**RESEARCH ARTICLE**

**Enumeration of Different Nutrient Management Practices in the Yield
of Black Gram (*Vigna mungo* L.)**

S. Sanjana[1]\*, D. Jeevitha [2] and V. Santhosh [3]

1&2 - Final year student of Nalanda College of Agriculture, Tiruchirapalli - 621104

3 - Department of Agronomy, Nalanda College of Agriculture, Tiruchirapalli - 621104

**\*Corresponding Author’s mail id -** sanjusrknth@gmail.com

**ABSTRACT**

Field experiment was conducted at Nalanda College of Agriculture, Trichy, during
(June - August, 2025) to study of different nutrient management practices on black gram. The treatments comprised of Control (T1), 100 % Recommended Dosage of Fertilizer (T2),
100% Farm Yard Manure @ 5 tons ha-1 (T3), 100% Vermicompost @ 3 tons ha-1 (T4),
50% Recommended Dosage of Fertilizer + 50% Vermicompost (T5), 50% Recommended Dosage of Fertilizer + 50% Farm Yard Manure (T6) and 50% Recommended Dosage of Fertilizer + 25% Farm Yard Manure + 25% Vermicompost (T7). The experiment was laid out in randomized block design with three replications. Farmyard manure, Vermicompost, Recommended Dose of Fertilizer is applied basally and used in the treatments. The result revealed that among the different treatments imposed application of 50% Recommended Dosage of Fertilizer + 25% Farm Yard Manure + 25% Vermicompost recorded the highest growth attributes like plant height (29.85 cm), leaf area index (4.41), dry matter production (2129.93 kg ha-1), number of branches plant-1 (7.06), number of leaves plant-1 (36.06) and yield attributes like number of pods plant-1 (27.96) pod length (5.83 cm), number of
grains pod-1 (5.53), grain yield (910 kg ha-1), haulm yield (2287 kg ha-1), Net return
(₹54559 ha-1) and BCR (2.63) The lowest values were obtained under control.

**Keywords:** *Black gram; Farm Yard Manure; Vermicompost; Growth and Yield parameters; Economics.*

**INTRODUCTION**

Pulses are the most important food crops after cereals, referred to as “grain legumes” and it is one of the important ingredients in a global vegetarian diet, commonly known as “poor man's protein source,” as they contain 20-25% of protein (Ray *et al*., 2023). Pulse crops contribute to soil health by fixing nitrogen, reducing the need for synthetic fertilizers. Their ability to thrive in diverse climates and conditions makes them resilient to climate change, ensuring food availability in challenging environments. Furthermore, pulse crops support biodiversity and can improve crop rotation systems, enhancing overall agricultural productivity. (Sunil Kumar *et al*., 2025). Black gram [*Vigna mungo* (L.)] is a widely grown pulse crop, assuming considerable importance for food and nutritional security in India (Banerjee *et al.,* 2021). It is an important short-duration pulse crop, typically grown in rainy (kharif) season in the country. Endowed with a unique capability of symbiotic nitrogen fixation, the crop has an excellent capacity to maintain soil fertility (Saleem *et al*., 2016). Black gram seeds are exceptional source of protein, carbohydrate, fat, fibre, vitamin, and minerals (Jadhav *et al*., 2019). India is now the world's leading producer of black gram, accounting for more than 70 per cent of worldwide output. Myanmar and Pakistan come in second and third, respectively. India has an area of 45.33 lakh ha under black gram cultivation, its production and productivity accounts for 20.84 lakh tonnes and 459 kg ha-1 respectively. The total area under black gram cultivation in Tamil Nadu is 4.05 lakh hectares. In Tamil Nadu, black gram production and productivity are 3.17 lakh tonnes and 783 kg ha-1 respectively. Pudukkottai district has an area of 4649 ha under black gram cultivation and its production and productivity are 2353 tonnes and 506 kg ha-1 respectively
(Muthulakshmi and Premavathi, 2021). INM includes the intelligent use of organic, inorganic and on-line biological resources so as to sustain optimum yield, improve or maintain the soil physical and chemical properties and provide crop nutrition packages which are technically sound, economically attractive practically feasible and environmentally safe
(Desai *et al*., 2020). INM is also important for marginal farmers who cannot meet the expense of supply crop nutrients from end-to-end costly chemical fertilizers. The biofertilizers have shown boosting results in sustaining the crop productivity and improving the soil fertility (Tomar *et al*., 2013).

**MATERIALS AND METHODS**

The study aimed to investigate the various nutrient management practices in the yield of Black gram (*Vigna mungo* L.) during the Kharif season. The experimental field was conducted at Nalanda College of Agriculture, M. R. Palayam, Trichy, from May to
August 2025. The site was located at 10.08° N latitude and 77.64° E longitude, with an altitude of 296 m above MSL. The climate was tropical zone, with a maximum temperature of 33.1 ºC to 38.9 ºC, a minimum temperature of 25.2 ºC to 27.4 ºC, and a mean annual rainfall of 800 mm to 1000 mm. The soil characteristics of the experimental field included clay loam soil type, 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. The physio-chemical characteristics of the soil sample were also studied. The study provides details of the experimental materials used and methods adapted during the study.

The study focuses on the Black gram variety VBN 11, which has high yielding, resistance to Yellow Mosaic Virus, leaf crinkle, and moderately resistance to powdery mildew diseases. 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 included application of recommended doses of NPK @ 20:40:20 kg ha-1, Vermicompost, FYM in different combinations besides the control plot.

The field preparation involved ploughing, harrowing, and providing irrigation channels. Good viable seeds of VBN 11 were used @ 20 kg ha-1, and irrigation was done regularly. Nutrients were applied in the form of DAP (46% P, 18% N), MOP (60% K) as soil application. Gap filling and thinning were done on 14 days, and hand weeding was done
on 25 and 35 days. Plant protection was taken up as per the recommendation whenever the pest and disease incidence crossed the economic threshold level. Harvesting was done by hand picking the mature pods thrice at weekly intervals.

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), Halum yield (kg ha-1), Harvest Index, 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 are subjected to square root transformation √x+0.5 and analysed statistically. Wherever the results were found significant, the critical difference (CD) was worked out at a 5% probability level for a significant result. Non-significant comparison was indicated as ‘NS’.

**RESULTS AND DISCUSSION**

The field experiment on black gram showed that integrated nutrient management practices significantly influenced growth characteristics. The application of
50% Recommended Dosage of Fertilizer + 25% Farm Yard Manure + 25% Vermicompost resulted in maximum values of plant height, leaf area index, and dry matter production. The combined use of organic manures and inorganic fertilizers improved the availability of nutrients to the crops, leading to increased growth attributes and higher dry matter production. Similar findings were reported by Mishra *et al.* (2024)

Yield attributing characters like the number of pods plant-1 and number of grains pod-1 were higher in the application of 50% Recommended Dosage of Fertilizer + 25% Farm Yard Manure + 25% Vermicompost. Similar research findings were reported by
Krishnaprabu (2018). This was due to the supply of plant nutrients to the crop through the combined application of organic manures with inorganic fertilizers. The combination of organic manures with inorganic fertilizers improved the soil physical and chemical properties, providing favourable soil conditions and soil health to improve nutrient use efficiency.

Among the various treatments, the application of 50% Recommended Dosage of Fertilizer + 25% Farm Yard Manure + 25% Vermicompost registered higher seed yield
(910 kg ha-1) and haulm yield (2287 kg ha-1). Sridhar *et al.* (2020) also reported similar results. Application of FYM and Vermicompost enhanced productivity and higher nutrient absorption in black gram, leading to better plant growth and superior yield attributes.

The effect of integrated nutrient management practices on black gram data was recorded, showing higher nitrogen, phosphorus, and potassium uptake at the harvest stage of the crop. The application of NPK as chemical fertilizer supplied nutrients initially required for black gram growth, resulting in higher growth and yield characters. Usman *et al.* (2015) and Lakshmi *et al.* (2015) also obtained similar results.

In terms of economics, the maximum gross income, net income, and BCR of
₹87943 ha-1, ₹54559 ha-1, and 2.63 were registered in the application of 50% Recommended Dosage of Fertilizer + 25% Farm Yard Manure + 25% Vermicompost. The integration of organic manures with inorganic fertilizers improved nutrient availability, increasing growth, yield attributes, yield, gross return, and profit.

**Table 1. Effect of various nutrient management practices on
growth parameters of Black 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)** |
| T1 - Control | 17.6 | 4.25 | 09.26 | 1.99 | 1061.6 |
| T2 - 100% RDF | 26.26 | 6.06 | 28.4 | 2.78 | 1714.2 |
| T3 - 100% Farmyard manure @ 5 tons ha-1 | 18.66 | 4.82 | 18.4 | 2.13 | 1311.07 |
| T4 - 100% Vermicompost @ 3 tons ha-1 | 19.67 | 5.13 | 24.4 | 2.20 | 1393.47 |
| T5 - 50% RDF + 50% Vermicompost | 29.79 | 6.94 | 29.13 | 3.52 | 1916.33 |
| T6 - 50% RDF + 50% Farmyard manure | 20.62 | 5.33 | 26.26 | 2.65 | 1433.8 |
| T7 - 50% RDF + 25% Farmyard Manure + 25% Vermicompost | 29.85 | 7.06 | 36.06 | 4.41 | 2129.93 |
| S. Ed | 0.32 | 0.78 | 3.24 | 0.19 | 96.668 |
| C.D (P=0.05) | 0.70 | 1.70 | 7.15 | 0.43 | 212.954 |

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

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Treatment Schedule** | **No. of pods plant-1** | **Pod length (cm)** | **No. of seeds pod-1** | **Grain yield (kg ha-1)** | **Halum yield (kg ha-1)** | **Harvest Index** | **Benefit Cost Ratio** |
| T1 - Control | 12 | 2.04 | 3.05 | 412 | 996 | 23.26 | 1.23 |
| T2 - 100% RDF | 23.21 | 3.83 | 4.73 | 775 | 1875 | 29.24 | 2.47 |
| T3 - 100% Farmyard manure @ 5 tons ha-1 | 16.93 | 2.91 | 4 | 502 | 1027 | 26.46 | 1.94 |
| T4 - 100% Vermicompost @ 3 tons ha-1 | 15.73 | 3.02 | 4.09 | 518 | 1135 | 27.33 | 2.16 |
| T5 - 50% RDF + 50% Vermicompost | 25.23 | 4.29 | 5.46 | 897 | 2154 | 29.40 | 2.61 |
| T6 - 50% RDF + 50% Farmyard manure | 19.28 | 3.16 | 4.27 | 694 | 1579 | 28.53 | 2.45 |
| T7 - 50% RDF + 25% Farmyard Manure + 25% Vermicompost | 27.96 | 5.83 | 5.53 | 910 | 2287 | 32.83 | 2.63 |
| S. Ed | 3.672 | 0.29 | 0.13 | 4.025 | 0.365 | 0.029 | NS |
| C.D (P=0.05) | 8.088 | 0.64 | 0.28 | 29.425 | 25.855 | 0.067 | NS |

**SUMMARY**

The study found that integrated nutrient management practices significantly influenced the growth characteristics of black gram plants. The application of
50% Recommended Dosage of Fertilizer + 25% Farm Yard Manure + 25% Vermicompost (T7) resulted in higher plant height, leaf area index, dry matter production, number of branches plant-1, and number of leaves plant-1. The control treatment (T1) recorded the least growth characters.

Integrated nutrient management practices also significantly influenced the pod length, number of pods plant-1, and number of seeds pod-1 of black gram. The application of
50% Recommended Dosage of Fertilizer + 25% Farm Yard Manure + 25% Vermicompost (T7) registered maximum pod length, number of pods plant-1, and number of seeds pod-1. The control treatment (T1) significantly reduced yield characters and test weight.

In terms of grain and haulm yield, the application of 50% Recommended Dosage of Fertilizer + 25% Farm Yard Manure + 25% Vermicompost (T7) recorded maximum grain and haulm yield. The application of 50% Recommended Dosage of Fertilizer + 25% Farm Yard Manure + 25% Vermicompost (T7) resulted in the maximum gross income, net income, and BCR invested of ₹ 87943 ha-1, ₹ 54559 ha-1, and 2.63, while the minimum gross income,
net income, and BCR were registered under the control treatment (T1).

**CONCLUSION**

Based on the result of the field experiment, it can be concluded that the Integrated application of 50% Recommended Dosage of Fertilizer +25% Farm Yard Manure +
25% Vermicompost (T7) was performed very well and economic method for enhancing the grain yield of black gram. Application of FYM and Vermicompost with inorganic fertilizer steadily supplies the nutrients which may be an economically viable method that can be recommended to the black gram farmers for good yield and profit.

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