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4.1.1. Общее земледелие и растениеводство (биологические науки, сельскохозяйственные науки)

ОБ ЭФФЕКТИВНОСТИ ГЕРБИЦИДОВ В АГРОЦЕНОЗЕ ОЗИМОЙ ПШЕНИЦЫ В УСЛОВИЯХ ЛЕСОСТЕПНОЙ ЗОНЫ ЧЕЧЕНСКОЙ РЕСПУБЛИКИ

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Цель – изучение возможности эффективного применения гербицидов нового поколения на основе результатов мониторинга засоренности посевов озимой пшеницы в условиях лесостепной зоны Чеченской Республики. Исследования проводили на опытном поле ФГБНУ «Чеченский НИИСХ», лесостепная зона Чеченской Республики. Использован сорт озимой пшеницы «Ахмат». Расход рабочей жидкости 300 л/га. В посевах озимой пшеницы лесостепной зоны Чеченской Республики определено порядка 20 видов сорных растений, представителей 18 семейств. Тип засоренности в опытах смешанный: однолетние – 60,5 %, многолетние, соответственно – 39,5 %. Перед уборкой количество сорняков на контроле 1 (без гербицидов и прополок) на посеве составило 160,0 шт/м^2, с массой 485,00 г/м^2. Спикер, КЭ (0,10 л/га) имел эффективность 78,80% гибели сорных растений и 86,5 % снижения массы. Использование Спикера, КЭ в норме 0,15 л/га обеспечивало 91,20% гибели и 88,0 % снижения массы сорняков. Спикер, КЭ в дозе 0,20 л/га 99,40% гибели и 99,10 % снижения массы сохранившихся экземпляров. Обнаруженные экземпляры сорняков - это «вторая волна». Урожайность озимой пшеницы на абсолютном контроле (без гербицидов и прополок) была 4,59 т/га. Наибольшая прибавка урожая отмечалась при использовании гербицида Спикер, КЭ в дозе 0,20 л/га – 4,92 т/га или 107,2 % в сравнении с контролем 1. Таким образом, в посевах озимой пшеницы в борьбе с сорняками в условиях лесостепной зоны Чеченской Республики наиболее эффективным является использование гербицида

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4.1.1. General agriculture and plant growing (biological sciences, agricultural sciences)

ABOUT EFFICIENCY OF HERBICIDES IN WINTER WHEAT AGROCENOSIS IN THE CONDITIONS OF THE FOREST-STEPPE ZONE OF THE CHECHEN REPUBLIC

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The objective is to study the possibility of effective use of new generation herbicides based on the results of monitoring the weed infestation of winter wheat crops in the forest-steppe zone of the Chechen Republic. The research was carried out on an experimental field. Federal State Budgetary Scientific Institution "Chechen Research Institute of Agriculture", forest-steppe zone of the Chechen Republic. The winter wheat variety used was "Akhmat". The working fluid consumption is 300 l/ha. About 20 species of weeds, representatives of 18 families, were identified in winter wheat crops in the forest-steppe zone of the Chechen Republic. The type of weed infestation in the experiments was mixed: annuals - 60.5%, perennials, respectively - 39.5%. Before harvesting, the number of weeds in control 1 (without herbicides and weeding) on the crop was 160.0 pcs / m2, with a weight of 485.00 g / m2. Speaker, KE (0.10 l / ha) had an efficiency of 78.80% of weeds death and 86.5% weight reduction. The use of Speaker, KE at a rate of 0.15 l / ha ensured 91.20% death and 88.0% weight reduction of weeds. Speaker, KE at a dose of 0.20 l/ha 99.40% of death and 99.10% reduction in the mass of surviving specimens. The detected weed specimens are the "second wave". The yield of winter wheat under absolute control (without herbicides and weeding) was 4.59 t/ha. The greatest increase in yield was noted when using the herbicide Speaker, KE at a dose of 0.20 l/ha - 4.92 t/ha or 107.2% compared to control 1. Thus, in winter wheat crops in the fight against weeds in the forest-steppe zone of the Chechen Republic, the most effective is the use of the herbicide Speaker, KE at a dose of 0.20 l/ha

Спикер, КЭ в дозе 0,20 л/га

Ключевые слова: ОЗИМАЯ ПШЕНИЦА, ЗАСОРЕННОСТЬ, ГЕРБИЦИДЫ, СОРНЫЕ РАСТЕНИЯ, СНИЖЕНИЕ МАССЫ, ЭФФЕКТИВНОСТЬ, ГИБЕЛЬ, ХЛОРОФИЛЛЫ

Keywords: WINTERWHEAT, WEED INFECTION, HERBICIDES, WEEDS, WEIGHT LOSS, EFFICIENCY, DEATH, CHLOROPHYLLS

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Introduction

In the North Caucasus Federal District, as well as throughout Russia, winter wheat occupies a leading place in the grain balance. This completely repeats the global trend. At the same time, the yield of this food grain crop is greatly influenced by harmful objects common in its crops. In the first place are weeds, therefore, the fight against weeds is very important as an element of winter wheat cultivation technology [5, 9].

The main problem with the use of herbicides in field crops today is the resistance of weeds to the preparations used, which entails an increase in their consumption rates, a decrease in the environmental friendliness of production, an increase in the cost of production, and a decrease in the level of agricultural culture. And, of course, the emergence of new forms of weeds that are more resistant to the effects of preparations. What is very remarkable, from the point of view of herbology, is that resistant species have appeared not only to individual preparations, but also to their tank mixtures. Today, there are weeds that are quite resistant to the effects of sulfonylurea derivatives, and this is the active ingredient of 3rd generation herbicides, which are distinguished by minimal consumption rates. Consequently, scientists and practitioners are faced with the task of finding new, environmentally friendly methods of destroying weeds. All this is intended to increase the effectiveness of weed control measures, reduce the pesticide load on ecosystems, etc.[6, 10].

Target – study of the possibility of effective use of new generation herbicides based on the results of monitoring the weed infestation of winter wheat crops in the forest-steppe zone of the Chechen Republic.

The research was carried out on an experimental field. Federal State Budgetary Scientific Institution "Chechen Research Institute of Agriculture", located in the forest-steppe zone of the Chechen Republic.

Climate conditions of the Chechen Republic temperate continental. Winter is mild with unstable snow cover, which explains the decrease in competitiveness of winter wheat, its vulnerability to harmful objects: weeds, pests and diseases. Soils are sod-podzolic, moderately humus (3.9%).

Materials and research methods.

Experience. Educational and methodological guide for conducting research in agronomyV2023-2024gg. [3].

To determine the effect of growth regulators on the growth and development of winter crop plants of wheat. The various levels of weed infestation of its crops were modeled. The possibility of pre-sowing treatment of corn seeds with a plant growth regulator based on humic substances was studied.

The variety of winter wheat used was domestically bred, developed at the P.P. Lukyanenko Research Institute of Agriculture (Krasnodar), mid-season, high-yielding "Akhmat", zoned in the North Caucasus region, has an average yield of up to 10.0 t/ha.

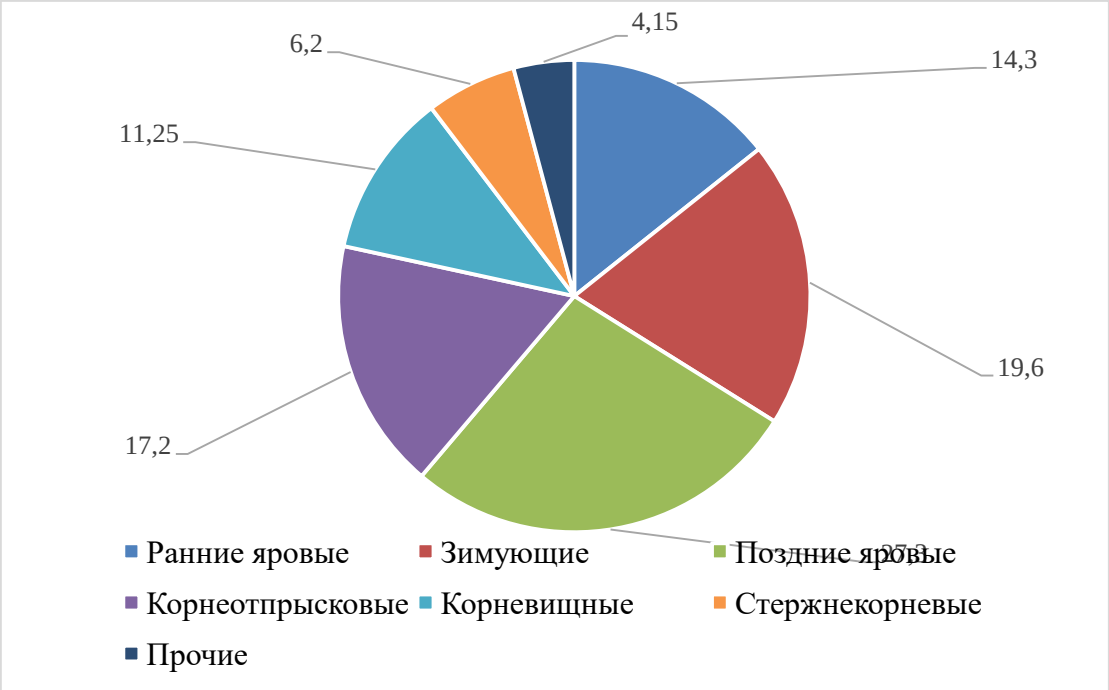
The experiment involved the use of the domestically produced herbicide Speaker, which isa two-component composition for controlling annual and perennial broadleaf weeds, including those resistant to 2,4-D, triazines and MCPA, in cereal crops: 422 g/l dicamba and 180 g/l florasulam. The treatment was carried out in the spring, in the tillering phase of winter wheat. The consumption of the working fluid was 300 l/ha. [1,4, 8].

Results and discussions.

In winter wheat crops of the forest-steppe zone of the Chechen Republic, about 20 species of weeds, representatives of 18 families, have been identified.

In particular, early spring crops: Galeopsis tetrahit (L.)), Chenopodium album (L.) and Chenopodium album (L.); late spring crops: Amaranthus retroflexus (L.) and Amaranthus blitoides (S), Echinochloa crusgalli (L.) and Ambrosia artemisiifolia (L.) and Abutilon theophrasti (Medicus) and Portulaca oleracea (L.) and Solanum nigrum (L.) and Galinsoga parviflora (Cov.); wintering: chickweed (Stellaria media (L.)), cleavers (Galium aparíne (L.)), cleavers (Galium aparíne (L.)); root-suckering: field thistle (Cirsium arvense (L.) Scop.), field bindweed (Convolvulus arvensis (L.)), sow thistle species (Sonchus spp.); rhizome: finger-footed pigweed (Cynodon dactylon (L.)), Syrian milkweed (Asclepias syriaca (L.)), field mint (Mentha arvensis (L.)); taproots: greater plantain (Plantago major (L.)), white campion (Melandrium albut (Mill.)), horse sorrel (Rumex confertus (Willd)). The presence of quarantine weeds is noteworthy, which is important when organizing protective measures (pic 1).

The type of weed infestation in the experiments was mixed: annual – 60.5%, perennial, respectively – 39.5%.



Picture 1. Biological groups of weeds in agrocenosis of winter wheat (2024)

Thus, we can conclude that the species composition of weeds in crops is quite diverse and that it is advisable to annually adjust protective measures to combat weeds.

Before harvesting, the number of weeds in control 1 (without herbicides and weeding) on the crop was 160.0 pcs/m2, with a weight of 485.00 g/m2. Speaker, EC (0.10 l/ha) had a fairly high efficiency of 78.80% weed mortality and 86.5% weight reduction. The use of Speaker, EC at a rate of 0.15 l/ha ensured 91.20% mortality and 88.0% weight reduction of weeds. Speaker, EC at a dose of 0.20 l/ha ensured 99.40% mortality and 99.10% weight reduction of surviving specimens. The use of Banvel, VR as a reference herbicide ensured the mortality of 85.7% weeds and 90.50% weight reduction of surviving specimens (Table1).

The specimens found during the quantitative and weight accounting of weeds were "second wave" weeds. Speaker, KE was quite effective in all the studied consumption rates [2, 7].

Table 1. – Efficiency of the herbicide Speaker, KE in the agrocenosis of winter wheat (2024)

Options	Weed mass, g/m2	% - counter.
Control 1	485,00	100,00
Control 2	0,00	0,00
Speaker, EC 0.10 l/ha	65.50	86.50
Speaker, EC 0.15 l/ha	58.20	88,00
Speaker, EC 0.20 l/ha	4.40	99.10
Speaker, EC 0.25 l/ha	0,00	100,00
Banvel, VR, 0.20 l/ha (standard)	46.10	90.50

So, uhThe level of chlorophylls “a”, “b” and carotene in the leaves of winter wheat during control 2 (manual removal of weeds) is 2.56 and 0.82 mg/g, carotene – 0.68 mg/g.

In the variant without herbicides and weeding, the content of chlorophylls “a” and “b” in the leaves of winter wheat plants was 1.67 and 0.45 mg/g, carotene – 0.34 mg/g, which is 65.2; 54.8 and 50.0% in comparison with control 2.

The use of the herbicide Speaker, KE did not have a depressing effect on the concentration of pigments, and, consequently, on the intensity of photosynthesis, since the concentration of chlorophylls "a" and "b" in the leaves of winter wheat plants was 52.7-85.9; 85.2-86.8%, carotene - 83.7-88.7% compared to control 2.

It is necessary to note the pronounced inhibitory effect on the intensity of photosynthesis of an increased dose of the herbicide Speaker, KE.

Banvel, VR at a dose of 0.20 l/ha provided an increase in the level of chlorophylls “a” and “b” in comparison with control 1. It amounted to 2.00 and 0.53 mg/g, carotene up to 0.48 mg/g.

In the variant without herbicides and weeding, the height of winter wheat plants is 62.0 cm. The use of the herbicide Speaker, KE provides an increase in plant height to 73.0 – 87.0 cm, which is 117.7 – 140.3% compared to control 1 (without herbicides and weeding), respectively (Table.2).

The use of Speaker, KE in doses of 0.10-0.25 l/ha contributes to an increase in the height of winter wheat plants to 76.0-87.0 cm or 1.22-1.40 times, respectively. Thus, against the background of Speaker, KE 0.20 l/ha, the height of winter wheat plants was 87 cm, which is 140.3% compared to control 1. It is necessary to note some depressing effect of an increased dose of the herbicide Speaker, KE 0.25 l/ha - the height of plants was 82.00 cm, which is 8.1% less compared to the height of winter wheat plants at a dose of 0.20 l/ha. Against the background of the use of the herbicide Banvel, VR (standard), the height of plants was 73 cm or 117.7%. The main reason is an increase in the nutritional

area of winter wheat plants due to the destruction of the weed component of the cenosis.

Table 2. - The effect of herbicides on the growth and development of winter wheat plants (2024)

Options	Height stem,		Average leaf length,		Weight of 1000 seeds	
	cm	% - counter.	mm	% - counter.	G	% - counter.
Control 1	62.0	-	72,00	-	34.8	-
Control 2	90.0	145.1	100,00	138.8	46.5	133.6
Speaker, EC 0.10 l/ha	76.0	122.5	78,00	108.3	40.3	115.8
Speaker, EC 0.15 l/ha	80.0	129.0	83,00	115.3	43.8	125.8
Speaker, EC 0.20 l/ha	87.0	140.3	96,00	133.3	45.9	131.8
Speaker, EC 0.25 l/ha	82.0	132.2	81,00	112.5	42.9	123.2
Banvel, VR, 0.20 l/ha (standard)	73.0	117.7	79,00	109.7	38.6	110.9

In the control variant, without herbicides and weeding, the average length of the winter wheat leaf was 72 mm. As a result of using herbicides in winter wheat crops, the average leaf length increased and was 79.00-96.00 mm, which was 109.7-133.3% compared to control 1 (without herbicides and weeding).

The indicator is of great importance in assessing the intensity of photosynthesis, and therefore the productivity of arable land and the level of agricultural culture. The use of the herbicide Speaker, KE (0.20 l/ha) allows increasing it to 96.00 mm, which is 133.3% compared to control 1. At the same time, a further increase in the dose, as in the case of plant height, has a depressing effect on the indicator.

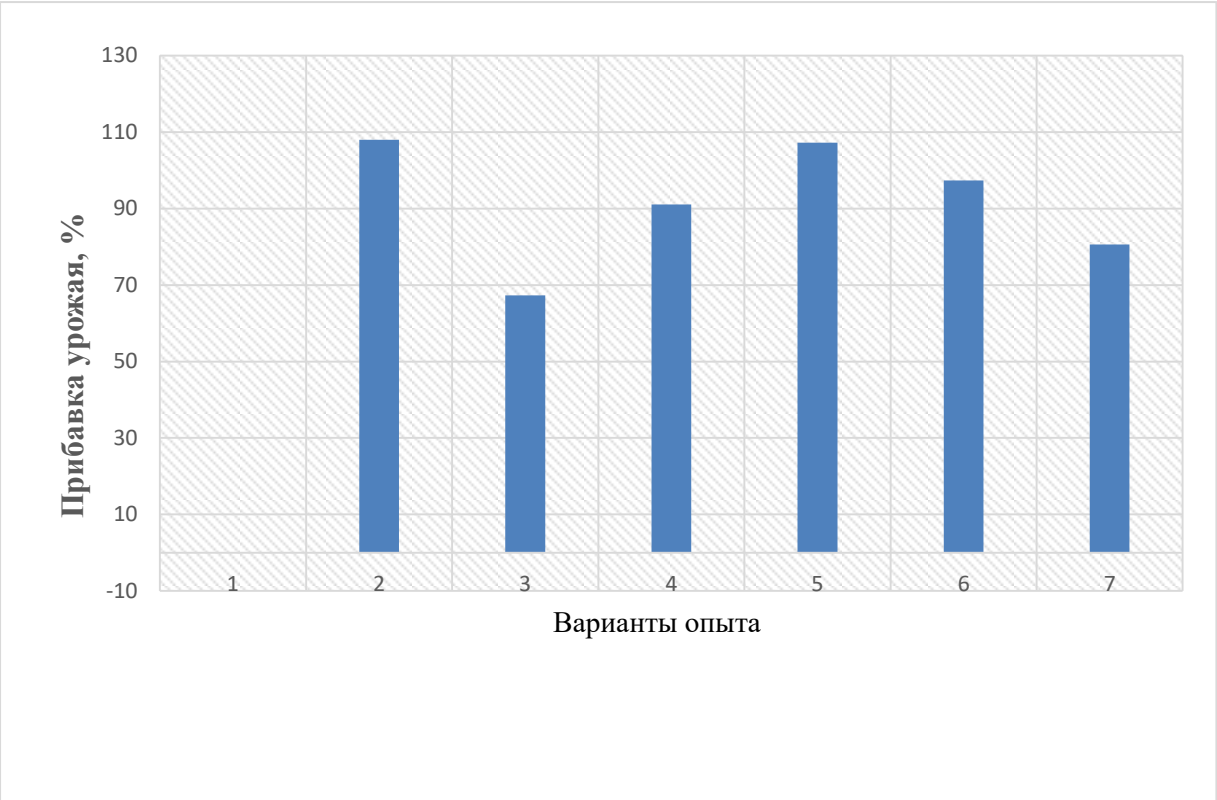
The mass of 1000 grains in the variant without herbicides and weeding (control 1) was 34.8 g. The use of herbicides ensured an increase in this indicator to 38.6 – 45.9 g, which was 110.9 – 131.8% compared to control 1.

When using the herbicide Speaker, KE in doses of 0.10-0.25 l/ha, the mass of 1000 grains increased and amounted to 40.3 – 45.9 g or 115.8 – 131.8% compared to control 1.This is due to the maximum reduction in the period of joint growth of crops and weeds. The maximum weight of 1000 grains was when using the herbicide Speaker, KE at a dose of 0.20 l / ha - 459 g, which was 131.8%. Against the background of 0.25 l / ha of the herbicide Speaker, KE, there was a decrease in the weight of 1000 grains, which was 42.9 g or 123.2%. Against the background of the introduction of the reference herbicide Banvel, VR - 38.6 g or 110.9%.

The yield of winter wheat under absolute control (without herbicides and weeding) was 4.59 t/ha. The highest yield increase was observed when using the herbicide Speaker, KE at a dose of 0.20 l/ha – 4.92 t/ha or 107.2% compared to control 1. The use of the herbicide Speaker, KE at a dose of 0.25 l/ha allowed to obtain a slightly smaller yield increase – 4.47 t/ha, which amounted to only 97.4%. The use of the herbicide Banvel, VR (0.20 l/ha) allowed to obtain a yield increase of 3.70 t/ha, which amounted to 80.61% compared to the control. The use of the preparation Speaker, KE STS at a dose of 0.20 l/ha can be considered optimal in terms of minimizing the pesticide load on the agrocenosis (Table3, pic 2).

Table 3. – Efficiency of herbicides in agrocenosis of winter wheat (2024)

Options	Productivity, t/ha	Increase in yield	
		t/ha	%
Control 1	4.59	0,00	0,00
Control 2	9.55	4.96	108.0
Speaker, EC 0.10 l/ha	7.68	3.09	67.32
Speaker, EC 0.15 l/ha	8.77	4.18	91.06
Speaker, EC 0.20 l/ha	9.51	4.92	107.2
Speaker, EC 0.25 l/ha	9.06	4.47	97.40
Banvel, VR, 0.20 l/ha (standard)	8.29	3.70	80.61



Picture 2. The effect of herbicides on winter wheat yield (2024) (1 – control 1 (without herbicides and weeding); 2 – control 2 (manual removal of weed component); 3 – Speaker, EC, 0.10 l/ha; 4 – Speaker, EC, 0.15 l/ha; 5 – Speaker, EC, 0.20 l/ha; 6 – Speaker, EC, 0.25 l/ha; 7 – Banvel, VR, 0.20 l/ha (reference).

Conclusion. In winter wheat crops in the fight against weeds in the forest-steppe zone of the Chechen Republic the most effective is to use the herbicide Speaker, KE at a dose of 0.20 l/ha.

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