THE INFLUENCE OF CHEMICAL TREATMENTS ON THE ABUNDANCE AND DOMINANCE OF HARMFUL ENTOMOFAUNA IN RAPESEED CROPS IN THE CONDITIONS OF THE S-E BOIAN

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ABSTRACT

The rapeseed crop is attacked by a very large number of pests. At the untreated control group, a number of 94 samples of Athalia rosae were collected with a dominance percentage of 23.26% and within the variant where seed treatment was performed with LUMIPOSA 625 FS (40ml/500 thousand seeds) the number of samples is reduced to 17 with a dominance percentage of 5.90%. And in the case of the Ceutorhynchus napi species the reduction of the number of pests takes place from 99 samples as we find in the control variant to 22 in the case of a treatment in the spring. The higher the number of treatments, the lower the number of pests and consequently the production losses associated with them decrease.

INTRODUCTION

Rapeseed is currently one of the most important oil species worldwide, being grown for its oil-rich seeds (42-48%), used in industry as well as in people's food. In developed countries, the rapeseed oil after various transformations is used as fuel for diesel engines, being cheaper than diesel and biodegradable.

The main advantages of rapeseed cultivation are represented by the fact that the production technology is fully mechanized being at the same time a very good precursor for the crops established in the autumn (Roman et al., 2012). In addition to the benefits brought to farmers, rapeseed crop also presents a number of risks that may be biotic or abiotic in nature (Hălmăjan, 2006). In the category of factors of an abiotic nature we can classify the droughts during the sowing period that prevent the emergence of the crop or cause an uneven emergence, the frost of the winter period; the frosts of late spring and hail. In the category of biotic factors we include the harmful pests that can produce very significant damages depending on the year (Râșnoveanu, 2011a; Popov et al., 2002,2003; Buburuz et al., 2012,2013).

The research indicates a multitude of pests that can cause significant damage since the emergence (Phyllotreta sp.; Psilliodes chrysocephala) or throughout the vegetation period (Athalia rosae; Meligethes aeneus; Ceutorhynchus sp; Epicometis hyrta; Entomoscelis pop (adonid)) 2004).

MATERIAL AND METHOD

The observations were made at a rapeseed crop established on the radius of Radomirești-Olt commune in the agricultural year 2019-2020 and consisted of:

- Ground surveys using a metric frame having the side of 0.5m * 0.5m
- Collection of entomological material with the aid of the "yellow bowl" type traps, the sticky yellow traps and the shaking method.

The interpretation of the results obtained in the study was performed using the following ecological parameters:

Abundance (A) represents the number of individuals of a species found in a catch at a given time.

Dominance (D) represents the percentage of participation of each species in the catch. It is calculated by the following formula:

$$D = \frac{nA}{N} x100$$ in which

D_A- dominance of species A

n_A- number of individuals of species A belonging to the analyzed samples

N- the total number of individuals of all species

The distribution of species according to the percentage of dominance takes place in the following classes:

- D1 - subrecedent – below 1.1%
- D2 - recedent – 1.1-2.0%
- D3 - subdominant – 2.1-5%
- D4 - dominant – 5.1-10.0%
- D5 - eudominant – more than 10%

The following treatment schemes were experienced in the study:

Variant 1: control (without chemical treatments)

Variant 2: seed treatment with LUMIPOSA 625 FS (40ml/500 thousand seeds)

Variant 3: seed treatment with LUMIPOSA 625 FS plus spring treatment after vegetation resumption with DECIS EXPERT 100 EC (75 ml/ha)

Variant 4: seed treatment with LUMIPOSA 625 FS, a treatment with DECIS EXPERT 100 EC at the resumption of spring vegetation plus a treatment with BISCAYA 240 OD (0.3l/ha) during the flowering period.

RESULTS AND DISCUSSIONS

From table 1, in the case of the control variant (without chemical treatments performed), it appears that the largest number of samples collected belong to the species Ceutorhynchus napi (99 samples), having a dominance percentage of 24.50%, followed by Athalia rosae with a dominance percentage of 23.26% and a number of 94 samples. Of the total of the collected pests in the control variant, 55.55% are classified in Class D5 (eudominant) with a dominance percentage greater than 10% (Ceutorhynchus napi 24.50%; Athalia rosae 23.26%; Meligethes aeneus 19.80%; Ceutorhynchus assimilis 11.63% and Phyllotreta attra 11.13%), 33.33% are in Dominance Class D2 (recedent) with a dominance percentage between 1.1-2.0% (Phyllotreta nemorum 1.98%; Pieris brassicae 1.73%; Entomoscelis adonidis 1.23%) and 11.11% classified in Dominance Class D3 (subdominant) with a dominance percentage between 2.1-5% (Epicometis hyrta 4.70%).

Table1

Abundance and Dominance of entomofauna in variant 1 (without chemical treatments)

Species	Abundance(number of collected samples)				Dominance	
	Sample 1	Sample 2	Sample 3	Total	%	Class
Athalia rosae	35	31	28	94	23.26	D5
Ceutorhynchus assimilis	18	7	22	47	11.63	D5
Ceutorhynchus napi	32	26	41	99	24.50	D5
Epicometis hyrta	6	2	11	19	4.70	D3
Meligethes aeneus	25	34	21	80	19.80	D5
Entomoscelis adonidis	3	0	2	5	1.23	D2
Phyllotreta attra	22	14	9	45	11.13	D5
Phyllotreta nemorum	3	0	5	8	1.98	D2
Pieris brassicae	1	4	2	7	1.73	D2
Total collected pests				404		

In the second variant (see table 2), where the seed was treated before sowing with the insecticide LUMIPOSA 625 FS in the dose of 40ml/500 thousand seeds, we note the decrease in the abundance of the pest Athalia rosae by 81.91%, the number of Phyllotreta attra samples was diminished by 68.88% and that of Phyllotreta nemorum was diminished by 62.50%. Depending on the percentage of dominance, the collected insects were classified into 4 classes: D1 (subrecedent) including two species (Phyllotreta nemorum; Pieris brassicae); D3 (subdominant) with two species (Entomoscelis adonidis and Phyllotreta attra); D4 (dominant) including two species (Athalia rosae and Epicometis hyrta); D5 (eudominant) comprising three species (Ceutorhynchus assimilis; Ceutorhynchus napi and Meligethes aeneus). Also, the total number of samples collected in the second variant was decreased by 28.71% compared to the control variant.

Table 2

Abundance and Dominance of entomofauna in variant 2 (seed treatment only)

Species	Abundance(number of collected samples)				Dominance	
	Sample 1	Sample 2	Sample 3	Total	%	Class
Athalia rosae	8	6	3	17	5.90	D4
Ceutorhynchus assimilis	20	5	20	45	15.62	D5
Ceutorhynchus napi	30	27	39	96	33.33	D5
Epicometis hyrta	9	0	10	19	6.59	D4
Meligethes aeneus	30	30	22	82	28.47	D5
Entomoscelis adonidis	6	5	1	12	4.16	D3
Phyllotreta attra	4	7	3	14	4.86	D3
Phyllotreta nemorum	0	0	3	3	1.04	D1
Pieris brassicae	0	0	0	0	0.00	D1
Total collected pests				288		

In the third variant (see table 3) where both seed treatment with the insecticide LUMIPOSA 625 FS was performed in the dose of 40ml/500

thousand seeds as well as a treatment at the vegetation resumption in the spring using the DECIS EXPERT 100 EC product at the dose of 75ml/ha the total number of collected pests decreased by 47.77% compared to the control variant. Besides the fact that the number of samples of Athalia rosae, Phyllotreta attra and Phyllotreta nemorum decreased compared to the control variant, we notice a significant decrease in abundance in the case of the species Ceutorhynchus napi with 77.77% compared to the control group, a phenomenon due to the treatment carried out in spring.

Of the total collected pests within this variant 73.45% belong to class D5 (Ceutorhynchus assimilis 22.27%; Ceutorhynchus napi 10.42%; Meligethes aeneus 40.75%), 19.90% belong to class D4 (Athalia rosae 7.58%; Epicometis hyrta 7.10% and Phyllotreta attra 5.21%), classes D3, D2, D1 having one representative as follows: D3 (Entomoscelis adonidis 4.26%); D2 (Phyllotreta nemorum 1.89%); D1 (Pieris brassicae 0.47%).

Table 3

Abundance and Dominance of pests in the case of variant 3 (seed treatment plus treatment in vegetation)

Species	Abundance (number of collected samples)				Dominance	
	Sample 1	Sample 2	Sample 3	Total	%	Class
Athalia rosae	6	6	4	16	7.58	D4
Ceutorhynchus assimilis	18	7	22	47	22.27	D5
Ceutorhynchus napi	6	5	11	22	10.42	D5
Epicometis hyrta	7	5	3	15	7.10	D4
Meligethes aeneus	26	33	27	86	40.75	D5
Entomoscelis adonidis	2	4	3	9	4.26	D3
Phyllotreta attra	0	9	2	11	5.21	D4
Phyllotreta nemorum	1	3	0	4	1.89	D2
Pieris brassicae	1	0	0	1	0.47	D1
Total collected pests				211		

For both seed treatment with LUMIPOSA 625 FS (40ml/500 thousand seeds) and two treatments during the spring vegetation period with DECIS EXPERT 100 EC (75ml/ha) and BISCAYA 240 OD (0.3l/ha), the number of collected samples has decreased greatly, from 404 to 64 samples respectively by 84.15% (see table 4). Of the total collected pests in this variant 44.44% belong to class D5 (Ceutorhynchus napi; Meligethes aeneus; Phyllotreta attra; Ceutorhynchus assimilis), 33.33% belong to class D4 (Phyllotreta nemorum; Athalia rosae; Epicometis hyrta), and 22.22% belong to class D1 (Entomoscelis adonidis; Pieris brassicae).

Table 4

Abundance and Dominance of harmful entomofauna in case of variant 4 (seed treatment and two treatments during vegetation)

Species	Abundance (number of collected samples)				Dominance	
	Sample 1	Sample 2	Sample 3	Total	%	Class
Athalia rosae	0	2	3	5	7.81	D4
Ceutorhynchus assimilis	1	0	6	7	10.93	D5
Ceutorhynchus napi	3	9	5	17	26.56	D5
Epicometis hyrta	1	0	3	4	6.25	D4
Meligethes aeneus	5	2	7	14	21.87	D5
Entomoscelis adonidis	0	0	0	0	0.00	D1
Phyllotreta attra	4	2	5	11	17.18	D5
Phyllotreta nemorum	1	0	5	6	9.37	D4
Pieris brassicae	0	0	0	0	0.00	D1
Total collected pests				64		

CONCLUSIONS AND RECOMMENDATIONS

The rapeseed crop is visited by many pests depending on the climatic conditions of each year, their number being very variable, in certain years it can compromise the whole harvest if it is not intervened with insecticide. In the period between sunrise and the formation of the leaf rosette in the autumn, great attention must be paid to the rape wasp (Athalia rosae) which in the larval stage can compromise the crop in a few days (in 24 hours a larva consuming leaves twice its weight), but also to the crucifer flea beetles (Phyllotreta sp.), which can also cause great damage to a crop in its early stages of development.

In the spring at the vegetation resumption in the plants, the moment of the emergence of the ladybird of the rapeseed stems (Ceutorhynchus napi) must be followed very carefully, which after a flight and mating period of about two weeks deposit their laying eggs inside the rapeseed stalks. When flowering, problems can be caused by both Epicometis hyrta and Meligethes aeneus if we do not intervene with specific insecticides.

In order to reduce the harmful entomofauna in the rapeseed crop, it is recommended to carry out both the seed treatment and the vegetation treatments at the warning when the pests appear depending on the economic threshold of harm. The higher the number of treatments, the lower the number of pests present and consequently the production losses due to them decrease.

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