

Effect of Sowing Methods and Foliar Nutrition application for Maximizing the Productivity of Greengram (*Vigna radiata*) in North eastern zone of Tamil Nadu

S.Manickam*, P. Veeramani

Department of Sustainable Organic Agriculture, Tamil Nadu Agricultural University Coimbatore, India

Research Article

Received: 10/08/2021

Accepted: 24/08/2021

Published: 31/08/2021

***For correspondence:**

S.Manickam, Department of Sustainable Organic Agriculture Directorate of Crop Management, Tamil Nadu Agricultural University Coimbatore, India

E-mail: veera.agri@yahoo.com

Keywords: Greengram; Pulse wonder; Foliar spray; Sowing

ABSTRACT

A field experiment was conducted during summer season, 2020 at Agricultural College and Research Institute, Vazhavachanur, Thiruvannamalai District. The experiment was laid out in Randomized Block Design (RBD) with consisting of two sowing methods (Broadcasting and Line sowing) along with four foliar applications viz., Seed treatment with biofertilizer (Rhizobium), Pulse wonder application @15 DAS, 1% Urea @ 30 and 45 DAS, and 2% DAP @45 and 60 DAS. The experimental results revealed that growth parameters viz., plant height 42.66 cm, dry matter production 243.31 g m⁻¹, leaf area index 1.47, Crop growth rate 11.03 gm⁻² day⁻¹, Relative growth rate 0.95 g g⁻¹ day⁻¹, Net assimilation rate 0.0032 gm⁻² day⁻¹ at 60 DAS are recorded in the line sowing with pulse wonder application @15 DAS. Similar to among the treatments, line sowing along with foliar spray of pulse wonder @15 DAS recorded significantly higher yield attributes viz., number of pods per plant (18.0), seed yield (1114 kg ha⁻¹), haulm yield (2621 kg ha⁻¹) and harvest index (37.36). It was followed by broadcasting +1% Urea @30 and 45 DAS registered 1065 kg ha⁻¹

INTRODUCTION

Green gram is an important pulse crop of India. It is grown in various part of the country. Throughout the India, the green gram is used for different purpose. The major portion is utilized in making dal, soup, sweets and snacks. In India, green gram occupies an area of 34.5 Million hectares, production of 15.91 Million tonnes and productivity of 461 kg ha⁻¹. In Tamil Nadu it occupies an area of 1.18 lakh hectare, production of 1.21 lakh tonnes and productivity of 640 kg ha⁻¹. Various factors responsible for the low yield viz., unawareness of the sowing date and planting pattern, imbalanced use of fertilizers and unaware of foliar spray. The low productivity of greengram may be due tonutritional deficiency in soil and imbalanced external fertilization ^[1]. Among this method of sowing is very important. Increase in yield can be ensured by maintaining the optimum plant population through different planting methods. It is an established fact that the plant population should be kept optimum to obtain high grain yield . Broadcasting is the principal method of greengram rising which is one of the most yield limiting factor. Line sowing also enhances the efficiency of resources like sunlight, water, air, space and results in increased crop productivity, profitability and resource use efficiency. Seed rate, by maintaining plant population to an optimum level, plays an important role in the growth and development of a crop by affecting plant density and, in turn, moisture, nutrient and space availability ^[2].

It is an established fact that the plant population should be kept optimum to obtain high grain yield. Most of the plant nutrients are absorbed through the leaves and absorption would be remarkably rapid and nearly complete. Foliar application of N at particular stage may solve the slow growth, nodule senescence and low seed yield of pulse without involving root absorption at critical stage. Hence, Proper nutrient management is an important factor to be considered for sustaining pulse productivity. Among them foliar application of major nutrients like urea, DAP, KCl and Use of growth regulators are the potent force in improving the growth, flower initiation, pod setting, seed quality and yield of pulses. Foliar application is credited with the advantage of quick and efficient utilization of nutrients, elimination of losses through leaching and fixation and regulating the uptake of nutrient by plants. Hence, present study was undertaken to find out suitable method of sowing in rainfed area and calculating yield and economics in greengram through application of foliar nutrition ^[3].

MATERIALS AND METHODS

The field experiment was conducted during summer season, 2020 at Agricultural College and Research Institute, Vazhavachanur, Thiruvannamalai District. Crops were experientially grown under two factors broadcasting and line sowing respectively and four foliar application treatments Viz., Seed treatment with biofertilizer (Rhizobium), Pulse wonder application @15 DAS, 1% Urea @30 and 45 DAS, and 2% DAP @45 and 60 DAS. The experiment was laid out on Randomized Block Design (RBD) with three replications. The topography of the experimental area was fairly uniform. The soil was red in colour, sandy loamy soil, well deep and fairly well drained. The climate of experimental site is semi-arid and sub-tropical dominated with extreme weather conditions having hot and dry summer and cold winter, where maximum temperature goes up to 400 C during summer.

The treatments were allotted randomly to each replication by keeping plot size as 5 × 4 m². The experimental plots were fertilized with 25 kg N ha⁻¹ as common and 50 and 25 kg of P and K ha⁻¹ respectively, according to the treatments by using fertilizer viz. urea for nitrogen, SSP (Single Super Phosphate) for P₂O₅ and KCl for potassium. Urea, SSP and KCl were mixed thoroughly in required proportion and incorporated in the field by closing the opened furrows after keeping the fertilizer in the field before dibbling. The seed of variety VRM (Gg) 1 was obtained from Seed Production Unit under ACandRI, Vazhavachanur.

The sowing was done by dibbling, keeping 30 cm distance between rows and 10 cm distance between plants, respectively. Two seed were dibbled at each hill. For collection of the biometric observations, five plants were randomly selected from each net plot and labeled properly. All the growth and yield parameters were recorded using standard procedure and grain yield was calculated at 12% moisture content. The statistical analysis of the data was carried out by the standard statistical method 'Analysis of Variance' ^[4].

RESULTS AND DISCUSSION

Effect of Growth parameters on greengram

All the growth attributes were significantly influenced by various sowing methods and foliar spraying of nutrients. The growth components viz., plant height, leaf area index, number of branches plant and DMP were enhanced due to different sowing methods along with foliar spraying of nutrients (Table 1). Among the different sowing methods Line sowing +Pulse wonder application @15 DAS significantly recorded the maximum growth attributes like plant height 42.66 cm, dry matter production 243.31, Crop growth rate 11.03 gm⁻²day⁻¹, Relative growth Rate 0.95 g g⁻¹ day⁻¹, Net assimilation rate 0.0032 gm⁻² day⁻¹ at 60 DAS.

This might be due to better growing conditions after seed germination and less competitive effect between plants in line sowing. Higher values were recorded in LAI and crop growth rate might be due to improved light penetration in middle and bottom of the crop canopy in line sowing sowing reflects in higher DMP. Similar results were also observed.

Table 1. Effect of different sowing methods and foliar spray application in green gram growth parameters.

Treatments	Plant height (cm) 60 DAS	Dry matter Production (g m ⁻²) 60 DAS	Leaf Area Index 60 DAS	Crop Growth Rate (gm ⁻² day ⁻¹) 60 DAS	Relative Growth Rate (g g ⁻¹ day ⁻¹) 60 DAS	Net Assimilation Rate (gm ⁻² day ⁻¹) 60 DAS
Line sowing + Seed treatment with biofertilizer (<i>Rhizobium</i>)	30	221.61	1.1	6.71	0.4635	0.0028
Line sowing +Pulse wonder application @15 DAS	42.66	243.31	1.47	11.03	0.9575	0.0032
Line sowing +1% Urea @30 and 45 DAS	38.9	233	1.28	9.47	0.847	0.0029
Line sowing +2% DAP @45 and 60 DAS	40.26	237.72	1.32	10.04	0.9247	0.0031
Broadcasting + Seed treatment with biofertilizer (<i>Rhizobium</i>)	34.36	235.54	1.2	8.37	0.7671	0.0024
Broadcasting +Pulse wonder application @15 DAS	36.63	237.05	1.23	8.94	0.7731	0.0025
Broadcasting +1% Urea @30 and 45 DAS	37.76	239.23	1.24	9.18	0.8285	0.0027
Broadcasting +2% DAP @45 and 60 DAS	32.4	228.47	1.15	7.23	0.5117	0.0021
SEd	0.76	18.2	0.15	0.41	0.12	0.05
CD (P=0.05)	1.42	36.7	NS	1.01	0.28	0.1

Yield attributes and Yield

All the yield attributes and yield were significantly influenced by sowing methods and foliar spraying of nutrients. The yield attributes, No. of pods per plant, grain yield and haulm yield were enhanced due to different sowing methods along with foliar spraying of nutrients Table 2. No of pods plant-1of green gram was significantly influenced by line sowing with application of pulse wonder @ 15 days recorded higher no of pods plant (18.0). Followed by Line sowing + 2% DAP @45 and 60 DAS (14.0). The no. of pods per plant increase in line sowing method of sowing and foliar spraying of TNAU Pulse wonder might be due to maintaining optimum plant population, reduced the flower droppings, and improved the pod formation and seed setting percentage [5].

Among the different treatments line sowing + Pulse wonder application @15 DAS significantly recorded the maximum yield attributes and grain yield of 1114 kg ha⁻¹ and haulm yield of 2621 kg ha⁻¹. The highest grain yield and haulm yield was obtained by the effective utilization of resources that increased the performance of crop. This result was conformity with the reports. This might be due to increased synthesis of translocation from source to sink

which in turn registered higher number of pods plant, and hundred grains. The cumulative and conjective application of nutrients to the crop might have enjoyed with sufficient nutrient condition for a longer period of time and the nutrient uptake there by allowing the plant to perpetuate with all the yield components and yield. This result was in conformity with the findings. The findings in this present study are in conformity with Muhammad Hamayun.

Table 2. Effect of different sowing methods and foliar spray application in green gram growth parameters.

Treatments	No of pods plant ⁻¹	Seed yield (kg ha ⁻¹)	Haulm yield (kg ha ⁻¹)	Harvest Index (%)
Line sowing + Seed treatment with biofertilizer (<i>Rhizobium</i>)	10	724	1485	24.9
Line sowing +Pulse wonder application @15 DAS	18	1114	2621	37.36
Line sowing +1% Urea @30 and 45 DAS	12	993	1293	32.16
Line sowing +2% DAP @45 and 60 DAS	14	998	1757	33.33
Broadcasting + Seed treatment with biofertilizer (<i>Rhizobium</i>)	11	969	1713	28.16
Broadcasting +Pulse wonder application @15 DAS	12	1009	1952	28.93
Broadcasting +1% Urea @30 and 45 DAS	13	1065	2069	30.3
Broadcasting +2% DAP @45 and 60 DAS	8.66	775	1543	26.33
SEd	0.21	21.1	44.21	0.42
CD (P=0.05)	0.46	45.38	97.3	0.89

CONCLUSION

In conclusion, from the field experiment, results revealed that growth parameters viz., plant height 42.66 cm, dry matter production 243.31, leaf area index 1.47, Crop growth rate 11.03 gm⁻²day⁻¹, Relative growth rate 0.95 g g⁻¹ day, Net assimilation rate 0.0032 gm⁻² day at 60 DAS. Are recorded in the line sowing with pulse wonder application@15 DAS. Similar to among the treatments, line sowing along with foliar spray of pulse wonder @15 DAS recorded significantly higher yield attributes viz., number of pods per plant (18.0), seed yield (1114 kg ha⁻¹), haulm yield (2621 kg ha⁻¹) and harvest index (37.36). It was followed by broadcasting +1% Urea @30 and 45 DAS registered 1065 kg ha⁻¹.

REFERENCES

1. Movalia D, et al. Effect of Boron and Molybdenum on Summer Green Gram (*Vigna Radiata L.*)(GM-4) Under Medium Black Calcareous Soils: A Review. NCIBS.2020.
2. Chaturvedi AK, et al. Assessment of different methods of sowing of vegetable cowpea to harness productivity and profitability potential. *Ann Agric Res New Series*. 2015;36(4):437-440.
3. Manonmani V, et al. Influence of mother crop nutrition on seed and quality of blackgram. *MadrasAgric. J.*2009; 96:125-128.
4. Sivakumar C, et al. Foliar Application of Different Phosphorus Sources for Transplanted Irrigated Pigeonpea [*Cajanus cajan (L.)*] in North Western Zone of Tamil Nadu. *Legume Res An Inte J*. 2021;44:5-8.
5. Mishra JP et al. Impact of conservation practices on crop water use and productivity of chickpea under middle Indo Gangetic plains. *J Food Legume*. 2012;25:310-313.