in 1982-83 and 35.7 and 24.4% in 1983-84 with the application of FYM at zero level and 50 kg K_2O/ha, respectively. The increase in Cu uptake with FYM application might be due to the addition of Cu and presumably by supplying soluble complexing agents which decreased its fixation. The results are in conformity with those obtained by Datta Biswas (1964).

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EFFECT OF METHODS AND INTERVALS OF IRRIGATION OF WATER REQUIREMENT AND WATER USE EFFICIENCY IN SESAMUM

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ABSTRACT

A study was conducted with sesamum cvs. TMV 3 AND Co 1 at Tanjore and Bhavanisagar respectively to find out suitable method and interval of irrigation to use water economically without affecting the yield. Irrigating in alternate furrows once in 20 days recorded the highest water use efficiency. High seed yield was recorded in alternate furrows - irrigating once in 30 days. Hence, irrigating in alternate furrows once in 20 days may be considered as optimum for sesamum.

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Methods of irrigation had a definite effect on the yield as well as on the economic use of water. According to Sivanappan et al. (1974) the quantity of water used for furrow method in cotton was the lowest (37.8 cm) as compared to check furrow (43.3 cm), check basin (54.8 cm) and border strip (62.3 cm) given in eight irrigations. Harman and Jones (1982) reported that the production developed for sunflower from the yield data indicated that a yield increase was noticed due to furrow irrigations upto 23 inches of net water applied. The present study was conducted to find out suitable method as well as interval to use the water, economically without affecting the yield.

MATERIALS AND METHODS

Two field trials were conducted during summer 1984 and 1985 at Tanjore and Bhavanisagar respectively. The cosmopolitan variety of sesamum TMV 3 of 90 days duration was chosen for the study at Tanjore. At Bhavanisagar the variety Co 1 of 90 days duration was chosen for the study. The experiment was laid out in randomised block design replicated three times. The treatments consist of four methods of irrigation and two intervals of irrigation and the details are given below :

TREATMENTS

Control : Farmer's method (Irrigating once in 15 days) Irrigation methods :

M_1 : Beds and channels

M_2 : Ridges and furrows

M_3 : Alternate furrows

M_4 : Broad bed (2 m apart)

Intervals of irrigation :

I_1 : Irrigating once in 20 days.

I_2 : Irrigating once in 30 days.

The depth of irrigation was fixed as 5 cm. The gross and net plot sizes were $5 \times 4\ m^2$ and $4.2 \times 3\ m^2$ respectively. The seeds were dibbled adopting a spacing of 30 x 30 cm. One sowing irrigation and another life irrigation on 4th day were given as common to all treatments to a depth of 5 cm to account 100 mm depth of irrigation. The plots were irrigated as per the schedule, with measured quantity of water through a Par-shall flume at Tanjore and through a module at Bhavanisagar fixed in the experimental field. The recommended package of practices were followed.

The water accounted through irrigations, effective rainfall and the water contents of 0 to 45 cm depth of soil profile at sowing and at harvest were considered in computing the total water requirement. The effective rainfall was 'nil' at both the centres.

RESULTS AND DISCUSSION

Seed yield difference were significations due to methods of irrigation, intervals of irrigation and the interaction due to methods and intervals (Table 1). Among the methods, the seed yield of alternate furrows was on par with ridges and furrows and superior to other methods under Tanjore conditions while at Bhavanisagar it was significantly superior to all the other methods, since the crop

TABLE 1 : Seed yield (kg/ha) and water use efficiency (kg/mm/ha)

Treatments	Tanjore (1984)					Bhavanisagar (1985)				
	M_1	M_2	M_3	M_4	Mean	M_1	M_2	M_3	M_4	Mean
Seed yield (kg/ha)										
I_1	685	608	787	433	628	885	807	987	633	809
I_2	535	711	630	332	552	735	910	830	522	752
Mean	610	659	708	382	590	810	859	909	693	781
Control	-	-	-	-	447	-	-	-	-	648
Water use efficiency*										
I_1	2.83	3.66	6.05	3.35	3.97	3.63	4.85	7.53	4.84	5.21
I_2	2.77	5.00	5.33	2.72	3.95	4.09	6.37	6.93	4.35	5.44
Mean	2.80	4.33	5.69	3.03	3.96	3.86	5.61	7.23	4.59	5.32
Control	-	-	-	-	1.53	-	-	-	-	2.21
C.D. (P=0.05)	M	I	M X I	C X rest		M	I	M X I	C X rest	
Seed Yield	31	51	73	126		44	31	63	138	

* Data not statistically analysed.

TABLE 2 : Water requirements (mm)

Particulars	Control		M_1xI_1		M1 x I_2		M2 x I_1		M2 x I_2		M3 x I_1		M3 x I_2		M4D x I_1		M2D I_2 x +	
	T	B	T	B	T	B	T	B	T	B	T	B	T	B	T	B	T	B
Number of irrigations	4	4	3	3	2	2	3	3	2	2	3	3	2	2	3	3	2	2
Amount of water applied (mm)	300	300	250	250	200	200	172	172	148	148	136	136	124	124	134	134	122	122
Moisture before sowing (mm)	3.9	3.1	3.9	3.1	3.9	3.1	3.9	3.1	3.9	3.1	3.9	3.1	3.9	3.1	3.9	3.1	3.9	3.1
Moisture before harvest (mm)	12.7	10.6	11.6	9.4	10.9	8.3	10.3	8.9	11.0	9.2	10.9	9.8	9.7	7.3	8.3	6.1	4.6	3.4
Storage change in soil moisture (mm)	8.8	7.5	7.7	6.3	7.0	5.8	6.4	5.5	6.0	5.2	5.9	5.0	5.7	4.2	4.4	3.0	0.7	0.3
Total water requirement (mm)	291	293	242	244	193	194	166	167	142	143	130	131	118	120	129	131	122	122
ntervals	15	15	20	20	30	30	20	20	30	30	20	20	30	30	20	20	30	30

T = Tanjore B = Bhavanisagar

is very sensitive to high moisture regimes. The findings are in conformity with hose of Patel and Singh (1979). The seed yield under the shorter interval was significantly higher than under wider interval at both the centres. The reduced yield in wider interval may be due to lack of nutrient uptake and improper crop growth and development under water stress. Similar findings were reported by Sandhu and Khera (1977).

The interaction between methods and intervals of irrigation was significant at both the centres. Irrigating the field once in 20 and 30 days in the alternate furrows, in ridges and furrows and in beds and channels induced more seed yield than in farmer's method at Tanjore and Bhavanisagar.

Irrigating the field in the alternate furrows once in 20 days influenced the seed yield to the highest level compared to other methods and intervals as well as farmer's method at both the centres. This may be due to high moisture conservative capacity of the alternate furrow system and making the conserved moisture available to the crop growth and development. Similar findings were reported in maize (Anon., 1983).

The data on number of irrigations, amount of water applied, effective rainfall and the total water requirement are presented in (Table 2) for both the centres. The number of irrigations was high in the farmer's method. The total water requirement was slightly higher at Bhavanisagar than the Tanjore centre. This might be due to lower soil moisture retention at Bhavanisagar. The amount of water consumed was highest in farmer's method i.e., 291 mm at Tanjore and 293 mm at Bhavanisagar centre. In alternate furrows -irrigating once in 30 days accounted for the lowest water consumption i.e., 118 mm at Tanjore and 120 mm at Bhavanisagar.

The total water requirement for alternate furrows - irrigating once in 20 days was 130 mm at Tanjore and 131 mm at Bhavanisagar during summer. The WUE was higher at Bhavanisagar than at Tanjore centre and this was mainly due to higher seed yield obtained at that centre (Table 1). Among the methods, the highest WUE was recorded at alternate furrows (5.69 kg/mm/ha at Tanjore and 7.23 kg/mm/ha at Bhavanisagar) and the lowest in beds and channels (2.80 kg/mm/ha at Tanjore and 3.86 kg/mm/ha at Bhavanisagar). Regarding the interaction, irrigating in alternate furrows once in 20 days had recorded maximum WUE (6.05 kg/mm/ha and 7.53 kg/mm/ha) at Tanjore and at Bhavanisagar centres. The farmer's method had recorded the lowest WHE (1.53 kg/mm/ha at Tanjore and 2.21 kg/mm/ha at Bhavanisagar) when compared to the methods and intervals of irrigation.

Thus it is closer that irrigating in alternate furrows once in 20 days recorded the maximum water use efficiency besides maximum yield at both the centres.

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Research Notes

GENETIC STUDIES IN RICE (Oryze sativa L.) INVOLVING F_2 AND BACK CROSS HYBRIDS[1]

In the present study, the extent of genetic variability for six economic traits in six F_2 croses and six back cross hybrids are reported. The parents TKM 9, IR 36, IR 50 (dwarf indicas), Co 29 (tall indica) were chosen and six F1 hybrids were obtained during 1983-84. In the next season, F_1 seeds of these crosses and parents were raised in a crossing block to obtain F_2 and EC1F1 generation in each cross. A final comparison was made with F_2, BC_1F_1 and parents in randomized block design with three replicating during late Samba season (Sept.-Oct. to Jan.-Feb.) of 1984-85 at Rice Research Station, Tirurkuppam, Tamil Nadu. In each replication, the following number of plants in each of the generation was raised.

Parents ...Two rows of twelve plants per row

F_2 ... Ten rows of twelve plants per row

BC_1F_1 ... One row of twelve plants

The spacing adopted was 30 cm between and 20 cm between plants. Observations from ten random competitive plants per replication for the parents and for F_2, following number of plants was studied.

1. Part of M.Sc.,(Ag.) Thesis submitted by Senior author to the Tamil Nadu Agricultural University, Coimbatore.