

ORIGINAL ARTICLE

EFFECT OF NUTRIENT MANAGEMENT IN IRRIGATED BLACKGRAM

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ABSTRACT

Field trial was carried out during 2015 (February to April) to study the effect of nutrient management in irrigated blackgram in Annamalai University Experimental Farm, Department of Agronomy, Annamalai nagar. The experiment was laid out in Randomized Block Design (RBD) with three replications and nine treatments. Data revealed that the combined application of organic, inorganic and bio fertilizers significantly influenced the plant growth and yield components of blackgram over control. The maximum plant height, number of branches plant⁻¹, leaf area index, number of pods plant⁻¹, number of seeds pod⁻¹, grain yield, uptake of nutrients, net returns, test weight and benefit cost ratio were observed in 100 per cent RDF + EFYM + Neem cake + RHL + PSF (T₉) followed by 100 per cent RDF + EFYM + RHL + PSF (T₇). The treatment 100 per cent RDF + PSF (T₃) and 100 per cent RDF + RHL (T₂) were on par. The lowest value was recorded in 100 per cent RDF @ 25:50:0 Kg NPK ha⁻¹ (T₁).

Keywords: Blackgram, Economics, yield and yield attributes.

1. INTRODUCTION

Pulses are commonly known as food legumes which are secondary to cereals in production and consumption in India. India is the largest producer and consumer of pulses in the world accounting for 33 per cent of world area and 22 per cent of world population. The productivity of pulses in India is low around 550- 625 kg ha⁻¹ against 1600 kg in USA, 1400 Kg in china and a world average of 900 kg ha⁻¹. Pulses improving the soil health by enriching nitrogen status, long term fertility and sustainability.

Black gram *vigna mungo* (L.) Hepper is the ancient and well known leguminous crop of Asia, and it is the third most popular pulse crop cultivated throughout India. It is widely considered as an excellent source of high quality protein with good digestibility and also contains water soluble vitamins and minerals. In India black gram occupies 2.9 million hectares with an annual production of 1.24 million tonnes and in Tamil Nadu it is grown in 3.41 lakh hectares with a production of 1.21 lakh tonnes and productivity 354.84 kg ha⁻¹ (Anjum *et al.*, 2010). In india the average productivity of blackgram crop has remained static (343 kg ha⁻¹) due to several reasons *viz.*, lack of suitable seed production techniques, cultural practices, inefficient harvest and post-harvest operation, improper storage and management practices, etc. The yield potential of blackgram is very low because of the fact, that the crop is mainly grown in rainfed conditions with poor management practices and also due to

various physiological, biochemical as well as inherent factors associated with the crop. Hence there is need for enhancement of productivity of blackgram by proper agronomic practices.

The nutrient management practices by using chemical fertilizers alone cause some negative impact on soil microbial load and fertility status of soil. To keep the soil alive nutrient management offers good scope. Organic manures and biofertilizers may have desirable characteristics, which influence the physical, chemical and biological properties of the soil. In the light of above, the field investigation was carried out to study the effect of nutrient management on the growth and yield of blackgram.

2. MATERIALS AND METHODS

A field experiment was conducted at Annamalai University Experimental Farm, Annamalainagar during summer (February – April) 2015 to study the effect of nutrient management in irrigated blackgram. The soil of the experimental site was clay loam with Ph 7.2, organic carbon (0.84%), available nitrogen 234.0, P₂O₅ 20.50 and K₂O 305.7 kg/ha. The experiment was laid out in Randomized Block Design with nine treatments *viz.*, T₁ - 100 % RDF @ 25:50:0 kg NPK ha⁻¹, T₂ - 100 % RDF + *Rhizobium leguminosarum* *Phaseoli* @ 600 gms ha⁻¹ (RHL), T₃ - 100% RDF + *Pseudomonas fluorescens* @ 400gms ha⁻¹ (PSF), T₄ - 100 % RDF + Enriched Farm Yard Manure @ 750 kg ha⁻¹ (EFYM), T₅ - 100% RDF + Neem cake @ 2t ha⁻¹, T₆ - 100 % RDF+RHL+PSF, T₇ - 100% RDF+EFYM+RHL+PSF, T₈ - 100% RDF + Neem cake + RHL+PSF, T₉ - 100% RDF+EFYM+ Neem cake+ RHL+ PSF replicated thrice. Black gram variety Vamban3 seeds were chosen for this experiment.

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Seeds were inoculated with biofertilizers with RHL @ 600g/ha and PSF 400g/ha and organic sources of nutrients were applied before sowing as per the treatment schedule. The inorganic fertilizers were applied to all plots @ 25 kg N and 50 kg P₂O₅ per hectare in the form of urea and SSP as per the treatment schedule. The seeds @ 20kg ha⁻¹ were sown during 12th February 2015 with a spacing of 30 x 10 cm and harvested on 23rd April 2015. For biometric observations five plants from each plot were randomly selected and observations were taken for plant height (30 DAS, 45 DAS and at harvest), no of branches plant⁻¹, seeds pod⁻¹, and pods plant⁻¹ were recorded. While haulm yield, grain yield, test weight, biological yield and harvest index were recorded only after harvest. The observed experimental data were statistically analysed as per the procedure outlined by Panse and Sukhatme (1978). For significant results the critical difference was worked out at five per cent probability level.

3.RESULTS AND DISCUSSION

From the experimental results, it is evident that the nutrient management practices significantly influenced the growth components viz., plant height, LAI, DMP. Among the nutrient management practices significantly higher growth components such as plant height (47.21 cm), number of branches (8.17 plant⁻¹), leaf area index (6.33), and total dry matter production (4497 kg ha⁻¹) were recorded in T₉ (100% RDF +EFYM +Neem cake +RHL +PSF) over rest of the treatments. In addition application of Enriched Farm Yard Manure @ 750 kg ha⁻¹ significantly increased growth attributes of crop (Vadivel *et al.*, 2001). Faisalur-Rasool *et al.*, (2013) significantly reported that application of Enriched Farm Yard Manure also increases the dry matter accumulation.

Table 1. Effect of nutrient management practices on growth and growth components of black gram.

| Treatment | plant height at Harvest (cm) | No. of branches plant ⁻¹ at harvest | DMP at harvest | LAI at harvest | harvest Kg ha ⁻¹ |
|--|------------------------------|--|----------------|----------------|-----------------------------|
| T ₁ : 100 % RDF @ 25:50:0 kg NPK ha ⁻¹ | 31.84 | 1.55 | | 3054 | 3.54 |
| T ₂ : 100 % RDF + RHL @ 600gms ha ⁻¹ | 33.32 | 2.16 | | 3194 | 4.00 |
| T ₃ : 100% RDF + PSF @ 400gms ha ⁻¹ | 33.47 | 2.22 | | 3195 | 4.04 |
| T ₄ : 100 % RDF + EFYM @ 750 kg ha ⁻¹ | 37.97 | 4.03 | | 3621 | 4.89 |
| T ₅ : 100% RDF + Neem cake @ 2t ha ⁻¹ | 36.46 | 3.02 | | 3478 | 4.61 |
| T ₆ : 100 % RDF+RHL+PSF | 40.25 | 5.00 | | 3837 | 5.28 |
| T ₇ : 100% RDF+EFYM+RHL+PSF | 44.87 | 7.01 | | 4275 | 6.00 |
| T ₈ : 100% RDF + Neem cake + RHL+PSF | 43.32 | 6.12 | | 4128 | 5.77 |
| T ₉ : 100% RDF+EFYM+ Neem cake+ RHL+ PSF | 47.21 | 8.17 | | 4497 | 6.33 |
| S.Em. ± | 0.53 | 0.18 | | 50.77 | 0.10 |
| C.D. (P=0.05) | 1.12 | 0.39 | 107.63 | 0.21 | |

RDF – Recommended dose of fertilizer, EFYM – Enriched Farm Yard Manure, RHL – *Rhizobium leguminosarum*, PSF – *Pseudomonas fluorescens*.

Effect of nutrient management practices on yield and yield components of black gram.

| Treatments | Grain yield | Number of Pod | Number of Test |
|--|-------------|---------------|----------------|
| T ₁ : 100 % RDF @ 25:50:0 kg NPK ha ⁻¹ | 852 | 12.53 | 3.09 |
| T ₂ : 100 % RDF + RHL @ 600gms ha ⁻¹ | 895 | 22.16 | 4.21 |
| T ₃ : 100% RDF + PSF @ 400gms ha ⁻¹ | 896 | 22.23 | 4.33 |
| T ₄ : 100 % RDF + EFYM @ 750 kg ha ⁻¹ | 1026 | 24.03 | 6.14 |
| T ₅ : 100% RDF + Neem cake @ 2t ha ⁻¹ | 983 | 23.02 | 5.15 |
| T ₆ : 100 % RDF+RHL+PSF | 1091 | 24.98 | 7.14 |
| T ₇ : 100% RDF+EFYM+RHL+PSF | 1221 | 26.97 | 9.08 |
| T ₈ : 100% RDF + Neem cake + RHL+PSF | 1178 | 26.03 | 8.14 |
| T ₉ : 100% RDF+EFYM+ Neem cake+ RHL+ PSF | 1286 | 29.16 | 9.90 |
| S.Em. ± | 15.32 | 0.17 | 0.11 |
| C.D. (P=0.05) | 32.47 | 0.36 | 0.24 |

RDF – Recommended dose of fertilizer, EFYM – Enriched Farm Yard Manure, RHL – *Rhizobium leguminosarum*, PSF – *Pseudomonas fluorescens*.

Table 3. Effect of nutrient management practices on economics of black gram.

| Treatments | Net returns Rs ha ⁻¹ | B.C ratio |
|--|---------------------------------|-----------|
| T ₁ : 100 % RDF @ 25:50:0 kg NPK ha ⁻¹ | 22330 | 2.32 |
| T ₂ : 100 % RDF + RHL @ 600gms ha ⁻¹ | 184 | 2.42 |
| T ₃ : 100% RDF + PSF @ 400gms ha ⁻¹ | 24226 | 2.42 |
| T ₄ : 100 % RDF + EFYM @ 750 kg ha ⁻¹ | 30073 | 2.75 |
| T ₅ : 100% RDF + Neem cake @ 2t ha ⁻¹ | 28218 | 2.65 |
| T ₆ : 100 % RDF+RHL+PSF | 32421 | 2.82 |
| T ₇ : 100% RDF+EFYM+RHL+PSF | 37551 | 3.01 |
| T ₈ : 100% RDF + Neem cake + RHL+PSF | 36065 | 2.99 |
| T ₉ : 100% RDF+EFYM+ Neem cake+ RHL+ PSF | 40390 | 3.15 |

RDF – Recommended dose of fertilizer, EFYM – Enriched Farm Yard Manure, RHL – *Rhizobium leguminosarum*, PSF – *Pseudomonas fluorescens*.

Application of 100% RDF + EFYM + Neem cake + RHL + PSF (T₉) recorded significantly higher grain yield (1286 kg ha⁻¹) and number of pods/plant (29.16). This was statistically significant with 100% RDF + EFYM+ RHL+ PSF (T₇). The yield increased significantly with the application of enriched FYM over control in blackgram. The similar result was reported by (Mathan *et al.*, 1996). The treatments T₃ and T₂ were on par. Significantly higher net returns (Rs.40390) and Benefit cost ratio (Rs.3.15) were noticed in T₉ over rest of the treatments, but it was closely followed by T₇. Application of 100% RDF+ EFYM @ 750 kg ha⁻¹+ Neem cake @ 2 t ha⁻¹ + RHL 600gms ha⁻¹+ PSF 400gms ha⁻¹(T₉) significantly increased the growth attributes, yield attributes and net returns of blackgram.

4. REFERENCES

Anjum, T., Gupta, K.S., and Datta, S., 2010. Mapping of mungbean yellow mosaic India virus (MYMIV) powdery mildew resistant gene in blackgram (*Vigna mungo* (L.) Hepper). *Electron J. Plant Breed.*, 1 (4): 1148-1152.

Anu Lavanya, G. and Ganapathy, M., 2010. Yield maximization of blackgram in Rice fallow blackgram through organic sources of nutrient management practices in Cauverydeltaic areas. *Legume Res.*, 33 (4): 291-294.

Balachandran, D., and Nagarajan, P., 2002. Dual inoculation of *Rhizobium* and Phosphobacteria the phosphorus on blackgram cv. Vamban 1. *Madras Agric. J.*, 89(10-12): 691-693.

Faisal-ur- Rasool, Barduk Hasan, Jahangir, I.A., Tahir ali and Mubarak, 2013. Nutritional yield and economic responses of sunflower (*Helianthus annuus* L.) to integrated levels of nitrogen, sulphur and farm yard manure. *J. Agric. Sci.*, 8(1): 17-27.

Mathan, K., Honora, J., Francis and Ramanathan, S.P., 1996. Response of blackgram fertilization and rhizobium inoculation. *Indian J. Agron.*, 41(1): 74-77.

Panase, A.S., and Sukhatme, P.V., 1978. *Statistical method for agriculture works*. ICAR, New Delhi, 3rd edn., pp:328.
