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Influence of Integrated nutrient management on growth, yield and quality of Blackgram (*Vigna mungo* L.)

Vineet Dwivedi and T Singh

Abstract

In order to explore the possibility of increasing growth, yield & quality of black gram. Therefore the present investigation was conducted during *kharif* season of 2019-20 at the instructional farm, Aks university, Sherganj, Satna by adoption RBD design. Among the treatment 100% RDF (20:40:20 Kg NPK/ha.) was one of the important treatment which showed pronounced response towards enhancement of growth, yield and quality of black gram. The highest plant height (24.76), Number of leaves (8.50), Number of branches (4.33), Profuse nodulation (19.99), Number of seeds/pod (5.16), length of pod (3.90), test weight (39.12), straw yield (38.00), biological yield (50.83) and harvest index (25.22) was found.

Keywords: Black gram, INM, yield and yield attributes

Introduction

Black gram (*Vigna mungo* L. Hepper) also known as urdbean being early maturing and short-duration pulse crop is being grown in an area of 31.9 lakh ha. With a production of 19.0 lakh tonnes and productivity of 596 kg/ha (Krishnaprabhu *et al.* 2018) [4]. Black gram is a self-pollinated leguminous crop which is grown during *kharif* as well as summer in seasons in arid and semi-arid regions of India. It is tolerant to drought and can be grown successfully on all types of soils. According to Vavilov (1951) [5] black gram is native to India, belonging to the Leguminosae family. It is a richest source of protein, contains 26% protein, 1.2% fat and 56.6% carbohydrates on dry weight basis and also is rich in calcium and iron. It fits well in various multiple cropping and intercropping systems. After picking of pods, blackgram plants may be used as green fodder for livestock or green manuring to increase fertility of soil. Besides these, the black gram crop also enriches soil by fixing the atmospheric nitrogen. Integrated nutrient management improve soil fertility, productivity and many other agronomic aspects of crop production, such as water retention capacity in the soil and disease and pest control, all of which would contribute to increase the crop yields. The appropriate combination of chemical fertilizers and organic manure with biofertilizers can be feasible and visible to sustain agriculture as commercial and profitable ensuring high yield of crop without deterioration in quantity and quality of the produce and soil health. Farm Yard Manure (FYM) is by far, the most popular and available for use as an organic source of plant nutrient for the Indian farmers.

Material and method

The present experiment was carried out during *kharif* season on 2019-20 at the instructional farm, Aks university, Sherganj, Satna (M.P.) The instructional farm, situated in North - east part of Madhya Pradesh the latitude of 23° 58' to 25° 12' and longitude of 80° 21' to 81° 23' east in Rewa division of M.P. and altitude of 315 m. from sea level. The soil of satna region under black soil. The experiment farm lies in humid subtropical monsoonic zone with the average rainfall 112.89 mm. during July to September. The summer months are very hot with mean maximum temp. Ranging from 30.6 °c to 41.6 °c may to June, whereas, December to January are very coldest months. The mean temperature range 21°C to 31°C during summer. The hottest months when temperature reach 41.6 °c. The average temperature range 33.01 °c to 20.12 °c. The Soil based on chemical composition low in organic carbon (0.43 g.), Available nitrogen (176.5 kg/ha.), available phosphorous (12.4 kg/ ha), available potassium (200.0 kg/ha.) with soil P^H (7.5) and electrical conductivity (0.16 ds/m). The soil sample tested based on P^H, electrical conductivity, Organic carbon content, available N, P, K given by Richards (1968), Richards (1968), Jackson (1973), Subbiah and Asija (1956), Olsen *et al* (1954), Jackson (1973).

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Farm Yard Manure (FYM) was applied @ 2 to 6 tonnes /ha. as treatment. Nitrogen through urea @ 20 kg/ha and Phosphorous in form of diammonium phosphate (DAP) @ 40 kg/ha and Potassium through Potas @ 20 kg/ha. Was applied in based dose of sowing as 100% fertility level. Molybdenum @ 800 kg/ha through sodium molybdate was applied in plot / treatment. Seed inoculation Rhizobium biofertilizer @ 20 g/kg seed before sowing of the crop seed sown on the furrow on June 30th 2019 and furrow covered by soil sown after seedling seed were treated with Bavistin before sowing.

Results and discussion

Integrated nutrient level recorded significantly higher plant height, Number of branch, Number of seed /pod, Number of Pod/plant, Biological yield, and harvest index during in this

experiment. The highest plant height (24.76 cm) at 30 days was after sowing recorded under the treatment @ 100% RDF (20:40:20 NPK kg/ha). The soil based treatment in 100 % RDF (20:40:20 NPK kg/ha) height, Number of branch (4.33), Number of Seed/pods (26.01), length of pod (3.90 cm), and test weight/1000 g. seed (39.12), grain yield (12.83 q/ha), Straw yield (38.00 q/ha), biological yield (50.83 q/ha), harvest index (25.22%) of black gram recorded from treated plot with treatment combination soil test based @100% RDF (20:40:20 NPK kg/ha). The highest yield and yield attributes gained under these treatment might be due to chemical fertilizer for better plant growth in better vegetative growth in plant height and total dry matter, positive response in terms of yield and yield attributes to integrated nutrient management have also been reported Amruta *et al.* (2016)

Table 1: Growth, yield and quality attributing of black gram due to use different treatment

Treatment	Plant height		No. of Branches		No. of seed/pod	No. of pod/plant	Test weight (1000 seed)	Grain Yield (Kg/ha)	Straw yield (Kg/ha)	Biological yield (Kg/ha)	Harvest index (%)	Protein content (%)
	30 DAS	45 DAS	30 DAS	45 DAS								
Control	19.37	29.11	2.63	20.19	3.31	19.82	33.92	7.33	26.98	34.31	21.39	20.97
100% RDF (20:40:20 NPK Kg/ha)	24.76	34.79	4.33	31.15	5.16	26.01	39.12	12.83	38.00	50.83	25.22	24.85
90%RDF + 2t FYM/ha	22.23	31.93	3.30	27.82	4.44	24.34	37.59	11.39	35.77	47.16	24.15	23.52
45%RDF + 4t FYM/ha	20.21	29.86	3.03	26.16	3.60	20.87	35.19	8.35	30.04	38.39	21.76	21.62
45%RDF + 5t FYM/ha + Rhizobium	20.23	29.88	3.05	26.37	3.64	21.42	35.65	8.58	30.86	39.44	21.73	21.74
50%RDF + 4t FYM/ha +Rhizobium	20.30	29.91	3.09	26.72	3.72	21.46	35.76	9.63	33.15	42.78	22.52	23.24
45%RDF+ 6t FYM/ha + +800 gm. Molybdenum /ha	22.11	31.57	3.13	27.59	4.10	22.64	36.61	10.15	34.18	44.33	22.88	23.27
2t FYM /ha+ Rhizobium +800 g. Molybdenum /ha	19.60	29.34	2.94	20.67	3.41	20.77	34.51	7.58	26.99	34.58	21.94	21.49
4t FYM /ha+ Rhizobium +800 g. Molybdenum /ha	20.05	29.58	3.00	24.55	3.58	20.83	34.75	7.67	27.03	34.70	22.12	21.55
SEm +	0.50	0.46	0.20	0.83	0.24	0.22	0.23	0.27	0.62	0.80	0.42	0.42
CD (P = 0.05)	1.45	1.34	0.57	2.42	0.70	0.65	0.66	0.79	1.82	2.34	1.23	1.23

Summary & conclusion

The significant higher plant height of black gram was recorded under the treatment of 100% RDF respect to values of 24.76 and 34.79 cm at the growth stage of 30 and 45 DAS to superior to rest of the treatments.

The maximum number of cluster per plant of black gram was recorded under the application 100% RDF with the respective to values of 7.73 proved to be significantly superior among the treatment.

The significant higher fresh weight of plant of black gram was recorded under the application of 100% RDF with respective to values of 49.35 and 53.73 g at the growth stage of 30 and at 45 DAS, respectively which proved to be significantly superior to rest among the treatments.

The significant highest pod length of black gram was recorded under the application of 100% RDF with the respective to values of 3.90 cm which proved to be significantly superior to rest among the treatments.

The significant highest number of pods per plant of black gram was recorded under the application of 100% RDF with respective to values of 26.01 which proved to be significantly superior to rest among the treatments.

The significant highest test weight of black gram was recorded under the application of 100% RDF with respective to values of 39.12 g which proved to be significantly superior among rest among the treatments.

The protein content of black gram was recorded under the application of 100% RDF with the respective values of 24.85 % which provide to be significant superior to rest of the treatment.

Based upon this experiment it is concluded that application of the application of 100% RDF recorded the maximum and significantly higher grain yield (12.83 q/ha), net returns (₹ 63456.00.00/ ha) and highest B: C ratio of 1: 3.67. Hence, application of these nutrient can be adopted in semi-arid eastern plain zone of Madhya Pradesh.

However, these results are only indicative and require further experimentation to arrive at more consistent and final conclusion to be passed on to growers.

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