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THE EFFECT OF PREVIOUS CROPS ON SOIL BULK DENSITY

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Annotaciya. *Qoraqalpog‘iston Respublikasi tuproqlari unumdorligi past, sho‘rlangan. Unumdorligi past tuproqlarda organik moddalar kam bo‘lganligi sababli tuproq zich bo‘ladi, bunday tuproqlarda o‘simlik ildiz tizimi o‘sishi va rivojlanishi qiyin bo‘ladi. Tajribada o‘tmishdosh va siderat ekinlar, organik va noan`anaviy o‘g‘itlarning tuproq hajm salmog‘iga ta`siri o‘rganildi.*

Kalit so‘zlar*: unumdorlik, sho‘rlanish, organik modda, hajm salmog‘i, zichlanish, o‘tmishdosh, siderat, organik va noan`anaviy o‘g‘itlar, o‘sish va rivojlanish.*

Аннотация*. Почвы Республики Каракалпакстан низко плодородные и засоленные на низко плодородных почвах в связи низким содержанием органических веществ она становится плотными, на таких почвах становится трудными рост и развитие корневой системы растений.*

На опыте изучены влияние предшествующих и промежуточных культур, органических и нетрадиционных удобрений на объемную массу почвы.

Ключевые слова*: плодородие, засоление, органическое вещество, объемная масса, уплотнение, предшественник, сидераты, органические и нетрадиционные удобрения, рост и развитие.*

Abstract. *The soils of the Republic of Karakalpakstan are characterized by low fertility and salinity. Due to the low content of organic matter in such soils, they tend to be compacted, which makes the growth and development of plant root systems difficult. The study examined the effects of previous crops and green manure (siderate) crops, as well as organic and non-traditional fertilizers, on soil bulk density.*

Keywords: *fertility, salinity, organic matter, bulk density, compaction, previous crops, green manure, organic and non-traditional fertilizers, growth and development.*

Introduction.

The agrophysical properties of soil are among the main indicators of its fertility. Even if the soil is fertile, if its bulk density is high, the plant root system cannot develop well, meaning that the plants cannot efficiently utilize nutrients. According to scientific research, one of the most effective ways to improve soil bulk density is through the use of organic fertilizers and green manure (siderate) crops.

Using green manure is effective in enriching the organic fraction of the soil. Green manure prepared from leguminous crops enriches the soil with nitrogen and organic matter. Green manure also improves the physical properties of the soil. The amount of aggregates larger than 0.25 mm increases by 3–7% in loamy soils and by 4–9% in heavy soils. As a result, the temperature in the soil layer where plant roots spread increases by 2°C–4°C, the number of microorganisms multiplies 10–17 times, and their activity is maintained at a maximum level for 45–50 days.

Methods of the experiment.

Eight experimental variants were studied. The control variant involved continuous sowing of winter wheat (Variant 1). Variants 2, 3, and 4 involved the cultivation of mung bean, sesame, and maize, followed by winter wheat. Variant 5 included mung bean for grain + 2 t/ha glauconite + winter wheat. Variant 6 included mung bean for grain + 10 t/ha manure + 2 t/ha glauconite + winter wheat. Variant 7 included mung bean for grain + 20 t/ha manure + 2 t/ha glauconite + winter wheat. Variant 8 involved mung bean as an intermediate crop + 20 t/ha manure + 2 t/ha glauconite + winter wheat. The effects of these methods on soil fertility were studied.

Results of the research.

In the spring of 2022, the average soil bulk density in the 0–30 cm layer varied by experimental variant from 1.34 to 1.38 g/cm³. In the control variant, it was 1.38 g/cm³; in Variants 2, 3, and 4, where mung bean, sesame, and maize were grown followed by winter wheat, it was 1.37 g/cm³; in Variant 5, with mung bean for grain + 2 t/ha glauconite + winter wheat, it was 1.36 g/cm³; in Variant 7, with mung bean for grain + 10 t/ha manure + 2 t/ha glauconite + winter wheat, it was 1.35 g/cm³; and in Variant 8, with mung bean as an intermediate crop + 20 t/ha manure + 2 t/ha glauconite + winter wheat, it was 1.34 g/cm³. In Variants 5, 6, 7, and 8, soil bulk density was 0.02–0.04 g/cm³ lower than in the control variant.

By autumn, soil bulk density reached 1.45 g/cm³ in Variant 1, 1.39–1.41 g/cm³ in Variants 2, 3, and 4, 1.39 g/cm³ in Variants 5 and 6, and 1.37 and 1.36 g/cm³ in Variants 7 and 8, respectively. Soil compaction from spring to autumn in the control variant was 0.07 g/cm³; in Variants 2, 3, and 4, it was 0.02–0.03 g/cm³; in Variants 5 and 6, 0.03 g/cm³; and in Variants 7 and 8, 0.02 g/cm³. In Variants 5, 6, 7, and 8, soil compaction in the 0–30 cm layer was 0.06, 0.06, 0.08, and 0.09 g/cm³ lower, respectively, compared to the control.

Conclusions.

To improve the fertility of low-fertility soils in the Republic of Karakalpakstan, crop rotation is recommended. Specifically, using a 1:1:2 system of cotton : grain : grain, and planting a previous crop of mung bean for grain + intermediate crop (mung bean) + 20 t/ha manure + 2 t/ha glauconite + winter wheat before winter wheat is considered the most effective approach.

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