



EFFECT OF FOLIAR APPLICATION OF INORGANIC AND ORGANIC NUTRIENTS ON THE YIELD AND NUTRIENT UPTAKE OF GREENGRAM

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ABSTRACT

The field experiment was conducted in Experimental Farm, Department of Agronomy, Faculty of Agriculture, Annamalai University during February to April 2023 to study the “Influence of foliar nutrients on the yield and nutrient uptake of greengram”. The experiment was laid out in Randomized Block Design (RBD) with eight treatments and three replications. Foliar application of inorganic and organic nutrients was sprayed at vegetative and flowering stages. The results exposed that, foliar application of 2 per cent TNAU pulse wonder on 30 and 45 DAS (T₄) recorded significantly higher yield attributes such number of pods (17.1), number of seeds pod⁻¹ (6.9), test weight (4.14), yields (seed yield 880 kg ha⁻¹ and haulm yield 3112 kg ha⁻¹), and harvest index (23.7). The higher N (52.97), P (10.81) and K (45.16) uptake of greengram was also registered with the foliar application of 2 per cent TNAU pulse wonder on 30 and 45 DAS (T₄). From the above results, it can be concluded that foliar application of 2 per cent TNAU pulse wonder on 30 and 45 DAS (T₄) can be recommended to get profitable yield in greengram.

Key words: Foliar spray, greengram, nutrient uptake, TNAU pulse wonder, yield

INTRODUCTION

Pulses are commonly known as food legumes which are secondary cereals in production and consumption in India. These are drought resistant and prevent soil erosion due to their deep root system and good cover, hence; pulses are called as “Marvel of Nature”. Pulses are called as “Poor man’s meat” and “rich man’s vegetable”, are important source of proteins, vitamins, and minerals. Greengram is widely grown legume and belongs to family Fabaceae and it is referred to as the “Queen of pulses” because it is a protein rich staple food and contains about 25 % proteins, which is almost three times that of cereals (Kunjammal and Sukumar, 2019).

It is an annual pulse crop that is primarily grown as a relatively short duration and enriches soil nitrogen by fixing atmospheric nitrogen (Ramesh *et al.*, 2020). India is the world's largest producer of greengram accounting for 70 % of global production area under greengram cultivation in the year 2022-23. In Tamil Nadu, the total area under greengram is 1.95 lakh hectares with production of 0.89 lakh tonnes and productivity of 444 kg ha⁻¹. The potential yield of greengram is very low because the crop is primarily grown in rainfed conditions with poor management practices, as well as due to various physiological factors and lack of nutrients during critical crop stages of crop growth, coupled with a number of pest and diseases were the reasons for poor yield (Anandha Krishnaveni *et al.*, 2021). Liquid manure plays an important role in increasing output while decreasing fertilizer dose. When moisture becomes scarce, fertilizer administration via foliar spray resulted in efficient absorption. Foliar nutrition is seen as important technique of fertilizer delivery because foliar nutrients usually penetrate the leaf cuticles and enters the cells, allowing for easy and rapid nutrient utilization. Foliar nutrition can be widely used to diminish nutritional deficiency in crop plant at critical growth stages (El- Hady *et al.*, 2020). Therefore, keeping the above facts in view, a field experiment was conducted to evaluate the influence of foliar nutrients on the yield and nutrient uptake of greengram.

MATERIALS AND METHODS

The field experiment was conducted in the Experimental Farm, Department of Agronomy, Faculty of Agriculture, Annamalai Nagar to study the "Influence of foliar nutrition on the growth and yield of greengram". The experiment field is geographically located at 11° 24' N latitude and 79° 44' E longitude and at an altitude of ± 5.79 m above the mean sea level (MSL). During the cropping period weekly mean maximum temperature ranged from 30.5 °C to 36.4 °C and weekly minimum temperature ranged from 16.8 °C to 22.6 °C. The relative humidity ranged from 69.85 % to 77.28 %. The soil of the experimental field is clay loam in texture with low in available nitrogen, medium in available phosphorus and high in available potassium. The pH of the soil is 7.7 with EC 0.64 dS m⁻¹. The experiment was laid out in Randomized Block Design (RBD) with eight treatments and three replications. The treatment comprised of T₁-100 per cent RDF (25:50:25 NPK kg ha⁻¹), T₂- Foliar application of 2 per cent DAP on 30 and 45 DAS, T₃- Foliar application of 2 per cent fish amino acid on 30 and 45 DAS, T₄- Foliar application of 2 per cent TNAU pulse wonder on 30 and 45 DAS, T₅- Foliar application of 2 per cent panchagavya on 30 and 45 DAS, T₆ –Foliar application of 5 per cent cow urine on 30 and 45 DAS, T₇ –Foliar application of 5 per cent vermiwash on 30 and 45 DAS, T₈ - Foliar application of 0.5 per cent egg extract on 30 and 45 DAS. Observations on yield and nutrient uptake were taken at the time of harvesting stage.

RESULTS AND DISCUSSION

Yield attributes and yield

The yield attributes, such as number of pods plant⁻¹, number of seeds pod⁻¹, 100 seed weight, were significantly enhanced by the application of foliar nutrition. Among the treatments, foliar application of 2 per cent TNAU pulse wonder on 30 and 45 DAS (T₄) recorded higher yield attributes. This was followed by foliar application of 2 per cent DAP on 30 and 45 DAS (T₂). This might be due to the presence of 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. The findings in the present study are in conformity with Nath and Singh (2016) and Anandha Krishnaveni *et al.* (2021). The increase in seed yield might be due to beneficial effect of nutrients in combination with growth regulators applied at proper time and stage, which resulted in higher yield was reported by Alizadeh., 2021. The seed yield gets increased due to foliar application by which it could be attributed to reduction in flower droppings and increased in pod setting. The above findings are in line with the observations of Verma, 2017 and Anandha Krishnaveni *et al.* (2021).

Increase in haulm yield might be due to higher leaf area index, higher plant height, maximum nutrient uptake and also photosynthetic rate. This foliar application might increase the growth parameters which resulted in higher haulm yield. These findings were similarly consisted with studies of Thakur *et al.* (2017) and Dayana *et al.* (2021).

The lower values of seed yield and haulm yield were resulted in 100 per cent RDF (T₁) due to poor accumulation of photosynthesis by which N, P, K and some other micronutrients get absent in it. These results are in accordance with the findings of Minakshi *et al.* (2018), Mohammad Aslam *et al.* (2019) and Kamaleshwaran and Karthiga (2021).

Treatments	Number of pods plant ⁻¹	Number of seeds pod ⁻¹	Test weight (g)	Seed yield (kg ha ⁻¹)	Haulm yield (kg ha ⁻¹)	Harvest index (%)
T ₁ - 100 % RDF	11.0	3.7	4.02	520	2248	19.3
T ₂ - Foliar application of 2 % DAP on 30 and 45 DAS	16.6	6.6	4.12	828	3014	23.3
T ₃ - Foliar application of 2 % fish amino acid on 30 and 45 DAS	14.9	5.1	4.07	688	2651	21.5
T ₄ - Foliar application of 2 % TNAU pulse wonder on 30 and 45 DAS	17.1	6.9	4.14	880	3112	23.7
T ₅ -Foliar application of 2 % panchagavya on 30 and 45 DAS	16.0	6.0	4.10	783	2897	22.6
T ₆ - Foliar application of 5 % cow urine on 30 and 45 DAS	15.5	5.6	4.08	738	2793	21.9

T ₇ - Foliar application of 5 % vermiwash on 30 and 45 DAS	12.5	4.2	4.03	575	2357	19.9
T ₈ - Foliar application of 0.5 % egg extract on 30 and 45 DAS	13.1	4.6	4.05	633	2513	20.7
S.Ed±	0.22	0.15	0.08	20.98	44.63	0.14
CD (p=0.5)	0.49	0.33	NS	44.91	95.52	0.31

Table 1: Impact of foliar application of inorganic and organic nutrients on the yield attributes and yield of greengram



Table 2: Impact of foliar application of inorganic and organic nutrients on the nutrient uptake of greengram

Treatments	Nutrient uptake (kg ha ⁻¹)		
	N	P	K
T ₁ - 100 % RDF	37.58	7.03	27.15
T ₂ - Foliar application of 2 % DAP on 30 and 45 DAS	51.30	10.33	42.68
T ₃ - Foliar application of 2 % fish amino acid on 30 and 45 DAS	45.40	8.90	35.38
T ₄ - Foliar application of 2 % TNAU pulse wonder on 30 and 45 DAS	52.97	10.81	45.16
T ₅ -Foliar application of 2 % panchagavya on 30 and 45 DAS	49.31	9.85	40.23
T ₆ - Foliar application of 5 % cow urine on 30 and 45 DAS	47.09	9.39	37.80
T ₇ - Foliar application of 5 % vermiwash on 30 and 45 DAS	41.66	7.71	30.56
T ₈ - Foliar application of 0.5 % egg extract on 30 and 45 DAS	43.65	8.39	32.97
S.Ed±	0.77	0.21	1.08
CD (p=0.5)	1.66	0.45	2.29

NUTRIENT UPTAKE

The nutrient uptake was significantly enhanced by the application of foliar nutrition. Among the treatments, foliar application of TNAU pulse wonder @ 2 per cent on 30 and 45 DAS (T₄) recorded higher nutrient uptake (52.97, 10.81, 45.16 kg ha⁻¹). The uptake of nutrients by the crop is a function of nutrient content and yield or biomass produced. The higher content of nutrients in seed and haulm is due to the addition of nutrients from both inorganic and foliar fertilization of organic inputs. The practise of soil application of recommended dose of fertilizer along with foliar application of TNAU pulse wonder augments better root proliferation which ultimately results with higher uptake of nutrients by greengram.

The results are in close conformity with the findings of Balaji *et al.* (2019), Iswarya *et al.* (2019) and Barkha *et al.* (2020).

CONCLUSION

The present investigation concluded that combined application of recommended dose of fertilizer along with foliar application of 2 per cent TNAU pulse wonder on 30 and 45 DAS enhanced the number of pods⁻¹, number of seeds pod⁻¹, test weight, seed yield, haulm yield, harvest index and nutrient uptake (N, P and K) of greengram. In the light of the above facts, it can be concluded that foliar application of recommended dose of fertilizer with 2 per cent TNAU pulse wonder on 30 and 45 DAS holds agronomically efficient, ecologically viable and economically feasible technology for augmenting the yield of greengram.

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