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Effect of Irrigation Schedules on Moisture Extraction Pattern and Consumptive Use of Mustard (*Brassica juncea* L.)

V. B. Ramani, M. P. Patel, H. S. Patel and P. L. Naik

Department of Agronomy, N. M. College of Agriculture, Gujarat Agricultural University, Navsari-396 450

A field experiment was conducted on clayey soil during *rabi* season of 1992-93 at Regional Sugarcane Research Station, Navsari by adopting randomized block design with twelve irrigation treatments scheduled on critical crop growth stages which replicated thrice. Field capacity, permanent wilting point and bulk density of the experimental field was 31.10 per cent, 17.63 per cent and 1.47 g/cc, respectively. The sowing of mustard variety Gujarat Mustard-1 was done on the November 4, 1992 and harvested on February 17, 1993. Measured quantity of irrigation water was applied with the help of Parshall flume. The first common irrigation of 60 mm depth was applied immediately after sowing and second after a week to ensure uniform emergence and establishment of the crop. The remaining irrigations were given as per schedule.

TABLE 1

Soil moisture extraction pattern consumptive use of water and water use efficiency of mustard as influenced by different irrigation treatments.

Treatment	*Percentage of moisture extracted from different layers (cm)*				*Consumptive use of water (mm)*	*Water use efficiency (kg/ha-mm)*	*Seed yield (kg/ha)*
	0-30	*30-60*	*60-90*	*90-120*			
I_1 (B)	39.51	24.71	22.37	13.41	159	2.98	474.83
I_2 (F)	40.23	24.79	22.01	12.97	167	3.07	512.95
I_3 (A)	41.31	24.98	21.37	12.34	170	3.32	565.05
I_4 (BA)	42.27	25.35	20.40	11.98	211	3.78	797.70
I_5 (FS)	43.52	25.54	19.75	11.19	213	3.84	818.30
I_6 (FG)	41.97	25.17	20.68	12.17	206	3.71	765.20
I_7 (BAG)	44.48	25.65	18.78	11.09	248	3.49	867.65

1.	2.	3.	4.	5.	6.	7.	8.
I_8 (FSG)	45.25	25.77	18.15	10.83	250	3.59	899.07
I_9 (FAS)	48.35	26.02	17.61	8.02	259	3.98	1032.75
I_{10} (BASG)	48.20	25.98	17.72	8.10	279	3.68	1028.50
I_{11} (BFSG)	47.93	25.82	18.13	8.12	277	3.67	1019.35
I_{12} (BFAS)	49.12	26.12	17.22	7.54	282	3.91	1103.32
Mean	44.34	25.49	19.52	10.65	227	3.59	

Note : B = Branching, F = Preflowering, A = Anthesis.
S = Siliquae formation, G = Grain filling stage

S Em. ± 65.54
C. D. at 5% 192.23
C. V.% 13.78

The data on moisture extraction (Table-1) revealed that the mean percentage of moisture extracted from first two layers i.e. from 0-30 and 30–60 cm was 44.34 and 25.49, respectively. Similarly extraction of soil moisture from 0–60 and 60-120 cm layers was 69.83 and 30.17 per cent, respectively. The moisture absorption from upper half was elevated with increase in irrigation frequency, may be due to increase in surface evaporation and water utilization by mustard crop. At lower layers (60-120 cm), the quantity of water depleted was higher under lower irrigation frequencies than that of higher irrigation frequencies. This might be due to presence of longer and finer rootlets in the deeper layers which utilized more amount of water from these layers of the soil. Similar results were also reported by Tomer *et al.* (1992). Consumptive use of water (Table 1) elevated sharply with the enhancement in the frequency of irrigation. The highest (282 mm) consumptive use of water was recorded with I_{12} (BFAS) treatment of 4 irrigations applied at branching, pre flowering, anthesis and siliquae formation stages, while the lowest (159 mm) value was noticed under I_1 (B) where one irrigation was applied at branching stage. Increase in consumptive use of water with more number of irrigation, may be due to improvement in plant water status, decrease in stomatal resistance and greater vapour pressure gradient between plant canopy-air under wet than under moisture stress conditions. Similar view was also expressed by Tomer *et al.* (1992).

In case of water use efficiency (Table 1), it was improved steadily from I_1 (one irrigation) to I_9 (three irrigations) treatments and reduced thereafter. The impressive higher water use efficiency was recorded with 3 irrigations applied at pre flowering, anthesis and siliquae formation stages (I_9). The

improvement in the efficiency of water utilization with increased water application indicated that the seed yield was remarkably enhanced proportionately to consumptive use of water. Silimar trend was also observed by Samui *et al.* (1986).

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