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RESEARCH ARTICLE

Effect of Various Integrated Nutrient Management Practices on the Yield of Green Gram (*Vigna radiata* L.)

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ABSTRACT

A field experiment was conducted at Nalanda College of Agriculture, Trichy, during June - August, 2025, to study different nutrient management practices on green gram. The treatments comprised Control (T_1), 100 % Recommended Dosage of Fertiliser (T_2), 75% Recommended Dosage of Fertiliser + 25% FYM at 1 ton ha^{-1} (T_3), 50% Recommended Dosage of Fertiliser + 25% FYM at 1 ton ha^{-1} (T_4), 50% Recommended Dosage of Fertiliser + Foliar application of Pulse wonder at 5 kg ha^{-1} (T_5), 75% Recommended Dosage of Fertiliser + 25% Vermicompost at 2 tons ha^{-1} (T_6) and 50% Recommended Dosage of Fertiliser + 25% Vermicompost at 2 tons ha^{-1} (T_7). The experiment was laid out in a randomised block design with three replications. Farmyard manure, Vermicompost, and the recommended dose of fertiliser were applied basally and used in the treatments. The result revealed that among the different treatments imposed, application of 50% Recommended Dosage of Fertiliser + Foliar application of Pulse wonder at 5 kg ha^{-1} recorded the highest growth attributes like plant height (37.88 cm), leaf area index (4.21), dry matter production (3542.76 kg ha^{-1}), number of branches $plant^{-1}$ (7.33), number of leaves $plant^{-1}$ (27.8) and yield attributes like number of pods $plant^{-1}$ (43), pod length (10.02 cm), number of grains pod^{-1} (11), grain yield (613 kg ha^{-1}), haulm yield (919.5 kg ha^{-1}), Net return (₹48719 ha^{-1}) and BCR (2.47). The lowest values were obtained under control.

Keywords: *Green gram, Pulse wonder, Farm Yard Manure, Vermicompost, Growth, Yield, BCR.*

INTRODUCTION

Pulses are one of the distinct health-benefit food crops globally due to their low-fat content and higher protein content. Pulses are an essential group of crops in India, which is also responsible for yielding significant financial gains accounting for a large part of the exports (Anon *et al.,* 2022). India is one of the agricultural countries, and food is a vital need for our country due to the growth of population (Vaithiyanathan and Sundaramoorthy, 2016). Green gram (*Vigna radiata* L.) is one of the most important and extensively cultivated pulse crops. India shares approximately 35-37% and 27% of the total area and production of pulses, respectively, in the world. Green gram, commonly known as “mung” or “mung bean”, is the most important crop of South-East Asia and particularly the Indian subcontinent

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(Ranpariya *et al.,* 2017). India is the largest producer and consumer of pulses in the world, accounting for about 29% of the global area and 19% of the world's production. Even more importantly, India is the world's largest importer and processor of pulses. Fatefully, the country's pulse production has been around 14-15 mt, coming from a near-stagnant area of 22 m ha. (Singh *et al.,* 2015). In India, the area under green gram is 654 lakh hectares, with a production of 599 lakh tonnes, with a productivity of 916 kg ha^{-1} (Joshi *et al.,* 2020). Integrated Nutrient Management (INM) is a comprehensive approach, managing nutrients for crops that maximises productivity while minimising environmental impact. It combines the use of chemical fertilisers, organic manures, and other nutrient sources to ensure that plants receive the right amount of nutrients at the right time. It improves crop yields and soil health by efficiently utilising nutrients, including chemical fertilisers, organic matter (such as compost and manure), and crop residues. By reducing fertiliser costs and preventing soil degradation, Integrated Nutrient Management is a smart way to grow healthy crops, protect the environment, and save money. It combines traditional and modern methods to provide plants with the necessary nutrients without overusing fertilisers, promoting sustainable agriculture. The present investigation aims to evaluate the impact of Integrated Nutrient Management (INM) practices on the growth, yield, and economics of green gram under the agro-climatic conditions of Trichy, Tamil Nadu. The findings are expected to provide scientific insights into nutrient use efficiency, soil fertility improvement, and sustainable production of green gram. By assessing both biological and economic responses, the study seeks to generate location-specific recommendations for farmers.

MATERIALS AND METHODS

The study focuses on the impact of various integrated nutrient management practices on the yield of green gram (*Vigna radiata* L.) during the Kharif season at Nalanda College of Agriculture, M. R. Palayam, Trichy. The experiment was conducted from June to August 2025, with the site located at 10.08° N latitude and 77.64° E longitude and an altitude of 296 m above MSL. The climate of the experimental site is a tropical zone, with a maximum temperature range of 33.1 °C to 38.9 °C, a minimum temperature range of 25.2 °C to 27.4 °C, and a mean annual rainfall range of 800 mm to 1000 mm. The soil characteristics of the experimental field were clay loam, with a fertility status of 213.59 kg ha^{-1} in available nitrogen, 3.94 kg ha^{-1} in available phosphorus, and 502.14 kg ha^{-1} in available potassium. Physical analysis revealed that the soil had a clay content of 55.12, silt of 33.00, and sand of 10.45. Chemical analysis revealed that the available organic carbon was 0.263%, the soil reaction pH was 8.34 and the EC (1:2 soil water suspension) was 0.10.

The study focuses on the green gram variety VBN 2. The experiment was conducted in a Randomized Block Design with three replications, with each treatment plot having dimensions of 5 m x 4 m. The treatments involved applying recommended doses of NPK, Vermicompost, FYM, and Pulse Wonder in different combinations, except the control plot. The time of foliar spray of Pulse Wonder was at 28 DAS during flowering, and the recommended dose of fertiliser was given through soil application at 20:40:20 NPK kg ha^{-1}.

Crop management practices included field preparation, basal application of nutrients, seed sowing, irrigation, gap filling and thinning, soil and foliar application of nutrients, hand weeding, plant protection, harvesting and threshing. VBN 2 variety seeds were used at 20 kg ha^{-1} and sown at a spacing of 30 cm x 10 cm. The critical period for irrigation in green gram is the flowering and pod formation stages. Five samples in each plot were tagged randomly in each net plot for recording biometric observations like Plant height (cm), Number of branches $plant^{-1}$, Number of leaves $plant^{-1}$, Leaf Area Index, Dry Matter Production (kg ha^{-1}), Number of pods $plant^{-1}$, Pod length (cm), Number of seeds pod^{-1}, Grain yield (kg ha^{-1}), Haulm yield (kg ha^{-1}), Harvest Index and Benefit Cost Ratio.

These experimental data were recorded and statistically analysed with the methods given by Gomez and Gomez (1984). The data showed high variation and hence the data were subjected to a square root transformation $\sqrt{x+0.5}$ and analysed statistically. Wherever the results were found to be significant, the critical difference (CD) was calculated at a 5% probability level for a significant result. Non-significant comparison was indicated as 'NS'.

RESULTS AND DISCUSSION

The results showed that integrated nutrient management practices had a significant influence on plant height, branch number, leaf area index, dry matter production, and yield characteristics.

The highest plant height was recorded in the treatment (T_5), which was 50% of the Recommended dose of fertiliser + Pulse Wonder at 5 kg ha^{-1}. Dayana *et al.,* (2022) also found similar results. It was followed by (T_6) 75% Recommended dose of fertiliser + 25% Vermicompost at 2 tons ha^{-1}. The lowest plant height and lowest number of leaves was recorded in the control treatment (T_1).

The leaf area index was also significantly influenced by the integrated nutrient management practices. The maximum leaf area index was recorded in the treatment (T_5) 50% Recommended dose of fertiliser + Pulse wonder at 5 kg ha^{-1}. Kamaleshwaran, R. and Karthiga, S. (2021) got similar results. Then followed by (T_6): 75% Recommended dose of fertiliser + 25% vermicompost at 2 tons ha^{-1}. The least leaf area index was recorded in the control treatment (T_1).

The study also revealed that the integrated nutrient management practices significantly influenced the dry matter production in green gram. The maximum dry matter production was recorded in the treatment (T_5), 50% Recommended dose of fertiliser + Pulse wonder at 5 kg ha^{-1}, Kunjammal, P., & Sukumar, J (2019) recorded similar results. Next, followed by (T_6) 75% Recommended dose of fertiliser + 25% Vermicompost at 2 tons ha^{-1}. The control treatment (T_1) recorded the least dry matter production.

The results showed that the application of 50% recommended dose of fertiliser and pulse wonder at 5 kg ha^{-1} significantly influenced the number of pods $plant^{-1}$, pod length, and seed yield pod^{-1} in green gram. The maximum pod length was recorded at 45 DAS and harvest stage. These results are consistent with the findings of Gupta *et al.,* (2024) and Krishnaveni *et al.,* (2021).

The maximum number of seeds pod^{-1} was recorded at the harvest stage, with 11 seeds pod^{-1}. Sundaralingam, K., & Vaideshwari, M. (2023) also obtained similar results. Test weight was not significantly different between the treatments.

The integrated nutrient management practices resulted in significant differences in grain yield, haulm yield, and harvest index. The maximum grain yield was 613 kg ha^{-1}, while the minimum grain yield was 354 kg ha^{-1} under the control treatment. The harvest index was statistically significant, with a range of 16.74 to 32.6.

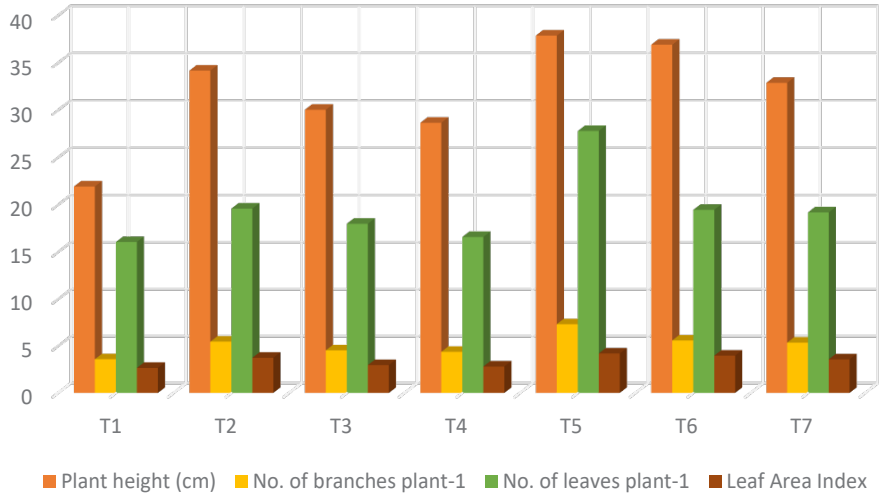
SUMMARY

The study showed that integrated nutrient management practices had a significant influence on the growth characteristics of green gram. The application of 50% Recommended Dosage of Fertiliser + Foliar application of Pulse wonder at 5 kg ha^{-1} (T_5) recorded higher plant height, leaf area index (LAI), dry matter production (DMP), number of branches $plant^{-1}$, and number of leaves $plant^{-1}$. The control treatment (T_1) recorded the fewest growth characters.

Table 1. Effect of various nutrient management practices on growth parameters of Green gram

Treatment Schedule	Plant height (cm)	No. of branches $plant^{-1}$	No. of leaves $plant^{-1}$	Leaf Area Index	Dry Matter Production (kg ha^{-1})
T_1 - Control	21.93	3.6	16.07	2.67	904.32
T_2 - 100% RDF	34.18	5.47	19.6	3.75	1465.76
T_3 - 75% RDF + 25% FYM at 1t ha^{-1}	30.04	4.54	18	2.97	1023.35
T_4 - 50% RDF + 25% FYM at 1 t ha^{-1}	28.67	4.38	16.6	2.82	987.05
T_5 - 50% RDF + Foliar application of pulse wonder at 5 kg ha^{-1}	37.88	7.33	27.8	4.21	3542.76
T_6 - 75% RDF + 25% Vermicompost at 2 t ha^{-1}	36.92	5.6	19.47	3.98	1943.98
T_7 - 50% RDF + 25% Vermicompost at 2 t ha^{-1}	32.89	5.36	19.2	3.58	1245.64
S. Ed	0.52	0.07	0.43	0.14	96.66
C.D (P=0.05)	1.16	0.16	0.95	0.05	212.95

Fig 1. Effect of various nutrient management practices on growth parameters of Green gram



Integrated nutrient management practices also significantly influenced pod length, the number of pods plant^{-1}, and the number of seeds pod^{-1} of green gram.

In terms of economics, the application of 50% Recommended Dosage of Fertiliser + Foliar application of Pulse wonder at 5 kg ha^{-1} (T_5) recorded the maximum gross income, net income and BCR investments of ₹81843 ha^{-1}, ₹48719 ha^{-1}, and 2.47, respectively, while the least gross income, net income, and BCR were registered under the control treatment (T_1).

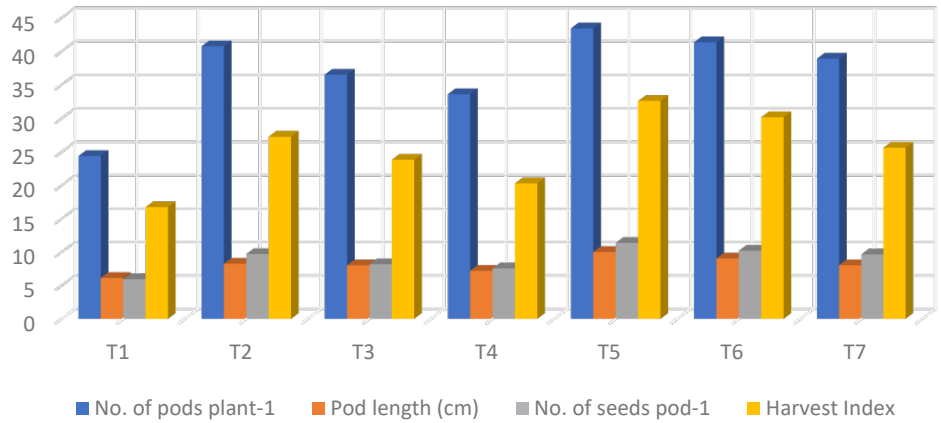
CONCLUSION

Based on the result of the field experiment carried out in Nalanda College of Agriculture, Trichy district, from June to August (2025), it can be concluded that the Integrated application of 50% Recommended Dosage of Fertiliser + foliar application of Pulse Wonder at 5 kg ha^{-1} (T_5) was a very effective and economic method

Table 2. Effect of various nutrient management practices on yield parameters of Green gram

Treatment Schedule	No. of pods plant^{-1}	Pod length (cm)	No. of seeds pod^{-1}	Grain yield (kg ha^{-1})	Haulm yield (kg ha^{-1})	Harvest Index	Benefit Cost Ratio
T_1 - Control	24.39	6.13	5.93	354	531	16.74	1.41
T_2 - 100% RDF	40.75	8.25	9.71	552	828	27.28	1.96
T_3 - 75% RDF + 25% FYM at 1t ha^{-1}	36.52	8.01	8.18	481	721.5	23.85	1.67
T_4 - 50% RDF + 25% FYM at 1 t ha^{-1}	33.61	7.20	7.56	458	687	20.31	1.46
T_5 - 50% RDF + Foliar application of pulse wonder at 5 kg ha^{-1}	43.42	10.02	11.38	613	919.5	32.6	2.47
T_6 - 75% RDF + 25% Vermicompost at 2 t ha^{-1}	41.35	9.05	10.21	587	880.5	30.17	2.14
T_7 - 50% RDF + 25% Vermicompost at 2 t ha^{-1}	38.91	8.03	9.65	529	793.5	25.62	1.84
S. Ed	0.46	0.69	0.11	12.25	13.25	0.02	NS
C.D (P=0.05)	4.57	1.52	0.25	26.99	27.54	0.06	NS

Fig 2. Effect of various nutrient management practices on yield parameters of Green gram



for enhancing the grain yield of green gram. Application of Pulse Wonder with inorganic fertiliser steadily supplies the nutrients, which may be an economically viable method that can be recommended to the green gram farmers for good yields and profits.

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REFERENCES

Anon, M. C., A. Quiroga, A. Scilingo and V. Tironi. 2022. Plant bioactive peptides (oilseed, legume, cereal, fruit, and vegetable). Cham: Springer International Publishing. In *Handbook of Food Bioactive Ingredients: Properties and Applications* (Pp. 1-34). https://doi.org/10.1007/978-3-030-81404-5_18-1

Dayana, K., T. Ramesh, S. Avudaithai, S. P. Sebastian, and S. Rathika. 2022. Feasibility of using drone for foliar spraying of nutrients in irrigated green gram (*Vigna radiata* L.). *Ecology, Environment and Conservation*, *28*:589-94. http://doi.org/10.53550/EEC.2022.v28i015.074

Joshi, M. P. and H. M. Virdia. 2020. Productivity of rabi green gram (*Vigna radiata* L.) summer pearl millet (*Pennisetum glaucum* L.) cropping sequence as influenced by integrated nutrient management. *Journal of Pharmacognosy and Phytochemistry*, *9*(5):2055-2059. https://dx.doi.org/10.22271/phyto

Kamaleshwaran, R. and S. Karthiga. 2021. Effect of foliar nutrition on yield and growth parameters of green gram in coastal area of Tamil Nadu (*Vigna radiata*) CV. Vamban 2. *International multidisciplinary e-Magazine*, *1*(3):22-27. https://www.researchgate.net/publication/357221230_EFFECT_OF_FOLIAR_NUTRITION_ON_YIELD_AND_GROWTH_PARAMETERS_OF_GREENGRAM_IN_COASTAL_AREA_OF_TAMILNADU_Vigna_radiata_CV_Vamban_2_EFFECT_OF_FOLIAR_NUTRITION_ON_YIELD_AND_GROWTH_PARAMETERS_OF_GREENGRAM_IN_

Krishnaveni, S. A., C. Supriya and S. M. Sridhar. 2021. Impact of foliar nutrition on the yield and economics of green gram (*Vigna radiata*). *International Journal of Chemical Studies*, *9*(2):11-13. https://doi.org/10.22271/chemi.2021.v9.i2a.11843

Kunjammal, P., and J. Sukumar. 2019. Effect of foliar application of nutrients and growth regulator on growth and yield of green gram (*Vigna radiate* L.). https://doi.org/10.29321/MAJ2019.000318

Ranpariya, V. S., K. B. Polara, D. V. Hirpara and K. H. Bodar. 2017. Effect of potassium, zinc and FYM on content and uptake of nutrients in seed of summer green gram (*Vigna radiata* L.) and post-harvest soil fertility under medium black calcareous soil. *International Journal of*

Chemical Studies, *5*(5):1055-1058. https://www.chemijournal.com/archives/?year=2017&vol=5&issue=5&ArticleId=1092&si=false

Singh, A. K., S. S. Singh, V. E. D. Prakash, S. Kumar and S. K. Dwivedi. 2015. Pulses production in India: Present status, sent status, bottleneck and way forward. *Journal of AgriSearch*, *2*(2):75-83. https://www.cabidigitallibrary.org/doi/pdf/10.5555/20173304010

Sundaralingam, K., and M. Vaideshwari. 2023. Efficacy of Early Foliar Spray Intervention on Alteration of Physiological Efficiencies and Seed Quality Attributes of Green Gram (*Vigna radiata* L.). *International Journal of Environment and Climate Change*, *13*(10):3495-3505. https://hal.science/hal-05190663/

Vaithiyanathan, T. and P. Sundaramoorthy. 2016. Impact of organic manure and inorganic fertilisers on seed germination of green gram (*Vigna radiata* L.). *World Scientific News*, *35*:111-122. https://worldscientificnews.com/wp-content/uploads/2024/01/WSN-35-2016-111-122.pdf