Influence of agronomic practices on the performance of irrigated blackgram

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Abstract

An experiment was conducted during season February – April 2014, to evaluate the agronomic practices on the performance of irrigated blackgram. The field experiments was raised in a randomized block design replicated thrice, consisting of 12 treatment combinations.

Key words: Rhizobium, Nutrient management, Soil health, Productivity and economics and Nutrient uptake.

Introduction

The higher available N, P and K status of soil were recorded when recommended dose of fertilizer (RDF) + 25 kg S ha^{-1} + Rhizobium + Phosphobacteria (seed inoculation) @ 600 g ha^{-1} + Foliar application of DAP @ 2% + NAA @ 40 ppm ha^{-1} + Salicylic acid @ 100 ppm ha^{-1} at 30 and 45 DAS (T_{12}) and also recorded with highest growth and yield components.

Pulses are commonly known as food legumes which are secondary to cereals in production and consumption in India. Pulses are an important source of dietary protein, energy minerals and vitamins for the man kind. The yield potential of blackgram is very low because of fact that, the crop is mainly grown in rainfed condition with poor management practices and also due to various physiological biochemical as well as inherent factor associated with crop.

Combination of organic and inorganic fertilizers can maintain the soil fertility and sustain higher productivity of crops. The productivity of blackgram can be increased by inoculation of bio-cultures preapred from Rhizobium and Phosphobacteria along with foliar fertilization. It has shown encouraging results in sustaining the crop productivity and improving soil fertility use of biofertilizers with inorganic manures may prove a viable option for sustaining crop production. A field experiment was conducted to study the combined effect of Rhizobium and Phosphobacteria under different source of nutrient supply

through foliar fertilization and inorganic fertilizers on crop growth, yield, nutrient uptake and soil fertility status of blackgram.

Use of biofertilizers enriches the microbial population. Hence, there is ample scope for enhancement of the production and producing of blackgram by proper agronomic practices several strategies were initiated to boos the productivity of blackgram. Biofertilizers are necessary to develop organic agriculture, sustainable and non-polluted agriculture (Mithal Jiskani, 2001). Therefore, present experiment was conducted to study the effect of agronomic practices on the performance. On yield and yield attributes of irrigated blackgram.

Materials and Methods

The field experiment was conducted during the Feburary to April season of 2014 in work laid out in randomized block design. With three replications in July 2014. The treatments comprised seed inoculation of biofertilizers *viz.*, Rhizobium and Phosphobacteria with and without in various plots. The recommended fertilizer schedule for irrigated adopted for blackgram was per schedule. All inorganic manures and biofertilizers were applied as basal and as seed inoculation. The soil was clay loam, having pH 7.7 and electrical conductivity 0.65. The available nutrient status in the soil was 212.93 N and 15.63 P and 242.88 K (kg ha^{-1}), respectively, during July 2014. Blackgram variety VBN 3 was sown at a spacing of 30 cm × 10 cm. Crop uptake and post-harvest soil status of NPK nutrients were carried out as per standard procedures.

Results and Discussion

Growth and yield components

Judicious combination of biofertilizers and inorganic fertilizers had significant impact on growth and yield attributes. Among the various treatments tested, application of recommended dose of fertilizer (RDF) (25:50:25 kg) NPK + 25 kg S ha^{-1} + Rhizobium + Phosphobacteria (seed inoculation) 600 g ha^{-1} + Foliar application of DAP @ 2% + NAA @ 40 ppm ha^{-1} + Salicyolic acid @ 100 ppm ha^{-1} at 30 and 45 DAS (T_{12}). The treatment without other combinations (T_1) recorded the lowest values for growth and yield attributes as well

as seed yield. The total uptake of N, P and K was highest in treatments with biofertilizers application (both rhizobium and phosphobacteria seed inoculation). Similar results reported by Parveen *et al.* (2002).

Biofertilizers

Beneficial effect of biofertilizers in improving the seed yield of blackgram (Table 1) and the combined inoculation of rhizobium and phosphobacteria showed more positive effects, indicating the synergistic association between them. Rhizobium showed its superiority with other combination in blackgram and the results, confirm the findings of Dubey (1997).

Enhanced nutrient uptake (NPK) was observed with biofertilizers (Table 2) and a higher N and P uptake under co-inoculation of biofertilizers might be attributed to enhanced nitrogenase and nitrate-reductase enzyme activities in soil (Sarawgi *et al.*, 1998) leading to more biological N fixation by rhizobium and increased availability of P in soil due to grater solubilization. Similarly, K uptake was greatly improved under biofertilizers and indicated its need for higher vegetative and seed formation. The present results are agreement with earlier findings of Doss *et al.* (2013).

Application of recommended dose of fertilizer (RDF) (25:50:25 kg) NPK + 25 kg S ha^{-1} + Rhizobium + Phosphobacteria (seed treatment) @ 600 g ha^{-1} + Foliar application of DAP @ 2% + NAA @ 40 ppm ha^{-1} + salicylic acid @ 100 ppm ha^{-1} 30 and 45 DAS improved number of pods/plant, number of seeds/pod, and seed yield (Table 1). It may be owing to beneficial effect of biofertilizers with inorganic fertilizers on crop growth and various physiological parameters, which affected growth and yield attributes and yield. The results are in accordance with the findings of Tyagi *et al.* (2014).

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Table 1. Influence of INM on growth and yield irrigated blackgram

Treatments	Plant height (cm)	DMP (kg ha^{-1})	Total no. of pods plant^{-1}	No. of seeds pod^{-1}	Seed yield (kg ha^{-1})
T_1	21.92	1075	17.34	3.68	737
T_2	29.02	1422	21.12	4.32	855
T_3	24.01	1168	18.49	3.92	771
T_4	26.33	1330	19.99	4.09	821
T_5	25.18	1249	19.19	4.01	796
T_6	31.10	1514	22.25	4.55	888
T_7	33.60	1677	23.95	4.68	937
T_8	32.28	1596	23.15	4.62	913
T_9	36.84	1851	25.95	5.01	995
T_{10}	37.94	1933	26.75	5.10	1020
T_{11}	35.59	1769	25.05	4.92	970
T_{12}	39.96	2025	27.85	5.34	1053
S.Ed	0.84	40.26	0.49	0.10	14.12
CD (P = 0.05)	1.84	80.52	1.08	0.20	28.24

Table 2. Influence of INM on nutrient uptake and soil available nutrients in blckgram

	Uptake (kg ha^{-1})			Post harvest soil (kg ha^{-1})		
Treatments	**N**	**P**	**K**	**N**	**P**	**K**
T_1	46.21	10.76	48.39	202.48	10.69	222.85
T_2	53.19	11.81	53.53	206.31	12.51	232.70
T_3	48.01	11.06	49.72	203.49	11.19	228.37
T_4	51.42	11.51	52.21	205.32	12.03	231.20
T_5	49.73	11.29	50.96	204.41	11.61	229.79
T_6	54.97	12.09	54.86	207.24	12.99	234.21
T_7	58.38	12.53	57.34	209.13	13.83	237.06
T_8	56.68	12.32	56.11	208.21	13.41	235.63
T_9	61.84	13.04	59.91	211.03	14.73	239.97
T_{10}	6.54	13.27	61.15	211.95	15.15	241.39
T_{11}	60.15	12.82	58.66	210.12	14.32	238.56
T_{12}	65.32	13.56	62.47	212.93	15.63	242.88
S.Ed	0.80	0.13	0.64	0.47	0.20	0.67
CD (P = 0.05)	1.75	0.26	1.28	0.94	0.40	1.34