

Original Research Article

<https://doi.org/10.20546/ijcmas.2020.910.210>

Nutrient Management in Rabi Blackgram

E. Aruna*, G. Karuna Sagar and A. Pratapkumar Reddy

Agricultural Research Station, Utukur, Kadapa, India

*Corresponding author

ABSTRACT

Keywords

Blackgram,
Nutrient
management, Rabi

Article Info

Accepted:
15 September 2020
Available Online:
10 October 2020

An experiment was conducted during the *rabi* seasons of 2018 and 2019 at Agricultural Research Station, Utukur, kadapa to study the effect of potassium and sulphur in addition to recommended nutrients of nitrogen and phosphorus on growth and yield of blackgram. The experiment was laid out in randomized block design with 11 treatments of different levels of nitrogen, phosphorus, potassium and sulphur. The results revealed that application of potassium and sulphur to *rabi* blackgram along with recommended dose of nitrogen and phosphorus influenced the plant height, number of branches per plant and pods per plant. Length of the pod, seeds per pod and 100 seed weight were not influenced by these nutrients. Application of 20-75-20-20 kg NPKS ha⁻¹ recorded higher seed yield of 2256 and 1904 kg ha⁻¹ in 2017 and 2018.

Introduction

Blackgram is a short duration pulse crop grown in all seasons with little amount of water. It can fit very well in intensive cropping systems. It is a perfect combination of all nutrients like proteins (25-26%), carbohydrates (60%), fats (1.5%), minerals, amino acids and vitamins. It is rich in vitamin A, B1, B3 and has small amount of thiamine, riboflavin, niacin and vitamin C. It also has very high calorie content with 100 gm of black gram containing 347 calories. Despite of all these features, the productivity of crop is below the average owing to several inherent soil related constraints such as low organic matter and poor soil fertility. Increase of pulse production is urgently needed to meet up the

demand of the people to reduce import, to save foreign currency and to increase pulse consumption for maintaining good health. Hence, there is a need to enhance its productivity by different means. It can meet its nitrogen requirements by symbiotic fixation of atmospheric nitrogen. The nutrients which need attention are phosphorus, potassium and sulphur (Nandal *et al.*, 1987). Potassium plays a critical role in enzyme activation, water use efficiency, photosynthesis, transport of sugars, protein and starch synthesis in plants (Muchena and Kiome, 1995) and is especially important in its interaction with nitrogen throughout the growing period. Blackgram is also very much responsive to sulphur application (Aulakh, *et al.*, 1997). In recent years, sulphur deficiency

has been aggravated in soils due to increase in cropping intensity and addition of sulphur free fertilizers. Sulphur is now recognized as the fourth major nutrients after N, P and K. The increasing concerns of sulphur deficiency suggest that S deserves greater attention than that it has received so far.

According to Tandon (1995), black gram yielding 8.90 qha⁻¹ removes 70 kg N, 5.6 kg P, 50.1 kg K and 5.1 kg S ha⁻¹ from the soil. Hence, phosphorus, potassium and sulphur can improve the quality and quantity of the crop. Though the blackgram requires potassium and sulphur, the recommended dose of fertilizers for pulses include 20-50 kg N and P ha⁻¹ only in this region. Therefore application of potassium and sulphur fertilizers becomes important both from quality as well as production point of view. Hence the present experiment was taken up to study the effect of potassium and sulphur on growth and yield of black gram.

Materials and Methods

A field experiment was conducted during *rabi* seasons of 2017 and 2018 at Agricultural Research Station, Utukur, Kadapa, Andhra Pradesh. The soil of the experimental site was analyzed and it was clayey loam with low nitrogen (139 kg ha⁻¹), medium phosphorus (87 kg ha⁻¹) and potassium (460 kg ha⁻¹) with P^H of 7.9 and EC of 0.06 dS/m. The experiment was laid out in randomized block design with 11 treatments viz., 20 kg N-50 kg P, 20 kg N-75 kg P, 20 kg N- 50 kg P -10 kg K, 20 kg N-75 kg P-10 kg K, 20 kg N-50 kg P- 20 kg K, 20 kg N-75 kg P- 20 kg K, 20 kg N- 50 kg P-10 kg K- 10 kg S, 20 kg N-75 kg P-10 kg K-10 kg S, 20 kg N-50 kg P - 20 kg K-20 kg S, 20 kg N-75 kg P-20 kg K-20 kg S and 19:19:19 sprays at 30 and 45 DAS in RBD design. The crop was sown with yellow mosaic resistant TBG-104 variety on 10th and 13th October during 2017 and 2018

respectively with spacing 30 cm x10 cm. All the fertilizers were applied basal at the time of sowing. The data on growth and yield parameters was taken at the time of harvest by taking five plants randomly from the plot. The data thus obtained was analysed statistically by using OP stat software.

Results and Discussion

Effect on growth

Taller plants were recorded with application of 20-50 -10 -10 kg NPKS ha⁻¹ (T₇) during both the years 2017 and 2018 with mean plant height of 32.38 cm (Table 1). It was on par with application of 20- 75 - 10 - 10 kg NPKS ha⁻¹ (T₈). Taller plants with potash and sulphur application might be due to their role in stimulation of cell division, cell expansion, synthesis of chlorophyll and photosynthetic process. Lower plant height was recorded with application of 19:19:19 spray twice at 30 and 45 DAS (T₁₁) in both the years. Increased plant height of blackgram with application of sulphur was also reported by Gokhilaet *al.*, (2017) in Coimbatore soils and Thesiyat *al.*, (2013) in Junaghadh. Higher number of branches per plant was recorded with application of 20-50-10-10 kg NPKS ha⁻¹ (T₇) and it was on par with other potassium and sulphur applied treatments in both the years indicating positive influence potassium and sulphur on growth of blackgram.

Effect on yield attributes and yield

Significantly higher number of pods per plant was observed with application of 20-50 -10 - 10 kg NPKS ha⁻¹ (T₇) in both the years with mean of 56.16. It was on par with 20-75 -20 - 20 kg NPKS ha⁻¹ (T₁₀) in 2018. Lower number of pods per plant was recorded with application of 19:19:19 spray twice at 30 and 45 DAS (T₁₁) in both the years.

Table.1 Growth and yield of blackgram (TBG -104) as influenced by nutrient management

	Fertiliser dose (Kg ha ⁻¹)	Plant height (cm)			No. of branches /plant			No. of pods /plant			Pod Length (cm)		
		2017	2018	mean	2017	2018	mean	2017	2018	mean	2017	2018	mean
T1	20 N - 50 P (RDF)	32.43	23.35	27.89	3.06	3.06	3.06	40.46	38.86	39.66	4.15	4.88	4.51
T2	20 N - 75P	33.66	23.00	28.18	3.40	3.28	3.34	37.40	42.40	39.90	4.28	5.07	4.67
T3	20 N - 50 P -10 K	34.93	23.73	29.33	3.60	3.56	3.58	44.93	43.60	44.26	4.56	5.17	4.86
T4	20 N - 75 P - 10 K	32.66	22.40	27.53	3.53	3.53	3.53	45.53	42.93	44.23	4.36	4.90	4.63
T5	20 N - 50 P -20 K	33.46	21.13	27.29	3.53	3.30	3.41	39.13	40.00	39.56	4.53	4.92	4.72
T6	20 N - 75 P -20 K	35.73	23.83	29.78	3.80	3.33	3.56	40.20	44.26	42.23	4.64	4.89	4.76
T7	20 N - 50 P -10 K- 10S	37.76	27.00	32.38	4.13	3.86	3.99	57.20	55.13	56.16	4.50	5.07	4.78
T8	20 N - 75 P -10 K- 10S	35.43	24.06	29.74	3.58	3.36	3.41	40.46	41.73	41.09	4.50	5.00	4.75
T9	20 N - 50 P -20 K- 20S	34.40	23.33	28.86	3.64	3.36	3.41	44.00	45.00	44.50	4.63	5.18	4.90
T10	20 N -75 P -20 K- 20S	34.50	26.20	30.35	3.62	3.30	3.35	48.40	51.50	49.95	4.50	4.90	4.78
T11	19:19:19 spray twice at 30 and 45 DAS	26.30	20.20	23.25	2.93	2.53	2.73	24.90	33.26	29.08	3.89	4.87	4.38
	S.E m_±	1.08	1.04		0.19	0.19		1.35	1.73		0.10	0.13	
	CD at 5%	3.20	3.09		0.56	0.56		4.02	5.14		0.32	NS	
	CV	5.54	7.67		9.31	10.1		5.76	6.89		4.21	4.78	

Table.2 Growth and yield of blackgram (TBG -104) as influenced by nutrient management

	Fertiliser dose (Kg ha ⁻¹)	No. of seeds/pod			100 seed wt (g)			Seed yield (kg ha ⁻¹)		
		2017	2018	mean	2017	2018	mean	2017	2018	mean
T1	20 N - 50 P (RDF)	6.93	6.26	6.59	5.64	5.27	5.45	1943	1568	1755
T2	20N - 75P	6.80	6.60	6.70	5.63	5.25	5.44	2001	1667	1834
T3	20 N - 50 P -10 K	6.96	6.80	6.88	5.69	5.31	5.50	2035	2024	2029
T4	20 N - 75 P - 10 K	6.83	6.36	6.59	5.46	5.50	5.48	2229	1742	1986
T5	20 N - 50 P -20 K	6.73	6.46	6.59	5.53	5.44	5.48	2010	1859	1934
T6	20 N - 75 P -20 K	6.50	6.93	6.71	5.75	5.27	5.51	2053	2039	2046
T7	20 N - 50 P -10 K- 10S	6.86	6.76	6.81	5.77	5.26	5.51	2035	1861	1948
T8	20 N - 75 P -10 K- 10S	6.83	7.06	6.94	5.77	5.29	5.53	2112	1799	1955
T9	20 N - 50 P -20 K- 20S	6.83	6.46	6.64	5.69	5.31	5.50	2110	1854	1982
T10	20 N -75 P -20 K- 20S	6.93	6.66	6.79	5.81	5.32	5.56	2256	1904	2080
T11	19:19:19 spray twice at 30 and 45 DAS	6.36	6.36	6.36	5.47	4.88	5.17	1568	1454	1511
		0.17	0.30		0.14	0.08		83	105	
		NS	NS		NS	NS		246	311	
		4.38	7.93		4.35	2.88		6.93	6.97	

Application of potassium and sulphur might have increased the translocation of these nutrients from source to sink (seed) which would have increased the number of pods per plant. This result was in conformity with the findings of Kokani *et al.*, (2014) who had reported increased number of pods in blackgram with application of S @ 20 kg ha⁻¹.

Lengthier pods of blackgram (4.66 cm) was observed with the application of 20-50 -10 -10 kg NPKS ha⁻¹(T₇) in 2017 but it was on par with other treatments except 20 - 50 kg N and P (T₁), 20 -75 kg N and P (T₂) and 19:19:19 spray twice at 30 and 45 DAS (T₁₁). During 2018, potassium and sulphur application did not significantly influence the length of pods in blackgram. Number of seeds per pod and 100 seed weight in blackgram were not significantly influenced by treatments in both the years. Whereas, Vaiyapuri *et al.*, (2010) revealed that application of S @ 30 kg ha⁻¹ increases all yield attributing characters viz., no. of branches plant⁻¹, no. of pods plant⁻¹, no. of seeds pod⁻¹ and 100 seed weight of soybean due to better plant metabolism.

Application of 20-75-20-20 kg NPKS ha⁻¹ (T₁₀) recorded higher seed yield of 2256 and 1904 kg ha⁻¹ respectively in 2017 and 2018 (Table 2). It was on par with other treatments except 20 - 50 kg N and P (T₁), 20-75 kg N and P (T₂) and 19:19:19 spray twice at 30 and 45 DAS (T₁₁) indicating the significant influence of potassium and sulphur on growth and yield of *rabi* blackgram. Beneficial role of potash and sulphur on photosynthetic process and enzyme activation might have improved the yield. Basumatary *et al.*, (2018) also reported increased grain and stover yield of blackgram significantly up to 20 kg S ha⁻¹ which was 95.69% higher over control. But reported higher Agronomic efficiency, apparent sulphur recovery and recovery efficiency at 10 kg S ha⁻¹ and found decreased with increase in level of sulphur.

It can be concluded that application of potassium and sulphur along with recommended dose of nitrogen and phosphorus influenced growth and yield of blackgram in kadapa region of Andhrapradesh. Hence 10 kg each of potassium and sulphur can be recommended to *rabi* blackgram along with recommended nitrogen (20kg) and phosphorus (50 kg) in kadapa region of Andhra Pradesh.

References

- Basumatary, A., Shangne, J. J., Das, K. N., and Bhattacharyya, D. 2018. Impact of sulfur fertilization on distribution of sulfur fractions and use efficiency in blackgram in subtropical acidic soil of Assam, India. *Journal of Plant Nutrition*.41: 1436-1443.
- Gokhila, B., Bhaskar, K., and Saravanapandian.2017. Nutritional significance of sulphur on growth, yield and quality of blackgram in major contrasting soil series of Tamilnadu, India. *International Journal of current microbiology and applied sciences* 6(11): 3139-3149.
- Kokani, J.M., Shah, K.A.,Tandel.,and Nayaka,P.2014. Growth, yield attributes and yield of summer blackgram (*Vigna mungo* L.) as influenced by FYM, phosphorus and sulphur. *The Bioscan*. 6: 429-433.
- Muchena, F., andKiome,R.1995. The role of soil science in agriculture development in east Africa. *Geoderma* 67:141-157.
- Nandal, D.P., Malik, D.S., and Singh, K.P. 1987. Effect of phosphorus levels on drymatter accumulation of kharif pulses. *Legume Research* 19:31-33.
- Tandon.1995.Sulphurfertilisers for Indian Agriculture- A guide book II edn. Fertilizer development and consultation organization, New Delhi.1-20.
- Thesiya, N.M., Chovati, P.K., and Kikani,V.L. 2013. Effect of potassium

and sulphur on growth and yield of blackgram under rainfed conditions. Legume Research 36(3): 255-258.

Vaiyapuri, K., Mohamed Amanullah, M., and Rajendran, K. 2010. Influence of

sulphur and boron on yield attributes and yield of soybean. Madras Agric. J.97 (1-3): 65-67.

How to cite this article:

Aruna, E., G. Karuna Sagar and Pratapkumar Reddy, A. 2020. Nutrient Management in Rabi Blackgram. *Int.J.Curr.Microbiol.App.Sci.* 9(10): 1735-1740.

doi: <https://doi.org/10.20546/ijcmas.2020.910.210>