

## Influence of sulphur and magnesium on growth and yield of sunflower (*Helianthus annuus*)

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### ABSTRACT

The trials were conducted during summer and rainy seasons (*kharif*) of 1993 to study the influence of sulphur and magnesium fertilization on the yield attributes and seed yield of 'Morden' sunflower (*Helianthus annuus* L.). Application of sulphur and magnesium increased the plant growth. Summer crop established early having the higher shoot length followed by *kharif* one. Combined application of sulphur at 45 kg/ha and magnesium at 45 kg/ha reduced the days to 50% flowering in both the seasons by about 3 days, increased the number of filled seeds/head, disk weight, 100-seed weight and kernel : husk ratio significantly. The seed yield was also increased by 6.2 and 14.9% during summer and *kharif* seasons respectively.

Efforts are being taken by the Oilseed Technological Mission to increase the productivity of oilseeds through optimum nutrient management. Besides NPK, sulphur is indispensable for the synthesis of essential oils and further it plays a vital role in chlorophyll formation. An information on the requirement of sulphur for sunflower (*Helianthus annuus* L.) seed is meagre. Magnesium, a constituent of chlorophyll, increases NPK uptake and the yield of sunflower (Kene *et al.*, 1990) Hence the present investigation was carried out to study the effect of graded levels of sulphur and magnesium on growth and yield attributes of sunflower in an Alfisol.

### MATERIALS AND METHODS

A field experiment was conducted at Bhavanisagar during summer and rainy sea-

sons (*kharif*) 1993 in Irugur soils which was (Inceptisols), medium in available nitrogen (193 kg/ha) and phosphorus (14.2 kg/ha) and high in available potassium (295 kg/ha). The available magnesium (0.015%) and sulphur (0.018%) were medium.

Sixteen treatment combinations included 4 levels of magnesium (0, 15, 30 and 45 kg/ha) and 4 of sulphur (0, 15, 30 and 45 kg/ha) and replicated thrice, in factorial randomized block design.

Recommended doses of NPK were applied as urea diammonium phosphate and muriate of potash. Seeds of 'Morden' sunflower were sown at a spacing 45 cm x 30 cm.

### RESULTS AND DISCUSSION

In sulphur- and magnesium-applied plots significantly higher plant growth was ob-

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served in summer and *kharif* as well. There was no significant variation among the doses. Number of days to 50% flowering was significantly reduced by sulphur application in both the seasons (Table 1), while reduction due to magnesium supply was significant only in summer. Similar seasonal variation was observed by Singh (1975). Both in summer and *kharif*, sulphur application significantly increased the filled number of seeds/head and 100-seed weight, the highest being at the S<sub>3</sub> level. Similar results were reported by Dubey *et al.* (1993). Magnesium application did not influence

both the parameters.

The disk weight was significantly increased by sulphur application in both the seasons. Treatment S<sub>3</sub> (45 kg S/ha) recorded the highest value, being significantly higher than all other treatments. The head diameter was also significantly increased by S application, while the variation due to doses was not significant.

Increase in leaf area was significant only under S<sub>3</sub> and Mg<sub>3</sub> (45 kg Mg/ha) treatments in both the seasons. The response to S and Mg application might be due to more synthesis of chlorophyll by Mg and S applica-

Table 1. Influence of sulphur and magnesium on growth and yield attributes of sunflower

Particular	S (kg/ha)					Mg (kg/ha)				
	0	15	30	45	CD (P = 0.05)	0	15	30	45	CD (P = 0.05)
<i>Summer season</i>										
Plant height (cm)	86.6	88.5	88.6	89.1	2.78	87.5	87.1	88.0	91.6	2.78
Days to 50% flowering	58.8	58.3	57.6	57.1	0.17	58.1	58.0	57.9	57.8	0.17
Head diameter (cm)*	16.6	16.8	17.1	17.1	0.29	16.8	16.9	16.9	16.9	NS
Disk weight (g)	61.6	61.8	62.6	63.0	0.33	62.1	62.0	62.2	62.4	NS
100-seed weight (g)	4.61	4.63	4.66	4.68	0.03	4.65	4.65	0.64	4.63	NS
Kernel : husk ratio	2.11	2.14	2.24	3.28	0.02	2.18	2.19	2.20	2.19	NS
Leaf area (cm <sup>2</sup> )	2,322	2,349	2,367	2,402	55	2,326	2,364	2,359	2,392	55
Filled seeds/head	804	808	813	822	3.3	810	812	811	813	NS
Seed yield (kg/ha)	2,149	2,168	2,201	2,257	60	2,191	2,187	2,219	2,161	60
<i>Rainy season</i>										
Plant height (cm)	94.4	95.8	96.6	99.0	3.30	93.8	96.2	96.6	99.2	3.20
Days to 50% flowering	56.8	56.3	56.1	55.9	0.11	56.3	56.3	56.2	56.2	NS
Head diameter (cm)	14.6	14.8	15.0	15.1	0.15	14.8	14.9	14.9	14.9	NS
Disk weight (g)	60.2	60.9	61.6	62.0	0.34	61.2	61.2	61.2	61.3	NS
100-seed weight (g)	4.58	4.61	4.63	4.65	0.03	4.61	4.61	0.62	4.63	NS
kernel : husk ratio	2.11	2.15	2.23	2.28	0.02	2.18	2.19	2.20	2.19	NS
Leaf area (cm <sup>2</sup> )	2,281	2,302	2,329	2,378	48	2,280	2,315	2,315	2,378	48
Filled seeds/head	786	793	807	815	2.8	799	799	800	801	NS
Seed yield (kg/ha)	1,583	1,806	2,111	2,319	211	1,861	1,945	1,972	2,042	NS

tion (Chatterjee *et al.*, 1985).

Kernel : husk ratio increased significantly with increasing level of sulphur application, the highest being under S<sub>3</sub> treatment. This corroborates the findings of Mandal and Singh (1993). Magnesium application did not show significant increase in both the seasons.

The seed yield increase at S<sub>3</sub> (45 kg S/ha) was the highest in summer and *kharif*. In summer seed yield from S<sub>3</sub> treatment was on par with S<sub>2</sub> (30 kg S/ha), while in *kharif* S<sub>3</sub> yield was significantly higher than rest of the treatments. This is attributed to increased seed set, head diameter and 100-seed weight. The effect of magnesium fertilization on seed yield was not significant

in both the seasons.

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