Indian J. Agron. **38** (1) : 150–151 (March 1993)

Response of late-sown safflower (*Carthamus tinctorius*) to irrigation

P. D. BHALERAO, P. N. JADHAO AND G. R. FULZELE

Oilseed Research Unit, Punjabrao Krishi Vidyapeeth, Akola, Maharashtra 444 104

Received: January 1992

Being a deep-rooted crop, safflower (*Carthamus tinctorius* L.) has greater capacity to exploit moisture from deeper soil layers. However, when the crop is sown after harvest of the rainy season (*kharif*) crops, viz. sorghum, soybean, blackgram and groundnut, the moisture retained in the soil may not be sufficient to meet its requirements. Singh and Singh (1980) reported that application of irrigation to safflower increases the yield substantially compared with unirrigated. Therefore, the investigation was taken up to ascertain the critical growth stages of late-sown crop of safflower for getting higher yield.

An experiment was conducted at Akola on shallow soil (20 cm depth) during 1986 on the medium black soil (60 cm depth) during winter (*rabi*) seasons of 1988 and 1990, after the harvest of groundnut crop. The mean rainfall during October–March was 18.6 mm. The experiment was vitiated due to post-sowing rains during 1987 (94.5 mm) and 1989 (54.8 mm). The total rainfall received during crop period in 1986, 1988 and 1990 was 11.4, 13.2 and 12.8 mm respectively. Fourteen irrigation treatments (Table 1) were tested in randomized block design with 3 replications. The gross and net plot sizes were 3.6 m × 4.2 m and 2.7 m × 3.6 m respectively. The variety 'Bhima' was sown after pre-sowing irrigation at 45 cm × 30 cm spacing by dibbling method on 31 October, 3 and 1 November during 1986, 1988 and 1990 respectively. N @ 25 kg/ha and P_2O_5 @ 25 kg/ha were applied through diammonium phosphate at the time of sowing. Necessary precautions to check the irrigation water from one plot to another was taken by keeping the border of 2 m between 2 plots. The crop was irrigated according to the treatments under study.

During 1986, application of 4 irrigations (I_{13}) recorded significantly higher yield than all the other treatments (Table 1). Differences in 2 (I_5) and 3 irrigations (I_{10}) were not significant. Yield levels during 1986 was low because of shallow soil. During 1988 and 1990 also, 4 irrigations (I_{13}) recorded the highest yield, followed by 2 irrigations (I_5) at 35 and 55 days after sowing. Similar trend was also observed in pooled analysis. From the pooled average, it was observed that increase in yield with application of 4 irrigations (I_{13}), 2 irrigations (I_5) and 1 irrigation of (I_2) was 71, 61 and 36% respectively over no irrigation (I_0). Similar results were also reported by Zaman and Das (1990). Irrigation applied at later stages of crop growth, i.e. flowering and seed development (I_3 and I_4), had no significant advantage over no irrigation (I_0). These results indicated that earlier stages of crop are most critical and responsive for

Table 1. Seed yield of safflower as influenced by application of irrigations at various stages

Treatment	Irrigation at				Seed yield(kg/ha)			Increase over no irrigation (%)
	R	B	F	S	1986	1988	1990	
I_0					378	1,775	1,166	
I_1	1				504	2,549	1,433	35.2
I_2		1			445	2,593	1,474	35.9
I_3			1		404	2,354	1,224	20.0
I_4				1	412	1,883	1,200	5.3
I_5	1	1			635	2,749	1,927	61.4
I_6		1	1		514	2,577	1,443	36.6
I_7		1		1	506	2,541	1,495	36.9
I_8	1		1		480	2,434	1,402	30.0
I_9	1			1	463	2,208	1,426	23.4
I_{10}	1	1	1		600	2,408	1,701	41.9
I_{11}		1	1	1	523	2,354	1,526	32.6
I_{12}	1	1		1	543	2,668	1,474	41.3
I_{13}	1	1	1	1	823	2,834	2,033	71.4
CD (P=0.05)					77.8	279.4	191.5	

R, Rosette 35 DAS; B, branching 55 DAS; F, flowering 75 DAS; S, seed development 95 DAS
DAS, Days after sowing

yield. Pawar *et al.*(1987) reported drastic reduction in yield due to moisture stress at earlier stages.

It was concluded that for maximum yield of safflower crop may be irrigated 4 times each at rosette, branching, flowering and seed-development stages under abundance availability of water. Where only 2 irrigations are possible, it may be given at earlier stages, i.e. rosette and branching and where only 1 irrigation is possible, it should be given at branching stage.

REFERENCES

Pawar, H. K., Patil, B. R., Khade, K. K., More, V. D., Naik, G. K. and Shinde, S. H. 1987. Effect of irrigation scheduling on yield of safflower varieties. *Journal of Oilseeds Research* **4** (2) : 162–168.

Singh, U. B. and Singh, R. M. 1980. Effect of graded levels of moisture regimes, N and P fertilization on seed yield, oil content and NPK uptake by safflower. *Indian Journal of Agronomy* **25** (1) : 9–17.

Zaman, A. and Das, P. K. 1990. Response of safflower to different moisture regimes and nitrogen levels in semi-arid Tropics. *Journal of Oilseeds Research* **7** (1) : 26–32.