Research Article

Climate Resilient Agro-Technology for Blackgram (*Vigna mungo* (L.) Hepper)

A. Subbarami Reddy[1], P. Venkata Rao[2] and M.V. Ramana[2]

[1]Agricultural Research Station, Amaravathi , Guntur , Andhra Pradesh
[2]Regional Agricultural Research Station, Lam, Guntur, 522034, ANGRAU, Andhra Pradesh

Abstract

An experiment was conducted to study the effect of foliar nutrition on growth and yield attributes of blackgram (*Vigna mungo* (L.) Hepper) under rainfed conditions during *rabi* seasons of 2015-16 and 2016-17 at Regional Agricultural Research Station, Lam, Guntur, Andhra Pradesh in Randomized Block Design with 8 treatments *viz*., T_1-Control (Water spray), T_2 - Urea @2 % spray at flowering initiation, T_3- TNAU Pulse wonder @5kg/ha at flowering initiation, T_4- salicylic acid 75 ppm at flowering initiation and 7 days after 1st spray, T_5 -18-18-18 (NPK) @ 2% sprays at flowering initiation, T_6 -Urea 2%+ Salycilic acid 75ppm spray at flowering initiation, T_7-Boran@0.25 ppm spray at flowering initiation, T_8-Nitrobenzene @500ppm spray at flowering initiation and replicated thrice. Growth and yield attributing characters *i.e*. plant height, no.of branches/plant, no. of pods per plant, test weight, yield were significantly influenced by different nutrients treatments. Application of Urea @2 % spray at flowering initiation (T2) recorded highest number of branches/plant (5.95) where as no. of pods per plant (20.35) test weight (4.92g), yield (675kg/ha) and BC ratio 1.4 were high in spraying of Salicylic acid 75 ppm at flowering initiation and 7 days after 1st spray (T_4).

Keywords: Black gram, Urea, MOP, DAP, salicylic acid, growth characters

***Correspondence**
Author: A. Subbarami Reddy
Email: asreddy5225@gmail.com

Introduction

Pulses are an important source of dietary protein provides 25 per cent of protein requirements of predominantly vegetarian population. The World Health Organisation (WHO) recommends a per capita consumption of pulses at 80 g per day and the Indian Council of Medical Research has recommended a minimum consumption of 47 g. Pulses play an important role in Indian Agriculture as they improve soil fertility by fixing atmospheric nitrogen through their nodules. Pulses are called as "Marvel of Nature" because of several beneficial characters such as good crop coverage, prevent soil erosion and fix atmospheric nitrogen. India is the largest producer and consumer of pulses in the world accounting for 33 per cent of the world area and 22 per cent of world production. The productivity of pulse in India is low around 550-625 kg/ha against 1600 kg in USA, 1400 kg in China and a world average of 900 kg/ha. This crop is grown in different cropping system as a mixed crop, catch crop, sequential crop in the country. In India black gram is very popularly grown in Andhra Pradesh, Bihar, Madhya Pradesh, Maharashtra, U.P., West Bengal, Punjab, Haryana, and Karnataka. The yield potential of blackgram is very low because, the crop is mainly grown in rainfed conditions with poor management practices. Apart from the genetic potential, the biotic and abiotic stresses during critical stages of crop growth play a major role in reduced blackgram production [1]. Several strategies were initiated to increase the productivity of blackgram. Among them e foliar application of organic and inorganic sources of nutrients for exploiting genetic potential of the crop is of major concern. This is considered as an efficient and economic method of supplementing portion of the nutrient requirements at critical stages. Nutrients play a pivotal role in increasing the seed yield in pulses [2]. Foliar application facilitates quick and efficient utilization of nutrients, elimination of losses through leaching and fixation and helps in regulating the uptake of nutrient by plants [3]. Foliar nutrients usually penetrate the leaf cuticle or stomata and enter the cells facilitating easy entry of nutrients.

As fertilizers application is complicated to apply through top dressing or placement, foliar fertilization is best suited for *rabi* pulses [4]. Foliar application of fertilizers as a possible means of applying the needed nutrients for successful crop production is gaining considerable interest in recent years [5].The productivity of the crop is declining over years due to various reasons. Among all the yield limiting factors, fertility management is paramount importance as they are growing in residual moisture and fertilizers. Farmers generally take up sowing with basal application of fertilizers as recommended and there is no standard recommendation of foliar nutrition during crop growth period. Further, soil application of fertilizers is often not sufficient to meet the growing crop demand particularly in short duration crop like black gram, In the present agriculture changing climate especially frequent and prolonged drought

and waterlogging caused entire crop loss in several occasions hence there is a need for nutrient supply as booster for management of abiotic stresses hence the present study was proposed.

Materials and Methods

An experiment was conducted to study the effect of foliar application of different nutrients on growth and yield attributes of blackgram under rainfed conditions during *rabi* seasons of 2015-16 and 2016-17 at Regional Agricultural Research Station, Lam, Guntur, Andhra Pradesh. The experiment was laid out in Randomized Block Design having 8 treatments *viz*., T_1-Control (Water spray), T_2 - Urea @2 % spray at flowering initiation, T_3- TNAU Pulse wonder @5kg/ha at flowering initiation, T_4- salicylic acid 75 ppm at flowering initiation and 7 days after 1st spray, T_5 -18-18-18 (NPK) @ 2% sprays at flowering initiation, T_6 -Urea 2%+ Salycilic acid 75ppm spray at flowering initiation, T_7- Boran@0.25 ppm spray at flowering initiation, T_8- Nitrobenzene @500ppm spray at flowering initiation and replicated thrice. The plot size was 6m x 4m and the variety LBG 752 was sown with a spacing of 30 cm x 10 cm. The data on plant height, number of branches, number of pod/plant and yield were recorded..

Results and Discussion

The effect of foliar application of different nutrients was studied during the rabi seasons and it was found that there was no significant difference in the plant height after the foliar application of different nutrients in all the treatments.

Number of Branches per plant

Branching is an important character of crop, which bears the pods and directly correlated with the yield of crop. The data revealed that all the nutrients application treatments were significantly superior over control. Highest number of branches was recorded in Urea @2 % spray at flowering initiation and it was on a par with the remaining nutrient application treatments. The minimum number of branches/ plant (4.75) was recorded in control treatment (T1). The increase in branches per plant in remaining treatments is mainly because of acceleration of various metabolic process *viz*. photosynthesis, energy transfer reaction and symbiotic biological N- fixation process. More number of branches might be due to the more availability of nutrients , which plays a vital role in cell division. In blackgram also reported the same due to foliar application of urea followed by combination of nutrients and PGR [6].

Number of pods per plant

Highest number of pods (20.35) were recorded in spraying of Salicylic acid 75 ppm at flowering initiation and 7 days after 1st spray (T4) and it was on a par with spraying of Urea 2%+ Salycilic acid 75ppm spray at flowering initiation (T6) (19.95) followed by TNAU Pulse wonder @5kg/ha at flowering initiation (19.35). Pod number was increased due to the application of nutrients at reproductive stage which helped in more translocation of photosynthates to the developing pods and also helped in better filing. Minimum number of pods (14.4) was recorded in control i.e water spray.

Test weight (g)

All the treatments had shown significant difference in test weight of blackgram. Maximum test weight of 4.92g was recorded in Salicylic acid 75 ppm at flowering initiation and 7 days after 1st spray (T_4) and Boran@0.25 ppm spray at flowering initiation (T_7) treatments.

Seed yield

Seed yield governed by number of factors which have direct or indirect impacts. The improvement in seed yield is achieved through improvement in yield attributing characters *viz.*, pod weight per plant, number of pods per plant, number of seeds per pod, pod length and test weight. In the present investigation, foliar application of Salicylic acid 75 ppm at flowering initiation (T4) and 7 days after 1st spray and Urea 2%+ Salycilic acid 75ppm spray at flowering initiation)has increased the yield attributing characters and it may be due to the immediate supply of nutrients to the plant due to increase in yield attributing characters, which finally increased the seed yield (674 kg ha-1) respectively.

The foliar application of macro and micronutrients at critical stages of the crop were effectively absorbed and translocated to the developing pods, producing more number of pods and better filling in soybean [7]. The factors which directly influence the grain yield are growth attributes like plant height, as influenced by foliar application of growth regulator, organic and inorganic nutrients [8]. Similar findings were reported by several workers [2, 9-12].

Nutritive values of seed particularly, sugar, starch, protein, methionine and ascorbic acid content were found to be influenced by application of these bioregulators. Brassinolide (BR) at 0.25 ppm and salicylic acid(SA) at 1000 ppm were most effective indicating optimum doses respectively and BR was found to be superior than SA for influencing these metabolite contents [13]

The higher B:C ratio (1.4) obtained with these treatments were ultimately due to higher productivity in terms of yield in these treatments. Such results were supported by several workers [2], [10] and [14].

Table 1 Effect of foliar nutrition on growth, yield attributes and yield of urdbean during *rabi* seasons 2015-16 and 2016-17 (Pooled data)

Treatments	Plant ht(cm)	Branches /plant	Pods /pod	Test wt (g)	Yield (kg/ha)	BC Ratio
T_1: Control (Water spray)	21.3	4.75	14.4	4.24	475	0.70
T_2: Urea @2 % spray at flowering initiation	22.85	5.95	17.3	4.73	627.50	1.00
T_3: TNAU Pulse wonder @5kg/ha at flowering initiation	21.90	5.45	19.35	4.85	660.50	1.30
T_4:Salicylic acid 75 ppm at flowering initiation and 7 days after 1st spray	21.70	5.90	20.35	4.92	674.50	1.40
T_5 : 18-18-18 (NPK) @ 2% sprays at flowering initiation	23.15	5.45	16.60	4.60	609.00	0.96
T_6: Urea 2%+ Salycilic acid 75ppm spray at flowering initiation	24.00	5.90	19.95	4.72	674.50	1.30
T_7: Boran@0.25 ppm spray at flowering initiation	22.35	5.10	17.55	4.92	610.00	1.20
T_8 : Nitrobenzene 500ppm spray at flowering initiation	22.75	5.40	16.50	4.50	561.00	0.90
SEm+	0.81	0.21	0.70	0.10	29.58	-
CD	NS	0.60	2.10	0.30	89.50	-
CV	6.25	6.30	6.85	3.65	8.4	-

Conclusion

Based on the results of present investigation it can be concluded that the application Salicylic acid 75 ppm at flowering initiation and 7 days after 1st spray (T4) recorded significantly superior in the all growth attributing characters in all observation stages and it was at par with the application Urea 2%+ Salycilic acid 75ppm spray at flowering initiation.

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