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Issue Article

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# A AMOUNT OF PROTEIN IN THE CONTENT OF YIELD OF PHASEOLUS AUREUS AS A SECONDARY CROP

***Abstract***: *The article presents the data of experience on the influence of the term and rate of sowing on the amount of yield and biologically valuable indicators of stubble mung bean in the conditions of takir-like soils of the Kashkadarya region. When sowing mung bean in the third decade of June with a norm of 14 kg/ha, the bulk densite in the arable and subarable soil layer decreased by 0,03 g cm³ compared to the norm of 10 kg/ha, and soil porosite increased by 1,0-1,2 %. It has also been observed that the amount of nitrate nitrogen increases with increasing seeding rate.*

*When growing mung bean as a secondary crop, later dates and increased seeding rates lead to a decrease in the amount of crude protein in the grain. In other words, when sowing at a rate of 10-14 kg/ha of seeds per hectare in the early stages (in the third decade of June), the amount of crude protein in the grain was 21,5-22,6 %, the difference between the options was 0,8-1,1 %. When sowing in the first decade of Jule (10.07.) 10; 12; at 14 kg/ha mung bean per hectare, the content of crude protein in the grain was 19,8-20,6 %, or the content of crude protein was 1,6-2,6 % lower than in the early sowing period.*

***Key words***: *soil, secondary, Phaseolus aureus,mung bean, terms and norms of sowing, root and crop residues, agrophysical properties of the soil, protein.*

***Language***: *English*

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## Introduction

Every year in the republic more than one million hectares of irrigated fields are cultivated with autumn cereals. After harvested of this area of autumn cereals, it becomes possible to grow secondary crops on that land.

Given that, first of all, the main attention should be paid to the cultivation of legumes, cereals and vegetable crops that satisfy the daily food needs of the population as secondary crops, in the future, the ground will be created to further strengthen food security in the republic, to fully satisfy the population's needs for agricultural products, and secondly, in the lands where the soil fertility is decreasing, the ground will created for enriching the soil composition with organic fertiliser along with the planting of repeated crops.

There was cultivated 135 million hectar of leguminous crops on earth. Among leguminous crops, in terms of the width of the cultivated area, after soybeans (about 74 million hectares of soybeans in the world), it takes the second place (about 25 million hectares), and the third place is peas (about 10 million hectares in the world). In our republic leguminous crops are grown annually as a repeated crop on more than 18-25 thousand hectares. Uzbekistan also has a significant place in the export of *Phaseolus aureus* in the world market, until to 67 thousand tons of mung bean are exported per year [1].

Grain of mung bean is rich in amino acids and magnesium, calcium, sulfur, sodium, iron, manganese, copper, boron, cobalt, nickel, iodine, phosphorus salts. On average 60-80 centner of hay or 240-300 centner of green mass was obtained per hectare. The amount of digestible protein in blue mass is two or three times higher than in corn leaf and its stem. Silage made by mixing corn with mung bean differs in its high nutritional quality.

In the researches of M.V.Donskaya and S.V.Bobkov, it was found that made on 82 varieties and lines of mung bean the hotter the weather during the growth period of most of the samples, the faster the grain will fill [3]. In the dissertation work of I.G.Aukina, under conditions of chestnut soils in the Volga region of Saratov feeding mung bean with mineral fertilizers were increased protein from 23.6% to 29.4%, oil from 4.87% to 6.57%, but reduced the amount of starch [4].

Research results show that there is a strong relationship between the amount of nitrate nitrogen and mobile phosphorus in the soil and productivity.

**Methods for experiments:** In the research field observations and laboratory analyzes were conducted based on methodological manuals such as "Methods for agrochemical analyzes of soils and plants" [6], "Methods of conducting field experiments" [9].

**Conditions for experiments:** The place of the experiment is Kashkadarya region, located in the south-western part of the republic, the summer is hot and long, the winter is short and cold, in the spring there is mostly high humidity. A total temperature of 4900-5000$^0$C is observed throughout the year, of which 2500-2900$^0$C is considered a useful temperature.

The spring of 2019, when the research was conducted, was characterized by mild and low temperature, hot summer months and cool autumn months. In 2020, the spring was characterized by mild and low temperature, summer by relatively low temperature and slow warming activity, and autumn by relatively coolness and relatively hot October.

In the experiment "Durdona", "Kahraba" and "Marjan" varieties of mung bean were planted as repeated crops.

## RESULTS AND DISCUSSION

According to the results of the experiment carried out in the conditions of takyr soils of Kashkadarya region, in the fields the initial indicators of porosity of soil of replanted mung bean were 49.2% in the 0-30 cm layer, also under the plow this indicator was 47.3% in the 30-50 cm layer.

According to the results obtained at the end of the growing season, soil porosity was 46.7-48.1% in the 0-30 cm soil layer, besides in the 30-50 cm soil layer 46.1-47.3% when planted in the 30.06 period. The highest indicator was observed in the version planted with mung bean seeds at the rate of 14 kg per hectare, and it was 48.1% in the 0-30 layers. So, it was observed that the soil porosity improves by 1-1.2% as the planting norms increase.

The soil of the experimental field was 0-30 and 30-50 cm the amount of humus in the layers is 0.799; 0.701%, the total nitrogen amount is 0.125; 0.081%, phosphorus amount 0.281; 0.296%. The amount of nitrate nitrogen in mobile forms of nutrients is 8.15; 3.79 mg/kg, mobile phosphorus 17.09; 16.01 mg/kg, commutable potassium 215; 209 mg/kg. This means that the soil is very low in nitrate nitrogen and low in mobile phosphorus and commutable potassium.

Among leguminous crops, mung bean (Phaseolus aureus) is an annual leguminous crop belonging to the leguminous family, one of the types of beans. There are India, China and Iran divided into subspecies. Mung bean's homeland is South-West Asia, where it began was cultivated in 4-3 thousand years BC.

Now mung bean is grown in Central Asia, India, Pakistan, Afghanistan, Iran, China, Japan and other countries. The arrowroot penetrates the soil up to 1.5 meters, forming nitrogen-fixing nodules. The fruitful stem spreads 20-100 cm, grows erect or unbranched, the leaves are wide and large. The flower is bisexual, butterfly-like, arranged in 3-12 leaf axils, yellow or yellowish-green in color. The fruit is a pod, thin, cylindrical, 6-18 cm long, with 6-15 seeds inside. The seeds are yellow, green, and black, the weight of 1000 seeds is 40-80 g. The mung bean is heat-loving, its seeds germinate in 5-7 days at a temperature of 12-15°C. The grasses will die at -1°C, -2°C. The mung bean is a moisture-loving plant. It is necessary to give water equal to its weight in order for the seed to germinate. It requires a lot of water, especially during

the flowering season. It grows well in shady areas. It grows well in fertile meadow soil. Basically, it pollinates itself. It ripes 85-95 days after plant grain in spring, and 60-65 days after plant it in late summer in Uzbekistan. They will harvest when ripe 75-80% of pods. Grain of mung bean contains 24-28% protein, 46-50% starch, 2-4% oil and vitamins. The mung bean is used in food, it is easily digestible, it is used in making pasta. Green grass are nutritious fodder in animal husbandry, and silage can be pressed from the stems. The yield is 10-16 centners per hectare on irrigated land, and 8-12 centners per hectare when it planted after cereal crops.

The mung bean's grain differs from other crops in terms of nutritional value. Because the level of digestibility of raw protein of mung bean is on average 86%. The amount of crude protein in mung bean varies according to the plant variety, growing area, weather conditions, applied fertilizers and agrotechnological measures. Especially, if mung bean is grown as a secondary crop, the crude protein content of the grain is even higher. High hot temperature can affect the crude protein content of mung beans to a certain extent. It has been found in researches that the duration and standards of mung bean planting have an effect on the amount of crude protein in grain of mung bean.

Similar data were obtained in the scientific observations of H.Kh.Saydaminova and et.al. [11], that is, this stress condition had different effects depending on the biological characteristics of the varieties when mung bean cultivars were maintained in soil drought. That is in some varieties the norms of protein decreased slightly, while the amount of fat increased significantly, and in some varieties, it was the opposite.

For this reason, it is important to study the influence of the crude protein content of grain of mung bean grown as a repeated crop in the fall wheat field on planting dates and norms. So, it is important to study the influence of the crude protein content of grain of mung bean grown as a secondary crop in the fall wheat field on planting dates and norms. Table 1 shows data on the dependence of the crude protein content of grain of mung bean on sowing rates and periods when mung bean was grown as a repeated crop in the field of winter wheat in the experiment.

**Table -1. Amount of crude protein of mung bean grown cereal at different periods and amount**

| Samples | Sowing dates | Samples of mung bean | Amount of sowing, kg | Amount of crude protien, % | Defference between amount of sowing, + - | Defference between times of sowing, + - |
|---|---|---|---|---|---|---|
| 1-variant | 30.06 | “Durdona” | 10 | 22,6 | - | |
| 2- variant | | | 12 | 21,8 | -0,8 | |
| 3- variant | | | 14 | 21,5 | -1,1 | |
| 4- variant | | “Qahroba” | 10 | 20,6 | - | |
| 5- variant | | | 12 | 20,3 | -0,3 | |
| 6- variant | | | 14 | 19,7 | -0,9 | |
| 7- variant | | “Marjon” | 10 | 21,5 | - | |
| 8- variant | | | 12 | 21,0 | -0,5 | |
| 9- variant | | | 14 | 20,2 | -1,3 | |
| 10- variant | 10.07 | “Durdona” | 10 | 20,6 | - | -2,0 |
| 11- variant | | | 12 | 20,2 | -0,4 | -1,6 |
| 12- variant | | | 14 | 19,8 | -0,6 | -1,7 |
| 13- variant | | “Qahroba” | 10 | 19,7 | - | -0,9 |
| 14- variant | | | 12 | 18,9 | -0,8 | -1,4 |
| 15- variant | | | 14 | 18,2 | -1,5 | -1,5 |
| 16- variant | | Marjon” | 10 | 18,6 | - | -2,9 |
| 17- variant | | | 12 | 18,2 | -0,4 | -2,8 |
| 18- variant | | | 14 | 17,8 | -1,8 | -2,4 |
| 19- variant | 15.07 | “Durdona” | 10 | 20,3 | - | -2,3 |
| 20- variant | | | 12 | 20,2 | -0,1 | -1,6 |
| 21- variant | | | 14 | 20,8 | +0,5 | -0,7 |
| 22- variant | | “Qahroba” | 10 | 19,2 | - | -1,4 |
| 23- variant | | | 12 | 18,9 | -0,3 | -1,4 |
| 24- variant | | | 14 | 18,8 | -0,4 | -0,9 |
| 25- variant | | “Marjon” | 10 | 20,3 | - | -1,2 |
| 26- variant | | | 12 | 18,2 | -2,1 | -2,8 |
| 27- variant | | | 14 | 18,8 | -1,5 | -1,4 |

| | Durdona | | | Qahroba | | | Marjon | | |
|---|---|---|---|---|---|---|---|---|---|
| 10 | 22,6 | 20,6 | 20,3 | 20,6 | 19,7 | 19,2 | 21,5 | 18,6 | 20,3 |
| 12 | 21,8 | 20,2 | 20,2 | 20,3 | 18,7 | 18,9 | 21 | 18,2 | 18,2 |
| 14 | 21,5 | 19,8 | 20,8 | 19,7 | 18,2 | 18,8 | 20,2 | 17,8 | 18,8 |
| r | -0,97 | -1 | 0,78 | -0,98 | -0,98 | -0,96 | -0,99 | -1 | -0,69 |
| r | | 0,97 | -0,59 | | 0,93 | 0,89 | | 0,99 | 0,59 |
| r | | | -0,78 | | | 1,00 | | | 0,69 |

According to the results of the research the amount of crude protein was observed to decrease up to, when sowing in the early season (30.06) 10-14 kg of seeds per hectare and in the grain is 21.5-22.6% the difference between them is 0.8-1.1%.

The mung bean is planted at the beginning of July (10.07) when at 10-14 kg per hectare, the amount of crude protein in the grain is 19.8-20.6%, compared to the early planting, the amount of crude protein is 1.6-2.6% decreased.

When mung bean grown cereal was sown in the second ten days of July (15.07) with the consumption of 10-14 kg of seeds per hectare, the amount of crude protein in the grain was 20.2-20.8%, compared to the samples planted in the early period, the amount of crude protein was observed 0.7-2.3%.

In "Kahraba" and "Marjon" varieties of mung bean the above laws are also repeated, and the amount of crude protein in the grain is 19.7-20.6% in the "Kahraba" variety, it was 18.2-21.5% in "Marjon" variety it was found that depending on the planting dates and norms.

The results of the analysis showed that increasing the amount of planting and delaying the dates ensured a decrease in the amount of protein in the grain, regardless of the varieties. Analyzing the correlation between these indicators showed that there is a moderate (r - 0.69) and strong (r - 0.78; - 0.99) inverse correlation between the amount of protein and the planting rate. Just in one of nine cases, i.e. Durdona variety, the protein content of mung bean's grain planted in the second decade of July was observed to have a strong correlation with the date of planting.

Analytical data showed that the delay in planting mung bean seeds caused a decrease in the protein content of its grain. It was found that the amount of protein depending on the planting period, had a moderate (r 0.59; 0.69) and strong (r 0.89; 0.99) correlation with the planting period.

So, when mung bean is grown as a repeated crop, delaying its planting dates and increasing its norms will lead to a decrease in the amount of crude protein in the grain.

**CONCLUSION:**

1. In the conditions of barren soils of Kashkadarya region, planting mung bean as a secondary crop at the end of June at 14 kg per hectare the volume mass of soil in plowed and under-plowed layers reduces on 0.03 g/cm$^3$, and porosity of soil increased on 1.0-1.2%.

2. In the conditions of barren soils of Kashkadarya region, it was observed that by the end of the period of growing, the amount of nitrate nitrogen increases with the increase of the planting rate, when repeated crops are planted in the field. That is, when planting mung bean at the amonut of 10 kg per hectare, the amount of nitrate nitrogen was 6.92 mg/kg, and when the planting rate was increased to 4 kg, it was 10.82 mg/kg and increased by 3.9 mg/kg.

3. Delaying the sowing period and increasing the amounts when growing mung bean as a repeated crop leads to a decrease in the amount of crude protein in the grain. That is, when mung bean was sown in the early period (30.06) with 10-14 kg of seeds per hectare, the amount of crude protein in the grain was 21.5-22.6%, and the difference between them decreased to 0.8-1.1%. At the beginning of July (10.07) when the grain is planted at 10-14 kg per hectare, the amount of crude protein in the grain is 19.8-20.6%, compared to the early planting the amount of crude protein is 1.6-2.6% decreased.

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