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EFFECT OF FOLIAR NUTRITION ON YIELD AND GROWTH PARAMETERS OF GREENGRAM IN COASTAL AREA OF TAMILNADU

(*Vigna radiata*) CV. Vamban 2

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ABSTRACT

A field experiment was carried out in the coastal area farmer's field at Mandabam village, near Chidambaram, during Thai pattam 2017-18 (Dec-Mar) to study the effect of foliar application of nutrients on growth and yield of green gram (*Vigna radiata*). The experiment was laid out in randomized block design, replicated thrice. The treatments comprised of five levels of foliar application viz., 2% DAP, 2% Pulse wonder, 2% micronutrient mixture, 40 ppm NAA, 100 ppm salicylic acid with control. The foliar spray was given thrice i.e., at 15th, 45th, 65th DAS. The results of the experiment shows that the foliar application of 2% DAP, 2% TNAU pulse wonder and 100 ppm NAA significantly increased the plant height, number of pods per plant and length of the pod. Foliar application of 2% DAP and 2% TNAU pulse wonder significantly increased the grain yield and bhusa yield. The present investigation concluded that application of 100% recommended dose of NPK-DAP 2% +TNAU pulse wonder at 2% on 45 days after sowing can be recommended to exploit the genetic potential and increases the productivity of black gram.

Keywords: DAP, Pulse wonder, NAA, Salicylic acid

INTRODUCTION

Protein malnutrition has created havoc in developing countries including India. The per capita consumption of pulses in India is around 30-35 g per day as against the recommendation of Indian Council of Medical Research (ICMR) at 45 g and World Health Organisation (WHO) at 80 g per day. The requirement of pulses for the billion people as per ICMR recommendation would be 17.15 million tonnes, whereas WHO's recommendations for well nourishment, the requirement must be 29.2 million tonnes. India is the largest producer and consumer of pulses in the world, accounting for 33 per cent of world area and 22 per cent of world production of pulses. Despite India being the largest producer (18.5 million tons) and processor of pulses in the world.The area under Green gram cultivation in India is 3.07 million ha and 1.51 million ton production. The total pulses demand has been projected to the tune of 26.5 million tonnes by 2020, 32 million tonnes by 2050. In Tamil Nadu, the area under pulses is around 886.9 thousand hectare with a production of 365.3 thousand tonnes and average productivity of 412 kg/ha.

The low yield is attributed to several reasons viz., cultivated as rainfed crops, as intercrops in marginal lands. Proper nutrient management is an important factor to be considered for sustaining pulse productivity. Poor management practices and low yield potential of varieties. Nutrient and weed management practices play a major role in realizing the potential of a given Variety along with other contributing factors (Anbumani *et al.,* 2003).

Growth regulating substances/growth regulators are known to influence a wide array of physiological parameters like alteration of plant architecture, assimilate partitioning, promotion of photosynthesis, uptake of nutrients (mineral ions), enhancing nitrogen metabolism, promotion of flowering, uniform pod formation, increased mobilization of assimilates to defined sinks, improved seed quality, induction of synchrony in flowering, and delayed senescence of leaves (Solaiappan and Ramaih, 1990). These growth regulators, when applied as foliar spray at proper crop growth stage in optimum concentration could play a significant role in increasing crop yield and quality of produce in different field crops (Nagasubramaniam *et al.,* 2007). These plant growth regulators have been considered as software for plant development and improvement in crop productivity (Malik, 1995).

Use of nutrient spray such as TNAU micro nutrient mixture TNAU pulse wonder, NAA. SCA, DAP was one of the potent force in improving the growth, flower initiation, fruit setting, fruit quality and yield. Salicylic acid (2-hydroxybenzoic acid), as a natural plant hormone, has many effects on physiological processes and growth of plants (Khan *et al.,* 2010). Furthermore, salicylic acid has an important role in tolerance of some environmental stresses such as heat, salts, and drought stress (EL- Tayeb., 2005). Maity and Bera (2009) revealed that foliar application of salicylic acid influences different physiological and biochemical aspects of green gram plant via increasing assimilation rate which revealed increasing in chlorophyll content and Hill reaction activity in the leaf.

Foliar application of both essential nutrients and micro nutrients also plays a vital role in pulse production by stimulating root development, nodulation, energy transformation, various metabolic processes, translocation activity in plants and increasing pod setting and thereby increasing the yield. The available literature proves the possible effect of soil application of nutrients and foliar spray in pulses especially in Green gram, to increase the productivity. But very limited work only had been carried out in these lines to develop region specific recommendation to enhance the yield of Green gram.

Keeping these points in view, the present investigation was carried out to develop specific management practices such as application of nutrients through foliar for the irrigated Green gram, to enhance the yield and productivity.

MATERIALS AND METHODS

A field experiment was carried out in the coastal area farmer's field at Mandabam village, near Chidambaram, during Thai pattam, 2017-18 (Dec-March), to study the effect of foliar application of nutrients on growth and yield attributes and yield of greengram (*Vigna radiata L.*,). The details of experimental materials used and methods adopted during the course of the study are

presented in this chapter. The experimental site is geographically located at 11°24′ N latitude, 79°44′ E longitudes and altitude of 5.79 M above mean sea level (MSL) in the southern part of India and 15 Km away from the Bay of Bengal Coast. The experimental soil was sandy loam in texture and taxonomically classified as *Typic Ustifluvent*. The fertility status was low in available nitrogen, medium in available phosphorus and potassium. The pre sowing soil samples were analysed for both mechanical and physical properties Piper (1966) and the particulars are follows Clay (per cent) – 7.52, Silt (per cent)-21.57, Fine sand (per cent)-11.28, Coarse sand (per cent)-58.20. The experiment was laid out in Randomized Block design and replicated thrice. The treatments comprised of three levels of foliar spray of nutrients (2% DAP, 1% KC1, 1% Salicylic acid, 2% Pulse wonder and 2% micronutrient mixture 100 ppm SCA, 400 ppm NAA) were used for foliar spray. The experimental field was prepared by providing one ploughing. The check basins were formed with specific dimension and by providing irrigation channels leaving a buffer channels around each plot so as to control the lateral seepage of water from one plot to another. Good viable seed of Greengram, Vamban 2 variety having germination of 93 per cent were used at the rate of 20 kg ha^{-1}. The seeds were sown at 30 x 10 cm spacing to a depth of 4 cm. The nutrients recommended i.e. N, P_2O_5, K_2O were applied in the form of Urea, SSP and MOP at basal application as per the treatment schedule. Foliar application of nutrients *viz*., DAP, Pulse wonder, Salicylic acid and NAA micronutrient mixture were given on 15, 45, 65 DAS as per the treatment schedule. DAP 2% - 122.8 g/6.14lit, TNAU pulse wonder 2% - 122.8 g/6.14lit, Micronutrient mixture 2% - 122.8 g/6.14lit, Salicylic acid 100 PPM - 100 mg/6.14 lit, NAA 40 PPM - 40 mg/6.14 lit. The treatments are T_1 – 100% RF + 2% of DAP, T_2 – 100% RF + 2% of TNAU PW, T_3 – 100% RF + 2% of TNAU MN Mixture, T_4 – 100% RF + NAA 40ppm, T_5 – 100% RF + SCA 100ppm, T_6 – 100% RF + 2% of DAP + 2% of TNAU PW, T_7 – 100% RF + 2% of DAP + 2% of TNAU MN Mixture, T_8 – 100% RF + 2% of DAP + NAA 40ppm, T_9 – 100% RF + 2% of DAP + SCA 100ppm, T_{10} – 100% RF + 2% of TNAU PW + NAA 40ppm, T_{11} – 100% RF + 2% of TNAU PW + SCA 100ppm, T_{12} – Control. Gap filling was done at 7 DAS. Thinning was done at 15 DAS leaving single plant per hole. The crop was irrigated as and when required. The crop was given two hand weeding's at 15 and 30 DAS. The harvested pods were threshed, cleaned, dried and grain yields were corrected to 8 per cent moisture. Haulms were then cut and dried in the field itself and weight of haulms was recorded plot wise. Five plants were tagged at random in each net plot for taking biometric observations. The leaf area of greengram, blackgram, cowpea and horsegram was worked out at 30 and 45 DAS as per the method suggested by Puttasamy (1976).

$$\text{Leaf area} = L \times B \times K$$

Where, L - Maximum length of the third leaf from top (cm), B-Maximum breadth of the third leaf from top (cm), K-Constant factor (0.6306). From this. LAI was computed taking into account the area occupied by each plant and numbers of leaves $plant^{-1}$.

$$LAI = LBK \times \frac{\text{No. leaves plant}^{-1}}{\text{Area occupied (cm}^2\text{)}}$$

$$\text{Harvest index} = \frac{\text{Economic yield (kg ha}^{-1}\text{)}}{\text{Biological yield (kg ha}^{-1}\text{)}}$$

RESULTS AND DISCUSSION

EFFECTS OF FOLIAR NUTRITION ON GROWTH OF GREENGRAM

The foliar application of 40 ppm NAA significantly taller plants with height of 26.94cm (T_4) and it was on par with DAP and NAA (26.57 cm) (T_8) was observed(Table 1). Foliar application of DAP, TNAU pulse wonder and NAA significantly increased the plant height, number of pods per plant and length of the pod. This might be due to enhanced level of nutrient available in the rhizo ecosystem of the foliar applied nutrients resulting in better plant growth and development. Application of nutrients would have resulted in better vegetative growth as observed taller plants and increased DMY. This favourable influence of foliar application of nutrients could be ascribed to more and quick access to nutrients by plants seedling and early development stages (Pradeep mohan dixit and Elamathi. 2007). Similar results have also reported by Setty *et al*., (1992). Senthil Kumar *et al*., (2008) observed, a significant increase in growth characters like plant height (47.5 cm), dry matter production (2576 kg ha^{-1}) and leaf area index (3.74) of black gram by foliar application of DAP at 20% at flowering and pod development stage as compared to no spray (37.1cm, 1712 kg ha^{-1}, and 2.76, respectively).

EFFECTS OF FOLIAR NUTRITION ON YIELD OF GREENGRAM

Number of pods $plant^{-1}$ is an important yield component in greengram and was higher in the application of TNAU pulse wonder and DAP with recommended dose of NPK. This might have caused more number of pods and efficient translocation of photosynthates from source to sink. Among the various foliar nutrition, the grain yield was increased in application of DAP and TNAU pulse wonder, which registered as 396.42 kg/ha and was on par with TNAU pulse wonder (397.14 kg/ha). Among the various foliar nutrition, the busha yield was increased in application of DAP and TNAU pulse wonder, which registered as 369.28 kg/ha and was on par with TNAU pulse wonder (372.87 kg/ha)(Table 2). Similar results were observed by S. Marimuthu and U. Surendran (2015).

This 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 Khalilzadeh *et al.,* 2001. The present investigation concluded that application of 100% recommended dose of NPK-DAP 2% +TNAU pulse wonder at 2% on 45 days after sowing can be recommended to exploit the genetic potential and increases the productivity of black gram.

CONCLUSION

The result of the experiment conducted at farmer's field at Mandabam village, near Chidambaram, during Thai pattam, 2017-18 (Dec-March) to study the response of green gram with different foliar nutrients shows that application of 100% recommended dose of NPK-DAP 2% +TNAU pulse wonder at 2% on 45 days after sowing can be recommended to exploit the genetic potential and increases the productivity of black gram.

Table 2: Effects of foliar nutrition on yield of greengram

TREATMENTS	PLANT HEIGHT(CM)	NUMBER OF PODS PLANT^{-1}	LENGTH OF THE POD	LEAF AREA INDEX
T_1 – 100% RF + 2% of DAP	26.87	37.67	7.07	2.20
T_2 – 100% RF + 2% of TNAU PW	25.42	46.67	7.83	2.39
T_3 – 100% RF + 2% of TNAU MN Mixture	26.94	40.33	7.43	2.32
T_4 – 100% RF + NAA 40ppm	24.89	35.33	6.30	2.07
T_5 – 100% RF + SCA 100ppm	24.50	36.33	7.43	2.11
T_6 – 100% RF + 2% of DAP + 2% of TNAU PW	24.94	45.67	7.37	2.47
T_7 – 100% RF + 2% of DAP + 2% of TNAU MN Mixture	24.15	36.00	7.23	2.25
T_8 – 100% RF + 2% of DAP + NAA 40ppm	26.57	35.33	7.03	2.27
T_9 – 100% RF + 2% of DAP + SCA 100ppm	23.09	36.00	7.31	2.13
T_{10} – 100% RF + 2% of TNAU PW + NAA 40ppm	24.50	41.33	8.00	2.11
T_{11} – 100% RF + 2% of TNAU PW + SCA 100ppm	24.79	40.00	7.77	2.05
T_{12} – Control	24.55	30.33	6.00	2.21
SEd	1.44	1.35	0.60	0.16
CV(0.05)	2.99	2.80	1.25	0.34

Table 1: Effects of foliar nutrition on growth of greengram

TREATMENTS	NUMBER SEEDS PODS^{-1}	GRAIN YIELD	BHUSA YIELD
T_1 – 100% RF + 2% of DAP	8.00	422.67	383.67
T_2 – 100% RF + 2% of TNAU PW	8.67	537.67	522.67
T_3 – 100% RF + 2% of TNAU MN Mixture	8.67	438.33	397
T_4 – 100% RF + NAA 40ppm	7.33	488	441.67
T_5 – 100% RF + SCA 100ppm	9.00	481.33	434.67
T_6 – 100% RF + 2% of DAP + 2% of TNAU PW	9.00	554.67	557
T_7 – 100% RF + 2% of DAP + 2% of TNAU MN Mixture	8.00	376.33	332.33
T_8 – 100% RF + 2% of DAP + NAA 40ppm	8.00	396.33	355.67
T_9 – 100% RF + 2% of DAP + SCA 100ppm	9.00	470	434.67
T_{10} – 100% RF + 2% of TNAU PW + NAA 40ppm	8.67	435.33	394
T_{11} – 100% RF + 2% of TNAU PW + SCA 100ppm	9.33	483.33	474
T_{12} – Control	8.67	326.33	295.33
SEd	1.07	73.30	75.42
CV(0.05)	2.22	152.02	156.40

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