

DATA REGARDING THE MONITORING OF THE SPECIES *DIABROTICA VIRGIFERA VIRGIFERA* LE CONTE SPECIES IN AGRICULTURAL CROPS FROM THE CENTRAL AREA OF MOLDOVA

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Abstract

In addition to the 25 species of harmful insects, of economic importance for the maize crops identified in Romania, of which, the corn leaf weevil (*Tanymecus dilaticollis*) and wireworms (*Agriotes* spp.) are very dangerous soil pests, it is added species *Diabrotica virgifera virgifera* Le Conte. The species was identified in Europe in 1992, and in 1996 it spread to Romania. The spreading area of the pest was initially restricted in the south-west and west, in the counties of Arad, Timiș, Caraș-Severin, Mehedinți, Dolj, Hunedoara, then gradually spread to all areas of maize cultivation. In the eastern part of the country, respectively in the area of influence of the A.R.D.S. Secuieni (Neamț, Bacău and North Vrancea counties area) the insect was reported in 2015, the flight intensity, abundance and frequency of attack increased from year to year, which imposed as a necessity the monitoring of the species and the way of attack. The species *Diabrotica virgifera virgifera* Le Conte causes damage to maize crops both in the larval stage and in the adult stage. Oligophagous larvae feed on the roots of several species of grasses, except sorghum, which they gnaw, cut off, the strongly attacked plants have the slanted stem in the form of a swan's neck, the plants dry prematurely, production losses being 10 - 13%, sometimes higher, up to 55%. Adults are polyphagous, but especially feed on the leaves, silk and corn pollen, but also on the grains at the top of the cobs. The attack reported on the corn leaves is similar to that of the species *Lema menalopa*. Observations and determinations on the appearance and flight of adults were made using yellow glue traps, which have been installed in maize crops since the beginning of June. The first adults were registered in the first decade of July, the flight continued without interruption until the end of September. During this period July - September, the adults made a single flight curve, the maximum flight peak was recorded in the second decade of August and totaled an average of 470 specimens / trap / decade. Knowing the abundance of *Diabrotica virgifera virgifera* Le Conte in agricultural crops in Central Moldova, it is necessary to continue the research on knowledge of bioecology, factors influencing the emergence, evolution and attack, measures to prevent and control the pest.

Key words: maize, pests, attack, crops, flight curve

In addition to the 25 species of harmful insects, of economic importance for the maize crops identified in Romania, of which, the corn leaf weevil (*Tanymecus dilaticollis*) and wireworms (*Agriotes* spp.) are very dangerous soil pests, it is added the species *Diabrotica virgifera virgifera* Le Conte (Trotuș *et al*, 2017; Trotuș *et al*, 2020).

The species entered Europe from North America, in 1992, in Serbia, near Belgrade International Airport, in 1995 it was reported in Croatia and Hungary, and in 1996 it entered Bosnia - Herzegovina and Romania.

In our country, the area of spread of the species was initially restricted in the south - west and west, in the counties of Arad, Timiș, Caraș-Severin, Mehedinți, Dolj, Hunedoara, then gradually expanded in all areas of maize

cultivation (Bărbulescu *et al*, 2020; Suciuc *et al*, 2019; Bayer Crop Science, 2018).

From 1997 until 2009, at A.R.D.S. Secuieni traps were installed with pheromones and together with the county inspectorates for plant protection Neamț and Bacău we monitored the occurrence of the pest in corn crops. During this period 1997-2009 the species *Diabrotica virgifera virgifera* was not reported in the eastern part of the country.

The pest was registered in the corn crops in the central area of Moldova, starting in 2015. The flight of adults intensified from one year to another, the frequency of attack by adults increased and was recorded in all crops in the eastern part of the country.

The species *Diabrotica virgifera virgifera* Le Conte is harmful both in the larval stage and in the adult stage.

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The larvae are oligophages, feed on the roots of several species of grasses, except sorghum, move through the soil until they reach the roots level, which they gnaw, get inside the roots and open gates of pathogens installation that cause their rot, decreases the stability of the plant, strong winds and rains cause the plants to fall. Strongly attacked plants have a sloping stem (swan neck), and dry prematurely, production losses being 10-13% and even higher up to 55% (Horgoș H., Grozea I., 2020).

Adults are polyphagous, but especially feed on leaves, pollen and silk and finally with the grains from the top of corn cobs. The attack on the leaves is identical to that of the *Lema menalopa* species. Adults migrate from corn crops, when pollen and fresh silk disappear in crops sown later, with younger plants. They are also found on different species of the rainbow family, being attracted by the substance cucurbitacin. The damage caused by adults is of secondary importance.

MATERIAL AND METHOD

The monitoring of the appearance in the corn crops, from the eastern part of the country, was carried out at A.R.D.S. Secuieni starting with 1997, with the help of traps with synthetic sex pheromones, from local origin developed and produced by the „Raluca Rîpan” Institute of Chemistry Cluj-Napoca.

The flight intensified starting with 2018, when the flight monitoring was done with the help of yellow glue traps. The traps were installed in the corn crops of the Plant Protection Laboratory of the A.R.D.S. Secuieni - Neamț from June 1st. The readings were made to each 10 days when the number of adults collected was recorded. The

traps changed monthly, and when they became clogged with other insect species, dust or plant debris, the traps became decad al

Based on the readings, the appearance, the beginning and the end of the flight, the flight curve and the flight intensity made by the adults of the species *Diabrotica virgifera virgifera* Le Conte were established.

RESULTS AND DISCUSSIONS

In the observations and determinations made in 2019 regarding the appearance and flight of the species *Diabrotica virgifera virgifera* Le Conte, with the help of two yellow glue traps, we totaled an average of 1537.5 specimens for the period July - September.

In trap no. 1, the total number of adults collected was 1433 specimens, and in the second trap 1642 specimens were registered (*table 1*).

Based on the data recorded on the yellow glue traps, we established the flight curve of the species, which we correlated with the climatic conditions of the agricultural year 2018/2019. The flight of adults began in the first decade of July and continued uninterrupted until the end of September. During this period, July and September, there was a maximum flight peak in the second decade of August, which was 468 specimens / trap 1, 473 specimens / trap 2 and an average of 470.5 specimens on the two traps.

After reaching the maximum peak in the second decade of August, the flight started to decrease, to 13, respectively 25 specimens / trap in the third decade of September (*figure 1*).

From a climatic point of view, the agricultural year 2018/2019 was characterized as hot and dry.

Table 1

Diabrotica virgifera virgifera Le Conte, adults collected with the help of yellow traps with adhesive glue

Installation date / Date of suspension	Date of collection		Number of specimens collected on traps		The average of the two traps
	Month	Decade	Trap 1	Trap 2	
01.06.2019	June	I	0	0	0
		II	0	0	0
		III	0	0	0
	July	I	8	13	10.5
		II	180	261	220.5
		III	228	229	228.5
	August	I	188	248	218
		II	468	473	470.5
		III	179	211	195
	September	I	127	130	128.5
		II	42	52	47
III		13	25	19	
30.09.2019			13	25	19
Total collected			1433	1642	1537.5

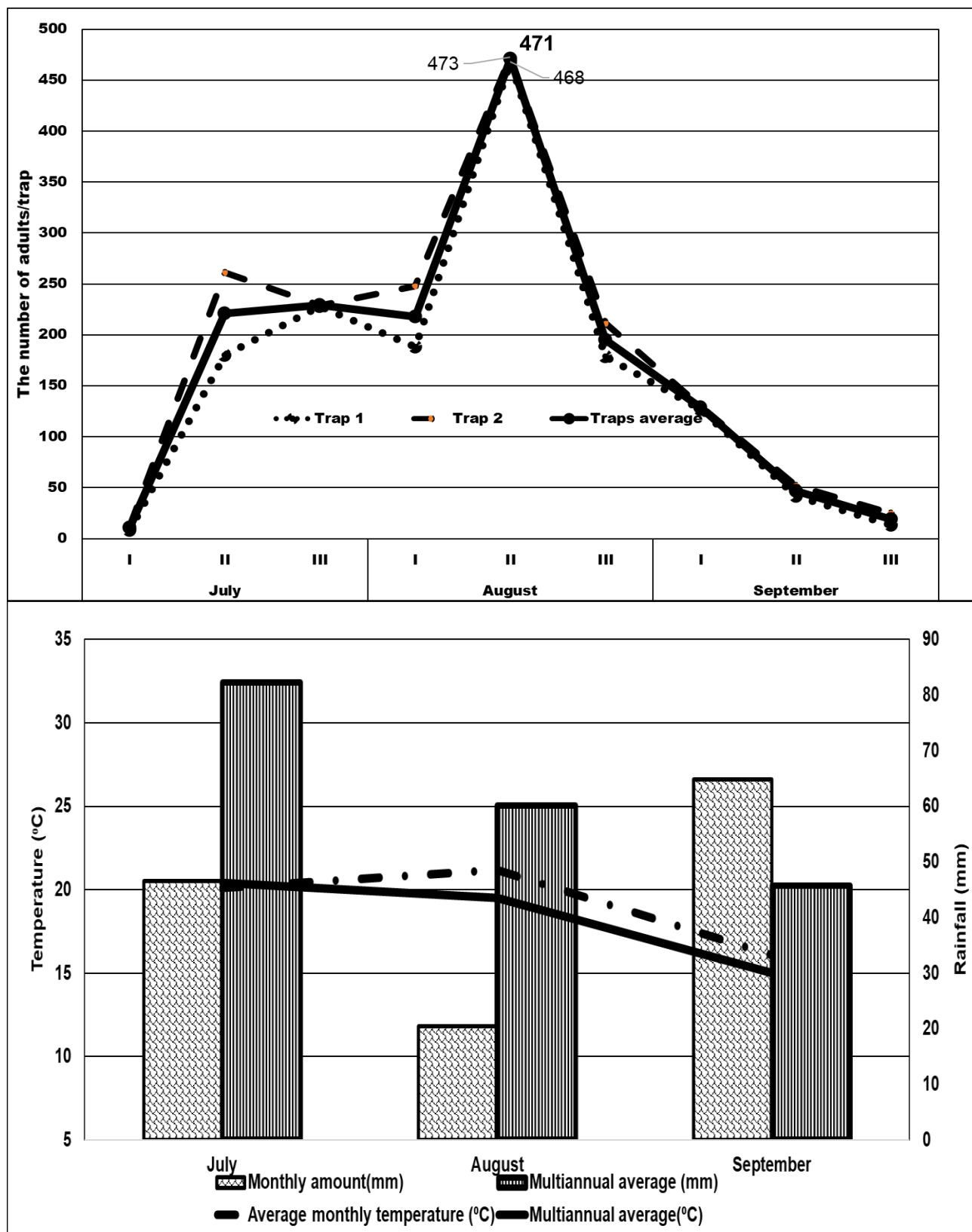


Figure 1. Flight of *Diabrotica virgifera virgifera* Le Conte in 2019, monitored using yellow glue traps correlated with the climatic conditions for the period July - September

The average multiannual temperature was 10.0 °C, 1.1 °C higher than the multiannual average which is 8.9 °C, and the annual amount of precipitation was 450.2 mm, 94.1 mm less compared to the average multiannual amount which is 544.3 mm (Table 2).

Between July and September, until the species flew, the monthly temperature deviations were between -0.3 °C (July) and 1.7°C (August), and in terms of precipitation, the monthly deviations were negative conditions between -29.2 mm (July) and -39.8 mm (August), due to the

favorable climatic conditions for the appearance, evolution and flight of the species *Diabrotica virgifera virgifera* Le Conte (figure 1).

CONCLUSIONS

The species *Diabrotica virgifera virgifera* has settled and developed an appreciable population in the eastern part of the country.

The species must be considered a dangerous pest of maize crops in the country and in the Central area of Moldova.

It is necessary to approach the different researches, in order to:

- knowledge of bioecology;
- knowledge of the factors that influence the appearance, evolution and attack;
- establishing prevention and control measures;
- improving the technology to control the whole group of soil pests.

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