

EFFECT OF FOLIAR NUTRITION FOR MAXIMIZING THE PRODUCTIVITY OF BLACK GRAM (*Vignamungo L.*)

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Abstract: A field experiment was conducted at Adhiparasakthi Agricultural College, Kalavai, Tamil Nadu during Thaipattam (February 2016 – April 2016) to evaluate the effect of foliar nutrition for maximizing the productivity of blackgram. The experiment was laid out in Randomized block design and replicated thrice with six treatments. The treatment details are as follows, T₁ - Absolute control (without any foliar nutrition), T₂ - Foliar spray of DAP 2 % + NAA 40 ppm, T₃ - Foliar spray of Urea 1% + DAP 2% + KCl 1% + NAA 40 ppm, T₄ - Foliar spray of TNAU Pulse wonder 1.125 %, T₅ - Foliar spray of Polyfeed 1 % + NAA 40 ppm, T₆ -Foliar spray of Polyfeed 1 % + NAA 40 ppm. The growth characters, viz., plant height, number of branches plant⁻¹, root nodules plant⁻¹, root length, dry matter production (DMP) and Yield attributes viz., number of clusters plant⁻¹ and number of seeds pod⁻¹ were significantly increased by foliar spray of TNAU Pulse wonder 1.125% twice at 30 and 45 DAS recorded the higher growth characters. The same treatment had significantly higher grain yield of 692 kg ha⁻¹. It was followed by foliar spray of polyfeed 1% + NAA 40 ppm registering 642 kg ha⁻¹. Based on the results of the above study, it is concluded that foliar spray of TNAU Pulse wonder 1.125% followed by foliar spray of Polyfeed 1% + NAA 40 ppm was recommended to get profitably higher yield besides improving the quality of Black gram with a B: C ratio of 2.95.

Keywords: Black gram, Foliar nutrition, Growth, Yield attributed, Yield, Higher profit.

Introduction

Pulses are an integral part of many diets across the globe and they have great potential to improve human health, conserve our soils, protect the environment and contribute to global food security. India accounts for 33% of the world area and 22% of the world production of pulses. Due to stagnant production, the net availability of pulses has come down from 60 gm in 1951 to 41.7 g/day/capita in 2012, as against Indian Council of Medical Research (ICMR) which recommends 65 g/day/capita. The total area under pulses in India is around 25.23 million hectares with a production of 19.27 million tonnes and productivity of 764 kg ha⁻¹ (Indiastat, 2014). In Tamil Nadu, blackgram is cultivated in 3.65 lakh hectares with the production of 3.10 lakh tonnes and with an average productivity of 851 kg ha⁻¹ (Tnstat,

2014). This low yield is attributed to several reasons *viz.*, low yielding varieties, cultivating in marginal lands mostly as rainfed crops and poor management practices.

Foliar application of growth regulators reduced the flower drop and improved the pod formation and seed setting percentage (Mir *et al.*, 2010). Reduced flower drop can be achieved in pulses by foliar spray of nutrients like TNAU Pulse wonder, polyfeed and growth regulators like NAA. Keeping these points in view, the present investigation was carried out to develop specific management practices such as sowing methods and application of nutrients through foliar application as plant growth regulating chemicals for the blackgram to enhance the yield and productivity.

Materials and Methods

A field experiment was conducted at Adhiparasakthi Agricultural College, Kalavai during Thaipattam (February 2014 – April 2015) to evaluate the effect of foliar nutrition for maximizing the productivity of blackgram. The climate of the experimental site is semi-arid tropical type. The mean annual rainfall is 786.6 mm in 40 rainy days. The mean maximum and minimum temperature of the location are 33.4 °C and 23.6 °C respectively. The relative humidity ranges from 60 to 80 per cent. Blackgram (*Vignamungo* L) variety ADT 3 was used as a test variety during the study. The experiment was conducted in a randomized block design with six treatments replicated thrice during the February 2016 – April 2016. The experiment consisted of six treatments. The treatment details are as follows, T₁ - Absolute control (without any foliar nutrition), T₂ - Foliar spray of DAP 2% + NAA 40 ppm, T₃ - Foliar spray of Urea 1% + DAP 2% + KCl 1% + NAA 40 ppm, T₄ - Foliar spray of TNAU Pulse wonder 1.125%, T₅ - Foliar spray of Polyfeed 1% + NAA 40 ppm, T₆ - Foliar spray of Polyfeed 1% + NAA 40 ppm.

Foliar application of nutrients *viz.*, urea, DAP, KCl, KNO₃, MAP, TNAU Pulse wonder, Polyfeed and plant growth regulator (NAA) were sprayed on 30 and 45 DAS as per the treatment schedule. Appropriate need based plant protection measures were taken up to control the pest and diseases as per the Crop production guide, 2012.

Plant height

Plant height was measured at harvest stage of blackgram. The maximum plant height of 53.4 cm was recorded in foliar spray of TNAU Pulse wonder at 1.125% and it was on par with foliar spray of Polyfeed 1% + NAA 40 ppm (50.0 cm). Plant height was minimum with no foliar spray (44.3 cm). It might be due to additional supply of major and micronutrients and

growth hormones through foliar spray. These findings corroborate with the results of Altab Hossain *et al.* (2008) and Dixit *et al.* (2008).

Number of branches plant⁻¹

Various foliar nutrition treatments imposed had significant influence on number of branches plant⁻¹ of blackgram. At harvest stage, foliar spray of TNAU Pulse wonder 1.125% produced significantly higher number of branches plant⁻¹ (7.7) and it was followed by foliar spray of Polyfeed 1% + NAA 40 ppm. The number of branches plant⁻¹ significantly lower 6.7 when the blackgram was sown without any foliar nutrition. This might be due to supply of major and micronutrients and growth hormones through foliar spray. These findings corroborate with the results of Dixit *et al.* (2008).

Number of root nodules plant⁻¹

Adoption of foliar spray of nutrients did not show any influence on the number of root nodules plant⁻¹. Among the treatments, foliar spray of TNAU Pulse wonder 1.125% significantly influenced higher number of root nodules plant⁻¹ (21.8). However it was on par with foliar spray of MAP 1% + KNO₃ 1% + NAA 40 ppm (21.3). The lowest number of root nodules plant⁻¹ (20.5) was recorded in control. This might be due to more space available in the sparse plant population observed under foliar spray of nutrients. Similar findings were also reported by Sathyamoorthi *et al.* (2008) and Muhammad Hamayun (2011).

Root length

The root length of blackgram at all the stages varied significantly due to foliar nutrition. Dibbling method of sowing along with foliar spray of TNAU Pulse wonder 1.125 % recorded higher root length of 16.2 cm at harvest. Lowest root length of 13.7 cm was observed in without foliar spraying. This might be due to supply of macro and micro nutrients by foliar spray. Similar findings were also reported by Sathyamoorthi *et al.* (2008) and Muhammad Hamayun (2011).

Dry matter production

The foliar spray of nutrient significantly influenced the dry matter production of blackgram. At harvest, foliar spray of TNAU Pulse wonder 1.125% recorded significantly higher dry matter production of 2885 kg ha⁻¹. However it was on par with foliar spray of Polyfeed 1% + NAA 40 ppm (2701 kg ha⁻¹). The lowest dry matter production was recorded in control (2026 kg ha⁻¹). This might be attributed to higher population and accumulation of nutrients unit area⁻¹. This is in accordance with earlier findings of Vijayakumar *et al.* (2006) in rice and Sathyamoorthi *et al.* (2008) in greengram.

Number of pod cluster plant⁻¹

The number of pod cluster plant⁻¹ of blackgram recorded at physiological maturity and it was significantly influenced foliar spray of nutrients. The number of pod clusterplant⁻¹ is higher (9.9) when foliar spray of TNAU Pulse wonder 1.125%. However it was on par with foliar spray DAP 2% + NAA 40 ppm (9.6). The lower number of pod clusterplant⁻¹ (7.7) observed in without foliar nutrition. This might due to foliar application of major and minor nutrients coupled with growth regulators enhanced the number of floral buds, prevented the floral shedding. The findings in the present study are in conformity with Hamayun and Chaudhary (2004) and Muhammad Hamayun *et al.*, (2011).

Length of pod

The pod length blackgram was significantly influenced by foliar spray of nutrients. The maximum pod length of 5.3 cm was registered in foliar spray of TNAU Pulse wonder 1.125% followed by foliar spray of Polyfeed 1% + NAA 40 ppm (4.9 cm) however it was on par with the remaining all other treatments. This might be due to adequate and continuous nutrient availability through foliar nutrition promotes the supply of assimilates to sink or yield container, thus enlarging the size of the yield structure. The findings in the present study are in conformity with Muhammad Hamayun *et al.*, (2011).

Number of seeds pod⁻¹

The foliar spray of nutrients was significantly influenced the number of seeds pod⁻¹. Among the treatments, the number of seeds pod⁻¹ was significantly higher in foliar spray of TNAU Pulse wonder 1.125%, which registered 6.6 seeds pod⁻¹ followed by foliar spray of Polyfeed 1% + NAA 40 ppm (5.8 seeds). The lowest number of seeds pod⁻¹ (4.9) was observed in without foliar spraying.

100 Seed weight

Seed test weight of blackgram was not significantly altered due to various crop foliar spray of nutrients. However, the foliar application of TNAU Pulse wonder 1.125% and Polyfeed 1% + NAA 40 ppm recorded higher seed test weight of 3.8 g. The lower seed test weight was recorded without foliar spraying (3.4 g). This might be due to supplementation of nutrients at the critical stage and foliar application of major and minor nutrients coupled with growth regulators enhanced the number of floral buds, prevented the floral shedding by maintaining optimum bio-physiological conditions in plants. The findings in the present study are in conformity with Hamid *et al.* (2002). Kalpana and Krishnarajan (2003).

Grain Yield

Adoption of foliar spray of nutrients has influenced the grain yield of blackgram. Foliar spray of TNAU Pulse wonder 1.125% significantly recorded the higher grain yield of 692 kg ha⁻¹. It was followed by foliar spray of polyfeed1% + NAA 40 ppm registering 642 kg ha⁻¹. The grain yield increases with these two treatments were 54 % and 42 % over the adoption of without any foliar nutrition (449 kg ha⁻¹). This might be due to maintaining optimum plant population, reduced the flower droppings, improved the pod formation and seed setting percentage. The findings in the present study are in conformity with Muhammad Hamayun, (2011) and (Mir *et al.*, 2010).

Conclusion

Based on the results of the above study, it is concluded that foliar spray of TNAU Pulse wonder 1.125% followed by foliar spray of Polyfeed 1% + NAA 40 ppm was recommended to get profitably higher yield besides improving the quality of Black gram. Over all, from the experimental results, it could considered that foliar spray of TNAU Pulse wonder 1.125% as a better option for achieving higher productivity and profitability of Black gram with a B: C ratio of 2.95.

Table 1: Effect of foliar nutrition on growth parameters of Black gram

Treatments	Plant height (cm)	Number of branches plant ⁻¹	No. of Root nodules plant ⁻¹	Root length (cm)	Dry matter production (kg ha ⁻¹)
T ₁ - Control	44.3	6.7	20.5	13.7	2026
T ₂ - FS of DAP 2% + NAA 40 ppm	46.4	7.2	20.7	14.6	2419
T ₃ - FS of Urea 1% + DAP 2% + KCl 1% + NAA 40 ppm	48.6	7.5	20.3	15.1	2579
T ₄ - FS of TNAU Pulse wonder 1.125%	53.4	7.7	21.8	16.2	2885
T ₅ - FS of Polyfeed 1% + NAA 40 ppm	50.0	7.6	21.1	14.8	2701
T ₆ - FS of MAP 1% + KNO ₃ 1% + NAA 40 ppm	48.1	7.4	21.3	14.7	2635
SEd	1.7	0.27	0.8	0.7	90
CD (0.05 %)	3.7	0.57	1.7	1.5	187

Table 2: Effect of foliar nutrition on yield attributes of Black gram

Treatments	No. of pod cluster plant ⁻¹	Length of pod (cm)	No. of Seeds pod ⁻¹	100 seed weight (g)	Grain yield (kg ha ⁻¹)
T ₁ - Control	7.7	4.6	4.9	3.4	449
T ₂ - FS of DAP 2% + NAA 40 ppm	9.5	4.5	5.4	3.6	560
T ₃ - FS of Urea 1% + DAP 2% + KCl 1% + NAA 40 ppm	8.3	4.6	5.4	3.7	613
T ₄ - FS of TNAU Pulse wonder 1.125%	9.9	5.3	6.6	3.8	692
T ₅ - FS of Polyfeed 1% + NAA 40 ppm	9.0	4.9	5.8	3.8	642
T ₆ - FS of MAP 1% + KNO ₃ 1% + NAA 40 ppm	8.6	4.8	5.6	3.7	634
SEd	0.4	0.2	0.2	0.14	23
CD (0.05 %)	1.0	0.4	0.4	NS	48

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