



MOONGBEAN AS A GREEN FODDER AND NATURAL SOIL FERTILIZER: BENEFITS FOR FARMERS - OVERVIEW OF MOONGBEAN

Goldy sharma*, Jyoti kumari, Abhisek Roy and Shani Gulaiya

School of Agriculture, Galgotias university, Greater Noida

*Corresponding Author Mail ID: goldysharma20301@gmail.com

Abstract

With its rapid growth cycle (usually ranging from 60 to 90 days), mungbean (*Vigna radiata*) is a versatile leguminous crop that is widely cultivated for its nutritional and agricultural benefits. Mungbean plays a critical role in improving food security, especially in developing countries. Its rapid growth cycle allows for multiple cropping seasons within a year, maximizing land use efficiency. Mungbean, as green fodder, gives cattle an abundant supply of nutrients, especially protein, which increases the production of milk and meat. Farmers can manage their supply of fodder sustainably and get the benefits of the biomass produced by harvesting the crop more than once. Apart from its use as animal feed, mungbean can also be a useful organic fertilizer for the land. Mungbean enriches the soil and lessens the need for synthetic fertilizers by fixing atmospheric nitrogen through a symbiotic connection with Rhizobium bacteria. This organic nitrogen fixation improves soil structure, encourages microbial activity, and improves soil fertility, all of which improve water retention and decrease erosion. Mungbean integration into agricultural systems offers farmers a number of financial advantages. Mungbean aids to sustainable agriculture methods by reducing reliance on chemical fertilizers, increasing crop rotation yields, and creating extra revenue through intercropping. For smallholder farmers, its minimal input requirements and versatility in different climate conditions make it a desirable choice. In addition to being a great source of green fodder, mungbean also functions as a natural soil fertilizer. This overview shows the many advantages of mungbean for farmers, including increased production, better soil health, and

support for economic stability in agricultural systems.

Key Words: Nutritional Benefits of Mungbean as Fodder, Moongbean as a Natural Soil Fertilizer, Economic Benefits for Farmers.

Introduction

Moongbean, commonly known as mungbean (*Vigna radiata*), is an annual leguminous crop that is extensively cultivated in tropical and subtropical regions of Latin America, Africa, and Asia. Mungbean has long been grown for its tasty seeds, which are an excellent source of protein and other essential nutrients. However, it is now well known for its important uses as green manure and a natural fertilizer for the soil. The dual role that mungbean plays in improving soil health and providing feed for animals has become more significant for both large-scale agricultural systems and smallholder farmers as agriculture moves toward more environmentally friendly and sustainable techniques. Because of its excellent nutritional profile—especially its high protein content and digestibility—mungbean is widely valued as green fodder for livestock, including cattle, goats, and poultry. According to studies, mungbean fodder gives animals the vital amino acids and minerals they need to grow more quickly and produce more milk in dairy animals. (Singh et al., 2016). Its appeal as a fodder crop is further enhanced by its palatability and simplicity of production, particularly in areas where traditional feed alternatives are scarce or costly. Mungbean's ability to fix atmospheric nitrogen through symbiotic partnerships with Rhizobium bacteria found in its root nodules is one of its most important ecological roles. There is less need for synthetic nitrogen fertilizers because of this biological nitrogen fixation, which enriches the

soil with nitrogen and makes it available for upcoming crops (Sarkar & Jena, 2019). In addition to increasing soil fertility, this procedure preserves organic matter content and boosts microbial activity, which in turn supports long-term soil health. The legume crop mungbean (*Vigna radiata*), commonly referred to as "moong," has long been a vital component of agricultural systems in Asia and other tropical countries. Mungbean has long been cultivated for its delicious seeds, but it is also becoming known for many other uses, such as a natural soil fertilizer and green cattle feed. Its double functions make it an important crop for sustainable agricultural methods, particularly in areas with scarce resources. Mungbean provides cattle with a highly nutritious green fodder option by supplying vital proteins, minerals, and vitamins that promote animal growth and productivity. Because of its great digestibility and delicate, leafy biomass, it is perfect for dairy and meat-producing animals. Additionally, because mungbean grows swiftly, farmers can effectively cover their feed needs during situations of urgent feed shortage. Furthermore, mungbean helps break disease cycles, enhance soil structure, and stop erosion when added to crop rotations or utilized as a cover crop (Ali *et al.*, 2018). Because of its short growth cycle, it may produce biomass quickly. This biomass can then be plowed back into the soil to increase the amount of organic matter, which improves soil fertility and water retention. Mungbean is a crop that is resistant to climate change because of its low water requirements and capacity to flourish in arid and semi-arid environments. It has proven to be effective in regions with little rainfall, giving farmers a flexible crop that they may cultivate in marginal lands or during off-seasons with no need for inputs (Kumar *et al.*, 2020). This flexibility fits in with the increasing demand for climate-resilient and sustainable farming methods. Farmers can contribute to a more sustainable and financially successful agricultural ecosystem by reducing their dependency on chemical inputs, increasing soil health, and improving livestock output through the use of mungbean in their farming systems.

Nutritional Benefits of Mungbean as Fodder

The highly prized nutritional profile of mungbean (*Vigna radiata*), which is frequently used as green fodder, includes important minerals and a high protein content that support the health and production of cattle. It is especially beneficial to use it as fodder in areas where standard feed sources are either expensive or insufficient. The following are the principal nutritional advantages of using mungbean as fodder:

Elevated Level of Protein

A leguminous crop with a high protein content, mungbean typically has a dry matter basis protein level of 17–24 percent. For ruminants such as cattle, goats, and sheep, this makes it an excellent diet, particularly in areas where protein sources are limited. Essential amino acids including lysine, methionine, and cysteine are abundant in mungbean protein and are vital for animal growth, milk production, and general health (Goyal *et al.*, 2012). Increased Protein Content Mungbean, a high-protein leguminous crop, normally has a dry matter basis protein level of 17–24 percent. This makes it a great diet for ruminants, like sheep, goats, and cattle, especially in places where there aren't many protein sources. Mungbean protein is high in essential amino acids, such as lysine, methionine, and cysteine, which are necessary for animal growth, milk production, and overall health (Goyal *et al.*, 2012).

Rich in Digestible Nutrients

Mungbean fodder has a dry matter digestibility rate of approximately 65-75%, making it highly digestible. This facilitates better energy use and nutritional absorption for cattle through easier metabolism. Because digestibility has a direct impact on an animal's energy intake, performance, and general health, it is important in animal feeds. Due to its high digestibility, mungbean is particularly beneficial for dairy cows, as it maximizes the conversion of feed into energy, resulting in increased milk production (Singh *et al.*, 2018)

Source of Essential Minerals and Vitamins

Mungbean fodder is high in protein and also contains a balanced range of minerals like calcium, phosphorus, and magnesium, which are all necessary for the growth of bones, metabolic processes, and the generation of milk in dairy animals. Vitamins like A, B-complex vitamins, and C are found in mungbean fodder, which helps cattle thrive and have a robust immune system, which lowers their vulnerability to illness (Pandey & Singh, 2020). For animals that are nursing, calcium and phosphorus are especially vital because they support good milk production and guard against deficiency conditions like milk fever. When added to the diet, mungbean fodder guarantees that animals have easy access to these essential minerals (Kumar *et al.*, 2017).

Taste and Quality of Forage

Mungbean has many advantages as a fodder crop, one of which is its excellent palatability, which refers to the ease with which cattle would eat it because of its pleasant flavor and texture. This promotes steady feed consumption, which is important to sustain productivity—especially in animals with high rates of production. Mungbean forage's soft, leafy shape makes it more palatable to livestock than coarser feed alternatives since it's easier for them to chew and digest (Nath *et al.*, 2019).

Supports Animal Health and Productivity

The well-rounded nutritional content of mungbean fodder enhances the general health and welfare of animals. Frequent mungbean feeding promotes a stronger immune system and lowers typical nutritional deficits. Better weight gain, milk production, and reproductive efficiency are the results of this, which in turn improves animal productivity. Because their cattle are healthier and more productive, farmers who use mungbean as fodder report higher economic benefits (Sharma *et al.*, 2021).

Moongbean as a Natural Soil Fertilizer

Beyond its usefulness as food and fodder, mungbean (*Vigna radiata*) fixes atmospheric nitrogen, which is essential for improving soil fertility. Its use into farming systems can enhance soil health, encourage

sustainable farming methods, and drastically cut down on the demand for artificial fertilizers. The following are the main advantages of mungbean as an organic soil fertilizer:



Fixation of Nitrogen via Biosynthesis:

Mungbean is a member of the legume family and is special because of its symbiotic association with *Rhizobium* bacteria, which are located in its root nodules, which allows it to fix atmospheric nitrogen. These microorganisms transform atmospheric nitrogen (N_2) into nitrogen that plants can absorb and use, ammonia (NH_3). Nitrogen, one of the most important nutrients for plant growth, is added to the soil through this method. Mungbean may fix up to 40–50 kg of nitrogen per hectare in a single cropping season, which eliminates the requirement for artificial nitrogen fertilizers, according to Sarkar and Jena (2019). This reduces the environmental impact of fertilizer runoff and groundwater contamination while simultaneously lowering input prices for farmers.

Soil Organic Matter and Structure Improvement:

Contribution of Organic Matter: Mungbean improves soil structure, moisture retention, and microbial activity when sown and integrated into the soil as a green manure. Additionally, it improves the capacity for cation exchange, which encourages greater nutritional availability.

Control of Soil Erosion and Weed Suppression:

The quick growth and canopy formation of mungbean help to reduce weeds by lowering their competition for resources. By lessening the effect of wind and rain on exposed soil surfaces, the dense growth can also prevent soil erosion.

Mungbean increases soil organic matter, which in turn promotes microbial growth and

activity. These microbes are necessary for increasing soil fertility and cycling nutrients, which results in a more fruitful farming environment.

Economic Benefits of Mungbean for Farmers

Farmers that grow mungbean (*Vigna radiata*) gain economically in many ways, particularly in resource-constrained agricultural settings. It is an economical choice for farmers due to its function as a legume that fixes nitrogen, its enhancement of soil health, and its comparatively low input needs. The main financial benefits that mungbean provides to farmers are listed below, along with citations for each.

Fertilizer Cost Reduction

Fixing atmospheric nitrogen through mungbean growth is one of the main advantages, as it eliminates the requirement for chemical nitrogen fertilizers. Mungbean can be used as a cover crop or in rotation with cereals to drastically reduce the amount of fertilizer that farmers must pay for their next crop. Farm profitability may increase as a result of these lower input costs, especially in areas where synthetic fertilizers are expensive or difficult to find. Benefits of Intercropping: Farmers can increase their income from the same plot of land by intercropping mungbean with cereals. By diversifying crops, intercropping lowers risk and guarantees farmers a harvest even in the event that one crop is damaged by pests, disease, or unfavorable weather. Furthermore, compared to monocropping systems, mungbean intercropping raises overall productivity and revenue.

Low Input Costs

Compared to many other crops, mungbean requires fewer inputs, such as pesticides, herbicides, and irrigation, and is therefore a relatively low-maintenance crop. Farmers can save resources and labor because to its short growth season (60-90 days) and capacity to survive in poor soil conditions. Mungbean is especially appealing to small-scale and resource-poor farmers because of this.

Conclusion:

Farmers can benefit economically from mungbean, especially those that operate low-

input or resource-constrained farming systems. Mungbean improves total farm profitability by decreasing reliance on chemical fertilizers, enhancing soil fertility for succeeding crops, and generating extra revenue through intercropping and market demand. These attributes, along with the crop's minimal care requirements and capacity for revenue source diversification, make mungbean a desirable crop for sustainable farming methods.

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