

Table 2: Effect of paper factory effluent on available NPK and yield in rice

Treatments	Available N kg ha ⁻¹		Available P kg ha ⁻¹		Available K kg ha ⁻¹		Grain yield kg ha ⁻¹		Straw yield kg ha ⁻¹	
	Kar	Pishanam	Kar	Pishanam	Kar	Pishanam	Kar	Pishanam	Kar	Pishanam
Mean										
M ₁	378.0	382.0	43.3	74.7	95.0	163.0	6861.0	5306.0	8575.0	6627.0
M ₂	372.0	375.0	46.0	71.7	98.0	192.0	6750.0	5178.0	8426.0	6471.0
M ₃	381.0	387.0	40.0	73.7	116.0	256.0	7000.0	5283.0	8747.0	6596.0
S ₁	369.0	375.0	39.0	65.9	91.0	165.0	7117.0	5361.0	8893.0	6693.0
S ₂	377.0	383.0	47.0	81.2	133.0	273.0	6989.0	5417.0	8726.0	6769.0
S ₃	385.0	387.0	43.0	72.7	85.0	173.0	6506.0	4989.0	8128.0	6233.0
CD (P=0.05)										
M	NS	NS	3.3*	NS	NS	NS	NS	NS	NS	NS
S	NS	NS	NS	7.8**	22*	32**	489*	393*	607*	383*
M at S	NS	NS	NS	NS	NS	78**	NS	NS	NS	NS
S at M	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS

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METHOD OF SOWING AND WEED MANAGEMENT IN IRRIGATED SESAME IN RICE BASED SEQUENCE

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ABSTRACT

An experiment was conducted in a farmer's field with clay loam soil in Cauvery delta zone of Tiruchirapalli district during summer '93 and summer '95 to identify the effect of method of sowing and weed management practices on weed characters, growth and productivity of irrigated sesame grown in rice based cropping sequence. Sowing sesame early in summer (February) immediately after rice, in lines with a spacing of 30 cm x 30 cm with pre-emergence application of pendimethalin at 0.75 kg ha⁻¹ followed by one hand weeding on 30 DAS reduced the population of broad leaved weeds and grasses, reduced the weed dry matter and enhanced the crop growth, yield attributes and yield of sesame crop. This treatment also recorded the highest gross income of Rs. 19775, net profit of Rs. 13750 and benefit cost ratio of 3.28.

KEY WORDS: Method of sowing, Weed management, Sesame

In Tamil Nadu sesame is cultivated in an area of 0.15 million ha with a production of 0.05 million tonnes. Out of the total area, Cauvery delta zone accounts for 35.3 per cent. In this zone 61.0 per cent of the farmers are cultivating sesame in rice fallow in different rice based cropping sequences

depending upon the resources and also to meet the home need and cash flow. The major production constraints in sesame are weed menace, labour scarcity, lack of adequate plant population due to improper method of sowing and poor economic resource of the farmers. Method of sowing is

considered to be an important cultural practice to maintain optimum population and indirect method of weed management or low cost input in weed management. Weiss (1971) reported that slow initial growth of sesame seedlings made them poor competitors with more vigorous weeds and it was the most important to ensure that as many weeds as possible were destroyed at the early stage. Loss caused by weeds was estimated to range between 49 and 70 per cent in sesame (Ghosh and Mukhopadhyay, (1980). The present investigation was therefore undertaken to determine the best method of sowing, to suggest a suitable weed management practice and to identify the most economical method of sowing and weed management practice for sesame crop.

MATERIALS AND METHODS

The field experiment was conducted during summer season 1993 and 1995 in the farmer's field in Cauvery delta zone of Tiruchirapalli district in split-split-plot design with three replications. The treatments comprised of three cropping sequences viz., rice (June-Sep)-rice (Sep-Jan)-sesame (Feb-May) (S_1), rice (June-Sep)-rice (Sep-Jan)-blackgram (Jan-Apr)-sesame (Apr-Jul) (S_2) and rice (June-Sep)-rice (Sep-Jan)-fallow (Jan-Apr)-sesame (Apr-Jul) (S_3) in main plots, two methods of sowing viz., broadcasting (B_1) and line sowing (B_2) in sub plots and weed management practices viz., two hand weeding at 15 and 30 DAS (M_1), pre-emergence application of pendimethalin 0.75 kg a.i. ha⁻¹ followed by one hand weeding at 30 DAS (M_2), pre-emergence application of metolachlor at 0.75 kg a.i. ha⁻¹ followed by one hand weeding at 30 DAS (M_3) and unweeded check (M_4) in the sub-sub plots. Sesame was raised as irrigated crop during the month of February in S_1 and during April in S_2 and S_3 sequences after thorough land preparation of ploughing and levelling. In line sown crop of sesame a spacing of 30cm x 30cm was followed while in broadcast sown crop a plant population of 11 m⁻² was maintained. Pre-emergence application of pendimethalin and metolachlor was applied immediately after sowing with the help of knapsack sprayer fitted with flat fan nozzle using spray volume of 650 litres ha⁻¹. The herbicide application was subsequently followed by irrigation. The soil was clay loam having low available N, medium P₂O₅ and K₂O.

RESULTS AND DISCUSSION

Weed Spectrum

The weed flora in the sesame crop included 10 species of broad leaved weeds, three species of grasses and one species of sedge. Out of them, *Cleome viscosa*, *Euphorbia prostrata*, *Gynandropsis pentaphylla*, *Trianthema protulacastrum* (broad leaved weeds), *Echinochloa colonum*, *Panicum repens* (grasses) and *Cyperus rotundus* (sedge) were the dominant weeds.

Weed Characters

Sesame raised after rice crop (S_1) in lines (B_2), with pre-emergence application of pendimethalin followed by one hand weeding on 30 DAS (M_2) drastically reduced the total weed population per unit area and weed DMP at 30 and 60 DAS. This may be attributed to influence of weather parameters especially occurrence of low temperature during the month of February (S_1) against higher temperature during April (S_2 and S_3), manipulation of crops in terms of planting geometry helps in maintaining dominant position of crop over weed, effective and broad spectrum weed control by the herbicide pendimethalin. Higher weed control efficiency was achieved by pre-emergence application of pendimethalin followed by one hand weeding on 30 DAS (M_2) and was closely followed by hand weeding twice (M_1) which had the lowest weed index (Table 1).

Crop Growth and Yield Attributes

Sowing sesame early in the season (February) as in S_1 sequence, in lines (B_2) and pre-emergence application of pendimethalin followed by one hand weeding on 30 DAS (M_2) resulted in tallest plants with more LAI, number of primary and secondary branches plant⁻¹, number of capsules plant⁻¹ and number of seeds capsule⁻¹. Favourable environmental condition prevailed during the growing season of sesame, when sown immediately after rice, proper crop geometry in line sown crop and weed free condition provided by the pre-emergence application of pendimethalin followed by one hand weeding on 30 DAS resulted in better crop growth and yield attributes (Table 1).

Table 1. Effect of cropping Sequence, method of Sowing and weed management on weed characters, yield of irrigated sesame and economics

Treatments	Total weed population (No m ⁻²) 60 DAS		Weed dry matter (kg ha ⁻¹) 60 DAS		Weed Control Efficiency (%) 60 DAS		Weed Index		LAI (kg ha ⁻¹)		Seed yield		Economics B/C ratio	
	Sum '93	Sum '93	Sum '93	Sum '93	Sum '93	Sum '93	Sum '93	Sum '93	Sum '93	Sum '93	Sum '93	Sum '93	Sum '93	Sum '93
Cropping Sequences														
S ₁	3.97 (60.96)*	3.90 (56.13)	5.62 (344)	5.51 (313)	-	-	-	-	3.23	3.23	789	782	2.51	2.64
S ₂	4.02 (63.29)	3.96 (59.50)	5.74 (372)	5.62 (346)	-	-	-	-	3.16	3.15	701	666	2.23	2.22
S ₃	4.10 (68.04)	4.00 (62.09)	5.84 (412)	5.77 (392)	-	-	-	-	3.11	3.08	637	608	2.03	2.05
SEd	0.013	0.012	0.003	0.030	-	-	-	-	0.02	0.02	31	16	-	-
CD	0.04	0.03	0.01	0.08	-	-	-	-	NS	NS	87	44	-	-
Methods of Sowing														
B ₁	4.14 (69.53)	4.01 (63.59)	5.84 (411)	5.74 (382)	-	-	-	-	3.13	3.12	689	670	2.22	2.29
B ₂	3.92 (58.66)	3.90 (54.89)	5.62 (341)	5.53 (318)	-	-	-	-	3.20	3.18	730	700	2.30	2.32
SEd	0.019	0.006	0.004	0.012	-	-	-	-	0.02	0.003	13	12	-	-
CD	0.05	0.02	0.01	0.03	-	-	-	-	NS	NS	33	29	-	-
Weed Management Methods														
M ₁	3.61 (35.28)	3.60 (32.61)	5.17 (177)	5.07 (160)	76.00	77.40	3.60	2.57	3.26	3.27	874	863	2.55	2.62
M ₂	3.48 (31.00)	3.38 (29.78)	5.11 (168)	4.93 (139)	77.20	80.40	0.00	0.00	3.29	3.28	908	887	2.80	2.93
M ₃	4.19 (64.67)	4.03 (54.45)	6.05 (426)	5.98 (397)	41.90	43.80	16.03	17.50	3.17	3.16	758	712	2.44	2.45
M ₄	4.84 (125.40)	4.80 (120.10)	6.60 (734)	6.55 (705)	-	-	66.93	68.50	2.95	2.90	296	280	1.24	1.23
SEd	0.036	0.034	0.011	0.060	-	-	-	-	0.03	0.05	31	24	-	-
CD	0.07	0.07	0.02	0.12	-	-	-	-	0.05	0.10	64	49	-	-

* Original values are given in paranthesis

Grain Yield

The seed yield of sesame was significantly influenced by cropping sequences studied, method of sowing and weed management practices. Among the different cropping sequences sesame raised immediately after rice crop (S₁) recorded an increased yield of 88 kg ha⁻¹ and 116 kg ha⁻¹ over sesame grown after blackgram (S₂) during summer '93 and summer '95. These increases were significant. Line sowing (B₂) of sesame, accompanied with pendimethalin application (M₂) recorded significantly higher yield. Enhanced crop growth and higher yield attributes finally resulted in higher seed yield.

Economics

The combination of sowing sesame during February immediately after rice in S₁ sequence, in lines and protected by pre-emergence application of pendimethalin followed by one hand weeding on 30 DAS resulted in higher gross income of Rs. 19775, net profit of Rs. 13750 and benefit cost ratio of 3.28.

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