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STUDYING THE BIOLOGICAL EFFICACY OF INSECTICIDES TO PROTECT THE SEEDLINGS OF RAPESEED

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РАПС ӨСКІНДЕРІ ҮШІН ИНСЕКТИЦИДТЕРДІҢ БИОЛОГИЯЛЫҚ ТИІМДІЛІГІН ЗЕРТТЕУ

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ИЗУЧЕНИЕ БИОЛОГИЧЕСКОЙ ЭФФЕКТИВНОСТИ ИНСЕКТИЦИДОВ ДЛЯ ЗАЩИТЫ ВСХОДОВ РАПСА

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Abstract

One of the main aspects of rapeseed cultivation is the protection of seedlings from early – onset pests, in particular from cruciferous fleas. Researches about study the biological effectiveness of various insecticides to protect seedling canola were conducted on the experimental plot of the laboratory of plant protection, RGAU – ICCA named after KA Timiryazev in the 2008 – 2009 and 2011 – 2012. The data on the economic evaluation of various ways to protect spring rape from cruciferous fleas are presented. Pre – sowing seed treatment with insecticidal disinfectants is an effective measure for the protection of rapeseed against early – occurring pests. It is also necessary to take into account the environmental safety of this protection measure by preserving the useful entomofauna, including pollinators, reducing the load on the soil, eliminating at least one ground treatment with insecticides, as well as reducing the amount of pesticide applied per 1 ha of field. In addition, the use of such a protection measure as pre – sowing treatment instead of spraying seedlings with insecticides reduces the seasonal load on the machine and tractor fleet.

Key words: spring rape, cruciferous fleas, protectants, insecticides.

Андатпа

Рапсты өсірудің негізгі аспектілерінің бірі өскіндерді ерте өскіндік зиянкестерден, атап айтқанда шаршыгүлділер бүргешелерінен қорғау болып табылады. К.А. Тимирязев атындағы РМАУ – МАША өсім – діктерді қорғау зертханасының тәжірибелік аймағында 2008 – 2009 және 2011 – 2012 жж. рапс өскіндерін қорғау үшін түрлі инсектицидтердің биологиялық тиімділігін зерттеу бойынша зерттеулер жүргізілді. Жаздық рапсты шаршыгүлділер бүргешелерінен қорғаудың түрлі тәсілдерін экономикалық бағалау бойынша деректер келтірілген. Тұқымдарды инсектицидті дәрілегіштермен егу алдында өңдеу – рапсты ерте кезеңдік зиянкестерден қорғаудың тиімді шарасы. Сондай – ақ пайдалы энтомофаунаны, оның ішінде тозаңдатқыштарды сақтау, топыраққа түсетін жүктемені төмендету, инсектицидтермен жер бетіндегі ең аз өңдеуді болдырмау, сондайақ егістіктің 1 гектарына енгізілетін пестицидтің санын азайту есебінен осы қорғау шарасының экологиялық қауіпсіздігін ескерген жөн. Бұдан басқа, өскіндерді инсектицидтермен бүркудің орнына себу алдындағы өңдеу сияқты қорғау шараларын қолдану машина – трактор паркіне маусымдық жүктемесін азайтады.

Түйінді сөздер: жаздық рапс, шаршыгүлділер бүргешелері, улағыштар, инсектицидтер.

Аннотация

Одним из основных аспектов возделывания рапса является защита всходов от ранневсходовых вредителей, в частности от крестоцветных блошек. На опытном участке лаборатории защиты растений РГАУ – МСХА имени К.А. Тимирязева в 2008 – 2009 и 2011 – 2012 гг. проводили исследования по изучению биологической эффективности различных инсектицидов для защиты всходов рапса. Приведены данные по экономической оценке различных способов защиты рапса ярового от крестоцветных блошек. Предпосевная обработка семян инсектицидными протравителями – эффективная мера защиты рапса от ранневсходовых вредителей. Следует также учесть экологическую безопасность данной меры защиты за счет сохранения полезной энтомофауны, в том числе опылителей, снижения нагрузки на почву, исключения минимум одной наземной обработки инсектицидами, а также уменьшения количества пестицида, вносимого на 1 га поля. Помимо этого, применение такой меры защиты как предпосевная обработка вместо опрыскивания всходов инсектицидами уменьшает сезонную нагрузку на машинно – тракторный парк.

Ключевые слова: рапс яровой, крестоцветные блошки, протравители, инсектициды.

Introduction

Held in 2005 in Lipetsk international scientific – practical conference was entitled «Rape – the culture of the XXI century», which reflects the increasing interest in this culture. This is due to the use of multilateral rape. Rape – valuable oilseed constituting more than 12 % of the world production of vegetable oils [1].

According to practitioners rape is considered one of the main sources of feed protein. The danger of an energy crisis brings today the use of raw rape as one of biofuels. Currently, rape is considered a leading oilseed crop in Canada. Rapeseed is grown even in natural areas, where the bulk of oilseeds does not always give the expected results [5]. Rapeseed production is now a multi – purpose, and according to the MV Chirkov and GP Moskalenko, can rightfully occupies a large area in the Russian Federation [6].

There is a high probability that the culture may soon compete with the traditional Russian oilseed crop – sunflower, which is capable of producing high yields in harsher climatic conditions, to improve the phytosanitary condition of the soil structure [5]. However, significant losses when growing rape may be associated with pest complex. In this regard, issues of improving the biological potential of this culture through the use of plant protection products are relevant. Improve the phytosanitary condition of the soil structure [5].

A major factor in the formation of the harvest of any crop are considered friendly shoots. Normal completion of this phase of development is the foundation for further growth and development of plants. To achieve this should eliminate the adverse environmental factors on the capacity of the environment. For rape seedlings are dangerous pests Phyllotreta cruciferae(Crucifer flea). These beetles can greatly damage the shoots cruciferous crops. In the spring, after the snow melts and the thawing of the soil, when the first vegetation appears, Phyllotreta cruciferaefound on weeds. Then, in the mass start to colonize the germination cultural kresotsvetnyh plants. As practice shows, the seedlings of rape almost all Russian regions suffer fromPhyllotreta cruciferae. According to RB Nurlygayanova annual high population numbersPhyllotreta cruciferaeobserved in the Volga area and the Middle Urals [3]. In the Republic of Bashkortostan in 2003, despite the moderate temperatures and abundant rainfall, Phyllotreta cruciferae populated canola crops and their average number was 11.2 copies per plant.

At strong damage leaves and whole plant dry out. Death of rape seedlings can reach up to 60 % [3]. According to VB Kostromina rape plants damaged by 25 – 30 %, reduce yields

by 42,3 – 46,5 % [2]. To protect canola seedlings previously prevailed fastakom processing plants karbofosom, rogorom et al. Preventive appeared more reliable protection from rape seedlings Phyllotreta cruciferaewhen making special insecticides (granulated phosphamide) in rows at sowing. Later (in the 80 – ies. XX century) spread rapkol (not registered in the Russian Federation), pre – treatment of seeds that completely enclose the sprouting of rapePhyllotreta cruciferae [6]. Further development of the pesticide market suggest other drugs for the protection of rape. We evaluated the impact of a number of insecticides on growth and development of seedlings of rape, as well as their biological effectiveness.

Materials and methods

Studies to determine the biological efficacy of insecticides against Phyllotreta cruciferaewas performed on the experimental plot of plant protection RGAU – MSHA named after KA laboratory Timiryazev in 2008 – 2009 and 2011 – 2012 years. Studied various methods of protection from rape Phyllotreta cruciferae: Pre – sowing treatment of seeds, ground spraying. As disinfectants in different years studies used imidalit COP (500 + 50 imidacloprid + bifenthrin), Chinook, SC (100 + 100 imidacloprid + beta cyfluthrin) kruyzer COP (350g / l thiamethoxam), Furadan, TPN (350g / l carbofuran) kruyzer rape, COP (280g / l thiamethoxam + 32,3g / l mefenoxam + 8g / l fludioxonil) at application rates recommended by the manufacturer. Seeds treated according to the recommended norms for 3 – 7 days before planting. Before laying field experiment evaluated the effect of insecticidal seed treatment on germination energy rapeseed. To do this, 100 pieces of seeds of each variant were placed in petri dishes on moist filter paper discs and were placed in a thermostat at a temperature of 25 C (GOST 12038 – GOST 12042).

Sowing of rape was carried out at the end of the first – the beginning of the second decade of May. Repeated tests 4 – fold, placing plots rendomizirovannoe. For ground processing plants in 2011 and 2012. They used a synthetic pyrethroid kinmiks, TBE (50 g / l of beta – cypermethrin) – 0.3 l / ha. Evaluation of biological efficacy (EB) was performed by visual assessment of damage according to a scale of damage cruciferous crops sprouting Phyllotreta cruciferae Approved by the International Standards Organization OEPP / EPPO [8].

Results and its discussion

Sowing was carried out at the end of the first – the beginning of the second decade of May. The first shoots appear in different years at 12 – 14 days after sowing.

The success of any crop cultivation begins with the friendly shoots. To study the effect of insecticidal seed treatment on the vigor of rapeseed in 2011 and 2012. Laboratory experiments were conducted, the results of which are presented in Table 1.

Table 1 Germination germination energy and field rapeseed,%

Option	2011		2012
	vigor	field germination	vigor
Control	97.5	84.9	94.3
Imidalit (4 l / t)	92.5	84.6	90.3
Imidalit (8n / m)	93.8	89.7	89.8
Furadan	86.5	77.9	89.8
Kruyzer Rape	94.5	91.0	92.3
NSR_{05}	4.4	5.0	4.0

As follows from the data shown in Table 1, rape seed germination was high. Insecticidal disinfectants did not render the phytotoxic action for rape. In the embodiment Furadan was a trend towards reduction of seed vigor. Use as a disinfectant preparation kruyzer rape, COP significantly increased germination culture, which is likely due to the presence in the composition except thiamethoxam also two active fungicidal substances: mefenoxam and fludioxonil.

During the study period the greatest damage in the control seedlings was recorded in 2008 [4]. In all embodiments, a pre – emergence treatment of seed damage does not exceed the threshold (10 %), resulting in the loss of harvest. Most damage of seedlings in the control was the second registration dates, whereas in the embodiments with processing a defective cotyledons did not exceed 6 %. The least damaged leaves throughout the observation period has been fixed in version imidalit. EB in this embodiment has a maximum and was 91 % in the first two records, in embodiments Chinook and kruyzer on the first date and account 79.97 61.84 % on the second date account 86.81 and 71.15 % respectively. The maximum duration of the protective effect (21 days) has been fixed in version imidalit.

In May 2009 featured a high average daily air temperature on the background of the increased rainfall. As a result, immediately after emergence of the plants quickly began to gain vegetative mass. Against the background of rapid growth of plant damagePhyllotreta cruciferaeIt was not as great as in 2008 (Table 2). However, the use of insecticidal seed treatment virtually eliminated leaf damage in embodiments with seed treatment.

Table 2 Damage to spring rape varieties Warrior cruciferous flea beetles, 2009

Options	Damage to plants,%		Biological efficiency,%	
	28.05	01.06	28.05	01.06
Control	0.28	6.84	–	–
Imidalit	0.12	3.99	57.43	41.6
Kruyzer	0.17	8.47	38.49	–
F_f	9.9	2.11		
F_{05}	4.26			
NSR_{05}	0.08	1.76		

The amount of precipitation in May 2011, was below historical averages more than 2 times, and the average daily temperature, on the other hand, exceeded the average annual values. This led to the later sprouting of rape. Dynamics damage sprouting rape cruciferous flea beetles, shown in Table indicates a significant difference in this index using protectants embodiments, and without treatment (control) from the moment of emergence (Table 3).

Table 3 The biological efficacy of insecticides against crucifer flea beetles, 2011

Option	Damage to plants,%				Biological efficiency,%			
	25.05	27.05	30.05	01.06	25.05	27.05	30.05	01.06
Control	3.00	4.66	11.02	10.50	–	–	–	–
Kinmiks (ground handling)	1.12	1.20	0.98	0.66	62.8	74.3	91.1	93.8
Imidalit (4 l / t)	0.28	1.09	1.90	3.40	90.7	76.7	82.7	67.6
Imidalit (8n / m)	0.25	0.83	1.78	3.44	91.6	82.5	83.9	67.2
Furadan	0.09	0.41	1.27	2.14	97.1	91.2	88.9	79.6

Kruyzer Rape	0.40	1.37	2.04	2.21	86.8	70.8	81.5	79.0
*F*f	2.84	3.28	7.78	4.11				
*F*05	2.77							
NSR05	1.95	2.52	4.12	5.08				

As can be seen from the data presented in Table 3, the period of the protective effect of all preparations was sufficient for the passage of plants of the most dangerous period – germination. Highest BE in the initial period was observed in the variant using Furadan. At last registered biological efficacy in embodiments using kruyzer canola and Furadan also remained fairly high (79.0 and 79.6 % respectively). The damage seedlings, in all cases with the use of insecticides, did not exceed the threshold, leading to crop failure.

In 2012, in all cases damage of seedlings did not exceed the threshold (10 %). Due to the low number of Phyllotreta cruciferae Rapeseed and, consequently, little damage seedlings, was unable to fully identify the biological efficacy.

Conclusion

Findings:

1. In a laboratory experiment on the effect of disinfectants on the vigor we found that drug Furadan somewhat reduced vigor and germination of seeds of spring rape. In the embodiment with the drug kruyzer rape, in turn, tended to improve germination.
2. All drugs in the early stages of plant development when harmfulness Phyllotreta cruciferae most pronounced fairly well protected plants, as in the embodiments of damaged plants by treatment with below 10 %.
3. During sprouting application presowing treatment was more effective than treatment ground synthetic pyrethroid kinmiks.
4. Presowing seed treatment insecticide protectants – effective measure of protection from rape rannevskhodovyh pests. environmental safety of the protective measures should also be taken into account by maintaining useful entomofauna, including pollinators, reducing the burden on the soil, elimination of at least one ground insecticide treatments, as well as reducing the amount of pesticide that contributed to the 1 ha field. In addition, the use of such protective measures as the presowing treatment instead of spraying the seedlings with insecticide seasonal reduces the load on the machines and tractors.

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