

## Irrigation and Manurial Requirements of Sunflower

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A field study with K1 Sunflower was conducted at the Agricultural College and Research Institute, Madurai with three irrigation regimes based on climatological approach coupled with three manurial levels on a clay loam soil. Irrigation scheduled at IW/CPE value of 0.75 was found optimum, lesser irrigation was at the expense of yield and higher irrigation was superfluous. Sunflower responded well to fertiliser application and the yield at a manurial level of 40:60:40 kg N, P<sub>2</sub>O<sub>5</sub>, K<sub>2</sub>O per hectare was the highest (1246 kg/ha) and was economical.

Most of the sunflower cultivars are photo insensitive and are admirably adapted for cultivation under wide range of environmental conditions. It yields well even under heavy soils where groundnut will fail. Available information on the irrigation and manurial requirements of sunflower in this part of the country is rather scanty. An attempt was therefore made to elucidate information on the irrigation requirement based on climatological approach as well the manurial requirement of this crop.

### MATERIAL AND METHODS

A field study under the Indian Council of Agricultural Research Scheme on Water Management was conducted at the Madurai Campus of the Tamil Nadu Agricultural University during summer seasons (January-April) of 1974 and 1976 with K1 sunflower.

The soil was of clay loam type with low availability of nitrogen (67.4kg/ha) and medium in availability of phosphorus (11.0 kg P<sub>2</sub>O<sub>5</sub>/ha) and potassium (121.0 kg K<sub>2</sub>O/ha). The soil pH was 7.6.

The treatments consisting of three irrigation regimes based on climatological approach viz., irrigation water to cumulative pan evaporation values (IW/CPE) of 0.60, 0.75 and 0.90 coupled with three levels of manuring viz., (M<sub>0</sub>), 20:30:20 (M<sub>1</sub>) 40:60:40 (M<sub>2</sub>) kg N:P<sub>2</sub>O<sub>5</sub>:K<sub>2</sub>O per hectare were accommodated in a randomised block design replicated thrice. The depth of irrigation water applied for each irrigation was six centimetre.

Seeds of K 1 sunflower was sown on February 2, 1974, and February 2, 1976. The fertilizer as per treatmental

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schedule using urea, super phosphate and muriate of potash to supply nitrogen, phosphorus and potassium was applied all basal at the time of sowing. Irrigation water was measured through 90 V notch. Prophylactic plant protection measures were taken against pests and diseases. The heads after full maturity were harvested on April 25, 1974 and May 5, 1976. Precipitation of 7.7cm and 11.4cm during 1974 and 1976 respectively was received as rainfall during the cropping period.

## RESULTS AND DISCUSSION

The seed yield as well as the water used recorded during the two years individually as well as the pooled data were statistically scrutinised and the results are presented in Table I through Table IV.

The levels of irrigation regimes tried significantly influenced the seed yield of sunflower during both the years as well as in the pooled data (Table I). Crop receiving irrigation at

TABLE I Seed yield of sunflower K 1, as influenced by irrigation regimes.

Irrigation regime IW/CPE value	Seedyield ka/ha		
	1974	1976	Pooled
0.60	794	968	881
0.75	952	1306	1129
0.90	967	1222	1095
SEm	23	20	52
CD P=0.05	47	41	105

IW/CHE 0.90 or 0.75 recorded significantly higher yield than that at 0.60 during 1974 summer season. During

the year 1976, the yield at the irrigation schedule of 0.75 ratio was higher than that at 0.90 ratio which in turn was significantly greater than that at 0.60 ratio. When the data for both the years were pooled and analysed the significant difference in seed yield observed between the irrigation treatments 0.75 and 0.90 ratios during 1976 got evened out and were at par. The yield at both these irrigation levels (IW/CPE 0.75 and 0.90) were significantly higher than that at 0.60. Water use efficiency was therefore the highest at 0.75 ratio (Table II). The water used was 36.5 cm through 4.5 irrigation (mean). Based on soil moisture deficit approach, Kaliappa *et al* (1974) reported similar increase in yield with increase in frequency of irrigation upto sixty per cent available soil moisture beyond which a decline in yield was observed. Thus, for sunflower irrigation is to be scheduled at 0.75 I/WCPE. Irrigation scheduled below this level causes stress and is at the expense of yield. Irrigation over and above the ratio of 0.75 is superfluous and had in one year decreasing influence on the yield.

Linearity was observed in seed yield with increase in fertilizer application. Yield recorded at the manurial level of 40:60:40 kg N : P<sub>2</sub>O<sub>5</sub> : K<sub>2</sub>O/ha was the highest and was followed by that at 20:30:20 kg/ha. No manuring recorded the least yield (Table III). Vikram Singh

TABLE II Water use efficiency of K. 1 Sunflower

Irrigation regime IW/CPE value	No. of irrigations			Water used			Water use efficiency kg/ha/cm		
	1973	1976	Pooled	1974	1976	Pooled	1974	1976	Pooled
0.60	4	3	3.5	31.7	29.4	30.5	25	33	29
0.75	5	4	4.5	37.7	35.4	36.5	25	37	31
0.90	6	5	5.5	43.7	41.4	42.5	22	30	26

TABLE III. Seed yield of Sunflower as influenced by manurial levels.

Manurial levels	Yield kg/ha		
	1974	1975	Pooled
No manuring	754	830	792
20:30:20 kg N, P <sub>2</sub> O <sub>5</sub> , K <sub>2</sub> O/ha	864	1270	1067
40:60:40 kg N, P <sub>2</sub> O <sub>5</sub> , K <sub>2</sub> O/ha	1094	1397	1246
SE(m)	23	20	52
C D. at P = 0.05	47	41	105

and Chumun Singh (1972) observed 40-80 kg N/ha to be optimum for sunflower. The net profit per rupee of investment on fertilisation was higher (Rs. 0.90) at the lower level of fertilisation than that at the higher level of fertilisation (Rs. 0.57) as is evidenced from Table IV.

TABLE IV Economics of fertilizer application (Pooled)

Manurial level	Cost of Fertilizer		Yield (kg/ha)	Value of Produce		Value of addl. yield over no manuring	Net Profit		Net return per rupee input of fertilizer	
	Rs.	Ps.		Rs.	Ps.		Rs.	Ps.	Rs.	Ps.
No manuring	—	—	792	1584.00	—	—	—	—	—	—
N, P <sub>2</sub> O <sub>5</sub> , K <sub>2</sub> O 20 : 30 : 20 kg	290.00	—	1067	2134.00	550.00	260.00	—	0.90	—	—
40 : 60 : 40 kg	580.00	—	1246	2492.00	908.00	328.00	—	0.57	—	—

Value per kg of N or P<sub>2</sub>O<sub>5</sub> = Rs. 5/- and K<sub>2</sub>O = Rs. 2/-  
Seed value per Kg : Rs. 2.00

## REFERENCES

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