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Influence of sowing methods and weed management on sesame (*Sesamum indicum*) yield under irrigated condition

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ABSTRACT

A field experiment was conducted in 2002 and 2003 at Pandit Jawaharlal Nehru College of Agriculture and Research Institute, Karaikal with the objective of identifying the best method of sowing and testing the relative efficacy of different herbicides in comparison with the conventional weed management in sesame under irrigated condition. The results revealed that the seed yield was significantly influenced by methods of sowing and weed management in both the years. Higher seed yield of 654 and 639 kg ha^{-1} was obtained in line sowing method with a spacing of 30 x 30 cm during 2002 and 2003, respectively. Among the herbicides, pre-plant incorporation of fluchloralin 1.0 kg ha^{-1} along with one hand weeding (HW) on 30 DAS recorded significantly the highest seed yield of 758 and 745 kg ha^{-1} during 2002 and 2003, respectively followed by pre- emergence application of alachlor 1.25 kg ha^{-1} along with one HW at 30 DAS.

Key words : Sesame, sowing method, chemical weed control.

After the single crop rice, the farmers in the coastal deltaic region of Karaikal are raising summer rainfed sesame. They are incurring yield loss in sesame due to poor plant stand in broadcasted method of sowing, which they are adopting till now. Though, the conventional methods of weed control *viz.*, hand pulling/hand hoeing is very much effective, the high wages and non-availability of labour at critical stages often lead to late weeding and cause economic loss in terms of sesame yield in this region. In the present study, different methods of sowing and herbicidal control with hand weeding was tried to find solutions for the above said problems.

MATERIALS AND METHODS

The treatment combinations of the study consisted of two factors *viz.*, methods of sowing (M_1: Broadcasting; M_2: Line sowing –30 cm x 30 cm) and weed management methods (W_1: Hand weeding (HW) twice at 15 and 30 DAS; W_2:Pendimethalin 0.75 kg ha^{-1} (PE) + HW at 30 DAS; W_3: Fluchloralin 1.00 kg ha^{-1} (PPI) + HW at 30 DAS; W_4: Alachlor 1.25 kg ha^{-1} (PE) + HW at 30 DAS; W_5: Weed free; W_6: Unweeded check) All the treatments in this experiment was replicated thrice in factorial randomized block design (FRBD). The soil type of the experimental field was sandy clay loam with low status of available nutrients *viz.*, nitrogen (134.4 and 142.8 kg ha^{-1}), P_2O_5 (6.5 and 5.9 kg ha^{-1}) and K_2O (84.4 and 90.6 kg ha^{-1}) during 2002 and 2003, respectively. A common dose of 35:23:23 kg ha^{-1} of N, P_2O_5 and K_2O was applied to all the treatments. Sesame seeds (5 kg ha^{-1}) were sown as per the treatment in lines and broadcasting. A spacing of 30 cm between rows and 30 cm within rows was followed for line sowing. After sowing, the seeds were covered with soil. In broadcasting method, the required seeds were mixed with four times of its volume with dry sand and broadcasted uniformly in the treatment plots and covered with soil gently. The pre-emergence (PE) herbicides *viz.*, pendimethalin and alachlor were sprayed uniformly over the soil using high volume sprayer. The herbicides were sprayed on 3 DAS as per the treatment schedule. Fluchloralin was applied as a pre-plant incorporation in the soil before sowing of the seeds and irrigated immediately.

RESULTS AND DISCUSSION

Weed density

Methods of sowing significantly influenced the total weed density at 45 DAS. Maximum weed density m^{-2} was noticed in broadcasting (M_1) followed by line sowing (M_2) during 2002 and was found to be non-significant during 2003. The highest weed density in broadcasting method might be due to wider spacing among the plants, which induced the conducive microclimate for rapid development of weeds. This is in

accordance with the observations of Om Prakash *et al.* (2001). Grassy weeds dominated the sedges and broadleaved weeds in both the years. In 2002, among the herbicides tried, pre-plant incorporation (PPI) of fluchloralin at 1.0 kg ha^{-1} followed by one HW on 30 DAS (W_3) registered significantly the lowest total weed density. Likewise during 2003, the trend was more or less same as in first crop during 2002. However, fluchloralin 1.00 kg ha^{-1} (PPI) + HW at 30 DAS (W_3) and hand weeding (HW) twice at 15 and 30 DAS (W_1) were on par. HW twice on 15 and 30 DAS (W_1) was found significantly the second best among the weed management practices imposed in the study. Chemical weed control using fluchloralin was found to be time saving, easier and economical as compared to manual weeding (Singh *et al.* 2001).

Number of branches/ Plant

Of the two methods of sowing, line sowing (M_2) registered more number of branches $plant^{-1}$ (4.4 and 4.4 during 2002 and 2003, respectively) than to broadcasting method (M_1). Kavimani *et al.* (1998) and Pandey and Padhiar (1999) have also postulated that broadcasting method of sowing decreased the number of primary and secondary branches $plant^{-1}$ when compared to line sowing. In both the crops the weed control methods influenced the number of branches $plant^{-1}$. The highest number of branches $plant^{-1}$ was same (5.5) in weed free treatment (W_5) during both the years. It was followed by fluchloralin 1.0 kg ha^{-1} + hand weeding at 30 DAS (W_3) and registered 4.9 and 4.8 $plant^{-1}$ in 2002 and 2003, respectively. During 2002, HW twice at 15 and 30 DAS (W_1) and alachlor 1.25 kg ha^{-1} + HW at 30 DAS (W_4) was observed on par. Increased number of branches $plant^{-1}$ under fluchloralin as pre-plant incorporation fb. HW treatment might be due to the minimum weed count and better weed control efficiency that resulted in better crop growth performance.

Number of capsules/ Plant

The number of capsules $plant^{-1}$ was higher in line sowing and recorded 35.7 and 34.9 capsules when compared to broadcasting which registered 33.6 and 32.8 capsules $plant^{-1}$ during 2002 and 2003, respectively. Among the weed control methods tested, the treatment weed free (W_5) recorded the highest number of capsules $plant^{-1}$ (55.6 and 55.0 during 2002 and 2003, respectively). Among the herbicide treated plots, fluchloralin 1.0 kg ha^{-1} + hand weeding at 30 DAS (W_3) recorded 40.7 and 38.0 capsules $plant^{-1}$ during 2002 and 2003, respectively. Less number of capsules $plant^{-1}$ was produced in control plot (W_6), with 6.5 and 9.5 capsules in 2002 and 2003, respectively. Increased capsule number $plant^{-1}$ due to the application of fluchloralin fb. HW was also reported by many workers (Venkatakrishnan, 1998; Om Prakash *et al.*, 2001 and Punia *et al.*, 2001).

Number of seeds/ Capsule

The methods of sowing did not exert any effect in determining the number of seeds $capsule^{-1}$ during 2002, whereas in 2003, the line sowing (M_2) significantly registered the highest number of seeds $capsule^{-1}$ (45.9) as compared to broadcasting (44.9). However, the influence of method of sowing on seeds $capsule^{-1}$ was very negligible. The highest number of seeds $capsule^{-1}$ was observed in the weed free treatment (W_5) in both the years (54.3 and 55.0), while fluchloralin + hand weeding (W_3) and hand weeding twice (W_1) were on par in both the years of investigation. The weed management practices *viz.*, weed free (W_5), fluchloralin 1.0 kg ha^{-1} + HW at 30 DAS (W_3) and HW twice at 15 and 30 DAS (W_1) were found superior over others and they were in order of merit in controlling the weeds and thus influenced the number of seeds $capsule^{-1}$.

Seed yield

In both the years, the seed yield was significantly influenced by methods of sowing and weed management (Table 1). The higher seed yield of 654 and 639 kg ha^{-1} was obtained in line sowing method (30 x 30 cm) against broadcasting method during 2002 and 2003, respectively. Among the herbicides, fluchloralin 1.0 kg ha^{-1} as PPI along with HW at 30 DAS recorded significantly the highest seed yield of 758 and 745 kg ha^{-1} during 2002 and 2003, respectively followed by alachlor 1.25 kg ha^{-1} as PE along with HW on 30 DAS. The line sowing of sesame with pre-plant incorporation of fluchloralin 1.0 kg ha^{-1} fb HW on 30 DAS recorded the highest seed yield of 779 and 762 kg ha^{-1} during 2002 and 2003, respectively. Hence, it could be concluded that the integration of line sowing in square geometry of 30 cm x 30 cm spacing with fluchloralin 1.0 kg ha^{-1} followed by one HW on 30 DAS can be used to

Table 1 Influence of methods of sowing and weed management on weed density, branches, capsules, seeds and seed yield

Treatments	Weed density m^{-2} at 45 DAS		No. of branches $plant^{-1}$		No. of capsules $plant^{-1}$		No. of seeds $capsule^{-1}$		Seed yield (kg ha^{-1})	
	2002	2003	2002	2003	2002	2003	2002	2003	2002	2003
I. Methods of sowing										
M_1 : Broadcasting	5.6 (31.1)	6.6 (42.5)	3.4	3.4	33.6	32.8	44.7	44.9	624.0	609.0
M_2 : Line sowing	5.5 (29.6)	6.5 (42.1)	4.4	4.4	35.7	34.9	45.6	45.9	654.0	639.0
S.Ed	**0.04**	**0.04**	**0.09**	**0.07**	**0.34**	**0.19**	**0.45**	**0.46**	**11.54**	**9.99**
CD (P=0.05)	**0.1**	**NS**	**0.2**	**0.2**	**0.7**	**0.4**	**NS**	**1.0**	**23.9**	**20.7**
II. Weed management methods										
W_1: HW twice	5.5 (30.3)	6.4 (41.1)	4.3	4.3	37.2	36.7	46.7	47.2	704.0	693.0
W_2 : Pendimethalin + HW	6.8 (45.9)	7.7 (58.8)	3.7	3.6	31.7	31.2	41.3	41.9	615.0	597.0
W_3 : Fluchloralin + HW	4.8 (22.9)	6.4 (40.2)	4.9	4.8	40.7	38.0	48.2	48.2	758.0	745.0
W_4: Alachlor + HW	6.2 (37.8)	7.1 (49.5)	4.0	4.0	36.2	32.8	44.5	45.2	678.0	668.0
W_5: Weed free	0.7 (0.0)	0.7 (0.0)	5.5	5.5	55.6	55.0	54.3	55.0	824.0	807.0
W_6: Unweeded check	9.2 (85.0)	11.0 (120.0)	1.2	1.2	6.5	9.5	36.0	34.8	254.0	235.0
S.Ed	**0.06**	**0.06**	**0.16**	**0.13**	**0.58**	**0.32**	**0.79**	**0.79**	**19.99**	**17.31**
CD (P=0.05)	**0.1**	**0.1**	**0.4**	**0.3**	**1.2**	**0.7**	**1.6**	**1.7**	**41.5**	**35.9**
M x V	**NS**	**NS**	**NS**	**0.4**	**1.7**	**1.0**	**NS**	**NS**	**NS**	**NS**

NS Not Significant

obtain economically higher seed yield in sesame during summer season (Feb-May) under irrigated condition in Karaikal region at the tail end of Cauvery delta zone. Higher seed yield of sesame by the application of fluchloralin fb. HW in row spacings was also reported by Sootrakar *et al.* (1995); Venkatakrishnan (1998); Om Prakash *et al.* (2001); Punia *et al.* (2001) and Singh *et al.* (2001).

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