

Research Paper :

Effect of sulphur, zinc and iron on growth, yield and nutrient uptake by safflower

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ABSTRACT

A field experiment was carried out to study the effect of sulphur, zinc and iron nutrition on growth, yield and nutrient uptake by safflower on Vertisol at the Main Agricultural Research Station, University of Agricultural Sciences, Dharwad, during *Rabi* season 2002-03. The results indicated that application of 30 kg S per ha showed superior growth parameters like plant height, number of leaves per plant, number of branches per plant and dry matter per plant, yield components like number of capsules, seed weight per head, 1000-seed weight and nutrient uptake of N, P, K, S, Zn and Fe as compared to other treatments. Combinations of sulphur along with micronutrients had significant influence on the growth, yield and nutrient uptake by safflower. The treatment receiving 30 kg S per ha + Fe + Zn foliar recorded the highest growth, yield and nutrient uptake as compared to 30 kg S per ha, 20 kg S per ha + Fe, Zn foliar, 10 kg S per ha + Fe + Zn foliar spray and control.

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Safflower (*Carthamus tinctorius* L.) is an important oilseed crop of the world. In India, it is grown in winter season in the *Deccan Rabi* zone. It contains about 36 per cent of oil, which accounted for about 8 per cent of the value of total agriculture produce. It contains 72 per cent linolenic acid, the factor which reduces blood cholesterol. Moreover, due to high content of unsaturated fatty acids and it is an excellent drying oil for use in paints and varnishes. Recently, scant attention was paid to the importance of secondary and micronutrients in plant nutrition. The deficiency of secondary and micronutrients is wide spread in many parts of the country due to cultivation of high yielding varieties, intensive agriculture and increasing use of sulphur free fertilizer in large quantities with concomitant decrease in use of organic manures, which necessitate rational application of these elements as they have becoming limiting factor for obtaining higher yields of several crops.

MATERIALS AND METHODS

The field experiment was conducted on safflower var. Annigeri-I, under irrigated conditions during *Rabi* season 2002-03 in Vertisol of Main Agricultural Research Station, University of Agricultural Sciences, Dharwad (Karnataka). The soil of the experimental field was neutral (soil pH 7.35) with low organic carbon (0.45%). The available N, P, K, S, Zn and Fe contents of the soil were 332, 11.90, 297.60, 10.95 kg per ha, 0.63 (ppm) and 4.45 (ppm), respectively. The treatments consisting of levels of sulphur (0, 10, 20 and 30 kg/ha) and their micronutrient combination, where sulphur applied in the form of ammonium sulphate, zinc and iron were foliar spray taken

at 30 and 65 DAS in the form of zinc chloride and ferric chloride, respectively. The experiment was laid out in a randomized block design having thirteen treatments and replicated thrice. Calculated quantity of N was applied in the form of urea, P in the form of diammonium phosphate and K in the form of muriate of potash. A uniform of basal dose of N and P₂O₅ @ 75 kg per ha each and 40 kg per ha K₂O was applied. The seeds were sown at the rate of 8 kg per ha with a spacing of 60 x 30 cm.

RESULTS AND DISCUSSION

The results obtained from the present investigation as well as relevant discussion have been presented under following heads :

Growth and yield attributes:

The data presented in Table 1 showed that levels of sulphur and their micronutrient combinations had significant influence on plant height, number of leaves per plant, number of branches and dry matter production of the safflower.

Among the sulphur levels, application of 30 kg S per ha registered the highest plant height, number of leaves, dry matter production. It was significantly superior over 20 kg S per ha, 10 kg S per ha and control. The treatment receiving 30 kg S per ha might have helped in vigorous root growth, formation of chlorophyll, resulting in higher photosynthesis. The research of this investigation are in consonance with the findings of Reddappa Reddy (1981). Similar results were reported by Sreemannarayana and Raju (1993). Stimulated photosynthetic activity and synthesis of chloroplast and protein which might have