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Effect of Density Soil on Productivity of Winter Wheat in Terms of Area with Moderate Moisturize.

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ABSTRACT

This article presents the results of studying the influence of cultivation technology on the productivity of winter wheat grown on leached chernozem in the temperate zone of the Stavropol Territory.

Keywords: winter wheat, grain quality, direct seeding.

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INTRODUCTION

Winter wheat is one of the most important, the most valuable and high-yielding food crops. Its value is that the grain is high in protein (16%) and carbohydrates (80%), it is widely used in bakery, macaroni, confectionery industry. In the Stavropol Territory, more than 1.5 million tons are sown annually. ha of winter wheat. Its yield on average is 33.6 centner / ha, but it varies considerably in the zones, which indicates that it is necessary to take into account the soil-climatic conditions, as well as the characteristics of the variety, the precursor, and the fertilizer system when it grows [2].

MATERIALSANDMETHODS

Scientific research was carried out in accordance with the theme of research of the Department of General Agriculture, Plant Production and Breeding. F.I. Bobrysheva. The object of research was winter wheat, grown by the predecessor of soy. In studies, one factor was studied: cultivation technology. The studies were conducted in field and laboratory experiments in 2015-2016 agricultural year.

Field experiments were conducted at the hospital of the Department of General Agriculture, Plant Production and Breeding. Professor F.I. Bobrysheva, laboratory - in the laboratory of the department of general agriculture, plant breeding and breeding them. Professor F.I. Bobryshev Stavropol State Agrarian University.

In the experiment we studied traditional technology and technology using direct sowing.

RESULTS AND DISCUSSION

Among all agrophysical indices of soil fertility, the soil density is most closely connected with the yield of agricultural crops, including winter wheat. The density of the soil is a generalizing characteristic of the physical state of the arable layer. It does not remain constant during the growing season of the culture and the growing season of 2015/2016 as a whole (Table 1).

Table 1: Effect of cultivation technology on soil density during the growing season of winter wheat, g / cm^3

Technology	Layer of soil, cm	Time of determination			Average
		before sowing	spring regrowth	full ripeness	
Traditional	0-10	1,12	1,17	1,21	1,17
	10-20	1,23	1,30	1,34	1,29
	20-30	1,29	1,33	1,37	1,33
Direct seeding	0-10	1,19	1,26	1,34	1,26
	10-20	1,32	1,35	1,38	1,35
	20-30	1,38	1,40	1,41	1,40

During the years of research at the hospital, the following data were obtained. With traditional cultivation technology, the soil density before sowing in the 0-10 cm layer is 1.12 g / cm^3, which is much lower than in direct seeding, where density in the same layer is 1.19 g / cm^3, which is explained by the absence of intermediate technological operations. This tendency is also manifested in the layers of 10-20 and in 20-30 cm of soil. At the same time, during the spring regrowth phase, the density varied from 1.17 to 1.33 g / cm^3 in a variant with traditional technology and from 1.26 to 1.40 g / cm^3 in the case of direct seeding.

The density of the soil does not remain constant during the growing season of the crop and the growing season as a whole. Under the influence of a number of factors, the density of the soil changes: it decreases in compacted areas and rises on loosened areas. Thus, the density of soil at different sites approaches the equilibrium value [1, 4].

In the phase of complete ripeness, a significant increase in density is observed for all the variants of the experiment. The difference between the options was 0.04-0.13 g / cm^3 in favor of technology where plowing was used.

During the spring renewal of vegetation, despite the wetting of the soil with meltwater and precipitation, its density increased with both technologies, but with traditional technology it averaged 1.21 in the 0-30 cm layer, with a direct seeding of 1.30 g / cm^3, or by 0.09 g / cm^3 is greater.

On average, in the soil layer 0-30 cm, the density in the variant with traditional technology was significantly lower and amounted to 1.27 g / cm^3, which is 0.07 g / cm^3, lower than in direct seeding during the spring regrowth phase. During the phase of full ripeness, the same tendency was preserved and the difference between the variants was 0.07 g / cm^3.

It should be noted that the soil was not treated for seven years. And according to the literary data there must be decompression of the soil, but this fact is not confirmed by us. Perhaps this phenomenon can be explained by the peculiarities of the moistening regime during the period of research, when heavy precipitation fell out before sowing, which caused some compaction of the soil during the cultivation of winter wheat. At the same time there is an increase in soil density and according to traditional technology. The increase in density for both technologies to 1.33-1.40 g / cm^3 is excessive and may adversely affect the growth, development and yield of winter wheat.

Important in the analysis of productive moisture is the moisture content in the 0-10 cm layer before sowing. During the sowing period, about 10 mm of moisture was contained in this layer, which is 50% of the seed requirement for germination.

A somewhat larger amount of moisture on the variant using direct seeding technology can be explained by the following factors. There are not so many vegetable soybean residues on the surface and they can not create a layer of organic matter completely covering the surface of the soil and shading it from excessive evaporation of moisture. Secondly, before sowing, about 90 mm of precipitation fell, which contributed to an increase in the content of productive moisture.

When analyzing the moisture content in a meter layer, it should be noted that in the case of direct seeding, the quantity exceeded the traditional technology option before sowing by 10.1%, during the spring regrowth by 17.3% and during the full ripeness period by 12.3%.

When analyzing the main elements of the structure of the crop of winter wheat, we found that the yield in the final result depends on the density of productive stalk, the number of grains in the ear and the mass of 1000 grains.

The highest indicators of the standing stand of the productive stem and the mass of the grain were formed during the cultivation of winter wheat using traditional technology, it predetermined the obtaining of a higher grain yield in comparison with the direct seeding technology.

According to the traditional cultivation technology, 382 pcs / m^2 of productive stems were obtained, 41 pieces of grain in an ear with a mass of 1,000 grains of 40.6 grams, and according to technology with direct seeding, these figures were respectively 351 pcs / m^2, 38 pcs. and 36.2 g respectively.

Thus, in the conditions of the zone of moderate moistening, the greatest biological yield of winter wheat grain was obtained with its cultivation according to traditional technology. The application of direct seeding technology in the cultivation of winter wheat leads to a significant decrease in grain yields, which is confirmed by analysis of the elements of the crop structure [3].

In our studies, the highest yield of winter wheat was obtained when grown according to traditional technology. According to this technology, 4.25 tons of grain per hectare was obtained, which is 1.35 t / ha or 17.2% more than in direct seeding technology (Table 2).

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Table 2: Effect of cultivation technology on the yield of winter wheat, t / ha

Technology	Repeatability			Average
	I	II	II	
Traditional	3,23	3,73	4,53	4,25
Direct seeding	2,66	2,09	3,24	3,56
$HCP_{0,95}$				1,06

Traditional technology of winter wheat cultivation provided a mathematically reliable yield increase compared to direct seeding technology.

Along with the increase in yield, great importance is attached to the quality of grain. He is paid much attention to both the procurement bodies and the processing industry, as well as the consumer.

The choice of cultivation technology did not have a significant impact on grain quality. So, in terms of the nature of the grain (750 g / l), the mass fraction of gluten (25%) and the quality of gluten, the grain of wheat of the grade Yuka corresponds to the third class according to GOST.

The quality and yield of grain determined the profit margin from one hectare of sown area. Profit is a part of the net income created in the process of production and sales of products, which is calculated as the difference between the income received from the sale of products and the costs of its production and sale.

Traditional technology led to the highest profit and profitability level of 17730.0 rubles. and 86.4% respectively. Using the technology of direct sowing, the level of profitability and profit was 4503 rubles and 16.1% lower.

The level of profitability with traditional technology was 86.4% and 70.3% with zero technology, respectively.

CONCLUSION

The variant with the use of traditional technology generated the highest grain yield of winter wheat (4.25 t / ha), and the lowest - by direct seeding technology (3.56 t / ha). The use of traditional technology contributed to an increase in production costs by 1,707 rubles, compared to 18,812 rubles for technology using direct seeding. The introduction of zero (resource-saving) technology in the cultivation of winter wheat reduced profitability by 16.1%, which does not prevent to recommend it for implementation, but taking into account all requirements.

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