Effect of inorganic, biofertilizers and growth regulator on growth and yield of irrigated blackgram

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Abstract

Field investigation was conducted on irrigated blackgram during February-April 2014 with a set of 10 treatments. Consisting of organic and inorganic sources of nutrients. The biofertilizers like rhizobium and phosphobacteria were applied with seeds as seed inoculation. Among the various treatments tested, application of recommended dose of fertilizer (25:50:25 NPK kg ha^{-1} + 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} at 30 and 45 DAS recorded the highest seed yield and highest benefit cost ratio compared with other treatments.

Key words: Biofertilizer, Foliar fertilization, Blackgram, Seed inoculation and Growth regulator

Introduction

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 mankind. 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. Among the grain legumes, blackgram is an ancient and well known a leguminous crop of Asia, it is a popular of its nutritional quality having rich protein (26.2%), carbohydrate (56.6%), fat (1.2%) mineral, amino acids, minerals and vitamins. The yield potential of blackgram is very low because of due to poor management practices and imbalanced nutrient application (Mithal Jiskani, 2001).

Biofertilizers and plant growth regulators were play an key role in improving the yield of the crop with out affecting soil, health. Thus INM is a strategy for advocating judicious and efficient use of inorganic

fertilizers combination (Chandrasekar and Bangarusamy, 2003). The investigation was conducted to study the influence of irrigated blackgram by integrated nutrient management techniques.

Materials and Methods

Field experiment was conducted during season of February – April 2014 at Experimental Farm, Annamalai University, Annamalainagar. The soil was clay loam soil having pH of 7.1, EC 0.17, organic carbon 0.4%. The experiment was laid out in randomized block design with three replications including twelve treatments. The treatments were:

T_1 – Control

T_2 – Recommended dose of fertilizer (25:50:25 kg NPK ha^{-1})

T_3 – Rhizobium + Phosphobacteria (seed inoculation) @ 600 g ha^{-1}

T_4 – Foliar application of DAP @ 2% at 30 and 45 DAS

T_5 – Foliar application of NAA @ 40 ppm ha^{-1} + Salicylic acid @ 100 ppm ha^{-1} at 30 and 45 DAS

T_6 – Recommended dose of fertilizer (25:50:25 kg) NPK + 25 kg S ha^{-1} + Rhizobium + Phosphobacteria (seed inoculation) @ 600 g ha^{-1}

T_7 – Recommended dose of fertilizer + 25 kg S ha^{-1} + Foliar application of DAP @ 2% at 30 and 45 DAS

T_8 – Recommended dose of fertilizer + 25 kg S ha^{-1} + Foliar application of salicylic acid acid @ 100 ppm ha^{-1} at 30 and 45 DAS

T_9 – Recommended dose of fertilizer + 25 kg S ha^{-1} + Rhizobium + Phosphobacteria (seed treatment) @ 600 g ha^{-1} + Foliar application of DAP @ 2% at 30 and 45 DAS

T_{10} – RDF + 25 kg S ha^{-1} + Foliar application of DAP @ 2% and 30 and 45 DAS + Foliar application of NAA @ 40 ppm ha^{-1} + Salicylic acid @ 100 ppm ha^{-1} at 30 and 45 DAS

T_{11} – RDF + 25 kg S ha^{-1} + Foliar application of DAP @ 2% and 30 and 45 DAS + Foliar application of NAA @ 40 ppm ha^{-1} + Salicylic acid @ 100 ppm ha^{-1} at 30 and 45 DAS

+ Rhizobium + Phosphobacteria (seed treatment) 600 g ha^{-1}

T_{12} – 1 + 2 + Rhizobium + Phosphobacteria (seed treatment) @ 600 g ha^{-1} + Foliar application + DAP 2% + NAA @ 40 ppm ha^{-1} + Salicylic acid @ 100 ppm ha^{-1} at 30 and 45 DAS. Inorganic fertilizers, biofertilizers and plant growth regulators were calculated as recommended dose and mixed with respective plots. The blackgram variety VBN 3 was chosen for the study and was sown during February – April 2014. Seeds are treated with Rhizobium and Phosphobacteria (600 g ha^{-1}) before sowing.

Results and Discussion

The results showed that the integrated nutrient management approach significantly influenced on growth and yield components *viz.*, plant height, dry matter production, number of pods per plant, number of seeds per pod and seed yield. Among the various treatments tested, application of recommended dose of NPK + 25 kg S ha^{-1} along with Rhizobium and foliar application of DAP @ 2% along with NAA @ 400 ppm ha^{-1} and salicylic acid @ 100 ppm ha^{-1} at 30 and 45 DAS.

These findings are in by coincide with reported by Doss *et al.* (2013) and Rahul Khatkar *et al.* (2004). This might be due to adequate supply of nutrients at different growth stages of the crop which helped in better absorption and translocation into the plant system more efficiency to developing pods resulting higher yield.

Economics

The field study and results indicated that application of recommended dose of fertilizer along with biofertilizers and INM regulator registered the highest return $rupee^{-1}$ during Febuary to April 2014. This

might be due to adequate supply of nutrients to the crop through application biofertilizers and plant growth regulators which ultimately resulted in higher returns. This results were agreement with earlier findings of Yakadri and Ramesh Thatikunta (2002) and Shashikumar *et al.* (2013).

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Table 1. Effect of inorganic, biofertilizers and growth regulator on growth and yield of irrigated blackgram

Treatments	Plant height (cm)	DMP (kg ha^{-1})	No. of pods plant^{-1}	No. of seeds pod^{-1}	Seed yield (kg ha^{-1})
T_1	18.11	1075	17.34	3.68	430
T_2	25.04	1422	21.12	4.32	855
T_3	20.03	1168	18.49	3.92	460
T_4	22.35	1330	19.99	4.09	580
T_5	21.20	1249	19.19	4.01	530
T_6	26.97	1514	22.25	4.55	888
T_7	29.47	1677	23.95	4.68	937
T_8	28.15	1596	23.15	4.62	913
T_9	32.71	1851	25.95	5.01	995
T_{10}	33.81	1933	26.75	5.10	1020
T_{11}	31.46	1769	25.05	4.92	970
T_{12}	35.83	2025	27.85	5.34	1053
S.Ed	1.73	84	1.49	0.24	21.2
CD (P = 0.05)	3.46	168	2.98	0.48	42.4