages (3 per plot) from beginning June to early September.

Peak population of the WCR in corn occurred from 28 July to 03 August each year and in each location. In soybean and on alfalfa plots WCR adults occurred a bit later with no clear peak. WCR adults showed a high preference for corn (either field or plots). The maximum of adult catches in corn fields were 27,6 in Gara, 2001; 3,11 in Szeged 2001; and 1,33 in Szeged, 2002 (per Pherocon AM traps/week). Few WCR adults were caught in non-corn fields or plots (from 0,11 to 0,66 adults in soybean, in 1st year alfalfa and 2nd year alfalfa per Pherocon AM tarps/week). In corn after soybean a total of 9 WCR adults emerged over 9 weeks. In corn after 2nd year alfalfa, we found a total of 7 (2001) and 8 (2002) WCR adults in emergence cages (over 8 and 10 weeks). No WCR adult was caught in emergence cages in 1st and 2nd year alfalfa and soybean. At the infestation level we found in corn, there was only a slight egg laying to non-corn fields and low population of WCR larvae in the succeeding year's corn crop.

(Supported by FAO WCR Network LoA No. PR 21261)

THE LIFE TABLE OF *Diabrotica virgifera* IN ESTABLISHED POPULATIONS IN HUNGARY

STEFAN TOEPFER, ULRICH KUHLMANN
CABI Bioscience Switzerland Centre, Delémont, Switzerland

The Western Corn Rootworm, *Diabrotica virgifera virgifera* LeConte is an alien invasive species in Europe. Due to its invasive status, the ecology and population dynamics of *D. virgifera* under European conditions have to be understood. Life table studies carried out over the last three years determined mortality factors acting on already established populations of *D. v. virgifera* in Europe. Information about the susceptibility of the different life stages of this pest can be extracted from these life tables and provide suggestions for the implementation of sustainable pest management measures. In order to determine mortality factors during the overwintering period of the pest insect, several sets of eggs were exposed to winter conditions in the field and recollected during the following spring. In order to determine mortality factors among the larval instars and pupae, several sets of 50 maize plants were artificially infested in the field. Larval instars and pupae were recollected using soil-root samples, and stage specific mortality factors were determined. Adult density was measured in 50 emergence cages covering artificially infested single plants in maize fields in two years, respectively. The population density was compared between each developmental stage, and the apparent mortality of each stage was calculated to construct a life table for two generations of *D. v. virgifera* in Hungary. During these investigations, each developmental stage was screened for indigenous natural enemies in Europe, primarily from Hungary, Yugoslavia or Croatia.

In summary, complete life tables for two generations of *D. v. virgifera* will be presented showing the highest generational mortality for the first instar larval stage. The value calculated for the generational mortality in diapausing eggs as well as in the third instar larval stages appears to be of medium importance. Mortality occurring during the period of pre-diapausing eggs, during the period of hatching from eggs and during the emergence of the adults was low resulting in a relatively small impact on the population dynamics of *D. v. virgifera*.

We like to thank the Swiss Bundesamt für Bildung und Wissenschaft (BBW) and the EU for funding this project (EU Project QLK5-CT-1999-01110). We like to thank our collaborators at the Plant Protection Service in Hodmezovasarhely in Hungary, our collaborators at the Osijek University in Croatia, and the Plant Protection Institute in Zemun, Yugoslavia.

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NOTES ON WCR BIOLOGY IN SOUTH BANAT IN 2002

ANICKA J. GALO, IVAN SIVCEV
Institute for Plant Protection and Environment, Zemun, Yugoslavia

In the South Banat region the first imagoes were registered in 1995 and the first damage occurred in 1996. Due to very abundant presence of corn fields in long-term monoculture, damages were severe in the next couple of years. After dry and very warm summer of 2000, the WCR population was reduced. In 2001 the presence of WCR imagoes was very low and there were no damages registered. For that reason many farmers repeated corn sowing in 2002.

Since corn is a very important crop for the region we initiated research on the biology of the WCR. The study of the WCR biology was conducted in the 3rd year corn field. Beginning of larval hatching under

laboratory conditions was May 21. Larval population density under field conditions was checked weekly from mid-May to mid-July by soil sampling. Larvae in soil samples were registered from May 28 to June 30 and maximum larval presence was registered June 16. First pupae appeared June 16. Adult occurrence was followed by pheromone “CsalomoN” traps and by yellow “Pherocon AM” sticky traps. Beginning of imagoes flight was registered 25 June. Maximum number of WCR imagoes was between 27 July and 3 August. Emergence cages, covering 0.5m2 of soil surface comprising one corn plant, were used for monitoring adult emergence. The number of emerged adults during corn season was 8.8 per cage.

Plant lodging was not registered.

ESTIMATION OF YIELD IN CORRELATION WITH THE WESTERN CORN ROOTWORM LARVAL DAMAGE AND WEATHER CONDITIONS

IBOLYA HATALA ZSELLÉR[1], ENDRE SZÉLL[2]
1) Plant Health and Soil Conservation Station of Csongrád County, Hódmezovásárhely, Hungary
2) Cereal Research Non-Profit Company, Szeged, Hungary

Since the first western corn rootworm, *Diabrotica virgifera virgifera* LeConte has been detected in 1995 in Hungary its economic importance was the subject of discussion between specialists and farmers. For years the pest has been spreading all over the country without any visible damage and farmers did not take the WCR a serious pest. The first economic damage caused by the western corn rootworm occurred in 2001. The survey on larval damage carried out in continuous corn crops showed considerable enlargement of economic damage countrywide in 2002.

Measurements on correlation between larvae damage, yield and weather have been carried out in Szeged for three years. One observation area has been on continuous corn for about twenty years. As control field corn and winter wheat rotations were applied. The hybrid tested was Szegedi TC 465. Ten emergence cages were placed around stalks of randomly chosen corn plants in each observation area. The number of WCR beetles developed within one plant root system was measured by counting beetles caught under the cages. The number of emerged adults was reported by decades. At the end of the season root damage caused by feeding larvae was rated by the modified IOWA-scale, yield of each plant was measured.

Relationship between yield, larval damage and temperature and precipitation over the period June-July in 2000, 2001 and 2002 was analysed. Preliminary results show significant correlation between the number of adults, root damage and corn yield.

Taking into account the value of corn production and potential yield loss this invasive insect has to be considered one of the most important pests in the Hungarian agriculture in the future.

(EU-Framework 5 project contract number: QLK5-CT-1999-01110)

INFLUENCE OF FERTILIZATION, HYBRIDS AND INSECTICIDES ON WESTERN CORN ROOTWORM LARVAL DAMAGE

TATJANA KEREŠI[1], RADOSAV SEKULIC[2], PERO ŠTRBAC[1], DRAGANA LATKOVIC[1]
1) Faculty of Agriculture, Novi Sad, Yugoslavia
2) Institute of Field and Vegetable Crops, Novi Sad, Yugoslavia

Following the early 1990s when the first introduction and severe damage by the western corn rootworm (WCR), *Diabrotica virgifera virgifera* Le Conte was recorded in Yugoslavia, acreage under continuous maize substantially decreased in the major growing regions. Because of limited arable lands for crop rotation it became important to determine agricultural practices permitting continuous corn growing. With this objective in mind we have studied the influence of fertilization systems and corn hybrids, with minimum chemical protection, on the harmfulness of the WCR.

Surveys were conducted in 2000-2002 in the vicinity of Novi Sad in a stationary trial with continuous corn (since 1965) that included three fertilization variants (1. NPK, 2. Crop residues + NPK, 3. Manure + NPK) and the non-fertilized control. Corn hybrids of different maturity groups (FAO 300, 500, 600, 700) were tested in the trial at experimental units of 6 rows 14.3 m long, in 4 replications using a randomized block design. In the last two years the study included chemical protection in two thirds of the trial (in 2001 by carbofuran and in 2002 by carbofuran and bifenthrin). WCR harmfulness and efficacy of insecticides was assessed via the percentage of plant lodging, extent of root damage and yield reduction.

The average plant lodging in the unprotected part of the trial was significantly lower (20%) under the extremely dry 2002 conditions than in the two previous years (48%). Under the dry conditions of the two years (2000 and 2002) lodging was higher in variants 2 and 3 compared with the control and variant 1 and vice versa under the humid 2001 conditions. Differences in plant lodging among hybrids were unsignificant. In the untreated part of the trial, average root damage was very high and similar in all years (over 4, on the scale 1-6). Root damage in 2000-2001 was the largest in the control and the lowest in variant 2 and vice versa, in this year the extent of root damage was higher in variants 3 and 2 than in the control and variant 1. Differences in root damage among hybrids were unsignificant in two dry years whereas in 2001 FAO groupes 300 and 500 experienced significant damages in relation to the two hybrids in FAO groupe 600.

The yield in 2000 was very low (1.8 t/ha) and in 2001 entirely satisfactory (5.5 t/ha). The highest yield was obtained in 2000 in variant 2 and in 2001 in variants 2 and 3 (6.3 and 5.9 t/ha, respectively) while the lowest yield was in the non-fertilized part of the trial. Differences among hybrids were small (except in the first year when yield was significantly higher in FAO groupes 700 and 600). Current yields are yet to be assessed, in October.

According to the average results the treatment with ploughing down crop residues + NPK, in spite of high plant lodging caused by WCR larvae had the least root-injury and the highest yield. Differences among hybrids on average were small regarding all three parameters.

The efficacy of carbofuran (4 l/ha) was very high in both years since plant lodging in the protected parts of trial was reduced on average by 88% and yield (in 2001) was on average 40% higher than in untreated rows. Bifenthrin (0.5 l/ha) showed no satisfactory efficacy in reducing plant lodging this year but yields are yet to be assessed.

REVIEW OF INVESTIGATIONS OF THE WESTERN CORN ROOTWORM (*Diabrotica virgifera virgifera* LeConte) AT GUNJA REGION

MARIJA IVEZIC[1], JON J. TOLLEFSON[2], EMILIJA RASPUDIC[1], MIRJANA BRMEZ[1], DRAZEN DZOIC[3]
1) University of J. J. Strossmayer in Osijek, Faculty of Agriculture in Osijek, Osijek, Croatia
2) Iowa State University, Department of Entomology, Ames, Iowa, USA
3) Ministry of Agriculture and Forestry, Zagreb, Croatia

From the time the western corn rootworm was first registered in the village Bošnjaci, near Gunja, this territory has permanently been monitored with regard to the presence and control of the pest using different experiments.

In 1998 and 1999, the investigation included pheromone traps Csalomon and yellow sticky traps. Pheromone traps showed better results and about 94% adults was captured using this method compared with yellow sticky traps. It is important to stress out that the number of beetles caught in both years proved the application of pesticides unjustifiable.

The second experiment was conducted in 1999 and 2000 when three corn hybrids were tested with three different soil insecticides in order to reduce the attack intensity of harmful stages of this pest. Only the insecticide (terbuphos) Counter considering its price and the price of corn, showed economic justification for its application. The latest experiment at the Gunja territory was conducted in 2001 and 2002, in order to investigate corn resistance to corn rootworms as one of the valuable alternative to insecticides. Twelve Croatian and two Pioneer hybrids were evaluated for WCR resistance. Root injury was rated using Iowa State University Node-Injury Scale (0-3), and hybrids tolerance to larval feeding was compared by evaluating root size and root regrow. Root injury was 0,36 in 2001 and 0,58 in 2002. Root size was 1,92 and 3,01 respectively and root regrow was 2,48 and 3,36 respectively for both years. Root regrow differed significantly between treatments.

At Gunja region root injury damage was higher (EIL) in comparison to the Osijek region. It needs to be stressed out that in 2002 in the Baranya region some fields had over 30% plant lodging. All those facts require further investigation in order to to find out the best crop rotation, tolerant hybrids and effective insecticide taking into account our conditions.

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SOME MORPHOLOGICAL ASPECTS OF SEXUAL DIMORPHISM IN *DIABROTICA VIRGIFERA VIRGIFERA* LE CONTE ADULTS

IOANA GROZEA
Banat's University of Agricultural Sciences and Veterinary Medicine, Timisoara, Romania

The body color of *Diabrotica virgifera virgifera* adults is widely used as a criterion for sex differentiation in monitoring studies. Sometimes beetles trapped have stripes of uncertain distinction, i.e. individuals having both male and female characteristics. The body color of *Diabrotica virgifera virgifera* adults can therefore not be considered a reliable sign of sexual dimorphism. Thus, investigations were focused to other morphological traits ensuring highly precise sex determination. These investigations were confirmed/infirmed by histological samples, carried out with hematoxilin-eozin method. Macroscopically observations were made on hundreds of beetles and microscopically ones on twenty adults, oddly chosen. The length of antennal segments of adults (60 individuals) was measured with micrometric scale from binocular magnifying glass. The results were statistically processed using the computer (Statistica Program), and "t" test was used to compare the significance of differences. Firstly, it could be noted that the abdomen of males was blunt (rounded), with an additional sclerit. This characteristic wasn't observed in any female. The last part of the females' abdomen had a sharp (acute) shape.

Measurements of the antennal segments lengths indicated high variation among all segments and between those of males and females (Tables 1, 2). Anyway, differences among total lengths of antennas in females (left: 5.39±0.23mm; right: 5.5±0.26mm) and males (left: 5.31±0.24mm; right: 5.16±0.17mm) were insignificant ($p>0.05$).

Table 1. The length (mm) of the segments from the left antennas in females

No. of antennal segment Specification
1 2 3 4 5 6 7 8 9 10 11

Total length
X (mm) 0,46 0,2 0,23 0,55 0,56 0,59 0,58 0,56 0,58 0,55 0,53 **5,39**
Sx 0,03 0,01 0,01 0,04 0,03 0,03 0,02 0,03 0,03 0,02 0,01 **0,23**
s.d. 0,15 0,07 0,06 0,19 0,18 0,14 0,14 0,15 0,15 0,11 0,07 **1,26**
VC 32,4 36 24,1 35 32,4 24,1 23,6 27 25,3 20,8 12,5 **23,3**
Sx% 5,91 6,57 4,39 6,38 5,91 4,4 4,3 4,93 4,62 3,8 2,28 **4,26**

Table 2. The length (mm) of the segments from the left antennas in males

No. of antennal segment Specification
1 2 3 4 5 6 7 8 9 10 11

Total length
X (mm) 0,34 0,17 0,25 0,53 0,55 0,57 0,56 0,56 0,61 0,58 0,62 **5,31**
Sx 0,02 0,01 0,02 0,04 0,03 0,02 0,03 0,03 0,03 0,03 0,03 **0,24**
s.d. 0,07 0,04 0,09 0,17 0,12 0,11 0,12 0,14 0,14 0,13 0,13 **1,09**
VC 20,6 26 38,3 32 21,5 19,4 21,2 24,5 23 22 21 **20,6**
Sx% 4,6 5,8 8,56 7,16 4,82 4,34 4,74 5,48 5,14 4,93 4,7 **4,6**

X=mean; Sx=middle mean error; s.d.=standard deviation; V.C.=variability coefficient; Sx%=percentage middle mean error.

Based on the results of these studies it can be concluded that the shape of the terminal segment of the adults' abdomen is an accurate criterion for differentiation of the two sexes. The length of antennal segments uncorroborated with body length cannot be considered a reliable sign for sex differentiation.

ESTABLISHING ECONOMIC THRESHOLDS FOR SILK FEEDING BY WESTERN CORN ROOTWORM ADULTS IN COMMERCIAL CORN

TAMÁS TUSKA[1], JOZSEF KISS[1], C. RICHARD EDWARDS[2]
1) Szent István University, Department of Plant Protection, H-2100 Gödöllo, Hungary
2) Purdue University, Department of Entomology, W. Lafayette, IN 47907-2054, USA

Silk feeding damage caused by WCR adults and its impact on the yield and quality of inbred corn lines has already been reported (TUSKA et al. 2001). Economic threshold for silk feeding by adults was estimated between 1-3 adults/ear for the inbred line tested. Commercial corn was also damaged by WCR adults in many fields in Hungary in 2002. The build-up of the WCR population in Europe requires that tests be conducted to determine the effect of WCR adult silk clipping on commercial corn production. The study was conducted on one commercial corn hybrid under field production conditions in Tótkomlós, South Hungary, in 2001 and 2002. Four densities of WCR adults (0, 3, 6, and 9 per ear) were used in 2001. Since our first-year experiences, the economic threshold for commercial corn was estimated above 6 beetles/ear, we adjusted the treatment levels to 0, 6, 9 and 12 adults/ear in 2002. WCR adults were placed into individual, cylindrical nylon bridal veil ear cages (40 by 25 cm, with 1 mm openings) at the plant growth stage R1. WCR beetles were randomly collected from a nearby cornfield 2-3 days prior to beginning the study. Two control treatments (0 beetles), one with ear cages and one without were included in the study to assess the impact of the bridal veil ear cages on pollination. Each treatment (beetle density) was replicated 16 times.

Presence of WCR adults was observed and silk length was measured daily at the same hour until silks dried from 03 July to 10 of July. Adults were removed from cages after pollination and the ears were allowed to mature. Ears were harvested, dried, and stored for further testing. Data on silk length, kernel number, and thousand-kernel weight were correlated with beetle densities.

Results for 2001 showed a week correlation (yield by treatment) (R2= 0,5039). Almost all treatment levels (3, 6 and 9 beetles/ear) resulted in the same (approximately 13%) yield loss.

Repeated trial with 0, 6, 9 and 12 beetles/ear gave a more precise data set in 2002. Silk length was strongly reduced (approximately by 40%) even by 6 beetles/ear. Silk feeding caused by WCR adults significantly reduced yield of the commercial corn line. Correlation of silk length to yield (g/kernels/ear) was strong (R2=0.9191). Correlation of yield to treatment gave a high R2 value (R2=0.9110). The lowest treatment level in the trial was 6 WCR adults/ear in 2002. This treatment level caused an approximate 20% yield reduction. According to the correlation results, the economic threshold level for the tested commercial corn hybrid in 2002 was likely between 4-6 adults/ear. However, dry whether conditions (shortage of rainfall and hot temperature) during the silking period may have contributed to decreased silk growth and yield loss through weather-related reduced pollination.

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ORIENTATION DISRUPTION OF Diabrotica virgifera virgifera and D. barberi IN LATE PLANTED ILLINOIS MAIZE FIELDS BY SPRAYING MCA EMULSIONS FROM A HIGH-CLEARANCE TRACTOR.

HANS E. HUMMEL[1], JOHN T. SHAW[2]
1) Biological and Biotechnical Plant Protection, Institute of Phytopathology and Applied Zoology, Giessen, Germany
2) Illinois Natural History Survey, Champaign, U.S.A.

In view of both environmental concerns and economic limitations the once favored use of toxic pesticides has been on a steady decline since the 1990's. In low cash value crops such as *Zea mays* there is a disbalance between rising pesticide expenses and both declining effectiveness due to formation of resistant ecotypes and increased environmental concerns. Since GMO plants do meet with limited acclaim and approval by the general public a considerable need exists for alternative approaches to containment and long term management of *Diabrotica*, including those countries where *Diabrotica* is newly introduced and has no natural enemies. Behavior modifying natural products such as pheromones and kairomones and their close relatives could bridge the existing gap between demand for new methods and economically feasible techniques.

Sex pheromones and kairomones have a proven record as reliable, very effective and specific attractants to point sources. At higher concentrations, their attractive effect generally turns into orientation disruption, a behavioral modification by which the adult insects are unable to locate traps baited with various attractants that in control plots catch large numbers. This disruption effect, if applied on a larger area, can inhibit the orientation of males and females and thus can potentially reduce successful matings with subsequent reduced egg deposition and reduced larval populations with their well known detrimental effects on maize roots.

In the case of *Diabrotica v.v.* and *D. barberi*, MCA (4-methoxy-cinnamaldehyde) is available as a synthetic and specific attractant. Unlike sex attractants, it works simultaneously for both males and females. By applying moderate levels of MCA by regular spray equipment, orientation disruption levels of up to 79% could be achieved within a 9 day treatment period for *D.v.v.* and of 0-61% for *D. barberi.* The treated field size was 0.648 ha.

Three different baits were used simultaneously on inverted sticky plastic cups with lures being 10 mg MCA, 100 ug sex pheromone and 10 mg MPE (4-methoxyphenylethanol). The traps had a minimal distance of 40 m from each other and were established 1 meter above ground. Disruption levels were calculated by applying the equation of Roelofs and Novak (1981). Specifically, 410 g/ha of MCA are mixed with 360 ml Triton X-100 emulsifier diluted with 64 liter of water, vigorously shaken and sprayed through a 6 m wide boom with 12 Teejet nozzles of size 8002 from a height of 1.90 m. The tractor was a John Deere 6000 high-clearance vehicle with rear-mounted boom. The tractor velocity was 4.8 km/h and it sprayed under CO2 pressure of 2.93 atm. Results obtained are in agreement with earlier reports by Hummel and Metcalf (1996) who later developed further the technique of MCA application in granular form. The spraying technique from a high-clearance tractor explored here, however, is faster, and many entomologists have easier access to spray equipment than to granular distributors as application tools.

MCA is a flavoring agent approved by FDA for human consumption. It is completely nontoxic and has, to our knowledge, no adverse environmental side effects. Thus, its potential as a behavioral population disruptant in maize merits further investigation, both for its own sake and also in combination with other IPM methods. Of interest are also the effects of MCA on Diabrotica ecotypes now occupying the space around alternative food and oviposition hosts such as soybeans and alfalfa.

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Diabrotica virgifera virgifera ERADICATION – CONTAINMENT TEMPTATIVE IN VENETO REGION: YEAR 2002

LORENZO FURLAN[1], MARCO VETTORAZZO[2], ANDREA DI BERNARDO[1], CHRISTIAN BONETTO[1], SILVANA MARZOLLA[3], LANFRANCO DONANTONI[3]

1) Department of Agronomy, Entomology, University of Padova, Agripolis, LEGNARO
2) Phytosanitary Service of Veneto, Venice Office, MESTRE VE
3) Freelances

The attempt to eradicate or at least to contain the newly arrived population of *Diabrotica virgifera virgifera* (WCR) near the International Airport of Venice was implemented using the strategies deployed in previous years with some improvements.

MATERIALS AND METHODS

The eradication program was based on:? ? **Initial focus area (2800 ha of cultivated land)**: - monitoring the WCR population: 291 sex pheromone PAL traps were placed out; most of them from 9th to 14th of July. - Imposing restrictions on the planting of maize in fields: it was prohibited to plant maize after maize. - Applying insecticide treatments to maize fields to control WCR adults; the insecticide used was Dursban (chlorpyrifos) WG at the rate of 1,1 kg/ha; 115 ha of maize fields were sprayed between 29th of July to 30th of August. - Prohibiting the movement of fresh maize or soil in which corn was grown the previous year outside of the focus area. - Not allowing maize to be harvested before September 15th. ? ? **Safe area (about 25.000 ha of cultivated land)**: - monitoring of WCR population: 357 PAL traps were deployed from 19th to 29th of June in all the maize fields (most of them were monoculture maize fields) of the part of safe area (named safe-endangered area) close to the border of focus area (about 2-3 km around); 80 PAL traps were placed out according to a 2 km X 2 km grid in monoculture maize fields localized in the rest of the safe area. In the first part of the season trap inspections were done twice per week, subsequently once per week. - Applying insecticide treatments to maize fields (and those all around) where WCR specimens are caught: 80 ha of maize fields, including the field in safe-endangered area where one specimen was captured by a PAL trap and all the maize fields around, were sprayed twice between July, 12th and August, 13th, together with further 40 ha.? ? **Other** s**ensitive sites in Veneto region:** further 218 PAL traps were deployed in sensitive sites of the region where a jumping movement of the species may occur; particularly around other airport facilities, in areas where there is an high presence of maize fields and along the border with Lombardy (infested region). All the traps were placed out in monoculture fields, most of them planted with maize for 3 to 20 subsequent years**.**

RESULTS

Field checks in focus area: all the fields in the focus area that had been planted to maize in 2001 were checked to determine what crop was planted in 2002. Twenty-eight fields totaling 11,54 ha of monoculture maize were found. All these fields were mechanically destroyed, most of them within July 10th . PAL traps placed out in these fields before the destruction captured no specimens.

WCR captures: ? ? **Initial focus area**: 1 specimen was captured on July 22nd in a maize field kept at set aside in the previous year.? ? S**afe area and new focus area**: in a monoculture maize field 500 m west of the border of the initial focus area, 1 WCR male was captured on a PAL trap on July 8th After insecticide treatments, the traps did not catch any more beetles until the end of the season. An additional focus area (190 ha of cultivated land) was immediately defined.? ? **Other sensitive sites in Veneto region:** no specimens were caught.

CONCLUSIONS

The strategies implemented in Veneto proved to be very effective in stopping WCR populations; the population has been reduced to the minimum from the year when the first captures were recorded (1998). Differently from all the other sites in the world where the species was detected, in five years there was no significant spread from the initial focus area and a dramatic reduction of the population levels despite the fact that the area proved to be suitable for WCR population development.

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REGISTRATION OF TRANSGENIC CORN FOR CORN ROOTWORM CONTROL AND ITS IMPACT ON CORN ROOTWORM BIOLOGY

TED A. WILSON, JON J. TOLLEFSON
Department of Entomology, Iowa State University, Ames, U.S.A.

Monsanto Company has applied for U.S. registration of MON 863, a genetically engineered corn that produces the *Bacillus thuringiensis* toxin Cry 3Bb. A public comment period was held by the U.S. Environmental Protection Agency in August 2002 and it is expected that a registration decision will be made by the end of 2002 or the beginning of 2003. This presentation will provide the latest information concerning the registration of MON 863 and any conditions placed on the growing of corn genetically engineered for corn rootworm resistance in the U.S.

Research in Iowa over the past 3 years has demonstrated that MON 863 is highly resistant to corn rootworm larval injury, but that there are larvae that feed and develop on plants expressing the Cry 3Bb toxin. How the genetically engineered corn is allowed to be grown will depend, somewhat, on the impact of the plant-expressed toxin on the biology of the surviving corn rootworms. At Iowa State University, the fitness of adult corn rootworms that survived as larvae on MON 863 was evaluated by measuring beetle flight capability, fecundity, fertility, longevity, and size.

Flight fitness was measured using a tethered flight mill system. During 2001 beetles from MON 863 flew a similar number of flights as beetles from a non-transgenic corn, but they flew significantly shorter distances than those from the isoline. Mated female beetles flew greater distances than males or virgin females, and virgin females did not conduct any dispersal flights (flight duration greater than 20 minutes). The distances flown by virgin females and males will influence the distance a refuge planting of susceptible (corn intended to produce corn rootworm that have not been exposed to MON 863) should be planted from blocks of MON 863. The fact that mated females, and not males or virgin females, make dispersal flights demonstrates that the first western corn rootworms that invade new areas of Europe are pre-ovipositional females, capable of initiating new infestations.

The impact of the larval feeding on MON 863 on adult growth and reproductive capability was quantified by measuring beetle size (pronotum width), weight, number of eggs produced, and the proportion of the eggs that hatched. Beetles that emerged from transgenic corn laid fewer eggs than those whose larvae had fed on non-transgenic corn; the difference was significant during the 2001 season. The fertility was comparable, however, with an equal proportion of the eggs hatching from those laid by females surviving on transgenic corn and non-transgenic corn. Also, there were no differences in beetle size, either pronotum width or body dry weight.

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PROPOSAL FOR THE PROTECTION OF MAIZE AGAINST *Diabrotica virgifera virgifera* LE CONTE IN THE CZECH REPUBLIC

FRANTIŠEK MUŠKA
The State Phytosanitary Administration Brno, Plant Protection Product and Aplication Equipment Division, Brno, Czech Republic

In the Czech Republic the first occurrence of *Diabrotica virgifera virgifera* LECONTE was registered in the village Cejc (district Hodonín) in July 2002. Gradual spread of this pest to other maize-growing regions was expected. Monitoring is of major importance for successful maize protection (using pheromon traps *Pherocon AM*) and it is necessary to determine the „critical number". There is very important knowledge from other countries Slovakia, Hungary, Serbia etc. It is very important to monitor this problem in the Czech Republic. The insecticides registered in the Czech Republic for maize protection are very important for this proposal:

Against larvae – there is the flowable concetrate Promet 400 CS (furathiocarb) for seed treatment, granular insecticides as follows Dursban 10 G (chlorpyrifos), Furadan 5 G a Furadan 10 G (carbofuran), liquide soil insecticides Furadan 350 F (carbofuran) and Marshal 25 EC (carbosulfan). All these pesticides were registered against *Elateridae.*

Against adults - Decis 2,5 EC, Decis EW 50, Decis 2,5 Flow (deltamethrin), Karate 2,5 WG (lambda-cyhalothrin), Nomolt 15 SC (teflubenzuron), Vaztak 10 EC a Vaztak 10 SC (alphacypermethrin). All these pesticides were registered against *Ostrinia nubilalis*.

FARMERS FIELD SCHOOL – YUGOSLAV EXPERIENCES IN 2002

ANICKA J. GALO, IVAN SIVCEV
Institute for Plant Protection and Environment, Zemun, Yugoslavia

During 2002 the Farmers Field School (FFS) has been organized in the village Padina, South Banat region. Corn is the major crop in that agriculturally oriented part of Serbia. Most of the land is under corn – in some years more than 80%. Large surfaces under corn in monoculture resulted in significant yield losses caused by the WCR.

Therefore, some corn producers employed crop rotation which resulted in the decrease of corn presence on agricultural land. Other corn producers having mechanization only for corn production and without the possibility for reorientation of production, continued growing corn in monoculture risking permanently WCR damages. These corn producers were involved in educational activities during the 2002 corn season.

During spring about 20 farmers constituted the group. These farmers were interested in participating in the FFS, meeting occasionally with each other and exchanging results obtained from own researches, analyzing activities which resulted in the increasing or decreasing rate of damages, e.g. effect of manure, soil preparation, precrop effect, sowing time, amount of precipitation, etc. Considering different ways of pest suppression new ideas useful for WCR eradication were exchanged. Depending on the corn growth stage and WCR development stage for the particular period the aim of Farmers study group meetings was to offer explanation to farmers on the biology of the pest and different factors influencing damages.

Meetings were organized 2 to 3 times monthly, amounting to 6 times during the period 15th May to 15th August. Each meeting was attended by 10 farmers on average. The FFS was organized as meetings in the village hall, group meetings in farmers' fields and discussions with individual farmers focusing on current problems facing corn production. Farmers monitored their corn fields and the presence of larval damage, and made risk assessment based on adult counting. All 30 fields included in the risk assessment activities were marked on the village field map in order to give a clear view of the WCR infestation in particular parts of the district. For each monitored field the number of trapped adults and precrop data were registered.

This type of education is expected to motivate farmers to take active part in the investigation of their corn plants condition, monitor corn fields, find answers to questions and exchange and discuss their observations and conclusions, and share their knowledge with other farmers.

BIOTECH APPROACH TO CORN ROOTWORM CONTROL: DEVELOPMENT STATUS OF MONSANTO'S CORN ROOTWORM RESISTANT MAIZE.

JAY C. PERSHING
Monsanto Co., 700 Chesterfield Pkwy North, Chesterfield, MO 63198

Maize is the largest crop in the United States in terms of acreage planted and net crop value. In 2000, the U.S. maize crop covered **79** million acres. The western corn rootworm (CRW), *Diabrotica virgifera virgifera* LeConte, (Coleoptera: Chrysomelidae) is one of the most serious pests of maize in the United States. Larvae damage maize through feeding on the roots, which reduces the ability of the plant to take up water and nutrients from the soil and causes harvesting difficulties due to lodging. There are currently two common options for controlling CRW larval feeding, including synthetic insecticides and crop rotation. The later tactic can be ineffective as a result of behavioral modifications. The most common insecticide regime is an at planting time application, where the most widely used insecticides have been the organophosphate and synthetic pyre.throid insecticides. In 2000, these insecticides for CRW control were applied on over 18% of the maize acreage. This accounted for the largest insecticide usage in any one crop, totaling approximately 12 million pounds of active ingredient targeting CRW.

Recently, a third option has been developed using molecular biological techniques to produce transgenic maize expressing a *Bacillus thuringiensis (B.t.)* Cry3Bb protein. The Cry3Bb protein has been successfully transferred to corn to produce maize resistant to CRW feeding.

This new transgenic management tool has demonstrated superior larval feeding protection over current insecticides and has the potential to greatly reduce the amount of insecticides applied in maize cropping systems, thus benefiting the environment and potential adverse effects throughout the manufacturing, distribution and use chain. This presentation describes the development status of Monsanto's Cry3Bb expressing maize, including the results of efficacy and safety testing.

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RESULTS OF CHEMICAL CONTROL OF THE WESTERN CORN ROOTWORM LARVAE Diabrotica virgifera virgifera LE CONTE IN FIELD MICROTRIALS

RADONIC KATARINA[1], INJAC MARKO[2], SLOBODAN KRNJAJIC[3]
1) DP. Agrozavod, Vrbas, Yugoslavia
2) Chemical Agrosava, Novi Beograd, Yugoslavia
3) Centar za pestiide, Zemun, Yugoslavia

The basic approach to setting up a trial was to determine the possibilities of controlling the corn rootworm which imposes: the application of insecticides for seed treatment, granulate insecticides during the sowing season and 20 days after in addition to nitrogen fertilizer and the pyrethroid incorporation on the whole surface. In 2001 the damage provoked by the natural population of *D.virgifera* was examined on hybrid corn, pop corn and sweet corn.

Trials were set up in 2000 and 2001 on areas with three consecutive years of growing corn and with heavy infestation in the previous year.

Treatments: Bifethrin (Talstar 10-EC) 1.5 l/ha, Tebupirimfos + betacyfluthrin (Arriba 2,1-GR) 10.8 kg/ha, Terbufos (Counter G-5) 25 kg/ha, Clothianidin (Ti-435 600 FS) 1 and 1,5 mg a.i/seed, Imidacloprid + pencycuron (Prestige 290 FS) 2,4 l/ha, Thiametoxam (Cruiser 350 FS) 0,9 l/100 kg seeds, Thiametoxam (Cruiser 350 FS) 0,6 l/100 kg seeds + tefluthrin (Force 20 CS) 0,2 l/100 kg seeds, Phoxim (Foksim GR 5) 12,5 kg/ha alone and with the addition of 150 kg/ha nitrogen fertilizer (Azomat 150 kg/ha), Methyl bromide (50 g/m2), the control.

Trial plot size was 28 m2. All treatments were tested in 4 replications and the results were computed using the analysis of variance and the LSD test. The efficacy of the insecticide was graded based on the effect of *D. virgifera* larvae, degree of root damage made by the larvae according to the Iowa scale and measurement of corn yield.

In April 2000 corn was sown under extremely dry conditions. From April to September, total precipitation was barely 121 l/m2. Root damage by the Iowa scale was found to be 4.48 in the control and 3.45 on the Tefluthrin treated plot. The efficacy of other insecticides was less than 3 on the Iowa scale.

In 2001 corn was completed in early May due to considerable rainfall which amounted to a total of 411.8 l/m2 during the period April-August.

The greatest number of *D. virgifera* larvae was in the control and on nitrogen treated plots and the least number was in treatments with Methyl bromide.

OPH insectides were more effective than neo-nicotinoids with regard to the number of *D. vigifera* larvae. On the other hand, neo-nicotinoids gave greater yields than organophosphates.

During the application of the granulate insecticide 20 days after sowing the number of *D. virgifera* larvae was significantly reduced but damage of the first nodus had already occured.

The application of insecticides in most cases ensured greater yields compared with the control.

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WCR TRAINING OF FARMERS IN BOSNIA AND HERZEGOVINA 2002

NEDZAD KARIC[1], SAMID KURTALIC[2], HUSNIJA FESTIC[1]
1) Faculty of Agriculture, Sarajevo, Bosnia & Herzegowina
2) Secondary School of Agriculture, Brcko, Bosnia & Herzegowina

In every production, even so in corn production, well educated farmers are the precondition contributing to both high and favourable yields. The WCR (*Diabrotica avirgifera virgifera* Le Conte) is a new pest registered in 1997 in Bosnia and Herzegovina, when the monitoring and the presentation of the problem started. In addition to media presentation, numerous lectures on this topic were held in the infested areas. In 2002, we initiated a more intensive training of farmers displayed in the formation of groups of farmers who, through monitoring, had the opportunity of meeting with the issues regarding the pest in detail.

Groups were formed according to the agreement of WCR network partners from Plitvice Lakes in March 2002.

Three groups of farmers, five farmers each, were formed in the most infested areas in Bosnia and Herzegovina. In addition to the farmers who were directly involved in these monitoring groups, a far greater number of farmers attending the training showed interest in this problem.

Work with each group meant direct contact and collective visits to the locations that had traps during the whole vegetation. The obligations of each farmer were to set the multiguard trap on his plot, to control trapped insect and to observe possible plant damages on which a facilitator gave detailed instructions.

Facilitator monitored the groups every two weeks.

Field meeting visit to Hungary by some farmers was part of the training. This kind of training resulted in greater interest of farmers in this problem. Therefore, we plan a greater number of groups in 2003.

These meetings enable farmers to exchange their experiences and various data. This should be used for distributing true information to farmers.

EVOLUTION OF *Diabrotica virgifera virgifera* POPULATIONS UNDER "NO TILLAGE" CROPPING SYSTEM CONDITIONS

IOAN G. PALAGESIU1, MONICA I. ANDRU2
1) Banat's University of Agricultural Sciences and Veterinary Medicine Timisoara, Timisoara Romania
2) S.C. Prodagro Vest SRL Arad, Arad, Romania

Investigations concerning the influence of different cropping systems on maize pests are rare in Romanian as well as foreign literature. The paper presents data concerning the influence of conventional agricultural practices in comparison to "no tillage" cropping system on the evolution of *Diabrotica virgifera virgifera* Le Conte populations. It presents also data concerning the influence of previous crops on the development of western corn rootworm populations. Investigations were carried out in the Arad zone in 2000, 2001 and 2002. A polyfactorial experimental design with subdivided plots was used. The results were interpreted using statistical methods. Western corn rootworm adults were captured with sex pheromone traps Csalomon R from June to October.

From the data obtained it can be concluded that the "no tillage" cropping system does not contribute significantly to the increase of *Diabrotica virgifera virgifera* Le Conte populations. Generally in the maize – maize succession the number of captured adults was higher than in the wheat – maize succession. The greatest number of captured adults was registered in August or sometime by the end of July in both cropping systems.

ABUNDANCE OF WCR *Diabrotica virgifera virgifera* LeConte BEETLES DURING THE FIRST YEAR OF CONTINUOUS MAIZE CROPPING DEPENDING ON THE SOWING DATE AND THE FAO MATURITY GROUP

FRANJA I. BACA[1], ŽIVORAD V. VIDENOVIC[1], PREDRAG Ž. ERSKI[2], JOZSEF KISS[3], C. RICHARD EDWARDS[4]
1) Maize Research Institute, Zemun Polje, Belgrade- Zemun
2) IMT Novi Beograd, Yugoslavia
3) Szent István University, Department of Plant Protection, Gödöllo, Hungary
4) Department of Entomology, Purdue University, Indiana, USA

Although the western corn rootworm appeared in the Yugoslav maize growing region only 10 years ago, its mass multiplication and rapid spread has resulted in the establishment of economic population levels in most parts of the Yugoslav territory. Serious damage caused by larvae has resulted in a regulation requiring movement away from growing maize in monoculture to crop rotation. As a consequence of this, the area under maize production has decreased by 10-15%, i.e. maize crop was grown on 1.2 M ha in 2002, instead of the usual 1.4 M ha. Therefore, it is of a great importance to observe all measures of managing the WCR population and, in case of need, to continue resowing of maize following these mitigating measures.

The determination of differences in feeding attractiveness of three maize hybrids sown on three different dates in 2001 is a continuation of previous studies and is especially interesting to farmers. Plant lodging did not occur in neither of nine combinations of these two factors in 2002 and imagoes were monitored to establish the population density.

The two-year trail with three hybrids H1 FAO 500, H2 FAO 600 and H3, FAO 700 was performed on an area of 2.4 ha. Sowing was carried out mechanically on three dates: V1 - April 14, V2 - April 26 and V3 - May 5, 2001. The plot size was with eight rows, four bordered rows at both sides of the plot and eight rows between the second and the third date amounted to 0.225 ha. The maize hybrid ZPSC 677 (FAO 600) was sown on the complete area in 2002. This hybrid was selected due to its good resistance to drought. Resistance to drought is based on a large root mass providing a possibility for maximum survival of larvae wherewith the representative population level. The traps were placed on June 22, 2002 and WCR beetles were counted once per week. Traps were replaced three times within the three-week period. Monitoring was performed till the end of the first decade of September.

Of 10,949 captured beetles 10,689 and 260 were captured on pheromone (PhT) and yellow (YsT) traps, respectively. Attractiveness of the yellow traps has decreased over the past several years, which was proven by this trial. Early completion of imago flights in 2001 was followed by early completion of migration; hence the best synchronisation in feeding attractiveness was in accordance with the growing season the first sowing date. Results obtained in V1 on both types of traps were in accordance with expectations. There were 923 and 14 beetles on PhT and YsT, respectively, in V1/H1 FAO 500. The corresponding numbers of beetles for H2 FAO 600 and H3 FAO 700 were 1003 and 27, and 1069 and 32, respectively. The lowest population level, 1158 and 1123, on PhT was detected in H1 sown on the second sowing date and H3 sown on the third sowing date, respectively. The abundance of beetles on YsT in

hybrids sown on the second sowing date was inversely proportional with the hybrids sown on the first sowing date. There was no regularity in the abundance of beetles on YsT in hybrids sown on the third sowing date. The total number of beetles on PhT in all hybrids over all sowing dates amounted to V1 - 2995, V2 - 3784 and V3 - 3910. If the number of WCR beetles in V1 is considered as an index of 100, then the index of V2 and V3, is 126 and 131, respectively. Based on stated values it can be concluded that the combination of the earliest sowing date with the earliest maturity hybrids, FAO 400-500, can significantly reduce maize crop attractiveness in the first year and mitigate the risk of larvae, which could be controlled only by seed treatments with insecticides.

FLIGHT DYNAMICS AND ABUNDANCE OF WCR *Diabrotica virgifera virgifera* LeConte BEETLES IN MAIZE GROWN IN CROP ROTATION AND CONTINUOUS CROPPING

FRANJA I. BACA[1], **MILADIN B. VESKOVIC**[1], **SLADJAN R. STANKOVIC**[2], **DIJANA D. ERAKOVIC**[3]
1) Maize Research Institute, Zemun Polje, Belgrade-Zemun
2) Institute for the Application of Science in Agriculture, Belgrade

Maize is grown in crop rotation in all plots of experimental fields of the Maize Research Institute, Zemun Polje, except in two trails under continuous cropping. In the adjacent fields, farmers grow maize in continuous cropping. Considering the good flying ability of WCR beetles, their migration towards crops grown in crop rotation was possible either from the immediate adjacency from the plots under long-term continuous cropping or from fields placed within a certain distance.

The aim of monitoring was to: observe flight dynamics and establish the number of WCR beetles in maize grown in continuous cropping and to compare that number with the one determined in maize grown in crop rotation; then to determine the segment of the population that remains in maize grown in continuous cropping and the one that migrates to crops grown in crop rotation.

Systematic monitoring of WCR beetles eclosion has been carried out in the trail under long-term continuous cropping at Zemun Polju since 1997. In the first year, monitoring started approx. mid-July, whereas in all the other years mid-June. Traps in maize grown in crop rotation, depending on a year, were set up in a part of plot used for breeding and selection, in demonstration trials and on sowing dates established by cropping practices. Traps were first placed in trails under continuous cropping and a week later, when the first beetles were registered on traps, in trials under crop rotation. Two to four pheromone (PhT) and four to eight yellow (YsT) traps were set up and used to calculate the average. Captured beetles were counted twice a week, sometimes only once, while the trap replacement, depending on a year, was done after two, three or four weeks. Monitoring was performed till late autumn. Imagoes emerged mid-June and disappeared at the end of August (2001), in September (1998, 2000 and 2002) and even in October when the first frost occurred (1997 and 1999).

Of 16,663 totally registered beetles in maize grown in continuous cropping, 11,872 and 4,761 beetles were recorded on PhT and YsT, respectively. At the same time, the corresponding numbers for crops grown in crop rotation amounted to 7,099 (5,853+1246). Based on the number of beetles captured on PhT and YsT, approx. Half of the imagoes, more precisely 49,3%, and ¼ or 27.2%, respectively, migrated to maize crop grown in crop rotation. The long-term capture average over types of traps (PhT and Ys T) and habitat, continuous cropping (MM) and crop rotation (MR) at the beginning of imago emergence in June amounted to: MM/PhT 8.6% and MM/YsT 7,2%, or 7.9% on the average, and MR/PhT 4.7% and MR/YsT 1.1%, or 2.9%, on the average. This means that the abundance of WCR beetles in the beginning of

eclosion, established over migration dynamics, was 2.7 fold-lower in maize grown in crop rotation than in continuous cropping. Abundance is similar during July and August, MM/PhT 74.7% and MM/YsT 88,2%, 81.4% on the average, i.e. MR/PhT 78.3% and MR/YsT 87.4 %, 82.9%, on the average. At the end of eclosion, the percentage of captured imagoes in maize grown in continuous cropping amounted to MM/PhT 16.6% and MM/YsT 4.6%, or 10.6%, on the average, and MR/PhT 17.0% and MR/YsT 11.5 %, or 14.2%, on the average, which is by 34.0% higher than in maize continuous cropping.

EFFECTS OF DIFFERENT GROWING SYSTEMS ON ATTRACTIVENESS OF MAIZE CROP TO BEETLES OF *Diabrotica virgifera virgifera* LeConte

FRANJA I. BACA[1] , ŽIVOTA V. JOVANOVIC[1], ŽELJKO Z. KAITOVIC[1], JEREMIC JASMINA[1], GÉZA RIPKA[2] , HATALA-ZSELLÉR IBOLYA[3]
1) Maize Research Institute "Zemun Polje", Belgrade, Yugoslavia
2) Plant Health and Soil Conservation Station of Budapest, Hungary
3) Csongrád County Plant Health and Soil Conservation Station, Hódmezovásárhely, Hungary

The multiple-purpose utilisation of maize as livestock feed (60 - 80%) and partially as human food, as well as, in industrial processing has created the need for its greater production. The Yugoslav maize production on areas greater than those providing crop rotation during the last 20 years has been required by its higher production efficiency than by other field crops. Therefore, maize continuous cropping has become a common practice not only in many states of the USA, but also in Yugoslavia. The stationary trial set up in Illinois, USA, in 1878 substantiated the possibility of successful maize continuous cropping with the presence of the WCR.

In Yugoslavia it is impossible to apply cropping practices and measures of protection in due time and with sufficient precision. Weeds, especially grassy-type weed control was the problem that occurred prior to the WCR appearance. WCR larvae chemical control does not provide sufficient protection under conditions of the abundant population. Under conditions of maize continuous cropping, it is not possible to accomplish desirable combination of sowing dates and selection of hybrids according to the length of the growing season in order to decrease crop activity for imago feeding and oviposition. It means that broad maize production in continuous cropping is constantly exposed to a greater or a smaller risk.

The four-year monitoring of WCR imagoes abundance was performed with yellow Pherocon AM (in 1999, 2000 and 2002) and pheromone Csalomon traps (in 2001 and 2002) in stationary field trail with four maize growing systems: 1. maize continuous cropping, 2. two crop rotation (wheat-maize), 3. two crop rotation (soybean-maize) and 4. three crop rotation (wheat-soybean-maize). The trail was set up in the experimental plot of the Maize Research Institute at Zemun Polje in 1985. The traps were set on maize plants from the end of June to the beginning of July. The survey of beetles was conducted once or twice a week depending on the year. The average three-year results on the number of beetles caught point out significant differences in maize continuous cropping in comparison to two crop rotation, and in two crop rotation in relation to three crop rotation. If we assume that the number of caught imagoes in maize continuous cropping is 100%, then: - the abundance in yellow traps amounts to 41.8%, 49.0%, and only 22.7%, in maizewheat rotation, maize-soybean rotation and maize-wheat-soybean rotation, respectively, - the corresponding abundance in pheromone traps amounts to 48.2%, 42.3%, and 29.1%.

The weather conditions over the period April-September, significantly differed over the years and affected the abundance of beetles in the given and the following year. The results obtained on the application of both types of traps indicate significant differences in the number of beetles caught in maize grown in two and three crop rotations. The differences observed in three crop rotation in relation to two crop rotation

can be attributed to a possible prolongation of the WCR diapause in the egg stage. These results also confirm the significance of the crop rotation as a measure to handle maize pest population.

ATTRACTIVENESS OF SWEET AND SUPER SWEET MAIZE HYBRIDS TO BEETLES OF THE WCR, *Diabrotica virgifera virgifera* LeConte, IN LATE SOWING IN 2002

FRANJA I. BACA[1], JAN V. PLANCAK[2], JAN TANCIK[3], LJUDOVIT CAGAN[3], GABOR PRINCZINGER[4]
1) Maize Research Institute, Zemun Polje, Belgrade-Zemun, Yugoslavia
2) ACB Factory for frozen Vegetables, Ruski Krstur, Yugoslavia
3) Slovak Agricultural University, Nitra, Slovak Republic
4) Ministry of Agriculture and Regional Development, Budapest, Hungary

Sweet maize production starts with a successive sowing from the beginning of April until the end of May-the beginning of June and as stubble crop sowing. Sweet maize is usually harvested prior to mass migration of WCR imagoes in search of food. Crop of later sowing dates or stubble crop sowing rich in pollen and fresh silk are very attractive to migrating imagoes.

The aim of these studies was to check the differences in attractiveness of four sweet maize hybrids sown in June and to find out whether the economic level of larvae will be achieved in the succeeding year.

One commercial hybrid originating from the USA (H1) was tested on several dozens hectares, while other three hybrids were experimental Israeli hybrids (H2, H3 and supersweet H4) and were tested in production, macro-trail plot within the irrigation system of the AC 1 maj in Ruski Krstur. The plot size amounted to 1 ha. Sowing was performed on June 4 in 36 rows each and the plot was 400 m in the length. Pheromene Csalomon (PhT) and yellow Pherocon AM (YsT) traps were used. Traps were placed on 1.5-m high pegs during the first two weeks (July 15-28) and then on plants. On July 15, PhT traps were placed in the middle of each hybrid in the 18th-19th row 50 m, i.e. 100 m away from the irrigation channel in H1 and H3, i.e. H2 and H4, respectively. YsT traps were placed 150 m away from PhT traps. Approximately 2g of cucurbitacines was placed in the central cubicle of yellow traps in order to increase their attractiveness. The survey of captured WCR beetles and their removal was done once a week. The replacement of the first trap was done after four weeks, while the second trap was replaced two weeks later, due to the beginning of harvest.

A total of 1878 WCR beetles were captured during six weeks of trap exposure in four sweet maize hybrids under conditions of irrigation. Of this number 1702 were captured on PhT traps in the following ratio: (H 1): 347, (H 2): 314, (H 3): 318, and (H4) : 723 which is 2.1-2.3 fold higher. A total of 176 beetles were captured on YsT traps in a ratio of (H 1): 51, (H 2): 60 i (H 3): 42, (H 4): 23.

Attractiveness of sweet maize to migrating WCR beetles increased with plant growth and development and with the time of flowering. During the first week of monitoring (July 15-22) while the plant height was approximately 1m, almost an equal number of beetles was registered on both types of traps: PhT: 29, YsT: 28 or 1.0 imago/trap/day. In the second and successive monitoring of PhT traps, there were 10.9, 23.8, 5.0 and 10.0 imagoes/trap/day. The corresponding numbers on the YsT traps amounted to 1.9, 0.7, 0.04 and 1.3 imagoes/day. In the second week of August, after four week of trap exposure, only 139, i.e. 1 beetles were captured on PhT and YsT traps, respectively. If traps had been replaced after three weeks from the date of their placement (August 7- 14), the number of captured beetles would have been equal with the number in the third and fourth week of August. The greatest number of beetles on PhT, i.e. YsT was registered in the first week of August, i.e. the fourth week of July, respectively. As long as traps were

observable above the plants, attractiveness of both traps was the same. Super sweet hybrid H4 was two fold more attractive than common sweet maize hybrids. In order to establish the effect of observed hybrids on the number of laid eggs in the sweet maize crop will be to determine the number of laid eggs by the sampling method. The most reliable way to determine this effect will be to sow one hybrid of the sweet maize in April in the following year and determine the number of larvae and the number of lodged plants and extent of root damage.

COMPARISON OF THE TRÉCÉ® AND CSALOMON® TRAPS FOR MONITORING POPULATIONS OF THE WESTERN CORN ROOTWORM

GERALD E. WILDE
Kansas State University, Dept. of Entomology, Manhattan, Kansas USA

Insect traps are an unbiased way of estimating insect population and abundance over time. We compared the TRÉCÉ® and Csalomon® traps baited with the Csalomon® female lure, the Csalomon® kairomone lure, or a combination of the lures for their efficiency in capturing western corn rootworm (*Diabrotica virgifera virgifera)* adults. More beetles were captured in the TRÉCÉ® than the Csalomon® trap when the kairomone or kairomone plus male attractant were used on a trap. Equal numbers of males were caught in the two traps when the male attractant was used by itself. The TRÉCÉ trap is easier to handle and quicker to change. Based on these tests, we suggest the use of the TRÉCÉ traps to monitor western corn rootworm populations.

CAPTURE OF WESTERN CORN ROOTWORM ADULTS VIA UKRAINIAN AND PHEROCON AM STICKY TRAPS IN NOVI SAD

TATJANA KEREŠI[1], RADOSAV SEKULIC[2], FRANJA BACA[3], PAVEL MELNIK[4], OLGA BUHACHUK[4], BOGDAN KUSHNIR[5]
1) Faculty of Agriculture, Novi Sad, Yugoslavia
2) Research Institute of Field and Vegetable Crops, Novi Sad, Yugoslavia
3) Maize Research Institute, Belgrade, Yugoslavia
4) Ukrainian Scientific Plant Quarantine, Boyani, Novoselitsa District, Chernivtsi Region, Ukraine
5) Ivano-Frankivsk State Inspection of Plant Quarantine, Ivano-Frankivsk, Ukraine

In 1996 the forecast service using 160 sex pheromone traps established that the western corn rootworm (WCR), *Diabrotica virgifera virgifera* Le Conte had already spread to over 60% of the Serbian territory.Ukrainian specialists decided to make their own attractants and traps in order to prevent similar happenings in their country. The main objective of this study was to determine if the Ukrainian traps (UT) can be used as a sampling tool for the WCR and then to compare their efficiency with Pherocone? AM (PT) yellow sticky traps.

Studies were conducted in Novi Sad during 2002 on maize grown in long-term continuous cropping trial (set up in 1965) using different fertilisation rates and hybrids where visual count in previous years showed high density of WCR beetles. Four Pherocone traps and eight yellow sticky traps that contained eight attractants (00, 01, 02, 03, 04, 05, 06 and 07) made in Ukraine, were used for monitoring. Pherocone traps were placed in the hybrid NS-640, and Ukrainian traps in hybrids NS-606 and NS-542, positioned

ca. 30 m apart. Sampling was conducted at weekly intervals, from June 18 (PT) and July 8 (UT) till the end of August. Pherocone traps were replaced at two-week intervals and Ukrainian traps only once, on July 30.

The weather during the vegetation season of 2002 can be characterised as very warm with long extremely dry periods. Under such conditions, the appearance of WCR beetles was detected at least two weeks earlier than in the previous year (which is similar to the situation of the also warm and dry 2000). The number of adults continuously increased from June 25 and peaked on July 16 for both types of traps.
Later, the population decreased till the end of August which was mainly caused by two rainy and cold weeks.

The results showed that Ukrainian yellow sticky traps can consistently sample WCR adults for about two weeks, although better during the first week. Pherocone traps caught more beetles than Ukrainian yellow sticky traps (approx. 1.7 times), comparing mean catches per trap at the equal period of observation (from July 9 to August 27) and mean catches per trap at the peak of appearance.

Great differences were observed among traps, depending on fertilisation rate (for both types of traps) and components used (UT). Therefore, it is hard to claim which attractant from Ukraine was the best. Under the above described conditions it was number 07 and 06 (highest capture after 24 hours, during the whole period of investigation and at the maximum of appearance), followed by variants 01, 03 and 04. Further investigations (in the year to follow) under equal fertilisation conditions are needed in order to get more valid conclusions.

THE COMPARISON OF EFFICIENCY BETWEEN UKRAINIAN TRAPS AND PHEROMONE "CSALOMON" TRAPS IN MONITORING *Diabrotica virgifera virgifera* LeConte OCCURRENCE IN 2002

FRANJA BACA[1], TATJANA KEREŠI[2], RADOSAV SEKULIC[3], PAVEL MELNIK[4], OLGA BUKACHUK[4], BOGDAN KUSHNIR[5]

1) Maize Research Institute "Zemun Polje", Belgrade, Yugoslavia
2) Faculty of Agriculture, Novi Sad, Yugoslavia
3) Research Institute of Field and Vegetable Crops, Novi Sad, Yugoslavia
4) Ukrainian Scientific Plant Quarantine, Boyani, Novoselitsa district, Chernivtsi Region, Ukraine
5) Ivano-Frankivsk State Inspection of Plant Quarantine, Ivano-Frankivsk, Ukraine

A group of researches, working at the Ukrainian Scientific Plant Quarantine Boyani and the State Inspection of Plant Quarantine Ivano-Frankivsk in Ukraine, have synthesised several pheromonal compounds in order to provide the possibility of monitoring the western corn rootworm (WCR) - *Diabrotica virgifera virgifera* LeConte on a greater territory of Ukraine. The first testing of efficiency of the eight selected compounds in monitoring WCR imagoes was performed in Yugoslavia (Zemun Polje and Novi Sad) in 2002.

The experimental pheromonal compounds were designated with the following ciphers: 00; 01; 02; 03; 04; 05; 06; and 07. Traps of sizes equal to Csalomon ones were made of thicker PVC foil. Csalomon traps are used as standards at Zemun Polje. The trail with traps was set up in the experimental field of the Maize Research Institute, Zemun Polje on July 4. This plot has been cultivated as a long-term continuous cropping trail. The first reading was done 24 hr upon trap placement, while the second and the third readings were performed after four, i.e. three days, respectively. All other readings were done once a week. All traps were replaced four weeks after their placement. The objective of the present study was to

rank and select the best combination on the basis of shown efficiency under conditions of great population abundance.

The data on the efficiency of certain compounds according to the number of caught beetles in Novi Sad and Zemun Polje differed significantly. A great effect of the local population abundance was observed, as trails in both locations had higher number of treatments with different fertiliser rates. At Zemun Polje, each combination expressed a certain efficiency, ranging from 45 to 158 WCR beetles in combinations 00 and 05, respectively. A total of 772 beetles, or 96 beetles per trap, were caught during eight weeks. In the standard variant with two Csalomon traps, the corresponding means amounted to 585 and 397 beetles in July, i.e. August, respectively. Comparing the means, the efficiency of the standard was on the average six fold-higher than of Ukrainian traps. The ratio between Ukrainian traps, the variant 05 and the variant 00, and the standard was ranging from 1 : 3.7 to 1 : 13. A total of 597 beetles or 2.7 beetles daily per trap were registered during the first four weeks in July. During the second four weeks the corresponding number amounted to 175, or 0.8 beetles daily per trap. The trap efficiency abruptly decreased when the population activity decreased due to extreme heat and drought during the first week of August and due to rain with a temperature drop during the second and the third decade of August. The number of WCR beetles with combinations 01; 02; 06; and 00 amounted to 0; 7; 12 and 2, respectively. The combination 04 was the most successful (50 beetles) with a lower number and lower activity of beetles and is followed by 03 with 34 beetles and 05 with 25 beetles.

However, Ukrainian yellow pheromone traps were also efficient in both locations, especially during the first day and the fist week of their placement. Traps should be placed in maize crops grown in both continuous cropping and crop rotation in the coming year. Furthermore, the number of beetles caught by Csalomon traps decreased at Zemun Polje after placement of Ukrainian traps, which was not observed in Novi Sad after placement of Pherocone traps.

IRRIGATION USING A HOSE-REEL IRRIGATOR

EVA KLEMENTOVÁ[1], MIKULÁŠ LÁTECKA[2]

1) Faculty of Civil Engineering, Slovak University of Technology, Department of Land and Water Resources Management, Bratislava, Slovak Republic
2) Dean of Faculty of Horticulture and Landscape Eengineering, Department of landscape planning and ground design, Faculty of Horticulture and Landscape Engineering, Slovak Agricultural University Nitra, Slovak Republic

In operations of large-scale irrigation systems in the Slovak Republic, strip sprinkling is the most frequently used irrigation method. The performance of irrigation is therefore a combination of two movements, the rotary movement of a sprinkler and its simultaneous move towards the reel of the irrigator. The work brings a graphic-and-analytical procedure for transformation of spraying curves of static spraying into dynamic hosereel irrigator for consideration and it is deemed to be its essential contribution then irrigation curve was calculated for the movement of a sprinkler and the confomity of the measured and calculated irrigation curves was verified as well. From the viewpoint of the uniformity of irrigation, which is an important indicator of quality, it is essential to elaborate a method by means of which the sprinkling intensity in various distances from the sprinkler within its range and therefore also the distribution uniformity may be calculated for any sprinkler type and for various velocities of hose spooling. By using the original graphic-and-analytical method of transformation we intended to contribute to the clarification of this issue and to specify the evaluation of the distribution conformity by strip sprinkling. Verification has been carried out by means of field measurements. Transverse uniformity of irrigation was measured and presented by means of a method for the evaluation of irrigation uniformity under field conditions using

Christiansen distribution uniformity coefficient. The presented results of strip irrigators testing for sprinkling irrigation give a justified ground for their reconstruction and refunctioning under current conditions.

CORRELATION BETWEEN PEST- AND ALUMINUM RESISTANCE OF AGRICULTURAL CROPS

EUGENE M. LISITSYN
North-East Agricultural Research Institute, Kirov, Russia

It is considered that plant varieties sensitive to unfavourable environmental conditionssuch as high soil acidity, are more sensitive to pests as well. One of the non-specific parameters of plant resistance against stressful factors is the stability of cell membranes. Disruption of membrane structure by anyone chemical stress or pest lead to the activation of such intracellular enzyme as acidic lipase. The objective of the study was to establish the correlation between changes in acidic lipase activity and potential acid-(aluminum-) resistance of agricultural crops.

Seedlings of peas, barley, and oats were prepared accordingly to Lisitsyn (2000), level of aluminum resistance was estimated as relative root growth (RRG, Cameron et al., 1986). The activity of acidic lipase estimated by amount of 0.1 N alkali, need for neutralization of derivated fatty acids

The calculation of coefficients of pair correlations between lipase activity and RRG has shown availability of statistically significant interrelations for peas (r = - 0.906). Much less strong correlation has appeared for barley (r = 0.419) and practically missed in a case of oats (r = - 0.220). It is possible to explain higher values of correlation coefficients for peas varieties, on the one hand, that the used varieties had a range of RRG variation from 26 up to 88 %, whereas barley varieties of - from 55 up to 64 %, oats varieties - from 63 up to 78 %. On the other hand, pea's plants had only one germinal root, therefore seedling response on stress shows much more strongly, than for multi-rooted seedlings of oats and barley. The depression of growth of the greatest root of grain crops can not be mirrored on growth of the remaining roots. Study of dynamics of activity of the enzyme within 8 days of action of stressful factor (1 mM aluminum, .. 4,3) has shown, that for sensitive oats variety Argamak lipase activity exceeded control values (.. 6.0 without aluminum) during all time of experience, and for a resistant variety Chizh came nearer to control to the end of experience. The relative activity of a lipase varied on days: on 5-th and 7-th day was higher for Chizh, on 6-th and 8-th day - for Argamak. As a whole tendency to lowering activity of a lipase in Al-treated roots was characteristic for variety Chizh, and for Argamak - to the contrary. Dynamics of activity of acidic lipase in root cells of intravarietal groups of plants considerably differed. For plants with the short roots (SR) of a resistant oats variety it looked like unimodal curve, and the lowering of relative activity of an enzyme was much sharper, than on the average for variety, and up to more low level. The activity of enzyme in the roots of plants with the long roots (LR) already to 5-th day has exceeded twice activity of the roots in control treatment and has remained at such level up to the end of experience. It can speak about the stabilization of a metabolism of cells of the seedlings of the given group. For sensitive variety the activity of enzyme in plants of both groups changed in an oscillatory mode and up to the end of experience was not stabilized. The level of lipase activity for LR considerably exceeded a level of activity of the SR on 5-th…6-th days of experience, but on 7-th and 8-th days the levels of activity of enzymes of both groups practically were equal.

The availability of statistically significant correlations makes it possible to use parameter of a modification of activity of an acidic lipase in researches of mechanisms of plant Alresistance, and also allows forecasting a stability of plants of agricultural cultures to the pests at growing in conditions of low-fertility acid soils.

Diabrotica virgifera virgifera **IN RUSSIA: WAYS OF INVASION AND ZONE OF DAMAGE**

IZHEVSKY S.S., JIMERIKIN V.N., BICHKOV N.S., KOUTAPHIN A.I.
Russian Institute for Plant Quarantine, Bykovo, Russia

After the introduction of *Diabrotica virgifera virgifera* LeConte (Dvv) into Ukraine, the danger of its further spread to the Russian territory had greately increased. First locus of Dvv in Ukraine were registered in the Transcarpathion region. East Carpathian Mountains will, no doubt, become an obstacle for the pest's further movement to the east. The most probable ways of introduction into Russia are southern regions – Moldavia and southern Ukraine. It should be also mentioned that the share of corn sown is higher – sometimes it is cultivated as a monoculture in these areas. Another way of introduction – by water ways with vessels via the Black sea from the Danube estuary to the Black sea ports of Russia. There is little opportunity for invasion of the beetles by air transport, since there are no direct flights between the main European airports and airports in the southern part of Russia.

The comparative analyses of evolutionary combinatory ties between the pest and its host plant, with agroclimatic resources of the USA and Russia as a background, - have shown that the zone of the highest Dvv damage in the Russian Federation coincide with the territory of regular cultivation of corn for grain. This territory embraces Rostov, Volgograd regions, Krasnodar and Stavropol areas, Kabardino-Balkaria. According to preliminary calculations, with no protective measures taken, yearly damage in this region may reach 15 million USD.

Forecasts based on the known average speed of Dvv distribution in the European area (av. speed is 50 km per year) make it possible to expect its appearance here in 20 years. However, taking into consideration the social-economic situation in the two states (Russia and Ukraine) that has been formed in the past few years, the actual period can make about 5 – 8 years.

Considering the inevitability of Dvv penetration in Russia, the task of the National Quarantine Service is to timely register the first appearing pest locus. In case of penetration all possible measures should be taken to slow down the process of occupation of the potential area by the pest and to decrease the possible damage.

INVITET®, A NEW WATER SOLUBLE BAIT FOR CORN ROOTWORM CONTROL

ROBERT F.W. SCHRODER, TOM BROWN

The corn rootworm is one of the most damaging and costly pest of corn in North America. Growers routinely apply soil insecticides to 50-60% of the 30 million acres of corn annually to control the pest. These insecticides are routinely applied prophylatically and are frequently unnecessary, and may cause imposed health risks to growers, livestock and wildlife, in addition to possible ground water and environmental contamination. During the past 10 years, reports of carbamate and organophosphate control failures of the corn rootworm have increased in parts of Nebraska. Crop rotation is no longer an effective tool for managing the rootworm in some states, because the rootworms are adapting to the corn/soybean rotation. It is evident that there is a need for alternative corn rootworm management strategies.

One of the alternative strategies involved the use cucurbitacin based feeding stimulants in a bait formulation with insecticides. In a cooperative venture between USDA and Florida Food Products, a water soluble cucurbitacin E glycoside based feeding stimulant/arrestant was commercially extracted from Hawkesbury watermelon. Many formulations of the extract were evaluated in the laboratory and field. The most efficacious formulation was an emulsifiable concentrate, labeled InviteTM EC. InviteTM EC is applied aerially with 90-95% reduced rates of recommended insecticides to control the adult rootworm. During 2001 growing season, approximately 250,000 acres of corn were treated with the InviteTM EC and 90% reduced rates of Penncap-M. In 2002, approximately 500,000 acres were treated. The applications of InviteTM EC with reduced rates of other insecticides including synthetic pyrethroids, carbamates, organophosphates and inert products were also successful in controlling the rootworm. The use of InviteTM in combination with select insecticides to control the rootworm were demonstrated in chemigation systems used in Texas and Nebraska. InviteTM EC applied with 90-95% reduced rates of foliar insecticides can reduce/eliminate the use of soil insecticides by only treating corn acreage with adult beetle densities at or above threshold levels. A reduction in the amount of insecticides used, would not only reduce treatment costs, but have minimal impact on nontarget organisms and the environment. Also the benefits of such a reduction would be immeasurable in terms of reducing health risks to crop consultants, farmers, applicators, livestock and wildlife.

InviteTM EC applied with reduced rates of insecticides is a cost effective, safe alternative that is available to the farmer for the control of the corn rootworm.

THE INTEGRATED WCR CONTROL BY SOIL, SEED AND AIR APPLICATION OF PESTICIDES AND NON-PESTICIDE AGROCHEMICALS

BERTALAN TÓTH, PÉTER MAROS, ZOLTÁN PARTALI

This year the western corn rootworm (WCR) has become the major problem in Hungary. Especially have the south, south-west regions of the country been dramatically hit. The goosneck symptom was overall visible in mid-summer in all the above mentioned regions.

The aim of the Biomark Ltd. was to develop and offer technically and economically sound solutions to the Hungarian corn producers.

We have concluded that crop rotation alone cannot be the only and sustainable solution in Hungary. Ever since the WCR has become epidemic in our country we were encouraged by our partners to develop a good and integrated technology against the beetle.

From the standpoint of pest control there were however many constraints:

- Soil insecticides do not always guarantee success. According to our experience the highest efficay in Hungary was 70%.
- ? A soil incorporated insecticide poses always an increased risk to the environment.
- ? Often the soil insecticide applied has already lost its efficiency by the time the WCR larvae appear.
- ? Aerial application is limited to bee safe products only because bees often feed on corn pollen.
- ? Fields where hybrid seeds are produced are the most endangered ones. Because of the detasseling 0 day entry time is required.
- ? Tillage is based on ploughing that distributes eggs unevenly in the soil levels. This fact contributes to a long swarming pattern which requires long residual effect from the insecticide as well.

The results of different types of applications, seed, soil an aerial treatments were demonstrated in the paper.

MONITORING AND FIRST RECORDS OF *Diabrotica virgifera virgifera* LeConte IN THE CZECH REPUBLIC

RUZICKA T.
State Phytosanitary Administration of the Czech Republic

Diabrotica virgifera virgifera was listed into the List of Quarantine Pests of the Czech Republic in 1997.

WCR monitoring in the Czech Republic started in 1999, when the Czech Republic obtained 150 pheromone and 150 Multigard traps from the FAO Monitoring Programme. The monitoring has been organised by the State Phytosanitary Administration – the National Plant Protection Organization of the Czech Republic.

The traps were placed, periodically controlled and changed by local inspectors of the State Phytosanitary Administration. Finally the used traps were checked in detail at the Central Diagnostic Laboratory of the State Phytosanitary Administration. Traps were located on about 50 sites in maize fields in the vicinity of international airports, transportation routes or Czech borders.

This monitoring has been carried out in the Czech Republic annually since 1999. In 2000 – 2002 only pheromone traps were used and the amount of locations was about 30, mainly in South Moravia.

The first records of *Diabrotica virgifera virgifera* in the Czech Republic date from July 2002. Two males were caught in a pheromone traps situated in a maize field in the district of Hodonin in South Moravia. Two other males were observed in the same place on 7th August. One male was found in Mikulcice in the district of Hodonin on 8th August and one male was observed in Borsice u Blanice in the district of Uherske Hradiste on 27th September.

In addition to that other three incidences were recorded within subsequent supervision of used traps carried out by diagnostic expert of the State Phytosanitary Administration at the end of this year´s monitoring. These new records come from Straznice in the district of Hodonin (one beetle in a trap in August), Lanzhot in the district of Breclav (one beetle in a trap in July) and Hrusky in the district of Breclav (one beetle in a trap in July). In summary, nine males of *Diabrotica virgifera* were trapped in 6 locations situated in 3 districts of the Czech Republic during July, August and September 2002. All these districts are situated in South Moravia in the immediate vicinity of the border. It is evident that trapped beetles are invading males that are spreading from infested areas. Conditions for spreading were very suitable this year - many warm (summer and tropical) days and southeast winds.

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MONITORING OF *Diabrotica virgifera virgifera* Le Conte IN UKRAINE

OLEKSIJ MOVCHAN, IVAN USTINOV, PAVLO MELNYK, NATALIA KONSTANTINOVA

In 2002 the total corn acreage in Ukraine amounted to 1.7 million hectares. The specialists of the National Service, Ukrainian Scientific-Research Station, researchers of plant quarantine monitored and revealed the western corn rootworm. On the territory of 500 000 ha 25 regions were visually inspected and by means of pheromone traps of both Moldavian and Ukrainian production 6000 ha in 6123 districts of 20 regions of Ukraine were monitored. There were defined the main ways of *Diabrotica* spread into Ukraine (figure 1). Major attention was paid to the regions of Odessa, Chernivtsi, Ivano- Frankivsk, Zakarpattya bordering with Romania, Slovakia, Hungary where the corn rootworm had already settled. The pheromone and cucurbicit traps were installed in the first half of July, starting 3 July 2002. Every 7 days the inspectors of the Phytosanitary Service counted and defined the traps, sent to quarantine labs for analysis. The pheromone capsules were changed every 30 days.

In 2002 Ukrainian specialists of the Phytosanitary service revealed 133 males (Table 1) of *Diabrotica virgifera* (caught by means of pheromone traps) in 17 inhabited locations of 6 regions: Vynogradivska, Beregovsky, Uzhgorodsky, Mukachivskiy, Khustsky, Irshavsky in Zakarpattya. These locations are situated in the frame of 30-km zone from the border with Slovakia, Hungary, Romania. WCR imagoes in the Zakarpatsky region were found on pheromone traps July 15 to July 29, 2002. The corn plantations monitored revealed no larvae of the western corn rootworm. Thus they migrated from the border regions of Hungary, Romania, Slovakia. The results of the investigations were published in the special journal. *Diabrotica virgifera virgifera* Le Conte was identified by Zakarpatska zone quarantine laboratory (the city of Uzhgorod) and confirmed by the Central scientific-research quarantine laboratory (the city of Kiev). In other locations and regions of Ukraine monitoring of the WCR in 2002 gave no positive results.

Based on the knowledge on the western corn rootworm there were edited methodical recommendations, letters and posters, articles were published in scientific and agricultural journals and other media, some TV programs were dedicated to this topic. On the basis of the Ukrainian scientific-research station of plant quarantine (the city of Chernivtsi) an international panel was organized focusing on the monitoring and means *Diabrotica* control. Scientists, specialists of the Phytosanitary Service of Ukraine, Moldova, Yugoslavia (up to 100 participants) took part in this meeting.

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IWGO - ITEMS

10th *Diabrotica* Subgroup Meeting, 9th EPPO ad hoc Panel and FAO Network Group

The 10th IWGO *Diabrotica* Subgroup Meeting will take place in

Engelberg; Switzerland; January 14 –16, 2004

The *Diabrotica* Subgroup Meeting will take place together with the 9th EPPO ad hoc Panel and the FAO –Network Group - Meeting.

On behalf of the IWGO – *Diabrotica* Subgroup Convenor, Prof. Dr. Rich EDWARDS, the local organisers Dr Ulrich KUHLMANN (CABI Bioscience, Delémont) and Mario BERTOSSA (Swiss Federal Research Station for Plant Production, Changins), and myself, you are kindly invited to take part in this meeting. Attached please find the outline of the scientific programme, general programme outline as well as the pre-registration form sheet. Please submit the title of your oral and / or poster presentation according to the themes given in the scientific outline.

Engelberg is situated in the heart of the Swiss High Alps and is surrounded by truly majestic mountains. It lies in a romantic valley in close proximity to Lucerne and its picturesque lake. How to get there: by airplane via Zurich Airport (90 km to Engelberg by train, nice journey, 2 hours); by train via Lucerne (one hour from Lucerne); by car: Motorway A2 (Basel-Gotthard) exit Stans-Süd, 19 km to Engelberg. At an elevation of 1050 m, Engelberg is the ideal place for skiing. With more than 82 km of a down hill ski runs, 38 km of winter hiking paths, and 36 km of cross country skiing runs, we would like to recommend that you extend your stay for some days after the meeting to enjoy this beautiful scenery. May-be you would like to bring your partner as well. For this post conference tour, we can arrange special packages including hotel, skiing pass and half board at a very competitive rate.

The registration fee will be EURO 150.00 (including all coffee breaks, lunch, dinner and drinks, meeting documents, and the IOBC-contribution). We have reserved a number of rooms for a special rate in the hotel, where the conference will take place (single rooms will be available for approximately Euro 59 = CHF 85 instead of CHF 110).

Further information especially concerning accommodation and more details about the conference location will be sent to you by the local organisers via e-mail in due time.

Looking forward to seeing you in Engelberg, Switzerland.

The Organizing committee took all efforts to manage a “post congress seesion” in Engelberg which will give us more possibilities for more scientific (and of course social) contacts. Please use this possibility and stay some days more in Engelberg.

Programme Overview* 10th IWGO - *Diabrotica* Subgroup Meeting Engelberg, Switzerland, January 14 – 16, 2004

Date	Activity	Location
Wednesday, 14 Jan 2004 17:00 17:00 19:00	• Welcome Coffee and Tea • Registration and Poster Installation • Get-together Apéro and Welcome Dinner	Hotel Europe
THURSDAY, 15 JAN 2004 8:30 13:00 14:00	• Scientific Sessions • Lunch Buffet • Scientific Sessions • Social Event • Traditional Swiss Style Dinner	Hotel Europe Monastery Engelberg Hotel Europe
FRIDAY, 16 JAN 2004 8:30 13:00 14:00 ca.16:00	• Scientific Sessions • Lunch Buffet • Scientific Sessions • Closing Session & Departure	Hotel Europe
SATURDAY, 17 JAN 2004	• Departure • Start of Post Conference Tour** as long as you like!	Hotel Europe

*** All activities mentioned in the programme overview are included in the registration fee apart from the Post Conference Tour**

**Post Conference Tour: There is an opportunity to extend your stay in Engelberg in case that you are interested to go alpine skiing, hiking or cross country skiing. After the conference we will get a special package if we stay at least 3 more nights in Engelberg (package includes hotel accommodation, breakfast, 3 course dinner, ski pass for Engelberg, another welcome cocktail, the package will cost approx . CHF 420,- per person, for 3 nights). Please indicate on the pre-registration form sheet if you are interested to book such a package. More information will be provided via e-mail to participants interested.

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SCIENTIFIC PROGRAMME OUTLINE

Thursday 15 and Friday 16 January 2004

Scientific Session 1: *Monitoring*
Country representatives are invited to provide an update about pest status and distribution of *Diabrotica* based on monitoring data from 2003. Each country speaker please prepare an oral presentation, which will last not longer than 7 minutes (max 4 slides each).

Scientific Session 2: *GM Maize*
Speakers should be prepared to provide information about GM products currently available for *Diabrotica* control worldwide, GM crop regulation issues in Europe, and GM crop risk assessment.

Scientific Session 3: *Farmer Information/Containment Strategies*
Speakers are invited to provide information about the principles of the Farmer Field School (FFS) approach, an update about the FFS implementation in Europe, containment strategies currently applied in the Ticino, Switzerland and in Italy. In addition it is expected that one speaker will provide information about the European Commission perspective for *Diabrotica* control in Europe.

Scientific Session 4: *Management Options*
Speakers are invited to provide information about the use of economic threshold models, adaptation of crop rotation practices, new maize cultivars, and other new products to control *Diabrotica*.

Scientific Session 5: *Basic Ecology*
Speakers are invited to provide information about the spatial distribution of *Diabrotica*, multitrophic interactions in the *Diabrotica* – maize system, influence of maize nutrition on larval performance, *Diabrotica* - nematode associations, and semiochemicals.

Scientific Session 6: Free Themes
Speakers are invited to provide information about topics, which would be otherwise not covered during the meeting.

Scientific Session 7: Poster Session
Time will be reserved to make sure that poster presentations can be discussed more in detail. Please use the opportunity to prepare a poster presentation as one meeting room has been reserved to display the contributions submitted.