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Effect of foliar application of nutrients on the yield enhancement of green gram (*Vigna radiata*. L)

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Abstract

A field experiment was conducted at Central farm of Imayam Institute of Agriculture & Technology, Thuraiyur during *kharif* 2022 to study the effect of foliar application of nutrients for the yield enhancement of green gram (*Vigna radiata*. L). The experiment was laid out in Randomized Block Design (RBD) and replicated thrice. The results revealed that among the different foliar nutrients, RDF+ foliar spray of 1% Pulse Wonder (T2) resulted in higher LAI and DMP, which was closely followed by 2% DAP spray. Similar to the yield parameters RDF+ foliar spray of 1% Pulse Wonder (T2) produced more number of pods / plant, pod length, 100 grain weight and grain yield. T2- RDF+Foliar Spray of 1% Pulse Wonder produced higher Grain yield of 919 Kg/ha and the highest gross return (Rs. 29,200 /ha), net return (Rs. 12,229 /ha) and BCR (1.72) were obtained with RDF+ foliar spray of 1% Pulse Wonder (T2).

Keywords: DAP, foliar spray, green gram, TNAU pulse wonder

Introduction

Green gram is a widely grown grain legume and belongs to the family Fabaceae and assumes considerable importance from the point of food and nutritional security in the world. It is a protein rich staple food and it contains about 25% protein, which is almost three times that of cereals (Kunjammal and Sukumar, 2019) [2]. Green gram is commonly known as Mung or Moong in India. It is an annual pulse crop that is primarily grown as a rainfed or rice fallow crop. It has relatively short duration nature and enriches soil nitrogen by fixing atmospheric nitrogen (Ramesh *et al.*, 2020) [4]. The potential yield of green gram is very low because the crop is primarily grown in rainfed conditions with poor management practices, as well as due to various physiological and inherent factors associated with the crop. Aside from the genetic makeup, the physiological factor *viz.* insufficient partitioning of assimilates, poor pod setting due to the flower abscission and lack of nutrients during critical stages of crop growth, coupled with a number of diseases and pests were the reasons for the poor yield (Anandha Krishnaveni *et al.*, 2021) [1]. India is the major producer of green gram in the world and grown in almost all the States. In India mung bean is cultivated on 4.5 million hectares and its total production is 2.5 million tones with productivity of 548 kg/ha and contributing 10% to the total pulse production. According to Government of India 3rd advance estimates, green gram production in 2020-21 is at 2.64 million tons (Green gram Outlook, 2021). Green gram cultivation in the rainfed/summer season results in low soil moisture; under rainfed condition even application of fertilizer at right time and right quantity may not be efficient due to soil moisture. When availability of moisture becomes scarce, application of fertilizers through foliar spray resulted in efficient absorption. Though foliar spray is not a substitute to soil application but it certainly be considered as a supplement to soil application (Latha and Nandanassababady, 2003) [3]. Keeping these factors in aforesaid point, the present investigation was carried out to study the "Effect of foliar application of nutrients on the yield enhancement of green gram (*Vigna radiata*. L).

Materials and Methods

The field experiment was conducted at central farm of Imayam Institute of Agriculture and Technology, Thuraiyur during *Kharif* 2022. The experimental field was situated at 11°16' N latitude and 78°62' E longitude with an altitude of 85 above MSL. The field experimental soil was loamy texture with low in available nitrogen, medium in available phosphorous and high in available potassium with p H of 7.2. The field experiment was laid out in Randomized Block Design (RBD) and replicated thrice.

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The treatments imposed in this experiment were, T₁ - RDF + foliar spray of 2% DAP, T₂ - RDF + foliar spray of 1% TNAU Pulse wonder, T₃ - RDF + foliar spray of 3% Panchagavya, T₄ - RDF + foliar spray of 0.5% (19:19:19), T₅ - RDF + foliar spray of 2% urea, T₆ - RDF + foliar spray of TNAU MN mixture, T₇ - Control (RDF alone - 25:50:25 Kg NPK ha⁻¹). 'VBN- 3' green gram variety was adopted for this study with a spacing of 30 × 10 cm. Spraying of nutrient solution was done using knapsack sprayer by using a spray fluid of 500 L ha⁻¹. At different stages of green gram growth the plant height, LAI, DMP, stover yield and grain yield were recorded. The statistical analysis of data was done by analysis of variance technique at 0.05 probability level.

Results and Discussion

Growth characters

The statistics on plant height, LAI and DMP of green gram are furnished in Table 1, illustrated the effect of foliar nutrients on growth characters of green gram. Among the treatments RDF + foliar spray of 1% TNAU Pulse Wonder (T₂) recorded higher plant height (39.20 cm), leaf area index (1.58) and dry matter production (1546 kg/ha) at harvest stage over rest of the treatments. This might be due to the positive influence of foliar spray of nutrients on cell division and cell elongation, which facilitates better crop growth and development resulting in higher growth characters. Similar results have been reported by Anandha Krishnaveni *et al.*, 2021^[1].

Table 1: Effect of foliar application of nutrients on the growth characters of green gram.

Treatments	Plant height (cm)	Leaf area index	Dry matter production (kg/ha)
T ₁ - RDF + foliar spray of 2% DAP	38.40	1.47	1269
T ₂ - RDF + foliar spray of 1% TNAU Pulse wonder	39.20	1.59	1546
T ₃ - RDF + foliar spray of 3% Panchagavya	37.50	1.26	1125
T ₄ - RDF + foliar spray of 0.5% (19:19:19)	36.90	0.99	1061
T ₅ - RDF + foliar spray of 2% urea	36.90	1.12	1074
T ₆ - RDF + foliar spray of TNAU MN mixture	37.70	1.39	1169
T ₇ - Control (RDF alone - 25:50:25 Kg NPK ha ⁻¹)	35.40	0.81	1042
SEd	0.10	0.01	1.10
CD (5%)	0.21	0.019	2.20

Yield Attributes

The observation on yield attributes and yield were taken at harvest stage (Table 2). Foliar application of nutrient brought significant variation in pods per plant and varied from 14.7 to 10.38. A close examination of data indicated that maximum number of pods per plant (14.70), pod length (4.86 cm) highest 100 seed weight (5.68 g) and the grain yield (919

kg/ha) were recorded with application of RDF + foliar spray of 1% TNAU Pulse Wonder (T₂). This might due to the presence major and minor nutrients coupled with growth regulators in Pulse wonder which enhanced number of floral buds, prevented the floral shedding by maintaining optimum bio-physiological conditions in plants were in consonant with the result of Kunjammal and Sukumar, 2019^[2].

Table 2: Effect of foliar application of nutrients on the yield characters of green gram.

Treatments	No. of Pods/plant	Pod length (cm)	100 grain weight (g)	Grain yield (kg/ha)
T ₁ - RDF + foliar spray of 2% DAP	13.96	4.6	5.5	893
T ₂ - RDF + foliar spray of 1% TNAU Pulse wonder	14.7	4.82	5.68	919
T ₃ - RDF + foliar spray of 3% Panchagavya	13.1	4.31	5.06	848
T ₄ - RDF + foliar spray of 0.5% (19:19:19)	12.22	3.9	4.88	720
T ₅ - RDF + foliar spray of 2% urea	12.7	3.97	4.92	826
T ₆ - RDF + foliar spray of TNAU MN mixture	13.4	4.6	5.21	885
T ₇ - Control (RDF alone - 25:50:25 Kg NPK ha ⁻¹)	10.38	3.65	4.69	588
SEd	0.04	0.08	0.02	0.37
CD (5%)	0.079	0.18	0.036	0.78

Economics

Highest cost of cultivation was obtained with RDF + foliar spray of 2% DAP (T₁) (Rs 17,321/ha) While the minimum cost of cultivation (Rs 16,071/ha) was found in Control (RDF alone - 25:50:25 kg NPK/ha) (T₇) (Absolute control). Highest gross return and Net return were obtained with RDF + foliar spray of 1% TNAU Pulse Wonder (T₂) (Rs 29,200/ha and 12,229/ha). TNAU Pulse wonder @ 2kg/ac (T₂) recorded the highest benefit: cost ratio (1.72).

Conclusion

From the above results, it can be concluded that RDF + foliar spray of 1% TNAU Pulse Wonder (T₂) at flowering improves productivity and makes green gram more economically viable by increasing BCR. Furthermore, this study gives farmers the option of choosing between inorganic foliar nutrition (TNAU pulse wonder) and organic nutrition (Panchgavya @ 5%).

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