

Studies on influence of INM practices on yield attributes, yield and nutrient uptake of Blackgram

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Abstract

A field experiment was conducted to study the effect of different levels of N and foliar application of nutrients on yield attributes, yield and nutrient uptake of irrigated blackgram during July–September 2021 at kashthambadi village, Polur taluk, Tiruvannamalai district. The experiment was laid out in randomized block design (RBD) and replicated thrice. The experiment consisted of nine treatments viz., Control (T₁), 100% RDN (T₂), 75% RDN (T₃), 100% RDN + Foliar application of 2% KNO₃ on 30 and 45 DAS (T₄), 100% RDN + foliar application of 2% Humic acid on 30 and 45 DAS (T₅), 100% RDN + foliar application of 2% DAP on 30 and 45 DAS (T₆), 75% RDN + foliar application of 2% KNO₃ on 30 and 45 DAS (T₇), 75% RDN + foliar application of 2% Humic acid on 30 and 45 DAS (T₈), 75% RDN + foliar application of 2% DAP on 30 and 45 DAS (T₉). The results revealed that the higher yield attributes was recorded in treatment with 100% RDN + foliar application of 2% DAP on 30 and 45 DAS (T₆) and the lowest was recorded in control plot (T₁). Higher nutrient uptake of NPK was observed in 100% RDN + foliar application of 2% DAP on 30 and 45 DAS (T₆) and lower uptake was recorded in control plot (T₁).

Key words : Blackgram, Nitrogen, DAP, Humic Acid.

Blackgram (*Vigna mungo* L. Hepper) is also known as urdbean is an important pulse crop in India. It belongs to the family Fabaceae and is very significant in terms of global food and nutritional security. With 24% protein, 59.6% carbohydrates, 154 mg calcium, 385 mg phosphorus, 7.57 mg iron, 0.254 mg riboflavin, and 0.273 mg thiamin per 100 g of blackgram, it is highly known for its nutritional content. In India, it is grown over an area of 4.6 million

ha area with production and productivity of 24.5 lakh tones and 533 kg ha⁻¹ respectively (Indiastat, 2020). The low productivity of pulses is due to the fact that these crops are typically produced on marginal and submarginal soils with little to no fertilizer input. The blackgram is primarily grown in conditions of residual wetness without any nutrition Farmers generally take up sowing with the basal application of nutrients as recommended. Further, soil application of nutrients is often not enough to meet the growing crop demand particularly in short duration crop like black gram, as it is basically indeterminate in habit of flowering and fruiting, there is a continuous competition for available assimilates between vegetative and reproductive sinks throughout the growth period. In many cases, the aerial spray of nutrients is preferred and gives quicker and better results than the soil application⁴. Under these circumstances, foliar application of nutrients would be more appropriate, efficient and economical than the soil application. Considering the above facts an experiment was conducted to evaluate various levels of N with foliar feeding of nutrients on yield and nutrient uptake of blackgram.

A field experiment was conducted at kashambadi village, Polur taluk at Tiruvannamalai district to study the effect of different levels of N and foliar application of nutrients on yield of irrigated blackgram during July – September 2021. The experimental field was geographically situated at 12° 35' North latitude and 79° 12' East longitude at an altitude of ± 171 meters (561 ft) above mean sea level. The soil of the experimental field was sandy clay loam. The soil was low in available nitrogen and phosphorus and medium in available potassium. The promising black gram

variety VBN 8 chosen for the study experiment was laid out in a Randomized block design with the three replications and it was sown with a spacing of 30 cm X 10 cm. The treatment involves Control (T₁), 100% RDN (T₂), 75% RDN (T₃), 100% RDN + Foliar application of 2% KNO₃ on 30 and 45 DAS (T₄), 100% RDN + foliar application of 2% Humic acid on 30 and 45 DAS (T₅), 100% RDN + foliar application of 2 % DAP on 30 and 45 DAS (T₆), 75% RDN + foliar application of 2% KNO₃ on 30 and 45 DAS (T₇), 75% RDN + foliar application of 2 % Humic acid on 30 and 45 DAS (T₈), 75% RDN+ foliar application of 2 % DAP on 30 and 45 DAS (T₉) were sprayed as foliar nutrition at flower initiation. The experiment consists of nine treatments namely Control only water spray. The recommended dose of P and K were applied to all the plots and nutrient N was applied as per the treatment schedule. The data on yield attributes, yield, and uptake of nutrients were statistically analyzed and interpreted.

All the yield and yield attributing characters viz., number of pods plant⁻¹, pod length, number of seeds pod⁻¹, seed yield, grain yield and harvest index of blackgram were remarkably influenced by the different treatments of soil and foliar application of nutrients. Application of 100% RDN + foliar application of 2% DAP on 30 and 45 DAS (T₆) recorded the maximum values of Number of Pods Plant⁻¹ (16.84 cm) , Pod length (6.50 cm), number of seeds pods⁻¹ (6.64), and yield (1267 kg ha⁻¹) respectively This might be due to availability of N and other major nutrients at critical stages of crop growth.

Blackgram fixes atmospheric nitrogen

through the symbiotic relationship between the host black gram roots and soil bacteria and thus improves soil fertility. The slow rate of dry matter accumulation during pre-flowering phase, leaf senescence during the period of pod development and low partitioning efficiency of assimilates to grain are identified as the main physiological constraints for increasing yield.

That is why blackgram is highly responsive to nitrogen. For the pulse crops, nitrogen is most useful because it is the main component of protein. The management of fertilizer greatly affects the growth, development and yield of this crop. Pulses although fix nitrogen from the atmosphere, application of nitrogenous fertilizers during the flowering stage is clearly beneficial in improving yield.¹

Foliar spray of 2% DAP recorded the highest values for yield attributing characters viz., number of pods plant⁻¹, number of seeds pod⁻¹, and pod length than other foliar spray treatments. The increase in yield attributes might be due to supplementation of nutrients at the critical stage without physiological stress.

Foliar application of nutrients enhanced the number of floral buds, prevented the floral shedding by maintaining optimum bio-physiological conditions in plants. Adequate and continuous nutrient availability through soil and foliar nutrition promotes the supply of assimilates to sink or yield contained, thus enlarging the size of the yield structure. The findings of Hossain *et al.*,³ have also confirmed the results of present study.

Nutrient uptake :

The nutrient uptake were significantly

influenced by the application of graded level of N and foliar nutrition. Among the treatments tested, T₆(100% RDN + foliar application of 2% DAP on 30 and 45 DAS) recorded highest nutrient uptake of NPK (Table-1). The higher uptake of nutrient was mainly due to absorption of nutrients under foliar application without any loss and higher activity of root nodules which would have fix the atmospheric nitrogen into the soil by which it increased the higher nutrient status in the soil. This is also attributed to the higher nutrient uptake throughout the crop growth period. Similar finding is confirmed with the report by Mondal *et al.*⁵. Better growth of plants resulting in higher dry matter production and higher nitrogen concentration in plants due to better absorption of nitrogen by blackgram could be the reason for such a positive trend. Easy availability and absorption of foliar nutrients in the plant system enhanced the growth of the crop and the crop thereby leading to better uptake of nutrients. This might be due to the availability of nutrients which is helpful to absorb other nutrients also in balance amount resulted more concentration of N, P, K in plant. The least uptake of nutrients was observed under control (T₁) due to non-availability of adequate supply of nutrients especially nitrogen and phosphorus to the crop which was evident from recording of low DMP values.

Application of the 2% DAP foliar spraying along with recommended dose of N significantly registered the maximum values for the yield attributes like number of pods plant⁻¹, number of pod length, number of seeds plant⁻¹, yield and also the NPK uptake of Blackgram over other treatments and control.

Table-1. Effect of graded levels of N and foliar application on yield attributes and nutrient uptake of blackgram.

Treat-ments	Number of Pods Plant ⁻¹	Pod length (cm)	Number of Seeds pod ⁻¹	Grain yield (kg ha ⁻¹)	Nitrogen Uptake (kg ha ⁻¹)	Phosphorus Uptake (kg ha ⁻¹)	Potassium Uptake (kg ha ⁻¹)
T ₁	12.19	3.63	4.34	533	53.96	6.51	20.79
T ₂	14.03	4.88	5.22	774	59.61	10.01	25.96
T ₃	13.01	3.98	4.75	638	55.93	9.03	22.68
T ₄	14.99	5.51	5.68	927	63.14	10.96	28.26
T ₅	16.03	6.13	6.26	1117	66.51	11.92	30.39
T ₆	16.84	6.50	6.64	1267	68.42	12.45	32.20
T ₇	13.79	4.49	5.11	741	57.98	9.58	24.62
T ₈	14.83	5.23	6.09	895	61.49	10.57	27.88
T ₉	15.82	5.85	6.09	1067	65.06	11.50	30.04
SEm±	0.1	0.06	0.14	31.80	0.62	0.17	1.26
CD (P=0.05)	0.77	0.32	0.31	95.42	1.86	0.51	3.80

T₁ - ControlT₂ -100% RDNT₃ -75% RDNT₄ -100% RDN +Foliar application of 2% KNO₃ on 30 and 45 DAST₅ -100% RDN + Foliar application of 2% Humic acid on 30 and 45 DAST₆ - 100% RDN + Foliar application of 2 % DAP on 30 and 45 DAST₇ - 75% RDN + Foliar application of 2% KNO₃ on 30 and 45 DAST₈ - 75% RDN + Foliar application of 2 % Humic acid on 30 and 45 DAST₉ - 75% RDN + Foliar application of 2 % DAP on 30 and 45 DAS

In view of the above experimental results, it can be concluded that application of 100 percent RDN along with foliar application of 2 percent DAP on 30 and 45 DAS is an effective method for producing higher yield attributes, and yield in blackgram. Hence this can be recommended to the farmers.

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