SOME ASPECTS OF WINTER RAPE PESTS COMBATING

Nicolaie CROITORU[1], Sergiu PANUŢA[1], Oana Maria LĂCĂTUŞU (BODESCU)[2]

e-mail: n.croitoru@uasm.md

Abstract

During crop vegetation the winter rape may be challenged by a complex of pests. Integrated protection of winter rape requires the use of complex measures. Chemical control of polyphagous pests to different cultures is provided by a large number of insecticides and winter rape culture require a much larger study. In complex integrated pest winter rape in Moldova are admitted about 10 to 12 insecticides. But plant protection practice in recent decades has shown that the composition of plant protection products must be constantly renewed. Proceeding from the above, the purpose of research is studying the biological effectiveness of insecticide Kaliber 200 SC in combating pests rapeseed complex.

Key words: *rape, pests, testing, insecticides*

Winter rape crop during the period of vegetation can be attacked by a complex of polyphagous pests, rarely - pests with a narrower nutrition specialization. In the autumn the sowing rape can be attacked by the turnip moths, 2nd generation of caterpillars (*Agrotis segetum* L.), rapeseed wasp (*Athalia colibri* Christ.). Early spring the rapeseed plants are attacked by the hibernate adults of corn leaf weevil (*Tanymecus dilaticollis* Gyll.), darkling beetle (*Opatrum sabulosum* L.), cabbage stem weevil (*Ceuthorhynchus quadridens* Panz.), pollen beetle (*Meligethes aeneus* F .) and the flea beetles (*Phyllotreta atra* F., *Ph. nigripes* F., *Ph. nemorum*). In the same period, but later, leaves, flowers and inflorescences buttons are attacked by various aphid species, of which the most common is the cabbage aphid (*Brevicoryne brasicae* L.). From the defoliating pests damage can be caused by the caterpillars of the cabbage butterfly (*Pieris brassicae* L.), the cabbage moth (*Mamestra brassicae* L.), the rapeseed wasp (*Athalia colibri* Christ.), the rapeseed weevil larvae and adults (*Ceuthorhynchus* spp.), the red turnip beetle (*Entomoscelis adonidis* Pall.), the mustard beetle (*Colaphellus sophiae* Schall.). During the summer, from the sucking group pests can be met the cabbage aphid (*Brevicoryne brasicae* L.) and cruciferous bugs (*Eurydema oleracea* L., *E. adorned* L., *Dolycoris baccarum* L.).

Integrated protection of rape requires the use of complex agro-technical measures. However, these measures do not provide total protection from pests. Chemical control of pests is provided by a large number of insecticides and for rapeseed crop this problem requires a much larger study. In the integrated complex of rape pests combating in Moldova are admitted about 10 to 12 insecticides. Proceeding from the above, the purpose of research is studying the biological effectiveness of insecticide Kaliber 200 SC in combating the complex of rapeseed pests.

MATERIAL AND METHOD

The experiments to determine the biological effectiveness of product Kaliber 200 SC were met in 2015. The experimental group was installed in winter rape field of agricultural company SRL "VALENAGRO COM" Ciutuleşti village, Floreşti district, which lies in theNorthern area of the Republic Moldova. Winter rape was sown in the first decade of September, 2014, with seeding scheme 20 X 15 cm, Ascona variety. The experiments were installed in four repetitions. The size of 10x10 m plots and the area - 100 square meters.

The location of plots in the experimental group was compact, randomized. As the strip of insulation between the plots were left gang with1 m width. The surface of all plots constituted 1600 square meters and the total area was 1720 square meters. The soil is clayey - sandy black earth with a high content of carbonates. In experiment were included four variants: untreated control; standard, FASTAC 100 EC, 0.15 l/ha; Kaliber 200 SC 0.08 l/ha; Kaliber 200 SC, 0.1 l/ha.

[1] State Agrarian University of Moldova, Chisinau, Republic of Moldova
[2] „Ion Ionescu de la Brad" University of Agricultural Sciences and Veterinary Medicine, Iasi

For detection of cabbage aphid and flea beetles were examinated 20 plants in each plot. The evidence of the cabbage butterfly and the cabbage moth was achieved by calculating the numebr of caterpillars on a plant, and for cabagge moth additionally have been taken into account the caterpillars from around the plant. The records were achieved by the treatment and the 3rd, 7th and 14th day after the treatment. For record of pollen beetle and cabbage stem weevil in each plot were marked 20 plants pattern. It was calculated the number of buttons and flowers at each plant pattern, and number of adults and larvae.

The darkling beetle and the corn leaf weevil density was calculated by record pests per plot 4 survey on the soil surface with dimensions of 0.25 square meters. The determination of the biological efficiency of insecticides was done according to the requirements of the method for testing and plant protection products (Chisinau, 2002).

RESULTS AND DISCUSSIONS

In order to select the most appropriate field to install the experiment, and to determine the biological effectiveness of Kaliber 200 SC insecticide, in mid-April were done a series of records. Thus, at the stage of bud - early flowering on the winter rape plants and on the soil surface were found 12 species of insect pests, of which - four species are polyphagous and 8 species olygofagous. Among the polyphagous pests were encountered more often *Tanymechus dilaticolis* and *Opatrum sabulosum*, whose density was 0.6 and 0.7 specimens/square meter. Cabbage aphid (*Brevicorine brassicae* L.) was found only as unique specimens of adults and larvae, and the cruciferous bugs (*Eurydema* sp.) density no exceeded 0.27 specimens per plant. Among entomophages deserves attention seven-spot ladybird (*Coccinella septempunctata* L.), which has the numerical value of 5.6 specimens per plant and syrphid flies (*Syrphus* sp., *Episirphus* sp.), which reached a density of 3.8 specimens per plant.

From the wide complex of polyfagous and olygofagous pests, in 2015, only the pollen beetle and the cabbage stem weevil exceeded PED. The record of April 16 the pollen beetle density was 8.54 - 9.14 specimens on plant, and the numerical value of the cabbage strain weevil reached the maximum of 2.84 - 3.41 specimens on plant. Therefore, the chemical treatment was done on 16 April. From the data presented in Table 1, it is noted that before treatment the numerical density of pollen beetle was uniform and was from 8.54 specimens per plant - in the third variant, up to 9.14 - in the fourth variant.

Research conducted at specific intervals (3, 7 and 14 days) after treatment, showed a essential reduction of hibernate adults in all treated variants. This index was 9.36 - 12.27 times lower than in control variant. Comparing the pests data density in relation to the initial, is observed that on the third day after treatment in all variants of experiment remained no more than 0.45 to 12.30% from baseline. In control this index made up 104.474%. Comparing after this index the experimental variants each other, it is noted that on the first record, the essential differences were recorded in the 4th variant- on the one hand, and the 3rd variant - on the other hand. The same regularity, but in a more pronounced form was observed in the following two records.

Analyzing the data of reducing the pest density compared to the control is observed that at the third day after treatment, only at the fourth variant and at the standard variant this index was 100.0 and 98.64%, respectively, but these differences are not essential . At the 3rd variant the number density reduction was 87.19%, which is lower than the standard variant and 4th. The deviation between experimental variants was increased in the following two records. Results records made at the 7th day after treatment, confirmed that only the standard variant and the fourth variant, the reduction of the numerical density of pollen beetle was above 90% and amounted to 91.89 and 92.31% accordingly. In the third variant this index was 80.97%, which is 10.92 to 11.34% lower than in the previous variant. The records made at the 14th day after treatment showed an overall decrease in the efficiency of the product, but during this period there were essential differences between standard and fourth variant - on one hand, and the third variant, on the other part.

Given that the adults and larvae of pollen beetle attack flowers and floral buttons, we conducted also the evidence of generative organs. From Table 2, it is seen that the attack frequency of flowers and flower buttons before treatment was fairly uniform and ranged from 3.51% - the 3rd variant, to 3.82% - 4th variant. The records made at the 3rd day after treatment showed that in all experimental variants flowers and flower buttons attack frequency was significantly reduced and constituted 1.09% in standard variant, 1.07 - variant 4th and 3.82 - 3rd variant. In March the index has risen by 1.92 times. The next two records degree of attack of flowers continued to decline and accounted for properly 0.57 to 0.41% - the standard 0.52 - 0.33% - in the 4th variant.

In the 3rd version also was labeled a reduction of flower attacked by the pollen beetle compared with the control, but this index essential gives both variant 4th and standard. In the control, the degree of attack of flowers to the 14th day after treatment constituted 14.00%, which is 4.01 times higher than the index to treatment. Comparing experimental variations to the control shown that plants processing with insecticide make the reducing of the flower attack

The analysis of attack degree of flowers, compared to the original, has given us the opportunity to see that, as in the standard variant and also in the 4th was noted a reduction of the index, respectively from 29.54 to 11 11% and from 28.01% to 8.64%. By comparing these variants with each other it can be seen that the deviation is not essential. Variant 3th essential gives for both the standard and the 4th variant. Calculation of reduction of the flowers attack compared to the control revealed that the highest reduction was achieved in the 4th variant, where the index has made up to the 14th day after treatment 96.17%, which is with 2.15% higher than the standard, but these deviations are not essential. The 3rd variant was much less marked reduction which gives essential standard. Generalizing the results it can be concluded that both consumption norms insecticide Kaliber 200 SC differ essentially as effectively, both among themselves and against the standard. The most effective insecticide has proved Kaliber 200 SC-consumption norm of 0.1 l/ha, which ensures a reduction of pollen beetle 100.0 to 92.31%, during the 10-12 days, what is at the standard level. The same product, with the consumption norm 0.08 l/ha, ensure a reduction of 87.19% only in the first days after treatment, and later its effectiveness decreases as essential to the standard so in relation to variant 4th .

Simultaneously with research on determining the biological effectiveness of two consumption norms insecticide Kaliber 200 SC in pollen beetle combating, were made records and the cabbage stem weevil, the numerical value of which also exceeded the threshold of economic damage.

Results of the biological effectiveness records and calculation formulas are given in Table 3. The data table can see that the adult density until the treatment ranged from 2.84 specimen/plant – the 3rd version, to 3.41 specimen/plant - the 4th variant. On the 3rd day after treatment only in variant 4th the pest have not been found. In other experimental variants of adult density ranged from 0.11 specimen/plant - in the standard, up to 0.38 specimen/plant 3rd variant. In control after this time, the pest density reached 4.21 specimen/plant, so increased by 1.09 specimen/plant.

The results received in evidence at the 7th day after treatment demonstrates that the pest was detected in all experimental variants, but the reduced density of adults was marked in the 4th variant and in standard respectively constituted 0.20 0.23 specimen/plant, deviations not being essential. The 3rd variant this index made up 0.92 specimen /plant and essentially gives both to the 4th variant and standard, but it is less than control by 4.90 times.

Results records made at the 14th day after treatment confess that the product efficiency feels afterwards. Thus, most reduced indices were mark at the 4th version (0.87 specimen/plant) and at standards (0.94 specimen/plant), the minimum essential deviation of 0.41 specimen/plant. At the 3rd variant, the weevil density was 2.04 specimen/plant and this index gives so essential as standard and variant 4th. Comparing the variant 3th of the control it is seen that in this variant weevil density is 0.57 times lower.

Another criterion in determining the effectiveness of prroduct is the density of the pest in relation to the original. Comparing experimental results after this index is seen that the lower indices over the three records were labeled variant 4th (0.00; 5.87; 25.51) and these indices are at the standard level (3.43; 7.17; 29.28), the deviations not being essential.

It is well known that the most convincing criterion in determining the biological effectiveness of the product is to reduce pest density compared to the control, expressed in%. Comparing this index after experimental variants is seen that on the 3rd day after treatment, the highest value was reached in the 4th variant and in the standard, deviation is not essential. In these variants reduction above 90% was marked also in the 7th day after treatment. Regarding variant 3rd the reduction of pest density above 90% was marked only in the first record, and later this figure was significantly reduced.

Based on research conducted during the vegetation period of 2015, it was found that the most effective in combating the cabbage stem weevil is insecticide Kaliber 200 SC-consumption norm 0.1 l/ha, which provided a reduction pest to 100 to 94.55% over a period of 10-12 days after treatment. Same product with the norm of consumption 0.08 l/ha gives essential as the previous variant and also to the standard.

Table 1

The biological efficiency of Kaliber 200 SC insecticide, for combating the pollen beetle adults (2015)

Variant	Consumption norm of the productl/ha	Numerical density of bugs per a pattern plant				The pest density, in %, compared with the iitial, at ... day after treatment			The reducing of pest density compared with control, in % at ..... day after treatment		
		until the treatment	after ... days after treatment								
			3	7	14	3	7	14	3	7	14
Control	untreated	8.79	9.18	11.29	12.92	104.47	128.44	146.99	0.0	0.0	0.0
Standard, FASTAC 100 EC	0.15	8.94	0.04	0.91	1.61	0.45	10.18	18.01	98.64	91.89	84.17
Kaliber 200 SC	0.08	8.54	1.05	1.97	2.91	12.30	23.07	34.07	87.19	80.97	70.86
Kaliber 200 SC	0.1	9.14	0.0	0.92	1.38	0.0	10.07	15.10	100.0	92.31	85.72
DEM. p. 5%			1.21			4.53			4.2		

Table 2

The results of attack degree of generative organs of winter rape. by the adults and larvae of the pollen beetle (2015)

Variant	Consumption norm of the productl/ha	The attack frequency of floral elements. %				The attack degree of floral buttons and flowers %. compared with the initial. at ... day after the treatment			The reducing of attack degree of floral buttons and flowers |%. compared with control. at ...day after treatment		
		until the treatment	At ... day after treatment								
			3	7	14	3	7	14	3	7	14
Control	untreated	3.49	6.71	8.89	14.00	192.26	254.79	401.15	0.0	0.0	0.0
Standard. FASTAC 100 EC	0.15	3.69	1.09	0.57	0.41	29.54	15.45	11.11	85.04	90.13	94.02
Kaliber 200 SC	0.08	3.51	3.82	4.09	4.19	108.89	116.52	119.37	42.07	11.84	22.15
Kaliber 200 SC	0.1	3.82	1.07	0.52	0.33	28.01	13.61	8.64	84.98	92.26	96.17
DEM. p. 5%			3.76			4.18			4.05		

Table 3

The biological efficiency of Kaliber 200 SC insecticide for cabbage stem weevil combating (2015)

Variant	Consumption norm of product. l/ha	The density of adults at a pattern plant				The pest density in % compared with the initial			The reducing of pest density in %. compared with control		
		until the treatment	At ... day after treatment								
			3	7	14	3	7	14	3	7	14
Control	untreated	3.12	4.21	4.51	5.24	134.94	144.55	167.95	0.00	0.00	0.00
Standard. FASTAC 100 EC	0.15	3.21	0.11	0.23	0.94	3.43	7.17	29.28	89.12	92.77	78.24
Kaliber 200 SC	0.08	2.84	0.38	0.92	2.04	13.38	32.39	71.83	91.13	72.34	46.19
Kaliber 200 SC	0.1	3.41	0.0	0.20	0.87	0.0	5.87	25.51	100.0	94.55	81.23
DEM. p. 5%											

CONCLUSIONS

In 2015 have created favorable conditions for both growth and development of winter rape and also the spread and development of the main pest species.

During the research period PED had overcome by the pollen beetle and cabagge stem weevil.

The product Kaliber 200 SC- consumption norm 0.08 l/ha, ensure an essential reduction of winter rape pest only in the first days after treatment.

Chemical treatment of winter rape plants with insecticide Kaliber 200 SC- consumption norm 0.1 l/ha, ensure a reduction of the cabbage stem weevil from 100 to 94.55% and the pollen beetle 100-92.31% over a period of 10-12 days.

Based on the results obtained Kaliber 200 SC insecticide is recommended to be included in the integrated protection of winter rape to combat the pollen beetle, cabbage stem weevil and other pests with the norm of consumption 0.1 l/ha, by performing 1-2 treatments in the bud stage.

REFERENCES

Busuioc M. 2006. *Entomologie agricolă*. Centrul Editorial al UASM. Chişinău. 639 p.

Croitoru N.. Timuş Asea. Panuţa S. 2010. *O результатах Государственного испытания различных фунгицидов против основных болезней картофеля. Материалы Международной научно-практической конференции. посвященной 65-летию кафедры защиты растений «Актуальные проблемы в защите растений»*. Горки. 23-25 июня 2010. с. 18–20.. 0.15 c.a.

Centrul de Stat. 2002. *Îndrumări metodice pentru testarea produselor chimice şi biologice de protecţie a plantelor de dăunători. boli şi buruieni în Republica Moldova*. Tipografia Centrală. Chişinău. 286 p.

Panuţa S.. Soare C. 2013. Rezultatele testării de stat a preparatului Kohinor 200 SL. în calitate de insecticid împotriva dăunătorilor rapiţei. În: *Lucrări ştiinţifice*. UASM. Chişinău. Vol. 36. Horticultură. Viticultură şi vinificaţie. Silvicultură şi Grădini publice. Protecţia plantelor. p. 287-291.. ISBN 978-9975-64-248-4.

Panuţa S.. Croitoru N.. Timuş Asea. 2010. Rezultatele testării insecticidului mavrik 240 ew. împotriva principalilor dăunători ai rapiţei. În: *Lucrări ştiinţifice*. UASM. Chişinău. vol. 24. Pt. 2: Horticultură. Viticultură şi vinificaţie. silvicultură şi grădini publice. protecţia plantelor. p. 423-428.. ISBN 978-9975-64-127-2.

Timuş Asea. Croitoru N.. Panuţa S. 2010. Эффективность инсектицида LAMBDA. 50 CS в борьбе с комплексом вредителей рапса в условиях Республики Молдова. *Материалы Международной научно-практической конференции. посвященной 65-летию кафедры защиты растений «Актуальные проблемы в защите растений»*. Горки. 23-25 июня 2010. с. 27–30.. 0.15 c.a.

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