THE INFLUENCE OF CHEMICAL TREATMENTS APPLICATION ON THE *OSTRINIA NUBILALIS* HBN. ATTACK TO MAIZE SOWED IN DIFFERENT EPOCHS IN THE CONDITIONS OF CENTRAL MOLDOVA

INFLUENȚA APLICĂRII UNOR TRATAMENTE CHIMICE ASUPRA ATACULUI PRODUS DE LARVELE SPECIEI *OSTRINIA NUBILALIS* HBN. LA PORUMBUL SEMĂNAT ÎN DIFERITE EPOCI ÎN CONDIȚIILE DIN CENTRUL MOLDOVEI

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Abstract. *The Ostrinia nubilalis Hbn. species it is one of the pests specific to the maize crop that produces production losses in terms of quality and quantity. At A.R.D.S. Secuieni, in 2019, researches were conducted regarding the application of chemical treatments to reduce the attack produced by the Ostrinia nubilalis Hbn. larvae to maize sown in different epochs. The results obtained regarding the influence of the interaction between the sowing epoch and the treatments applied on the vegetation on the attack produced by the european corn borer larvae indicated that regardless of the sowing epochs, the variant where it was applied cyantranyliprole had the lowest percentage of attacked plants. The influence of the interaction of the two factors (epoch and treatment) also materialized by reducing the average number of holes and larvae/plant, highlighting with the best results, the variants sown in the third epoch, where chemical treatments ensured a good protection of maize plants.*

Key words: european corn borer, chemical treatments, swoing epoch, maize, attack

Rezumat. *Specia Ostrinia nubilalis Hbn. este unul dintre dăunătorii specifici culturii de porumb care produce pierderi de producție din punct de vedere calitativ şi cantitativ. În condițiile anului 2019 la S.C.D.A. Secuieni, s-au efectuat cercetări privind aplicarea unor tratamente chimice pentru reducerea atacului produs de larvele speciei Ostrinia nubilalis Hbn. la porumbul semănat în diferite epoci. Rezultatele obținute privind influența interacțiunii dintre epoca de semănat şi tratamentele aplicate pe vegetație asupra atacului produs de larvele de sfredelitorul porumbului au indicat faptul că, indiferent de epoca de semănat, varianta unde s-a aplicat substanța activă cyantranyliprole a înregistrat cel mai redus procent al plantelor atacate. Influența interacțiunii celor doi factori (epocă şi tratament) s-a materializat şi prin reducerea numărului mediu de orificii şi larve/planta, evidențiindu- se cu cele mai bune*

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rezultate, variantele semănate în epoca a treia, unde tratamentele chimice au asigurat o protecție bună plantelor de porumb.

Cuvinte cheie: sfredelitorul porumbului, tratamente chimice pe vegetație, epoca de semănat, porumb, atac

INTRODUCTION

The species *Ostrinia nubilalis* Hbn is a polyphagous pest, adults show sexual dimorphism. Females lay clustered eggs covered with wax on the underside leaves to protect them from climatic variations and predators. The larva goes through five larval stages. The first two stages are the most sensitive to climatic factors because they are found outside the plant, on the leaves. The larva of the third stage enters the stem where it creates its galleries. This is where the mature larvae of the fifth stage enter in diapause and transform into pupae in spring and then into adults (Roşca *et al*., 2011).

The production losses due to the attack of the larvae on the stem vary depending on the climatic conditions, but also on the reserve of hibernating larvae. Among the methods to prevent and combat the attack caused by the insect we mention: compliance with agrotechnical measures by chopping plant residues, avoiding monoculture, cultivating hybrids tolerant to attack, biological control through the species *Tricogramma*, etc. One aspect of chemical control is the timing of treatment. Data from the literature underline the particular importance of correlating treatments with the biology of the species in order to maximize the efficacy of active substances. Thus the application of treatments is necessary to be carried out before the larvae enter the stem where they are protected.

In Poland, Mazurek et al. (2005) studied the effectiveness of chemical and biological control of corn borer larvae at sweet corn. Among the insecticides studied, the commercial product Karate Zeon 100 CS was noted, which recorded efficacy values between 77% (1998) and 90% (2000), and maize plants showed a lower percentage of attack.

From the research conducted by Obopile *et al.* (2008), for maize sown in different epochs, it was found that maize sown later has larger galleries.

Chemical control of larvae of *Ostrinia nubilalis* Hbn. has also been studied by romanian researchers. The results obtained by Georgescu et al. (2016) showed that active substance indoxacarb (500 ml/ha) and cyantraniliprol (150 and 200 mL/ha) provided good protection of corn plants and reduced the attack of larvae.

In the Transylvanian Plain, Vălean *et al*. (2017) applied the active substances cyantraniliprol and thiacloprid + deltamethrin, and maize plants had a lower attack rate and were protected from corn borer larvae attack. The research was continued by Tărău et al. (2019), and the results obtained show that among the active substances that provided good protection to maize plants are indoxacarb and deltamethrin, reducing the length of the gallery / plant and had efficacy values of 90% and 85% respectively. Among the least effective in reducing the attack

were the active substances tiacloprid and thiamethoxam, which showed efficacy values of 15% and 27%, respectively.

This paper presents the results obtained at A.R.D.S. Secuieni, where, starting with 2019, researches were conducted on the influence of the application of chemical treatments in reducing the attack produced by the larvae of *Ostrinia nubilalis* Hbn. species to maize sown in different epochs.

MATERIAL AND METHOD

Due to the importance of this pest for corn cultivation, at A.R.D.S. Secuieni, starting with 2019, was initiated research to the influence of chemical treatments application for reducing the *Ostrinia nubilalis* Hbn larval attacks to corn sown in different epochs.

In order to achieve the objective, in the experimental field was located a bifactorial experience, type 3 x 6, according to the method of subdivided plots into three repetitions, were the first factor (A) it is represented of the sowing epoch (a1- Epoch I - 10.04.2019, a2 - Epoch II - 22.04.2019 and a3 - Epoch III - 01.05.2019), and the second factor (B) by the chemical treatment (b1 - untreated control, b2 - cyantranyliprole 200 g/L -Coragen - 175 ml/ha, b3 - deltamethrin 50 g/l - Decis mega 50 EW -75 ml/ha, b4 - tau-fluvalinate 240 g / l - Mavrik 2 F - 0,2 l/ha, b5 - acetamiprid 200g / kg - Mospilan 20 SG - 0,1 kg / ha and b6 - thiacloprid 480 g/l - Calypso 480 SC - 0,1 l/ha. The experimental variant had a length of 10 m and a width of 4.2 m.

The biological material used for sowing was the Turda Star maize hybrid. Maize cultivation was established according with the technology of cultivation of some species in conditions in Central Moldova (Trotuş *et al.*, 2015).

The timing of applying the insecticide treatment on vegetation was correlated with the pest biology. At 10 days after recharging the maximum flight peak for adults were applied the insecticide, so that the treatments effectiveness can be maximum after the larvae have hached and are in the early stages of life.

To determine the frequency of plants attacked by *Ostrinia nubilalis* Hbn. larvae and attack parameters (frequency of attacked plants; average number of holes /plant; number of larvae; length of galleries) the observations were made on 25 plants/variant, which were harvested from the rows in the middle of the variant and sectioned.

The year 2018/2019 was characterized climatically as warm in terms of temperature, with a deviation of 1.1 ^{0}C compared to the average multiannual temperature of 8.9 ^{0}C for the area. The amount of rainfall sum up 430.2 mm during the year, with a deficit of 114.1 mm, characterized the year as dry, the amount recorded and the distribution of the vegetation period being very varied.

RESULTS AND DISCUSSIONS

Following the determinations performed, it was observed that the interaction between the sowing season and the treatments on the vegetation influences the level of the attack produced by the larvae.

For maize sown in epoch I, the untreated variant had a frequency of attacked plants of 25.00%, relative with the variants treated with its cyantranyliprole 200 g/L (Coragen - 175 mL / ha) of 11.67% and was between

15.00% at the variant treated with thiacloprid 480 g/l (Calypso 480 SC - 0.1 L / ha) and 16.67% for the variant where acetamiprid was applied 200g / kg (Mospilan 20 SG - 0.1 kg/ha) (fig. 1).

At the interaction between the second sown epoch x the chemical treatments applied on the vegetation, the obtained results show that the maize plants registered higher percentages of attack at the untreated variant, of 15% compared to the treated variants, where the frequency of the attacked plants reached values between 10% at the variants treated with cyantranyliprole 200 g/L (Coragen - 175 mL/ha) and acetamiprid 200 g/kg (Mospilan 20 SG - 0.1 kg/ha), 13.00% in the variant treated with tiacloprid 480 g/L (Calypso 480 SC - 0.1 L/ha) and 15.00% in the case of variants where deltamethrin 50 g/L was applied (Decis mega 50 EW -75 mL/ha) and tau-fluvalinate 240 g/L (Mavrik 2 F - 0.2 L/ha) (fig. 1).

The frequency of the attacked plants was reduced to the interaction between the maize sown in Epoch III x chemical treatments applied on the vegetation and reached up to 25% to the untreated variant of the experiment.

Regarding the influence of the interaction between the sowing season and the treatments applied on vegetation on the frequency of the attacked plants, the obtained results show that in all three sowing epochs experienced the variant where cyantranyliprole 200 g/L (Coragen - 175 mL/ha), recorded a low percentage of attacked plants (fig. 1).

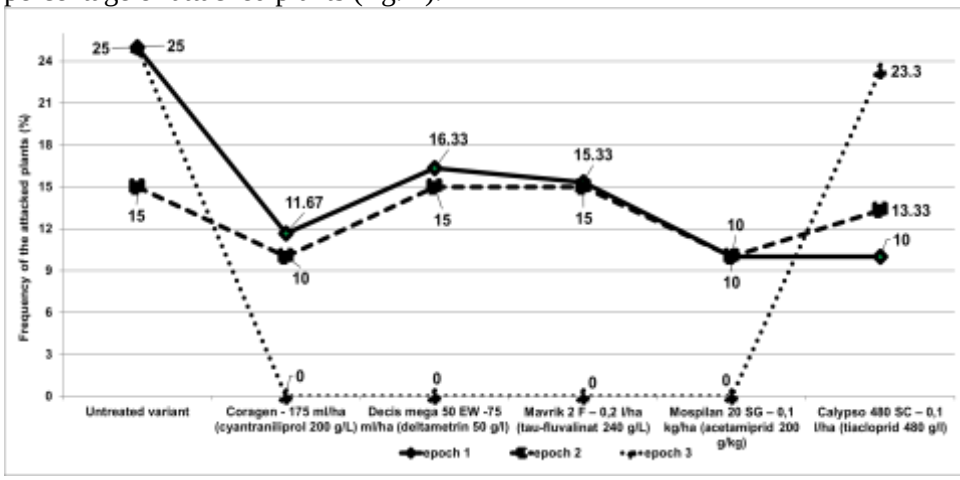

Fig. 1 The influence of the interaction between the sowing season and the treatments applied on the vegetation on the frequency of the attacked plants (%), Secuieni- Neamț - 2019

At the interaction between Epoch I (sown on 10.04.2019) x Treatments applied on vegetation with different active substances, all treated variants recorded low values of the number of holes, these being between 0.23 holes / plant (cyantranyliprole 200 g/L - Coragen - 175 mL/ha) and 0.40 holes (tau-fluvalinate 240 g / L - Mavrik 2 F - 0.2 L/ha) compared to 0.67 holes/plant as

recorded in the control, untreated variant. Regarding the average number of larvae/plant, the variant treated with active substances cyantranyliprole 200 g/L (Coragen - 175 mL/ha) in which 0.18 larvae / plant were registered, and following the application of pyrethroid products, the number of larvae varied from 0.25 (deltamethrin 50 g/L- Decis mega 50 EW -75 mL / ha) at 0.22 (tau-fluvalinate 240 g/L - Mavrik 2 F - 0.2 L/ha). In variants treated with acetamiprid 200 g/kg (Mospilan 20 SG - 0.1 kg/ha) and thiacloprid 480 g/L (Calypso 480 SC - 0.1 L/ha) up to 0.22 were identified on average larvae (fig. 2).

Compared to the untreated control of the second epoch sown in the second decade of April which showed 0.38 holes / plant and 0.37 larvae / plant, the variants where the products based on pyrethroids, neonicotinoids and anthranilamides were applied did not register larvae / plant, and the number of holes / plant varied from 0.15 (acetamiprid 200 g / kg - Mospilan 20 SG - 0.1 kg/ha) and 0.18 (cyantranyliprole 200 g/L - Coragen - 175 mL/ha) at 0.42 larvae / plant (deltamethrin 50 g/L - Decis mega 50 EW -75 mL/ha).

The lowest values of the average number of holes were recorded in the variants treated with cyantranyliprole 200 g/L (Coragen - 175 mL/ha) and acetamiprid 200 g / kg (Mospilan 20 SG - 0.1 kg/ha, while the variants where the products based on pyrethroids were applied obtained values relatively close to the average number of holes/plant to those of the control of the experiment, the untreated variant (fig. 2).

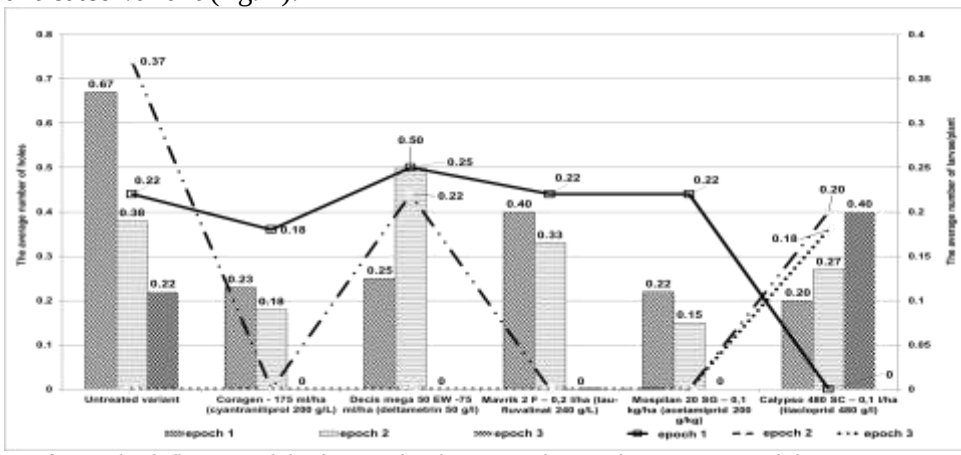

Fig. 2 The influence of the interaction between the sowing season and the treatments applied on vegetation on the average number of holes / plant and the average number of larvae/plant, Secuieni- Neamț - 2019

Similar results were obtained by Pilcher and Rice (2001) who found that maize sown at different times recorded significant differences in eggs density, the first generation of the pest laying between 50 and 100% of eggs on early sown maize plants, and about 40-60% of the eggs laid by the second generation were recorded in late sown maize.

CONCLUSIONS

1. The results obtained showed that vegetation treatments applied with insecticides from the class of pyrethroids, neonicotinoids and anthranilamides prevented the attack of larvae, reducing the number of holes, larvae and the average length of the gallery.

2. Chemical treatment with cyantraniliprole register the lowest values of the attack produced by this pest.

3. Indifferent of the epoch of sowing, the variant treated with the active substance cyantranyliprole recorded the lowest percentage of attacked plants.

4. The influence of the interaction of the two factors (epoch and treatment) led to the reduction of the average number of holes and larvae / plant, the lowest values were recorded at the variants sown in the third epoch.

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