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Introduction of Calculated Doses of Mineral Fertilizers to Achieve Maximum Productivity of Winter Wheat Varieties on Chernozem Leached Stavropol Upland.

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ABSTRACT

The article presents the research materials for the 2016-2017 influence the calculated doses of mineral fertilizers on productivity of winter wheat varieties in Krasnodar breeding (Grom, Vassa, Dolya) on leached Chernozem Stavropol upland.

Keywords: winter wheat, fertilizers, planned yield, leached Chernozem, fertilizer dose.

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INTRODUCTION

Cereals occupy more than half of the world's arable land, and the volume of world grain trade is 240-316 million tons and has a steady upward trend, which is not enough for food security, according to estimates by the United Nations and the World Health Organization (WHO). The solution to this problem is to increase the yield of crops on the available arable land, by investing additional funds in the use of new efficient cultivation technologies, high-yielding varieties and hybrids, machines and tools for cultivating crops, fertilizers, etc., that is, which produce food [1, 7].

A big role in obtaining high yields is played by: climatic conditions, fertilizer system and variety. A variety is not only a means of increasing crop yields, but also a factor without which it is impossible to realize the achievements of science and technology. In agricultural production, the variety acts as a biological system, which can not be replaced by anything [9].

Soil fertilization performs not only the functions of replenishing nutrients for the plant, but also their mobilization in the soil in an accessible form, increasing the energy of vital processes in the soil, improving their properties. Consequently, a scientifically based fertilizer system performs important ecological functions when applied in an agroecosystem [6,8,10]. Mineral fertilizers are, and will, remain in the foreseeable future one of the main levers for increasing the productivity of crop production. Currently, there is no reasonable alternative to their use. In 2017 in Russia for each hectare, an average of about 33 kg of nutrients. The volume of their application is eight times lower than that of foreign countries [2,3,4,5].

MATERIALS AND METHODS

Studies on the effect of calculated doses of mineral fertilizers on achieving maximum productivity of winter wheat varieties of Krasnodar breeding were conducted from 2015 to 2017. at the agricultural experimental station of the Stavropol State Agrarian University, which is located on the northern slope of the Stavropol Upland in the Grachev-Kalaussky landscape of forests and steppes.

The territory of the experimental station belongs to the fourth agroclimatic region. The zone is characterized by unstable moistening over the years and uneven precipitation during the year. The average long-term sum of precipitation is 551 mm, during the vegetation period 350-370 mm, the average annual air temperature is 9.2°C. The hydrothermal coefficient is 1.1-1.3. The soil of the experimental site is chernozem leached, powerful, low-humus heavy loam, which is characterized by an average humus content (5.1-5.4%), nitrification capacity (16-30 mg / kg), mobile phosphorus (20-25 mg / kg according to Machigin) and exchange potassium (220-270 mg / kg). The reaction of the soil solution in the upper horizons of the soil is neutral, is within the range of 6.1-6.5.

The plots were placed by the method of randomized repetitions, the repetition of the experiment was 3-fold. The width is 3.6 m, the length is 5 m, the total S plots are 18 m², the accounting S experience is 648 m². The experiment is two-factorial, represented by the following factors: factor A - varieties of winter wheat Dolya, Vassa, Grom; Factor B - doses of mineral fertilizers for productivity 5,0, 7,5 and 10,0 t / ha. Scheme of experience: 1. control (fond N₆₃P₅₂); 2. planned yield 5.0 t / ha – N₁₂₄P₇₂K₃₀; 3. planned yield 7,5 t / ha – N₁₈₆P₉₅K₄₅; 4. planned yield 10,0 t / ha – N₂₄₈P₁₃₃K₆₀. The previous culture in the experiment was peas.

It should be noted that the humidification conditions and the temperature regime for the formation of the winter wheat crop in 2016 were more favorable than in 2017. The average yield for all options in 2016 was 6.69 t / ha, in 2017 - 6.01 t / ha (Table 1).

All studied doses of mineral fertilizers significantly increased the yield of winter wheat in relation to the control, regardless of the varieties under study in 2016 by 1.15-5.15 t / ha, in 2017 by 1.76-5.04 t / ha. The maximum productivity was obtained by introducing a dose of N₂₄₈P₁₃₃K₆₀ for the planned yield of 10.0 t / ha and averaged over 2016-2017 - 8,8 t / ha.

RESULTS AND DISCUSSION

On average, in two years the planned level of productivity of 5.0 t / ha when applying a dose of

fertilizer $N_{124}P_{72}K_{30}$ was achieved. The productivity level of 7.5 t / ha ($N_{186}P_{95}K_{45}$) and 10.0 t / ha ($N_{248}P_{133}K_{60}$) was not achieved, the greatest reliability of the planned yield of 99% was obtained by introducing a dose of $N_{186}P_{95}K_{45}$ for the planned yield of 7.5 t / ha.

Table 1: Yields of winter wheat varieties on the basis of optimization of mineral nutrition for 2016-2017, t / ha

Planned productivity, t / ha	Doses of fertilizers	Variety of winter wheat	2016	2017	Average for 2016-2017 years
Control (fond)	$N_{63}P_{52}$	Vassa	3,60	3,18	3,39
		Grom	4,31	2,90	3,60
		Dolya	4,80	3,98	4,39
5,0	$N_{124}P_{72}K_{30}$	Vassa	4,71	5,45	5,08
		Grom	5,32	4,66	4,99
		Dolya	6,13	5,23	5,68
7,5	$N_{186}P_{95}K_{45}$	Vassa	7,51	7,64	7,58
		Grom	7,30	7,09	7,20
		Dolya	8,39	6,79	7,59
10,0	$N_{248}P_{133}K_{60}$	Vassa	8,23	9,23	8,73
		Grom	9,46	8,65	9,06
		Dolya	10,47	7,30	8,89

On average, over two years of research, when the dose $N_{124}P_{72}K_{30}$ and $N_{186}P_{95}K_{45}$ was administered, the planned yields were 5.0 and 7.5 t / ha in Vassa and Dolya varieties. The Grom variety did not provide the planned yields of 5.0 and 7.5 t / ha, and the difference in relation to the planned level was 0.01 and 0.3 t / ha. The planned yield of 10 t / ha with the dose $N_{248}P_{133}K_{60}$ was received only in 2016 on the variety Dolya.

The data given in Table 2 show that all studied doses of mineral fertilizers provided an increase in the gluten content in the grain of winter wheat compared to the control by 1.2-4.2%. The greatest content of gluten on average for 2016-2017 (26.0%) was obtained with the introduction of $N_{186}P_{95}K_{45}$ on the variant with a planned productivity of 7.5 t / ha.

All doses of mineral fertilizers for the planned productivity 5.0; 7.5; 10 t / ha increased the protein content by 1.1 - 2.2%. The highest protein content was obtained with the dose of $N_{186}P_{95}K_{45}$ and was 14%.

Table 2: Effect of doses mineral fertilizers on the quality of winter wheat in 2016-2017

Planned productivity, t / ha	Doses of fertilizers	Variety of winter wheat	Content gluten, %	Index of gluten deformation	Protein
2016					
Control	$N_{63}P_{52}$	Vassa	21,1	67	11,3
		Grom	21,0	66	11,2
		Dolya	21,2	65	11,4
5,0	$N_{124}P_{72}K_{30}$	Vassa	23,1	73	12,8
		Grom	23,3	74	12,9
		Dolya	23,1	75	12,7
7,5	$N_{186}P_{95}K_{45}$	Vassa	25,3	84	13,2
		Grom	25,6	83	13,5
		Dolya	25,4	85	13,2
10,0	$N_{248}P_{133}K_{60}$	Vassa	22,1	81	12,7
		Grom	22,0	82	12,6
		Dolya	21,8	80	12,5
2017					
контроль	$N_{63}P_{52}$	Vassa	21,9	66	11,6
		Grom	22,0	67	11,8
		Dolya	21,5	65	11,4
5,0	$N_{124}P_{72}K_{30}$	Vassa	23,2	74	12,4
		Grom	24,6	76	13,4
		Dolya	23,6	75	12,8
7,5	$N_{186}P_{95}K_{45}$	Vassa	25,7	83	13,3

		Grom	26,5	83	14,1
		Dolya	27,2	84	14,7
10,0	N ₂₄₈ P ₁₃₃ K ₆₀	Vassa	24,0	82	12,2
		Grom	24,5	81	12,6
		Dolya	25,6	83	13,1

CONCLUSIONS

The use of all the studied doses of mineral fertilizers also contributed to the production of gluten of good quality - IDK (gluten strain meter) readings amounted to 73-85 units. Thus, the fertilizer doses studied had a positive effect on the analyzed indicators of the quality of winter wheat grains.

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