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EDITORIAL

The IXth IWGO – Diabrotica – Subgroup Meeting took place in Belgrade November 2 – 4, 2002. The IWGO – Convenor and the Convenor of the IWGO – *Diabrotica* subgroup thought it would be a good idea to hold an IWGO meeting on Diabrotica on the place of its first detection 1992. The meeting was again organized together with the EPPO Panel on *Diabrotica* and the FAO – network group, and so representatives from the EPPO headquarter in Paris and the FAO headquarter in Rome attend the meeting.

The meeting was very well organized by the Serbian Organization for Plant protection by its president Prof. Radoslava **SPASIC** and the Secretary of the Organization Mrs. Ivanka **KRAUS**. The meeting was attended by more than 80 participants from 19 countries. Participants came from Europe, America and Asia. Old and new faces were to be seen and for the first time a colleague from Israel attended a *Diabrotica* subgroup meeting.
The meeting was opened by the Deputy Federal Minister for Economy and Internal Trade Mr. Miroslav **MALESEVIC** who expressed his pleasure for hosting the group.

During the meeting 56 papers (including 10 posters) were presented. All were on a very high scientific level and gave a good overview about the situation of Diabrotica in Europe.

On behalf of the Global IOBC Working Group on Maize Pests (IWGO) I want to thank again the organizers for hosting the group not only for giving us an opportunity for the presentation of scientific papers but also for arranging a very nice and amusing social program.

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In this issue of the NEWSLETTER you find an original paper from Ioan RIOSCA which was presented at the meeting. Additionally you will find - as usual – the list of participants of the meeting and additionally the abstracts of the papers having been presented in Belgrade. This mainly for those who did not have the opportunity to attend the meeting and still are interesting in IWGO – work and meetings.

Harald K. BERGER
(IWGO Convenor / Editor)

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POSIBILITIES OF CONTROLLING WESTERN CORN ROOTWORM (*DIABROTICA VIRGIFERA VIRGIFERA* LE CONTE) IN ROMANIA THROUGH CROP ROTATION AND OTHER METHODS

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Referring to impact of *Diabrotica virgifera virgifera* on different systems of corn cultivation, we were able to establish FAO crop rotation trial under Contract FAO WCR Network, Letter of Agreement (LoA) number PR 21261. Experiments were done in field (4 years corn monoculture before), in demonstrative plots in Clarivii, 4 km far from Jimbolia, for studying crop rotation role on *Diabrotica virgifera virgifera* populations.

Emergence cages and yellow sticky traps (3 traps x 4 crops x 6 replications) were weekly monitories. In crop rotation trial has surveyed evolution of pest (data of first larvae appearance, number of larvae/plant, pest attack noted on Iowa scale, number of adults captured in emergence cages and in yellow sticky traps, production of plants with different level of attack and recovery of attacked roots.

Referring influence of crop rotation on pest population evolution, data presented in table 1, shows that number of captured adults was greatest in plots where was cultivated corn in monoculture (257.95 adults/trap), followed by plots where, after corn, was cultivated soybean (20.1), followed by sunflower (14.02) and less capture were registered in plots with two-row barley after corn (5.5).

Much more evident are these results if we are referring to the level of adults trapped in emergence cages. In studied period of time have came out from soil with 5 year corn monoculture, 17.94 adults/0.25 m2 or 71.76/m2, that means a high pest population and non from plots where after corn, was cultivated soybean, sunflower or two-row barley (Table 2).

In each plot of corn, soybean, sunflower and two-row barley, on a weekly base, from the end of May till the end of July, 5 plants, in 3 replicates were examined for presence of larvae in soil surrounding plant or in wounded roots, by splitting each root. It was found larvae only in corn roots or in soil surrounding these roots, their number being correlated with pest biology (Table 3).

On the monthly base, from each corn plot 10 plants were examined and noted on Iowa scale, in order to note the recovery of root system. We have to underline that if in June (24-30) the average attack of WCR was 3.57, it seems to decrease, or better to say that the root system of corn plants has the possibility to be reconstructed, so in July (19-25) the average attack of WCR was 3.15, in August (26-1 September) the average attack of WCR was 2.5 and in September (23-29) the average attack of WCR was 2.35.

In order to emphasize the role of WCR on corn production, at the end of September it was harvested 10 plants, belonging to 4 categories (first with goose neck symptom and 5-6 Iowa note; second with goose neck symptom and 3-4 Iowa note; the third without goose neck symptom and 2-3 Iowa note; the fourth without goose neck symptom and 1-2 Iowa note) from each corn plot. The kernel production was strongly correlated with WCR attack; it was of 338; 1787.5; 8060 respectively 8450 kg/ha.

In order to have different options for controlling of pest at Voiteg was the second main experimental field for studying of resistance of usual cultivated hybrids on pest attack and for a trial for control of pest with seed treatment.

In corn monoculture field was surveyed pest attack on 10 hybrids: EVELINA, PR 36 R 10, FLORENCIA, COLOMBO, VASILICA, STIRA, DEKALB Bt 512, CICLON, OLT, and F 376. Due to missing rains, in June

25, there are no significant differences, regarding number of larvae/plant (2.1-2.7) or attack level, expressed by Iowa scale (2.2-2.5).

Data from table 4 show that it is very difficult to control the pest, especially in a special weather conditions by seed treatment.

CONCLUSIONS

- Technologies of corn cultivation, precedent culture, have an essential role in increasing of pest population, corn monoculture favoring the pest.
- There are no significant differences between tested corn lines or hybrids and what is more important, in Romania there is no registered pesticide treatment and in 2002 conditions none of seed chemical treatment has stopped pest attack, it seems that Cosmos 250 FS, Gaucho 350 FS and Cruiser 350 FS will a choice in the future.
- Field studies on WCR including crop rotation have created more knowledge on crop rotation importance in local agro-ecosystems and cultural practice that contribute to understanding the importance of finding the adequate crop rotation system and to elaborate future management options.

Table 1 **Number of adults captured/ Pherocon AM (Yellow sticky) traps in crop rotation trial (precursory culture 4 years corn monoculture)-2002**

	27.VI	4.VII	11.VII	18.VII	25.VII	1.VIII	8.VIII	15.VIII	22.VIII	29.VIII	5.IX	12.IX	TOTAL
Two-row barley	0.11	0.28	3.11	2	ND	ND	ND	ND	ND	ND	ND	ND	**5.5**
Soy-bean	0.44	0.89	2.44	1.61	4.11	3.17	3	2.5	1.06	0.5	0.28	0.11	**20.11**
Corn	12	16.33	102.67	45.17	36.89	19.5	11.39	8.06	3.44	1.67	0.61	0.22	**257.95**
Sun-flower	1.11	0.56	3.56	1.17	3.11	2.17	0.72	0.78	0.56	0.11	0.11	0.06	**14.02**

Table 2 **Number of adults captured/ Pherocon AM (Yellow sticky) traps in emergence cages (0.25 m2) in crop rotation trial (5 years corn monoculture)-2002**

Date	27.VI	4.VII	11.VII	18.VII	25.VII	1.VIII	8.VIII	15.VIII	22.VIII	29.VIII	5.IX	12.IX
Average	0.61	4.5	5.44	0.94	2.56	3.11	0.72	0	0	0.06	0	0

Table 3 Number of larvae and adults/corn plant in crop rotation trial (5 years corn monoculture)- 2002

Date	27 V -9 VI	10-16 VI	17-23 VI	24-30 VI	1-7 VII	8-14 VII	15-21 VII	22-28 VII	29 VII -4 VIII	5-11 VIII	12-18 VIII	19-25 VIII	26 VIII -1 IX	2-8 IX	9-15 IX
No. Larvae / plant	0	0.07	0.5	3.33	6.66	2.97	0.67	0.1	0	0	0	0	0	0	0
No. Larvae in soil	0	0	0	0.83	3.63	1.87	0.63	0.1	0	0	0	0	0	0	0
No. Adults/ plant	0	0	0	0.17	0.83	1.23	1.63	2.13	3.17	3.57	2.5	1.7	0.37	0.24	0

Table 4 Efficacy of seed treatment on *Diabrotica virgifera* attack

	VARIANT	Dose	No. larvae/plant	IOWA Note
1	COSMOS 250 FS	5 l/t	0.7	1.6
2	COSMOS 250 FS	10 l/t	0.4	1.45
3	COSMOS 250 FS	15 l/t	0.25	1.2
4	GAUCHO 600 FS	8 l/t	0.4	1.4
5	CRUISER 350 FS	10 l/t	0.35	1.45
6	MOSPILAN 70 WP	30 l/t	0.55	1.75
7	COUNTER 5 G	20 kg/ha	1.75	2.1
8	CARBODAN 35 ST	28 l/t	0.4	1.5
9	Mt.	-	2.3	2.5

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Committees and List of Participants of the

7th FAO/TCP Meeting
8th EPPO ad hoc Panel
9th International IWGO – Workshop

Belgrade, Serbia, Yugoslavia, November 3 – 5, 2002

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INTRODUCTION

Researchers from both Europe and the USA have shown great interest in participating in the 9th Diabrotica Subgroup Meeting held in Belgrade thus pointing to the global importance of this major field crop. In Europe corn crop covers over 13 million hectares of which mostly in the south-east and east of the continent. Corn is the largest crop in the European agriculture followed by wheat. Thus the incidence of the WCR (*Diabrotica virgifera virgifera* LeConte) in Europe has attracted considerable attention of researchers and contributed eventually to substantial changes with regard to corn production. The consequences of WCR incidence are yet to be faced.

The presence of the WCR was registered at a very sensitive point of the disappearance of a larger State and the formation of numerous smaller States on the same territory. For this reason the importance and attention of this serious pest of corn was considerably minimized at first. Despite numerous difficulties the researchers from different countries of the region gathered together in the EPPO/IWGO and the FAO pooling knowledge and skill in solving various issues with regard to the pest.

The Belgrade Meeting showed an increasing interest of researchers in the problems raised by the new pest. Over 100 participants applied and 54 papers were presented. Hopefully the results presented will be useful to those imperiled by the new pest, the WCR.

The Ministry for Agriculture, Forestry and Water Management of the Republic of Serbia and the Federal Ministry for Economy and Internal Trade have given financial support and the Plant Protection Society of Serbia has contributed in every other way to the success of the Meeting.

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ABSTRACTS OF THE PAPERS PRESENTED AT THE

EU – Research Project Meeting on *Diabrotica*)*
7th FAO/TCP Meeting *)
8th EPPO ad hoc Panel on *Diabrotica *)*
9th International IWGO – *Diabrotica* **Subgroup Meeting** *)

COMPARISON OF YIELD AND PROFIT/LOSS OF SELECTED SOIL INSECTICIDES USED AGAINST ROOTWORM LARVAE IN INDIANA, USA

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For more than 25 years, scientists at Purdue University have been evaluating soil insecticides for *Diabrotica virgifera virgifera* LeConte larval control. Initial studies included organochlorine soil insecticides, which were phased out in the mid 1970's, and the "newer" organophosphate and carbamate insecticides. Synthetic pyrethroids appeared in the late 1980's. Although carbamates are no longer recommended in Indiana as planting time treatments for rootworm larval control, organophosphates and synthetic pyrethroids are still used. As a result, organophosphate and synthetic pyrethroid insecticides have been field tested for a number of years. Some of the newer chemistries, or ways to deliver products, have not been tested for a sufficient amount of time to gain a thorough understanding how their use impacts the bottom line, that being yield and profit. However, over the past 11 years, enough data have been generated on key products to provide some insight into their impact on protecting yield and providing a positive economic return to farmers. Experiments were located at Purdue Agricultural Centers. A randomized complete block design with 4 replications was used. Each experimental unit was 2.3 m wide (3 corn rows) by 91 to 152 m long, depending on location and year. A planter equipped to utilize bench-calibrated Noble® insecticide metering units or other specialized application devices was used. All insecticides, which included Aztec® 2.1G (tebupirimphos & cyfluthrin), Counter® CR® (terbufos), Force® 3G (tefluthrin), Fortress® 5G (chlorethoxyphos), Lorsban® 15G (chlorpyrifos), and Regent® 4SC (fipronil), were applied in the soil at labeled rootworm rates.

Ten randomly collected corn root systems from each plot were rated for rootworm damage using the Hills and Peters 1-6 root rating scale. Plots were individually machine harvested using commercial combines and weighed using either stationary scales or combine-mounted yield monitors. Grain weights were converted to 15.5% moisture. Insecticide costs were based on pricing data provided by an input supplier. Costs also included an equipment and labor charge of US$4.94/ha.

Results showed that the average yield among the various treatments ranged from 9.1 mt/ha for Regent to 8.5 for Counter (number of sites where each insecticide was included ranged from 13

to 30). Yield advantage when compared to the untreated plots ranged from 0.68 mt/ha for Lorsban to 0.38 for Aztec. Insecticide, equipment, and labor costs per hectare ranged from US$52.76 for Force to US$43.69 for Fortress. From these results, Lorsban provided the greatest dollar return.

HOMAGE TO THE PHEROMONE TRAP

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The chemical structure of the female-produced pheromone of the western corn rootworm (WCR) (*Diabrotica v. virgifera*) (Coleoptera: Chrysomelidae) was elucidated by USDA scientists in the early eighties [1]. Since pheromone traps proved to be suitable for sensitive detection of a great number of pest insects, it was surprising that when WCR started to spread in the early nineties from its original European introduction site near Belgrade airport, in neighboring countries other trapping methods (i.e. cucurbitacin traps and yellow sticky sheets with no chemical bait) were used. It is well known from literature that cucurbitacin is a non-volatile compound, so no attraction can be expected from it, although it is a potent feeding stimulant of the WCR. Yellow sticky sheets will chromotropically capture a large number of insect species, but such traps are usually quite insensitive at low population densities, and due to the many insects trapped sometimes it is hard to discern the target species.

Since we were convinced that a much better performance can be expected from traps baited with the pheromone, we synthesized 8-methyl-2-decyl propanoate, the sex pheromone of the WCR and tested it for field performance in 1995. Already in the first tests the compound showed high activity capturing large numbers of male WCR. Soon afterwards it became clear that although the pheromone is highly potent, the common trap designs – i.e. the sticky delta trap so commonly used for moth pests – are not optimal for capturing the WCR. It appeared that open vertical sticky surfaces work much better, and consequently the first commercial pheromone trap in Europe, the CSALOMON® LEM ("panel") was developed [2]. The new trap proved to be excellent for detection. For example, in 1995, the first year when the WCR was detected in Hungary, out of the total of 17 specimens captured in Hungary, 16 were caught in pheromone-baited LEM traps, despite the fact that pheromone traps became available only from August 1995. In 1996 in Croatia, a total of 788 WCR were captured in pheromone traps, while only 21 in other types of traps [3].

Later the LEM trap was improved to give the sticky "cloak" CSALOMON® PAL trap, which is simpler and easier to assemble [4]. We are proud to announce that detection of the presence of WCR in new countries in Europe has been performed most successfully over the past years with the aid of PAL traps.

Pheromone traps have been criticized that their capture may not represent local populations, as

it was hypothesized that presumably they attract insects from larger distances. In one of our preliminary studies we showed that the attractive range of a WCR pheromone trap is probably below 10 m [5]. Recently, more detailed studies seem to support this idea (Furlan, L. pers. comm.). Another criticism was that pheromone traps are too effective, in a high population situation attracting more insects than the sticky surface can hold (PAL traps saturate above ca 300-350 beetles). To overcome this difficulty, we developed the CSALOMON® VARs+ funnel trap, a non-sticky, high capacity (>10000 beetles) trap design [6]. By using a non-saturating funnel trap, other general disadvantages of sticky traps (especially in quantitative monitoring) can be overcome. Finally, a disadvantage of pheromone traps is that they attract only male specimens. This problem can be solved by using alternative baits, i.e. floral scent-based attractants, which, although not as effective as the pheromone, will attract predominantly females (but also males to a lesser extent) [6].

It is our pleasure to trust that the above trap types developed as results of our research efforts will constitute useful and important components in the management of the WCR in Europe also in the future.

ECONOMIC EFFECTS OF *Diabrotica virgifera virgifera* LeConte OCCURRENCE IN SOUTH BANAT

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Maize was grown in monoculture only until the first occurrence of *Diabrotica virgifera virgifera* Le Conte in the region of south Banat. For this reason, this research was focused on socio – economic aspects of the occurrence of this pest in the region. During the period of July – August 2002 a poll has been conducted with the major maize producers of the two villages, Padina and Zagajica.

In both villages five private farmers working on fields of more than 20 ha and producing monoculture maize until 1996 were polled. After the first occurrence of the maize beetle, polled farmers employed crop rotation with the aim of protecting the maize from the new pest. Since then they have also been growing sunflower and wheat on the same fields.

The total acreage of the investigated farms was 119 ha in Padina and 109 ha in Zagajica village. The average acreage of the farms was 22 ha. The share of maize accounted for 50 % of the total crop structure, followed by wheat and sunflower 25 % each.

The questionnaires containing questions with regard to the applied technology and agricultural practices, mechanization, labor, average yields, market prices of agricultural products and inputs for September 2002 were analyzed. Based on these data, analytical calculations on the direct costing level, per 1 ha of wheat, maize and sunflower were composed. The economic result per

1 ha of sunflower declined by 32% and that for wheat by 36% compared with maize. Engagement of prime movers per 1 ha was noted to decrease as well (sunflower by 20%, wheat by almost 50%). Manpower labor decreased by 35% per 1 ha of sunflower and 65% per 1 ha of wheat compared with maize. At the same time, wheat and sunflower harvesting costs increased.

THE WESTERN CORN ROOTWORM (*Diabrotica virgifera virgifera* LeConte) IN UKRAINE IN 2002

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The first beetles of the western corn rootworm, *Diabrotica virgifera* LeConte (WCR) in Ukraine were discovered in a corn field on 15 August 2001 in the Zakarpattya (Transcarpathian) Region on a junction of the borders of Ukraine, Rumania and Hungary with the use of pheromone traps. Because corn fields occupy about 3 million hectares the spread of this pest bears a great hazard to growers of this crop. In addition, Ukrainian peace-keeping divisions under UNO command, which execute their duty in the Balkan region (Bosnia, Herzegovina, Kosovo, Makedonia) after returning to Ukraine may contribute to passive introduction of this pest to diverse Regions of Ukraine. Therefore, the aim of our study consisted in discovering current distribution and density of the WCR in the Transcarpathian Region and searching for it in firingplots, airports, and corn fields in other Regions of Ukraine.

In so doing, we used visual survey of corn fields before the appearance of brushes with the aim of detecting any damage provoked by WCR larvae (end of June), and exposition of pheromone traps. These traps produced in Hungary and Moldova were able to catch only males or males and females. Also, we used adhesive traps of yellow color or traps containing boiled pumpkin.

In 2002 corn damage due to WCR larvae was not discovered in Ukraine, whereas the presence of WCR imagoes was noted only in the Transcarpathian Region in a stripe along the Ukrainian border with Rumania and Hungary. The flight began early July, reached a maximum by the end of July and finished by mid-August. Beetles were caught only by pheromonal traps although the number of them was 10 times greater than in 2001. Visually, in corn fields only a few individuals were recorded however, in August characteristic signs of weak affection of pollen bearing stamena in brushes, threads and grains in the upper part of spikes occurred. In general, the area of a diffusive distribution of the WCR has spread northward to a distance of 20 km and comprises currently about 575 square km.

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RESULTS OF MONITORING THE (*Diabrotica virgifera virgifera* LeConte) THE TRANSCARPATHIAN REGION (UKRAINE) IN 2001 - 2002.

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The western corn rootworm (WCR) was monitored on maize sowings of the populated localities immediately along the border with Slovakia, Hungary, and Romania in a valley of the river Tysa, at boundary items of plant quarantine, and also at those removed from the border on 10-15 km maize sowings.

1) During July - August 2001 visual inspection of maize sowings was carried out - WCR was not detected.
2) 2. In 2001, pheromone and yellow sticky traps were used to monitor maize fields at 22 populated localities, the WCR was detected only using pheromone traps at 7 populated localities in quantity of 15 specimens. This year was the beginning of an invasion of the WCR on the territory of Ukraine in the Transcarpathian region.
3) From July 16th till September 12th maize sowings were monitored using pheromone tent shape traps (184 specimens), pheromone plastic rectangular transparent traps and same traps with slices of a pumpkin (12 specimens each).
   The same 22 populated localities as in 2001, as well as at 15 populated localities removed from border on 10-15 km were monitored. Tent shape pheromone traps (16 pieces) were also used on boundary items of plant quarantine.
4) In 2002, using pheromone traps 129 specimens of the WCR in the Vynohradivsky, Berehivsky, Uzhgorodsky and Hustsky districts were caught. Of that number 125 specimens were from fields of the populated localities near the border and only 4 specimens from the 6-15 kilometers distance from the border. WCR was found at 17 populated localities of the region.

STATUS OF *Diabrotica virgifera virgifera* LeConte IN SERBIA IN 2002

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In 2002 the dispersal of the WCR (*D. virgifera virgifera* LeConte) in Serbia was further monitored. Sex pheromone traps and Pherocon AM traps were used on 100 sites in order: a) to check the presence or absence of WCR imagoes and b) to check the population density on permanent monitoring sites. Further spread to the southeast was registered, in the region of Pirot and to the south of Serbia in the region of Prokuplje. In these newly infested regions population density was low and the number of caught beetles/trap/week ranged from 1-3. The area infested in 2002 was estimated on 71.900 km^2. The WCR population density within the

infested area in Serbia was quite different ranging from low to high. In most regions population density was increasing but was still below the economic threshold in most fields. In general, after population breakdown in 2000, population was recovering but not in all regions. In southern Vojvodina due to severe drought seed germination and plant and corn root development was not synchronized with larval hatching. Therefore high mortality of larvae occurred which resulted in further population density decline. An increasing economic population and damages were registered in the area covering currently about 28.000 km2. In 2002 new larvae damaged areas in northwest Serbia were registered. Severely damaged corn fields were reported mainly from the north - newly infested areas of Serbia by economic population. The density of the WCR population was much higher in corn fields in the north.

PRESENT SITUATION OF THE WESTERN CORN ROOTWORM (*Diabrotica virgifera virgifera* LeConte) IN HUNGARY IN 2002

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5) Plant Protection and Soil Conservation Service of county Komárom-Esztergom, Tata, Hungary
6) Plant Protection and Soil Conservation Service of county Baranya, Pécs, Hungary
7) Plant Protection and Soil Conservation Service of county Békés, Békéscsaba, Hungary
8) Plant Protection and Soil Conservation Service of county Tolna, Szekszárd, Hungary

The Hungarian Plant Protection Organization has carried out a nation-wide survey of the western corn rootworm (WCR) in Hungary since 1996. The Plant Protection and Soil Conservation Services in all counties have participated in the study. The WCR monitoring system was based on two examinations:

1. Scout trapping

On 35 locations of the non-infested areas of 7 counties, Hungarian pheromone traps (Csalomon®) were placed out in maize fields. The traps were monitored from 11 June till the end of September at 10-day intervals. Within 30 days the traps were replaced by new ones.

2. Permanent Monitoring Network

To determine the WCR population build-up Hungarian pheromone traps (Csalomon®) and Pherocon® AM yellow sticky traps were placed out in pairs on 42 sites of 19 WCR - infested counties. The distance between pheromone and Pherocon® AM traps was 50 m. The traps were

monitored from 11 June to early October. All traps were changed at intervals of 30 days. Catches were recorded decadely. On scout traps 2163 beetles, on permanent monitoring pheromone traps 29102 beetles were caught till the end of August. During this period 5170 WCR adults were captured on Pherocon® AM traps. In June 2431 adults were trapped. It is much more than in 2001 (339 beetles). In the southern part of Baranya, Békés, Tolna and Bács-Kiskun counties, on continuous corn fields, the adult density was very high in July and first decade of August. In these counties, several hundreds of hectares of cornfields were sprayed with insecticides using aerial application, in the beetle control program. In 10 WCR-infested counties WCR larval damages were surveyed in 919 maize fields on 40621 ha. It is approximately 5% of the total maize fields of these counties. The Hills-Peters scale was used for the evaluation of root damage. In Baranya, Bács-Kiskun, Békés, Csongrád, Tolna, Fejér, Hajdú-Bihar, Pest, Somogy and Jász-Nagykun-Szolnok counties larval damages were observed on 7488 ha (18,4%). In counties Baranya, Bács-Kiskun, Békés, Csongrád, Somogy and Tolna the root damages reached the economic level (3<Iowa scale) on 5381 ha (13,2%). Plant lodging was registered in several corn fields of these counties.

The results of field efficacy trials with insecticides for the control of larvae (soil treatment) and adults (aerial application) will be presented.

THE CONFIRMATION OF WCR (*Diabrotica virgifera virgifera* LeConte) IN AUSTRIA: OCCURRENCE, EXPANSION AND FUTURE PROSPECTS

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Monitoring for the western corn rootworm (WCR; *Diabrotica virgifera virgifera* LeConte) has been conducted in Austria since 1999, since it had spread dramatically from its site of introduction near Belgrade, Serbia. in 1992 The pest was found in Austria for the first time on July 10th, 2002, near the towns of Deutsch Jahrndorf and Andau in the eastern province of Burgenland just across the borders of Slovakia and Hungary, respectively, using pheromone traps developed by Hungarian colleagues. Further monitoring showed that the pest was well established along the eastern border of Austria from the Danube in Lower Austria to the Andau Bridge over the channel to Hungary's Sopron district. It was also confirmed in 3 pheromone traps north of the Danube near the March river, 5 traps around Parndorf in northern Burgenland and one trap in middle Burgenland near the town of Unterloisdorf.

A total of 207 pheromone traps in the Austrian provinces of Burgenland, Lower Austria, Upper Austria, Styria, Carinthia, Tyrol and Vienna were monitored. Male beetles were confirmed in 64 of them and a total of approx. 500 beetles were caught. The traps catching the highest amount of beetles (58 and 51 respectively) were situated in the two towns where WCR has first been registered.

Possible further spread of the pest, the monitoring program for the next year and possible control measures were discussed.

MONITORING DATA 2002 OF *Diabrotica virgifera virgifera* LeConte IN SWITZERLAND

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Situation

In 2001 the for Switzerland unknown population levels of the western corn rootworm were found in the southern part of Ticino region near the Italian border. These events compelled the authorities in 2002 to ban the cultivation of corn after corn in the infested site. This measure was controllable and fairly well followed by the farmers. A consequence was also a more intense monitoring all over Switzerland. The number of strategic locations observed was 81 and 40 have been selected in the southern part of the Alps. For better comparison the same trapping system (Csalomon ®) and trap checking methods as in previous years were applied on all sites. The monitoring period lasted 15 weeks, from 19 June to 25 September.

Results

No beetles were found in the northern part of the Alps. The first catch in Ticino was made on 10 July. In the border region adjacent to Italy intense flight activity of the beetles began 17 July and reached its maximum value at the end of July. A total of 3'047 beetles were caught during the monitoring period in Ticino which is ~ 50% more than last year. Traps in the border region showed an increased catch intensity but a shorter flight curve than in 2001. The infested area expanded from ~728 km2 to ~1'645 km2. Despite this expansion but also due to an augmented monitoring area and trap number, some positive effect of the corn rotation decree is evident. The trap location with the highest population density caught 1'293 beetles in 2001, this year the same trap at the same place showed only 86 beetles.

There is a good change that the catches found in the area with enacted crop rotation may reflect re-infestation from Italy. On the other hand, it is possible that few sites with important population levels located in non-rotated areas could have a local origin. In the whole area of Ticino no economic damage was observed. Next year, authorities will extend crop rotation obligation excluding high altitude valleys to the entire Canton of Ticino. The monitoring grid will also be extended.

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MONITORING OF THE WESTERN CORN ROOTWORM (*Diabrotica virgifera virgifera* Le Conte) IN TIMIS COUNTY, FROM 1997 TO 2002

MARIANA HANCU, IOAN PALAGESIU, IOAN ROSCA, IOANA GROZEA

In 1996 the western corn rootworm (*Diabrotica virgifera virgifera* Le Conte) was found for the first time in Romania, Nadlag, district Arad in the western region close to the Hungarian and Yugoslav borders. Over the past 6 years the pest has spread to almost half of the corn acreage of the country.

Pest population has increased substantially over the years, as indicated by pheromone traps captures reported. In a FAO WCR NETWORK Project PR 19713/2001 and PR 21261/2002, the western corn rootworm was monitored in the Timis district with regard to the symptoms of attacked plants (gooseneck) in the field, number of larvae/plants, number of adults/plants, in corn fields with and without continuous corn cropping, number of adults/pheromone trap and yellow sticky traps. in plant protection centers from all area of the county Timis. The number of WCR larvae/plant and frequency and intensity (1-6 Iowa notes) of root damages were registered in different corn fields with monoculture. There were other fields counted for root damages.

In the Timis district corn growing areas years running have declined over years from 60.6% in 1997 to 11.9 in 2001. However, the number of adults captured in pheromone traps has increased from 13,167 in 1997 to 35,240 in 2000 and the number was unchanged in yellow sticky traps, namely from 1,043 in 1997 to 910 in 2000. Over the past two years the number has decreased, so in 2002, there were only 4,519 adults captured in pheromone traps and 473 in yellow sticky traps, in 9 localities from 15 June to 15 September.

FIRST OCCURRENCE OF *Diabrotica virgifera virgifera* IN FRANCE

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Since 1999 a traps network survey has been carried out in corn fields and near international airports by the French Ministry of Agriculture (*DGAL* : *Direction générale de l'alimentation* – Food Directorate-General) together with the French Interprofessional Association of corn producers (*AGPM*) and the Technical Center for vegetable crops (*CTIFL*). This 2002 survey network included 284 sites with pheromone traps (type PAL of Hungarian origin). Thus, the detection of *Diabrotica virgifera virgifera* LeConte in France has been made possible for the first time. Detection of the western corn rootworm was confirmed Wednesday August 21, 2002 by the entomology laboratory of Montpellier (*LNPV*) in traps inspected on 19 August near Le Bourget and Roissy international airports (9 specimens). Later, a second infested area was identified near Orly International Airport (one specimen). All captures were located near Paris. The rest of the traps network were free from Diabrotica. Identification was realized according to the EPPO diagnostic protocol (draft version).

Immediately after this identification, a mandatory eradication program has been implemented. A control area was defined with 3 sectors : a focus area (5 km wide), a safety area (10 km wide) and a buffer area (40 km wide). Inside these sectors, phytosanitary measures were performed, including in particular trappings reinforcement to evaluate infested surfaces, obligation of crop rotation after corn as well as insecticides treatments on adults and control of weeds according to the recommendations of the regional office of the Plant Protection Service (*DRAF /SRPV*). In a complementary way, corn producers were informed about this new pest (information sheet, meetings).In 2003, monitoring will continue in all corn areas, near international airports (civil and military) and in close proximity to expressways.

ASPECTS OF MONITORING ACTIVITY OF - *Diabrotica virgifera virgifera* LeConte AT AGRICULTURAL RESEARCH AND DEVELOPMENT STATION LOVRIN - ROMANIA

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Corn is the major crop in Romania (about 3 mil. ha). There are 25 pest species of economic importance in the corn plants such as *Tanymecus dilaticollis, Agriotes* sp. etc., and the damage provoked by these soil pests is considerable in Romania. Since 1996, when the WCR was signaled in Romania (Nadlac–Arad) it has become another problem for corn crops.

The researches carried out at the Agricultural Research and Development Station Lovrin in the field of plant protection included numerous aspects regarding the biology, ecology and control of various pests and pathogens.

Diabrotica virgifera virgifera Le Conte, the new corn pest in Romania is of major interest in the activities of the Laboratory and a joint multinational FAO monitoring project by placing colored and pheromonal traps has been initiated. In Lovrin monitoring has been conducted every year since 1997, starting in July and ending up with corn harvesting in September using pheromones and Yellow Sticky traps .

Pheromonal traps used were Hungarian pheromonal traps Csalomon and Romanian pheromonal traps – ICCR Cluj – Napoca type. Traps were observed daily and changed every month.

We followed the attraction capacity of the traps during a month and the dynamic activity of *Diabrotica virgifera* at different times of the day. Based on the monitoring conducted between June, 15th – and October, 15th it can be concluded that the number of adults captured with traps or directly from the field increased from one year to the other. This allowed us to design the

yearly flight curve, very much influenced by both environmental conditions (rainfalls, wind, temperature, decrease, heat) and pheromonal attractant when speaking of trap measurements. In our presentation we showed the pest flight curve on the average for the period 1999 – 2001 and we showed the data of the comparative study of the two trap – types (Hungarian and Romanian), as well as the dynamics for different daily periods influenced by the above mentioned conditions. The results show an annual increase of the population level in the area.

POPULATION DYNAMICS OF *Diabrotica virgifera virgifera* LeConte AND POSSIBILITIES OF ITS CONTROL

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DD "Carnex" - Vrbas, RJ "Jedinstvo", Backo Dobro Polje, Yugoslavia

The first WCR imagoes were registered in Backo Dobro Polje along the Belgrade- Subotica highway in 1995 by checking visually monoculture corn fields. During 1999 and 2000 population dynamics and damages were further monitored in the region known for its monoculture corn fields.

Population dynamics was monitored using pheromone and yellow sticky traps. In addition, the efficacy of some insecticides in the control of *D.virgifera* was investigated. In 1999 pheromone and yellow sticky traps were set up beginning July and in 2000 mid- June due to an earlier imago incidence. The insecticides were applied in the planting period: Talstar 10 EC (1.5 l/ha and 1.0 l/ha) on the whole acreage; Ariba 2.1 GR (6 kg/ha and 8 kg/ha), Counter G-5 (25 kg/ha), Talstar (0.5 l/ha) in bands; Cruiser 350 FS (0.6 l/kg and 0.9 l/kg of seeds) and Gaucho 350 FS (1 l/100 kg of seeds) for seed treatment.

The following parameters were tested: number of plants per hectare, plant lodging, root damage and yield. The number of imagoes was considerable in both traps and trial years thus proving the rising trend of the pest. In 1999 Counter G-5 (25 kg/ha) and Ariba 2,1 GR (higher dose) were the most efficient. Cruiser 350 FS (higher dose) was the most efficient in 2000. Based on the results obtained the insecticides tested can be applied against WCR larvae.

However, crop rotation needs to be employed being the most efficient measure in the control of the WCR.

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MONITORING THE SPREAD OF *DIABROTICA VIRGIFERA VIRGIFERA* LE CONTE IN BOSNIA AND HERZEGOVINA IN 2002

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During 2002, as well as during previous years, both the spread of *Diabrotica virgifera virgifera* Le Conte and population density increase have been monitored. Also some preventive resistance measures have been carried out. This year, interestingly enough, the spread of the pest was intensified. The pest has spread to all directions. Intensive spread has been registered in corn fields along rivers and more frequent roads. This may be attributed to favorable climatic conditions, average temperatures amounting to 20-25o C in June, July and August and a lot of cloudy and rainy days intensified the spread of the pest. During summer the pest spread to various directions flying distances of 25-30 km on average depending on corn growing areas and the terrain. It is important to note that last year the pest appeared in the western part of Bosnia and Herzegovina, Velika Kladusa. However, it was not registered this year.

Generally, in Bosnia and Herzegovina *Diabrotica* spreads rapidly and soon we expect it to be present in the most important corn growing areas. Population density was established by Multiguard traps. It is also important to mention that plant lodging was not registered in areas previously infested by the pest.

Lodging of plants may be expected in the years to follow because it has been five years since the pest appeared first. Pest resistance has not been carried directly. We advised crop rotation through media, but also in personal contacts with farmers. In our encounters with the producers we point to the ways of pest identification and the damages provoked.

Due to the researches conducted so far, the BH general public has been informed of the pest and in the years to come greater activities focused on pest control may be expected.

REPORT ON MONITORING OF THE WESTERN CORN ROOTWORM IN SLOVENIA IN THE YEAR 2002

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As in previous years, the western corn rootworm – *Diabrotica virgifera virgifera* – was monitored in Slovenia in 2002 as well. The number of checkpoints was a bit higher and the duration of monitoring was little longer, i.e. 11 weeks. By the end of June, pheromone traps and yellow sticky traps were placed at 57 checkpoints all over Slovenia. The majority of checkpoints, 39, were set up along the border with Croatia and Hungary, the major corn-growing area in Slovenia. The remaining 18 checkpoints were placed near the border with Italy and around the International Airport Ljubljana (Brnik). As soon as we found out that the western corn rootworm

was detected in Austria this year, 4 new checkpoints were established in the area near the juncture of the three state borders (Slovenian-Austrian-Hungarian). During the summer months the traps were inspected regularly (each 7 to 12 days) and replaced with the new ones (pheromone traps were replaced every 3 to 5 weeks and yellow sticky traps more frequently). By mid-September the traps at checkpoints were examined for the last time and removed from corn fields. Until present, the western corn rootworm has not been discovered at any of more than 60 checkpoints distributed in Slovenia. In view of the fact that in Croatia this pest has already been discovered in 2000 near the town of Varaždin (27 km from the Slovene-Croatian border), we can be satisfied that it has not appeared in Slovenia yet. Considering that the climatic conditions in Slovenia are favorable for the development of the western corn rootworm, it is only the question of time when it will be discovered in our country too.

MONITORING OF *Diabrotica virgifera virgifera* LE CONTE IN ROMANIA, IN 2002

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The WCR (*Diabrotica virgifera virgifera* Le Conte) was monitored by the Ministry of Agriculture, Food and Forestry through the Central Laboratory for Phytosanitary Quarantine and the County Phytosanitary Department. Observations were done from end-June to mid-September and were carried out in 22 counties (15 infested counties and 7 non-infested counties) and 3 airports areas (Bucharest, Constanta, Suceava) . In 2002, Romanian and Hungarian pheromone traps and Pherocon® AM yellow sticky traps were used. The traps were placed on 165 sites, 108 sites were located in infested counties and 57 in non-infested counties. On each site 1 pheromone and 1 Pherocon® AM trap were placed at a distance of 50 m from each other. The pheromone traps were changed every 30 days and yellow sticky traps every 15 days.

Diabrotica virgifera virgifera was caught in 14 out of 22 counties. In the two infested counties (Gorj and Olt) *Diabrotica virgifera virgifera* was not caught in any of the traps during 2002. Economic damages were registered sporadically in counties Arad (“small farmers”) and Timis.

Comparing last year’s and 2002 population density it can be concluded that the latter has been reduced in the infested areas: total number of captures at the end of August was 14618 (119,8 beetles/installed trap), whereas in 2001 total number of captures was 26486 (194,7 beetles/installed trap) for the same period.

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THE PRESENCE OF *Diabrotica virgifera virgifera* LeConte IN ITALY IN 2002: DISTRIBUTION AND POPULATION LEVELS

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5) Veneto Region, Phytosanitary Service, Venice Office, Mestre-Venezia.
6) Emilia Romagna Region, Phytosanitary Service, Bologna

In 2002 *Diabrotica virgifera virgifera* (WCR) was monitored following a common protocol. Maize fields were selected in the already defined focus areas, in sites where maize is often grown for multiple years and also at potential introduction areas (such as nearby airports, custom institutions, etc.). PAL sex pheromone traps were set up almost exclusively in maize after maize fields with the exception of the areas where maize monoculture is prohibited: about 130 in Friuli Venezia Giulia, 1000 in Veneto, 100 in Emilia Romagna, 400 in Lombardia, 440 in Piemonte.

PRESENCE: in Emilia Romagna no specimens were caught. In Veneto only 2 specimens were captured in the focus area which was extended to about 3000 ha of cultivated lands. Lombardia: numerous specimens were captured in the provinces of Varese, Como, Lecco, Bergamo, Sondrio, Milano, Lodi, Sondrio, Brescia and Cremona. Piemonte: specimens were captured in an area of about 150.000 ha of cultivated lands including Novara province which borders the focus area of Lombardia and the provinces of Alessandria, Biella, Torino, Vercelli, Verbano C.O. The very first specimens were captured in Friuli Venezia Giulia where monitoring had been carried out since 1996. Ten traps out of 39 captured a total of 31 WCR specimens in fields around the military airport of Aviano. Two traps placed out 4 m from the border of the airport facility captured 22 males on July, 24th; the other 8 traps captured further 9 specimens in an area 1 km around the airport facility (about 800 ha of cultivated land). All the maize fields just around the airport were treated with insecticide to control the adults within a few days after captures were noted.

POPULATION LEVELS: negligible peaks of male captures were recorded in Friuli Venezia Giulia and Veneto since non-established populations were present. Lombardia: for the first time in Italy an economic population was detected in an area of some dozens of hectares in Como Province (Boriani *et al.*, 2002). In this area adult feeding damage on leaf tissues and ears was observed together with heavy root damage which also caused typical signs of attacks like goose necking of many plants in the middle part of some fields. Levels up to at least 170 WCR males/ PAL trap/day were recorded from monoculture maize fields in this area. Captures over 5 specimens/day were recorded by Pherocone AM traps in this area. Piemonte: conspicuous populations were detected only in the area (Novara province, about 50.000 ha of cultivated land) where the species had already been detected in 2001. On Pal traps the peak population was less than 15 males/trap/day with only a slight increase in comparison with the previous year. No

visible effects of larval and adult feeding were observed respectively on the roots and on leaves and ears.

STRATEGIES FOR THE FUTURE: Veneto and Friuli: the eradication/containment program should be continued following the strategies implemented in the previous years in Veneto. Lombardia and Piemonte: in order to stop or at least to slow down WCR spreading a strip with NO maize after maize fields should be created along the border of the area where WCR specimens have been detected. This measure should be supported by an intensification of the information program on WCR biology and the importance of crop rotations that is targeted at farmers in the regions in order to decrease the potential inoculate of the infested area. Emilia Romagna and other regions: monitoring should continue following the instructions utilized over the last several years.

WESTERN CORN ROOTWORM – HIGH RISK AREAS OF SELECTED EU MEMBER STATES*

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2) Institute for Technology Assessment in Plant Protection, Germany

Precise data of maize growing areas are analyzed for the following countries: France, Germany, Austria, the Netherlands, Belgium, Switzerland and Luxembourg and for Italy with restriction. For Italy, there are data about grain maize and CCM but not about silage maize which has only a percentage of 14 of the whole maize growing area. On the other hand especially for the region Lombardia, with 26 % the largest maize growing area in Italy and infested with Western corn rootworm (WCR, *Diabrotica virgifera virgifera*) since 2000, we have very precise data for grain maize and CCM for 1,198 municipalities.

We assumed that regions comprising more than 50 % of arable land in maize have significant areas in continuous maize and defined these areas as “areas with high risk” (SCHAAFSMA, BAUFELD and ELLIS 1999). However, the average percentage of the province or municipality areas in maize does not reflect the real maize concentration of the individual maize-growing farms and in some cases there is continuous maize in spite of the average is 50 % or even below. Beef, cash crop, and dairy producers used continuous maize because of the tendency of specialization. This impression is confirmed on the EU missions on *Diabrotica* together with the Food and Veterinary Office in Italy in 1999 and 2001. For avoiding greater mistakes especially for larger regions like provinces we consider areas with 50 % of maize in crop rotation as high risk areas.

France, Germany, Italy, Austria, the Netherlands, Belgium, Switzerland and Luxembourg have 1.646 million ha of high-risk maize areas. This is about one-fourth of the maize growing areas of

*part of the EU project QLK5-CT-1999-01110

these countries. The 7 above-mentioned EU member states reflect 1.642 million ha high-risk and 20.7 % 0of the entire maize growing area of the EU.

Considering absolute figures, Italy has the largest high-risk area with 551,918 ha. Considering relative figures, this makes up 43.4 % of its whole maize growing area. Thus it ranks second after the Netherlands with a percentage of 69.2. In the Netherlands, missing crop rotation in maize growing areas is very suitable for the development and multiplication of the WCR. In future, the concentration in the maize growing will lead to high damage or intensive control of WCR. France (467,956 ha) and Germany (347,620 ha) have also large high-risk areas in continuous maize. In Germany for example, the four federal lands Niedersachsen, Nordrhein-Westfalen, Bayern, and Baden-Württemberg have high-risk areas of 133,509 ha, 114,113 ha, 86,992 ha, and 13,006 ha, respectively. In Austria, the percentage of 21.1 maize high-risk areas is comparable with the situation in Germany. The situation in East Austria is characterized by low maize in concentration (>= 15 %) which reduces the spreading rate of WCR. In Belgium, one-third of the maize growing areas shows a high concentration of maize. Much better is the situation in Switzerland (7.1 %) and Luxembourg (no high risk area).

RESULTS OF THE MONITORING of *Diabrotica virgifera virgifera* LeConte IN 2002 IN THE REPUBLIC OF BULGARIA

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Central laboratory for plant quarantine, Sofia, Bulgaria

Maize acreage in Bulgaria occupies the second place and maize is the most important crop from the group of grain crops. *Diabrotica virgifera virgifera* poses a great risk to this important crop. In Bulgaria the pest was found for the first time in 1998 and it has since been monitored every year. The 2002 monitoring in our country had the objective of determining:
- the WCR spread to new regions
- the change of the number of the WCR population over the years at the monitoring places.

The National Plant Protection Service and the Central Laboratory for Plant Quarantine have monitored the pest. This year the survey began in June. Because of the limited number of pheromone traps (Csalomon PAL traps) they were distributed and sent to the regional departments with a requirement to make the plan of their location. Pheromone traps were located at 15 positions (8 permanent and 7 new). Yellow sticky traps (Pherocon AM traps) were located at 55 positions. In accordance with the plan until the end of June pheromone and yellow sticky traps were located everywhere. The observation was held at an interval of seven - ten days.

This year the monitoring in the regions of Vidin, Vratsa and Montana was connected with the training of farmer groups. In my opinion additional data on the farmer groups activities are necessary. In 2001 five farmer groups were organized in our country – in Bregovo, Vidin.,

G.B.Retchka, Prevala and Asparuhovo. In 2002 five more groups were formed – in Gramada, Drenovetzs, Kanitz and Montana – 2 of them. Officially the number of the participants was 62.

The members of the farmer groups participated actively in the monitoring. They themselves reported on the traps (G. Byala Rechka, Asparuhovo, Bregovo, Drenovets) or together with the phyto-sanitary inspectors for the respective regions.

Results:

1. The first adults were caught on the 3rd of June, and the last 20 adults -on 15 of October. The adult density was very high in August (1178 adults were captured). The total number of captured adults was 2496. Small producers grow maize together with pumpkins, beans. In August and September, after the silk got brownish, the adults of the WCR fed on pumpkins' blossoms. They damaged the corolline part of the blossom. It is necessary to stress that the greatest number of beetles was caught in Prevala. Most of the small producers in the village of Prevala employed crop-rotation. Only 3 producers in this region have grown maize 3 years running and the number of the adults registered was 1081;

2. In the region where the pest was observed for the first time in 1998, the region of Lom, during the past few years no adults have been caught nor any damages on maize leaves and silk registered. The only explanation may be drought during June, July and August. This year the vegetation of plants, including maize was also impeded due to high temperatures, lack of rainfall and low air humidity in June and July. For this reason the pest has not been registered in the regions of Montana and Vratza. At the foot of the hilly areas and areas under irrigation high density was observed – Prevala, G. B. Rechka, Gramada. No damages were observed in other regions as maize leaves and silk withered rapidly because of the drought.

3. Until now no WCR damages of economic importance have been registered. For the first time last year damages on leaves and silk in the region of Prevala were observed. This year damages on leaves and silk not only in the region of Prevala, but also in G. B. Rechka and Gramada were registered.

4. The spread of the WCR to the east and to the south continuous. This year pest spread was also observed to the east of the town of Kneza.

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RESULTS OF MONITORING WESTERN CORN ROOTWORM *Diabrotica virgifera* subsp. *virgifera* IN THE SLOVAK REPUBLIC IN 2002

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The first occurrence of the WCR in Slovakia was recorded in 2000. In 2002 the WCR (*Diabrotica virgifera* subsp. *virgifera* LeConte) infestation in the Slovak Republic was further monitored. Field training for corn growers from infested areas was also initiated. Both activities were carried out within FAO Projects.

The survey was carried out by phytosanitary inspectors of the Central Control and Testing Institute of Agriculture and other external observers within the framework FAO project – WCR Network activities. Some data on population density of pest were obtained from FAO project focused on field farmers training.

Pheromone traps Csalomon and yellow traps Pherocon AM were used in the survey. Monitoring points were set up in both infested and endangered corn belts. Pheromone and yellow traps were set up together in infested areas. Pheromone traps only were set up in endangered corn belts. Pheromone traps were additionally set up in new endangered areas later. Altogether 144 pheromone and 145 Pherocone AM traps together were set up.

Monitoring WCR adults started mid-June. A great number of adults were caught during July into pheromone traps in districts Komárno and Dunajská Streda (pest presence registered was from 2000, 2001 respectively) and also in new areas of districts Galanta and Nitra. For this reason new monitoring points were added in districts Skalica (neighbor with Czech Republic) and Trnava in August. New occurrences of WCR adults were found only in district Trnava. The average number of WCR adults per one pheromone trap was 20 individuals in 2002. In 2001 and 2000 it was 5 and 3 WCR adults in pheromone traps respectively. Monitoring points were also set up near the border with Ukrajine in localities Cierna nad Tisou and Kristy. Adults were not caught in these localities. Also no economic damages from larvae or adults were registered. The survey of WCR spreading form 2000 to 2002 is shown in the map.

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MONITORING WCR BEETLES, *Diabrotica virgifera virgifera* LeConte, IN THE REPUBLIC SRPSKA IN 2002

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4) Agricultural Station, Doboj, Republic of Srpska

A progressive increase of imago population abundance was registered during the five year monitoring of the occurrence and spreading of the western corn rootworm in the Republika Srpska (RS) (since 1998). Over the years this increase has been rising from east to west. Drought accompanied by high temperatures in the eastern parts of the RS was stressful only in 2000, affecting the abundance of the population. Precipitation sum and distribution, as well as temperatures in 2001 and 2002, had no adverse affects on either maize crop or the WCR on the whole territory of the RS; hence the number of individuals caught increased significantly in 2002.

Pheromone traps were used to monitor the occurrence and spreading of WCR imagoes in the same locations as in previous years. The analysis of the results on the number of WCR beetles caught in 2002 was performed according to 50-km east-west territorial zoning, showing analogous average values with those obtained in previous years. The fluctuation of population was caused by precipitation sum and air temperatures. Meteorological data for Bijeljina, Doboj and Banja Luka presented the conditions for the 50-km, 50-100-km and 100-150-km EW zones, respectively.

Generally, it can be stated that the WCR population in 2001 had favorable conditions for accelerated hatching in maize continuous cropping in the 50-km EW zone due to very warm ambient temperatures in 2000 with approximately 150oC HU registered already in April. Earlier hatching of larvae and delayed maize root development, due to insufficient moisture, caused the reduction of the WCR larval population, and the lower number of imagoes appeared as the end result.

Population abundance increased on the 50-km zone westbound in 2001 by 20% in relation to 2000 and was equal with the abundance in 1999. The average number of individuals in 2002 (377) was three fold and two fold higher than in 2000 (133) and 2001, respectively. The abundance increased in the other 50-km EW zones over all years of investigation. The total number of caught individuals mainly in the same locations for the eight-week monitoring period amounted to 1972, 3722 and 6083 in 2000, 2001 and 2002, respectively. The obtained results indicate that the abundance increase in 2002 was three fold-higher than in 2000, i.e. 61.3% greater than in 2001. Due to extreme weather conditions, population abundance was reduced in 2000, but it was increased by 1800 in 2001, i.e. 2361 in 2002 (2002-2001), i.e. 4111 (2001-2000). The index of increase in 2002 ranged from 147 to 260 and grew in the western direction.

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WESTERN CORN ROOTWORM (WCR), *Diabrotica virgifera virgifera* LeConte IN CROATIA- CURRENT AND FUTURE STATUS

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In Croatia the western corn rootworm (WCR), *Diabrotica virgifera virgifera* LeConte was found for the first time in 1995. Since 1995 the pest has been monitored by the Faculty of Agriculture, Department for Agricultural Zoology.

In Croatia the WCR spread over a distance of 40 km per year. In 2001 a minor spread to the west was registered. In spite of minor spreading, population density has increased thus further spread of the WCR was expected.

The monitoring campaign continued in 2002. As in previous years, pheromone and Pherocon AM traps were placed out on 145 monitoring sites. Traps were placed out between June 17th and June 23rd. Each 7 days traps were checked and beetles collected.

The first catch on pheromone trap was registered on June 21st. The data from the monitoring sites are still collected and final results on the flight dynamics and population density will be presented in the report.

In 2002 the WCR was registered for the first time on 8 monitoring sites located outside the area infested in 2001. All the 8 monitoring sites mentioned were located in the central and southern part of the infested area. No further spread along the Hungarian border has been registered.

Before disposing all the results we can state that the WCR has infested an area of about 19,000 km2. In that area approx. 250,000 ha of corn is grown. The preliminary results of the monitoring are shown in Table 1.

Table1. The estimation of the area infested by the WCR

YEAR	TOTAL km^2	Arable Land ha	Corn ha
1995	1.200	30.000	10.000
1996	6.500	250.000	85.000
1997	9.000	430.000	125.000
1998	10.000	500.000	140.000
1999	12.750	585.000	165.000
2000	14.000	650.000	200.00
2001	15.000	680.000	220.000
2002	19.000	750.000	250.000

Damages caused by the WCR in 2002 in some fields in the eastern part of Croatia were visible and high. In the Baranja region a 1.5 ha field with a damage up to 85% was registered.

The development of the WCR in Croatia in 2002 proved the statement (Igrc Barcic et al., 2001) that root damage increase in 2002 may be expected. Countries which have been infested over the past 4 years, have a high amount of corn (over 35% of all crops) because of animal breeding. This situation means more continuous corn and conditions favoring pest development in future.

MONITORING THE WCR (DIABROTICA VIRGIFERA VIRGIFERA LECONTE) IN THE REGION OF MIDDLE BANAT

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In the region of central Banat maize is grown on an area of approx. 80.000 ha and it is the major crop followed by wheat and barley.

The WCR population has permanently been monitored from 1996 to 2002. The whole region of central Banat was covered with traps (Csalomon pheromone trap and Pherocon AM trap) placed on permanent monitoring sites. Every 7 days checkpoints were controlled and WCR beetles registered and collected. According to the flight dynamics the adult maximum density was determined. This way of checking the density of the WCR proved well because, thanks to it, we were able to locate the main sources of WCR pests that enabled us to follow its dispersal.

During the years of monitoring, permanent monitoring sites were trapped and observed. Each site was covered with two traps at a minimum distance of 100 m from each Other traps were placed in fields from 3rd July. Maximum adult density was registered in the period from July 25th to August 6th.

The WCR was registered on 35 of the 41 monitoring sites during 1996 but damages were not observed. Due to the practice of individual farmers to grow maize in monoculture (two or more years on the same field) and even in repeated sowing, the spreading of the WCR in 1997 was enabled. All monitoring sites demonstrated higher population density while damages were still tolerable because of the regeneration of maize root. The WCR population was rising consecutively and corresponding damages as well so that in 2000 it reached its maximum density with registered damages of 5 – 70 %. The economic population was still present during 2001 and the damages registered amounted to 50 %.

The density rate of the WCR population dropped rapidly in 2002 due to extreme drought and high temperature during the whole vegetation period as well as the fact that individual farmers employed crop rotation.

Based on the registered and observed data, lower population density of the WCR may be expected next year.

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WESTERN CORN ROOTWORM (*Diabrotica virgifera virgifera* LeConte) AND THE EUROPEAN CROP ROTATION SYSTEM: RESULTS OF A REGIONAL TRIAL

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5) University of Agric. Sci. and Vet. Medicine, Bucharest, Romania;
6) Plant Health and Soil Cons. Station, Hódmezövásárhely, Hungary

The focus of this study was to determine if WCR adults over the population buildup period in Europe can be attracted to crops grown in rotation with corn for egg laying. A crop rotation trial was established in 2000 in Szeged in Southern Hungary (EU-5 project). This study was extended within the framework of the FAO WCR Network in Croatia, in the Federal Republic of Yugoslavia (FRY) in 2001 and in Romania in 2002. This allowed for comparisons among four different regions within Central Europe (Szeged, Hungary; Tovarnik, Croatia; Dobanovci, FRY; and Jimbolia, Romania). The crops rotated with corn were corn (therefore, continuous corn), sunflower, soybean, and a cereal (winter wheat, oat, or spring barley). Corn was grown on trial fields in previous years.

The study field was divided into two sections. One section consisted of corn, while the other consisted of 6 replications each of a cereal, sunflower, soybean, and corn. The year after, these two sections were rotated so that the rotated crops in one section were followed by corn and the corn section by the rotated crops. The presence of WCR was assessed and quantified by using Pherocon AM traps and emergence cages (3 each per plot) from mid June to early-mid September. In addition, soil samples and corn roots were taken from each plot to determine WCR egg and larval populations. This presentation will include a discussion on numbers of WCR adults caught on Pherocon AM traps in non-corn plant stands, larval presence (soil and corn root samples), and adult emergence (emergence cages) in the following year's corn. WCR adult populations in continuous corn were at economic threshold levels in the study regions. WCR adults were trapped by Pherocon AM traps in non-corn plant stands (winter wheat or barley, sunflower and soybean) in Hungary and Croatia, though in significantly lower numbers when compared to corn. Beside corn plots, few WCR adults were trapped in soybean only in F.R. Yugoslavia, though WCR population in continuous corn increased there by 4 times. Study site observations of sunflower (flowers and pollen) and volunteer winter wheat showed that these plants were attractive as a feeding site for adult WCR in Hungary. Based on the study, there is a potential for WCR female egg laying in non-corn plant stands.

In Hungary, eggs were found only in soil where corn was planted, but numbers were extremely low. Similar samplings in Croatia and FRY confirmed that WCR eggs were difficult to find. Egg laying by females may be too heterogeneous in distribution over a 9th IWGO Diabrotica Subgroup Meeting and 8th EPPO ad hoc Panel, Belgrade 2002 field, thus sampling methods from the USA could have too large a bias and not appropriate for following WCR populations at the present infestation levels in the research plots in Europe.

Larval sampling in June and July in corn after all non-corn pre-crops confirmed larval presence though in significantly less numbers compared to that of corn after corn in Hungary. In addition to larval sampling, WCR adults were trapped under emergence cages in corn after cereals, soybean and sunflower both in Hungary and Croatia. In the study sites in Hungary and Croatia, it was determined that WCR females have the ability to lay eggs in rotated crops, although presently at low levels, and some larval feeding was noted in the following year's corn. In F.R. Yugoslavia, there were no WCR in emergence cages in corn after non-corn pre-crops.

(EU-Framework 5 project no. QLK5-CT-1999-01110 and FAO WCR Network LoA No. PR 21261)

POSSIBILITIES OF CONTROLLING WESTERN CORN ROOTWORM (*Diabrotica virgifera virgifera* Le Conte) IN ROMANIA THROUGH CROP ROTATION AND OTHER METHODS

IOAN ROSCA, IONUT AXINTE

In 2001 a FAO WCR Network research was conducted choosing one corn-growing field 3 years running and different plots with corn, sunflower, soybean and wheat. The presence of *Diabrotica virgifera virgifera* was assessed and quantified in 2001 and 2002 installing 3 pheromone traps, 3 yellow sticky traps and 3 emergence cages/field cultivated with these four crops following corn. The biology of the pest, corn damages and root system recovery were observed in Jimbolia in a crop rotation experiment.

In a preliminary experiment from Voiteg, in a corn-growing field 8 years running, a study of comportment of 10 hybrids showed no evident difference of root attack. Because the problem of chemical control has arisen, especially considering the requirements with regard to pesticide registration, an attempt has been initiated to control the pest by seed treatment in a trial using 8 pesticides.

Regarding the influence of crop rotation on pest population evolution, experimental data showed that the number of adults captured in yellow sticky traps from 27 June-12 September, 2002 was the highest in corn-growing fields 5 years running (257.95 adults/trap), followed by soybean after corn 4 years monoculture (20.1), sunflower after corn 4 years monoculture (14.02) and the

smallest in field with two-row barley after corn 4 years monoculture (5.5). Much more evident were these data on emergence traps (0.25 square meter) where no capture was registered in soybean, sunflower and two rows barley culture after corn monoculture 71.76 adults/m2 were captured, that means a high population. It seems that crop rotation option is the most suitable for WCR management but relevant conclusions may be expected in the years to follow. The WCR and the most important corn pest till now in Romania, *Tanymecus dilaticollis* Gyl., were compared.

DISTRIBUTION POTENTIAL OF *DIABROTICA VIRGIFERA* IN THE NETHERLANDS AND SURROUNDING COUNTRIES: A CLIMEX STUDY

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The present study was started to test the potential distribution of *Diabrotica virgifera* LeConte (Coleoptera: Chrysomelidae) in The Netherlands with the aid of the Climex program. Climex predicts the effects of climate on plants and animals. Surrounding countries will be included in this study. The results can be used in a Pest Risk Analysis (PRA) for the same species.

The species under study is known as the Western Corn Rootworm (*D. virgifera virgifera*), which is native in North America. In the same publication Krysan et al. described a new subspecies, *D. virgifera zeae*, which has a more southern distribution. It prefers a warmer climate, and is distributed over the states of Oklahoma, Texas and farther south over Mexico.

D. virgifera is a major pest to maize crops in the USA, because of the feeding habits of larvae and adults. It poses a threat for central and western Europe, because *D. virgifera* was (unintentionally) introduced into Serbia (Belgrade) in 1992. It has already damaged maize crops in Serbia, and is spreading in a rapid pace in the Danube basin (Hungary, Romania, Croatia, and Slovakia). In 2000 the total European area infested by D. virgifera was nearly 200.000 km2.

The objective was to get a clear picture of the relation between the potential distribution of *D. virgifera* and climatological conditions. This means weighing of species parameters (and their values) related to climate, such as temperature or moisture. The resulting distribution maps should reflect the potentialities of the species in the northwestern European climate, and particularly in The Netherlands. Climex maps (of potential species distribution) will be compared with the actual species distribution in the USA.

ABSTRACTS TO BE CONTINUED IN IWGO – NEWSLETTER XXIV - 1
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IWGO PERSONAL ITEMS

As mentioned already in the Editorial we had a very good and interesting meeting in Belgrade this fall. Again a large number of scientist attended the meeting and a lot of new faces were seen. It seem that also Western European colleagues and companies realize the thread going out from this pest and show more and more interest.

The meeting was accompanied by a very nice social program as we saw national Serbian dancers and singers.

********** ### **********

At the beginning of the meeting in Belgrade IWGO gave a sign of recognition to **Prof. Rich EDWARDS** accompanying the group for now 10 years and helping European scientist in the battle against Diabrotica:

1992 2002

To **Prof. Dr. C. Richard Edwards**
Purdue University, Lafayette, Indiana, USA

In appreciation for and recognition of your scientific advice and assistance these past ten years in combating the expansion of the Western Corn Rootworm, (*Diabrotica virgifera virgifera*), in Europe, and

for chairing the Working Group on *Diabrotica* of the International Working Group on *Ostrinia* and other maize pests (IWGO) within the International Organization for Biological and Integrated Control of Noxious Animals and Plants.

Harald K. Berger,
Global IOBC/IWGO Convenor

Belgrade, November 2002

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IWGO – Convenor Harald BERGER handing over IWGO – thanks to **Prof. Rich EDWARDS**

IWGO – Meetings do **not only** mean hard work .....

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For the next meeting of the Diabrotica – Subgroup the group has an invitation to come to Switzerland in 2003. Our colleagues **Ulrich KUHLMANN** and **Mario BERTOSSA** will be glad to host IWGO in Switzerland.

Additionally there is an invitation for the "big" group (including all maize pests such as *Ostrinia*, *Agriotes*, etc.) to come to Egypt in 2004. I would like to hear comments on this invitation and if the group is ready to go to Africa for the first time.

Opening of the Meeting in Belgrade (from left to right: Prof. **Richard Edwards** (Purdue University; Diabrotica Group – Convenor), **Manuela Allara** (FAO), **Harald K. BERGER** (IWGO)