EUROPEAN AND MEDITERRANEAN PLANT PROTECTION ORGANIZATION

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Report of the 8th Meeting of the EPPO ad hoc Panel on *Diabrotica virgifera virgifera* held jointly with the 10th International IWGO Workshop on *Diabrotica virgifera virgifera*

Engelberg, CH, 2004-01-14/16

1. Opening

A very large number of participants (110 from 23 different countries) participated in this Conference on *Diabrotica virgifera* which took place in Engelberg, a beautiful alpine ski station, located in the heart of Switzerland. Welcome addresses were made by the local organizers (Dr Kulman and Dr Bertosa), the IWGO conveners (Prof Edwards and Dr Berger), EPPO (Ms Roy) and the FAO project coordinator (Prof Kiss).

2. Situation of *Diabrotica virgifera* in the EPPO region

In summary, *D. virgifera* has continued to spread in Central Europe in 2003 (see Fig. 1), and the outbreak has now reached Slovenia. *D. virgifera* was also found for the first time in Belgium (no information was provided during the Conference), Netherlands and United Kingdom. In France, a new outbreak was found in Alsace (near Germany and Switzerland). In Italy, eradication measures taken in the Veneto region proved to be effective and very few adults were caught. However, *D. virgifera* continued to spread in Lombardia, Piemonte, and has now reached Emilia Romagna and Trentino-Alto Adige. A rather large outbreak has also been found in Friuli-Venezia-Giulia, near Slovenia. In Switzerland, several new outbreaks have also been found in the north of the Alps. Fig. 2 presents the area of economic damage of *D. virgifera* since 1998. For the European Union, 2003 has also been highlighted by the official publication of emergency measures against *D. virgifera* (Commission Decision 2003/766/EC[*]) which was presented in detail by Ms Meroni (EU Commission).

Albania

Dr Çota explained that national monitoring started in 1999. In 2003, pheromone traps and yellow sticky traps were placed at 6 locations in maize fields (Shokodra, Rinas International Airport, Elbasan, Dibra, Durres, Saranda). *D. virgifera* was not found.

Austria

Dr Cate recalled that the first beetles were caught in 2002, in the eastern part of Austria. In 2003, the monitoring programme was intensified (581 traps) and extended to all Austrian provinces. As a result, 8673 beetles were caught in 256 traps: 8330 beetles in Burgenland (all districts), 339 in Niederösterreich (Mistelbach, Gänserndorf, Bruck/Leita), and 4 in Steiermark (Fürstenfeld, Radkersburg). In 2003, it was observed that the insect had spread from Hungary and Slovakia, along the entire eastern border (231 km from north to south), and up to 30 km into the Austrian territory. Faster dispersal and higher population levels were observed in the most intensive maize-growing areas. For 2004, it is expected that the pest will

[*] Commission Decision (2003/733/EC) of 24 October 2003 on emergency measures to prevent the spread within the Community of *Diabrotica virgifera* Le Conte.

continue to spread within Austria. The main problem will be the dispersal of the pest towards the region of Graz which is one of the most important maize-growing region.

Bosnia and Herzegovina

M. Karic explained that monitoring has been conducted in Bosnia and Herzegovina since 1997. In 2003, Hungarian pheromone traps and yellow sticky traps were placed at 60 sites (30 permanent and 30 new sites). Most traps were located near the front line of spread. The most important agricultural areas are located in the north part of Bosnia, mainly along river valleys. The first catch was made on the 18th of June (pheromone trap) in the north of the country. Monitoring showed that, as usual, the insect spread along rivers and roads. In 2003, only a limited spread was observed. *D. virgifera* spread a little towards the west and slightly more to the east. The pest was found near Sarajevo airport. Further spread towards the east and central parts of the country may be more difficult because of the presence of mountains and of limited cultivation of maize. Although *D. virgifera* was first found in 1997, no economic damage has yet been recorded in Bosnia and Herzegovina.

Dr Bača presented the results of monitoring in the Republika Srpska. In 2003, weather conditions were very dry and hot. In the eastern part, a decrease of pest populations was observed as probably egg laying was rendered more difficult by hard and desiccated soils. But in the west part where maize is grown on larger areas, a significant population increase was recorded (up to 3 fold in some localities). Similarly, no economic damage was observed.

Bulgaria

Ms Ivanova recalled that *D. virgifera* was first found in 1998 and that monitoring programmes have been regularly carried out since then. 2003 results showed that the pest is slowly spreading toward the east and south. It was found for the first time in the region of Dragoman. In 2003, the total number of adults caught was 4,770. The highest numbers were caught in the regions of Dolna Biala Rechka, Prevala, Gramada and Dolni Lom. Larval damage was observed in the regions of Bregovo, Gramada, Dolna Biala Rechka and Prevala but it did not reach economic levels. In 2003, climatic conditions were unfavourable to maize growth, and the most important insect populations were found in irrigated areas or areas with sufficient amounts of ground water.

Croatia

Ms Igrc Barčić explained that a progressive increase of adult populations has been recorded in Croatia, since the first appearance of the pest in 1995. For several years, the pest has been spreading within the most important maize-growing areas without any visible damage. However, in 2002 first economic damage was seen in the region of Baranja. In 2003, pheromone and yellow sticky traps were placed at 121 monitoring sites. A significant spread was noted towards the west (30 km), nearly reaching Zagreb. The total infested area is now 23,500 km² (covering approximately 80% of the Croatian maize production). Population densities continued to increase in general, but were still much higher in the east part than in the west. In 2003, extreme climatic conditions were not favourable to maize cultivation, and it is estimated that these conditions led to yield losses of 30%. Damage caused by larvae was recorded again in the eastern part of Croatia, in the counties of Osječko-Baranjska, Vukovarsko-Srijemska, Požeško-Slavonska and Virovitičko-Podravska. Damage was seen over a area of 12,500 km², essentially in continuous maize fields. In observed fields, yield losses varied from 4.8 to 45 %. In Croatia, no chemical treatments are currently recommended against *D. virgifera*, the main recommendation being the use of crop rotation.

Czech Republic
Monitoring, said M. Vahala, started in 1999 in the region of South Moravia. *D. virgifera* was caught for the first time in 2002, in the districts of Breclav, Hodonin and Uherske Hradiste. In 2003, monitoring continued with the help of GPS to locate precisely the 61 trapping points. Pheromone traps were placed in South Moravia, as well as near international airports. In total, 19 males were caught in the districts of Breclav, Hodonin, Uherske Hradiste, and Vyskov.

France
M. Reynaud explained that, since 1999, a trapping network has been implemented in France. In 2002, two outbreaks were reported in the region Ile-de-France, near the airports of Roissy and Orly. Eradication measures were immediately taken. In 2003, the national monitoring programme continued (401 sites with 2 pheromones traps per site) in all maize-growing areas, as well as near airports and motorways. In July 2003, a new outbreak was detected at Blotzheim, in Alsace, near the Basel-Mulhouse-Freiburg airport and close to the German and Swiss borders. In Alsace, maize is a very important fodder crop and occupies 70 % of arable land. In accordance with EU Commission Decision 2003/766/EC, eradication programmes were followed in Ile-de-France and Alsace. In each case, an outbreak area (5 km radius), a safety zone (10 km) and a buffer zone were delimited. Prohibition of maize monoculture, treatments, various restrictions and intense monitoring are applied in these zones. In Alsace, an increase of trapping intensity (92 traps) led to the capture of 9 beetles (in 6 traps). In Ile-de-France, 192 traps were distributed in the outbreak, safety and buffer zones. In total, 9 adults were found in fields at 2 localities which were already infested in 2002 (i.e. inside the outbreak area). Some additional beetles were caught on volunteer maize in a fallow. This finding stressed the necessity to destroy volunteer maize plants, as they support small populations of the pest. It is considered that eradication measures applied in Ile-de-France were very effective. Official phytosanitary measures will continue in 2004.

Germany
Dr Baufeld explained that monitoring programmes have been implemented since 1997. In 2003, 459 traps were placed (increase of 43% compared to 2002) at 305 monitoring places, covering nearly all federal lands. Traps were located in maize fields near points of entry, airports, ports, railways, motorways, maize breeding stations, etc. The most intensive trapping was done in Baden-Württemberg because of the latest introductions of *D. virgifera* into Alsace (France) and Basel canton (Switzerland). Because parts of the delimited zones around the outbreak in Alsace are located on German territory, phytosanitary measures will be applied in 2004. But so far, no beetle was found in Germany. At a later stage of the Conference, Dr Baufeld presented a simulation model of *D. virgifera* spread which showed very clearly the benefit from taking containment/eradication measures in comparison to the absence of any measures, taking the example of the newly infested location in Alsace.

Greece
Dr Tsitsipis presented the monitoring programme which was carried out in Greece in 2002 and 2003. The study focussed on maize fields near civil or military airports. In 2002, four areas were surveyed (Thessaloniki, Kavala, Alexandroupoli and Patra). In total, 16 pheromone traps were placed. In 2003, three airport areas were selected (Thessaloniki, Kavala and Alexandroupoli), as well as two additional maize-growing regions (Promahonas, Serres and Orestiada, Evros). In total 32 traps were set up. No *D. virgifera* was found in either year. Monitoring will continue in 2004.

Hungary

Dr Ripka presented the situation in Hungary. *D. virgifera* was first found in 1995, and nationwide surveys have been conducted since 1996. In Hungary, maize is the most important fodder crop and most profitable field crop. It is grown over 1.2 -1.3. million ha with 40% in monoculture. In 2003, spread continued towards the north, so that almost all the Hungarian territory is now infested. The first adults were caught on the 16th of June and adult flight peaked in June-early July. Over the years, the general trend in adult captures is a significant increase (in 1997: an average of 147 beetles was captured per trap – in 2003: nearly 900 beetles). In 2003, 1145 locations were inspected for larval damage. As a result, damage was observed on 10,922 ha (compared with 7,488 ha in 2002). In these areas, the economic threshold for root injury was reached in 5,955 ha. In terms of geographical coverage, larval damage is expanding towards the north. Chemical treatments and crop rotation are applied in Hungary.

Italy

Dr Furlan presented the monitoring programme which was carried out in Italy in 2003. Monitoring was conducted in already infested areas, in maize monoculture, and at potential places of entry (airports, custom stations etc.). The following numbers of pheromone traps have been placed in: Friuli Venezia-Giulia (>270), Veneto (1488), Emilia-Romagna (212), Lombardia (>350), Piemonte (520), Trentino (74), Campania (20), Lazio (9). In infested areas, yellow sticky traps were also included.

Veneto region

D. virgifera was first caught in 1998, near Marco Polo airport (Venezia international airport). Since then eradication measures based on compulsory crop rotation and treatments against the adults have been applied. In 2003, only 4 beetles were caught in the outbreak area and 4 in the safety area (very close to the outbreak area). It is concluded that eradication measures followed in Veneto region are very effective as populations have been kept at a very low level for 6 years, and the pest has not significantly spread from the initial outbreak area. Eradication measures will continue in 2004.

Friuli-Venezia-Giulia region

D. virgifera was caught for the first time in 2002 (31 beetles in 10 traps) in maize fields near the military airport of Aviano (north of Pordenone). In 2003, 3 beetles were caught in the outbreak area (near Pordenone) and 19 in the adjoining safety zone. New infestations were found in the provinces of Udine and Gorizia (close to Slovenia). In a very small part of Udine province (Buttrio municipality) a population peak of 75 males per trap per day was recorded in monoculture fields, in other parts only small populations were detected.

Lombardia region

In 2002, a large population was first reported and some economic damage was seen. In the area where economic damage was seen (on approximately 5,000 ha in the province of Como), maize planting was allowed only after the 15th June, which resulted in a significant decrease of maize cultivation. But in other parts, no specific prohibitions of maize monoculture were made. In 2003, *D. virgifera* was found in a new province (Mantova), so all cultivated land in Lombardia can be considered as infested by the pest with the exception of a restricted area along the border with the Veneto region. Significant populations (reaching up to 200 males per trap per day) were observed in the provinces of Como, Varese and Milano, but low

captures were made in the rest of the region. In 2003, no economic damage was seen in Lombardia

Piemonte region
No containment strategies were applied in this region. In 2003, all provinces, except Asti, were at least partially infested. The highest levels of populations were detected in the area where the pest had been detected in 2001, in all other parts only low levels were detected.

Emilia-Romagna region
In 2003, the first adults were caught in the provinces of Parma and Piacenza close to the border with Lombardia.

Trentino- Alto Adige region
In 2003, *D. virgifera* was caught for the first time in a small valley (Chiese) on about 270 ha of cultivated land bordering the northern part of Lombardia region.

No beetles were found in Campania and Lazio regions.

Netherlands
A poster from Lammers *et al*. presented the first finding of *D. virgifera* in the Netherlands. Monitoring has been done in the Netherlands since 1997. In 2003, 120 pheromone traps were placed mainly in maize fields in monoculture and in areas at risk (airports, harbours, military airbases). On the 14th of August 2003, two adults of *D. virgifera* were caught in one maize field near the international airport of Schiphol and the Aalsmeer flower auction. This particular field had been surveyed for 5 years. Eradication measures, in conformity with the EU Commission Decision 2003/766, were applied. As no other beetle was found, it is assumed that the situation is under control. However, monitoring programmes will be intensified in 2004.

Romania
Ms Cean presented the monitoring programme carried out in Romania. *D. virgifera* was first found in 1996 (Arad county) near the Hungarian border. In 2003, pheromone and yellow sticky traps were placed on 193 sites in 25 counties (15 infested in 2002 and 10 non-infested). No new county was found infested in 2003, but population densities increased. In 2003, the total number of captures was 71,206 beetles (368.9 beetles/trap), compared to 14,959 beetles (138.5 beetles/trap) in 2002. Economic damage was sporadically seen in continuous maize fields, in the counties of Arad and Timis.

Serbia and Montenegro
Dr Sivcev presented the situation in Serbia. Since the first observation of *D. virgifera* in 1992, population densities fluctuated from year to year. In the beginning, populations increased and spread, thus causing more and more damage. However, this increase was not linear as it mainly depended on the area of maize fields in monoculture and climatic conditions. The most significant levels of damage were recorded from 1998 to 2000. 2000 was an exceptionally warm and dry year which resulted in a severe reduction of pest populations. In 2001 and 2002, only sporadic damage was seen in small maize-producing areas in the north and south of Serbia. In 2003, populations probably started to recover, as a small increase in numbers of damaged fields was recorded. In 2003, the infested area was 73,000 km². No further spread was observed towards the south, and only minor spread towards the southwest.

Economic damage was observed on 3,000 ha (in the north of Serbia, near Novi Sad, Belgrade, and Kragujevac).

Slovakia

M. Siviček recalled that *D. virgifera* was first found in Slovakia in 2000. In 2003, the monitoring programme continued. Pheromone and yellow sticky traps were placed at 44 sites. Results showed that the insect has spread towards the north and now occupies the main maize-growing areas. The insect was also caught in the east part of the country, coming from Ukraine or Hungary. The highest populations were observed in the south (where the first infestations were discovered). The average number of beetle per trap increased from year to year. In 2003, no economic damage was observed but this may be expected in 2004.

Slovenia

A poster from Urek et Modic presented the first report of *D. virgifera* in Slovenia. Monitoring started in 1997. In 2003, pheromone and yellow sticky traps were placed in maize and pumpkin fields in the regions of Pomurje, Podravje, Posavje, Gorenjska and Northern Primorska. The first catches of *D. virgifera* were made in the region of Pomurje on the 23rd of July, and as a consequence more traps were placed. In total 62 localities were monitored. At the end of the growing season, results showed that *D. virgifera* occured in the eastern part of Slovenia (regions of Pomurje and Podravje) along the borders with Croatia and Hungary, and also in the western part (region of northern Primorska) near the city of Nova Gorica and the Italian border (see situation of Italy described above).

Switzerland

Dr Derron recalled that, in Switzerland, monitoring started in 1999 in the surroundings of the airports of Genève, Zürich and Lugano. The first 4 beetles were caught in 2000 near Lugano (south of the Alps). From 2001 to 2003, the monitoring programme gradually extended to all areas in Switzerland where maize is grown (both north and south of the Alps). In 2003, 120 traps were placed in maize fields, mostly near airports, main roads, and railways. In the south of the Alps, the number of catches has increased since 2000. In 2003, *D. virgifera* was caught for the first time in the north of the Alps. The first catch occurred in a maize field, near the exit of the tunnel of Gotthard (canton of Uri). Further findings were then made in July and August: 3 males were caught along the motorway going to Lucerne, 3 beetles were trapped near Basel in an isolated maize field (20 km south of the airport), 1 beetle was caught near Zurich airport. Five to ten traps were added in these 4 sites within five days after the first catch. Only one beetle was caught in the supplementary traps. In 2004, maize monoculture will be prohibited within 10 km around findings and the monitoring network will be strengthened in the north of the Alps. Dr Bertossa presented the effect of containment strategies followed in Switzerland which are based on compulsory crop rotation and elimination of volunteer plants. Results showed that a strictly controlled crop rotation can be successful in keeping populations below the economic threshold.

Ukraine

In Ukraine, Dr Omelyuta explained that *D. virgifera* was reported for the first time in 2001, in the Transcarpathian region (districts of Vinogradovsky and Beregovsky). From 2001 to 2003, visual inspections were done and pheromone traps were placed. Gradually, *D. virgifera* has spread in maize fields along railways, highways and river valleys (Tisza, Uzh). In 2003, the infested area continued to increase (3000 km² in 2003 - 575 km² in 2002, 60 km² in 2001). The insect continued to spread from the Hungarian and Romanian borders towards the north-west where it has reached Užgorod and Mukačevo. In total, 656 beetles were caught during

2003. A poster from Movchan *et al*. presented the results obtained from the Plant Quarantine Service in Ukraine which were basically the same. The Plant Quarantine Service caught in total 2590 beetles on 61 sites, in 10 districts of the Transcarpathian region

United Kingdom

In United Kingdom, Ms Cheek explained that a PRA was done in 1994. It supported the inclusion of *D. virgifera* in the EU regulations, but indicated only a marginal risk to the UK due to the limited area of maize production and cool summer temperatures. In UK, only 20% of maize is in continuous cultivation. This PRA was revised after the finding near Paris, and showed that conditions have slightly changed in UK: maize-growing areas have increased in the west and south of England during the last 10 years (mostly grown as silage for animal feed), and climate matching showed that *D. virgifera* can now complete its cycle in most years, although it remains at the edge of its range in the UK. In 2003, a monitoring programme was initiated and covered sites of greatest risk in southern England (e.g. maize holdings near airports). In late August/early September, positive finds were made at 5 farms: 4 near Heathrow airport and 1 near Gatwick airport. After these findings, the trapping programme was intensified. In total, 91 males and 4 females were caught. This could indicate that the pest has been present for one or more years prior to these findings. Phytosanitary measures were applied to minimize risk of spread: rotation was required for outbreak farms, rotation and seed treatment was required in surrounding areas and chlorpyrifos was applied to stubble (post-harvest). Investigations will continue in 2004 to clarify the extent of the current outbreak, to determine the potential establishment of the pest in UK, its potential economic impact and the suppression measures which could be implemented.

3. Research papers

A very large number of research papers and posters were presented during the Conference (biology, host plants, effects of crop rotation, chemical control, biological control, IPM, trapping techniques, GMOs, model on spreading scenarios, experiences of farmers field schools in several countries). Abstracts and list of participants are being published in IWGO Newsletters and can be downloaded from Internet (http://www.cabi-bioscience.ch/diabrotica-meeting/IWGOMeeting_Abstracts_and_ParticipantsBOOKLET.pdf).

4. Close

Warm thanks are due to Dr Kulman, Dr Bertossa and all their colleagues for the very fine organization of the Conference, and for having provided such a beautiful environment to all participants.

Figure 1. Spread of *D. virgifera* in Europe from 1992 to 2003.

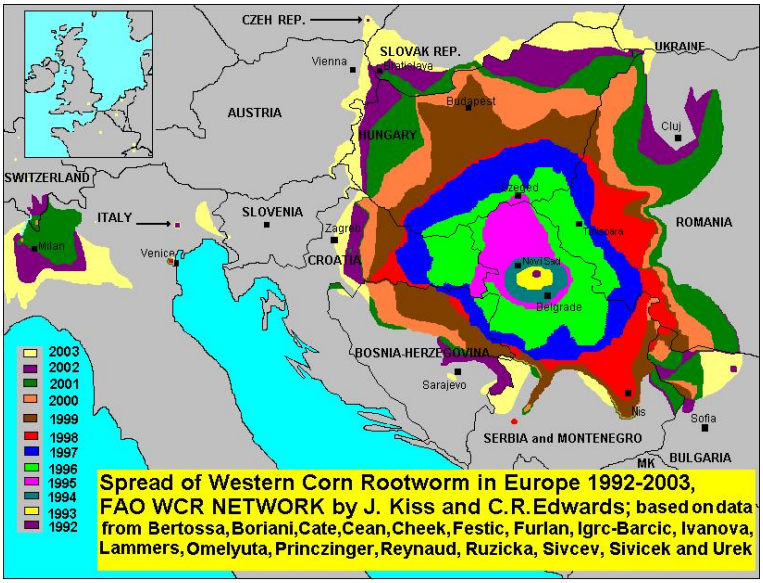

Figure 2. Area of economic activity of *D. virgifera* in Europe from 1998 to 2003.