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SEED YIELD AND YIELD ATTRIBUTES AS INFLUENCED BY METHODS AND INTERVALS OF IRRIGATION IN SESAMUM (*SESAMUM INDICUM* L.)

M. AYYASWAMY and R. KULANDAIVELU

A study was made to determine the effect of methods of irrigation viz, Beds and channels, ridges and furrows, alternate ridges and furrows and broad bed with two intervals of irigation (once in 20 and 30 days) and farmer's method (irrigating in beds and channel once in 15 days) as control on sesamum. The yield attributes like number of capsules present on the mainstem, primary and secondary branches were increased by lower levels of moisture in alternate furrows and broad bed system irrigating once in 20 days. Capsule length was significantly increased by higher moisture levels. Higher seed yield was recorded in alternate furrows-irrigating once in 20 days followed by ridges and furrows-irrigating once in 30 days at both the centres. Hence, irrigating in alternate furrows once in 20 days may be considered as optimum for sesamum.

Water forms the essential and expensive input in agricultural production. Water, the earth's most abundant resource is a vital constituent in all living matters and it may be considered as the blood of the earth (Russel and Russel, 1973). The water use efficiency for increasing economic production and the concept in determining the water requirement of the crop, had been keenly felt. The sesamum crop is generally grown in beds and channels which consumes more quantity of water which in turn may affect the yield due to excessive moisture. Finding sutable method as well as interval to use the water economically without affecting the yield is essential. The methods and intervals of irrigation are complementary to each other on the economic use of water for sesamum crop. There is paucity of agronomic research data under such situations in sesamum. Hence, the present study was chosen to investigate the effect of various methods as well as intervals of irigation with the following objectives namely (i) to fix a suitable method of irrigation for sesamum and (ii) to findout the optimum interval of irrigation.

MATERIALS AND METHODS:

The experiments were conducted during summer 1984 and 1985 at Soil and Water Management Research Institute, Tanjore and at Agricultural Research Station, Bhavanisagar, respectively. The cosmopolitan variety of sesamum TMV3 with 90 days duration was chosen for the study at Tanjore and at Bhavanisagar the variety CO 1 with 90 days duration was chosen for the study.

The experiment was laid out in randomised block design replicated three times. The treatments tried were none (control, four methods of irrigation and two intervals of irrigation).

Treatments

Treatment symbols	Treatments
Control	Farmer's methods irrigating once in 15 days)

Agricultural Research Station, Bhavanisagar 638 451.

Irrigation methods

M_1	Beds and channels
M_2	Ridges anf furrows
M_3	Alternate furrows
M_4	Broad bed (2m 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.

Plot size :

Cross : 5 x 4m²
Net : 4.2 x 3m²

The seeds were treated with Bavistin at the rate of 2 g/kg of seed against seed borne diseases. Five to six seeds were dibbled per hole by adopting a spacing of 30 x 30 cm. The quality of irrigation water used for irrigation is presented in Table 1. 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 fertilizer application, after cultivation and plant protection measures were followed. The following bio-metric observations were recorded on five plants selected randomly in the net plots.

Number of capsules

Number of capsules present on the mainstem, primary and secondary branches were counted at harvest.

Length of the capsule :

The Length of the capsule was measured and expressed in cm.

Seed yield :

After harvest, threshing was taken up and seed yield was recorded.

RESULTS AND DISCUSSION

Production of capsulesoon the mainstem was significantly superior in alternate furrows compared to other methods and was on par with broad bed at Tanjore. At Bhavanisagar, alternate furrows was on par with broad bed and ridges and furrows and they were superior to beds and channels. The intervals of irrigation and interaction did not influence the production of number of capsules in the main stem at both the centres. The treatment, alternate furrows-irrigating once in 20 days had increased the capsule on main stem compared to farmer's methods of irrigation at both the centres.

Alternate furrows had significantly increased the capsule number on primary branches compared to ridges and furrows and beds and channels and it was on par with broad bed at both the places. The intervals of irrigation did not alter the capsule number in the primary branches at both the places even though it was significant at Bhavanisagar. The interaction of alternate furrows-irrigating once in 20 days had recorded the highest capsule number at Bhavanisagar, while at Tanjore there was no effect.

The treatments, alternate furrows-irrigating once in 20 days and broad bed irrigating once in 30 days were superior in increasing the capsule number on the

primary branches over farmer's method at Tanjore. while at Bhavanisagar the treatment alternate furrows-irrigating once in 20 days had increased the capsule number over farmer's method.

Capsule production on the secondary branches was more under alternate furrows compared to other methods and was on par with broad bed. Irrigation intervals had no effect on the number of capsules on the secondary branches. The interaction of alternate furrows-irrigating once in 20 days had significantly increased the capsule number. The treatments, alternating furrows-irrigating once in 20 days, alternate furrows-irrigating once in 30 days and broad bed-irrigating once in 30 days were superior in increasing the capsule number on secondary branches over farmer's method at Tanjore, which at Bhavanisagar the treatments, alternate furrows-irrigating once in 20 days had increased the capsule number over farmer's method.

The production of lower number of capsules on the main stem, primary and secondary branches at beds and channels, ridges and furrow's and farmer s method might be due to excessive vegetative growth with the resulf of more nutrient uptake and mutual shading under higher levels of moisture in the soil Similar findings were reported by Suraj Bhan and Khan (1979) in mustard.

The irrigation methods increased the length of capsule at Bhavanisagar compared to Tanjore centre. Among the methods, beds and channels and ridges and furrows had significantly superior effect in increasing the capsule length at Bhavanisagar, while at Tanjore it had no effect on the length of capsule,

Among the intervals, shorter interval recorded significantly higher capsule length at Tanjore, while at Bhavanisagar shorter and wider intervals were on par. The wider interval did not influence the capsule length at Tanjore centre. The length of the capsule is low in wider interval and this indicated the inadequacy of moisture supply towards the development of caqsules. Paida and Parmar (1980) reported similar influence of moisture on capsule development in castor.

The interaction of methods and intervals did not inf luencethe capsule length at Tanjore, while at Bhavanisagar irrigation in beds and channels-irrigating once in 20 days had induced significantly higher capsule length.

Regarding the farmer's method versus rest, the farmer's method was superior in increasing the capsule number over broad bed system-irrigating once in 30 days at Tanjore, while at Bhavanisagar it was superior over ridges and furrows, alternate furrows and broad bed irrigating once in 20 and 30 days. The capsule length is minimum in the treatments of broad bed system-irrigating once in 20 and 30 days This might be due to improper davelopment of capsule in the absence of adequate water supply. Similar findings were reported by Banerjee *et al.* (1967) in toria.

seed yield differences were significant due to methods of irrigation, intervals of irrigation and the interaction

due to methods and intervals. 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 other methods, since the crop is very sensitive to higher moisture regimes. The optimum level of moisture in alternate furrows would have contributed towards the production of more number of capsules in the mainstem, primary and secondary branches and resulted in increased seed yield. The findings are in confirmity with the findings of Erie and French (1969) in safflower Balci (1974) in sesamum, Singh *et al*, (1974) in oilseed crops, Chahal *et al*, (1980) in various crops, Dev *et al*, (1980) in indian rape and Patel and Singh (1979) in sunflower.

The seed yield under the shorter interval was significantly higher than wider interval at both the centres. The reduced growth and 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, once in 20 and 30 days in ridges and furrows and once in 20 and 30 days in beds and channels induced more seed yield over farmer's method at Tanjore and Bhavanisagar.

The treatments, alternate furrows-irrigating once in 20 and 30 days, ridges and furrows-irrigating once in 20 and 30 days and beds and channels-irrigating once in 20 days were recorded significantly higher seed yield over farmer's method at both the centres. 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 places. 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).

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Table 1. Number of capsules on the mainstem at harvest

Treatments	Tanjore (1984)					Bhavanisagar (1985)				
	M_1	M_2	M_3	M_4	Mean	M_1	M_2	M_3	M_4	Mean
I_1	23.2	28.1	34.5	30.0	29.0	23.1	30.0	39.8	31.9	31.2
I_2	27.1	29.4	31.3	32.3	30.0	28.8	31.3	33.2	34.1	31.9
Mean	25.2	28.8	32.9	31.2	29.5	26.0	30.7	36.5	33.0	31.5
Control	—	—	—	—	21.0	—	—	—	—	20.4

	M	I	M x I	C x rest	M	I	M x I	C x res
SE	1.30	0.92	1.84	3.24	1.95	1.38	1.95	4.79
CD	3.75	NS	NS	2.57	5.86	NS	NS	14.35

NS : Not significant

Table 2. Number of capsules on the primary branches at harvest

Treatments	Tanjore (1984)					Bhavanisagar (1985)				
	M_1	M_2	M_3	M_4	Mean	M_1	M_2	M_3	M_4	Mean
I_1	29.5	36.7	52.3	39.9	39.6	31.5	38.6	54.4	42.0	41.6
I_2	35.3	38.2	42.2	45.8	40.4	37.3	40.2	44.2	47.7	42.4
Mean	32.4	37.5	47.3	42.9	40.0	34.4	39.4	49.3	44.8	42.0
Control	—	—	—	—	27.2	—	—	—	—	29.2

	M	I	M x I	C x rest	M	I	M x I	C x rest
SE	2.41	2.89	1.85	5.89	2.91	2.06	4.11	8.22
CD	6.97	NS	NS	17.07	8.71	6.17	12.32	24.60

NS : Not Significant

Table 3. Number of capsules on the secondary branches at harvest

Treatments	Tanjore (1984)					Bhavanisagar (1985)				
	M_1	M_2	M_3	M_4	Mean	M_1	M_2	M_3	M_4	Mean
I_1	12.1	14.4	22.7	16.3	16.4	11.9	16.2	25.4	18.0	17.9
I_2	14.2	15.7	18.5	20.5	17.2	16.0	17.6	20.4	21.6	18.9
Mean	13.2	15.1	20.6	18.4	16.8	14.0	16.9	22.9	19.8	18.4
Control	—	—	—	—	11.1	—	—	—	—	11.3

	M	I	M x I	C x rest	M	I	M x I	C x rest
SE	1.01	0.71	1.44	2.49	1.31	1.08	1.85	3.21
CD	2.93	NS	4.14	7.19	3.79	NS	5.37	9.29

NS : Not significant

Table 4. Length of the capsules (cm)

Treatments	Tanjore (1984)					Bhavanisagar (1985)				
	M_1	M_2	M_3	M_4	Mean	M_1	M_2	M_3	M_4	Mean
I_1	2.83	2.50	2.40	2.37	2.53	3.23	2.57	2.44	2.39	2.66
I_2	2.52	2.45	2.29	2.10	2.34	2.62	2.55	2.43	2.20	2.45
Mean	2.68	2.48	2.31	2.24	2.24	2.93	2.89	2.43	2.30	2.55
Control	—	—	—	—	2.91	—	—	—	—	3 32

	M	I	M x I	C x rest	M	I	M x I	C x rest
SE	0.1	0.1	0.14	0.26	0.1	0.06	0.06	0.24
CD	NS	0.28	NS	0.75	0.30	0.16	0.38	0.70

NS : Not significant

Table 5. Seed yield (kg/ha)

Treatments	Tanjore (1984)					Bhavanisagar (1985)				
	M_1	M_2	M_3	M_4	Mean	M_1	M_2	M_3	M_4	Mean
I_1	685	608	787	433	628	885	807	987	633	809
I_2	535	711	630	332	552	735	910	830	532	752
Mean	610	659	708	382	590	810	859	909	693	781
Control	—	—	—	—	447	—	—	—	—	648

	M	I	M x I	C x rest	M	I	M x I	C x rest
SE	10.87	17.75	25.09	43.46	14.83	10.48	20.97	47.74
CD	31 48	51.43	72.73	125.99	44.43	31.42	62.85	138.38

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