

Determination of critical level of sulphur for soybean in inceptisol and effect of its graded levels on nutrient uptake

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ABSTRACT

A pot culture experiment was conducted to determine the critical level of available sulphur. The result obtained indicated that the plant height was significantly increased by sulphur application upto 30 mg kg⁻¹ sulphur over control. The average dry matter yield varied from 4.47 to 5.92 g plant⁻¹. There was significant increase in dry matter yield by application of sulphur upto 45 mg kg⁻¹ soil. The nitrogen uptake values ranged from 96.2 to 165.9 mg plant⁻¹ and were significantly increased due to application of sulphur up to 60 mg kg⁻¹ in all soils. The response was maximum in case of soils having low available sulphur, followed by soils having high available sulphur and medium available sulphur. The mean P uptake value varied from 19.97 to 32.79 mg plant⁻¹ that indicated the significant response to sulphur upto 45 mg kg⁻¹ in soils containing low available sulphur and 60 mg kg⁻¹ in soils containing low and medium available sulphur and upto 30 mg kg⁻¹ in soils containing high available sulphur. The K uptake was significantly increased by sulphur application upto 60 mg kg⁻¹ in all soils. The mean K uptake value ranged between 59.84 to 138.31 mg plant⁻¹. The mean value of sulphur concentration in the soybean plants varied from 0.227 to 0.423 per cent. There was significant increase in the concentration of sulphur in soybean plants due to application of sulphur over control. There was significant increase in sulphur uptake by soybean due to sulphur application upto 60 mg kg⁻¹. The mean value of sulphur varied from 6.21 to 16.15 mg plant⁻¹. The result indicated good response of soybean plants to sulphur application particularly in case of soil with low and medium sulphur content. The critical concentration of sulphur in plant for Inceptisol was found to be 0.23 per cent and the critical level of sulphur in Inceptisol soil for soybean plant was found to be 13.33 mg kg⁻¹.

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Soybean (*Glycine max* L. merril), often designated as 'Golden Bean', is an important pulse as well as oilseed crop of the world. It is a legume crop belonging to family Leguminaceae and sub-family papillionaceae. Being a legume plant, soybean has ability to fix atmospheric nitrogen with the help of root nodule bacteria and to add organic matter in the soil, thereby increasing the productivity of soil.

Among the oil seed crops, soybean has occupied fourth place in the edible oil scenario of India, next to groundnut, rapeseed and mustard. Its production in India is 7.6 million tonnes (Anonymous, 2004). In Maharashtra State, it is grown on an area of about 11.05 lakh hectare with annual production of about 13.85 lakh tonnes (Anonymous, 2002). The data indicate that per ha yield of soybean are much less in India (1090 kg ha⁻¹) and Maharashtra state (1227 kg ha⁻¹) as compared to other countries like Brazil (2032 kg ha⁻¹) and USA (2441 kg ha⁻¹). The low yield of soybean in India (including

Maharashtra) may be attributed to the growing soybean under rainfed condition, lack of irrigation facilities, unscientific nutrient management, poor cultivation practices, use of local varieties, lack of technical know-how etc.

Application of major nutrients viz., N, P and K has been known to increase the yield of *kharif* soybean. The nutrient requirement of a crop is determined from the growth response curve which indicates the critical deficiency, critical toxicity and optimum range for that nutrient. The critical level is determined quantitatively from the plant and soil analysis after conducting the pot culture experiment. The critical levels of N, P, K have been worked out for several crops. However, information on the critical level of S in general and for soybean in particular grown in soils of Maharashtra State is limited. In view of the above, the present investigation was planned and carried out to estimate plant critical level of sulphur for soybean and to find out the soil critical level of available sulphur in Inceptisol for soybean.

MATERIALS AND METHODS

A pot culture experiment was conducted at the