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Research Article

Response of Foliar Nutrition on Growth and Yield of Green Gram

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Abstract

Field experiment was conducted at Annamalai University experimental farm, Annamalai nagar to study the response of foliar nutrition on yield and nutrient uptake in green gram during August - October 2018. Result of the present study revealed that application of RDF 100 per cent + DAP 2 per cent foliar spray + NAA 40 ppm on 20 and 35 DAS resulted in higher grain yield which is superior over other treatments. Yield and uptake of nitrogen, phosphorus and potassium were also found to be significantly higher with RDF 100 per cent + DAP 2 per cent foliar spray + NAA 40 ppm on 20 and 35 DAS applications compared to other treatments.

Keywords: *Foliar Nutrition; Growth; Yield; Green Gram*

Introduction

Pulses are the cheapest and rich source of protein which can be considered as life line for vast vegetarian population of India. Green gram is the important pulse crop grown in India next to black gram and red gram. It is a favorable pulse crop since it thrives better in all seasons as a sole, mixed, inter or fallow crop. Indian council of medical research (ICMR) has recommended a per capital intake of 50g of pulses per day for the balanced nutritional supply [1]. In pulses, the time gap between the maximum vegetative phase and flower initiation stage is less. Foliar application of DAP in pulses reduce the flower drop and increase the yield of pulses is a regular practice in many areas [2]. The major cause for low yield in pulses is due to higher level of flower shedding. This problem must be overcome with external application of growth regulators. Plant growth regulators (PGRS) can play an important role in increasing the crop yield by making the plants photosynthetically more effective in enhancing the number of flower buds and checking their abscission. Growth promoting PGR's are used for preventing pre-harvest fruit drop and increasing fruit set. Foliar application is a simple and effective method of providing nutrients to the crops directly where they are actually needed without spending energy for their transport and any losses in transit which often brings about immediate improvement on the crop growth than soil application [3]. Foliar application will be more efficient than soil application at the later stages of crop, when there is preferential assimilates translocation into seeds or fruits and root activity for nutrient uptake is limited [4]. It was therefore, worthwhile to study the combined application of DAP and NAA in enhancing the growth and yield attributes in pulses.

Materials and Methods

Field experiment was conducted at the Agriculture Experimental farm, Department of Agronomy, Annamalai University, Annamalai Nagar, Tamil Nadu during August to October 2013. The soil was clay loam in texture with pH 7.9. It contained 234 kg ha^{-1} available N, 20.50

kg ha^{-1} P and 305.7 kg ha^{-1} K. The experiment was laid out in randomized block design replicated thrice. The treatments included T1- RDF 100% + water spray on 20 and 35 DAS, T2- RDF 100 per cent + NAA 40 ppm on 20 and 35 DAS, T3- RDF 100 per cent + DAP 1 per cent foliar spray on 20 and 35 DAS, T4- RDF 100 per cent + DAP 1 per cent foliar spray + NAA 40 ppm on 20 and 35 DAS, T5- RDF 100 per cent + DAP 2 per cent foliar spray on 20 and 35 DAS, T6- RDF 50 per cent + DAP 2 per cent foliar spray + NAA 40 ppm on 20 and 35 DAS, T7- RDF 75 per cent + DAP 2 per cent foliar spray + NAA 40 ppm on 20 and 35 DAS and T8- RDF 100 per cent + DAP 2 per cent foliar spray + NAA 40 ppm on 20 and 35 DAS. Green gram variety VBN-3 was sown at a spacing of 30 x 10 cm. N, P_2O_5 and K_2O @ 25: 50: 25 kg ha^{-1} were applied as urea, single superphosphate and muriate of potash respectively. 100 per cent of recommended NPK was applied as basal and the remaining 75 per cent and 50 per cent recommended dose of NPK for other treatments were also applied at basal. Plant protection measures were done as and when required. Observations on growth and yield data were recorded.

Results and Discussion

The results revealed that effect of foliar nutrition was significant on the growth and yield of green gram. Among the treatments, RDF 100 per cent + DAP 2 per cent + NAA 40 ppm on 20 and 35 DAS (T8) significantly increased the yield of green gram compared to other treatments (Table 1).

Treatment	Plant Height (Cm)	No. of Pods Plant^{-1}	Dry Matter Production (Kg Ha^{-1})	100 Seed Weight (G)	Grain Yield (Kg Ha^{-1})
T1	44.52	13.65	2110	3.29	396.44
T2	45.66	15.85	2363	3.47	563.53
T3	46.76	15.15	2247	3.44	483.90
T4	47.86	18.06	2637	3.77	738.45
T5	48.99	17.05	2500	3.62	650.99
T6	50.13	19.31	2774	3.92	825.91
T7	51.23	20.01	2890	3.95	905.54
T8	52.36	21.02	3027	4.10	993.00
CD at 5%	1.12	0.71	122.15	0.05	83.57

Table 1: *Effect of foliar nutrition on growth and yield attributes of green gram.*

Application of RDF 100 per cent + DAP 2 per cent + NAA 40 ppm on 20 and 35 DAS (T8) recorded the highest plant height (52.36 cm), this might be due to the synergistic and cumulative effect of above DAP, NAA and NPK might have helped in increasing the plant height. Increased plant height might be due to increase in protein synthesis and cell growth. Mohiuddin Chowdhury., *et al*. [5], Kumar and Chandra [6] and Aucharmal., *et al.* [7] also reported similar results. The dry matter production was significantly higher under application of RDF 100 per cent + DAP 2 per cent + NAA 40 ppm on 20 and 35 DAS (T8). The resulted higher leaf area with this treatment might have better solar radiation intercept and photosynthetic rate, contributing to higher values of varied growth components. Application of RDF 100 per cent + DAP 2 per cent + NAA 40 ppm on 20 and 35 DAS (T8) at different stages of the crop recorded the highest number of pods plant^{-1} (21.02). This might be due to better photosynthetic activity and enhanced amount of photosynthetic assimilates translocation to sink region which might have resulted in better development of yield components.

Application of RDF 100 per cent + NAA 40 ppm on 20 and 35 DAS (T2) and RDF 100 per cent + DAP 1 per cent foliar spray on 20 and 35 DAS (T3) were not significantly different. These treatments recorded the grain yield of 563.53 and 483.90 kg ha^{-1} respectively which is superior over control. Godase., *et al*. [8] reported that foliar spray of 1% urea + 1% DAP before flowering increased the yield contributing

characters in green gram and studies conducted by Kalita., *et al.* [9] confirmed that application of 3.0% P_2O_5 and 100 ppm NAA recorded the highest dry matter accumulation in green gram.

Application of RDF 100 per cent + DAP 1 per cent foliar spray + NAA 40 ppm on 20 and 35 DAS (T4) and RDF 100 per cent + DAP 2 per cent foliar spray on 20 and 35 DAS (T5) were significantly different. These treatments recorded the grain yield of 738.45 and 650.99 kg ha^{-1} respectively which is superior over control. Foliar application of 2 per cent DAP recorded the highest grain yield in black gram [10]. Behera and Elamathi (2007) revealed that application of 2 per cent foliar spray of DAP and NAA 40 ppm twice at 25 and 35 days after sowing significantly increased the grain yield. Similar results were also obtained by Mathan., *et al* [11]. RDF 50% + DAP 2% foliar spray + NAA 40 ppm on 20 and 35 DAS (T6) and RDF 75 per cent + DAP 2 per cent foliar spray + NAA 40 ppm on 20 and 35 DAS (T7) were not significantly different and found equally effective. These treatments recorded the grain yield of 825.91 and 905.54 kg ha^{-1} respectively which is superior over control.

Application of RDF 100 per cent + DAP 2 per cent + NAA 40 ppm on 20 and 35 DAS (T8) at different stages of the crop recorded the highest grain yield (993 kg ha^{-1}) followed by application of RDF 75 per cent + DAP 2 per cent + NAA 40 ppm on 20 and 35 DAS (T7) (905.54 kg ha^{-1}). The yield increase may be due to the increase in the growth and yield parameters of green gram. Spraying of DAP in combination with NAA at 50% flowering stages of green gram recorded the highest seed yield due to increased number of pods $plant^{-1}$, seeds pod^{-1} and pod yield [12].

Conclusion

Adequate supply of nutrients at different growth stages of the crop which helped in better synthesis and translocation of photosynthetic assimilate efficiently to developing pods contributing proper filling up of pods which resulted in higher grain yield. The lowest grain yield recorded under control treatment might be due to lack of adequate supply of essential nutrients which in turn affecting proper development of growth and yield components which ultimately reflecting on yield.

Bibliography

1. Chaturvedi SK and Masood Ali. "Poor man's meat needs fresh fillip". The Hindu Survey of Indian Agriculture (2002): 63-70.
2. Raja M. "Studies on the effect of different dates of sowing and foliar nutrition on the yield of rice fallow blackgram". M. Sc. (Ag.) Thesis, Annamalai University. Annamalai Nagar, Tamil Nadu (2012).
3. Alexander A and M Schroeder. "Modern trends in foliar fertilization". *Journal of Plant Nutrition* 10.9-16 (1987): 1391-1399.
4. Romheld V and MM El- Fouly. "Foliar nutrient application. Challenge and limits in crop production. The 2nd international workshop on foliar fertilization". Kenote Paper (1998): 1-25.
5. Mohiuddin Chowdhury Md., *et al.* "Effect of boron and nitrogen fertilization on cowpea growth, nodulation and grain yield". *Legume Research* 23.1 (2000): 9-14.
6. Kumar R and R Chandra. "Influence of PGPR and PSB on *Rhizobium legumnacearum* competition and symbiotic performance in lentil". *World Journal of Agricultural Sciences* 4.3 (2008): 297-301.
7. Aucharmal SM., *et al.* "Growth and yield of black gram (*Vigna mungo*) as influenced by growth regulators". *Journal of Soils and Crops* 17.1 (2007): 82-85.
8. Godase MM., *et al.* "Effect of different foliar spray of nutrients on growth, yield and quality of summer green gram". *Indian Journal of Agricultural Research* 39.1 (2014): 11-15.

9. Kalita P., *et al.* "Influence of foliar application of phosphorus and Napthale Acetic Acid on nitrogen, dry matter accumulation and yield of green gram (*Vigna radiata* L.)". *Indian Journal of Agronomy* 40.3 (1995): 321-325.

10. Sritharan NR., *et al.* "Physiological studies for yield enhancement in black gram (Vigna mungo L.)". *Plant Archives* 7.1 (2007): 339-362.

11. Mathan KK., *et al.* "Response of blackgram (*Phaseolus mungo*) to fertilization and Rhizobium inoculation". *Indian Journal of Agronomy* 41.1 (1996): 74-77.

12. Radhamani S., *et al*. "Foliar nutrition with growth regulators on the productivity of rainfed green gram". *Agricultural Science Digest* 23.4 (2003): 307-308.

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