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Short Communication

Influence of Environmental Conditions on Yield of Agricultural Crops

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Abstract:

The article presents ideas about the need for agricultural technology for growing early-ripening varieties of winter wheat, taking into account soil and climatic conditions, individual feeding norms, and irrigation regime. Soil moisture has been studied as the main factor affecting the yield of winter wheat under irrigated agriculture. Additionally, the conditions for the use of organic waste from the production of fungi are studied, as well as the necessary technologies for its practical application.

Key words: early ripening varieties of wheat; irrigation regime; feeding norms; density of soil moisture; crops; productivity

Introduction

This article sets out ideas about the need for a particular agrotechnical cultivation of early ripening winter wheat taking into account the soil and climatic conditions, individual feeding norms, irrigation regime. Also, emphasis is placed on soil moisture as the main factor affecting the yield of winter wheat under irrigated agriculture. Consideration of issues related to the cultivation of frost-resistant varieties of cereals has become relevant and attracted the attention of the government of Uzbekistan.

With the development of the mushroom growing industry in Russia, the amount of spent mushroom composts is increasing, which are beginning to be actively used as organomineral fertilizers for agricultural crops. Research questions to increase the production of agricultural crops, especially cereals, have become relevant throughout the world. For several reasons: the negative impact of the environmental situation on the yield of grain crops, the deterioration of hydrological conditions, a sharp increase in demand for grain crops.

The growth in demand for these fertilizers reduces the severity of the problem of storing waste composts. In studies conducted on dark gray forest soils of the Ryazan region, the effect on crop yields of mushroom production waste as organic fertilizers with a high percentage of nutrients that can improve the physical, biological and biochemical properties of the soil was studied. In the above experiments in waste composts: freshly unloaded and one year of storage, the content of nutrients was revealed: ash content - 8.0 and 74.1%; organic matter - 66.3 and 25.9%; NPK—0.50, 0.63, 0.44 and 0.45, 0.51, 0.39%, respectively, in combination with a favorable acid regime (pH 8.0–7.3). The maximum productivity of agricultural crops was noted in the variants with the action of semi-rotted compost: the yield of spring wheat was 2.82 t/ha (an increase of + 0.23 t/ha to the control); spring barley—3.21 t/ha (+0.17); spring rape — 1.77 t/ha (+0.24), as well as potatoes (Vympel variety — 27.91 (+ 4.41), Kolobok — 11.21 t/ha (+1.63)) and peas sowing — 2.10 t/ha (+0.21).

The high efficiency of using mushroom composts as fertilizers to increase the yield of spring barley and wheat, spring rapeseed, potatoes and peas has been confirmed.

The dose of compost application was determined in accordance with the results of calculations of the need for fertilizers for the formation of the planned yield and analysis of scientific and production results on the programming of crop yields. In accordance with this, the average dosage of composts was 50 t/ha for spring cereals, 40 t/ha for spring rapeseed, and 80 t/ha for potatoes. The presented composts are distinguished by a rather high content of basic nutrients. Content in composts: spent and 1 year of storage: ash content - 8.0 and 74.1%; organic matter - 66.3 and 25.9%; mass fraction of moisture - 65.4 and 29.3%; the content of natural humidity of common elements NPK is 0.50, 0.63, 0.44 and 0.45, 0.51, 0.39%, respectively.

All composts have a favorable pH (8.0–7.3), so physiological acidification of the soil is excluded. In the experiment, the content in the soil: humus - 3.7%, P2O5 - 10.5, K2O—14.1...15.6 mg/100 g of soil; pHsol — 5.4. The objects of research are spring wheat variety Ladya, spring barley variety Vladimir, spring rapeseed variety Rif, potatoes—mid-ripening table varieties Vympel, Kolobok, and sowing peas—Rocket. Agricultural crops were grown according to generally accepted recommendations for the conditions of the Non-Chernozem Zone. State Customs Committee 2020—1.4; State Customs Committee 2021—0.9.

The crops were grown in a crop rotation: bare fallow—winter wheat—potatoes—spring rapeseed—peas—spring cereals. The introduction of composts in the experiment was carried out under milling tillage with the MTZ-1221 + FP-1.8 unit (potatoes) or pre-sowing cultivation MTZ-1221 + KPE-3.8 (for all other crops). The total area of the variant is 80 m², accounting - 65 m2. The repetition is four times [1]. The field experiment, accompanied by numerous observations, records and laboratory analyzes, was chosen as the main research method.

Mathematical processing was carried out by the method of dispersion analysis according to B.A. Dospekhov [2].

The results of the experiments made it possible to establish a positive effect from the applied fertilizers. It should be noted that the application of fertilizers contributed to the increase in leaf area. The greatest differences were achieved in the variant with the use of semi-rotted compost. In the experiment with spring wheat in the flowering phase of the crop, with the introduction of semi-rotted compost, the leaf surface area was 2.26 m2/m, which is 1.44 times more than the values of the control variant. [1]

Information on the state of food supply in the world gives the following conclusions:

- in the world under the threat of poverty for 1.7 billion people;

- Turkey is the most dependent on wheat supplies from Russia and Ukraine;

- Egypt in 2019 received 70% of the total grain purchased from Russia, and in 2021 41% of Egyptians at times did not have enough money to buy food. A much more deplorable situation is observed in Kenya, also dependent on Russian supplies: there, and in 2021, 69% of the population at times could not afford to buy food.

All this is due to the fact that the share of the Russian Federation in the production of wheat and barley is 30%, corn - 20% and sunflower oil - more than 50%, and the products of the two countries serve as a source of food for the poorest inhabitants of the planet [8].

It is important to study the irrigation regime in the agricultural technology of winter wheat, since the effectiveness of the applied mineral fertilizers directly depends on the optimal soil moisture. As is known from scientific sources, the need for water and the development of winter wheat, based on biological characteristics, is different in different soil conditions and in different phases of development. Based on this, in 2008-2010. on the fields of the educational and experimental farm of the Andijan Agricultural Institute, experiments were carried out to determine the norms of top dressing and the irrigation regime for early-ripening varieties of winter wheat [3].

The soil on the experimental plot is partly light gray soil, mostly meadow, the depth of groundwater is 1.5. 1.7 m. 70–70–60; 65–65–60% of the field limiting capacity (FWC). The experimental plot was located in the first department of the educational and experimental farm of the Andijan Institute of Agriculture and Agrotechnologies [9].

For agricultural crops, especially for winter wheat under irrigated agriculture, the main factor affecting yield is soil moisture. With normal humidity (optimal humidity) of the soil, wheat will “survive” the heat of 45 ° C (this temperature regime is almost normal in Uzbekistan).

At 50 ° C, wheat begins to wither after 30 minutes. According to [3,4], for each variety, the appropriate soil and climatic conditions, separate fertilizing norms, and irrigation regime should be observed (the type of soil, the level of water layers and other factors are taken into account).

The studies show the influence of the irrigation regime and norms of mineral fertilizers for winter wheat varieties on the yield of grain and straw in the conditions of meadow gray soils of the Andijan region. The obtained averaged data for three years of research (2014-2016). From the above, the following conclusions can be drawn. Under the variant of pre-irrigation soil moisture of 65-65-60% of the FPV with the norm of mineral fertilizers Na - 180, P2O5 - 100, K2O - 60 kg/ha, the grain yield for three years was 70.2 q/ha, respectively; 74.5 q/ha; 71.2 centners/ha, on average for three years - 71.4 centners/ha. In the variant "Without fertilizers", the results were respectively 36.7 q/ha; 38.1 q/ha; 36.4 c/ha, on average for three years - 37.3 c/ha. The difference in yield is the result of applying irrigation at the time of greatest need for irrigation, taking into account the rationing of water supply. There was observed savings in water consumption of about 5-6% relative to the total water consumption [9].

Under the variant of irrigation with mineral fertilizers with pre-irrigation soil moisture of 65–65–60% of the FPV, the grain yield for three years was 58.5 c/ha, respectively; 60.6 q/ha; 60.6 centners/ha, on average for three years -59.9 centners/ha. Additional yield due to the use of irrigation amounted to 11.1 c/ha. The highest yield for three years averaged 80.7 c/ha, the highest yield from irrigation was 37 c/ha.

The additional yield of straw compared to the option "Without fertilizer" was 20.7 c/ha. Based on three years of research, we can say the following: the highest yield of winter wheat was obtained with a pre-irrigation soil moisture of 65–65–60% of the FPV and with mineral fertilizers with an annual rate of Na - 180 kg/ha, P2O5 - 100 kg/ha, K2O - 60 kg / ha.

In conclusion, we note that the yield depends directly on the irrigation regime while maintaining the rate of mineral fertilizers, as well as taking into account the characteristics of the soil and natural conditions. The rational use of organic waste from other agricultural sectors, such as mushroom growing, can have a positive impact on increasing crop yields.

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