INFLUENCE OF IRRIGATION ON GROWTH AND YIELD OF SESAMUM

Sesamum constitutes 14 per cent of the total area under oil seed crops in India. In Kerala, it is mainly grown as a catch crop after the second crop of rice in the rice fallows utilizing the residual moisture and fertility. Since the crop is raised with residual soil moisture after the second crop of rice, lack of sufficient soil moisture during the growth period results in poor growth and establishment. Water stress conditions cause considerable damage to plants and the extent of damage depends up on the physiological stages and degree of water stress. Vora *et al.* (1975) reported that sesamum grown under soil moisture stress conditions decreased the dry matter production. Low water supply induces xerophytic modification and leads to quantitative and anatomical modifications (Yousef *et al.*, 1982).

The present investigation was undertaken at the Rice Research Station, Kayamkulam, during the summer period of 1983-84 to determine the influence of irrigation on the growth and yield of sesamum. The soil of the experimental site was sandy loam with a soil pH of 5.3, bulk density 1.548 g/cm^3 and field capacity 16.05%. The layout was split plot design with eleven main plot treatments and three subplot treatments. The main plot treatment consisted of sowing the seeds on the same day of irrigating the plots to field capacity (TS) and thereafter sowing the seeds at one day interval till 9 days after the initial irrigation (T1-T9) and the control (TO). The subplot treatments included no irrigation during growth phase (I0) one irrigation (15 days after sowing) at vegetative phase (I1) and two irrigations one at vegetative and the other at the reproductive phase (I2). Five plants per plot were selected according to random clustering sampling method for recording the biometric observations. The plants earmarked for destructive sampling unit were used for leaf area and dry matter production determinations. The plant height, leaf area, dry matter production, number of capsules per plant and number of seeds per capsule were recorded at harvest. The crop was harvested at maturity and seeds were separated by drying in sun and the seed weight was recorded.

The growth characters of sesamum were significantly influenced by the time of sowing and frequency of irrigation. The irrigation treatments (I1 & I2) have produced maximum plant height, leaf area per plant and dry matter production per ha (Table 1). In the plots receiving one or two irrigations during the growth phase, soil moisture was not a limiting factor which in turn might have influenced and favoured the growth characters and it is generally through the result of cell division and cell enlargement and the latter is more sensitive to irrigation than the former (Begg and Turner, 1976). The increased plant height might have favoured the plant to carry out the cell division, cell elongation and cell enlargement at a fasterrate resulting in the

differentiation of developing primordia into leaves resulting in maximum leaf area per plant. Water stress conditions make changes in the pattern of leaf growth and leaf ontogeny (Marc, 1981). The reduction of leaf area under unirrigated conditions might be due to the sensitivity of cell enlargement to moisture stress conditions leading to smaller area which is again in accordance with the findings of Unger (1983).

Sowing three days after irrigation (T3) has given maximum values for all the growth characters. The lesser plant density noticed in this treatment might have helped the plant to grow without much competition for light, water and space. But the dry matter production per unit area was significantly less (Table 1). Sowing one day after irrigation (T1) has recorded the highest dry matter production per unit area. The higher dry matter production might be due to the high plant density obtained as a result of optimum soil moisture at the time of sowing. The dry matter production in the late sowing treatments was also significantly lesser even though the per plant vegetative growth was quite high which can be due to low plant density and consequent larger land area per plant. Irrigation during vegetative phase (I1) and irrigation at vegetative as well as reproductive phases (I2) have shown same effect. However, it was significantly superior to treatments with no irrigation during growth phase (I0). It is again in conformity with the findings of Yousef *et «/.*, (2982).

The yield data presented in Table 1 reveal that it is significantly influenced by time of sowing, frequency of irrigation and their interactions. Sowing one day after irrigation (Tl) has produced significantly higher yield and was superior to all other treatments. The same treatment (Tl) has recorded maximum dry matter, seed weight per plant, 1000 seed weight and more number of seeds per capsule. All these parameters might have accounted for getting maximum seed yield in Tl treatment.

It was also observed that irrigation at vegetative phase (I1) and irrigation both at vegetative and reproductive phases (I2) have greater influence over all growth characters and yield attributes. This might have resulted and attributed for recording higher seed yield in I1 and I2 treatments and is in accordance with the findings of Sharma and Reddy (1983). It can be concluded that sowing the seeds one day after the initial irrigation and scheduling one irrigation vegetative phase or two irrigations one at vegetative and the other at the reproductive stages can give better results.

Rice Research Station
Kayamkulam 690 502, Kerala, India

Thomas **Mathew**
U. Mohammed **Kunju**

Table 1. Growth and yield as influenced by teatments

Treatments	No. of plants per plot at harvest	Plant height at harvest (cm)	Leaf area per plant (cm) at harvest	Dry matter production (kg/ha) at harvest	No. of capsules per plant	No. of seeds per capsule	Seed weight per plant (S)	1000 weed weight (g)	Seed yield per hectare (kg)
1	2	3	4	5	6	7	8	9	10
Time of sowing									
T0	164.8	95.6	485.8	900.0	78.0	54.4	3.47	3.29	265.0
TS	634.2	89.5	698.5	2769.1	49.4	55.8	2.74	3.30	729.6
T1	640.3	101.2	671.6	2976.0	54.7	57.0	2.83	3.30	785.0
T2	420.6	94.6	389.1	1830.7	73.9	55.9	3.47	3.29	398.8
T3	323.4	106.7	708.9	1458.2	80.5	57.0	3.63	3.29	386.6
T4	184.5	99.3	265.4	1064.5	73.5	50.5	3.20	3.29	276.8
T5	180.0	98.2	384.0	1070.8	61.5	51.0	2.52	3.29	275.1
T6	179.0	92.1	371.9	830.7	41.6	46.8	1.98	3.29	236.3
T7	155.6	94.2	412.4	612.8	42.3	48.2	2.02	3.29	164.0
T8	155.2	105.6	304.3	845.6	54.7	49.6	2.40	3.29	148.4
T9	182.8	101.0	489.8	808.2	48.3	52.1	2.14	3.29	148.4
CD (0.05)	7.5	3.8	98.1	68.3	6.2	3.6	1.87	NS	12.5
Frequency of irrigation									
I0	292.9	95.2	357.8	1258.2	49.81	49.6	2.20	3.29	293.5
I1	294.3	100.2	511.6	1438.1	65.7	54.5	3.05	3.30	373.6
I2	296.5	98.9	543.9	1440.3	64.1	53.6	3.04	3.29	373.1
CD (0.05)	NS	3.8	35.4	22.4	3.3	1.7	0.10	NS	4.7

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