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Influence Of Fertilizers on African Procorry Growing (HHBBC)

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Annotation: The article presents the results of studying the influence of mineral, organic, and micro-fertilizers on the growth, development, and yield of African millet. Their physiological functions, influence on root system formation, photosynthetic activity, grain filling, and yield quality are examined. It has been shown that the optimal nutrition system includes the combination of mineral fertilizers with organic fertilizers, which ensures maximum crop productivity in arid climates and irrigated agriculture.

Keywords: African millet, fertilizers, nitrogen, phosphorus, potassium, organic matter, trace elements, yield.

Introduction

Modern agriculture, in the context of climate change, water scarcity, and soil degradation, faces the task of finding adaptive crops capable of ensuring high yields and simultaneously improving the state of agroecosystems. In this context, African millet (HHBBC) has a particular interest, which has been increasingly being introduced into the agricultural practices of Central Asian countries, including Uzbekistan, in recent years.

African millet is one of the oldest cultivated plants, and its cultivation began more than four thousand years ago in Africa and South Asia. Currently, this crop occupies significant areas in India, Nigeria, Sudan, and is gradually expanding its distribution in the arid regions of Central Asia. The main factor determining its value is its unique resistance to drought and high temperatures. The biological characteristics of African millet largely determine its role in agriculture. First of all, it is a powerful root system capable of penetrating to a depth of 1.5-2.0 m and effectively utilizing moisture from the lower horizons. This feature allows the crop to

withstand prolonged periods of dry weather and to form a harvest even with limited irrigation. In addition, after the decomposition of roots, a significant amount of organic matter remains in the soil, which improves its structure, water permeability, and aeration. An important aspect is the short vegetation period (90-120 days). Thanks to this, African millet can be successfully incorporated into various crop rotation systems, used as an insurance crop when other plants die from drought, and grown as an intermediate crop.

The nutritional value of African millet grain is no less important. It contains 11-13% protein, up to 70% starch, as well as trace elements (Fe, Zn, Mg). In the countries of Africa and Asia, grain is used as food, and green mass and straw are used as livestock feed. In the conditions of Uzbekistan, culture can play a dual role: food and fodder. Despite its resistance and simplicity, African millet is quite responsive to fertilizers. On poor serozem soils without fertilizer application, only low yields are formed, as the crop uses nutrients from the soil intensively. At the same time, research shows that optimal application of nitrogen and phosphorus fertilizers increases grain yield by 0.6-0.8 t/ha, increases 1000 grain weight by 15-20%, and increases grain protein content by 1.0-1.5%.

Nitrogen plays a key role in the synthesis of proteins, enzymes, and chlorophyll, enhancing the growth of vegetative mass and the formation of panicles. However, excessive doses of nitrogen can delay ripening and reduce plant resistance. Phosphorus stimulates the development of the root system, improves growth energy, and accelerates grain filling. Potassium increases drought resistance, regulates water regime, and contributes to the accumulation of carbohydrates. Organic fertilizers (manure, compost, green manure) improve soil structure, increase humus content, and enhance microflora activity. Particular attention has been paid in recent years to microelements (zinc, boron, manganese) that enhance grain germination and its nutritional value.

An important area of research is the combination of organic and mineral fertilizers. Experimental data show that combined systems (e.g., N60P45K30 + 20 t/ha of manure) provide the highest yield increase - up to 1.2-1.4 t/ha, as well as improved grain quality and soil condition.

Methods

The research was conducted under the conditions of irrigated typical sierozem soils of the Tashkent region, characterized by low humus content (1.2-1.5%), alkaline reaction (pH 7.5-8.0), light mechanical composition, and low levels of available phosphorus and potassium. The climate of the region is continental, with hot dry summers and relatively mild winters. The average annual precipitation is 250-300 mm, with the majority falling during the cold season. To obtain a stable harvest in conditions of insufficient natural moisture, regular furrow irrigation was used.

Figure 1. Photo of African millet plants in the experimental plot

The object of the study was the African millet variety “HHBBC,” which belongs to mid-season varieties and is characterized by high adaptability to arid climate conditions. The crop is characterized by a robust root system penetrating to a depth of 150-200 cm and a relatively short growing season (90-120 days).

Since the African millet variety “HHBBC” is mid-ripening, its growth rate increased in the middle of the growing season. The length of the panicle was also determined during the growing season. African millet spikes are long, cylindrical, green, light yellow, or grayish in color, their length is typically 10-45 cm. In our experiments, the average length of the panicle in the "HHBBC" variety was 29-42.5 cm. According to the variants of the experiment, it was established that in the 2nd variant (N60P45K30 + 15 t/ha of manure), the average length of the panicle reached 45.8 cm.

Conclusions

Studies have shown that the African millet variety “HHBBC” responds positively to both mineral and organic fertilizers. Variants with the application of mineral fertilizers ensured stem growth of 7-10 cm compared to the control, and the maximum plant height was noted when N60P45K30 was combined with organic matter (300 cm). The average indicator for the experiment was 33.5-43.6 cm. The longest panicle length (43.6 cm) was recorded in the combined fertilizer system, which indicates a significant influence of organic matter in the complex with mineral elements. Mass of 1000 grains. Variants with nitrogen-phosphorus-potassium fertilizers ensured an increase in the weight of 1000 grains to 5.5 g, and when NPK was combined with organic matter, the indicator reached 7.0 g, which is almost twice as high as the control (3.8 g). Thus, the “HHBBC” variety is characterized by a high sensitivity to fertilizers, and the greatest positive effect is achieved when organic and mineral fertilizers are combined, which ensures: an increase in stem and panicle length, the formation of heavier and fuller grains, and overall improvement of morphological characteristics directly related to yield. According to the obtained results, it is recommended to use the combined fertilizer system (N60P45K30 + 15 t/ha of organic matter) as the most effective for cultivating the African millet variety “HHBBC” in serozem conditions.

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