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Productivity of Sunflower as Influenced by Phasic Water and Fertility Management Under South Gujarat Conditions*

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ABSTRACT

A field experiment was conducted during *rabi* seasons of 1993-94 and 1994-95 to study the effect of irrigation, nitrogen and phosphorus each at three levels on the productivity of sunflower. Yield attributes as well as seed yield improved significantly with 0.8 IW/CPE ratio and 80 kg N/ha but phosphorus did not exert significant influence on any of the yield contributing characters and seed yield of sunflower.

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INTRODUCTION

Sunflower, being a salt tolerant crop has been recently drawing the attention of farmers, particularly in salt affected belt of Gujarat and also in paddy follows with limited water resources. An area of 1.8 - 2.0 million hectare is available for intercropping with groundnut in Gujarat (Wasnic and Lal, 1984), which is almost equivalent to the area at present under sunflower cultivation throughout the country. The scope for sole crop is equally good. However, the information on its production technology is limited, particularly with respect to water and fertility management. Hence, the present study was undertaken to evaluate the performance of sunflower under various levels of water and fertility management.

MATERIALS AND METHODS

The field experiment was conducted with EC-68414 cultivar during the *rabi* seasons of 1993-94 and 1994-95 in slit plot design with three replications. The treatments comprised of irrigation levels (IW/CPE ratio of 0.6, 0.8 and 1.0 with 6 cm depth of irrigation water) as main plot treatment. Nitrogen (60, 80 and 100 kg/ha) and phosphorus (30, 40 and 50 kg/ha) levels were religated to sub plots. Two common irrigations were given, one immediately after sowing and the other just after a week for better germination and establishment of crop. Half of the nitrogen was applied at the time of sowing along with full dose of phosphorus; and the ramaining nitrogen was applied 30 days after sowing as per treatment.

The field capacity, permanent wilting point and bulk density were 32%, 18.2% and 1.39 g/cc, respectively. The soil was clayey in texture, having 0.53% organic carbon, 31.01 kg/ha available phosphorus and 360.12 kg/ha

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TABLE 1

Yield attributing characters and yield of sunflower as influenced by varying levels of irrigation, nitrogen and phosphorus (Pooled data).

Treatment	Plant height (cm) (75 DAS)	Head diameter (cm)	No. of seeds/ head	Filled seeds (%)	Seed weight/head (g)	Seed index (g)	Seed yield (q/ha)
IW/CPE ratio							
0.6	173.73	12.77	664.10	71.33	23.73	53.26	17.72
0.8	185.26	14.66	730.99	76.95	30.26	58.02	21.29
1.0	187.93	14.74	735.43	77.13	30.52	58.56	21.41
S. Em. ±	1.83	0.18	7.36	0.84	0.34	0.61	0.29
C. D. at 5%	5.72	0.57	22.96	2.62	1.07	1.90	0.91
C. V. %	7.39	9.57	7.69	8.02	8.97	7.89	10.71
Nitrogen (kg/ha)							
60	171.64	12.63	653.55	70.16	24.26	54.60	18.68
80	183.39	14.70	721.34	77.35	29.84	57.32	20.70
100	191.89	14.85	735.64	77.90	30.41	57.92	21.04
S. Em. ±	2.23	0.19	7.10	0.87	0.35	0.71	0.23
C. D. at 5%	6.27	0.54	19.96	2.44	0.97	1.20	0.65
Phosphorus (kg/ha)							
30	181.04	14.03	699.66	75.05	27.95	56.49	19.93
40	182.34	14.05	702.76	75.15	28.23	56.78	20.16
50	183.54	14.09	708.09	75.22	28.33	56.57	20.33
S. Em. ±	2.23	0.19	7.10	0.87	0.35	0.71	0.23
C. D. at 5%	NS	NS	NS	NS	NS	NS	NS
C. V. %	8.99	10.13	7.41	8.51	9.05	9.22	8.56
Interactions	NS	NS	NS	NS	NS	NS	NS

NS = Not Significant.

available potash with pH 7.9. The quantity of water was measured with the help of 7.5 cm Parshal Flume installed across the irrigation channel. The crop was sown on 26th Nov., 1993 and 28th Nov., 1994 at 60 x 20 cm spacing.

RESULTS AND DISCUSSION

Irrigation scheduled at 0.8 and 1.0 I/W CPE ratio produced significantly higher seed yield with significant improvement in the yield contributing characters viz., head diameter, number of seeds, filled seeds (%), seed yield/ head and seed index compared to the lower level of irrigation (0.6 ratio). The magnitude of increase in seed yield on pooled basis was to the tune of 20.1% at 0.8% and 20.8% at 1.0 IW/CPE over 0.6 IW/CPE ratio (Table 1). This might be due to adequate supply of water which has increased sink size. Seed size and seed filling were also improved with these treatments indicating better translocation of assimilates. The findings are in conformity with Bhan and Khan (1980) and Somasundaram and Iruthayaraj (1981).

Similarly, significant improvement was noticed in yield attributes and seed yield with 80 kg/ha, and was also on par with apply of 100 kg N/ha. The percentage of increase in seed yield over N 60 was to the tune of 10.8 and 12.6% with 80 and 100 kg N/ha, respectively. The results are in conformity with Dhaka and Agarwal (1981).

Phosphorus fertilization did not excert and significant effect on either yield contributes or yield. This might be due to medium available phosphorus content of soil. The findings are substantiated with the reports of Deshmukh *et. al.,* (1987).

The results led to the conclusion that shedulling irriatation at 0.8 IW/CPE ratio (with 6 irrigations including the two common irrigations) and fertilizing the crop with the 80 kg N/ha were found optimum for sunflower under South Gujarat conditions.

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