

AGRICULTURAL SCIENCES

THE EFFECT OF BIOCHAR IN IMPROVING THE PROPERTIES OF THE PHYSICAL PROPERTIES OF THE SOIL

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Abstract

One of the most pressing problems in the North Kazakhstan region is the deterioration of soil retention properties due to climatic changes, soil intolerance to dry climatic conditions and a decrease in crop productivity. In this article, to study the effect of biochar on improving the physical properties of leached chernozem soils in the North Kazakhstan region, biofertilizer biochar was introduced in different quantities. The physical properties of arable land, virgin land and soils in which biochar was introduced, used in agriculture for more than 30 years, have been studied in comparison. The dry spring climate of recent years has a significant impact on the decline in crop yields in the North Kazakhstan region.

Keywords: biochar, chernozem, soil physical properties, moisture retention, soil fertility

Introduction. The physical properties of biochar play an important role in the function of restoring the environment, ecosystems. Research has shown [1] that biochar increases soil fertility and increases moisture retention capacity, soil pH, cation exchange capacity, biochar has a positive effect on soil aeration and cation exchange, porosity, reduces soil density and changes soil structure and consistency by improving physical and chemical properties. In drought-prone regions, plant productivity can be reduced by reducing the impact of drought and using biochar, which has the ability to retain moisture [2,3]. Today, climate change, global warming trends lead to soil degradation, lack of moisture in the soil, as a result of which agricultural productivity decreases, therefore, the importance of biochar in improving the physical properties of soils is high.

Studies on the influence of biochar on the physical properties of soils [4,5] have shown that biochar improves the ability of large or medium textured soils to retain water and retain moisture. Improving the physical properties of the soil is to meet the needs of the soil for vegetation, ecosystem, water, aeration [6]. Extensive cultivation of agricultural crops for a long time leads to a deterioration in the physical properties of the soil. In the arid climate of northern Kazakhstan, the physical properties of the soil are one of the indicators of soil fertility.

The results and discussion. According to the physical properties of the soil, soil moisture in autumn is 12-16 in virgin land, 11-12 in the control version, 12-14 in the 30t/ha version, biochar 13-14% in the 50t/ha version, biochar 14-11,4 % in the 70t/ha version, soil density is 1.2-1.5 g / cm³ in virgin land, 1.3-1.6 g / cm³, biochar in version 30t/ha 1,2-1,5 g / cm³, biochar in version 50t/ha 1.14-1.5 g / cm³, biochar in version 70t/ha 1.13-1.45 g / cm³, soil porosity in virgin land 53-

46%, control version 52.0-41.0%, biochar in version 30t/ha 56-46%, biochar is 57-46% in version 50t / ha, biochar is 57-47% in version 70t/ha, soil porosity aeration is 38.6-21.8% in virgin land, 37.8-21.8% in control version, biochar is 42.5-29.6% in version 30t/ha, biochar is 42.5-26.3% in version 50t/ha, biochar is 70t/ha 41.8-27.3%, the specific weight of the soil is 2.6-2.7 g / cm³ in virgin land, 2.7-2.8 g / cm³ in the control version, 2.66-2.72 g/cm³ in the 30t / ha version, 2.65-2.72 g/cm³ in the 50t / ha version, 2.65-2.71 g/cm³ in the 70t / ha version. The study of the physical properties of soils, the consideration of ways to improve them is of high importance for achieving optimal yields for different types of soils in a given climatic conditions [3]. According to a study by roughly [5], it was found that the density of the soil in which biochar was introduced decreased by up to 2%. According to the results obtained, soil moisture in biochar versions is 1.6-3.4% higher than in the control version, biochar version 70t/ha is 2.6% higher than in virgin land, density in biochar versions decreased by 0.2-0.14 g / cm³ compared to the control version, and in virgin land decreased by 0.1 g / cm³. Biochar bronzing increases the porosity of the soil and strengthens the structural strength, as a result of which it prevents soil compaction [7]. It is observed that the soil porosity is 4.7-5.74% higher than the control version, 3.0% higher than the virgin land, the porosity aeration is 3.7-4.5% higher than the control version, and 3.6% higher than the virgin land. As the proportion of organic matter in the soil increases, the specific weight decreases with biochar decreased by 0.11 g / cm³ in the introduced variants. The data obtained on the physical properties of soils in the autumn period clarify the properties of biochar in the summer period to retain moisture, reduce soil density, and improve porosity.

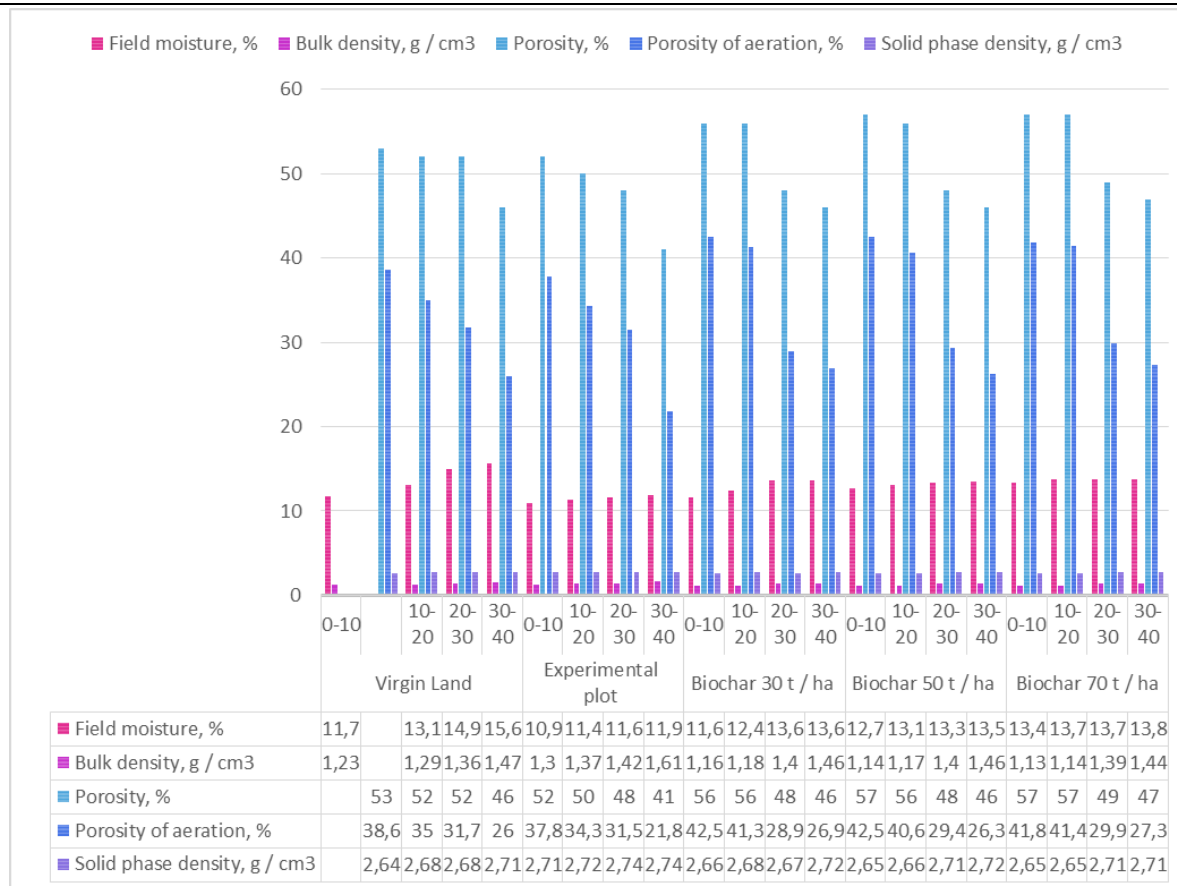


Fig. 1-physical properties of soil in summer

According to the results of the study, there is an increased ability of biochar to maintain the stability of the physical properties of the soil. And biochar is distinguished by its ability to gradually assimilate into the soil for many years in the soil. therefore, the need and importance of biofertilizers in increasing the productivity of agricultural crops and maintaining soil fertility is high.

Conclusion

The results of the study showed that although the porosity, aeration of the soil in the experimental site showed good indicators, the moisture and density of the soil in comparison with Virgin soils rich in organic substances, there is a low ability to retain moisture in the surface layer of the soil, compaction, increased moisture and decreased density after the introduction of biochar. In the dry climatic conditions of the North Kazakhstan region, biochar is an effective biofertilizer for improving the physical properties of chernozem.

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