

Effect of nutrient management and biofertilizer on quality, NPK content and uptake of blackgram in medium black soil

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ABSTRACT

A field experiment was conducted at Instructional farm, Junagadh Agricultural University, Junagadh during *Kharif* season of 2007. The experiment comprised of twelve treatment combinations of three levels of recommended dose of fertilizer (A_0 -0% RDF, A_1 -50% RDF and A_2 -100% RDF) and two levels each of Farmyard manure (F_0 - No FYM, F_1 - FYM 6 t ha⁻¹). Significantly the 100% RDF + FYM 5 t/ha and biofertilizers inoculation with and without inoculation with *Rhizobium* sp. + *Pseudomonas striata* enhanced protein content, nitrogen, phosphorus and potassium content and uptake by blackgram as compared to rest of treatments.

Key words : Nutrient management, Biofertilizers, F.Y.M., Blackgram

INTRODUCTION

Blackgram is one of the legume crops which has its own importance due to high nutritional value of seeds as a human food and rich feed for cattle. Nutrient management has played very significant role in providing the physical condition of soil and supply all the macro and micro nutrients which are required by crop for balanced nutrition (Gaur *et al.*, 1990). Biofertilizers containing latent cells of efficient strains of nitrogen fixing or augmenting the extent of availability of nutrients in a form which can be easily assimilated by plants. Therefore, the present investigation was carried out to evaluate the effect of nutrient management and biofertilizers on quality parameters and NPK content and uptake of blackgram.

MATERIALS AND METHODS

A field experiment was conducted at Instructional farm, Junagadh Agricultural University, Junagadh during *Kharif* season of 2007. The experiment comprised of twelve treatment combinations was laid out in factorial Randomized Block Design with three replications. Three levels of RDF (20:40:0 kg NPK ha⁻¹) viz., A_0 -0%RDF, A_1 -50%RDF and A_2 -100%RDF ha⁻¹. Two levels each of FYM viz., F_0 - No FYM, F_1 - FYM 6 t FYM ha⁻¹ and Biofertilizers viz., B0-no seed inoculation, B1- seed inoculation with *Rhizobium* sp. + *Pseudomonas striata*. The soil of experimental plot was clayey in texture and medium in available nitrogen, available phosphorus and available potassium. Sowing was done on 7th July 2007 by seed drill keeping 45 cm inter row spacing. Farmyard manure was applied after preparation of layout as per treatments before sowing. The dose of inorganic fertilizer was applied in the form of urea and single super phosphate

as per treatment. The seeds were treated with *Rhizobium* sp. and *Pseudomonas striata* both @ 10g per kg of seeds as per treatment.

RESULTS AND DISCUSSION

The results obtained from the present investigation are summarized below in the following sub heads:

Effect of recommended dose of fertilizer :

Fertilizer application of 100% RDF significantly increased protein content in seed, nitrogen, phosphorus and potassium content in seed and straw of blackgram. The highest nitrogen and phosphorus content in seed and straw may be due to greater availability of nitrogen and phosphorus and their efficient absorption by the roots of black seed (Balu *et al.*, 1995; Akbari *et al.*, 2005). Uptake of nitrogen and phosphorus are product of nutrients content and crop yield. Therefore, increase in seed and straw yields as well as increase in nitrogen and phosphorus contents in seed and straw with increase in amount of fertilizer application has resulted in higher uptake of nitrogen and phosphorus by blackgram.

Effect of FYM :

Protein content in seed, nitrogen, phosphorus and potassium content in seed and straw of blackgram were significantly increased by application of 6 t FYM ha⁻¹. This increase in N, P, K content might be outcome of increased availability of nutrients to the plant upon decomposition of applied FYM. The significant increase in protein content in seed of blackgram was due to increased nitrogen content in seed and nitrogen which is an integral part of protein. It may also be attributed due

Table 1 : Effect of recommended dose of fertilizer, farmyard manure and biofertilizers on yield attributes as well as seed and straw yield (kg ha⁻¹) of black gram

Treatments	Protein content (%)	Nitrogen content (%) in		Phosphorous content (%) in		Potassium content (%) in		Nitrogen uptake (kg ha ⁻¹) by		Phosphorous uptake (kg ha ⁻¹) by		Potassium uptake (kg ha ⁻¹) by	
		Seed	Straw	Seed	Straw	Seed	Straw	Seed	Straw	Seed	Straw	Seed	Straw
Recommended dose of fertilizer (RDF)													
A ₀ 0% RDF	20.56	3.28	1.26	0.378	0.219	0.794	0.968	21.83	23.37	2.556	3.692	5.316	16.84
A ₁ 50% RDF	22.70	3.63	1.39	0.413	0.228	0.873	1.025	29.38	25.39	3.507	4.110	6.956	18.45
A ₂ 100% RDF	23.76	3.80	1.46	0.425	0.240	0.896	1.090	32.40	26.46	3.559	4.484	7.659	19.42
S.E.±	0.60	0.10	0.04	0.009	0.004	0.022	0.026	1.04	0.66	0.101	0.118	0.240	0.55
C.D. (P=0.05)	1.75	0.28	0.13	0.027	0.012	0.065	0.077	3.04	1.93	0.297	0.346	0.703	1.60
farmyard manure (FYM)													
F ₀ No FYM	21.41	3.43	1.30	0.393	0.223	0.823	0.985	24.77	24.19	2.938	3.899	5.933	17.36
F ₁ FYM 6 t ha ⁻¹	23.23	3.72	1.44	0.418	0.235	0.886	1.070	30.97	25.96	3.477	4.292	7.355	19.11
S.E.±	0.49	0.08	0.04	0.008	0.003	0.018	0.022	0.85	0.54	0.083	0.096	0.196	0.45
C.D. (P=0.05)	1.43	0.23	0.11	0.022	0.010	0.053	0.063	2.48	1.57	0.243	0.283	0.574	1.31
Biofertilizers (<i>Rhizobium</i> + <i>O. striata</i>)													
B ₀ No inoculation	21.40	3.42	1.30	0.391	0.224	0.824	0.993	25.55	24.19	3.006	3.915	6.196	17.41
B ₁ Inoculation	23.23	3.72	1.44	0.419	0.235	0.884	1.063	30.19	25.96	3.409	4.275	7.092	19.06
S.E.±	0.49	0.08	0.04	0.01	0.003	0.02	0.02	0.85	0.54	0.08	0.10	0.20	0.45
C.D. (P=0.05)	1.43	0.23	0.11	0.02	0.01	0.05	0.06	2.48	1.57	0.24	0.28	0.57	1.31
Interaction	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
CV%	9.28	9.28	11.38	7.86	6.10	9.05	8.87	12.87	9.07	10.94	9.98	12.49	10.37

NS = Non significant

to increased availability of phosphorus, as it is structural element of certain co-enzymes involved in protein synthesis. The increase in seed and straw yields along with improved content of N and K in seed and straw due to application of FYM resulted in increased uptake of N, P, K by seed and straw of blackgram. The present results are in accordance with the findings of Vasanthi and Subramanian (2004).

Effect of Biofertilizers :

Seed inoculation with biofertilizers significantly increased the protein content (23.23%) in seed, nitrogen, phosphorus and potassium content in seed and straw as well as nitrogen, phosphorus and potassium uptake by blackgram. The reason for increase in nitrogen content in seed with biofertilizers like *Rhizobium* sp. may be attributed due to higher nodulation. Phosphorus content in seed and straw was increased with seed inoculation with biofertilizers like *Pseudomonas striata*. This might be due to symbiotic nitrogen fixation by *Rhizobium* sp. which makes plant root to absorb more nutrients and production of chelating compounds by *Pseudomonas striata* which remove insoluble phosphates and release soluble P which may taken up by plants. Similar findings were observed by Singh *et al.* (1993).

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