

Report of the 2nd Meeting of the EPP0 ad hoc Panel on *Diabrotica virgifera* held jointly with the 4th International IWGO Workshop on *Diabrotica virgifera*

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PARTICIPANTS

Austria	Berger, H.K.	Federal office and Research Center of Agriculture, A-1226 Wien, Spargelfeldstr. 191. P.O.B. 400
	Reiterer, E.	Cyanamid Ges. m.b. h., Eastern Ccentral Europe, Storchengasse 1/4, 1150 Wien
	Selmeczi, J.	FMC Chemikalien, Paulinergasse 13, 1040 Wien
Bosnia and Herzegovina Croatia	Seratlic-Turkic, A. (Ms)	Faculty of Agriculture, Sarajevo. Fax: 387 71 667 429
	Igrc Barcic, J. (Ms)	Agricultural Faculty, Svetosimunska 25, Zagreb. Fax: 385 1 2393970
	Ivezic, M. (Ms)	Faculty of Agriculture, Institute for Plant Protection, Trojstva 3, POB 117, 31000 Osijek
	Maceljiski, M.	Agricultural Faculty, Svetosimunska 25, Zagreb. Fax: 385 1 2393970
	Masten, T. (Ms)	Institute for Plant Protection, Svetosimunska 25, 10000 Zagreb. Fax: 385 1 211 640
	Mlinarevic, M. (Ms)	Faculty of Agriculture, TRG Sv., Trojstva 3, POB 117, 31000 Osijek
	Raspudic, E. (Ms)	Faculty of Agriculture, TRG Sv., Trojstva 3, POB 117, 31000 Osijek
	Zlof, V. (Ms)	Institute for Plant Protection, Svetosimunska 25, 10000 Zagreb. Fax: 385 1 211 640
France	Reynaud, P.	LNPV, 2 Place Viala, Montpellier Cedex. Fax: 33/0467521554
Germany	Baufeld, P.	BBA, Stahndorfer Damm 81, Kleinmachnow. Fax: 49/3320348385
Hungary	Barna, G.	University of Agricultural Sciences, Department of Plant Protection, H-2103 Gödöllő, Páter Károly u. 1.
	Benedek, P.	PATE Mosonmagyaróvári Kara, 9200 Mosonmagyaróvár, Vár u. 2.
	Bogár, K. (Ms)	University of Agricultural Sciences, Department of Plant Protection, H-2103 Gödöllő, Páter Károly u. 1.
	Bognár, É. (Ms)	Biological Control Lab., Plant Health and Soil Cons. Station of County Pest, 2100 Gödöllő, Kottlán S. 3.
	Cziklin, M. (Ms)	Biological Control Lab., Plant Health and Soil Cons. Station of County Somogy, Kaposvár, Guba S. u. 20.
	Dellei, A. (Ms)	Biological Control Lab., Plant Health and Soil Cons. Station of County Heves, 3300 Eger, Szövetkezet út 6.
	Gabi, G.	Biological Control Lab., Plant Health and Soil Cons. Station of County Tolna, 7101 Szekszárd, Keselyûsi út

Hungary	Galambos, G.	Biological Control Lab., Plant Health and Soil Cons. Station of County Hajdú-Bihar, 4032 Debrecen, Böszörményi u. 146.
	Gyulai, P.	Biological Control Lab., Plant Health and Soil Cons. Station of County Borsod-Abaúj-Zemplén, 3501 Miskolc, Pf. 197.
	Havasréti, B.	Biological Control Lab., Plant Health and Soil Cons. Station of County Győr-Sopron-Moson, 9027 Győr, Toldi u. 8/a
	Hertelendy, P.	Biological Control Lab., Plant Health and Soil Cons. Station of County Pest, 2100 Gödöllő, Kottlán S. 3.
	Horn, A.	SUMMIT-AGRO Hungaria Kft., 1123 Budapest, Táltos u. 15/b
	Horváth, L.	PATE, 8360 Keszthely, Deák F. u. 16.
	Hosszabjár, B.	University of Agricultural Sciences, Department of Plant Protection, H-2103 Gödöllő, Páter Károly u. 1.
	Ilovai, Z.	Biological Control Lab., Plant Health and Soil Cons. Station of County Csongrád, H-6800 Hódmezővásárhely, P. O. Box 99.
	Kasza, I.	Biological Control Lab., Plant Health and Soil Cons. Station of County Jász-Nagykun-Szolnok, 5000 Szolnok, Vízpart krt. 32.
	Kerekes, L.	Air Doctor Air Service Company, H-6723 Szeged, Lomnici u. 9.
	Kiss, J.	University of Agricultural Sciences, Department of Plant Protection, H-2103 Gödöllő, Páter Károly u. 1.
	Kuroli, G.	PATE MTK, 9200 Mosonmagyaróvár, Vár u. 2.
	Lánszky, I.	ZENECA Hungary Kft., H-1016 Budapest, Hegyalja u. 7/13
	Mile, L.	DATE Mezőgazd.-i Főisk. Kar, 6800 Hódmezővásárhely, Andrássy u. 15.
	Molnár Györfyné, J. (Ms)	Biological Control Lab., Plant Health and Soil Cons. Station of County Veszprém, 8229 Csopak, Kishegyi u. 13.
	Mucsi, K. (Ms)	Biological Control Lab., Plant Health and Soil Cons. Station of County Csongrád, H-6800 Hódmezővásárhely, P. O. Box 99.
	Pálfay, G.	Cyanamid Hungary, 9023 Győr, Buda u. 4.
	Páll, P.	Biological Control Lab., Plant Health and Soil Cons. Station of County Szabolcs-Szatmár-Bereg, 4400 Nyíregyháza, Kótaji út 33.
	Péter, G.	University of Agricultural Sciences, Department of Plant Protection, H-2103 Gödöllő, Páter Károly u. 1.
	Petró, E.	Biological Control Lab., Plant Health and Soil Cons. Station of Capital Budapest, H-1519 Budapest, P. O. Box 340
	Princzinger, G.	Ministry of Agriculture, H-1860 Budapest 55, P. O. Box 1.
	Ripka, G.	Biological Control Lab., Plant Health and Soil Cons. Station of Capital Budapest, 1118 Budapest, Budaörsi út 141-145.
	Rüll, G.	Biological Control Lab., Plant Health and Soil Cons. Station of County Heves, 3300 Eger, Szövetkezet út 6.

Hungary	Sárfalvi, B. (Ms)	University of Agricultural Sciences, Department of Plant Protection, H-2103 Gödöllő, Páter Károly u. 1.
	Sótonyi, J.	Biological Control Lab., Plant Health and Soil Cons. Station of County Zala, 8900 Zalaegerszeg, Kinizsi u. 83.
	Szász, Á.	Biological Control Lab., Plant Health and Soil Cons. Station of Capital Budapest, H-1519 Budapest, P. O. Box 340
	Széll, E.	Cereal Research Institute, H-6726 Szeged, Alsókikötősor 5.
	Tóth, B.	Biological Control Lab., Plant Health and Soil Cons. Station of County Baranya, 7615 Pécs, Ph. 15, Pf. 13.
	Tóth, M.	Plant Protection Institute, Hung . Academy of Sci., H-1525 Budapest, P. O. Box 102
	Uggy, P.	Biological Control Lab., Plant Health and Soil Cons. Station of County Vas, Tanakajd, Ambrózy s. 2.
	van der Burgt, W.A.C.M.	Biological Control Lab., Plant Health and Soil Cons. Station of County Csongrád, H-6800 Hódmezővásárhely, P. O. Box 99.
	Vasas; L.	Biological Control Lab., Plant Health and Soil Cons. Station of County Békés, 5600 Békéscsaba, Szarvasi út 79/1
	Vörös, G.	Biological Control Lab., Plant Health and Soil Cons. Station of County Tolna, 7101 Szekszárd, Keselyűsi út 7.
	Zsellér Hataláné, I. (Ms)	Biological Control Lab., Plant Health and Soil Cons. Station of County Csongrád, H-6800 Hódmezővásárhely, P. O. Box 99.
Italy	Furlan, L.	Institute of Agricultural Entomology University of Padova, Padova. Fax: 39/42153945
	Ortez, A.	Osservatorio per le malattie delle piante, Via Beato Odorico 13, Pordenone. Fax: 39/434520570
Poland	Bialooki, P.	Gdynia 2 ul. Dokrow 5, skr. poczt. 245. Fax: 21-73-19
Romania	Barbulescu, A.	Research Institut for Cereals and Industrial Crops, Fundulea, Calarasi. Fax: 311-0722
	Vonica, I.	Ministry of Agric. and Food Cental Lab. for Phyt. Quarant., Bucarest. Fax: 401 2406891 or 401 2405445
Slovakia	Sivice, P.	Central Control and Testing Institute of Agriculture, Matuskova 21, Bratislava. Fax: 42/17377436
Slovenia	Pajmon, A.	Agricultural Institute of Slovenia, Hacquetova 17, Ljubljana
	Urek, G.	Agricultural Institute of Slovenia, Hacquetova 17, Ljubljana
Switzerland	Kuhlmann, U.	International Institute of Biological Control European Station, Chemin des Grillos 1. 2800 Delémont
Ukraine	Djutschenko, B.	Ukraina Ministerstvo Agropromislovovo Komplexi, Uzsgorod
	Melnik, P.	Ukrainian Scientific-Research Station on Plants Quarantine, Chernivtsi region, Novoselitsa district, Bogani

Ukraine	Ushuk, T.	Frontier State Plant Quarantine, Inspection Service, Shevchenko 32, UA-274001 Chernivtsi
USA	Ustinov, I.D. Edwards, C. R. Tollefson, J.J. Chandler, L.D. Woodson, W.D.	State Plant Quarantine Inspection Service, Kiev Purdue University, Entomology Hall ,West Lafayette, Indiana. Fax: (765) 494-2152 Department of Entomology Iowa State University, 17 Insectary Bldg. Ames. Fax: (515) 294-4431 U.S. Department of Agriculture, Northern Grain Insects Research Lab., 2923 Medary Ave., Brookings, South Dakota 57006 U.S. Department of Agriculture, Northern Grain Insects Research Lab., 2923 Medary Ave., Brookings, South Dakota 57006
Yugoslavia	Baca, F. Keresi, T. (Ms) Sivcev, I. Strbac, P.	Maize Research Institute 'Zemun Polje', P.O.Box 89, 11081 Zemun. Fax: 2354-994 Faculty of Agriculture, Institute for Plant Protection, Trg D. Obradovica 8, 21000 Novi Sad. Fax: 381 21 58058 Institute for Palnt Protection and Environment, Beograd, P.O.B; 936, YU-11001 Institute of Field and Vegetable Crops. Maksima gorkog 30, 21000 Novi Sad.
EPPO	Roy, A.S. (Ms)	Information Officer, EPPO, 1 rue Le Notre, Paris, France. Fax: 33/142248943

1. Opening

The meeting was opened by Dr Fésüs and Dr Eke from the Ministry of Agriculture in Hungary and by Dr Kiss the chairman of the organizing committee of the Workshop. Dr Berger welcomed the participants on behalf of IWGO and Mrs Roy on behalf of EPPO.

2. Situation of *Diabrotica virgifera* in different EPPO countries

The situation of *Diabrotica virgifera* in Central Europe was reviewed during this joint meeting, and several papers were presented to describe the situation in the countries concerned. In short, the spread of *Diabrotica virgifera* continues in Central Europe at a rather rapid pace, adults being trapped over a wider and wider area. However, except in the parts of Serbia where the pest was first found, no economic damage has yet been seen on maize. Because the adults can fly considerable distances, it is difficult to decide which parts of the 'potentially infested' areas where adults are trapped in fact contain breeding populations. A map presented in Appendix 1 shows the spread of *D. virgifera* in Europe from 1992 to 1997.

Bosnia-Herzegovina

A survey on *D. virgifera* was initiated in July 1997 using pheromone traps in the cantons of Tuzla-Posavina and Zenica-Doboj which are situated in the region near the borders of Croatia and Serbia (Yugoslavia). *D. virgifera* was trapped in the region around Tuzla (but the situation towards the west where the pest is progressing, or toward the south, is not exactly known). This report confirms earlier records of *D. virgifera* in Bosnia-Herzegovina.

Croatia

D. virgifera was first found in the east part of Croatia in 1995. One adult was caught in a cucurbitacin trap, but now it is considered that the pest was probably already present on an area extending about 30 km from the Yugoslav border and situated to the south of the river Bosut. In 1996, the pest spread westwards (80 km from the Yugoslav border) and adults were trapped in approximately 6000 km². In 1997, many traps (both yellow sticky traps and pheromone traps) were placed in this area, along its

border line and at the west of it. Approximately 3500 beetles were trapped from July to October 1997 (mainly in pheromone traps). The area where adults are trapped has now reached 9000 km² and the front line of the outbreak is situated 100 km from the Yugoslav border. Larval damage to maize roots was seen in an insecticide trial (root damage was rated at 5 on a scale from 1 to 9), but no yield reduction on maize was noted.

Hungary

D. virgifera was first found in Hungary in 1995 in the south of the country. As in previous years, the monitoring programme continued in 1997. The results showed that *D. virgifera* continues to spread towards the north (up to 100-120 km from the Yugoslav border). In 1996-1997, it is estimated that the pest has moved 40 km to the north. More than 4000 beetles were caught in pheromone traps. The pest is now present in the following counties: Baranya (Villány-Boly), Bács-Kiskun (Kecskemét), Csongrád (Szeged, Csanádpalota, Maroslele-Makó) and Békés (Mezőkovacsháza, Mezőhegyes, Battonya, Csnádapáca). The highest population numbers were found in Békés and Csongrád counties. Larvae were seen for the first time, slightly damaging maize roots near Szeged (Csongrád county), but without any impact on maize yield. In general, populations are more abundant in places where maize is grown as a monoculture. It is estimated that approximately 10 000 km² are now potentially infested by *D. virgifera* in Hungary, and it is expected that the pest will continue its progression towards the north of the country. In southern Hungary, aerial treatments on wide areas have been initiated using Slam® (a commercial product which contains a bait and carbaryl in a special formulation).

Romania

The first find of *D. virgifera* was made in 1996 in Nadlac (district of Arad – west of the country near Hungary) on yellow sticky traps. In 1997, a monitoring programme started in July with 240 pheromone traps located in the western part of the country (Arad, Timis, Caras-Severin, Bihor). In August, more traps (pheromone and yellow sticky traps) were placed in four other districts (Mehedinti, Alba, Hunedoara and Dolj). Approximately, 40000 adults have been trapped in Romania. *D. virgifera* was caught mostly in Arad, Timis and Caras-Severin districts. In August and September, adults started to be caught in Mehedinti district which is situated near Bulgaria. The present situation in Bulgaria is not known. In Romania, it is estimated that approximately 10000 km² are now potentially infested, but no root damage was seen. No insects were trapped in the other districts studied (Alba, Bihor, Dolj, and Hunedoara).

Yugoslavia

It must be recalled that *D. virgifera* was reported for the first time in Europe in Surcin, near Belgrade airport in 1992-1993. A monitoring programme was done in 1997 and showed that the pest continues to spread towards the south of Serbia, as it can now be found in places near Kragujevac. It is estimated that in Serbia the infested area was respectively: 0.5 ha in 1992, 6 ha in 1993, 60 ha in 1994, 275 ha in 1995, and 10 787 ha in 1996. It is felt that the total potentially infested area in 1997 has been multiplied by 2 compared to 1996. However, damage was only reported near Belgrade, Pozarevac and Vrsac (an area of 50 km from south to north and 130 km from west to east around Belgrade). Damage in 1997 was not as severe as in 1996, as with abundant rains in summer, maize plants were able to recover. The pest has not been found in Montenegro.

Slovenia

A monitoring programme has been in place in Slovenia since 1995 in the north-east and south-east of the country, which are two intensive maize-growing areas near Hungary and Croatia. So far, *D. virgifera* has **not** been found in Slovenia.

3. FAO project

Dr. Edwards (Purdue University, US) presented the FAO project which has just been set up against *D. virgifera*. It includes two aspects: a trapping programme and a containment programme. A permanent monitoring network was put in place in several countries in order to determine population levels over time. In 1997, permanent pheromone traps were placed in Croatia (10 traps), Hungary (40), Romania

(20) and also in Bosnia-Herzegovina (4), in infested areas, at the border of infested areas and in non infested areas. Traps are inspected every week or month according to the situation (infested area or not). This trapping programme will continue during the next season and it is expected that more countries will participate: Serbia, Austria and possibly Slovakia. It was also felt that Bulgaria should be encouraged to participate to this programme, because of the nearby infested areas in Romania. A containment programme using intense trapping and area-wide management (aerial treatments with SLAM[®] : bait + insecticide (carbaryl) is also included in the FAO project. For intense trapping, both pheromone and yellow sticky traps are used in order to catch males and females. Two to three trapping sites in each participating country have been chosen. When insects are caught in a trap, additional traps are placed within the four directions (the distance between traps being 1 km). Checks are done every 7 to 10 days. It was felt that this type of intensive trapping could perhaps be useful in river valleys or near mountains to reduce population levels and spread of the pest. In order to control *D. virgifera*, aerial treatments over large surfaces with a particular product have started to be tested in Hungary, but further results are needed to evaluate the efficacy of such treatments. The commercial product used (called SLAM[®]) contains a bait (cucurbitacin) and an insecticide at a reduced dose (carbaryl).

Finally, studies on the potential for movement of *D. virgifera* through Europe have been initiated. FAO has started to use Geographical Information System and various criteria to try to predict the areas where *D. virgifera* could establish and develop. These studies were only very preliminary and it was not possible to present yet final results. However, it seemed to indicate that excepted very arid or cold areas (in which no maize is grown!), the pest could develop in most countries in Europe. As an over simplification, it could be perhaps said that wherever maize is grown, the pest it likely to survive and develop.

Dr Edwards stressed that as the FAO project will be conducted over a limited period of time (it will end in 1999), other possible donors have to be found to continue these activities.

4. Research reports

M. Reynaud (FR) presented a paper on the risk assessment of *D. virgifera* in France. Since 1992-1993, the French Plant Protection Service has closely followed the spread of this pest. He recalled that maize is a very important crop in France (3rd in order of importance). It is cultivated in various regions for grain, silage or seeds. He noted that the application of granular soil insecticides (e.g. carbofuran, terbuphos, fonophos) at planting is a common practice against various soil insects. He then showed that the climate in France would be suitable for the development of *D. virgifera*. The introduction of this insect into France would cause economical losses (direct yield losses caused by insect feeding and additional costs of for treatments). He explained that inspections are carried out on maize seeds, as a precaution, but that no *D. virgifera* has ever been found. At this point, it was stated again by several participants and EPPPO, that maize seeds are not a pathway for the entry of *D. virgifera*.

Many papers were then presented on the possible means of control against *D. virgifera*. Abstracts of these papers will be published in a forthcoming IWGO Newsletter (which can be obtained from Dr Berger in due course).

The preliminary results of the 'area-wide' treatments in Hungary were presented (Dr Petro and Dr Ilovai). As the commercial product was received rather late in the season, it was not possible to assess its efficacy also on egg laying or larvae. However, the first results obtained were considered satisfactory against the adult populations, as the number of beetles was considerably reduced. Further experiments will be carried out in 1998 and the effects of the treatment on adult populations, larval activity and egg laying will be studied. The experience obtained in United States with such treatments was presented by Dr Edwards, Chandler and Tollefson (US). The possible use of Geographical Information System in order to develop appropriate management programmes of *D. virgifera* over large areas was explained by Dr Woodson (US).

Several papers presented results of trials on the efficacy of various chemicals (soil-applied insecticides) carried out in Hungary (Dr Zseller), in Yugoslavia (Dr Baca and Dr Strbac), and also trials done by chemical companies.

The various types of traps which can be used for *D. virgifera* were presented by Dr Toth (HU). During the Workshop, it was generally admitted that pheromone traps were the best tools to monitor the spread of *D. virgifera* in Europe and to detect new outbreaks. However, Dr Edwards noted that in the case of economic populations, yellow sticky traps are probably more appropriate to follow the population dynamics and to trigger the application of treatments when certain thresholds are attained.

Finally the possibilities of biological control against *D. virgifera* were presented. The International Institute of Biological Control (IIBC) of CABI has started to review the potential natural enemies which could be used against *D. virgifera*. At present, little information is available on natural enemies associated with *D. virgifera* which could be used in practice. Some data are given on Tachinidae, Braconidae, Formicidae, Carabidae which could be tested against *D. virgifera*. Fungal entomopathogens like *Beauveria bassiana* or *Metarhizium anisopliae* could be studied. Nematodes like *Steinernema carpocapsae* or bacterium (*Bacillus thuringiensis* strain San Diego) may also present some interest for biological control. However, a lot of research work is needed in this area.

When closing the meeting, it was stressed that the spread of *D. virgifera* continues rather rapidly within Central and Eastern European countries. Some participants felt that more international cooperation is needed in this field and particularly are funds are necessary to help countries where the pest is now present to apply control and containment measures. The next joint EPPO/IWGO meeting will be held in Slovenia, on the 1998-10-28/29.

APPENDIX 1
Spread of *Diabrotica virgifera* in Europe from 1992-1997 (based on data from FAO/TCP coordinators: Barcic, Camprag, Festic, Ilovay, Maceljki, Princzinger, Vonica)

