

Response of Bengalgram to Foliar Spray of Macro, Micronutrients and Growth Promoters

M. Punithavathi and K. Wahab

K. WAICAR-Krishi Vigyan Kendra, Valikadapuram, Perambalur-621115. T.N. India

Department of Crop Management Thanthai Roever Institute of Agriculture and Rural Development T.N. India

Abstract

A field experiment was carried out during the summer season of 2022–23 at ICAR–Krishi Vigyan Kendra, Perambalur, to evaluate the influence of foliar nutrition on the growth and yield of Bengalgram. The study was conducted using a Randomized Block Design with three replications and seven treatments, including T₁ – control (water spray); T₂ – KCl @ 2%; T₃ – Nano Urea @ 1%; T₄ – TNAU Pulse Wonder @ 2 kg ac⁻¹; T₅ – Panchagavya @ 5%; T₆ – NPK (19:19:19) @ 1%; and T₇ – NAA @ 50 ppm. The results revealed that foliar application of TNAU Pulse Wonder @ 2 kg ac⁻¹ significantly improved growth parameters, including plant height, number of branches, leaf area index, and dry matter production. This treatment also recorded the highest grain yield (994.28 kg ha⁻¹), followed closely by panchagavya @ 5%. Enhanced performance under these treatments may be attributed to improved nutrient uptake and physiological efficiency. The study demonstrates that foliar nutrition, particularly with TNAU Pulse Wonder, can effectively enhance productivity and profitability of Bengalgram under field conditions.

Key words: Bengalgram, Crop, Plant legume, symbiosis and mycorrhizae

Introduction

Bengalgram (*Cicer arietinum* L.) is one of the most widely cultivated pulse crops and plays a crucial role in ensuring nutritional security due to its high protein content. It serves as an economical source of dietary protein for humans and also contributes to livestock feeding. The crop possesses the ability to fix atmospheric nitrogen through symbiotic association with *Rhizobium* and interacts effectively with mycorrhizal fungi, enabling it to perform well even under relatively poor soil fertility conditions. Despite these advantages, the average productivity of Bengalgram in India remains below its potential. One of the major constraints is the imbalance or inadequate availability of nutrients during critical growth stages, which adversely affects plant growth, development, and yield formation. Therefore, improving nutrient management practices is essential for enhancing crop performance. In recent years, foliar application of nutrients has gained importance as an efficient

technique to supplement soil fertilization (Chaudhary *et al.*, 2023). This method allows rapid absorption and utilization of nutrients by plants, minimizes losses due to leaching and fixation, and ensures timely nutrient availability during critical growth stages. Hence, foliar nutrition can be considered a promising strategy to improve the growth, yield, and overall productivity of Bengalgram.

Materials and Methods

The field experiment was conducted at the ICAR–Krishi Vigyan Kendra farm, Perambalur, Tamil Nadu, during the summer season of 2022–23. The region experiences a temperature range of 23°C to 38°C and receives an average annual rainfall of 908 mm, predominantly from the North-East monsoon. The soil of the experimental site was clayey in texture and moderately well-drained. The study was laid out in a Randomized Block Design with seven treatments and three replications. The treatments included T₁ – control (water spray); T₂ – KCl @ 2%; T₃ – Nano Urea @ 1%; T₄ – TNAU Pulse Wonder @ 2 kg ac⁻¹; T₅ – Panchagavya @ 5%; T₆ – NPK (19:19:19) @ 1%; and T₇ – NAA @ 50 ppm. Foliar sprays were applied twice: first at the flowering stage and again 15 days later. A recommended fertilizer dose of 25:50:25 kg N:P₂O₅:K₂O ha⁻¹ was applied through urea, single super phosphate, and muriate of potash at the time of sowing. The crop was raised with a spacing of 30 cm × 10 cm using Bengalgram variety CO 4. Standard agronomic and plant protection practices were followed throughout the crop growth period. Observations on growth parameters were recorded from five randomly selected plants in each plot. Yield data were collected at harvest and statistically analyzed using appropriate methods.

Results and Discussion

Growth parameters

Growth-attributing characters, viz., plant height (cm), number of branches per plant, leaf area index (LAI), and dry matter production (g plant⁻¹), were significantly influenced by the different treatments (Table 1). The highest plant height (34.94 cm), number of branches per plant (5), LAI (1.16), and dry matter production (11.11 g plant⁻¹) were recorded with the foliar application of TNAU Pulse Wonder @ 2 kg ac⁻¹ (T₄), which was found to be significantly superior. This was followed by the application of Panchagavya @ 5% (T₅). The lowest values for plant height (26.00 cm), number of branches per plant (2), LAI (0.36), and dry matter production (8.37 g plant⁻¹) were recorded in the control (T₁). However, no significant difference was observed during the initial stage (first spray), while differences became evident at later stages of observation.

The increased plant height may be attributed to the additional supply of macro- and micronutrients, along with growth hormones, through the foliar application of Pulse Wonder. These findings are in agreement with those reported by Anandhkrishnaveni *et al.* (2004). The higher leaf area index and number of branches per plant might be due to the foliar application of nitrogen, which enhances nutrient accumulation and translocation, resulting in a prolonged vegetative phase and improved photosynthetic efficiency in Bengalgram. Foliar application of TNAU Pulse Wonder also facilitates the supply of photosynthates for the development of pods and grains, along with intensified metabolic activity and efficient utilization of nitrogen. These results are supported by the findings of Arun Raj *et al.* (2018). The significant increase in dry matter accumulation may be attributed to the role of nitrogen in maintaining higher auxin levels, thereby promoting vegetative growth and biomass production.

Yield

TNAU Pulse Wonder @ 2 kg ac⁻¹ (T₄) produced a significantly higher grain yield (994.28 kg ha⁻¹) and haulm yield (1651.48 kg ha⁻¹). This was followed by Panchagavya 5% (T₅), which recorded grain and haulm yields of 990.80 kg ha⁻¹ and 1521.10 kg ha⁻¹, respectively. The increased yield might be attributed to reduced flower drop, improved pod formation, and a higher seed-setting percentage, which enhanced yield attributes. The findings of the present study are in conformity with those reported by Hemalatha and Sreemathi (2018). The lowest grain yield was recorded in the control plot (without foliar spray), which yielded 807.36 kg ha⁻¹. These results are in agreement with the findings of Kumar *et al.* (2011) (Table 2).

Table.1 Effect of foliar spray on growth parameters of Bengalgram

	Treatment	Plant Height(cm)	Leaf area index (LAI)	Dry Matter Production (g/plant)	Number of branches per plant
T ₁	Control plot	26.00	0.36	8.37	2
T ₂	KCL 2%	32.32	0.76	10.33	3
T ₃	Nano Urea 1 %	29.25	0.60	9.75	3
T ₄	TNAU Pulse Wonder @2 kg/ac	34.94	1.16	11.11	5

T₅	Panchagavya 5%	33.21	0.98	10.66	4
T₆	NPK (19:19:19) 1%	29.80	0.33	8.85	2
T₇	NAA 50 ppm	32.54	0.73	9.92	3
	SEd	0.61	0.16	0.44	0.41
	CD(5%)	1.34	0.19	0.89	0.89

Table.1 Effect of foliar spray on yield parameters of Bengalgram

	Treatment	Haulm yield (Kgha-1)	Seed yield (Kgha⁻¹)
T₁	Control plot	1126.08	807.36
T₂	KCL 2%	1403.44	987.32
T₃	Nano Urea 1 %	1337.74	926.44
T₄	TNAU Pulse Wonder @2 kg/ac	1651.48	994.28
T₅	Panchagavya 5%	1521.10	990.8
T₆	NPK (19:19:19) 1%	1357.12	932.8
T₇	NAA 50 ppm	1400.4	975.2
	SEd	34.45	16.854
	CD(5%)	69.96	36.358

Conclusion

Based on the findings of the present study, foliar spraying of TNAU Pulse Wonder at 2 kg ac⁻¹ during the flowering stage was found to markedly improve the productivity of Bengalgram. In addition, the results suggest that farmers can select either an inorganic foliar nutrient source such as TNAU Pulse Wonder or an organic alternative like Panchagavya at 5%, depending on their resources and management preferences.

References

- Anandhakrishnaveni, S., Palachamy, A., and Mahendran, S., (2004). Effect of foliar spray of nutrients on growth and yield of greengram. *Legume Research*, 27:149-50.
- Arun Raj, M., Sathya, P., and Vignesh, S., (2018). Effect of foliar nutrition for maximizing the Productivity of black gram (*Vigna mungo* L.). *International Journal of Science, Environment and Technology*, Vol. 7, No 6, 2018, 2026 – 2032.
- Chaudhary, B. J., Chaudhari, P. P., Parikh, R. M., Patel, K. K., & Chaudhari, N. M. (2023). Effect of Foliar Nutrition on Yield, Quality, Nutrient Content and Uptake of Kharif Cowpea. *International Journal of Environment and Climate Change*, 13(10), 4046-4050.
- Hemalath, M., and Sreemathi, M., (2018) Effect of crop geometry, fertilizer level and foliar nutrition on growth, growth analysis and yield of black gram (*Vigna mungo* L.) under irrigated condition. *International journal of advances in agricultural science and technology* vol. 5, 144-152.
- Kumar, S., Ganesh, KP., Tharmaraj, K., Saranraj , P., 2011. Growth and development of blackgram (*Vigna mungo*) under foliar application of panchagavya as organic source of nutrient. *Current Botany*. 2011; 2(3): 9-11.