

# Research Journal of Pharmaceutical, Biological and Chemical Sciences

## Influence Of Fertilizers And Methods Of Soil Cultivation On The Dynamics Of Mobile Sulphur Chernozem Leached To The Winter Wheat Crops In The Zone Of An Unreliable Moistening Of Stavropol Territory.

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### ABSTRACT

The article presents the studies that were carried out in 2011-2015, in an experimental rotation hospital departments agrochemicals and farming agriculture, located in the educational-experimental station of the Stavropol State Agrarian University. In an experiment to study the effect of fertilizer systems built on different principles (recommended, biologizing, design), methods and techniques tillage on the dynamics of the content in the 0-20 cm layer of chernozem leached mobile sulfur in crops of winter wheat "Zustrich" after foregoing crop - peas. During all phases of the development of winter wheat maximum value of the element in the soil provided biologizing fertilizer system, which is aimed at maximizing the use of organic fertilizers and soil treatment method with overturn arable layer (plowing 20-22 cm).

**Keywords:** fertilizer system, the methods and techniques of cultivation, the mobile sulfur, leached chernozem, winter wheat.

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## INTRODUCTION

The main agricultural practices increase soil fertility and crop productivity is a rational composed system of fertilizer based on bioclimatic potential of the area (zone) features plants and market conditions [1, 3]. It involves reducing doses of fertilizer increase soil reserves nutrition elements. Modern fertilizer system should be based on the biological function of agriculture, combined with the rational use of mineral and organic fertilizers, as applied to the specific soil and climatic and economic conditions, taking into account environmental requirements and adaptive agriculture [7, 8]. Sulfur need for plants not smaller than phosphorus and potassium. However, to date it as an element of mineral nutrition was not given much importance. It was believed that a sufficient amount of sulfur enters the soil with precipitation, and fertilizers such as simple superphosphate, ammonium sulfate, potassium sulfate and others. At the same time the big carryover of this element with yields of crops, changing assortment of fertilizer (increased use of concentrated fertilizers) have led in recent years to its deficiency in some soils [5, 6]. However, despite this, the role of the ways and methods of soil cultivation to optimize nutrient regime has not lost its value. Scientists have proved that the content of nutrients in the soil significantly influenced not only the processing depth, but its methods [2, 4]. The main thing is the effective regulation of soil fertility, organic matter balance, nutrient regime of plants, improve phytosanitary conditions, creating favorable conditions for planting, plant care and harvesting [6].

## MATERIALS AND METHODS

The purpose of this work - to determine the effect of fertilizer systems, methods and techniques of tillage on the dynamics of the content of mobile sulfur leached chernozem in winter wheat crops Stavropol Upland.

Studies were carried out in 2011-2015, at the experimental station of the department farming agriculture and agrochemical of the Stavropol State Agrarian University, located within the Stavropol Upland in unreliable moistening zone.

Soil experimental plot - leached chernozem loam powerful low humus content, having an average content of humus (5,2-5,9%), mobile phosphorus (18-28 mg / kg Machigin), exchangeable potassium (240-290 mg / kg) and nitrification capacity (16-30 mg / kg). neutral reaction of soil solution - 6,1-6,7.

Experience include two-factor, 3 × 4.

Factor A - methods and cultivation techniques.

Variants the studied according to the experimental scheme fertilizer system imposed at the options with a variety of methods and techniques of the basic soil cultivation:

- 1 - overturn (method with overturn arable layer; PLN 5-35), 20-22 cm;
- 2 - combined method (AKM-6), 20-22 cm;
- 3 - surface tillage (BMD × 4 × 4) 10-12 cm.

Factor B - fertilizer in crop rotation system (Table 1).

**Table 1: The fertilizer system of winter wheat with foregoing crop peas, kg / ha (active ingredient)**

Fertilizer system	Introduced directly under the crops	The methods of fertilizer application		
		basic	preplant	additional fertilizing
Control	–	–	–	–
Recommended	N <sub>70</sub> P <sub>40</sub>	N <sub>30</sub> P <sub>30</sub>	N <sub>10</sub> P <sub>10</sub>	N <sub>30</sub>
Biologizing	straw 2,4 t/he + N <sub>60</sub> P <sub>10</sub>	straw 2,4 t/he + N <sub>20</sub>	N <sub>10</sub> P <sub>10</sub>	N <sub>30</sub>
Calculation	N <sub>120</sub> P <sub>75</sub> K <sub>24</sub>	N <sub>60</sub> P <sub>65</sub> K <sub>24</sub>	N <sub>10</sub> P <sub>10</sub>	N <sub>50</sub>

Accommodation options by randomized method of split plots, repeated experience 3-fold, the width of the plot - 7.5 m, length - 15 m total area of 108 m<sup>2</sup> plot, and accounting - 50 m<sup>2</sup>. In the experiment studied recognized varieties of winter wheat – Zustrich. Foregoing crop - peas. Apply fertilizer: ammophos, nitroammophos, ammonium nitrate, potassium chloride.

**RESULTS AND DISCUSSION**

When considering the ways and methods of tillage on average experience, it was noted that in the context of overturn soil treatment method the content of mobile sulfur reached the maximum values - 4.5 mg / kg of soil. This indicator is only slightly higher with use combined method, 0.3 mg / kg, and the acceptance surface tillage, 0.5 mg / kg.

Biologizing fertilizer system facilitated a significant increase in the content of mobile sulfur in the 0-20 cm soil layer as compared to the control variant, 0.9 mg / kg. This is due to the fact that the system is full of organic fertilizers, including manure. Recommended fertilizer system insignificantly increased the content of the element under study in comparison with the control to - 0.3 mg / kg, and the settlement system of fertilizer insignificantly reduced the content of mobile sulfur in the soil, compared with the natural agrochemical background in the - 0.2 mg / kg of soil.

**Table 2: Effect of fertilization systems and methods of tillage on the dynamics of the content of mobile sulfur (mg / kg) in the 0-20 cm soil layer in winter wheat crops, 2011-2015.**

Methods of tillage, A	Fertilizer system, B	Period of sampling					A, HCP <sub>95</sub> = 0,5	B, HCP <sub>95</sub> = 0,5
		Before sowing	Tillering	Booting	Earing	Full ripeness		
Overturn, 20-22 cm	Control	4,9	4,3	4,2	3,9	3,7	4,5	4,0
	Recommended	5,1	4,9	4,5	4,1	3,9		4,3
	Biologizing	5,7	5,5	5,1	4,9	4,5		4,9
	Calculation	4,9	4,1	3,9	3,7	3,3		3,8
Combined, 20-22 cm	Control	4,8	4,2	4,1	3,8	3,6	4,2	
	Recommended	5,0	4,6	4,1	3,8	3,5		
	Biologizing	5,5	5,1	4,9	4,5	4,3		
	Calculation	4,7	4,0	3,6	3,4	3,1		
Surface tillage, 10–12 cm	Control	4,6	4,1	3,7	3,4	3,2	4,0	
	Recommended	4,9	4,7	4,0	3,6	3,2		
	Biologizing	5,2	5,0	4,7	4,4	4,1		
	Calculation	4,5	4,1	3,3	3,1	2,7		
C, HCP <sub>95</sub> = 0,9		5,0	4,6	4,2	3,9	3,6		HCP <sub>95</sub> = 1,8

Analyzing Table 2, it can be concluded that on average at experience, the maximum content of the element was discovered before sowing of winter wheat - 5.0 mg / kg, then we have observed a gradual decline, and the phase of full ripeness of the culture of mobile sulfur content reached the minimum values - 3 6 mg / kg. The reason for the maximum content of sulfur mobile (5 mg / kg) before sowing can be in abundant precipitation during the growth. During the growth and development of plants concentration decreased significantly due to the consumption of the plant cells.

All studied the systems of fertilizer, except calculation, the average at experience, increased content of mobile sulfur compared to the control in the 0-20 cm soil layer leached chernozem in winter wheat crops. With the use of overturn soil treatment method difference compared to the control variant was: before sowing crops - 0.2-0.8; in the phase of tillering - 0.2-0.3; booting - 0.3-0.9; the phase of earing - 0.2-1.0; in the phase of full ripeness - 0.2-0.8 mg / kg. In embodiments, the combined method of soil treatment difference compared to the control variant were: before sowing - 0.2-0.7; in the phase of tillering - 0.4-0.9; booting - 0.1-

0.8; the phase of earing - 0.1-0.7; in the phase of full ripeness - 0.1-0.7 mg / kg. In embodiments using surface soil tillage, difference compared to natural background agrochemical were: before sowing - 0.3-0.6; in the phase of tillering - 0.6-0.9; booting - 0.3-1.0; the phase of earing - 0.2-1.0; in the phase of full ripeness - 0.1-0.9 mg / kg. The content sulfur mobile in the using the calculation system options fertilizer was equal to or control variant, or slightly below. On the natural of agrochemical background with use combined method of tillage and receiving surface tillage maximum performance mobile sulfur observed before sowing the study of culture - 4.9; 4.8 and 4.6 mg / kg of soil, respectively. Then there was a gradual decrease in the achievement of the minimum value to the phase of full ripeness of winter wheat - 3.7; 3.6 and 3.2 mg / kg of soil. On biologizing system of fertilizer on the options in the application of the overturn, the combined method and surface tillage before sowing of winter wheat were observed maximum values of the content of mobile sulfur - 5.7; 5.5 and 5.2 mg / kg of soil. In the future, there was a decrease to the minimum value in the phase of full ripeness of winter wheat - 4.5; 4.3 and 4.1 mg / kg by soil.

The content of mobile sulfur for leached by grouping chernozem soil is low (less than 6 mg / kg). The principal reason for the inadequate provision of mobile sulfur is to reduce the use of fertilizers containing this element. It is recommended to increase the amount of sulfur-containing fertilizers, such as ammonium sulfate. In crop rotation was entered organic fertilizers, but this is not enough, because organic fertilizers cannot be fully considered as the main source of sulfur into the soil. Livestock manure contains about 200 kg sulfur in per 1 ton. Sulfur can get into the soil with precipitation, but lately its emissions declined significantly due to the economic downturn. A certain amount of sulfur can enter the atmosphere during the combustion of coal and wood, heating of premises.

### CONCLUSION

Using the method with overturn arable layer, the content of mobile sulfur reached the maximum values - 4.5 mg / kg, which is slightly higher than the combined method na - 0.3 mg / kg, and surface tillage - 0.5 mg / kg. Among the studied systems fertilizer, biologizing system contributed to a significant increase in mobile sulfur concentration in the 0-20 cm soil layer, compared with the control at - 0.9 mg / kg. Before sowing of winter wheat element content is 5 mg / kg, followed by a gradual decrease, and the phase of full ripeness of mobile sulfur concentration was 3.6 mg / kg.

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