American Journal of Applied Science and Technology

VOLUME Vol.06 Issue 05 2026
PAGE NO. 235-237
DOI 10.37547/ajast/Volume06Issue05-41

The Effect of The Mung Bean Plant on The Amount of Nutrients in The Soil

Norbotayeva Ogiloy
Second-year Master's Student at Gulistan State University, Uzbekistan

Fayziyev Kamoliddin Inobiddinovich
Doctor of Philosophy in Agricultural Sciences (PhD), Associate Professor at Gulistan State University, Uzbekistan

Musurmanov Alisher Amirqulovich
Doctor of Philosophy in Agricultural Sciences (PhD), Associate Professor at Gulistan State University, Uzbekistan

Received: 18 April 2026; **Accepted:** 06 May 2026; **Published:** 31 May 2026

Abstract: This article describes the processes of changes in the amount of humus and nutrient elements in the soil as a result of using the mung bean plant as a repeated crop in the irrigated sierozem-meadow soils of Gulistan district, Syrdarya region. In the experimental field where the mung bean plant was not sown, the amount of organic matter in the arable layer was 0.41–0.82%, while the results after the mung bean plant was sown amounted to 0.47–0.93%, and accordingly, it was determined that it increased by 0.06–0.11%.

Keywords: Sierozem-meadow soil, nutrient elements, humus, nitrogen, phosphorus, potassium, leguminous crop, mung bean.

INTRODUCTION

In the current conditions, when the need of the world population for food products is increasing, the issue of preserving and increasing soil fertility in agriculture is of urgent importance. Leguminous crops, particularly mung bean (Vigna radiata L.), occupy a special place in restoring soil fertility and ensuring its stability. Mung bean is recognized not only as a valuable food and fodder crop, but also as an important biological factor that improves the agroecological condition of the soil.

The positive effect of leguminous crops on soil fertility is primarily related to their ability to biologically assimilate atmospheric nitrogen. The scientific foundations of this process were studied by microbiological scientists at the end of the nineteenth century and the beginning of the twentieth century. In particular, while Martinus Beijerinck determined that nodule bacteria live in symbiosis with leguminous plants, Sergey Winogradsky scientifically substantiated the importance of microbiological processes in the soil for plant nutrition. These studies later laid the foundation for the formation of the theory of biological nitrogen fixation.

In the conditions of Central Asia and Uzbekistan, scientific research on the effect of leguminous crops on soil fertility was conducted by A. A. Rasulov, Sh. T. Toshqo'ziyev, B. M. Mirzayev, and other scientists. Their studies showed that mung bean sown as a repeated crop serves to preserve the amount of humus in the soil, increase mobile forms of nitrogen, and enhance the activity of soil microflora [1;2;3].

In the studies conducted by R. K. Singh and S. S. Ahlawat, it was determined that mung bean has a short vegetation period, leaves a certain amount of organic residue in the soil, and improves the physicochemical

properties of the soil in the crop rotation system. According to their data, the yield of cereal crops sown after mung bean increased [1;2;3;4;5;6;7;8].

In studies conducted by specialists of the International Crops Research Institute for the Semi-Arid Tropics (ICRISAT) on the importance of leguminous crops in arid and semi-arid regions, it was determined that when mung bean is used as green manure, the reserve of organic carbon in the soil increases, water-holding capacity improves, and erosion processes decrease. At the same time, it was emphasized that mung bean root residues serve as an additional nutrient source for the development of soil microorganisms.

In recent years, scientific works devoted to the importance of mung bean in ecological farming systems have especially recognized the role of this crop in reducing the consumption of mineral fertilizers, preventing soil degradation, and ensuring the biological stability of agroecosystems. Researchers emphasize that the inclusion of mung bean in the crop rotation system is one of the important factors in preserving soil fertility and ensuring the ecological safety of agricultural production.

Mung bean contributes to the stable preservation of fertility by biologically fixing atmospheric nitrogen, increasing the amount of organic matter in the soil, activating microbiological processes, and improving the physicochemical properties of the soil. Therefore, the widespread introduction of mung bean in crop rotation systems and as a repeated crop is considered one of the scientifically substantiated directions for increasing soil fertility.

With the increase of humus and nutrient elements in the soil composition, it is observed that the granularity of the soil improves and its fertility also increases. In such soils, this is of great importance for the good growth and development of plants and the formation of high yields. The total amount of humus and nutrients in the soil composition is considered one of the main indicators and is supplied differently across soil layers.

As a result of the decomposition of plant residues, substances that are in a difficult-to-assimilate form are transformed into an easily assimilable form, that is, humus and nutrients (nitrogen, phosphorus, potassium, and others) are formed. These include plant residues (stem, leaf, root) that have not decomposed to a state that plants can assimilate, as well as the residues of large and small organisms living in the soil.

Soil fertility depends on the degree of its humus supply, and as a result of the decomposition and exchange of substances through the activity of microorganisms that directly affect its fertility, humus and nutrient elements are formed.

Humus is of great importance in the nutrition of agricultural crops, and as a result of the decomposition of some components of organic matter in humus, they pass into a mobile form that plants can assimilate. In addition to being a source of nutrients, organic matter activates biological processes in the soil and affects plant growth and biologically active substances in the root system.

According to the results of the irrigated soils of the research area, it was determined that as a result of crop rotation, the amount of humus accumulated more in the upper layers of the field where mung bean was sown. The main reason for this is considered to be the high accumulation of nitrogen by nodule bacteria in the roots of the mung bean plant. The formation of humus in the soil and the increase in its amount largely depend on the amount of incoming organic matter, which can be clearly seen in the results of the conducted research.

In the experimental field where mung bean was not sown, the amount of organic matter in the arable layer was 0.41–0.82%, while the results after mung bean was sown amounted to 0.47–0.93%, and accordingly, it was determined that it increased by 0.06–0.11% (Table 1).

Table 1.

The effect of the mung bean-sown field on the amount of humus and nutrient elements, % (2024–2025).

№	Layer depth, cm	Humus	N	P_2O_5	K_2O
Before sowing	0-15	0,82	0,062	0,28	0,870
	15-30	0,79	0,060	0,24	0,775

mung bean	30-50	0,59	0,056	0,23	0,775
	50-70	0,57	0,048	0,19	0,610
	70-100	0,41	0,038	0,17	0,572
After sowing mung bean	0-15	0,93	0,069	0,29	0,945
	15-30	0,79	0,059	0,26	0,682
	30-50	0,73	0,059	0,25	0,595
	50-70	0,62	0,058	0,20	0,510
	70-100	0,47	0,037	0,19	0,512

From this, it can be concluded that in irrigated sierozem-meadow soils, the field where mung bean was sown improves the activity of microorganisms. As a result of humus mineralization, an increase in organic matter is observed in the upper layers of the soil. Based on the results of the conducted experiment, it was determined that the amount of nutrients increased in the field where mung bean was sown compared to the control.

REFERENCES

1. A. A. Jo‘rayev. Jo‘rayev A.A. Takroriy ekinlar yetishtirishda dukkakli o‘simliklarning ahamiyati // Agro ilm. – Toshkent, 2018. – № 3. – B. 42–45.
2. B. M. Mirzayev. Mirzayev B.M. Bo‘z tuproqlar unumdorligini oshirishda dukkakli ekinlardan foydalanish // Qishloq xo‘jaligi ishlab chiqarishi. – Toshkent, 2017. – № 6. – B. 18–22.
3. Sh. T. Toshqo‘ziyev. Toshqo‘ziyev Sh.T. Sug‘oriladigan tuproqlarda takroriy mosh ekinining agrokimyoviy ahamiyati // Agro kimyo va tuproqshunoslik muammolari. – Toshkent, 2019. – B. 73–77.
4. Biological Nitrogen Fixation. Postgate J. Nitrogen Fixation. Cambridge University Press, 1998.
5. Soil Microorganisms and Plant Growth. Subba Rao N.S. Soil Microorganisms and Plant Growth. Oxford & IBH Publishing, New Delhi, 2001.
6. Singh R.K. Role of mungbean in sustainable agriculture and soil fertility improvement // Journal of Food Legumes. – 2018. – Vol. 31. – №2. – P. 65–72.
7. Ahlawat S.S. Pulses for soil health and sustainable crop production // Indian Journal of Agronomy. – 2016. – Vol. 61. – №3. – P. 318–324.
8. International Crops Research Institute for the Semi-Arid Tropics (ICRISAT). Mungbean cultivation and soil fertility management reports.