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## ORIGINAL ARTICLE

# Effect of Foliar nutrition on green gram [*Vigna radiata* (L.) Wilczek] productivity

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**ABSTRACT**
*A field experiment wasconducted during kharif season of 2015 at Mahatma Gandhi Chitrakoot Gramodaya Vishwavidhyalaya, Chitrakoot, Satna, Madhya Pradesh, India.The farm is situated under agro-climatic zone - Bundelkhand region of Northern Madhya Pradesh. Geographically Chitrakoot is situated between the 25$^0$ 10'N latitude and 80$^0$ 52' E longitude and about 190-200 meter above mean sea level.The crop received 509 mm rainfall, during July to January 2015-16 with maximum rainfall during month of July (291 mm). The experiment was laid out in a randomized block design (RBD) replicated thrice, with 8 treatments. Application of urea 2%at FI closely followed by urea 2%+salicylic acid 75ppm at FI. Proved to be best combination for obtaining better all growth attributes viz.,(plant height and number of branches/plant). However, Urea 2% ($T_2$) registered significantly higher seed yield (588 kg/ha) among all the treatments. However application ofUrea 2%+ Salicylic acid ($T_6$) and TNAU pulse wonder ($T_3$ ) yielded (582 kg/ha) same field and almost equal with Urea 2% ($T_2$) The maximum net profit of 42146 /ha and benefit: cost ratio of 3.49 was earned in green gram with the Application of urea 2% ($T_2$) at FI.*
***Keywords:*** *Green gram,Gross monetary return,foliar nutrition, Productivity, Yield attributes, Yield*

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## INTRODUCTION

Green gram is one of the major pulse crops of world as well as country and also it serves as an important protein source of our Indian diet. Being rich in quality proteins, minerals and vitamins, mungbean is an in separable ingredient in the diets of vast majority of population in Indian sub continents. The germinated seeds (sprouts) of mungbean have good nutritional value as there is an increase in the concentration of thiamine, niacin and ascorbic acid with sprouting. Grown extensively in Madhya Pradesh, Maharashtra, Uttar Pradesh, Punjab, Andhra Pradesh, Karnataka and Tamilnadu states. Mungbean is a short duration grain legume having wider adaptability and low input requirements. It has the unique ability to fix atmospheric nitrogen (55-109 kg/ha) in symbiotic association with *Rhizobium* bacteria, which not only enables to meet its own nitrogen requirements but also benefits to succeeding crops [1]. Its seeds contain approximately 25-28% protein, 3.5-4.5% ash, 62-65% carbohydrate on dry weight basis.

The mungbean area in Madhya Pradesh was 389.9 thousand hectare which produce 191.8 thousand tonnes with a productivity of 492 kg/ha [2]. Inspite of having the larger area under mungbean in the country and state as well, its productivity is not satisfactory which yet to see a major breakthrough. The low productivity of mungbean is due to biotic and abiotic factors. Among them, imbalance use of nutrients is one of the most important factors[3]. To meet the additional nutritional requirement of ever increasing population, it is very much essential to enhance the production of pulses. Evaluation of suitable management practices to increase the productivity of pulses even under rainfed situation essential. Nitrogen is the most important nutrient and is seems to have quickest and pronounced effect. It protein and chlorophyll, involved in photosynthesis, respiration and protein synthesis resulted in more above ground vegetative growth and development of plant. With the supply of sufficient quantity of nitrogen in

the soil, plants acquire healthy green color. Growth of plant is fairly rapid, crop matures normally and gives higher yield.

Foliar feeding of nutrients (Nitrogen and phosphorous) has been found and efficient method of applying nutrients in rainfed conditions of Foliar application of fertilizers may be a good source of nutrient supply in small amounts[4]. It may be prove an alternative for low input technology. It is 2 to 3 times better than soil application. Thus foliar application of fertilizer either alone or with soil application may be useful in increasing the yield of mungbean crop under rainfed condition.

## MATERIAL AND METHODS

The field experiment was conducted at Mahatma Gandhi Chitrakoot Gramodaya Vishwavidhyalaya, Chitrakoot, Satna, Madhya Pradesh, India.The farm is situated under agro-climatic zone - Bundelkhand region of Northern Madhya Pradesh. Geographically Chitrakoot is situated between the $25^0$ 10'N latitude and $80^0$ 52' E longitude and about 190-200 meter above mean sea levelduring kharif season of 2015-16. The soil of experimental field as sandy loam in texture, neutral in reaction ($p^H$ 8.02), low in organic carbon 0.06%, available nitrogen 135.4 kg/ha high in available phosphorus (32.9 kg/ha) and potassium (26.9 kg/ha). The crop received 509 mm rainfall, during July to January 2015-16 with maximum rainfall during month of July (291 mm). The 8 treatments were tested in a 3 replicated randomized block design. The treatments were $T_1$: Control (Water spray) ,$T_2$: Urea 2% spray at flower initiation ,$T_3$: TNAU Pulse wonders @ 5 kg/ha at flower initiation ,$T_4$: Salycilic acid 75 ppm at flower initiation and 7 day after $I^{st}$ spray, $T_5$: 18:18:18 (NPK) at flower initiation .$T_6$: Urea 2% + Salycilic acid at flower initiation ,$T_7$: Boron 0.25 ppm spray at flower initiation, $T_8$: Thiourea 500 at flower initiation.Experiment was conducted in randomized block design with 3 replications. The sowing was done on 04/07/2015 by making a furrow at desired distance. The shallow furrows were opened with the help of *desi* plough at 30 cm apart .Harvesting was done on 15/09/2015. Economics were calculated as per prevailing prices of market in the area .All the observation were taken as per standard procedure .

## RESULTS AND DISCUSSION

### Yield and Yield Parameter

Seed yield was registered significantly higher under urea 2% ($T_2$) than water spray and remained significantly at par. However application ofUrea 2%+ Salicylic acid ($T_6$) and TNAU pulse wonder ($T_3$) yielded (582 kg/ha) same field and almost equal with Urea 2% ($T_2$). It was attributed due to higher value of shoot and root growth and yield attributes. Similar findings was also reported by [6].

Straw yield was recorded significantly superior under application of Thiourea ($T_8$) (694kg/ha) than water spray ($T_1$) and remained significantly at par. This was attributed due to higher value of growth characters. It might be due to the reason that at lower level of fertility, foliar fertilization has increased the availability of N and P to the crop plants, while at higher fertility level, crop requirement of N and P was fulfilled from basal application only. Similar were corroborated with the findings of [5].Application of urea 2% recorded significantly higher harvest index (39.99) than water spray.

**Table no 1. Influences of different treatments on Grain Yield ,Straw Yield and harvest index of Green gram.**

| Treatment number | Grain yield (kg/ha) | Straw yield (kg/ha) | Harvest Index (%) |
|---|---|---|---|
| $T_1$Water spray | 423 | 813 | 34.20 |
| $T_2$ Urea 2% FI | 588 | 935 | 39.99 |
| $T_3$ TNAU Pulse Wonder @ 5 kg/hac.FI | 582 | 945 | 35.19 |
| $T_4$ Salicylic acid 75 ppm | 580 | 954 | 37.79 |
| $T_5$ 18:18:18(NPK).2%FI | 566 | 955 | 37.17 |
| $T_6$ (Urea 2%+Saly-acid FI | 582 | 954 | 37.80 |
| $T_7$ (Boron 0.25 ppm FI | 521 | 914 | 36.31 |
| $T_8$ (Thiourea 500 ppm F I | 569 | 964 | 37.07 |
| SEm ± | 25.50 | 17.61 | 0.92 |
| $CD_5$% | 77.35 | 53.4 | 2.73 |
| CV(%) | 8.16 | 3.28 | 4.32 |

 

**Table 2 Cost of cultivation, gross return, net return and benefit: cost ratio of green gram as influenced by treatment**

| Treatment number | Cost of cultivation ( ₹ /ha) | Gross returns ( ₹ /ha) | Net returns ( ₹ /ha) | B :C Ratio |
|---|---|---|---|---|
| $T_1$Water spray | 16700 | 43114 | 26414 | 1.58 |
| $T_2$ Urea 2% FI | 16866 | 59012 | 42146 | 2.49 |
| $T_3$ TNAU Pulse Wonder@ 5kg/hac.FI | 16768 | 51736 | 34968 | 3.08 |
| $T_4$ Salicylic acid 75ppm | 18035 | 59155 | 41153 | 2.25 |
| $T_5$ 18:18:18(NPK).2%FI | 18232 | 57588 | 39356 | 2.14 |
| $T_6$ (Urea 2%+Saly-acid FI | 18137 | 59188 | 41018 | 2.27 |
| $T_7$ (Boron 0.25ppm FI | 17785 | 53014 | 35229 | 1.98 |
| $T_8$ (Thiourea 500ppm F I | 18935 | 57860 | 38925 | 2.00 |
| SEm ± | 0.0 | 2437 | 2437.4 | 0.14 |
| $CD_5$% | 0.0 | 7393.9 | 7394 | 0.43 |
| CV (%) | 0.0 | 7.67 | 12.06 | 7.88 |

**Economics**

Cost of cultivation varied under different foliar nutrients treatments . Maximum as Thiourea 500 ppm ($T_8$) ( ₹18935/ha) followed by NPK18:18:18 (18252). These variations in cost of cultivation was due to variable cost of foliar nutrient applied in different treatments**.** Gross returns was obtained significantly higher in urea + salicylic acid ( 59188) followed by salicylic acid 75ppm ( ₹ 59155) . However ,all the foliar fertilized treatment also exhibited significantly greater gross returns than that of water spray . this increase was became of significantly higher value of grain and straw yield .The marginal profit of Rs 26414 $ha^{-1}$ was obtained when crop was without fertilization treated (only water spray) the crop season. The maximum and significant higher Net monitory returns was recorded under $T_2$ Urea 2% (Rs.42146 $ha^{-1}$) followed by $T_4$ Salicylic acid (Rs. 41153 $ha^{-1}$),$T_6$ Urea 2%+ Salicylic acid (Rs. 41018 $ha^{-1}$) and $T_5$ 18:18:18 (NPK).2% (Rs.39356 $ha^{-1}$). Benefit :Cost ratio was obtained higher under the application of urea 2% ($T_2$) followed by Salicylic acid ($T_4$) ,Urea 2%+ Salicylic acid($T_6$) ,$T_5$ 18:18:18(NPK) ($T_5$) .which shoved significantly greater than water spray.

**CONCLUSION**

On the basis of one year field experimentation concluded that Application of urea 2%at foliar initiation closely followed by urea 2%+salicylic acid 75ppm foliar initiation. Proved to be best combination for obtaining better growth and yield of green gram. The maximum net profit of 42146 /ha and benefit: cost ratio of 3.49 was earned in green gram with the Application of urea 2% ($T_2$) at FI. Thus, it can be concluded that the application of urea 2% at FI was found the best treatment for obtaining greater yield and maximum profit of green gram in Chitrakoot area.

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