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Effect of foliar application of organic and inorganic fertilizers on growth and yield of greengram

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Abstract
During the cropping season of July to September 2021, a field experiment was undertaken at Cherukumpalem village, Atchempet Mandal, Guntur District, Andhra Pradesh, to evaluate the performance of greengram by foliar spraying of various liquid organic and inorganic fertilizers together with 75% recommended dose of fertilizer. The experiment was set up using a Randomized Block Design with ten treatments and three replication. Among the ten treatments performed, foliar application of panchagavya @ 3% with 75% recommended dose of fertilizer was determined to be the best and had a significant impact on all growth and yield attributes of greengram. The tallest plant (58.5cm) higher number of branches (6.2), higher LAI (4.65), maximum DMP (3765 kg ha^{-1}) and maximum seed yield (1365 kg ha^{-1}) were observed in this treatment. Next to panchagavya, the second best treatment was foliar application of nanourea @ 0.5% along with 75% recommended dose of fertilizer which also significantly influenced all growth and yield parameters of greengram.

Keywords: DMP, greengram, nanourea, panchagavya, seed yield

1. Introduction
Green gram is known as the "Queen of Pulses" because of its superior nutritional value. Greengram is native to East Asia, Southeast Asia and the Indian Subcontinent. It is India's third most significant pulse crop, accounting for 16 and 10% of total pulse acreage and production, respectively. It is an important crop in India and grown in all states. Greengram is grown on 4.5 million hectares in India, with a production of 2.5 million tonnes and a productivity of 548 kg per hectare. Green gram grains contain 22-28% protein, 60-65% carbohydrates, 1.0-1.5% fat, minerals 3.5%, 3.5-4.5% fibre and 4.5-5.5% ash. These seeds are more flavorful, nutritious, digestible, and non-flatulent than other pulses growing in the nation. It is a good source of protein with high quality lysine (460 mg g^{-1} N), tryptophan (60 mg g^{-1} N) and low anti-nutritional components. It also has a high concentration of ascorbic acid and riboflavin with a value of 0.21 mg 100^{-1} g (Azadi *et al*., 2013) [1]. According to the third advance projections for 2020-21, the state of Andhra Pradesh in India ranks sixth in terms of green gram cultivation, with an area of 1.13 lakh ha and an output of 0.83 lakh tonnes with a productivity of 735 kg ha^{-1}. Greengram is typically grown in rainfed conditions with poor management. As a result, adequate agronomic techniques are required to increase greengram productivity. Soil applied nutrients are insufficient for crops to meet their nutrient requirements, and this could be due to nutrient non-availability, exhausted soil conditions, nutrient losses through leaching, and a variety of other factors that can obstruct the availability of nutrients to plants and stop plant growth, affecting crop yield and quality. To maximise the efficiency of greengram, multiple strategies have been introduced (Prasanth *et al*., 2021) [6]. Among them, with environmental concerns in mind, as well as the need to reduce soil and water pollution while saving money on NPK fertilisers and minimising NPK application losses in the soil, foliar application has become the most efficient, useful, and cost-effective strategy in recent decades. Foliar feeding is the most efficient and cost-effective method of resolving nutrient deficiencies in plants. In recent decades, foliar nutrient feeding has become commonplace in crop production, with the goal of increasing yield and enhancing crop quality. As a result, foliar application of nutrients at critical stages of crop growth is the most appropriate and accurate means of treating nutrient shortages, and it helps the crop to achieve its maximum potential yield. Appropriate plant nutrition is vital for increased output (Thakur *et al*., 2017) [9]. Foliar fertilization would be more useful in early maturing, short-duration crops, while soil-applied fertilizer might not be fully available until the crop matures.

Foliar fertilization is preferable for rabi pulses since it is more difficult to administer nutrients through top dressing or placement. It lowers the cost of cultivation by requiring less fertiliser, decreases crop losses and optimises crop productivity. Foliar nitrogen input can boost photosynthetic efficiency by delaying the start of leaf senescence due to higher absorption efficiency. Nutrients applied through foliar application resulted in a considerable increase in crop growth and yield.

2. Materials and Methods

A field experiment was conducted at Cherukumpalem village, Atchempet Mandal of Guntur district in Andhra Pradesh state during July to September 2022. The experimental field is geographically located at 16°68′ N latitude and 80°11′ E longitude and at an altitude of 97 meters above mean sea level. The climate of Guntur is tropical. The maximum and minimum temperature ranged from 30 ^{0}C to 35.57 ^{0}C and 25.57 ^{0}C to 27.85 ^{0}C respectively. The total rainfall received during the cropping period is 292.5 mm in 24 rainy days. The Soil of the experimental field is Sandy Clay Loam in texture. The soil is medium in available nitrogen (201 kg ha^{-1}), high in available phosphorus (67 kg ha^{-1}) and medium in available potassium (209 kg ha^{-1}). The field experiment was conducted in randomized block design with three replications. The experiment was carried out with test variety IPM2-14 (Shreya). The crop was sown with a spacing of 30×10 cm. The recommended dose of fertilizer 25:50:0 kg NPK ha^{-1} was adopted for 100% recommended dose from which 75% (18.75:37.5:0 kg NPK) was calculated and applied to plots as per treatment schedule. The treatments comprised of T_1 - 100% Recommended dose of fertilizers, T_2 - 75% Recommended dose of fertilizers, T_3 - T_2 + Fish meal extract spray @ 3% on 25 and 40 DAS, T_4 - T_2 + Panchagavya spray @ 3% on 25 and 40 DAS, T_5 - T_2 + Bokashi spray @ 5% on 25 and 40 DAS, T_6 - T_2 + Banana pseudo stem extract spray @ 2% on 25 and 40 DAS, T_7 - T_2 + Karpura Karaisal spray @ 10% on 25 and 40 DAS, T_8 - T_2 + Polyfeed spray @ 1% on 25 and 40 DAS, T_9 - T_2 + Nano urea spray @ 0.5% on 25 and 40 DAS, T_{10} - T_2 + DAP @ 2% + NAA @ 40 ppm spray on 25 and 40 DAS. Various organic and inorganic fertilizer solutions were prepared at required concentrations and sprayed to the respective plots on 25 and 40 DAS by using knapsack sprayer. Standard cultivation practices were adopted.

3. Results and Discussion

3.1 Growth attributes

All the growth attributes were markedly influenced by foliar application of various organic and inorganic liquid fertilizer sources. Among the various treatments, T_4- T_2 + panchagavya spray @ 3% on 25 and 40 DAS recorded maximum values of plant height (58.5 cm) higher number of branches (6.2), bigger LAI (4.65). This could be as a result of NPK application plus availability of all macro and micronutrients as well as growth enzymes in panchagavya, which promoted quick cell division and multiplication. Additionally, it assisted in the movement of nutrients or minerals that the plants could more easily absorb for improved photosynthetic activity. This was reflected in a notable rise in plant height and cell elongation, which encourages higher LAI. The similar research reports were observed by Gopal Lal Choudhary *et al.* (2017a) [3], Gunasekar *et al.* (2018) [4] and Bhargavi *et al.* (2021) [2]. The reason for higher number of branches and dry matter production might be due to consistent supply of primary nutrients, availability of moisture, appropriate soil physical conditions encouraged the auxillary buds to develop into new shoots. This findings are in line with Somasundaram *et al.* (2007) [7], Mudigoudra and Balikai (2009) [5], Gopal Lal Choudhary *et al.* (2017a) [3], Gunasekar *et al.* (2018) [4] and Subrata Chongre *et al.* (2019) [8]. Application of 25% less than recommended NPK reduced the plant height upto 7.4 cm, number of branches plant^{-1} upto 1.0, leaf area index upto 0.37, dry matter production upto 358 kg ha^{-1}, root length upto 4.6 cm compared to T_1- 100% recommended NPK. However, this reduction was improved from 2.6 to 11.1 cm (plant height), 0.8 to 2.1 (number of branches plant^{-1}), 0.87 to 1.72 (LAI), 143 to 880 kg ha^{-1} (DMP), 0.6 to 9.6 cm (root length) due to the foliar application of various organic and inorganic fertilizers along with 75% recommended NPK.

3.2 Yield attributes

The seed yield was remarkably influenced by foliar application of various organic and inorganic liquid fertilizer sources. Among the different treatments, T_4- T_2 + panchagavya spray @ 3% on 25 and 40 DAS recorded superior seed yield (1365 kg ha^{-1}). This might be due to application of 75% NPK plus foliar application of panchagavya. Nitrogen is required for chlorophyll pigment synthesis, phosphorus is necessary for root development, which may have increased root volume and facilitated the uptake of additional soil nutrients and water. Potassium application may have aided numerous physiological processes involved in seed development and plant growth. Additionally, panchagavya contains a variety of nutrients, including macronutrients like nitrogen, phosphorus, and potassium, micronutrients, vitamins, amino acids, and growth regulators like auxins and gibberellins, as well as advantageous microorganisms like *Pseudomonas*, *Azatobacter* and *Phosphobacteria* that may have influenced the yield of greengram. Application of Bokashi @ 5% or banana pseudo stem extract @ 2% or Karpura Karaisal @ 10% on 25 and 40 DAS along with 75% recommended NPK increased the seed yield to the tune of 9.01, 6.9 and 5.6% over 75% recommended NPK alone. Application of panchagavya @ 3% or Nano urea @ 0.5% or DAP @ 2% + NAA @ 40 ppm along with 75% recommended NPK performed better compared to 75% recommended NPK alone and the yield increase over this treatment was noticed upto 28.17, 21.13 and 16.43% respectively. Application of 75% recommended NPK alone recorded with least seed yield of 1065 kg ha^{-1}. Application of 25% less than recommended dose of fertilizer (T_2) resulted in reduction in grain yield to the tune of 150 kg ha^{-1} compared to 100% recommended NPK application alone (T_1). However, this reduction in seed yield was improved due to foliar application of various organic and inorganic liquid fertilizer sources. Foliar feeding with various organic and inorganic sources along with 75% recommended NPK increased the seed yield from 60 to 300 kg ha^{-1} over 75% recommended NPK (T_2) alone.

Table 1: Effect of foliar application of various liquid organic and inorganic fertilizers on growth and yield of greengram

Treatments	Plant height at harvest (cm)	Number of branches plant^{-1} at harvest	Leaf area index at 55 DAS	Dry matter production at harvest	Root length (cm)	Seed yield (Kg ha^{-1}) at harvest
T_1 -100% Recommended dose of fertilizers	54.8	5.08	4.10	3243	17.5	1215
T_2- 75% Recommended dose of fertilizers	47.4	4.12	2.93	2885	12.9	1065
T_3- T_2 + Fish meal extract spray @ 3% on 25 and 40 DAS	53.9	5.33	4.35	3188	15.2	1190
T_4- T_2 + Panchagavya spray @ 3% on 25 and 40 DAS	58.5	6.25	4.65	3765	22.5	1365
T_5- T_2 + Bokashi spray @ 5% on 25 and 40 DAS	53.3	5.33	4.03	3160	14.9	1161
T_6- T_2 + Banana pseudo stem extract spray @ 2% on 25 and 40 DAS	52.4	5.11	3.80	3112	14.4	1138
T_7- T_2 + Karpura Karaisal spray @ 10% on 25 and 40 DAS	50.0	4.93	3.80	3028	13.5	1125
T_8- T_2 + Polyfeed spray @ 1% on 25 and 40 DAS	55.4	5.33	4.39	3300	17.6	1205
T_9- T_2 + Nanourea spray @ 0.5% on 25 and 40 DAS	56.3	5.94	4.50	3688	19.2	1290
T_{10}- T_2 + DAP @ 2% + NAA @ 40 ppm spray on 25 and 40 DAS	56.0	5.67	4.41	3402	18.8	1240
S.Em±	1.17	0.08	0.70	46.75	0.40	35.3
CD (p=0.05)	3.29	0.33	0.24	141.15	1.01	118.8

4. Conclusion

Based on the experimental findings, it could be concluded that application of 75% recommended NPK + panchagavya spray @ 3% on 25 and 40 DAS to greengram holds viable and economical combination for improved crop production of greengram and gave higher economic returns to the farmers of Guntur region in Andhra Pradesh and similar agro ecological regions in Tamil Nadu.

5. References

1. Azadi E, Rafiee M, Hadis N. The effect of different nitrogen levels on seed yield and morphological characteristic of Mungbean in the climate condition of Khorramabad. Annals of Biological Research. 2013;4(2):51-55.
2. Bhargavi Y, Sudhakar P, Rajeswari VR, Krishna TG. Influence of natural liquid organics on growth and biochemical attributes of blackgram (*Vigna mungo* L.). Journal of Pharmacognosy and Phytochemistry. 2021;10(1):759-767.
3. Gopal Lal Choudhary, Sharma SK, Kendra Pal Singh, Sanju Choudhary, Bazaya BR. Effect of panchagavya on growth and yield of organic blackgram [*Vigna mungo* (L.) Hepper] International Journal of Current Microbiology and Applied Sciences. 2017a;6(10):1627-1632.
4. Gunasekar JK, Swetha Reddy G, Poovizhi Sindhu, Anand S, Kalaiyarasi G, Anbarasu M, *et al*. Effect of leaf extracts and panchagavya foliar spray on plant characters, yield and resultant seed quality of black gram *Vigna mungo* (L.) Hepper cv. CO 6. International Journal of Current Microbiology and Applied Sciences. 2018;7(2):3205-3214.
5. Mudigoudra S, Balikai RA. Evaluation of plant products in combination with cow urine and panchagavya against sorghum shoot fly (*Atherigona soccata Rondani*). Karnataka Journal of Agriculture Science. 2009;22(3):618-620.
6. Prasanth A, Kandasamy S, Kalaiyarasan C, Krishnamoorthy R. Effect of foliar nutrition on growth and yield of irrigated greengram (*Vigna radiata* L.). International Journal of Botany Studies. 2021;6(5):1003-1005.
7. Somasundaram E, Mohhamed M, Amanullah K, Thirukkumaran R, Chandrasekaran K Vaiapuri, Sathyamoorthi K. Biochemical changes, nitrogen flux and yield of crops due to organic sources of nutrients under maize based cropping system. Journal of Applied Science and Research. 2007;3(12):1724-1729.
8. Subrata Chongre, Ramyajit Mondal, Soumik Biswas, Ammaruddin Munshi, Riasen Mondal, Mahadev Pramanick. Effect of liquid manure on growth and yield of summer green gram (*Vigna radiata* L. Wilczek). Current Journal of Applied Science and Technology. 2019;38(6):1-7.
9. Thakur V, Teggelli RG, Meena. Influence of foliar nutrition on growth and yield of pulses grown under North Eastern Dry zone of Karnataka. International Journal of Pure and Applied Bioscience. 2017;5(5):787-795.