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THE EFFECTIVENESS OF SOME INSECTICIDE TREATMENTS AGAINST *Tanymecus dilaticollis* Gyll. AT MAIZE

Alexandru RANTEȘ

University of Agronomic Sciences and Veterinary Medicine of Bucharest, 59 Marasti Blvd, District 1, 011464, Bucharest, Romania

Corresponding author email: alex_rantes@yahoo.com

Abstract

In Romania, maize ranks the first place regarding the cultivated area. In 2019, there were cultivated over 2.68 million ha with maize, with a total production of 17.43 million tonnes. The maize yield is influenced by the climatic conditions, applied crop technology, but also by the pest attack which can have a significant effect on the final yield.
The objective of the present paper is to present the effectiveness of different pesticide treatments (seed and vegetation treatments) against the maize leaf weevil (Tanymecus dilaticollis Gyll.) attack in the maize crops from South Romania.
The researches were performed under field conditions in South Romania (Giurgiu county, Putineiu location) in 2019. The experimental factors were the followings: Factor A: pesticide seed treatment, with three variants (no pesticide seed treatment; Nuprid AL 600 FS (600 g/l imidacloprid), in dose of 8 l/t of seeds; Actara 25 WG (25% thiametoxam), in dose of 10 kg/t of seeds); Factor B: pesticide treatment in the vegetation period, after plant emergence, with three variants (no pesticide treatment; Mospilan 20 SG (200 g/kg acetamiprid), in dose of 0.1 kg/ha; Actara 25 WG (25% thiametoxam), in dose of 0.1 kg/ha; Lamdex Extra (25 g/kg lambda-cihalotrin), in dose of 0.3 kg/ha); Factor C: maize hybrid, with two variants (Olt hybrid; DKC4351 hybrid).
The higher insecticide effectiveness in terms of productivity was registered in the variant with the seed treatment with Nuprid AL 600 FS, with 12,460 kg/ha and with a plant density of 70,536 plants/ha. The highest maize leaf weevil attack was recorded on the control variant with no pesticide treatment applied (no pesticide seed treatment and no insecticide applied in the vegetation period). In the case of spraying insecticides in the first vegetation stages against maize leaf weevil, the higher effectiveness was recorded on the variant treated with Mospilan 20 SG.

Key words*: maize, Tanymecus dilaticollis, insecticides, seed treatment, crop protection.*

INTRODUCTION

Maize (*Zea mays* L.) is one of the most important crop at world level. This ranks the second place as harvested area (197.2 million ha, according to FAO data) after wheat, this being due to its high capacity of production, to its wide ecological plasticity which gives it the ability to be sown on a large types of agricultural areas.
From a technological point of view, it can be resown on the same area in a monoculture system, it's a fully mechanised crop and it put into value very well the organically and mineral fertilisers.
Besides these arguments, maize is also cultivated because of its variety of possibilities to be used.
In Romania, maize ranks the first place regarding the cultivated area. In 2019, there were cultivated over 2.68 million ha with maize, with a total production of 17.43 million tons (FAOSTAT, 2019).
The maize yield is influenced by the climatic conditions, the applied crop technology, but also by the pest attack which can have a significant effect on the final yield.
Regarding the pest attack on maize, one of its most important pests which makes a lot of damages on the crop, even compromising the crop, is the maize leaf weevil (*Tanymecus dilaticollis* Gyll.) (Barbulescu, 1977). Adults of maize leaf weevil attack the young plants in course of and after emergence, producing total damage on their leaves (Paulian et al., 1979; Voinescu, 1985). If the pest is not controlled in proper time, farmers have to resowing the crop because it is compromised (Barbulescu, 2001).
Maize leaf weevil is considered the most harmful pest on maize crops on European level, a majority of its attack being identified in the South-Eastern area of the continent (Paulian, 1972).

In Bulgaria, the *T. dilaticollis* attack is mostly identified on maize, sunflower and beetroot crops (Kirkov, 1967; Krusteva et al., 2006). Also, significant damages are recorded in Eastern Croatia (Čamprag et al., 1969).

Researches conducted in 2010 in Greece in the maize areas put into evidence the aggressive attack of the maize leaf weevil. Even though plants emergence is successfully they were damaged almost completely (Papadopoulou, 2012).

Maize leaf weevil was identified also in Ukraine, where it caused major damage on maize and beetroot crops (Dieckmann, 1983).

In Romania, maize leaf weevil is mostly found in the South-Eastern area of the country, this area being very favourable for pest growth (Paulian, 1972). Researches shown over time that the attack is a very intense one, with high density of pest population when facing monoculture system (Paulian, 1972; Voinescu and Barbulescu, 1998; Popov & Barbulescu, 2007; Georgescu et al., 2014).

Regarding pest controlling measures, best results were recorded when using systemic insecticide treatments on the seeds, which ensure plant protection in the first growing stages. Best results against maize leaf weevil are given by active substances from neonicotinoids class. If the seeds treatment was not properly conducted, one can apply a contact insecticide in the first growing stages. But, this is supposed to be more a correction treatment.

Over the years, in Romania, there were a lot of discussions about using the neonicotinoid class active substances. In 2013, following the 485th directive of the European Commission, three of the neonicotinoids substances were banned: imidacloprid, thiametoxam, and clotianidin, which left the farmers without any approved substance for seeds treatment against maize leaf weevil. Currently, waivers for using these substances are obtained annually, but only for maize seeds treatment. This leads to sunflower crops still remaining without any approved seeds treatment against maize leaf weevil.

The objective of the present paper is to present the effectiveness of different pesticide treatments (seed and vegetation treatments) against the maize leaf weevil attack in the maize crops from South Romania.

MATERIALS AND METHODS

A field experience was conducted in the Southern area of the country, in the Burnaz Plain, in Giurgiu county, Putineiu location (43º52'59'' North Latitude, 25º40'1'' East Longitude, 67 m altitude), in the year 2019. The experimental factors were the followings:

- Factor A: pesticide seed treatment, with three variants, respectively:
  - No pesticide seed treatment;
  - Nuprid AL 600 FS (600 g/l imidacloprid), in dose of 8 l/t of seeds;
  - Actara 25 WG (25% thiametoxam), in dose of 10 kg/t of seeds.
- Factor B: pesticide treatment in the vegetation period, after plant emergence, with three variants, respectively:
  - No pesticide treatment;
  - Mospilan 20 SG (200 g/kg acetamiprid), in dose of 0.1 kg/ha;
  - Actara 25 WG (25% thiametoxam), in dose of 0.1 kg/ha;
  - Lamdex EXTRA (25 g/kg lambda-cihalotrin), in dose of 0.3 kg/ha.
- Factor C: maize hybrid, with two variants, respectively:
  - Olt hybrid;
  - DKC4351 hybrid.

Experimental plots had a length of 40 m, with 4.2 m width (6 plant rows), resuming in a total surface of 4000 m^2.

The preceding plant was winter wheat. The sowing was performed on 10th of April with a tractor and the SPC 6 seeder, the distance between rows being of 0.7 m and between the maize seeds being of 0.19 m. The planned density was of 75,000 seeds/ha.

From each experimental plot, 40 plants from 4 rows have been assessed. 10 plants per each row have been marked with stakes, marked plants being assessed in a "stairs" system. The attack intensity of the *T. dilaticollis* was assessed when plants arrived at two leaf stage (BBCH 12), using a scale from 1 to 9, elaborated and improved by Paulian (1972), where 1 means plant is not attacked and 9 means plant is destroyed completely, with leaves chafed close to soil level.

After the assessment of the attack intensity, then the vegetation treatments were applied. After another 15 days, measurements were

made on the number of plants saved after the vegetation treatments. They consisted in assessing the new damages registered on the plants, without taking into account the damages discovered when the intensity of the attack before applying the vegetation treatments was measured.

In the spring of 2019, the climatic conditions were optimal for maize crop, but in the same time very favourable for the pests' attacks. The medium temperature in April was of 14ºC. On the sowing date, 14ºC were registered and the soil temperature was of 9ºC, with a growing tendency. Regarding the rainfalls, two days after sowing 35 mm rainfall were registered, which lead to maize germinating and rising in optimal parameters.

The field experience was performed on a chernozem soil type, with a high content of humus (over 4%), with a slightly acid pH (6.4), well supplied with nutrients and very good water and aeration properties.

RESULTS AND DISCUSSIONS

Regarding the intensity of *T. dilaticollis* attack before the vegetation treatment was applied, it is noticed that the highest value (a medium note of 4.75) was registered on the experimental plot sown with Olt hybrid, without seed treatments. The lowest one can be observed on the experimental plot sown with Olt hybrid, with Actara treated seeds (a medium note of 3.97) (Figure 1).

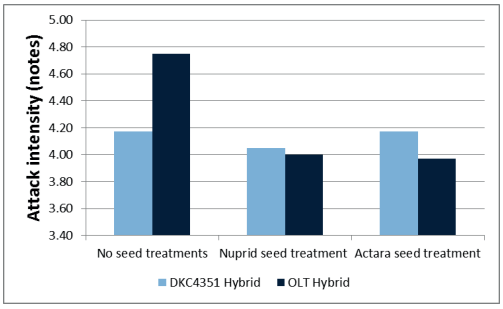

Figure 1. Intensity of *T. dilaticollis* attack before the vegetation treatment

Concerning the intensity of *T. dilaticollis* attack after the vegetation treatment was applied, it is noticed that the highest value (a medium note of 4.42) was registered on the experimental plot sown with DKC 4351 hybrid, with Actara treated seeds and no vegetation treatments. The lowest one can be observed on the experimental plot sown with DKC 4351 hybrid, with Nuprid treated seeds and both Mospilan and Actara treatments applied in vegetation (both plots with a medium note of 3.22) (Figure 2).

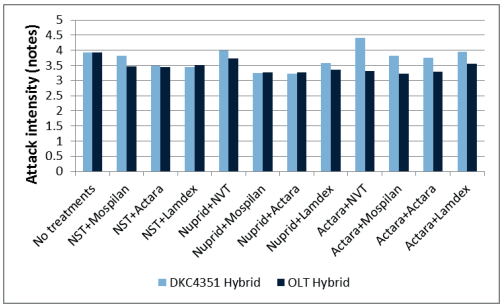

Figure 2. Intensity of *T. dilaticollis* attack after the vegetation treatment

*Legend: NST - no seeds treatment; NVT - no vegetation treatment

Regarding the density of plants on hectare, the experimental plot sown with Olt hybrid stands out, with Nuprid treated seeds and Mospilan treatment applied in vegetation (density of 74,196 plants/ha). The lowest density was recorded on the experimental plot sown with DKC 4351 hybrid with Actara treatments applied both on seeds and in vegetation (density of 49,286 plants/ha) (Figure 3).

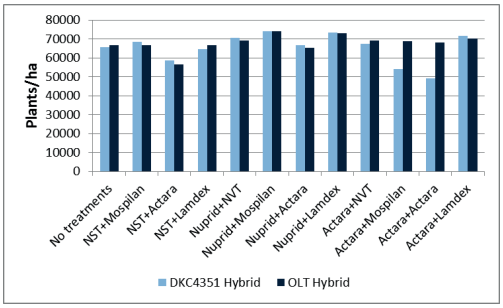

Figure 3. Density of plants depending on experimental plot

*Legend: NST – No seeds treatment; NVT – No vegetation treatment

Regarding the grain yield obtained on hectare, the experimental plot sown with DKC 4351 hybrid stands out, with Nuprid treated seeds and no treatments applied in vegetation (production of 12,460 kg/ha). The lowest grain yield was recorded on the experimental plot

sown with Olt hybrid with no treatment applied on seeds and Actara treatments applied in vegetation (production of 7716 kg/ha) (Figure 4).

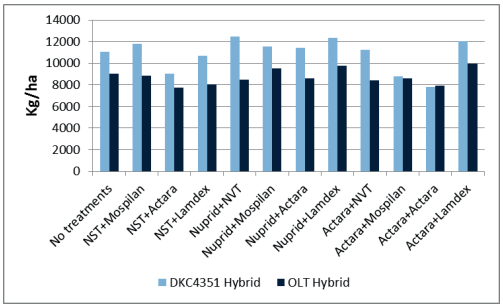

Figure 4. Grain yield recorded depending on experimental plot
*Legend: NST - No seeds treatment; NVT - No vegetation treatment

CONCLUSIONS

Before the vegetation treatment was applied, the most damaging *T. dilaticollis* attack was recorded on the experimental plots without seeds treatments, especially in the case of the Olt hybrid.

After the vegetation treatment was applied, the most damaging *T. dilaticollis* attack was registered on the experimental plot sown with DKC 4351 hybrid, with Actara treated seeds and no vegetation treatments.

The highest plant density on hectare was recorded on the experimental plot sown with Olt hybrid, with Nuprid treated seeds and Mospilan treatment applied in vegetation.

The highest grain yield obtained on hectare was recorded on the experimental plot sown with DKC 4351 hybrid, with Nuprid treated seeds and no treatments applied in vegetation.

Currently, vegetation treatments can be considered an alternative in the fight with the maize leaf weevil but an expensive one and with a significant smaller yield than seeds treatments. The main method of controlling *T. dilaticollis* will still remain a properly performed seeds treatment with a high efficacy insecticide.

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