Short Communication

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Impact of Integrated Nutrient Management on Green Gram Growth, Soil Health, and Economics

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ABSTRACT

The combination of organic manures and inorganic fertilizers has emerged as a successful strategy for improving the stability of crop yields and the health of the soil. The use of this approach not only results in increased crop yields, but it also increases the populations of soil microorganisms and enhances the physicochemical qualities of the soil. The practice of Integrated Nutrient Management (INM) is an essential source of energy, organic carbon, and readily available nitrogen. It also has major long-term effects on the soil and the crops that are grown in the future. INM's major purpose is to reduce dependency on chemical fertilizers by promoting environmentally friendly soil health practices. This is accomplished by utilizing the complimentary features of organic and inorganic sources. The Integrated nutritional Management (INM) approach assures soil fertility, improves production levels, maximizes profitability, and reduces environmental pollution by striking a balance between the inputs of fertilizer chemicals and the nutritional requirements of crops.

Keywords: *INM, eco-friendly, biofertilizers, FYM and inorganic fertilizers.*

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Introduction

Pulses are the principal source of protein for human growth and development in India, where the majority of the population is vegetarian. The World Health Organization recommends that each individual consume a minimum of 80 grams of pulses daily from this source [1]. With a record production of 25.23 million tonnes in 2017–2018, India is the greatest producer of pulses in the world. The country cultivates more than 29 million hectares of land to increase its production. The leguminous crop known as green gram plays an important part in the environment because it stores nitrogen from the atmosphere in its root nodules. This helps to reduce the amount of artificial fertilizers that are required for agricultural activities. In addition to having a protein content of 24.5% and considerable quantities of lysine and tryptophan, green gram also contains a significant quantity of ascorbic acid and riboflavin. The presence of antinutritional elements in mung beans, such as tannins and phytic acid, which might affect digestion and the absorption of nutrients, is something that should be taken into consideration. Mung bean farming, which is an annual crop that normally grows between 60 and 76 centimeters in height, is confronted with continual issues owing to nutrient depletion. This highlights the significance of maintaining a balanced mix of organic and inorganic fertilizer sources to keep the soil healthy. The ever-increasing need for food grain production, which is anticipated to reach 400 Mt by the year 2050, has resulted in a significant increase in India's usage of chemical fertilizers, which poses dangers to the sustainability of the soil and the environment. The methods of integrated nutrient management (INM) are emerging as a potential approach for increasing agricultural yields while also guaranteeing the sustainability of the crop over the long term. In sustainable agricultural systems, the incorporation of bio-fertilizers as part of integrated nitrogen management (INM) provides an option that is both cost-effective and environmentally benign to chemical fertilizers. Through the addition of plant wastes, legume plants, of which India is a major producer and importer, provide a considerable contribution to the fertility of the soil. INM not only provides soil microorganisms with a source of energy, organic carbon, and accessible nitrogen, but it also enhances the physical qualities of the soil, which has a long-lasting residual influence on succeeding crops [2]. Enzymes that are essential to the soil, such as amylase, cellulase, and urease, are released from a variety of sources. These enzymes play important roles in the biological activities that occur in the soil, which contribute to the general health and fertility of the soil [3].

Influence of Integrated Nutrient Management (INM) on Green Gram Growth and Productivity

It has been demonstrated via research that the combination of organic manure and chemical fertilizer materials contains potential not only for increasing crop yield but also for assuring consistency in crop output and boosting the physical characteristics of the soil. For instance, research conducted by [4] has shown that the utilization of vermicomposting in conjunction with poultry manure led to substantial enhancements in the growth and output of green gram in the Bundelkhand area. The use of chicken manure in conjunction with diammonium phosphate (DAP) resulted in significant improvements in a variety of growth indices and yield characteristics of green gram. Furthermore, [5] discovered that the use of prescribed amounts of fertilizers in conjunction with bio inoculants led to the highest possible growth and production of green gram. These findings are further corroborated by research carried out by [6-7], and [8]. These studies all illustrate the good influence that integrated nutrition management has on the development and production of green gram. Additionally, the application of a combination of nutrients, which includes organic sources such as vermicomposting and poultry manure, as well as bio inoculants such as Rhizobium and phosphorus-solubilizing bacteria, has consistently demonstrated promising results in improving a variety of growth parameters and yield attributes of green gram, as highlighted by several experiments [9-17]

INM's Influence on Soil Health

Research indicates that INM positively affects soil health by enhancing organic carbon and the availability of essential nutrients such as nitrogen, phosphorus, and potassium [18-24]. Application of INM leads to increased microbial populations, improved nutrient uptake, and enhanced soil fertility, contributing to better soil structure and moisture retention.

Economic Implications of INM:

Research conducted by [25-34] has demonstrated that the use of integrated crop management (INM) strategies leads to increased yields and economic returns in the production of green gram. Green gram production that is both sustainable and economically feasible can be achieved by the utilization of optimal mixtures of fertilizers, biofertilizers, and organic amendments. These combinations maximize gross returns, net profits, and benefit-cost ratios.

Conclusion

In conclusion, the impact of integrated nutrient management (INM) on green gram cultivation has demonstrated multifaceted benefits encompassing growth enhancement, soil health improvement, and economic viability. Through the judicious integration of organic and inorganic fertilizers, along with bio fertilizers, the growth parameters of green gram have exhibited significant improvement, leading to enhanced yields and crop productivity. Moreover, the adoption of INM practices has contributed to the enrichment of soil fertility and structure, promoting long-term sustainability in agricultural ecosystems. By reducing dependency on chemical fertilizers and fostering a balanced nutrient supply, INM approaches have mitigated adverse environmental effects while bolstering soil resilience against degradation.

Economically, the implementation of INM has proven advantageous by optimizing input costs, increasing net returns, and fostering resilience to market fluctuations. Overall, the adoption of integrated nutrient management stands as a promising strategy to optimize green gram production, enhance soil health, and ensure economic prosperity for farmers, thereby fostering sustainable agricultural practices for the future.

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