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MINERAL FERTILIZERS FOR PLANTING THE INFLUENCE OF HARVEST SOYBEAN AND CORN.

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Annotation: *Crops such as maize, sorghum, Sudan grass, oats, and soybeans can be cultivated as secondary crops. In order to produce highly nutritious feed required for livestock farming, intercropping maize and soybean as a secondary crop is an important technological measure. Maize is a high-yielding crop with sufficient feed units, but its protein content does not meet the nutritional requirements. Soybean is also a high-yielding crop, and the feed produced from it contains a high amount of protein but fewer feed units.*

Keywords: *maize, soybean, mineral fertilizer, secondary crop, yield.*

In the Resolution No. PQ-4243 of the President of the Republic of Uzbekistan dated 2019, "On measures to further develop and support the livestock sector"**,** it is stated: "The accelerated development of the livestock sector plays an important role in providing the population with affordable and quality meat and other food products, especially in increasing employment and incomes of people living in rural areas. At the same time, the current state of affairs in the regions requires the implementation of specific comprehensive measures to support enterprises in this sector, expand the fodder base, improve breeding practices, including the development of artificial insemination, and strengthen the material and technical base of breeding farms."

In order to meet the growing demand of the population for food and to produce highly nutritious feed for livestock, it is necessary to develop new intensive

technologies in crop production. It is essential to research and implement technological measures that ensure high-quality yields in field crop cultivation, make full use of irrigated lands, and enhance soil fertility.

Therefore, it is necessary to identify effective methods for the full utilization of the existing land resources. In our country, serious attention is being paid to the development of grain production. Scientific research is being conducted in several directions with the aim of growing a second crop by utilizing the land vacated after wheat harvesting.

As a secondary crop, maize, sorghum, Sudan grass, oats, and soybean can be cultivated. In order to produce highly nutritious feed required for livestock, intercropping maize and soybean as a secondary crop is considered an important technological practice. Maize is a high-yielding crop and has a sufficient feed unit value, but its protein content does not meet the required standards. Soybean is also a high-yielding crop, and while it has a high protein content, its feed unit value is relatively low. However, when these two crops are cultivated together, it is possible to produce a balanced feed that meets both protein and energy requirements.

When maize is intercropped with soybean and 135 kg of nitrogen is applied, maize yields range from 7.44 to 9.08 tons per hectare. Without fertilizer application, yields range from 4.23 to 7.53 tons per hectare [2].

When different nitrogen fertilizer rates were studied, the best results for intercropped sorghum and soybean were obtained with the application of 120 kg/ha of nitrogen [3].

Nitrogen-phosphorus fertilizers have a positive effect on maize intercropped with soybean, leading to an increase in nitrogen content within the plants. As a result, the protein content in the green mass increased by 1.2–4.3%, phosphorus by 0.04–0.11%, potassium by 0.41–0.85%, fat by 0.1–1.0%, ash by 1.0–2.1%, and calcium by 0.01–0.16%. In addition, the protein yield increased from 12.7 to 28.8 centners per hectare, and the feed unit yield rose from 128.2 to 171.4 centners per hectare [1].

In the experiment, crops were sown using the same method: row spacing was 60 cm, and plant spacing within the row was 10 cm. There were 5 maize plants and 5

soybean plants per meter. Accordingly, when planted as sole crops, the plant density for both maize and soybean was 83.3 thousand plants/ha, and when intercropped, the total density reached 166.6 thousand plants/ha.

Experimental results showed that plant survival rates depended on both the sowing method and nutrient availability. During the germination stage, the number of plants closely matched the theoretical plant population, indicating the influence of both sowing method and nutrient supply.

Since maize has stronger growth vigor and is taller than soybean, the number of maize plants did not differ significantly between sole and intercropping systems. The sowing method had little effect on maize survival, whereas nutrient supply had a more pronounced impact. In the first variant (sole cropping of maize), the plant density after thinning was 82.8 thousand plants/ha, and before harvest it was 78.5 thousand plants/ha.

In the second variant (maize intercropped with soybean), after thinning, the maize and soybean plant densities were 63.0 thousand/ha and 72.9 thousand/ha respectively, totaling 135.9 thousand/ha. Before harvest, the densities were 61.6 thousand/ha for maize and 63.1 thousand/ha for soybean, totaling 124.7 thousand/ha. Thus, the total number of plants in the intercropping variant was 46.2 thousand/ha higher than in the control (sole cropping) variant.

In re-sown maize, stem height increased by 8.8 to 19.4 cm due to fertilizer application. In re-sown soybean, stem height was 72.4 cm without fertilizer, 82.6 cm with the application of nitragin, 85.8 cm with the combination of P60K60 + nitragin, 90.1 cm with N60P60K60 + nitragin, and reached 99.2 cm with N90P60K60 + nitragin. Thus, stem height increased by 10.2 cm due to nitragin, and by an additional 3.4 to 10.7 cm depending on the applied rates of mineral fertilizers. Mineral fertilizers had a positive effect on the growth of both re-sown maize and soybean crops.

The variability in growth results of maize intercropped with soybean is attributed to differences in soil and climatic conditions, varietal characteristics, and cultivation technology.

According to the experimental data, the height of maize and soybean plants depended on the sowing method and fertilization conditions. In the first variant, where maize was sown alone, its average height recorded on July 20 was 72 cm. In the second variant, where maize was intercropped with legumes (soybean), the maize height was 73 cm, and soybean height was 29 cm. On August 11, in the variant "Vatan N90P90K60," the average height of maize reached 141 cm. When maize was intercropped with soybean under the same fertilization rate ("Vatan + soybean N90P90K60"), maize height increased to 162 cm, and soybean height reached 40 cm, indicating a noticeable difference. In the third variant, where "Vatan + soybean" was fertilized with N120P90K60, maize height reached 175 cm, while soybean reached 43 cm.

On September 11, in the variant "Vatan N90P90K60," the average height of maize was 159 cm. When intercropped with legumes (soybean) under the same fertilization rate ("Vatan + soybean N90P90K60"), maize height reached 175 cm and soybean height was 54 cm. In the third variant, where "Vatan + soybean" was fertilized with N120P90K60, maize reached a height of 222 cm and soybean 58 cm.

Soybean plants exhibited good growth under the influence of fertilization, and the positive effect of fertilizers was clearly observed. However, when intercropped with maize, soybean stems were thinner and less branched. This indicates the differences in the biological characteristics of the crops used in the experiment.

Plant growth and stem height are among the key factors influencing yield formation. In cases where plants showed vigorous growth, higher green biomass yields were obtained.

It is well known that, according to zootechnical requirements, to achieve the planned level of livestock production, one feed unit should contain 100–120 grams of protein. Therefore, in our experiment, along with the number of feed units, we also determined the protein content in the green mass. For this, published data were used.

Table 1.

Protein yield per hectare in sole and intercropped planting systems

treatmeans	Protein content, kg/ha

	soybean	maize	total
Vatan N_{90} P_{90} K_{60}	-	701	701
Vatan + soybean N_{90} P_{90} K_{60}	111	759	870
Vatan + soybean $N_{120}P_{90}$ K_{60}	195	916	1111

According to the results of the experiment, in the first variant (Vatan N90P90K60), the protein yield was 701 kg/ha; in the second variant (Vatan + soybean N90P90K60), it was 870 kg/ha; and in the third variant (Vatan + soybean N120P90K60), protein yield reached 1111 kg/ha.

According to the data in the above table, when the maize hybrid "Vatan" was planted alone with the initial fertilizer rate, 701 kg/ha of protein was obtained. When intercropped with soybean, this figure increased by 169 kg. When a moderate fertilizer rate was applied, the sole-planted maize hybrid produced 701 kg/ha of protein. With an increased fertilizer rate, intercropping maize hybrid with soybean resulted in a total of 1111 kg/ha of protein, which is 410 kg/ha more than the control (first variant).

It was found that the quality of the obtained green mass depended on the planting method, hybrid characteristics, and fertilizer application. Intercropping soybean with the maize hybrid "Vatan" improved the quality of the green fodder and enhanced its nutritional value.

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