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COMPARE OF THE TECHNICAL MEANS WHEN ADMINISTERED OF PLANT EXTRACTS FOR CONTROL OF R PESTS OF OIL SEED RAPS

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Abstract

With a view protection of rapeseed during flowering of pest and conservation of the main pollinators on crop plants namely bees are looking for alternative means of control. In this connection under field tested plant extracts: walnut (Juglans regia L.), wild walnut (Ailantthus altissima Swing.), tobacco (Nicotiana tabacum L.), against adult pollen beetle (Meligethes aeneus F.) and blosson beetle [Tropinota (Epicometis) hirta Poda]. Exploring held in 2018 in experimental rape fields in Southern Bulgaria. Experiment was conducted in 3 repetitions and 6 variations aim parameters. The following were: the type of sprayer and the plant extract at the same concentration of solutions. The results of conduct a studies show that high effectiveness against adults pollen beetle (M. aeneus) and blossom beetle (T. hirta) occurs with the use of plant extracts. It is established, influence both on the type of sprinkler, and the nature of the plant extract.

Key words*: oil seed raps, pests, plant extracts, sprayers.*

INTRODUCTION

Enhanced use of insecticides for controlling the pest of cultural plants lead to distortion the ecological equilibrium and in many cases until the resistance emerges insects to certain plant protection products. On the other hand, the type of sprinkler used in treatment is also a problem. As a result, the search for new ways to protection of its production restrict the use of chemical preparations.

During flowering key pests on oil seed rape are: pollen beetle (*Meligethes aeneus* F.), blossom beetle [*Tropinota (Epicometis) hirta* Poda]. They are directly threatened yield, under favorable conditions are massively multiplied. The pollen beetle (*M. aeneus*) in separate years may compromise the harvest, because you lose it reach 30-80%, and in some cases 100% (Hansen, 1996; Coll et al., 1998; Mason & Huber, 2002; Heimbach et al., 2007; Kazachkova, 2007; Wegorek & Zamoyska, 2008; Ahmanl et al., 2009; Farkas & Kondor, 2014; Erban et al., 2017).

A number of authors, Pavela (2005; 2006; 2009), Pavela et al., (2009a; b), Zabka et al., (2009), Nerio et al., (2010), in their research, found that essential oils derived from plant species exhibit insecticidal, fungicidal and bacterial action. As in most cases the essential oils exhibit activity against pests (Isman, 2000; Nerio et al., 2010). On the one hand by the insecticidal effect of plant extracts reducing the density of the enemy, but on the other cause antifungal activity (Pavela, 2011).

Pavela (2011) tested the insecticidal activity of essential oils from 9 plant species: *Carum carvi* L., *Cinnamomum osmophloeum* Kaneh., *Citrus aurantium* L., *Foeniculum vulgare* Mill., *Lavandula angustifolia* L., *Mentha arvensis* L., *Nepeta cataria* L., *Ocimum basilicum* L., *Thymus vulgaris* L. against adult's pollen beetle. The results of the monitoring show that the tested essential oils exhibit high efficacy and cause of death of adult insects. Plant extracts of caraway (*Carum sarvi* L.) and thyme (*Thymus vulgaris* L.) exhibit the highest efficiency from 65.6 to 63.8%.

Based on their observations Hummelbrunner and Isman (2001) and Pavela (2008) found that essential oils of vegetable origin can cause not only mortality, they also affect fertility and lifespan of their enemies.

Recent years have witnessed the constant development of agricultural sprayers, with the availability of accessories such as electronic controls, GPS, plant sensors and air assistance along the spray boom. However, little is known

about these modifications in relation to the efficiency of the pest and disease control (Bauer & Raetano, 2003; Van de Zande et al., 1994).

It's the literature Nuyttens et al. (2006), that the size of the sprinkler, the pressure of the solution, the speed of movement and the height of the bar significant influence on the performance of the sprayer.

Studies have been made Bauer and Raetano (2003) to assess the degree of coverage when treating legumes with a classic sprayer of a Twin System. No improvement was found the degree of coverage when applying air support. Pascuzzi (2013) has established the degree deposition of the working fluid on the foliage from vineyards at work with pneumatic sprinkler.

Several experiments have been carried out observations at work on fan and pneumatic sprinklers in fruit species. (Panneton & Lacasse, 2004; Pezzi & Rondelli, 2000; Dekeyser et al., 2013; Doruchowski et al., 2002). Experimental results show, that the distribution of the sprayed liquid is directly related with the airflow from sprinklers. Sprayers, equipped with pneumatic sprinklers are more effective ecological to work in these plantations.

They were not in the literature found results for work of sprayers, equipped with pneumatic sprinklers, in field crops.

Thus, purpose of this study is to establish insecticidal activity of some plant extracts against pollen beetle (*Meligethes aeneus* F.) and blossom beetle [*Tropinota (Epicometis) hirta* Poda], such as are used different types of sprinklers.

MATERIALS AND METHODS

The research was held in 2018 in the area of Opan, Yambol, Southern Bulgaria in rape seed of the hybrid variety "Xenon" at size of Experimental parcels 25 m^2. Under field conditions were tested plant extracts of: walnut (*Juglans regia* L.), wild walnut (*Ailantthus altissima* Swing.) and tobacco (*Nicotiana tabacum* L.) for controlling of key pests in oil seed raps during flowering: pollen beetle (*Meligethes aeneus* F.) and blossom beetle [*Tropinota (Epicometis) hirta* Poda], when used two types of sprinklers: cranked and pneumatic.

Experience is bet in six variants and three iteration: Variant I - treatment crocked sprinkler with wild walnut extract; Variant II - treatment crocked sprinkler with tobacco extract; Variant III - treatment crocked sprinkler with walnut extract; Variant IV - treatment pneumatic sprinkler with wild walnut extract; Variant V - treatment pneumatic sprinkler with tobacco extract; Variant VI - treatment pneumatic sprinkler with walnut extract; Variant Control - treatment with one of the commonly used insecticides for chemical control of pollen beetle. In everyone variants marked 10 plants.

To determine the degree of coverage close to the inflorescence of each of the marked plants are put a sheet watermarking paper. Immediately after treatment, with the help of planner, the area covered by the solution is counted. This area is attributed to the total area of the leaves reflects degree of coverage (%).

Efficiency of the plant extracts were carried out on the 3rd and 7th day.

Main parameters, the following were: efficacy of plant extract and degree of coverage in colour area in dependence the type of sprayer used, at the same concentration of the solutions.

Received results were processed mathematically by dispersion analysis and comparing average values.

RESULTS AND DISCUSSIONS

Average data for the degree of coverage and for the efficacy of plant extracts of the experiments and the results obtained in them are presented in Table 1.

Table 1. Results of the experiments

Sprinkler	Plant extract	Grade on coverage, %	Efficacy %	
			3rd day	7th day.
Cranked	wild walnut	43.6	67.4	80.5
Cranked	walnut	44.6	33.4	42.1
Cranked	tobacco	44.6	38.7	45.1
Pneumatic	wild walnut	64.3	68.2	83.4
Pneumatic	walnut	64.0	40.3	57.3
Pneumatic	tobacco	64.0	41.6	52.4
Cranked	insecticide	44.0	64.5	81.3

With the above data a dispersion analysis was performed for the influence of the independent variables on the degree of coverage and efficacy. About the degree of coverage, the following results were obtained (Tables 2 and 3).

Table 2. Dispersion analysis for influence of the species of the sprinkler on the degree of the degree of coverage

	SS	Degr. of	MS	F	p
Intercept	20106.67	1	20106.67	128888.9	0.000001
sprinklers	678.87	1	678.87	4351,8	***0.000001***
Error	0.78	5	0.16		

Table 3. Dispersion analysis to influence the type of extract on the degree of coverage

	SS	Degr. of	MS	F	p
Intercept	17065.16	1	17065.16	86.68312	0.002623
extract	89.05	3	29.68	0.15078	***0.922730***
Error	590.61	3	196.87		

In regard to the degree of coverage has been proven statistical difference at significance level p = 0.000001, which is much less than the limit value - 0.05.

There is a clear division into the quality of work of both types of sprinkler independently of the type of working solution (Figure 1).

With pneumatic sprinkler it is about 20% larger in comparison with a slit.

This is due to the fact that, in the case of a pneumatic sprinkler, the air jet crashes the working fluid of very small drops with approximately equal size (about 50 μm) and more in number. This enables them to be better placement on the treated surface, with cover of a larger area than it.

In the slit sprayer drops are with considerably larger diameter (150 to 300 μm), as a result of which is obtained and worse coverage in the same amount of spitting solution.

From the analysis it is established, that kind of extract has no effect the degree of coverage.

There is no statistically proven difference, because the calculated level of significance p = 0.92273 is much higher than the acceptable 0.05.

For efficacy of plant extracts on the 3rd and 7th days according to the type of sprinkler were obtained the following results (Tables 4 and 5).

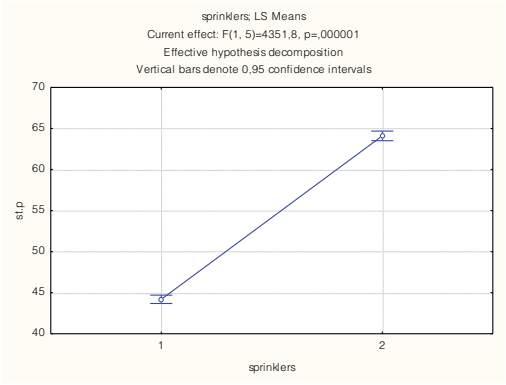

Figure 1. Comparison of average values of degree of coverage at the two sprinklers

Table 4. Dispersion analysis for influence type of sprinkler on the efficacy of plant extract on day 3

	SS	Degr. of	MS	F	p
Intercept	17498.97	1	17498.97	62.13477	0.000528
sprinklers	1.60	1	1.60	0.00569	***0.942806***
Error	1408.15	5	281.63		

Table 5. Dispersion analysis for influence type of sprinkler on the efficacy of plant extract on day 7

	SS	Degr. of	MS	F	p
Intercept	27483.05	1	27483.05	70.41460	0.000394
sprinklers	7.68	1	7.68	0.01968	***0.893915***
Error	1951.52	5	390.30		

From Tables 4 and 5, that the level of significance is 0.942806 for 3 days and 0.893915 on day 7, this gives us reason to say, that there is not statistically proven difference for influence the type of sprinkler on the efficacy of plant extracts.

For efficacy of plant extracts of 3 and 7 days the following results (Tables 6 and 7).

It is statistically proven (p = 0.004807) that plant extracts show different efficacy.

Table 6. Dispersion analysis of the efficacy of plant extracts on day 3

	SS	Degr. of	MS	F	p
Intercept	17522.60	1	17522.60	1855.552	0.000028
extract	1381.42	3	460.47	48.762	***0.004807***
Error	28.33	3	9.44		

Graphical comparison performed of the mean values (Figure 2) that the wild walnut extruder (b) has the same efficiency with that of control (a) chemical preparation.

Extracts of walnut and tobacco are lower efficiency as they have close values.

Table 7. Dispersion analysis of the efficacy of plant extracts on day 7

	SS	Degr. of	MS	F	p
Intercept	27394.76	1	27394.76	561.4830	0.000165
extract	1812.83	3	604.28	12.3852	***0.033879***
Error	146.37	3	48.79		

The results are similar to the 3 rd day.

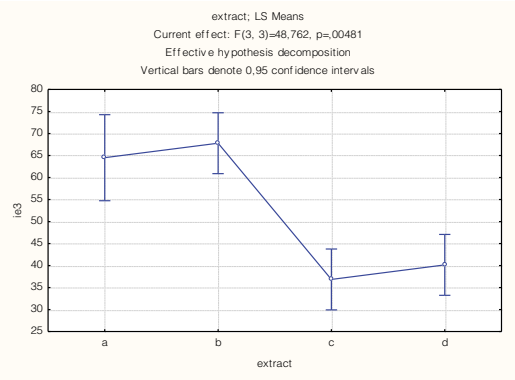

Figure 2. Comparison of the mean efficacy values for the different extracts

CONCLUSIONS

As a result of conducted research can be done the following conclusions:

- Significant influence on the degree of coverage type of uses sprinkler;
- The walnut extract is c equal insecticidal efficacy as the control (chemical used). The efficacy of tobacco and walnut extracts is unsatisfactory.

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