

## RESEARCH ON THE ATTACK PRODUCED BY OSTRINIA NUBILALIS HBN. LARVAE AT DIFFERENT GENOTYPES OF MAIZE IN THE CONDITIONS OF CENTRAL MOLDOVA

### CERCETĂRI PRIVIND ATACUL PRODUS DE LARVELE SPECIEI OSTRINIA NUBILALIS HBN. LA DIFERITE GENOTIPURI DE PORUMB ÎN CONDIȚIILE DIN CENTRUL MOLDOVEI

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**Abstract.** During the maize vegetation period, *Ostrinia nubilalis* larvae causes production losses by producing attack on the stem, cob or inflorescence. To reduce losses, are chosen maize hybrids that are tolerant to larval attack. But the attack depends on the climatic conditions at the time of eggs laying and the appearance of larvae, the phenophase in which the crop is infested and the numerical pressure of the population in that region. This paper presents the results obtained from the observations and determinations made on the attack produced by the larvae of *Ostrinia nubilalis* Hbn. to several romanian and foreign maize genotypes, in the conditions of Central Moldova. The average frequency of attack produced by the *Ostrinia nubilalis* Hbn. larvae were 29.76%, the minimum value of the attack being 17.50% and the maximum reached to 47.67%. Among the genotypes studied, *Deliciul verii* recorded very significant values of all monitoring parameters, the frequency of attack was 47.67%, the most numerous holes (2.63) and galleries (2.14) were identified, and the larvae created galleries with an average length of 22.46 cm. An average, 0.73 holes/plant were register, the larvae created 0.65 galleries/plant with a length of 8.38 cm and were identified 0.38 larvae/plant.

**Key words:** maize genotypes, larvae, attack

**Rezumat.** În perioada de vegetație a porumbului provoacă pierderi de producție prin atacul produs asupra tulpinei, știuletelui sau inflorescenței larvele speciei *Ostrinia nubilalis*. Pentru a reduce pierderile sunt aleși hibridii de porumb care prezintă toleranță la atacul larvelor. Atacul depinde însă de condițiile climatice din momentul depunerii pontelor și apariției larvelor, de fenofaza în care este infestată cultura și de presiunea numerică a populației din regiunea respectivă. În lucrarea de față sunt prezentate rezultatele obținute în urma observațiilor și determinărilor efectuate asupra atacului produs de larvele speciei *Ostrinia nubilalis* Hbn. la mai multe genotipuri de porumb românești și străine, în condițiile din

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*Centrul Moldovei. Frecvența medie a atacului produsă de larvele speciei *Ostrinia nubilalis* Hbn. a fost de 29,76%, valoarea minimă a atacului fiind de 17,50% și cea maximă de 47,67%. Dintre genotipurile studiate, Deliciul verii a înregistrat valori foarte semnificative ale tuturor parametrilor urmăriți frecvența plantelor atacate a fost de 47,67%, s-au identificat cele mai numeroase orificii (2,63) și galerii (2,14), iar larvele au creat galerii cu lungimi medii de 22,46 cm. Au fost înregistrate, în medie, 0,73 orificii/planta, larvele au creat 0,65 galerii/planta cu lungimea medie de 8,38 cm, iar numărul larve identificate a fost de 0,38 larve/planta.*

**Cuvinte cheie:** genotipuri de porumb, atac

## INTRODUCTION

Globally, in 2019 maize was cultivated on 197 million ha ([www.fao.org/](http://www.fao.org/)), and in Romania on 2,678.5 thousand ha ([www.madr.ro/](http://www.madr.ro/)). Its spread over large areas also attract a series of pests that attack at different developmental phases, the attack being located on various parts of plant.

A dangerous pest of maize is *Ostrinia nubilalis*, a species that occurs during the vegetation of maize and causes production losses by attacking the stem, cob or inflorescence (Troțuș *et al.*, 2018). The insect is widespread in all areas where maize is grown, and the attack it produces is different from one area to another: in Moldova the attack reaches 30.2% (Troțuș *et al.*, 2018), in the west of the country (Ștef *et al.*, 2020) and in the Transylvanian Plain (Tărău *et al.*, 2019) the frequency of the attack is close, of 59%, instead in the south of the country the attack reaches 70% (Popov *et al.*, 2007), and in the Oltenia Plain it varies between 22.4% and 40.7% (Draghici, 2008).

The observations and determinations made at A.R.D.S. Secuieni on the bioecology of the species showed that the insect has one generation per year, in years with high temperatures may have a second incomplete generation. The species has on average the coefficient of variability for the period 1993-2017 of 20.01%, including the insect in the group of abundant insects for the eastern part of the country (Troțuș *et al.*, 2018).

The genotype of cultivated maize has different tolerance to the attack produced by the larvae of *Ostrinia nubilalis* Hbn. The attack depends on the climatic conditions at the time of spawning and the appearance of larvae, the phenophase in which the crop is infested and the numerical pressure of the population in that region. Its behavior at the attack produced by larvae has been studied both romanian and foreign researchers, being an objective for identifying attack-tolerant forms of maize (Georgescu *et al.*, 2013; Beres and Gorski, 2012; Pereverzev, 2005; Haș *et al.*, 2012; Haș *et al.*, 2014).

In the present paper are presented the results obtained through observations and determinations on the attack produced by the larvae of the species *Ostrinia nubilalis* Hbn. to several romanian and foreign maize genotypes.

## MATERIAL AND METHOD

In the period 2019-2020, a single-factor experiment placed in randomized blocks in three repetitions was located in the experimental field of the Secuieni - Neamț Agricultural Research and Development Station.

The biological material used was made up of the following romanian and foreign genotypes: Turda star, Turda 248, Turda 344, Turda 332, Olt, Deliciul Verii, Vibrion, Inventive, Method, Kerala, Messir.

The experiments were performed on a typical cambic chernozem type soil, with pH in water 6.29, humus content 2.3, nitrogen index 2.1, content in mobile  $P_2O_5$  39 ppm and 161 ppm mobile  $K_2O$ .

The experiment was established respecting the cultivation technology of this species in the conditions of Central Moldova (Trotuș *et al.*, 2020).

At the end of the vegetation period, 25 plants / variant / repetition were harvested and sectioned to establish the following parameters of the attack: frequency of attacked plants, average number of holes' plant, length of galleries and number of larvae / plant.

Statistical analysis: The results obtained are presented as average values of the monitored parameters (frequency of attacked plants, average number of holes / plant, average number of galleries / plant, number of larvae / plant and length of galleries. Data were calculated in Excel (Microsoft USA), and the results obtained were interpreted with the ANOVA program (analysis of variance).

The meteorological data were recorded at the weather station of the unit, which is VANTAGE PRO 2. It is located in the experimental field, and the recording and storage of data in the computer is automated. To characterize the years from a climatic point of view, we used data on average air temperature ( $^{\circ}C$ ) and the amount of precipitation (mm).

## RESULTS AND DISCUSSIONS

Climatic conditions have greatly influenced the evolution of crops, but also the appearance, spread and attack of the species *Ostrinia nubilalis* Hbn.

The two years were characterized as warm (2018/2019) and very warm (2019/2020), registering, compared to the multiannual average of  $8.9^{\circ}C$ , the deviations of the average temperature were of  $+1.1^{\circ}C$  and  $+2.3^{\circ}C$  (Fig. 1).

In terms of rainfall, the two years were deficient in precipitation, achieving, compared to the multiannual average of 544.3 mm, negative deviations of precipitation of -114.1 mm (2018/2019) and -168.5 mm (2019/2020). The uneven distribution and the reduced amount of precipitation recorded during the two years characterized the years as dry (2018/2019) and very dry (2019/2020) (Fig. 1).

In both years of experimentation, 2019 and 2020, the flight of the species *Ostrinia nubilalis* Hbn. it was continuous, without interruption, the first adults being registered in the first decade of June, and the insect's flight ended at the final of September. The intensity of the flight was maximum, both in 2019 and in 2020, starting with the third decade of June, continuing in the first decade of July, but the appearance of larvae and adults was staggered in July and August.

The climatic conditions in the summer months have negatively influenced the appearance and evolution of the larvae causing their extinction, especially in 2020.

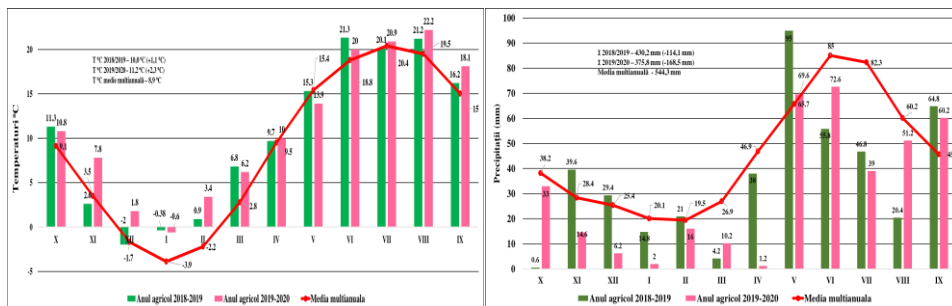


Fig. 1 The evolution of climatic conditions recorded at S.A.R.D.S. Secuieni in the period 2019-2020

Regarding the biological material, it registers variations in larval attack. The studied genotypes recorded average attack frequencies between 17.50% (Vibrion) and 47.67% (Deliciul verii). Very significant attacks were registered at the genotype Deliciul verii (47.67%), followed by Turda 332 (45.24%) and Olt (36.92%) compared to the average experience (29.76%). Of the 11 genotypes studied, six recorded close attacks as the average value of the experience: Inventive (26.33%), Turda 248 (28.59%), Turda 344 (27.73%), Kerala (30.33%) and Messir (29.78%) (Fig. 2).

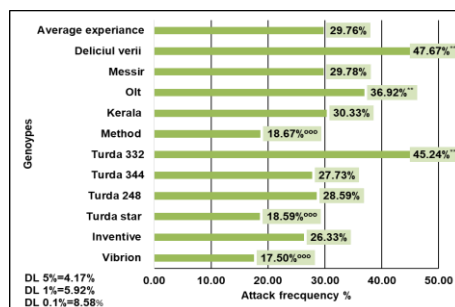
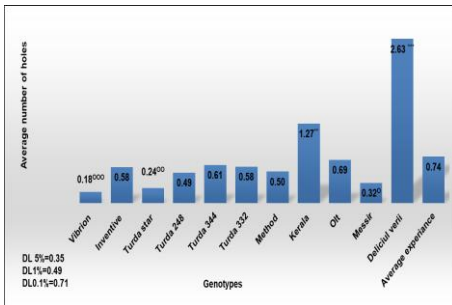


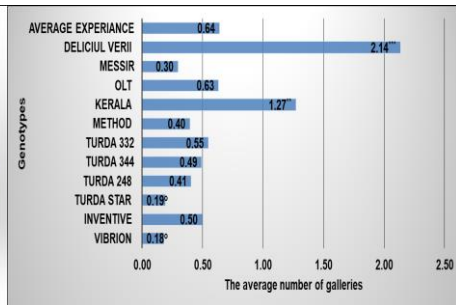
Fig. 2 Frequency of attack on different maize genotypes, Secuieni, 2019-2020

The average number of holes varied from one genotype to another from 0.18 holes to 2.63 holes. The Deliciul verii genotype recorded a very significant number of holes (2.63 holes) followed by the Kerala genotype which had a significant value of holes (1.27 holes) compared to the average experience (0.73 holes). Very significant negative values, distinctly significant negative and negative significant of the number of holes were recorded at Vibrion (0.18 holes), Turda star (0.24 holes) and Messir (0.30 holes) compared to the average experience (0.73 holes) (Fig.3).

Regarding the galleries created by the larvae, it is found that their number varied, being recorded, on average, 0.64 galleries. The most numerous galleries were registered at the genotypes Deliciul verii (2.14 galleries) and Kerala (1.36 galleries) values assured as very significant and distinctly significant. Significant negative results of the number of galleries had the genotypes Vibrion (0.18) and Turda star (0.19) compared to the average (Fig. 4).



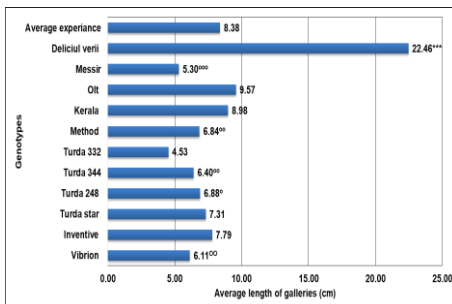
**Fig. 3** The average number of holes recorded in different maize genotypes Secuieni, 2019-2020



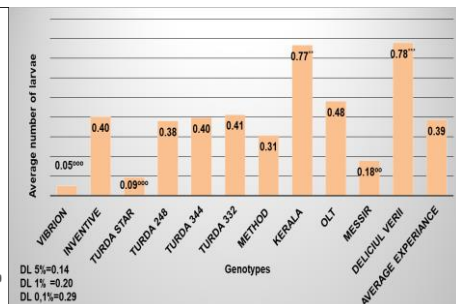
**Fig. 4** The average number of galleries recorded for different maize genotypes, Secuieni, 2019-2020

The longest galleries, of 22.46 cm, were registered in the genotype Deliciul verii, and the smallest galleries were identified in Turda star (4.53 cm) and Messir (5.3 cm). The genotypes Turda 332, Messir and Vibrion had distinctly significant negative values and very significant negative lengths of the gallery length compared to the average of the experiment (Fig. 5).

The average number of larvae identified inside the maize plants ranged from 0.05 to 0.78 larvae. Five genotypes recorded a number of larvae close to the average experience (0.39): Inventive- 0.40; Turda 0.38; Turda 344 - 0.40; Turda 332 - 0.41; Method - 0.31. It is noted with low values of the number of larvae, three hybrids (Vibrion - 0.05; Turda star - 0.09; Messir - 0.18) compared to the average experience (Fig. 6).



**Fig. 5** Average length of galleries recorded for different maize genotypes, Secuieni, 2019-2020



**Fig. 6** The average number of larvae recorded in different maize genotypes, Secuieni, 2019-2020

## CONCLUSIONS

1. The average frequency of attack produced by the larvae of the species *Ostrinia nubilalis* Hbn. was 29.76%, the minimum value of the attack being 17.50% and the maximum 47.67%.

2. Genotype Deliciul Verii recorded very significant values of all the parameters of the follow-up: frequency of attacked plants was 47.67%, the most numerous orifices (2.63) and galleries (2.14) were identified, and the larvae created galleries with medium length of 22.46 cm.

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