

# On The Evaluation of The Effect of Soil and Fertilizer Treatment on The Cultivation of Cereal Crops

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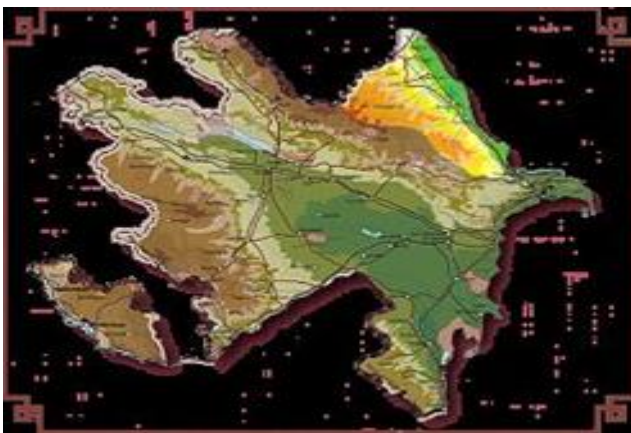
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## Abstract

The article gives the results of studies of the effect of soil treatment and fertilizers on the productivity of winter wheat in the Ganja-Gazakh area of Azerbaijan. The positive effect of fertilizers on winter wheat plants is manifested only in well-cultivated soils with an environmental reaction close to neutrality. At the same time, it is proven that between the intensity of the application of mineral fertilizers and the productivity of cereal crops in the world, a close direct dependence is established. Therefore, the highest grain yield here was obtained in the manure variant 10t/ha + N90P90K60 57.1 c/ha, an increase of 24.3 c/ha or 74.1%, where the 40-50% yield increase is due to the application of fertilizers.

**Keywords:** winter wheat, soil treatment, traditional, minimal, manure, mineral fertilizers, yield.

## Introduction



Global science and practice at the current stage

Global science and practice at the current stage of development in the field of agriculture convincingly prove the possibilities of developing energy- and resource-efficient technologies for the cultivation of agricultural crops. The main development directions envisage the production of competitive products subject to the introduction of the minimization of soil cultivation on the basis of the optimization of the structure of seeded areas and crop rotations, the fertilizer system, the protection of soil fertility and other elements of agricultural systems, taking into

account the soil-climatic characteristics of the territory [3].

Resource-efficient technologies in soil cultivation are one of the most promising methods of land use, developed in our time.

In this experiment, winter wheat was studied, the yield of which was directly related to the cultivation of the soil and the application of organic and mineral fertilizers.

In all agrotechnical measures that contribute to high yields of winter wheat food grains, fertilizers play a leading role.

We, by skillfully using fertilizers, have tried to improve the quality of the grain, increasing its protein content, gluten content and technological properties.

The purpose and objectives of the study: The purpose of our research is to study the methods of soil cultivation and fertilizers, improve soil fertility and winter wheat cultivation technology, which guarantees better yield and quality of cereals in the Ganja-Gazakh area of Azerbaijan.

### **The conduct of the study**

On the basis of the studies conducted, it was established that in order to obtain a high-quality and high-quality winter wheat harvest and restore soil

fertility on gray-brown to long-irrigated soils of this area, it is recommended for farms (traditional loosening 20-22 cm) and minimal tillage, using fertilizers annually in the manure standard is 10t / ha + N90P90K60. As a result, the cultivation of soil treatments and the rate of fertilizers are recommended, in addition, after 3 years the minimum treatment should be replaced with traditional treatment.

Winter wheat is one of the main food crops in Azerbaijan. In 2015, the total area of winter and spring wheat seedlings in the Republic was 539679 hectares, the total cereal production was 1687681 tons, the average yield was 31.3 hundredths / ha.

In the Ganja-Gazakh area, respectively 48887 hectares, 154236 tons and 31.6 centner / ha, and place of experience of the Samukh region, respectively, 4784 hectares, 15773 tons and 33.0 centner / ha [10].

Winter wheat is one of the most important, valuable and high-yielding cereal crops. Its value is that the grain is rich in protein and carbohydrates, along with spring wheat it is widely used in baking, macaroni and the confectionery industry [6].

When growing agricultural crops, basic tillage, before and after sowing is carried out. They account for about 40% of energy and 25% of labor costs [1].

Scientifically based soil cultivation allows the accumulation and preservation of moisture in the root zone, the mobilization of nutrients, the effective control of weeds, diseases, pests, the creation of optimal agrophysical conditions for biological processes in the topsoil, the growth and development of cultivated plants [2].

The soil cultivation system in agriculture should aim to maximize the use of local bioclimatic resources, biological and agro-technical methods to regulate the productivity of arable land [4]. Plant nutrition is the most important factor in crop productivity. Between the intensity of the application of mineral fertilizers and the productivity of cereal crops around the world, a close direct relationship has been established.

The increase in yields of 40-50% is due to the use of fertilizers [9]. At the current stage of agricultural development, the main direction in improving mechanical soil treatment is its minimization - a reduction in intensity due to a reduction in the number and depth of processing, and the combination of a number of technological operations into a single passage of the aggregate along the field using combined machines and tools [7].

In modern agricultural production, the problems of

developing new low-cost technologies for growing crops, effectively eliminating the causes of soil degradation, as well as the negative consequences of human impact on soils, are more acute than ever.

Resource conservation is one of the current issues in grain growing technology. It is well known that in traditional technologies, 50% of the cost comes from basic tillage in the form of ploughing to a depth of 20-22 cm.

At the same time, there is very little material on the effectiveness of surface and small-scale cultivation of uncontaminated soils and very little data on the results of the systematic application of zero treatment to all crop rotation crops [5, 8].

### Research Methodology

The studies were conducted in 2012-2015 at the central experimental base of the Azerbaijani Cotton Cultivation Research Institute located in the western area of Azerbaijan. The scheme of the experiment is two-factor (2x4) with the following factors.

Factor a: soil treatment.

- 1) Traditional treatment (loosening 20-22 cm), 2)
- 2) Minimal treatment (10-12 cm scissors).

Factor b: Fertilizer doses:

- 1) Fertilizer-free;
- 2) manure 10t /ha + N60P60K30;
- 3) manure 10t / ha + N90P90K60;
- 4) Manure is 10 t / ha + N120P120K90.

The precursor of winter wheat was cotton.

The soil of the experimental site is carbonate, long irrigated, grey-brown, easily loamy.

The nutrient content decreases from top to bottom in the meter horizon.

According to the accepted gradation in the country, agrochemical analysis shows that these soils are poorly supplied with nutrients and require the use of organic and mineral fertilizers.

The content of total humus (according to Tyurin) in the layer 0-30 and 60-100 cm, 2.15-0.85%, nitrogen and crude phosphorus (according to KE Ginzburg) and potassium (according to Smith), respectively, is 0.15 - 0.06%; 0.13-0.07% and 2.39-1.51%, absorbed ammonia (according to Konev) 18.0-6.5 mg / kg, nitric nitrogen (according to Grandval-Liazhu) 9.7-2 , 6 mg / kg, mobile phosphorus (according to Machigin) 15.8-4.5 mg / kg, potassium exchange (according to Protasov) 263.5-105.3 mg / kg, pH of the aqueous suspension is 7.8-8.4 (in potentiometer).

And also, the physico-chemical composition of the

soils of the experimental site was studied.

Experimental fields are characterized by a high sum of exchange bases, reaching in the ploughing layer 29.8 meq / 100 g of soil.

With depth, it decreases, reaching a minimum in the layer of 60-100 cm is 21.1 meq / 100 g of soil. Soil density is 1.19-1.31 g / cm<sup>3</sup>, respectively. Agrotechnics of the cultivation of winter wheat of the variety "Gobustan" is traditional for the area. The total area of the plot is 56 m<sup>2</sup>, or 50.4 m<sup>2</sup>, the repetition is threefold, the location of the plots is random. Every year, manure, phosphorus and potassium were brought in the fall for ploughing, nitrogen fertilizers were used in the spring 2 times as fertilizer.

The experiment was established by methodical instructions (M.: VIUA, 1975) by the method of comb sowing at the rate of 200 kg / ha.

As mineral fertilizers, nitrogen ammonium nitrate, simple phosphorus superphosphate, potassium sulfate and potassium are used here.

### Results and Discussion

In traditional soil treatment, on average, over the years of research, the harvest of winter wheat in fertilizer-free version amounted to 32.8 c / ha (Fig. 1).

In the variant, manure 10 t / ha + N60P60K30 the grain yield is 40.1 c / ha, the increment is 7.3 c / ha or 22.3%.

The highest grain yield was obtained in the manure variant 10t/ha + N90P90K60 57.1 c/ha, an increase of 24.3 c/ha or 74.1%. With a further increase in the doses of mineral fertilizers on the background of manure (N120P120K90), grain collection increased insignificantly by 50.0 c / ha, the increase was 17.2 c / ha (52.4%) of grain. their reliability: P = 1.38-2.47%; E = 0.58-1.16 centner / ha

E = 0.58-1.16 c / ha

P = 1.38 to 2.47%

Fig. 1. The influence of traditional processing and fertilizer rates on the yield of winter wheat (for 3 years) With minimal soil treatment, on average, for research years, the harvest of winter wheat in unsophisticated version amounts to 30.6 c / ha (Fig.2).

In the variant, manure 10 t/ha + N60P60K30 gives a grain yield of 37.0 c/ha, which is an increase of 6.4 c/ha or 21.0%. The highest grain yield was obtained in the manure variant 10 t/ha + N90P90K60 53.4 c/ha, an increase of 22.8 c/ha or 74.5%. With a further increase in the doses of mineral fertilizers on the manure round area (N120P120K90), cereal collection increased insignificantly by 47.2 c / ha, the increase

was 16.6 c / ha (54.3%) of cereals.

The mathematical processing of the data obtained showed their reliability: P = 1.83-2.50%; E = 0.75 to 1.06 t / ha.

E = 0.75 to 1.06 t / ha

P = 1.83 to 2.50%

Fig. 2. Effect of minimum processing and fertilizer rates on winter wheat yield (for 3 years).

### Conclusion

Thus, based on the studies carried out, it can be concluded that to achieve a high and qualitative harvest of winter wheat grain and restore soil fertility on gray-brown, long irrigated soils in this area, it is recommended that traditional farms (loosening 20-22 cm) and minimal tillage, also the use of fertilizer annually in the manure standard is 10t / ha + N90P90K60 kg / ha. As a result, the cultivation of soil treatments and the rate of fertilizers are recommended, in addition, after 3 years the minimum treatment should be replaced with traditional treatment.

### References

1. Bakirov, F. G., Petrova, G. V., Dolmatov, A. P., & Petrov, D. G. (2014). Resource-saving technologies on chernozems of the Orenburg region. *Achievements of science and technology of agroindustrial complex*, 5, 3-5.
2. Garkusha A.A., (2002), Effectiveness of methods of minimizing pre-sowing tillage and maintenance of spring wheat crops under the conditions of the Altai Ob region: Dis ... ks-x. science. Barnaul, 134 p.
3. Drobyshev A.P. Optimization of crop rotation and basic tillage in resource-saving agriculture in southern Western Siberia. *Insult. ps-x. science. Moscow*, 213, 320 p.
4. Ilyasov MM, Yapparov A.Kh., Shaikhutdinov F.Sh. and others, (2014), The formation of winter wheat cultivation according to the fertilizer system while minimizing the main soil crop // *Bulletin of the Kazan GAU*, No. 1 (31), p.65-75.
5. Kazantsev, (2013), SI Effectiveness of minimum methods of cultivation of the basic soil in a cereal crop rotation link on the typical chernozems of central Chernozem. *Dis.... cc-x. nauk. Eagle*, 150 with.
6. Craft VN, Saiko VF, Shevchenko, (1978), AI Harvest and quality of wheat, according to variety, the standard of fertilizer sowing doses // *Bulletin of Agricultural Sciences*, No. 10, p.63-69.

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7. Semizorov S.A., (2013), Differentiated basic treatment of meadow-chernozem soil at different levels of mineral nutrition in the northern Urals: Dis ... cs-x. science. Krasnoyarsk, 206 p.
8. Shabaev AI, Kholinsky NM, Azizov NM, Sokolov NM, (2007), Soil protection treatment saving soil resources in agricultural landscapes of the Volga region // Zemledelia, No1, p.20-22.
9. Yagodin BA, Zhukov Yu.P., Kobzarenko V.I., (2004), Agrochemistry Ed. B.A. Yagodin. Moscow: Mir, 584 p  
View at Publisher | View at Google Scholar.
10. Http: WWW.STAT.GOV.AZ