

## SUMMARY

The genus *Ostrinia* includes 20 species (Mutuura and Munroe, 1970). Only four of these are recognized as pests: *Ostrinia nubilalis* Hübner and *Ostrinia furnacalis* Guenee are mainly pests of maize; *Ostrinia obumbratalis* Lederer attacks maize, but to a lesser extent, and *Ostrinia zaguliaevi* Munroe that attacks legume species.

*Ostrinia nubilalis* Hbn. it is the most important of these pests and attacks the largest number of plant species. This species was first described by Hübner in 1796.

The doctoral thesis entitled “**Research on morphology, bioecology and control of European corn borer (*Ostrinia nubilalis* Hbn.) in some species cultivated under the conditions of A.R.D.S. Secuieni**” includes updated data on the morphology and bioecology of *Ostrinia nubilalis* Hbn. in the conditions of the Center of Moldova, the attack registered on some cultivated plant species and its evolution depending on the technological factors.

The paper is structured in two parts, the first part summarizing general information entitled "GENERAL CONSIDERATIONS" comprises three chapters, spread over 42 pages and the second part entitled "OWN CONTRIBUTIONS" which includes three chapters comprising 127 pages, 31 tables and 73 figures.

The three chapters of the first part refer to the importance of maize cultivation, mention the results published in the scientific literature on the topic of the thesis, data that were used in part II of the thesis to compare and interpret the results and present information on the geographical location, the natural environment and pedoclimatic conditions of A.R.D.S Secuieni.

Part II, entitled "OWN CONTRIBUTIONS", contains three chapters. It presents data on the evolution of climatic conditions during the research period, the research material and method and the results obtained on morphology, biology, larval attack on maize and other cultivated species and the role of technological factors in reducing insect attack.

The research was carried out at the Secuieni Agricultural Research and Development Station, the unit which is located in Neamț County, in the SE part.

The average temperature for the period 2012-2021 increased by + 1.1 ° C compared to the multiannual average of 8.9 ° C, which shows a warming trend in the area. In terms of rainfall, the average amount of precipitation in the same period was 61.5 mm lower than the multiannual average of 544.3 mm, the area being characterized as slightly dry.

**Chapter IV presents the main purpose of the thesis and the objectives of the research, the research material and method.**

In the research conducted during 2019-2021, we had the following objectives:

- monitoring the bioecology of *Ostrinia nubilalis* Hbn. in the conditions of Central Moldova (duration of pest development stages, flight curve and maximum flight peak of adults and biological cycle of the species in the conditions of Central Moldova);
- the attack and evolution of the species on maize and some cultivated species;
- technological factors influencing the attack of *Ostrinia nubilalis* Hbn larvae. (sowing epoch, maize genotype, chemical control of larvae and the influence of chemical control on maize sown in different epochs).

Morphology research consisted of biometric determinations on the stages of mature larva, hibernating larva, pupa and adult: 100 of specimens were collected from maize and hemp crops from the field of the A.R.D.S. Secuieni and were measured and weighed.

To monitor the bioecology of *Ostrinia nubilalis* Hbn. observations were made by means of an entomological isolator located within the unit, the subsequent determinations being continued in the experimental field. The biological material was analyzed (remains of larval plants, maize plants laying eggs, larvae, attack) and the appearance and evolution of the pupae, adults, eggs laying, larval hatching and attack mode and the duration of each stage were periodically noted.

In the experimental field, a series of monofactorial experiments and a bifactorial experiment were placed on a typical cambic chernozem soil, with a pH of 6.29 in water, a humus content of 2.3, a nitrogen index of 2.1, a content of 39 ppm mobile P<sub>2</sub>O<sub>5</sub> and mobile potassium content was 161 ppm mobile K<sub>2</sub>O.

In the single-factor experiments, the factor was represented by the sowing epoch, the maize genotype and the chemical control of the larvae. The aim of these experiments was to establish the role of technological factors in reducing the larval attack of *Ostrinia nubilalis* Hbn.

The bifactorial experience of the Axis B type was based on the method of subdivided plots, the factor A being represented by the sowing period with three graduations, and the factor B by the chemical control measures, with six graduations.

**Chapter V presents data on the morphology, bioecology of *Ostrinia nubilalis* Hbn. the attack produced on other cultivated species and the influence of technological factors in reducing the attack.**

From the determinations made, two populations of larvae were identified to developed on maize and hemp were identified, which were highlighted by biometric differences in the length and weight of larvae, pupae and adults.

The length of the larvae collected in autumn from the maize crops was on average 19.5 mm while it was 17 mm in hemp. In terms of weight, it is noted that the larvae from the maize crops had weights between 103 mg and 169 mg, being well developed, while those analyzed from the hemp crops were smaller, having between 82 mg and 120 mg.

The hibernating larvae recorded in the spring had sizes that ranged between 16 and 19 mm in hemp, being smaller than those analyzed on maize that were between 16 and 21 mm. On average, mature larvae weighed 72 mg (hemp) and 122 mg (c maize).

The pupae analyzed from the maize vegetal residues were longer, averaging 14 mm compared to those recorded for hemp, which were smaller and averaged 11 mm.

Regarding the **bioecology of the species**, the results obtained in the period 2020-2021 show that the evolution of the stages is closely related to the climatic conditions.

The determinations made in the experimental field on the vegetal residues show that the species overwinters in the vegetal residues of maize in the form of mature larva.

The evolution continues in the spring when the transformation into a pupa takes place, the duration of this stage is dependent on the recorded temperatures, the cool periods extending the duration of the stage. When the pupa appears, the sum of the useful temperatures was between 151.2 °C and 169.2 °C.

The flight of adults started in the first decade of June, being continuous until the end of September. During this period, the species records a maximum flight peak at the end of June and the beginning of July, which can be extended to the second decade of July, depending on the temperatures recorded in the first two decades of June. The first adults were caught when the sum of the useful temperatures was between 229.4 °C (2021) and 271.1 °C (2020). At the end of the flight of *Ostrinia nubilalis* Hbn., The sum of the useful temperatures was between 1319 °C (2020) and 1363.3 °C (2021).

The egg stage was identified in maize crops from the third decade of June to the second decade of July. The eggs are laid by females grouped. It is estimated that egg laying begins when the sum of the useful temperatures was between 367.8 °C (2021) and 385.3 °C (2020).

The larvae began to hatch from eggs at the end of June, their appearance continuing until the second decade of July, this stage was identified in the sections made in the field until the end of the maize crop. When the larvae hatch, the sum of the useful temperatures was between 449.7 °C (2021) - 464.3 °C (2020).

Being a very mobile stage, the larvae were identified in the stem, on the leaves, on the panicle or on the cobs, where they bear fruit and create galleries of different lengths. The larval attack is recognized by the holes created in the stem where it penetrates and feeds on the maize marrow, gnaws on the top of the cobs or perforates the main vein of the leaves.

The influence of **technological factors** on the attack of *Ostrinia nubilalis* Hbn larvae was assessed.

The attack on the five experienced maize epochs shows that the lowest values of the parameters observed were recorded in the III<sup>th</sup> epoch, the optimal epoch for the conditions in Central Moldova: the frequency of attacked plants was 18.65%, being identified on average 0.60 holes / plant and 0.36 galleries / plant. Also, were recorded 0.38 larvae / plant and the average length of the galleries was 8.39 cm.

The first two epoch of sowing maize, which corresponded to the first and second decades of April, suffered quite high attacks, the frequency of the attacked plants being on average over 22%. The number of holes / plant (I<sup>st</sup> epoch - 0.70 and II<sup>nd</sup> epoch - 0.60) and the number of galleries / plant (I<sup>st</sup> epoch - 0.65; II<sup>nd</sup> epoch - 0.53) was much higher than the optimal epoch which shows that females were attracted to lay eggs on early-sown maize.

The late maize sowing epoch recorded the most holes / plant (IV<sup>th</sup> epoch - 1.2; V<sup>th</sup> epoch - 0.99) and galleries / plant (IV<sup>th</sup> epoch - 0.96 and V<sup>th</sup> epoch - 0.75) comparatively with the optimal epoch, which shows that some of the eggs were laid on these crops, and the larvae found very good conditions for development, perforating the plants and consuming the marrow inside the maize. It is also noted that the most larvae were recorded 0.83 larvae / plant in the IV<sup>th</sup> epoch and 1.15 larvae / plant in the V<sup>th</sup> epoch, which shows that a higher number of larvae survived over the summer and that the reserve of larvae is considerable. The high number of larvae led to the registration of galleries (IV<sup>th</sup> epoch - 19.20 cm and V<sup>th</sup> epoch - 15.62 cm) longer by more than 7 cm compared to what was recorded at the optimal epoch.

The 11 genotypes of maize tested, analyzed in terms of grain variety and maturity group, recorded variations in attack during the three years of experimentation.

In terms of grain variety, the sugar genotype Delicul Verii had the highest values of the frequency of attacked plants (59.72%), the number of holes / plant (2.79 holes / plant), the average number of galleries / plant (2.20 galleries / plant) and the average length of the gallery (30.94 cm).

From the point of view of the maturity group of the hybrid, the lack of tolerance to the larval attack of the studied genotypes is noticed and an increase of the attack is observed from the early hybrids to the late hybrids.

The Kerala semi-late genotype (FAO 400) recorded, compared to the average experience (1.29 holes / plant, 1.10 galleries / plant, 0.83 larvae / plant, the average length of the gallery being 16.87 cm), high values of the attack (1.72 holes / plant, 1.50 galleries / plant, 1.27 larvae / plant, the average length of the gallery being 15.91 cm), although the frequency of attacked plants (47.16%) was close to average experience (46.43%).

The Turda 344 genotype recorded the most holes / plant (1.75) and the longest galleries created by larvae with an average length of 20.16 cm.

In the period 2019-2021, chemical control measures for larvae ensured the protection of maize plants. The variant treated with the active substance cyantraniliprol 200 g / l registered the lowest attack produced by larvae, of 8.85% compared to the untreated variant, of 41.88%. In the variants where insecticides from the class of pyrethroids and neonicotinoids were applied, the attack frequencies were recorded between 20.82% (deltamethrin 50 g / l) and 26.93% (acetamiprid 200 g / kg), compared to the untreated variant where the attack was of 41.88%.

The interaction between the sowing epoch x the chemical control of the larvae recorded a low level of attack on the treated variants from the III<sup>th</sup> epoch. Among the active substances, cyantraniliprol 200 g / l reduced the frequency of attack in all three epochs (I<sup>st</sup> epoch - 12.65%; II<sup>nd</sup> epoch - 9.78%, III<sup>rd</sup> epoch - 4.11%) compared to the untreated variant (I<sup>st</sup> epoch - 40.19%; I<sup>nd</sup> epoch - 36.78%, III<sup>rd</sup> epoch - 48.67%).

Regarding the attack and its evolution on some species cultivated in the conditions of Central Moldova, the preference of the larvae of the species *Ostrinia nubilalis* Hbn was highlighted for maize plants.

In the period 2019-2021, the average frequency of attack on maize was the highest, of 37.77%, compared to that recorded in hemp crops, where the attack was 8.43%, and with sorghum, where the attack was much reduced, by 3.67%.

It is noted that in favorable climatic conditions, as recorded in 2021, hemp and sorghum crops have higher attacks, the larvae perforating and creating more holes and longer galleries.

These species may be alternative sources for the species for egg laying, hatching and larva evolution.