

Effect of irrigation schedule on yield, water use and oil content of toria (*Brassica napus* var *napus*)

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ABSTRACT

A field experiment was conducted during 1987-88 to 1989-90 on sandy-loam soil at Sriganaganagar, to study the effect of irrigation schedule on yield, water use and oil content of toria (*Brassica napus* L. var. *napus* sensu stricto; syn. *B. campestris* Hook. f. Thoms var. *toria* Duthie & Fuller). Toria responded significantly to irrigation levels. Mean maximum seed yield of 13.5 q/ha was recorded under 2 irrigations given at branching and siliques, development stage-closely followed by that with 2 irrigations at branching and flowering. Oil yield was significantly higher with 2 irrigations applied at branching and silique-development stages. Consumptive use of water and water-use efficiency were 250 mm and 5.39 kg/ha-mm respectively with 2 irrigations scheduled at branching and silique-development stages.

Recently, in multiple-cropping systems cultivation of toria (*Brassica napus* L. var. *napus* sensu stricto; syn. *B. campestris* Hook. f. & Thoms var. *toria* Duthie & Fuller) has been extending in north-west irrigated plains of Rajasthan. But information regarding irrigation schedule and water requirement of this crop is scarce. Hence an experiment was undertaken to study the response of toria to irrigation schedules based on critical growth stages of this crop.

MATERIALS AND METHODS

An experiment was conducted during the winter seasons of 1987-88, 1988-89 and 1989-90 at Sriganaganagar. The soil was sandy loam, low in nitrogen (125 kg/ha), medium in phosphorus (26 kg P_2O_5 /ha) and rich in potash (330 kg K_2O /ha). The field capacity, permanent wilting point and bulk density of soil were 16.5% and 4.6% and

1.51 g/cm³ respectively, with pH 8.1 and electrical conductivity 0.25 mmhos/cm. The experiment was laid out in randomized block design with 4 replications. Treatment consisted of 7 irrigation schedules based on critical growth stages [no irrigation (I_1), irrigation at branching (I_2), peak flowering (I_3), silique development (I_4), branching and flowering (I_5), branching and silique development (I_6) and peak flowering and silique-development stages (I_7)]. A basal dose of 60 kg N and 30 kg P_2O_5 /ha was applied uniformly to all the plots and the crop was sown 30 cm apart using 5 kg seed/ha. A presowing irrigation of 10 cm was given to all the treatments. Post-sowing irrigation of 6.0 cm was applied by measuring Parshall flume as per treatments. The crop was sown on 11, 22 and 29 September and harvested on 29 December, 27 January and 19 January. Consumptive use of water was computed. Rainfall received

during crop season of 1987–88, 1988–89 and 1989–90 was respectively 2.4, 76.2 and 10.5 mm.

RESULTS AND DISCUSSION

Two irrigations applied at branching and flowering or at branching and siliqua-development stages gave significantly higher yield of *toria* than the other irrigation schedules. Maximum average seed yield of 13.50 q/ha was recorded when 2 irrigations were applied at branching and siliqua

development, closely followed by the yield obtained at branching and peak flowering (12.83 q/ha) stage. The increase in seed yield under I_5 and I_6 over the control was 6.13 and 6.80 q/ha respectively. Two irrigations given either at branching and siliqua development or at branching and flowering stages recorded a significant increase in plant height and pods/plant over the control. These results are in accordance with those of Raja (1987).

Different irrigation schedules did not

Table 1. Effect of irrigation schedule on yield attributes, and oil content and oil yield of *toria* (mean data of 3 years)

Treatment	Seed yield (q/ha)	Plant height (cm)	No. of siliqua/plant	Oil content (%)	Oil yield (q/ha)
I_1	6.70	108.7	190	43.3	2.81
I_2	8.90	113.0	188	42.4	3.50
I_3	10.39	117.6	212	42.8	4.30
I_4	8.25	113.9	203	42.3	3.36
I_5	12.83	116.6	245	41.7	5.13
I_6	13.50	120.5	261	42.1	5.54
I_7	10.76	117.2	226	41.4	4.19
CD ($P = 0.05$)	2.03			NS	0.77

Details of treatments are given under Materials and Methods

Table 2. Effect of irrigation schedule on consumptive use, water-use efficiency and Et/Eo of *toria*

Treatment	Consumptive use (mm)				WUE (kg/ha-mm)				Et/Eo			
	1987–88	1988–89	1989–90	Mean	1987–88	1988–89	1989–90	Mean	1987–88	1988–89	1989–90	Mean
I_1	121	159	132	137	4.72	5.43	4.33	4.83	0.28	0.46	0.33	0.36
I_2	179	217	177	191	4.60	4.96	4.35	4.64	0.42	0.62	0.44	0.49
I_3	175	213	171	186	5.43	6.19	4.94	5.52	0.41	0.61	0.43	0.48
I_4	173	211	167	184	4.23	4.87	4.27	4.46	0.40	0.61	0.42	0.47
I_5	239	277	230	249	4.94	5.74	4.66	5.11	0.56	0.80	0.58	0.65
I_6	236	275	238	250	5.30	5.77	5.09	5.39	0.55	0.79	0.60	0.65
I_7	234	272	221	242	4.18	4.86	4.20	4.41	0.55	0.78	0.55	0.63

Details of treatment are given under Materials and Methods

affect the oil content of *toria* significantly. However, owing to increased seed yield, oil yield was increased significantly with irrigations applied at branching and siliqua-development stage over the other irrigation schedules, except 2 irrigations at branching and flowering. Raja and Bisnoi (1988) also reported higher oil yield with 2 irrigations, applied at 31 and 73 days after sowing.

Consumptive use of water increased with increasing frequency of irrigation. Maximum consumptive use of water was recorded when 2 irrigations were given at branching and siliqua-development stage. The maximum water-use efficiency kg/ha-

mm) was observed in treatment where 1 irrigation was applied at peak flowering and lowest when 2 irrigation applied at peak flowering and siliqua-development stage. Water-use efficiency with 2 irrigation at branching + siliqua development was 5.39 kg/ha-mm.

REFERENCES

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