Journal of Pharmacognosy and Phytochemistry

Available online at www.phytojournal.com

E-ISSN: 2278-4136
P-ISSN: 2349-8234
JPP 2018; 7(4): 1402-1404
Received: 07-05-2018
Accepted: 10-06-2018

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The effect of micronutrients applied as foliar spray, on yield & yield attributes and oil content of sesame crop (*Sesamum indicum* L.)

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Abstract
A field experiment was conducted during *kharif* season 2017 at field experiment, Department of Agronomy, Bhagwant University to study the effect of micronutrients applied as foliar spray, on yield & yield attributes and oil content of sesame crop. The field experiments were laid out in a Randomized Block Design. All treatments recorded significantly yield parameters and oil content over control. However, T_9 (mixture of all above micronutrient) recorded significantly yield and oil content than the other treatments. Similarly yield and oil content components were significantly higher in T_9 (mixture of all above micronutrient) where as control recorded significantly lower yield parameters and oil content.

Keywords: sesame, foliar spray, oil and yield

Introduction
Sesame (*Sesamum indicum* L.) is a flowering plant in the genus *Sesamum*. Numerous wild relatives occur in Africa and a smaller number in India. It is widely grown in tropical regions around the world and is cultivated for its edible seeds, which grow in pods. Sesame is one of the important oilseed crops in Indian agriculture.

Sesame seeds are rich source of food, nutrition, edible oil and bio-medicine. Sesame oil has excellent nutritional, medicinal, cosmetic and cooking qualities for which it is known as 'the queen of oilseeds'. Due to the presence of potent antioxidants, sesame seeds are called as 'the seeds of immortality'. Sesame cake or meal obtained as a byproduct of the oil milling industry is rich in protein, vitamin (Niacin) and minerals.

The crop is grown for its seeds, which contain 50-60% oil, 8% protein, 5.8% water, 3.2% crude fiber, 18% carbohydrate, 5.7% ash and it is very rich in minerals such as Ca, P and vitamin E. Also, sesame oil has a very high level of unsaturated fatty acids, which is assumed to have reducing effect on plasma cholesterol, as well as on coronary heart disease.

The role of different micronutrients has been well established in plant metabolism. Zn, as micronutrients, is involved in the biosynthesis of auxins, indole -3-acetic acid. It participates in the metabolism of plant as an activator of several enzymes. Boron is involved in the carbohydrate transport within the plant which helps in translocation of sugar and DNA synthesis in meristems. Also it has been implicated in cellular differentiation and development, nitrogen metabolism, fertilization, active salt absorption, hormone metabolism, water relations, fat metabolism, phosphorus metabolism and photosynthesis. Molybdenum has long been implicated in gaseous nitrogen fixation and nitrate assimilation. Zinc (Zn) and manganese (Mn) are important micronutrients in sesame production. Reduced growth hormone production in Zn deficient plants causes shortening of internodes and short leaves resulting in malformation of fruit with little or no yield. Mn is essential to photosynthesis reactions, enzyme activation and root growth. Therefore, the steady supply of macro nutrients and Zn was found to increase stem height and nodes for capsule development in sesame. Major micronutrients like nitrogen, phosphorus and potassium along with micronutrients such as zinc and manganese are influencing the growth and yield of sesame.

Materials and Methods
The present investigation entitled "the effect of micronutrients applied as foliar spray, on yield & yield attributes and oil content of sesame crop" was conducted during *kharif* season of 2017 at the Agricultural Research Farm, Bhagwant University, Ajmer Rajasthan. The are materials used, experimental procedure followed and techniques adopted during the course of investigation are described in this chapter. The experiment consisted of 10 treatments involving one control (without foliar spray).

Geographically, experimental site falls under the agro-climatic zone III A (semi-arid eastern plain zone) and located on 250 10' N latitude 820 37' E longitudes and at an altitude of 427 meters above mean sea level. The experimental of site was uniform in topography and well-drained. The experiment was laid out in randomized block design with ten treatments replicated thrice. Sesame seeds of the variety Prachi used as planting materials were procured from oil seed project of Orissa University of Agriculture and Technology, Bhubaneswar.

The experiment consisted of 10 treatments involving one control. The details of the treatments are given below.

T_1:	Controlled (RDF N P K 30:20:20 kg/ha)
T_2:	Foliar spray of Boron @ 100ppm ($Na_2B_4O_7 \cdot 10H_2O$)
T_3:	Foliar spray of Zinc @ 100ppm as ($ZnSo_4$)
T_4:	Foliar spray of Mo @ 50ppm as ($NH_4Mo_7O_{24}. 4H_2O$)
T_5:	Foliar spray of Cu @ 100ppm as ($CuSO_4. 5H_2O$)
T_6:	Foliar spray of Fe @ 100ppm as ($FeSO_4. 7H_2O$)
T_7:	Foliar spray of Mn @ 100ppm as ($MnSO_4. H_2O$)
T_8:	Foliar spray of Co @ 50ppm as ($Co(NO_3)_2$)
T_9:	Mixture of all above micronutrient
T10:	Foliar spray of Commercial micronutrient mixture (5 ml/ 2lt H_2O)

Table 1: Effect of different micronutrients on seed yield and its components.

Treatments	No. of capsule/plant	Shelling (%)	No. of seeds /capsule	1000 seed weight(g)	Seed yield /plant(g)	Yield kg/ha.	HI (%)	Oil (%)
T_1	25.1	31.85	45.8	2.62	3.01	662.6	28.84	43.2
T_2	35.2	42.80	52	3.21	5.87	1292.6	29.03	48.6
T_3	33	46.43	51.6	3.19	5.43	1195.0	25.26	49.3
T_4	31.9	37.97	50.2	3.18	5.09	1120.3	30.09	47.4
T5	26.2	33.13	47.8	3.15	3.94	867.8	32.25	44.6
T_6	26.4	38.67	48.6	3.15	4.04	889.1	30.73	45.1
T_7	28.0	42.00	49.9	3.17	4.42	974.4	28.21	45.3
T8	26.7	42.22	49.2	3.14	4.12	907.4	27.57	44.9
T_9	35.8	52.16	55.6	3.22	6.40	1410.0	24.75	50.2
T10	29.1	39.03	50	3.18	4.62	1017.9	28.54	46.5
SE(m)+	0.533	2.254	0.876	0.182	0.274	60.377	1.576	0.837
C.D(0.5)	1.58	6.69	2.60	NS	0.81	179.36	NS	2.48

Results and Discussions

The experiment was laid out in a Randomized Block Design with ten treatments and replicated thrice. The treatments were T_1: control (no spray of micronutrients), T_2: B (100ppm), T_3: Zn (100ppm), T_4: Mo (50ppm), T_5: Cu (100ppm), T_6: Fe (100ppm), T_7: Mn (100ppm), T_8: Co (50ppm), T_9: (combination of above micronutrients) and T_{10}: commercial mixture of micronutrients. Observations were recorded on yield & yield attributes and oil content of sesame.

Number of capsules per plant differed significantly among the treatments. It varied from a minimum of 25.1 to maximum 35.8 capsules per plant among the treatments. Foliar application of all the micronutrients significantly increased the number of capsules per plant over control except Cu (T_5) and Fe (T_6) whereas highest number of capsules was found in (T_9) followed by B(T_2), Zn(T_3) and Mo(T_4).

Shelling percent varied among the treatments. The highest shelling percent (52.16%) was recorded in T_9 and the lowest (31.85%) in T_1 among the treatments. Foliar application of all the micronutrients showed significant increase in shelling percent over control except Mo (T_4) and Cu (T_5).

Number of seeds per capsule varied among the treatments and ranged a minimum of 45.8 to a maximum of 55.6. Foliar application of all the micronutrients alone or in combination as well as their commercial mixture significantly increased the number of seeds per capsule over control except application of Cu (T_5). Among all the treatments the highest seeds per capsule was obtained in (T_9) followed by B (T_2), Zn (T_3) and Mo (T_4).

Variation in seed size was noticed among the treatments. The highest thousand seed weight (3.22g) and the lowest (2.62g) were recorded in T_9 and T_1 respectively. However no significant difference was observed among the rest treatments with respect to thousand seed weight.

Seed yield per plant varied among the treatments. Foliar application of micronutrients significantly increased seed yield per plant over control. The highest seed yield (6.40g/plant) was recorded in T_9 followed by T_2 (5.87g), T_3 (5.43g), T_4 (5.09g) per plant.

Seed yield per hectare showed similar trend as it was found in seed yield per plant. The highest seed yield 1410 kg per hectare was obtained by combined micronutrients (T_9) which registered 112% higher yield followed by 95% for B (T_2), 80% for Zn (T_3) and 69% for Mo (T_4) over control (T_1).

Harvest index varied in the range between 32.25 and 24.75 but no significant variation was found among the treatments.

Variation in oil content was observed among the treatments. Foliar application of micronutrients in combination (T_9) registered the highest oil content (50.2%) followed by Zn (49.3%), B (48.6%), Mo (47.4%) and commercial mixture (46.5%) which were significantly higher over control. However no significant difference in oil content was observed in rest of the treatments.

References

1. Singaravel R, Imayavaramban V, Thanunathan K, Shanmughapriya V. Effect of micronutrients on yield and nutrient uptake of sesame (*Sesamum indicum* L.) in a Vertisol soil, Sesame and safflower Newsletter. 2002; 17:46-48.
2. Balakrishnan V. Effect of micronutrients on flower yield and xanthophylls content of African marigold (*Tagetus erecta* L.) M. Sc., Thesis submitted to Tamil Nadu Agricultural University, Coimbatore, 2005.

3. Berglund DR. Soybean Production Field Guide for North Dakota and Northwestern Minnesota. Published in cooperative and with support from the North Dakota Soybean Council, 2002.
4. Buzetti S, Muraoka T, SA ME. Boron rates in soybean under different soil acidity conditions. Dry matter and grain yields and critical level in soil. Revista Brasileira de Ciencia do Sob. 1990; 14(2):157-161.
5. Devarajan R, Palaniappan SP. Zinc and molybdenuim on yield and nutrition of soybean. The Madras Agricultural Journal. 1995; 82(3):188-189.
6. Hatwar GP, Gondane SU, Urkude SM, Gahukar OV. Effect of micronutrients on growth and yield of chilli, Soils and Crops. 2003; 13:123-125.
7. Hu YS, Ma YH, Sun YL, Guo G. Effect of B application on the agronomic traits, yields and oil contents of a double-row rape (*Brassica napus* L.) cultivar, Oil Crops (China), 1994; 16:43-46.
8. Kaya C, Higgs D. Response of tomato (*Lycopersicon esculentum* L.) cultivars to foliar application of zinc when grown in sand culture at low zinc. Scientia Horticulturae. 2002; 93:53-64.
9. Kohnaward P, Jalilian J, Pirzad A. Effect of foliar application of micronutrients on yield and yield components of safflower under conventional and ecological cropping systems. International Research Journal of Applied and Basic Sciences. 2012; 3(7):1460-1469.
10. Mousa MA, EAE, Zedan ZS. Effect of nitrogen fertilizers and some micro nutrient on flax yield and chemical composition characters. Journal of Plant Production Mansura University. 2010, 2090-3677.
11. Narimani H, Rahimi MM, Ahmadikhah A, Vaezi B. Study on the effects of foliar spray of micronutrient on yield and yield components of durum wheat. Archieves of Applied Science Research. 2010; 2(6):168-176.
12. Oyinlola EY. Effect of boron fertilizer on yield and oil content of three sunflower cultivars in the Nigerian savanna. Journal of Agronomy. 2007; 6:421-426.
13. Potarzycki J, Grzebisz W. Effect of zinc foliar application on grain yield of maize and its yielding components. Plant Soil Environment. 2009; 55(12):519-527.
14. Ramamoorthy K, Sudarsan S. Supply of zinc and boron on yield and seed quality in groundnut. Annals of Plant Physiology. 1992; 6:33-38.
15. Renukadevi A, Savithri P. Sunflower (Helianthus annuus L.) oil yield and quality as influenced by boron application. Madras Agricultural Journal. 2003; 91:74-76.
16. Salwa AI, Mohsen E, Abass M, Behary SS. Amelioration productivity of sandy soil by using amino acids, sulphur and micronutrients for sesame production. Journal of American Science. 2010; 6(11):250-257.
17. Tiwari RK, Namdeo KN, Girish JA, Jha G. Effect of nitrogen and sulphur on growth, yield and quality of sesame (*Sesamum indicum* L.) varieties. Research on Crops. 2000; 1:163-7.