Impact Factor: 9.9 ISSN-L: 2544-980X

The Impact of the use of the Herbicide Atlantis 3.6% and Fertilizers on the Yield of Winter Wheat in the Conditions of Uzbekistan

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Abstract: The article highlights the dependence of the yield of winter wheat on the use of herbicide and fertilizers. Combining the use of Atlantis herbicide and mineral fertilizers is an effective way to develop grain production in the steppe zone of southern Uzbekistan, which increases the grain of winter wheat with the help of herbicide to 19.3 c/ha, due to NPK to 25.7 c/ha.

Keywords: winter wheat, grains, yield, herbicide, Atlantis, mineral fertilizers, monocotyledonous, dicotyledonous, weed plants.

Introduction

The annual loss of grain crops worldwide due to weeds amounts to 500-510 million tons. Such losses, along with other factors, occur due to the absorption of nutrients from the soil by weeds [1,3].

An integral part of modern intensive farming is the use of herbicides against weeds. One of the main factors limiting the production of a high grain yield with sufficient mineral fertilizers is the high infestation of grain fields [4,5].

Sowing grain crops in continuous rows limits the mechanical destruction of weeds, which forces the use of herbicides against weeds [6,7].

In the south of Uzbekistan, methods have been developed for controlling monocotyledonous weeds in winter wheat crops using herbicides with the active ingredient fenoxaprop-P-ethyl + antidote and against dicotyledonous weeds with the active ingredient trebenuron-methyl [7,8,9].

The objective of our research is to study the effect of the herbicide Atlantis on monocotyledonous and dicotyledonous weeds against the background of mineral fertilizers, which compensate for the lost grain yield of winter wheat by weeds [8,9,10].

Object of study and methodology

Field experiments were conducted in 2016-2018 on light gray soils in the Kasan district of the Kashkadarya region in the south of Uzbekistan. The size of the experimental plot was 180 m^2, the accounting plots were 100 m^2. The experiments were carried out in quadruple replication [2].

To study the efficiency of the Atlantis herbicide application, two backgrounds were created: Atlantis was not applied on the first background, and Atlantis was applied on the second background on April 10 at a rate of 300 g/ha. In both backgrounds, mineral fertilizers were applied at different rates and ratios. In the control variant, NPK was not applied; in other experimental variants, NPK was applied at reduced ($N_{150}P_{70}K_{50}$), recommended ($N_{180}P_{90}K_{60}$), and increased ($N_{210}P_{105}K_{70}$) rates and ratios [2].

The yield data were mathematically processed using the Dospekhov method [2].

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Research results and discussion

As the results of the studies of the effect of the use of the herbicide Atlantis and fertilizers on the yield of winter wheat have shown, the use of the herbicide Atlantis at a rate of 300 g/ha against the background of the optimal rate and ratio of mineral fertilizers is one of the ways to further increase grain production in the steppe zone of southern Uzbekistan (Table 1).

Against the background of the absence of the use of the Atlantis herbicide in winter wheat fields, the additional yield of winter wheat grain obtained in the experimental variant with a reduced rate and ratio of mineral fertilizers ($N_{150}P_{70}K_{50}$) was 9.1 c/ha compared to the control variant of the experiment, where NPK was not used.

In the increased rate and ratio of mineral fertilizers, the grain yield naturally increases. In the experimental variant, where NPK was applied at the recommended rate and ratio ($N_{180}P_{90}K_{60}$), the increase in grain yield was 11.9 c/ha, and in the experimental variant with an increased rate and ratio of mineral fertilizers ($N_{210}P_{105}K_{70}$), the additional grain yield was 14.1 c/ha.

Table 1. Yield of winter wheat

№	Experience options	Productivity, c/ha				Additional yield due to NPK, c/ha		Additional yield due to herbicide, c/ha	
		2016 y M±m	2017 y M±m	2018 y M±m	Average	±	%	±	%
No herbicide									
1	$N_0P_0K_0$ (St)	31,4±0,45	30,9±0,39	29,6±0,40	30,6	0	0	0	0
2	$N_{150}P_{70}K_{50}$	41,8±0,57	39,2±0,60	38,2±0,49	39,7	9,1	29,7	0	0
3	$N_{180}P_{90}K_{60}$	45,3±0,41	42,1±0,53	40,1±0,43	42,5	11,9	38,9	0	0
4	$N_{210}P_{105}K_{70}$	47,6±0,88	44,2±0,59	42,4±0,35	44,7	14,1	46,2	0	0
Atlantis 300 g/ha									
5	$N_0P_0K_0$ (St)	39,6±0,44	38,1±0,57	37,4±0,55	38,3	0	0	7,7	25,3
6	$N_{150}P_{70}K_{50}$	59,9±0,58	57,1±0,49	56,3±0,44	57,8	19,4	50,6	18,1	45,5
7	$N_{180}P_{90}K_{60}$	63,9±0,69	60,7±0,50	58,4±0,38	61,0	22,7	59,1	18,5	43,5
8	$N_{210}P_{105}K_{70}$	67,6±0,54	63,8±0,64	60,8±0,69	64,1	25,7	67,1	19,3	43,2
	$SSD_{0.5}$=c/ha * Factor A (herbicide)	1,02	0,81	0,48					
	$SSD_{0.5}$=c/ha Factor B (NPK)	1,18	0,93	0,55					
	$SSD_{0.5}$=c/ha Factor AB	2,05	1,62	0,95					

Note: *smallest significant differences for 5% significance level

However, against the background of the experiment, where Atlantis was used at a rate of 300 g/ha, the efficiency of NPK increased almost twice. In the experimental variant with a reduced rate and ratio of mineral fertilizers ($N_{150}P_{70}K_{50}$), the additional grain yield of winter wheat was 19.4 c/ha. In the experimental variant with the recommended rate and ratio of mineral fertilizers ($N_{180}P_{90}K_{60}$), the additional grain yield increased by 3.3 c / ha compared to the experimental variant with a reduced rate and ratio of mineral fertilizers, and in the experimental variant with an increased rate and ratio of mineral fertilizers ($N_{210}P_{105}K_{70}$), the additional yield was 25.7 c/ha. This indicator of the winter wheat grain yield is 11.6 c/ha higher than with a similar experimental variant, where Atlantis was not used.

If we compare the effectiveness of the use of mineral fertilizers against the background of the experiment with the use of the herbicide Atlantis against monocotyledonous and dicotyledonous weeds in winter wheat fields with the background of the experiment where Atlantis was not used, the following pattern was established.

In the experimental variant without the use of the Atlantis herbicide against monocotyledonous and dicotyledonous weeds and without NPK, the grain yield of winter wheat averaged 30.6 c/ha. And in a similar experimental variant without NPK against the background of the Atlantis herbicide 300 g/ha, the grain yield of winter wheat was 38.3 c/ha, which is 7.7 c/ha higher compared to the background without the use of the Atlantis herbicide against weeds. And against the background of NPK, the grain yield of winter wheat increased by 19.4-25.7 c/ha, compared to the control variant of the experiment, where NPK was not used and 18.1-19.3 c/ha, where the Atlantis herbicide was not used against weeds.

The obtained data on the study of the effect of the use of the herbicide Atlantis against monocotyledonous and dicotyledonous weeds and fertilizing winter wheat indicate that the combination of herbicides with mineral fertilizers is an effective way to develop grain production in the steppe zone of southern Uzbekistan, where soil and climatic conditions are unfavorable for growing winter cereals.

Conclusions

The combination of the use of the Atlantis herbicide against monocotyledonous and dicotyledonous weeds and fertilizing winter wheat is an effective way to develop grain production in the steppe zone in the south of Uzbekistan, which helps to increase the grain yield of winter wheat with the help of the herbicide to 19.3 c/ha, due to NPK to 25.7 c/ha.

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