

Original Research Article

<https://doi.org/10.20546/ijcmas.2019.806.305>

Influence of Foliar Nutrients and Biostimulant on Growth, Yield Attributes and Yield of Greengram (*Vigna radiata* L.)

Mohammad Aslam*, A.V. Nagavani, D. Subramanyam and B. Ramana Murthy

Department of Agronomy, S.V. Agricultural College, Tirupati-517502, A.P., India

*Corresponding author

ABSTRACT

Keywords

Greengram, Foliar nutrients and biostimulants, Yield attributes and yield

Article Info

Accepted:

20 May 2019

Available Online:

10 June 2019

A field experiment was conducted at the Dryland farm of S.V. Agricultural College, Tirupati during *kharif*, 2018 to study the response of greengram to foliar nutrients and biostimulants. Among the various foliar nutrients and biostimulant tested, the higher yield attributes and yield of greengram were obtained with 19: 19: 19 @ 0.5% Spray + Seaweed extract @ 2% Spray, which was significantly superior to remaining treatments. The next best treatment was 19: 19: 19 @ 0.5% Spray + humic acid @ 0.1% Spray, which was however comparable with the resulted yield attributes and yield of 19:19:19 @ 0.5% Spray and urea @ 2% Spray + seaweed extract 2%. The lowest seed yield was recorded with no Spray (control).

Introduction

Greengram (*Vigna radiata* L.) is an important pulse crop and an excellent source of high quality protein. It consists of about 25 per cent protein which is almost 2.5-3.0 times more than the cereals. Greengram also known as mungbean is consumed as whole grain and in the form of dal. Sprouted greengram whole seed is used in South India for preparing curry or a savory dish. Greengram is cultivated in an area of 43.05 lakh hectares with a production of 20.70 lakh tonnes and productivity of 481 kg ha⁻¹ in India and 1.34 lakh hectares area with production of 0.66 lakh tonnes and productivity of 443 kg ha⁻¹ in Andhra Pradesh, respectively (Ministry of agriculture and Co-operation, 2017).

The productivity of greengram is declining over years due to various reasons. Farmers generally take up sowing with the receipt of first showers without basal application of nutrients as recommended. Due to this reason, potential productivity is not achieved and hence, there is a need to check balanced nutrition at right time to the crop. Further, soil application of nutrients is often not enough to meet the growing crop demand particularly in short duration crop like greengram.

Among the various inputs in agriculture, fertilizer is a vital input since it replenishes the nutrients removed from the soil by crops and also boosts the yield of crops. Method of fertilizer application is a non-monetary input

which influences growth and consequently the yield. Foliar application targets the above ground parts where the nutrient is needed and rapid absorption is facilitated. To compensate the decline in root activity and nutrient uptake especially during reproductive stages, foliar fertilization can be a better strategy. It is a short term approach which improves the quality of produce by reaching the site of food synthesis directly and preserves the crop yield with low environmental impact. As the nutrient needed for foliar sprays is less it is economical in achieving higher monetary returns than soil application.

Materials and Methods

A field experiment was carried out during *kharif*, 2018 at the dryland farm of S.V. Agricultural College, Tirupati. The experimental soil was sandy loam in texture, neutral in reaction (pH 6.9), low in organic carbon (0.41 per cent) and available nitrogen (230 kg ha⁻¹), high in available phosphorus (35 kg ha⁻¹) and medium in potassium (139 kg ha⁻¹). The experiment was laid out in randomized block design and replicated thrice. There were nine treatments *viz.*, No Spray (Control) (T₁), Urea @ 2% Spray (T₂), 19:19:19 @ 0.5% Spray (T₃), Humic acid @ 0.1% Spray (T₄), Seaweed extract @ 2% Spray (T₅), Urea @ 2% Spray + Humic acid @ 0.1% Spray (T₆), 19:19:19 @ 0.5% Spray+ Humic acid @ 0.1% Spray (T₇), Urea @ 2% Spray + Seaweed extract @ 2% Spray (T₈) and 19:19:19 @ 0.5% Spray + Seaweed extract @ 2% Spray (T₉). Greengram variety Ydadadri (WGG-42) was tested with an inter and intra row spacing of 30 cm x 10 cm.

Results and Discussion

Growth attributes

Taller plants, maximum leaf area index and higher dry matter production at harvest were

recorded with 19: 19: 19 @ 0.5% + Seaweed extract @ 2% Spray (T₉), which was however comparable with 19: 19: 19 @ 0.5% Spray + humic acid @ 0.1% Spray (T₇) and significantly superior to the rest of treatments tried (Table 1). The higher dry matter accumulation by greengram was attributed to beneficial effect of nutrients particularly N, P and K as water soluble fertilizers in readily available form (19: 19: 19) which were supplied through foliar Spray. These nutrients were directly absorbed by plant either through cuticle or stomata and might have participated in photosynthesis activity in plant leaves leading to increased dry matter yield. The combined application of 19:19:19 @ 0.5% Spray + seaweed extract @ 2% Spray resulted in timely supply of optimum quantity of nutrients to the plant and their subsequent absorption by greengram leaves resulting in better assimilation and translocation of nutrients.

Increased photosynthetic activity might have caused more number of auxillary buds and ultimately resulted in more number of branches. Further, phosphorus present in 19:19:19 fertilizer absorbed directly by the plant might have increased cell division and cell development leading to more number of branches which in turn increased the dry matter production. These results were in conformity with Banasode and Math (2018). The shortest plants were observed under control (T₁).

Yield attributes

The higher number of branches plant⁻¹, number of pods branch⁻¹, number of seeds pod⁻¹, length of pod (cm) and hundred seed weight (g) were recorded with application of foliar Spray of 19: 19: 19 @ 0.5% Spray + Seaweed extract @ 2% Spray (T₉), recorded the highest number of branches plant⁻¹ which was however, comparable with 19: 19: 19 @

0.5% Spray + humic acid @ 0.1% Spray (T₇) and significantly superior over remaining other treatments (Table 2). This might be due to foliar Spray of nutrients and biostimulants was found to be promising in obtaining the higher yield attributes. The substantial increase in the growth of the plants leading to higher values of yield attributes. The beneficial effects of seaweed extract may be due to presence of some growth promoting substances IAA, IBA, Gibberellins, Cytokinins, micronutrients and amino acids. The same was obvious through the findings of Rao *et al.*, (2015). The lower number of yield attributes were recorded with (T₁).

Yield

Seed and haulm yield

The higher seed and haulm yields were obtained with foliar application of 19: 19: 19 @ 0.5% Spray + Seaweed extract @ 2% Spray (T₉), which was significantly superior to remaining treatments. The next best treatment was 19: 19: 19 @ 0.5% Spray + humic acid @ 0.1% Spray (T₇), which was however comparable with the resulted seed and haulm yield of 19:19:19 @ 0.5% Spray (T₃) and urea @ 2% Spray + seaweed extract 2% (T₈) (Table 3).

Table.1 Plant height (cm), leaf area index and dry matter production (Kg ha⁻¹) at 60 DAS as influenced by various foliar nutrients and biostimulants at different growth stages of greengram.

Treatments	Plant height at 60 DAS	Leaf area index at 60 DAS	Dry matter production at 60 DAS
T ₁ - No Spray (Control).	30.63	2.11	1318
T ₂ - Urea @ 2% Spray.	35.00	2.77	1783
T ₃ - 19:19:19 @ 0.5% Spray.	35.66	3.11	2269
T ₄ - Humic acid @ 0.1% Spray.	33.18	2.23	1754
T ₅ - Seaweed extract @ 2% Spray.	34.46	2.42	1923
T ₆ - Urea @ 2% Spray + Humic acid @ 0.1% Spray.	34.40	2.29	1878
T ₇ - 19:19:19 @ 0.5% Spray+ Humic acid @ 0.1% Spray.	39.06	3.19	2433
T ₈ - Urea @ 2% Spray + Seaweed extract @ 2% Spray.	33.83	2.47	2186
T ₉ - 19:19:19 @ 0.5% Spray + Seaweed extract @ 2% Spray.	40.80	3.58	2585
SEm±	1.37	0.27	22
CD (P=0.05)	4.15	0.81	75

Table.2 Yield attributes as influenced by various foliar nutrients and biostimulants at different growth stages of greengram

Treatments	Number of branches plant ⁻¹	Number of pods branch ⁻¹	Number of seeds pod ⁻¹	Length of pod (cm)	Hundred seed weight (g)
T ₁ - No Spray (Control).	3.93	5.34	6.91	4.82	3.2
T ₂ - Urea @ 2% Spray.	4.48	6.60	7.94	5.84	4.0
T ₃ - 19:19:19 @ 0.5% Spray.	4.86	7.13	8.33	6.21	4.3
T ₄ - Humic acid @ 0.1% Spray.	4.43	6.38	7.26	5.50	4.1
T ₅ - Seaweed extract @ 2% Spray.	4.30	7.05	7.48	5.34	3.8
T ₆ - Urea @ 2% Spray + Humic acid @ 0.1% Spray.	4.20	6.52	7.24	5.63	3.6
T ₇ - 19:19:19 @ 0.5% Spray+ Humic acid @ 0.1% Spray.	4.93	7.24	8.80	6.27	4.5
T ₈ - Urea @ 2% Spray + Seaweed extract @ 2% Spray.	4.42	7.09	7.29	5.73	4.2
T ₉ - 19:19:19 @ 0.5% Spray + Seaweed extract @ 2% Spray.	5.56	7.36	9.86	7.17	4.8
SEm±	0.23	0.59	0.34	0.26	0.13
CD (P=0.05)	0.69	1.79	1.05	0.78	0.4

Table.3 Seed yield, haulm yield (kg ha⁻¹) and harvest index as influenced by various foliar nutrients and biostimulants at different growth stages of greengram

Treatments	Seed yield (kg ha ⁻¹)	Haulm yield (kg ha ⁻¹)	Harvest index
T ₁ - No Spray (Control).	842	1475	31.8
T ₂ - Urea @ 2% Spray.	945	1799	32.1
T ₃ - 19:19:19 @ 0.5% Spray.	1053	2053	34.2
T ₄ - Humic acid @ 0.1% Spray.	929	1744	31.8
T ₅ - Seaweed extract @ 2% Spray.	982	1823	33.8
T ₆ - Urea @ 2% Spray + Humic acid @ 0.1% Spray.	967	1799	32.6
T ₇ - 19:19:19 @ 0.5% Spray+ Humic acid @ 0.1% Spray.	1071	2194	34.3
T ₈ - Urea @ 2% Spray + Seaweed extract @ 2% Spray.	1039	2028	32.6
T ₉ - 19:19:19 @ 0.5% Spray + Seaweed extract @ 2% Spray.	1140	2235	34.6
SEm±	22	61	2.21
CD (P=0.05)	66	184	NS

The higher seed yield might be accounted to the increased supply of almost all essential plant nutrients by translocation of photosynthates accumulated under the influence of foliar Sprays of nutrients along with biostimulants. Further, the translocation and accumulation of photosynthates in the economic sinks thus increased the yield attributes resulted in increased seed yield. Foliar application of seaweed extract in combination with 19: 19: 19 improved nutrition of greengram, due to presence of micro elements and plant growth regulators, especially cytokinins which resulted increase in yield. The same was obvious through the findings of Zodape *et al.*, (2010), Ganapathy *et al.*, (2013). The increased haulm yield might be due to continuous supply of nutrients which could have increased the leaf area and dry matter resulting in higher haulm yield (Kuttimani and Velayutham, 2011). The lower seed and haulm yield was recorded with no Spray (control) (T₁).

Higher value of harvest index was recorded with the foliar Sprays of 19: 19: 19 @ 0.5% Spray + Seaweed extract @ 2% Spray (T₉) followed by 19: 19: 19 @ 0.5% Spray + humic acid @ 0.1% Spray (T₇). The lower value of harvest index was recorded with non spraying of nutrients and biostimulants (T₁). Higher values of harvest index were achieved due to optimum availability of nutrients and biostimulants leads to efficient translocation of assimilates partitioning to reproductive parts which reflect in the harvest index. Seaweed extract is the rich source of several primary nutrients like K, P and secondary nutrients and it stimulate various aspects of growth and development of harvest index. These findings were in agreement with Pramanick *et al.*, (2013).

In conclusion, it can be inferred from the investigation that foliar application of

19:19:19 @ 0.5% Spray + Seaweed extract @ 2% Spray (T₉) at 30 and 45 DAS on greengram proved to be promising nutrient management practice for obtaining higher yield attributes and yield of greengram.

References

- Banasode and KK Math. 2018. Effect of foliar feeding of 19:19:19 and potassium nitrate water soluble fertilizers on major nutrient status of soybean in a vertisol. *International Journal of chemical studies*, 6 (3) 2251-2253.
- GanapathySelvam, G., Balamurugan, M., Thinakaran, T and Sivakumar, K. 2013. Developmental changes in the germination, growth and chlorophyllase activity of *Vigna mungo* L. using seaweed extract of *ulva reticulata foresskai*. *International Research Journal of Pharmacy.*, Issn 2230-8407.
- Kuttimani, R and Velayutham, A. 2011. Foliar application of nutrients and growth regulators on yield and economics of greengram. *Madras Agricultural Journal.*, 98 (4-6): 141-143.
- Ministry of agriculture and Co-operation. 2017. *Agricultural statistics at a Glance*. Agricoop.nic.in.
- Pramanick, B., Koushik Brahmachary and Arup Chogh. 2013. Effect of seaweed sap on growth and yield improving of greengram. *African Journal of Agricultural Research.*, 8(13): 1180-1186.
- Rao, P., Reddy, A. S and Koteswara Rao, Y. 2015. Effect of seaweed liquid fertilizers on productivity of *Vigna radiata* (L.) wiliczek. *International Journal of Research in Chemistry and Environment.*, Issn 2248-9649.
- Zodape, S. T., Soumita Mukhopadhyay, Eswaran, K., Reddy, M. P and Chikara,

J. 2010. Enhance yield and nutritional quality in greengram (*Phaseolus radiata* L.) treated with seaweed (*Kappaphycus alvarezii*) extract. *Journal of Scientific*

and Industrial Research., Vol. 69, pp. 468-471.

How to cite this article:

Mohammad Aslam, A.V. Nagavani, D. Subramanyam and Ramana Murthy, B. 2019. Influence of Foliar Nutrients and Biostimulant on Growth, Yield Attributes and Yield of Greengram (*Vigna radiata* L.). *Int.J.Curr.Microbiol.App.Sci.* 8(06): 2540-2545.
doi: <https://doi.org/10.20546/ijcmas.2019.806.305>