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Evaluation of Different Sulphur Sources on Sunflower (Helianthus Annuus L.)

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Abstract: *Sunflower is an important edible oilseed crop of the country and its oil is consider as premium because of its high poly unsaturated fatty acid content with high level of lenoleic acid and absence of linolenic acid . A field trial was conducted at the Agricultural Research Station, Junagadh Agricultural University, Amreli to study the "Evaluation of different sulphur sources on sunflower".The experimental was laidout inRandomized Block Design with four replications. There were 9 treatments comprising. The analysis of three year pooled data revealed that the treatment T_8 40 kg sulphur/ ha through gypsum (266kg/ha) in soil addition with recommended dose of chemical fertilizer get higher oil content and higher yield of sunflower with higher BCR value.*

Keywords: *Sunflower, Sulphur, Gypsum*

I. Introduction:

Sunflower is a potential remunerative oil seed crop of the world due to its desirableattributes such as early maturity, adaptability to a wide range of climate and soil, photo-thermoinsensitiveness, drought tolerance and responsiveness to better productionmanagement practices Sunflower is an important edible oilseed crop of the country and its oil is consider as premium because of its high poly unsaturated fatty acid content with high level of linoleic acid and absence of linolenic acid. Besides nitrogen and phosphorus, sulphur also play an important role for enhancing the seed and oil yield of sunflower. The requirement of sulphur and cheap source of sulphur for higher seed and oil yield.

Apart from climatic conditions, nutrients available for growth and development may influence the overall plant structure and yield. Sulphur is the fourth major nutrient in crop production. Most of the crops require as much sulphur as phosphorus. Sulphur is the component of the aminoacids, cystin, cystein and methionine, needed for chlorophyll (Marschner, 1995). Sulphur also plays animportant role in the chemical composition of seeds. Itincreases the percentage of oil (Saron&Giri, 1990). Poonia(2000) recorded significant increase in dry matter, plantheight, head diameter, number and weight of seeds, testweight, seed and biological yields of sunflower whensulphur was applied at 25 kg S ha-1. The increase in seedyield was observed up to 50 kg S ha-1. Similarly, Wani et al.(2001) observed significant increase in seed yield andprotein content of sunflower with the increase in sulphurlevel. Sulphur takes time to become available to plants, thusaffects the succeeding crop. Babu and Hegde (2002) studiedthe residual response of sulphur on rice-sunflower andsunflower-groundnut cropping systems. The residual effecton succeeding sunflower crop resulted in 37% increase inseed yield and 45% increase in oil yield.Though sunflower is a temperate zone crop, it canperform well under various climatic and soil conditions. Thewider adaptability of the crop and wide range of climatic condition.

II. Material And Methods:

The experiment was conducted at Agricultural Research Station, Junagadh Agricultural University, Amreli. The soil of the experiment site was medium black. The experiment was laid out in randomized block design with 9 treatments 1) Control, 2) 20 kg sulphur/ha through Ammonium sulphate, 3) 20kg sulphur/ha through single super phosphate, 4) 20 kg sulphur/ha through gypsum, 5) 20 kg sulphur/ha through elemental sulphur, 6) 40 kg sulphur/ha through Ammonium sulphate, 7) 40 kg sulphur/ha through single super phosphate 8) 40 kg sulphur/ha through gypsum 9) 40 kg sulphur/ha through elemental sulphur and with four replication. The plot size was 4.2 X 5.00 m. Well decomposed farm yard manure was applied uniformly at the rate of 10 tons per hectare at time of land preparation. Recommended doze of fertilizer applied uniformly. All other agronomic practices followed uniformly. Data on days to 50 % flowering, plant height, head diameter, plant stand, yield per plant in gram, 100 seed weight, 100 ml wt. in gram seed filling oil per cent and plant height were recorded. Yield was also computed on the basis hectare. The data were analyzed statistically. Economics was also worked out in terms of gross and net realization on the basis of the prevailing market rate.

Table:1 Physico- chemical properties of soil soil up to 15 cm depth

Physical properties		Chemical properties	
Sand	30.51%	pH	7.78
Silt	22.41 %	EC mmhos/cm	0.24
Clay	47.08 %	Available Nitrogen	180.00 kg/ha
		Available Phosphorus	20.50 kg/ha
		Available Potash	388.50 kg/ha

III. Results And Discussion

Effect of sulfur on seed yield

The seed yield data presented in Table :-2, Pooled analysis of three years results indicated that the response of various sulphur treatments on seed yield of sunflower found significat during 2006, 2007 and 2008. During kharif 2006, treatment T_8 (40 kg sulphur/ha through gypsum recorded the maximum seed yield of 915 kh/ha and at par with by treatments T_7 (870 kg/ha), T_9 (849 kg/ha), T_4(878 kg/ha),T_6 (804 kg/ha).

In the year of 2007, treatment T_8 gave the maximum seed yield of 1248 kg/ha but was at par with treatments T_9 (1141 kg/ha), T_7(1123 kg/ha), T_6 (1066 kg/ha) and T_5 (14050 kg/ha) respectively

During kharif -2008, maximum seed yield of 1172 kg/ha in treatment T_8 was observed, however, it was at par with T_9 (1061 kg/ha), T_7 (1054 kg/ha) and T_5 (976 kg/ha).

Pooled analysis revealed that the maximum sunflower seed yield of 1077 kg/ha was recorded under treatment T_8 (40 kg sulphur/ha through gypsum), it was at par with treatment T_9(985 kg/ha), T_7 (983 kg/ha) T_6 (931 kg/ha) and T_5 (915 kg/ha).

Table: 1 Effect of different treatments on seed yield of sunflower

Treatments	Seed yield kg/ha			Pooled
	2006	2007	2008	
T_1	649	715	652	647
T_2	775	926	848	820
T_3	759	937	860	823
T_4	878	984	913	892
T_5	810	1050	976	915
T_6	804	1066	1014	931
T_7	870	1123	1054	983
T_8	915	1248	1172	1077
T_9	849	1141	1061	985
SEm+	44.84	80.25	69.37	61.78
C.D.at 5 %	134.44	240.60	207.97	185.22
C.V.%	9.56	12.06	12.65	11.42
YxT	SEm+	65.25	C.D.at 5%	NS

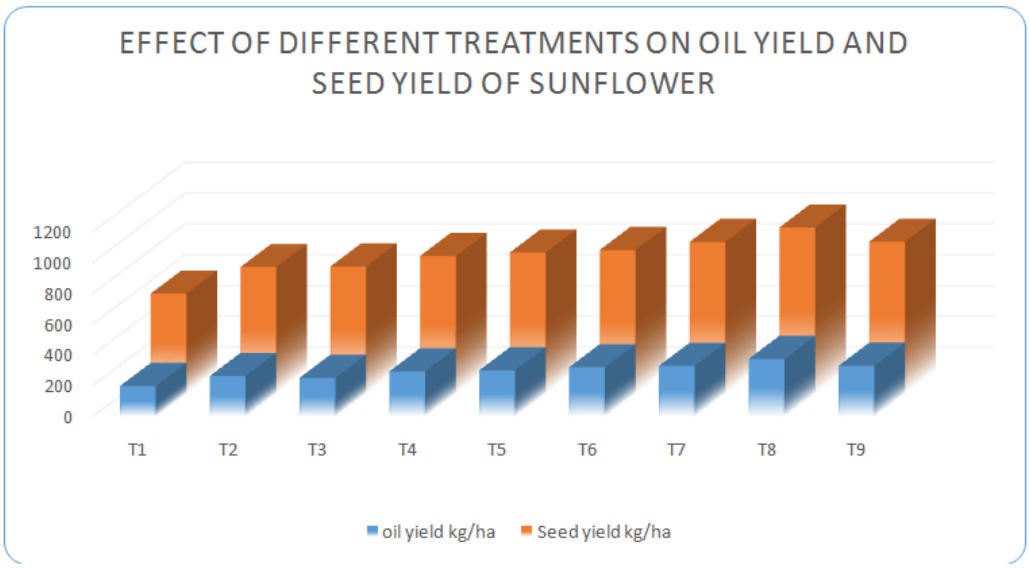

Table: 2 Economics influence by different sulphur treatments on seed yield of sunflower

Treatments	Seed yield kg/ha	Oil yield kg/ha	Gross income Rs/ha	Cost of culti. Rs/ha	Net return Rs/ha	BCR
T1	647	197.34	16826	7960	8866	1.11
T2	820	262.40	21333	8751	12582	1.44
T3	823	251.02	21405	8810	12595	1.43
T4	892	292.58	23182	8950	14232	1.59
T5	915	299.21	23779	8970	14809	1.65
T6	931	319.33	24205	9542	14663	1.54
T7	983	328.32	25552	9660	15892	1.65
T8	1077	373.72	28000	9940	18060	1.82
T9	985	328.99	25602	9980	15622	1.57

Market price:

Sunflower	:	26.00 Rs./kg	Ammoni. Sulphate	:	6.72 Rs./kg
Nitrogen	:	10.63 Rs./kg	SSP	:	3.40 Rs./kg
Elemental sulphur	:	18.00 Rs./kg	Gypsum	:	0.50 Rs./kg

Table:3 Effect of different treatments on yield parameters of sunflower

Treatments	Days to 50% Flow.	Days to maturity	Plant height (cm)	Head Diameter	Yield/ Plant (gm)	100 seed wt.	100 ml wt. (gm)	Seed filling	Oil %
T_1	58.0	89.5	119.5	14.5	11.7	3.7	32.0	53.0	30.5
T_2	57.0	89.0	129.0	17.5	14.0	3.9	33.6	56.5	32.0
T_3	59.5	91.0	131.0	18.5	13.7	3.9	34.3	60.5	30.5
T_4	57.5	88.5	132.5	15.5	15.5	4.1	34.8	60.0	32.8
T_5	59.5	88.5	131.5	15.0	15.3	4.2	34.9	60.5	32.7
T_6	56.5	89.5	129.5	16.5	15.3	4.1	35.5	59.5	34.3
T_7	60.0	91.0	134.5	17.5	16.5	4.2	35.7	59.5	33.4
T_8	57.5	87.0	137.0	19.5	17.6	4.4	37.0	62.0	34.7
T_9	61.5	92.0	133.0	19.0	16.5	4.2	36.6	60.0	33.4

IV. Discussion

An insufficient S supply can affect yield and quality ofcrops; caused by the S involved in protein and enzymesynthesis as well it is a constituent of the amino acidsmethionine, cystin and cystein. Sulphur depletion in soil ismainly caused by leaching. It takes place when the watermoving vertical downward in soil profile is higher than thatof the water uptake of the plants, evapo-transpiration and theamount of water necessary for the saturation of the soil(Scherer, 2001). Total S requirement mainly differs betweencrop species and the development stages of plant. In generalS demand of oilseed crops are higher than those of cerealcrops as they contain more S containing compounds neededfor oil biosynthesis (Scherer, 2001). In present study, Sapplication response was positive and consistent, whichprogressively improved the yield attributes, yield and oilcontents. However, narrow range of difference may be dueto relatively lower doses of S used in this study. Oilseedshave high demand of S,

V. Conclusions

Higher seed and oil yields of sunflower during the kharif season were realized withthe application of sulphur at 40 kg/ha through gypsum(266 kg/ha) in soil in addition to the recommended dose of chemical fertilizer. Growth and yield components were favorably influenced by S (40 kg S/ha). sulphur had beneficial effects on seed and oil yield of sunflower with higher BCR value.

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