ISSN: 0975-8585

Research Journal of Pharmaceutical, Biological and Chemical Sciences

Previous Crop - As An Element Of Organic Farming In The Cultivation Of Winter Wheat In The Central Pre Caucasus.

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ABSTRACT

Scientifically based crop alternation is fundamental to the regulation of soil fertility factors and obtaining stable high quality yields. The data presented in the paper confirm the theoretical conclusion. When cultivating winter wheat in the arid zone, on the basis of the obtained experimental data, it was shown that cultivation of winter wheat in a couple of pure peas and flax provides the best germination of plants (80.8, 84.4 and 74%) compared to repeated sowing (73.0%). Cultivation of winter wheat in re-sowing contributes to an increase in weed infestation by 2-3 times, in comparison with the predecessors studied. In this connection, during the cultivation of winter wheat, the predecessors obtained a high yield: by flax 5.08, by pea - 5.67, by a couple of net - 5.71, whereas in re-sowing 4.99 t/ha.

Keywords: crop rotation, winter wheat, predecessor, yield.

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ISSN: 0975-8585

INTRODUCTION

When establishing the alternation of crops in crop rotation, it is necessary to consider the nature of their interaction with the environment. This interaction manifests itself in a wide variety of forms. Cultivated plants have on agrophysical and biological properties of the soil, weeds, biological processes, fungal flora, etc. [4, 6].

The impact of cultivated plants on the soil is manifested in a variety of ways. Under the influence of plants, the physical and biological properties of the soil change [2]. At the same time, the species composition of crops, the thickness of their above-ground and root mass, their density, etc., have a significant influence. [1, 7]. It is necessary to note the positive effect of mineral fertilizers, which contributed to a better development of the root system, resulting in more organic matter remaining in the soil [3, 4, 8].

Correct alternation of crops in crop rotation helps to optimize agrophytocenoses, in particular, to reduce weed infestation, since re-cultivation of an agricultural crop leads to the accumulation of seeds of wintering weeds that germinate in crops of the second crop [5, 9].

In connection with the above, the placement of crops in a science-based crop rotation is rational from the point of view of preserving soil fertility and obtaining economically viable harvests of winter wheat.

MATERIALS AND METHODS

Studies on the effect of winter wheat precursors on soil fertility indicators and crop yields were conducted in the unstable wetting zone of the Stavropol Territory based on the Yurchenko farm in the Stavropol Territory in 2016-2017. The object of the study is winter wheat, cultivated on a clean pair, leguminous crops, flax and in re-sowing, the subject of the study - the predecessors, the method of research field and laboratory. A variety of winter wheat Yuka breeding Krasnodar. The variety is suitable for cultivation on all predecessors on medium and high agricultural backgrounds. The main territory of the agricultural land of Yurchenko farm has a leached chernozem, powerful, heavy loamy soil, which is characterized by an average humus content (5.2–5.9%), an average nitrification capacity (16–30 mg / kg), an average content of mobile phosphorus (18-28 mg / kg according to Machigin), and increased - exchangeable potassium (240-290 mg / kg). The reaction of the soil solution in the upper soil horizons is neutral, the pH is in the range of 6.1–6.7. The content of total nitrogen - 0.23–0.25%, total phosphorus - 0.13–0.15%, total potassium - 2.2–2.4%. According to the manganese content, the soil is medium-sufficient - 18 mg / kg of soil, the content of mobile zinc is low - 0.7 mg / kg, the mobile boron is high - 2.86 mg / kg, the sulfur content is 13.4 mg / kg of soil.

Determination of weed infestation by the quantitative method (I.P. Vasiliev, A.M. Tulikov, G.I. Bazdyrev, 2005). Phenological observations were established by passing the calendar dates for the development of winter wheat in accordance with the State Testing Methodology (1985). Experimental data were processed dispersively, using personal computer analysis (B.A. Dospekhov, 1985).

RESULTS AND DISCUSSION

The data presented in table 1 indicate that in the cultivation of winter wheat for a clean pair, flax and pea field seed germination is within the limits of GOST and is respectively 89.7, 82.2 and 97.7%, when cultivated in repeated sowing it is lower - 81.1%. This is due to several reasons: the contamination of crops, the development of pathogenic microflora, the entry and accumulation of plant residues of homogeneous chemical composition, which leads to the accumulation of phytotoxic substances that inhibit the germination of winter wheat seeds. The counting of overwintered plants confirmed the above described patterns - in the re-sowing there were 331 pieces / m^2, which amounted to 73.5%, for peas 382-84.8%, for flax 336-74.6%, for a clean pair of 367 pieces / m^2- 81.5%.

Consequently, the seed germination is higher in peas and in a clean pair, both before leaving in the winter before winter and after it. Field germination and preservation of plants for harvesting in re-sowing and flax is slightly different from each other and is lower than in pure steam and peas, this is due to the lack of nutrients in the soil, as flax is a drying culture and in the soil after this culture insufficient amount of moisture, and re-seeding is an unfavorable precursor for winter wheat, as there is a deterioration in the phytosanitary

condition, one-sided removal of nutrients, accumulation of toxic substances. This is confirmed by the data on the contamination of crops (Table 2).

Table 1: The number of winter wheat plants, depending on their predecessors

Predecessor	Autumn tillering, pcs / m^2	Field germination,%	Number of overwintered plants, pcs / m^2	Safety of plants for cleaning,%
Re-seeding	365	81,1	331	73,5
Peas	422	93,7	382	84,8
Clean steam	404	89,7	367	81,5
Linen	370	82,2	336	74,6

Table 2: Weediness of winter wheat sowings depending on predecessors, pieces / m^2

Predecessor	Number of plants per m^2, pcs						Total weeds m^2, pcs
	Annual weeds			Perennial weeds			
	Total	Including		Total	м		
		Cereals	Dicotyledons		Cereals	Dicotyledons	
Winter wheat	143	8	135	30	-	30	173
Linen	90	4	86	2	-	2	92
Peas	45	3	42	22	-	22	67
Clean steam	34	3	31	8	-	8	42

The weed infestation of winter wheat cultivated in repeated sowing was maximum and amounted to 173 pcs / m^2, of which 143 are annual and 30 are perennial. According to its predecessor, flax contamination is also quite high and amounted to 92, of which 90 are annual and 2 perennial weeds per square meter. What is connected with the relatively late date of harvesting, to which many species of weeds are inseminated and cause further contamination of winter wheat crops. For peas, there were 67 pieces / m^2 of weeds.

The smallest amount of weeds is in a clean pair, since the field of steam is constantly processed for one year, and also herbicides are applied. For winter wheat re-sown there is a significant amount of grass weeds. This negatively affects the production of this crop, since this type of weed is difficult to destroy in areas where winter wheat is cultivated due to belonging to the same family.

Analysis of the data presented in Table 3 shows that for a clean pair of weeds is much less than for other predecessors, this applies to all biological groups of weeds. The overwhelming group was wintering weeds - blue cornflower, tender horispora, tenacious bedstraw, shepherd's purse, purple purpurea. Their number of predecessors ranged from 40 to 60%. The greatest amount of weed plants was in flax and in re-seeding.

Table 3: Species composition of weeds on winter wheat by various predecessors

Weed plants pcs / m^2	Predecessors			
	Winter wheat	Linen	Peas	Clean steam
Ambrosia wormwood	47	17	9	10
Field bindweed	20	1	12	8
White march (quinoa)	23	12	11	3
Cornflower blue	56	12	14	10
Wild Oat (Oats is empty)	8	4	2	2
Khorispor tender	10	8	1	1
Field Thistle	-	1	1	-
Cleavers	1	1	6	5
Shepherd's purse	3	21	2	2
Lamia purple	11	4	9	1

Star is average	1	1	-	-
Total pc	173	92	67	42

The precursor has a significant amount, mass and composition of plant residues. The remains of leguminous crops, contain mainly nitrogen and the ratio between nitrogen and carbon is quite narrow, and therefore the rate of decomposition of plant residues by microorganisms is intense. The biological activity of the soil after peas in winter wheat crops was 76.2%, it is slightly lower in repeated crops - 56.4%. According to its predecessor, flax biological activity is lower than 67.3%, due to the fact that the flax plant residues contain in their composition of two main components - organic and inorganic. The organic components of flax are represented by cellulose and its companions (hemicellulose, lignin, pectin, nitrogenous and waxy substances) [10, 11, 12]. The elementary bast fibers are 98% cellulose and they decompose extremely slowly. A couple of pure biological activity is the lowest - 49.9%, which is associated with the almost absence of plant residues and the rapid rates of their decomposition due to intensive tillage.

Consequently, in the soil under legumes the biological activity is higher, the decomposition of plant residues and the release of nutrients for use by the subsequent culture will go faster.

Table 4: Cellulolytic activity of the soil under winter wheat depending on the precursors

Predecessors	% loss of cotton fiber
Re-seeding	56,4
Linen	67,3
Peas	76,2
Clean steam	49,9

After analyzing all the above results of the analysis of the cultivation of winter wheat by flax, pea, clean pair and in re-sowing, we can conclude that in re-sowing the yield and quality of grain is the lowest, and in a clean pair and pea the yield of grain is slightly different from each other, While the quality of grain in a clean pair is higher than in peas, which is associated with the accumulation in the soil of a clean pair of nutrients necessary to obtain high-quality grain. In the re-sowing, both the grain quality and its productivity deteriorate, which is associated with the depletion of the soil during the cultivation of winter wheat again in one agricultural plot (Table 5).

Table 5: Productivity and grain quality in winter wheat

Indicators	Yield t / ha	Nature	Amount of gluten	Gluten quality	Protein content
Winter wheat	4,99	788	16,4	61	11,7
Linen	5,08	796	17,8	63	12,5
Peas	5, 67	804	18,2	61	11,2
Clean steam	5,71	785	20,2	70	13,0
HCP, $_{05}$, t/ha	0,12				

Statistical data processing showed that the cultivation of winter wheat in pure pairs and peas gives a significant increase in yield.

Table 6 shows the economic efficiency of cultivating winter wheat by various predecessors in the 2016-2017 year.

Table 6: Economic efficiency of winter wheat grain depending on its predecessor

	Indicators	Predecessors			
		Peas for grain	Winter wheat	Clean steam	Linen
1	Productivity from 1 ha, t	5,7	5,0	5,7	5,1
2	Selling price 1 ton, rub.	7000,0	7000,0	7800,0	7500,0
3	Cash proceeds from 1 ha, rub.	39900,0	35000,0	44460,0	38250,0

4	Labor costs per 1 hectare, people- h.	11,6	12,3	12,9	11,7
5	Labor costs per 1 ton, man-h	2,0	2,5	2,3	2,3
6	Production costs per 1 ha, rub.	28004,6	24052,5	33908,7	25130,8
7	The cost of 1 tons of products, rub.	4913,1	4810,5	5948,9	4927,6
8	Profit per 1 ha, rub.	11895,4	10947,5	10551,3	13119,2
9	Profitability level,%	42,5	45,5	31,1	52,2

After analyzing the data in the table, we can conclude that the profitability of winter wheat production for a clean pair is lower than for other predecessors, despite the fact that the yield and quality of winter wheat grain is higher and higher and, accordingly, more expensive than other predecessors, but for its cultivation costly.

CONCLUSION

Cultivation of winter wheat for flax is highly profitable, since the cost of this crop for flax is slightly higher than for peas and re-seeding and lower than for pure steam, but the grain quality is higher than for peas and flax, respectively, the price of grain is higher.

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