



Effect Of Foliar Application Of Nutrients on Growth of Soybean (*Glycine Max (L) Merrill*).

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ABSTRACT

The present Investigation was carried out for the "Effect of foiar application of nutrients on growth of soyabean" The experiment was conducted in randomized block design with three replications. The result of present investigation indicated that the growth of soybean significantly influenced with application of RDF and two spraying of urea (30 and 45DAS) T₆ followed by RDF and two spraying of KNO₃ (30 and 45 DAS) and RDF and two spraying of ZnSo₄ (30 and 45 DAS) over control and single spraying of these nutrients The growth parameters viz plant height no of branches, no of nodules, no of pods, was found to be superior in treatment T₆ as compared to T₈.Yield and quality of soybean significantly improves due to application of RDF along with two spraying of nutrients (T₆) followed by T₈ and T₄ over control.

Keywords: Foliar Application, RDF, Plant Nutrients

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INTRODUCTION

Imbalance and indiscriminate use of fertilizers and emergence of micronutrients deficiencies have been identified as the most important factors for decline in crop productivity. The increasing cost of fertilizer nutrients have led to search for alternative practices of managing the fertilizer nutrients more judiciously, efficiently and in balance proportions. Such approach would reduced the depletion of macro and micronutrients from soil and make agriculture more sustainable [2-4].

Soybean (*Glycine max L. Merill.*) belongs to family leguminaceae. Soybean is also called as gold of America, it plays a decisive role in oil economy of India. It is the cheapest and main source of dietary protein of majority vegetarian. Soybean seed consists of 18-25 per cent oil and 30-50 per cent protein Soybean has been accredited as principle food crop since long time that produces 2-3 times more high quality protein yield per hectare than other pulses and cholesterol free oil. It is preferred especially by vegetarians on account of its richness in protein, fat, carbohydrates, minerals, salts and vitamins (Thiamine and Riboflavin). In Maharashtra, the area under this crop is about 2.6 million hectares with annual production of 27.54 lakh mt with the productivity 10.58 q ha⁻¹. One of the limiting factors for low yield was found to be imbalance and indiscriminate use of fertilizers and emergence of micronutrients deficiencies [6].

The increasing cost of fertilizer nutrients have led to search for alternative practices of managing the fertilizer nutrients more judiciously, efficiently and in balance proportions. Such approach would reduce the depletion of macro and micronutrients from soil. Among the nutrients, macro-nutrients have been given the priority and little attention has been towards micronutrients. In the absence of micronutrients, plant shows physiological disorders which eventually lead to low crop yield and fair quality. Undoubtedly higher yield and quality especially oil yield obtained by micronutrient spraying. Foliar spraying of nutrient is very helpful when the roots cannot provide necessary nutrients.

By using foliar application of fertilizer helps to increase yield of legume crops. During last three years, it was observed that in Marathwada there was continuous dry spell of 15 to 35 days during *kharif* season, which severely affected the growth and yield of soybean. Therefore, for efficient exploitation of high yield potential and oil content of the soybean under semi-arid condition, it is important to work out effect of foliar application of nutrients on yield, quality of soybean.

MATERIAL AND METHODS

The field experiment was conducted on the farm of Department of Soil Science and Agricultural Chemistry, College of Agriculture, Latur, VNMKV Parbhani during *Kharif*2016-2017 on soybean crop. The experimental soil was clayey in texture, calcareous in nature and slightly alkaline in reaction; low in N high in K and medium in P and Zn. The experimental soil was deep black in color with good drainage. As per soil taxonomy this soil attributed as vertichaplustars.

RESULTS AND DISCUSSION

Effect of foliar nutrition on growth parameters of soybean.

The effect of foliar application of nutrients on plant height of soybean at various growth stages were tabulated in table. The data showed that spraying of nutrients two times at 30 and 45 DAS has significant increase in plant height as compared to single spraying at 30 DAS. Plant height was maximum in T₆ (40.76cm, 45.93cm, 46.34cm) followed by T₈ (36.84cm , 43.27cm ,44.27cm) at all growth stages. The significant increase in plant height was observed due to spraying of zinc sulphate two times T₄ (34.23cm,40.61cm, 43.21cm) over control (27.91cm, 33.11cm, 34.25cm) plant height of soybean was increased (T₁) gradually with advancement of growth of plants up to 75 DAS and there after slight increase in height at harvest

Table 1: Effect of foliar application of nutrients on plant height (cm) of Soybean at different stages.

Treatment	Days after sowing		
	45	75	AH
T ₁	27.91	33.11	34.25
T ₂	32.03	39.37	40.54
T ₃	21.29	40.17	41.07
T ₄	34.23	40.61	43.21
T ₅	35.52	41.26	44.46
T ₆	40.76	45.93	46.34
T ₇	33.80	40.18	40.48
T ₈	36.84	43.27	44.27
S.E. ±	1.77	2.22	1.74
C.D.at 5 %	5.37	6.70	5.27

Table 2: Effect of foliar application of nutrients on number of branches plant¹of soybean at different growth stages.

Treatment	Days after sowing		
	Flowering	Pod filling	At harvest
T ₁	3.20	5.47	5.72
T ₂	4.07	7.10	7.32
T ₃	4.12	8.12	8.24
T ₄	4.73	8.73	8.86
T ₅	5.24	9.20	9.43
T ₆	5.85	10.09	10.15
T ₇	4.67	8.67	8.90
T ₈	5.37	9.87	9.93
S.E. ±	0.35	0.62	0.59
C.D. at 5%	1.06	1.33	1.26

Table 3 : Effect of foliar application of nutrients on number of nodules plant¹of soybean at different stages.

Treatment	Days after sowing	
	45	75
T ₁	47.31	42.79
T ₂	52.57	49.66
T ₃	54.82	56.10
T ₄	55.76	57.05
T ₅	57.17	58.64
T ₆	58.76	60.85
T ₇	55.40	56.69
T ₈	58.01	59.64
S.E. ±	2.14	1.97
C.D.at 5 %	6.46	5.94

Table 4 : Effect of foliar application of nutrients number of pods plant¹ of Soybean at different stages.

Treatment	Days after sowing		
	75	90	At harvest
T ₁	15.80	19.00	20.33
T ₂	20.87	22.93	23.83
T ₃	18.67	24.50	25.23
T ₄	20.80	23.65	25.67
T ₅	24.47	26.72	27.40
T ₆	24.94	27.42	28.11
T ₇	22.17	24.13	26.20
T ₈	24.03	27.40	27.93
S.E. ±	1.26	1.31	1.29
C.D.at 5 %	3.81	3.97	3.89

RESULTS AND DISCUSSION

The effect of foliar application of nutrients on plant height of soybean at various growth stages were tabulated in table 6 The data showed that spraying of nutrients two times at 30 and 45 DAS has significant increase in plant height as compared to single spraying at 30 DAS. Plant height was maximum in T₆ (40.76cm, 45.93cm, 46.34cm) followed by T₈ (36.84cm , 43.27cm ,44.27cm) at all growth stages. The significant increase in plant height was observed due to spraying of zinc sulphate two times T₄ (34.23cm ,40.61cm, 43.21cm) over control (27.91cm, 33.11cm, 34.25cm) plant height of soybean was increased (T₁) gradually with advancement of growth of plants up to 75 DAS and there after slight increase in height at harvest

The increase in plant height due to spraying of nutrients increases plant height this could be attributed due to involvement of nutrients in plant cell, cell wall, and translocation of plant nutrients to growing plant and thereby increase in photosynthetic efficiency by delaying the leaf senescence.

The response of urea @ 0.2 % (T₆) was found to be superior as compared to KNO₃ @ 0.1 % (T₈) and ZnSo₄ 0.5 per cent (T₄) in increase in plant height

Ganga *et al.*, [5] revealed combined spray of 2 per cent urea and 0.25 per cent multiplex increased plant height.

The effect of foliar application of nutrients on number of branches of soybean at various growth stages were presented in table 7 The data showed that spraying of nutrients two times at 30 and 45 DAS has significant increase in number of branches as compared to single spraying at 30 DAS.

The number of branches were maximum in T₆ (5.85,10.09,10.15) followed by T₈ (5.37 ,9.87 ,9.93) at 45 ,75, DAS and at harvest of soybean crop. The significant increase in number of branches was observed due to spraying of zinc sulphate two times T₄ (4.73,8.73,8.86) over control (3.20, 5.47, 5.72) number of branches of soybean was increased (T₁) gradually with advancement of growth of plants up to 75 DAS and there after slight increase in no of branches at harvest. The response of urea @ 0.2 per cent was found to be superior as compared to KNO₃ @ 0.1 per cent and ZnSo₄ 0.5 per cent in increase in number of branches.

The increase in number of branches due to urea spray helps in sustaining greenness of leaves for longer period, which help in improving productivity due to better photosynthesis. Foliar urea spray also improves storage of N compounds like amino acids and protein in plants. Thus directly affects N metabolism under stress condition. The marked superiority in growth parameters like branches observed due to potassium which enhances plant vigor and strengthens the stalk, further it has synergistic effect with nitrogen and phosphorus resulted in better plant growth and more number of branches per plant. The similar results were obtained by Hiwale [7] he reported that the application of two foliar sprays of KNO₃ and @ 1.0 per cent at 45 and 60 DAS improved growth parameter like number of branches plant¹. Goud *et al.*, (2014) studied the response of chickpea to potassium fertilization and recorded higher number of branches due to application of RDF 2 per cent KNO₃ at flowering and 15 days there after. Reddy *et al.*, [8] studied the effect of Potassium nitrate @ 1 per cent and NAA 100 ppm on red gram and found the significant increase in growth of number of branches plant¹ in red gram

The effect of foliar application of nutrients on number of nodules of soybean at various growth stages were reported in table 8 and Fig.1 the data showed that spraying of nutrients two times at 30 and 45 DAS has significant increase in number of nodules as compared to single spraying at 30 DAS. Number of nodules was maximum in T₆ (58.76, 60.85) followed by T₈ (58.01, 59.64) at all growth stages.

The significant increase in T₆ (58.76, 60.85) number of nodules was observed due to spraying of zinc sulphate two times T₄ (55.76, 57.05) over control (47.31, 42.79) number of nodules of soybean was increased (T₁) gradually with advancement of growth of plants up to 75 DAS and there after slight increase in number of nodules at harvest

The increase in number of nodules due to spraying of nutrients might be due to nodulation activity in leguminous plant refers to number of root nodules per plant. It has pronounced influence on growth and development of leguminous plant. Development of root nodule is mainly dependent on phosphorus availability and enhance the function of root nodule forming bacteria Application of phosphorus through RDF fastened the absorption of phosphorus source fastened the absorption phosphorus through RDF and induces root nodule formation and rhizobial activity. Nitrogen requirement in legumes during reproductive stage is far higher which was met from foliar application of urea in our study resulting in higher nodule number Similar results reported by Hiwale [7] application of two foliar sprays of KNO₃ @ 1.0 per cent at 45 and 60 DAS improved growth parameter like number of nodules plant⁻¹. Aggarwal *et al.*, (2015) indicated that application of 2 per cent urea spray at vegetative + flower initiation stage increased the highest number of nodules plant⁻¹.

The effect of foliar application of nutrients on number of pods at various growth stages were reported in table 9 The data showed that spraying of nutrients two times at 30 and 45 DAS has significant increased the number of pods as compared to single spraying at 30 DAS. No of pods was maximum in T₆ (24.94, 27.42, 28.11) over T₁ and T₂ however at par with T₁ and T₈ followed by T₈ (24.03, 27.40, 27.93)

The significant increase in number of pods was observed due to spraying of zinc sulphate two times T₄ (20.80, 23.65, 25.67) over control (15.80, 19.00, 20.33).

The increase in number of pods due to spraying of nutrients could be attributed to significant effect of microelements on reproductive organs such as stamens and pollens. Stamens activity enhances the number of flowers that can fertile well and as a result, larger number of pods per plant produced.

Similar results were observed by Aggarwal *et al.*, [1] indicated that application of 2 per cent urea spray at vegetative + flower initiation stage increased highest, number of Pods plant⁻¹. Ganga *et al.*, [5] revealed combined spray of 2 per cent urea and 0.25 per cent multiplex increased number of pod plant⁻¹.

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