

## RESULTS ON THE SPECIES *DIABROTICA VIRGIFERA VIRGIFERA* LE CONTE IN THE CONDITIONS OF CENTRAL MOLDOVA

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### Abstract

The species *Diabrotica virgifera virgifera* Le Conte (western corn rootworm) is part of the order Coleoptera, family Chrysomelidae and is an invasive alien species native to Central or South America. In Europe, it was reported in 1992, and in Romania in 1995. The attack produced by the species *Diabrotica virgifera virgifera* significantly reduces maize production, the pest being a carrier of various pathogens that cause crop plant diseases (Bacal et al, 2020). In the present paper, are presented partial results regarding the appearance, evolution and flight of adults of the species *Diabrotica virgifera virgifera*, respectively, the attack that the insect produces in the maize crops in the Central area of Moldova. In the year 2021, the flight of this species began in the first decade of July and continued until the third decade of September. The maximum flight peak was achieved in the third decade of July, being 180 specimens/trap. In the year 2022, the flight of the species started in the first decade of July and continued until the end of September. The maximum flight peak was recorded in the first decade of August, when a number of 182 specimens/trap were collected. In the year 2022, a maize silk attack frequency of between 85% and 100% was recorded. From the results obtained in 2022, the treatment carried out on the vegetation with insecticides reduced the number of adults per plant from 1.6 specimens to 0.1 specimens.

**Key words:** *Diabrotica*, maize, flight, attack, treatment

The species *Diabrotica virgifera virgifera* Le Conte is part of the order Coleoptera, family Chrysomelidae, is an invasive alien species, originating in Central or South America, first reported in 1968 in Colorado, a habitat where the species fed mainly on host plants from the Poaceae family, which presents a great spread and diversity in the area (Manole T., 2017).

In Europe, it was reported in 1992, in Yugoslavia, in a maize field near the international airport in Belgrade. The area of the pest expanded by about 20-25 km/year, being reported in 1995 in Hungary and Croatia, near the border with Yugoslavia, and in 1996 in Bosnia-Herzegovina and Romania (Arad county). The species has expanded continuously, being reported in northern Bosnia, in the eastern part of Montenegro, in 1998 near Venice, and in 2000 it was identified in western Bulgaria, Slovakia and Albania. Adults were also reported in Switzerland and in 2002 in France near Paris (Tălmăciu M., 2017).

In 1996, the species was reported in Nădlac, on the border with Hungary, and the monitoring process continued. In 1997, weak attacks were reported in Arad and Caraș-Severin counties, and

from 1998 it spread throughout the south-west area of Romania.

According to the information published by the Bucharest Central Phytosanitary Quarantine Laboratory, in 2003 the species was present in the counties: Arad, Caraș Severin, Mehedinți, Bihor, Timiș, Satu Mare, Sălaj, Hunedoara, Cluj, Alba, Sibiu, Gorj, Dolj, Vâlcea, Olt, Bistrița Năsăud, Mureș, Harghita, Maramureș, Argeș, Brașov, Prahova and Teleorman (Manole T., 2017).

At ARDS Secuieni, between 1997 and 2009, pheromonal traps were installed and the appearance of the pest in maize crops was monitored, but it was not reported in the eastern part of the country during this period. The adult fly was identified in the maize crops in the Central area of Moldova starting from 2015, and it intensified from one year to the next (Trotuș et al, 2020).

The attack produced by the species *Diabrotica virgifera virgifera* significantly reduces maize production, the pest being also a carrier of various pathogens that cause crop plant diseases (Bacal S. et al, 2020).

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Due to the attack produced by the larvae on the roots, the stability of the plants is reduced, so in case of stronger rains or winds, the plants fall. Attacked plants can be recognized by the inclined stem in the shape of a swan's neck, wither and dry prematurely. Production can be reduced by 10 – 13%, sometimes even up to 50% (Horgoș H., Grozea I., 2020).

Adults feed on the leaves of corn plants, and during the flowering period, the attack extends to silk and pollen. Towards the end, the adults feed on the grains at the top of the cobs which are in the milk stage.

In the present paper, are presented results regarding the appearance, evolution and flight of adults of the species *Diabrotica virgifera virgifera* and the attack produced by the insect on maize crops in the Central area of Moldova.

### MATERIAL AND METHOD

Starting from 2021, at ARDS Secuieni, more extensive research was initiated on the species *Diabrotica virgifera virgifera* Le Conte regarding the appearance, evolution and attack of the species in maize crops.

Observations and determinations were made in maize crops where were followed the appearance, evolution and end of the flight of the species *Diabrotica virgifera virgifera* Le Conte. Flight monitoring was carried out with the help of yellow glue traps and pheromonal ones.

In 2021, the traps were installed in the field in the first decade of June, and in 2022, they were installed in the third decade of June. The readings were carried out every decade, and based on them the flight curve of the species was made.

Also, the attack produced by the larvae and adults was followed, as well as the influence of some chemical treatments on the vegetation in reducing the population of adults.

In the spring of 2022, a maize experiment was placed in the experimental field of the Plant Protection laboratory, according to the randomized block method, in three repetitions, where was observed the influence of the chemical treatment

on the vegetation on the reduction in the number of adults of *Diabrotica virgifera virgifera*.

The plant that preceded maize was wheat. Soil work, fertilization, seed bed preparation and crop maintenance were done according to the maize cultivation technology for the specific conditions of the Moldavian Plateau.

Sowing was done on 16.04.2022, and the emergence of plants was recorded on 06.05.2022. The hybrid used was Turda Star.

In the variants where treatment was applied to reduce the attack of *Ostrinia nubilalis* larvae, was also monitored their influence on *Diabrotica virgifera virgifera* adults.

The treatment was carried out in the first decade of July, when the maize was in the flowering and silking phenophase, and *Diabrotica* adults were present in the crop.

Five products with insecticidal action were tested, namely: Apis - 0.15 l/ha, Coragen - 0.15 l/ha, Decis - 0.075 l/ha, Inazuma - 0.2 kg/ha and Fastac - 0, 6 l/ha.

Meteorological data were recorded from the VANTAGE PRO 2 weather station located in the experimental field, the station being automated with data recording and computer storage.

Climatic conditions during the maize growing season showed that the spring of 2021 was quite cool. The summer months were normal (June, August) and hot (July) in terms of average monthly temperatures. The monthly deviations in terms of temperatures were between -2.0°C (April) and 1.8°C (July) (figure 1).

In terms of precipitation, the monthly deviations from the multiannual monthly sum were between -36.5 mm (September) and 16.6 mm (August) (figure 2).

The maize growing season in 2022 was characterized as hot and dry.

Regarding temperatures from April to September, the deviations from the multiannual average were between 0°C (April) and 3.2°C (August) (figure 1).

The precipitation recorded in the same time interval had deviations from the multiannual average between -8.5 mm (April) and -47.1 (July) (figure 2).

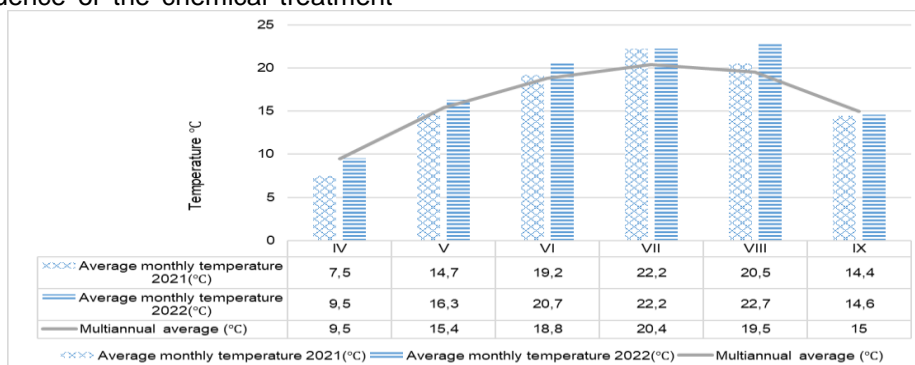


Figure 1 Temperatures recorded during the maize vegetation period, 2021 – 2022

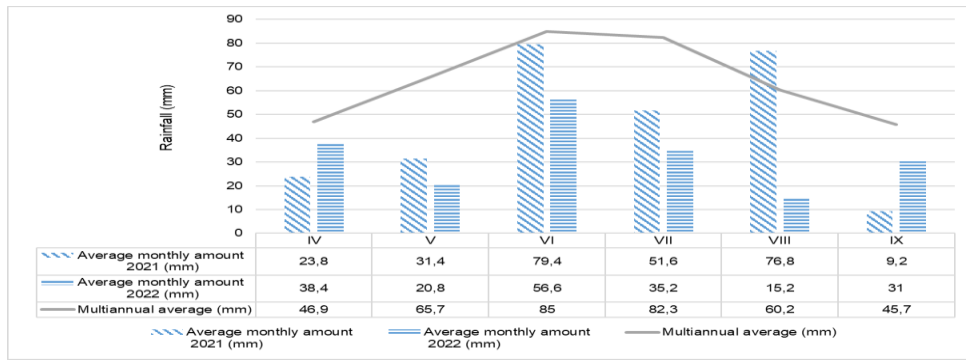


Figure 2 Precipitation recorded during the maize vegetation period, 2021 – 2022

**RESULTS AND DISCUSSIONS**

During the two years, the monitoring of the flight of *Diabrotica virgifera virgifera* adults was carried out with the help of pheromonal and yellow glue traps.

In the year 2021, the first adults were recorded in the first decade of July, when were captured 2 adults/trap and the maize was in the flowering and silking phenophase. The flight

continued without interruption until the end of September, when the maturity of the plants was also achieved.

The maximum flight peak was recorded in the third decade of July and was 180 specimens, after which the number of collected adults began to decrease gradually, up to 47 specimens/trap in the third decade of September (Amarghioalei și colab., 2022) (figure 3).

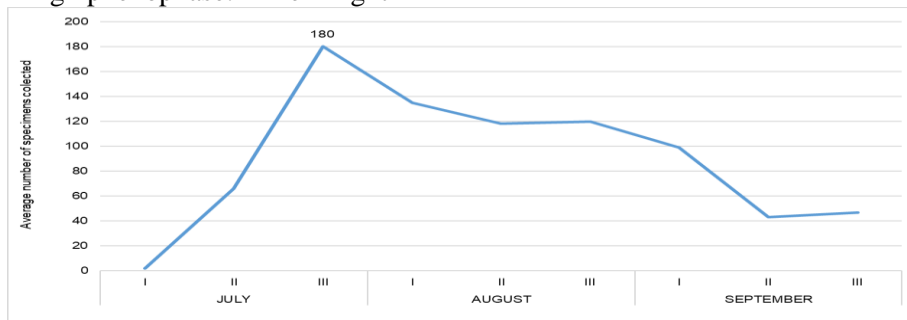


Figure 3 The flight of the species *Diabrotica virgifera virgifera* in 2021, monitored with the help of traps

From the readings carried out at the glue traps in 2022, it was found that the flight of adults started in the first decade of July when the maize was in the phenophase of flowering and silking, with 42 specimens collected/trap, and continued until the end of September.

The maximum flight peak was recorded in the first decade of August, when a total of 182 specimens/trap was captured, then the flight started to decrease (figure 4).

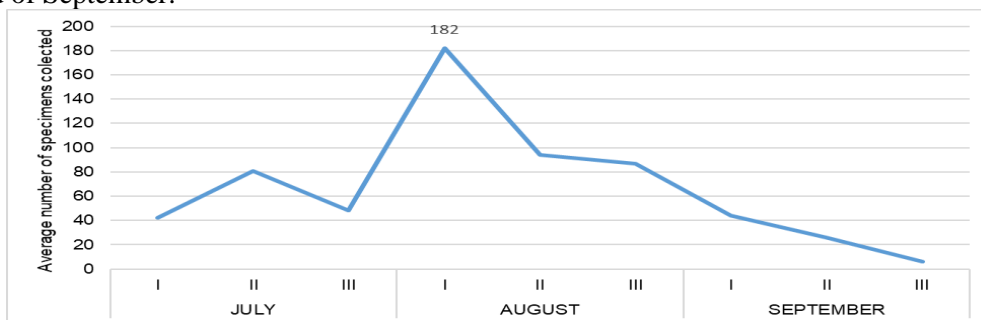


Figure 4 The flight of the species *Diabrotica virgifera virgifera* in 2022, monitored with the help of traps

The plant preceding the maize crop being wheat, the reserve of *Diabrotica* larvae in the soil was reduced, thus the attack produced on the roots was also reduced, the swan neck symptom being very little visible in the crop.

The attack produced by adults of the species *Diabrotica virgifera virgifera* on maize silk was high in 2022, being recorded an attack frequencies between 85% and 100% (figure 5).

Before the treatment on the vegetation, the number of adults per plant was between 1.2 and 1.6 specimens/plant.

In the determinations made three days after the application of the treatment on the vegetation, it was found that the number of adults was lower,

except for the variant where the Apis insecticide was applied in a dose of 0.15 l/ha.

The best results were obtained in the variant where the Fastac insecticide was applied in a dose of 0.6 l/ha, the number of adults being reduced to 0.1 (figure 6).

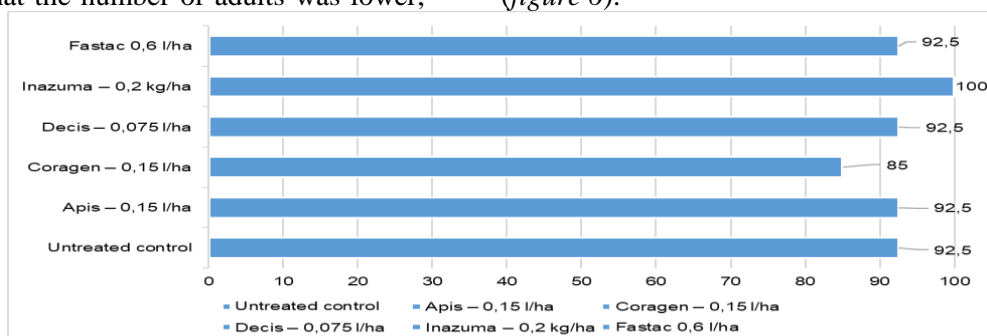


Figure 5 Frequency of attack produced by adults of the species *Diabrotica virgifera virgifera* in the year 2022

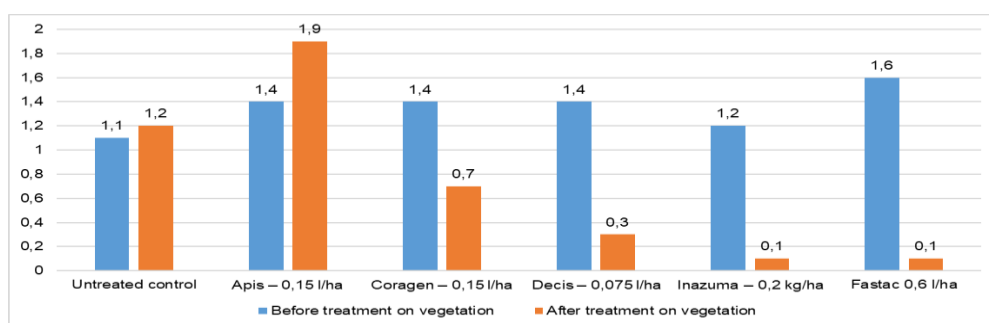


Figure 6 Number of adults per plant before and after chemical treatments on vegetation, 2022

## CONCLUSIONS

The species *Diabrotica virgifera virgifera* Le Conte is considered to be a dangerous pest for the maize crop in the Central area of Moldova.

In the year 2021, the flight of the species *Diabrotica virgifera virgifera* began in the first decade of July and continued until the end of September. The maximum flight peak was recorded in the third decade of July, being 180 specimens/trap.

In the year 2022, the flight of the insect began in the first decade of July and continued without interruption until the end of September. The maximum flight peak was recorded in the first decade of August, when a number of 182 specimens/trap were collected. In 2022, the attack produced by the larvae was less, instead adults were present in the culture in high numbers, the attack frequency being up to 100%. The number of adults per plant was between 1.2 and 1.6.

Chemical treatment on the vegetation with the insecticides Apis (0.15 l/ha), Coragen (0.15 l/ha), Decis (0.075 l/ha), Inazuma (0.2 kg/ha) and Fastac (0.6 l/ha), reduced the number of adults per plant from 1.6 to 0.1.

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