



Research Article

EFFECT OF FOLIAR APPLICATION OF NUTRIENTS ON GROWTH, DEVELOPMENT AND PRODUCTION OF BLACKGRAM (*VIGNA MUNGO* L. HEPPER)

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Abstract: An experiment was conducted to study the effect of foliar application of nutrients on growth, development and production of blackgram (*Vigna mungo* (L.) Hepper) under rainfed condition during 2016-2019 at Krishi Vigyan Kendra, Mehsana, Gujarat. The experiment was laid out with ten replications having two treatments namely T1 [N : P : K – 10 : 20 : 00 Kg/ha + PSB and Rhizobium culture seed treatment], T2 [T1 + Two spray of 2% DAP at appearance of flowering and 15 days after first spray]. Yield attributes viz., number of seeds per pod and 100 seed test weight were positively increased by foliar spray of 2% DAP at appearance of flowering and 15 days after first spray with RDF recorded the higher growth characters. The same treatment had higher grain yield of 697 kg/ ha. Based on the results of the above study, it is concluded that foliar spray of 2% DAP at appearance of flowering and 15 days after first spray with RDF was recommended to get profitably higher yield besides improving the quality of blackgram with a BC ratio of 1.83.

Keywords: Foliar spray, Blackgram, *Vigna mungo*, Pulses, Economics, Yield

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Introduction

Pulses are an integral part of many diets across the globe and they have great potential to improve human health, conserve our soils, protect the environment and contribute to global food security. India accounts for 33% of the world area and 22% of the world production of pulses. Due to stagnant production, the net availability of pulses has come down from 60 gm in 1951 to 41.7 g/day/capita in 2012 (Crop Production Guide, 2012), as against Indian Council of Medical Research (ICMR) which recommends 65 g/day/capita. The total area under Kharif pulses in India is around 112.02 lakh hectares with a production of 54.91 lakh tonnes and productivity of 490 kg /ha (DES, Min. of Agri. & FW, New Delhi, 11th Advance Estimates, 2015-16). In Gujarat, blackgram is cultivated in 0.65 lakh hectares with the production of 0.39 lakh tones and with an average productivity of 597.81kg/ha [1].

This low yield is attributed to several reasons viz., local varieties, cultivating in marginal lands mostly as rainfed crops and poor management practices. Manivannan *et al.* (2002) [2] found that Rhizobium seed treatment and foliar application of microsols (NPK and Chelated micronutrients) recorded markedly higher leaf area index, dry matter production and crop growth rate. Foliar spray of nutrients mixture with salicylic acid 100 ppm at 20, 30 and 40 DAS proved to be the best treatment to improve Leaf area index, Leaf area duration, specific leaf weight, total dry matter accumulation and seed yield of blackgram [3].

Rahman *et al.* (2014) [4] conducted a trial and the result showed that foliar spray of N, P and K significantly increased number of pods/plants, number of seeds / pods, biomass and grain yield. Reduced flower drop can be achieved in pulses by foliar spray of nutrients. Keeping these points in view, the present investigation was carried out to develop specific management practices such as sowing methods and application of nutrients through foliar application as plant growth regulating chemicals for the blackgram to enhance the yield and productivity.

Materials and Methods

An On Farm Trial (OFT) was conducted to study the effect of foliar application of nutrients on growth and development of blackgram (*Vigna mungo* (L.) Hepper) under rainfed condition during 2016- 2019 at different villages of Mehsana district, Krishi Vigyan Kendra, Mehsana, Gujarat. The variety GU-1 was used as a test variety. The experiment was laid out with ten replications having two treatments namely T1[N : P : K-10 : 20 : 00 Kg/ha + PSB and Rhizobium culture seed treatment], T2 [T1 + Two spray of 2% DAP at appearance of flowering and 15 days after first spray]. The data on number of seeds per pod, 100 seed Test Weight and yield were recorded with use of statistical appropriate formula and calculated economics of the crop.

Results and Discussion

Number of seeds per pod

As per [Table-1] foliar spray of nutrients has positively influenced the number of seeds per pod. Among the treatments, the number of seeds per pod was higher in T2 [T1 + Two spray of 2% DAP at appearance of flowering and 15 days after first spray], which registered 6.6 seeds per pod. The lowest number of seeds per pod (4.9) was observed in T1 [N: P: K-10: 20: 00 Kg/ha + PSB and Rhizobium culture seed treatment].

100 Seed weight

Result predicted in [Table-1] showed that seed test weight of blackgram was positively altered due to foliar spray of nutrients. However, T2 [T1 + Two spray of 2% DAP at appearance of flowering and 15 days after first spray] recorded higher seed test weight of 4.00 g. The lower seed test weight was recorded in T1 [N: P: K-10: 20: 00 Kg/ha + PSB and Rhizobium culture seed treatment] (3.84g). This might be due to supplementation of nutrients at the critical stage enhanced the

Table-1 Effect of foliar nutrition on yield attributes of blackgram

| Treat. | No. of seeds per pod | | | | 100 Seed weight (g) | | | | Grain Yield (Kg/ha) | | | |
|--------|----------------------|---------|---------|-----|---------------------|---------|---------|------|---------------------|---------|---------|-----|
| | 2016-17 | 2017-18 | 2018-19 | Av. | 2016-17 | 2017-18 | 2018-19 | Av. | 2016-17 | 2017-18 | 2018-19 | Av. |
| T1 | 5.2 | 4.8 | 4.7 | 4.9 | 4.16 | 3.71 | 3.65 | 3.84 | 681 | 727 | 495 | 634 |
| T2 | 8.1 | 5.9 | 5.8 | 6.6 | 4.31 | 3.85 | 3.85 | 4.00 | 742 | 804 | 545 | 697 |

Table-2 Effect of foliar nutrition on Economics of blackgram

| Treat. | Gross return (Rs./ha) | | | | Net return (Rs/ha) | | | | BCR | | | |
|--------|-----------------------|---------|---------|-------|--------------------|---------|---------|-------|---------|---------|---------|------|
| | 2016-17 | 2017-18 | 2018-19 | Av. | 2016-17 | 2017-18 | 2018-19 | Av. | 2016-17 | 2017-18 | 2018-19 | Av. |
| T1 | 34050 | 27626 | 23265 | 28313 | 19960 | 9208 | 3518 | 10895 | 2.42 | 1.50 | 1.18 | 1.70 |
| T2 | 37100 | 30552 | 25615 | 31089 | 22538 | 11700 | 6008 | 13415 | 2.55 | 1.62 | 1.31 | 1.83 |

number of floral buds, prevented the floral shedding by maintaining optimum biophysiological conditions in plants. The findings in the present study are in conformity with Hamid *et al.* (2002) [5] and Kalpana and Krishnarajan (2003) [6].

Grain Yield

As per [Table-1], three-year pooled results showed that adoption of foliar spray of nutrients has positively influenced the grain yield of blackgram. Foliar spray of 2% DAP at appearance of flowering and 15 days after first spray recorded the higher grain yield of 697 kg/ ha. The grain yield increases with T2 treatment was 9.88% over the T1 without any foliar nutrition (634.33 kg/ ha). This might be due to maintaining optimum plant population, reduced the flower droppings, improved the pod formation and seed setting percentage.

The findings in the present study of all the parameters are in conformity with Muhammad Hamayun (2011) [7], Mir *et al.* (2010) [8], Deepak *et al.* (2019) [9], Arun *et al.* 2018 [10], Suhathiya and Ravichandran 2018[11]; Devaraju and Senthivel 2018[12]; and Uma Maheswari and Karthik (2017) [13].

Economics

The pooled results of three year [Table-2] revealed that gross return, net return and BCR recorded as 28313 Rs/ha, 10895 Rs/ha and 1.70, respectively in T1, whereas 31089 Rs/ha, 13415 Rs/ha and 1.83, respectively in T2 treatment.

Conclusion

Based on the results of the above study, it is concluded that T2 [T1 + Two spray of 2% DAP at appearance of flowering and 15 days after first spray] was recommended to get profitably higher yield besides improving the quality of blackgram. Over all, from the experimental results, it could consider that foliar spray of 2% DAP at appearance of flowering and 15 days after first spray as a better option for achieving higher productivity and profitability of blackgram with a BC ratio of 1.83.

Application of research: This study is very useful for farmers community for increasing the income (10-15 %) against very low expenditure incurred in pulses. Now days, this technology is useful in doubling farmers income concepts. Foliar spray of DAP in pulses is low expensive concepts, save chemical fertilizers as well as increasing the grain yield.

Research Category: On farm trial,

Abbreviations: T= treatment, %= percent, OFT= on farm trial, ICAR= Indian Council of Agricultural Research, BCR = benefit cost ratio, ha = hacter , PSB = phosphate solubilising bacteria, N= nitrogen, P= phosphorous, K= potash

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Research project name or number: On farm trial

Author Contributions: All authors equally contributed

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Study area / Sample Collection: Mehsana district, Gujarat

Cultivar / Variety / Breed name: Blackgram, Gujarat Udad-1

Conflict of Interest: None declared

Ethical approval: This article does not contain any studies with human participants or animals performed by any of the authors.
Ethical Committee Approval Number: Nil

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