



Integrated weed management in sesame

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ABSTRACT

A field experiment was conducted to find out the most effective control measure for weeds in sesame (*Sesamum indicum* L.) under rainfed condition. Result showed that two hand weeding (weed free) recorded lowest weed population and dry weight which was significantly superior over rest of the treatments. Application of quizalofop-ethyl 10.05 kg/ha + 1 HW proved most effective and also recorded lower population and dry weight of weeds followed by trifluralin 0.75 kg/ha + 1 HW and pendimethalin 0.75 kg/ha + 1 HW. Weed control efficiency and seed yield was higher under quizalofop-ethyl 0.05 kg/ha + 1 hand weeding as compared to other weed control treatments.

Key words: Herbicides, Integrated weed management, Sesame, Weed control efficiency, Weed flora

India is the world's largest producer of sesame accounting nearly 35% of the total production but its productivity is extremely low (368 kg/ha). Inadequate weed management appears to be one of the major constraints for such low productivity of sesame. Being a slow growing crop during seedling phase, weeds affect the growth of sesame and reduced the yield. The period from 15 and 30 DAS is the most critical period of crop weed competition in sesame (Venkatakrisnan and Gnanamurthy 1998). In oil seed crops, yield loss due to weed competition varied from 16 to 68% (Varaprasad and Shanti 1993). Hand weeding is commonly practiced by the farmers as an effective method of weed control but incessant rain, high wages and timely unavailability of labourers at weeding peaks are also some of constraints. Therefore, integrated weed management (manual as well as chemical weeding) is most efficient and acceptable approach to combat with the weed control problems. Hence, present study was under taken.

MATERIALS AND METHODS

Field studies were conducted during rainy season of 2009 and 2010 at RVSKVV, College of Agriculture, Farm, Gwalior. The soil of the experimental was sandy loam with (7.97 P^H), available N 237 kg/ha, P₂O₅ 23.73 kg/ha and K₂O 477.22 kg/ha. There were Ten treatments (Table 1). The experiment was laid down in randomized block design with three replications. Sesame variety 'JT 8' was sown on 25th July during 2009 and 23rd July 2010 in row 30 cm apart, using 5 kg/ha seeds. Crop was fertilized 40 kg N, 30 kg P₂O₅ and 20 kg K₂O as basal dose. The N,P and K nutrients were applied through urea, diamolium phos-

phate (DAP) and muriate of potash, respectively. Trifluralin was incorporated in depth of 2-3 cm top soil layer before sowing, pendimethalin as pre-emergence and quizalofop-ethyl was applied at 20 DAS with hand knapsack sprayer fitted with flat fan nozzle at spray volume of 800 l/ha. Weed density and weed dry weight were recorded at 30, 60 DAS and harvest stage with the help of 0.5 x 0.5 m quadrate by throwing randomly at three places in each plot. Weeds were removed and counted species wise. After drying in hot air oven (60±1°C for 24 hours), weed dry weight was recorded and reported as per square meter. Weed control efficiency was also calculated as suggested by Maity and Mukherjee (2011). The economics was calculated on the basis of prevailing market rates of agriculture produced and cost of cultivation treatments wise.

RESULTS AND DISCUSSION

Effect on weeds

Among the weed flora, *Phyllanthus niruri*, *Commelina benghalensis*, *Digera arvensis*, *Cyperus rotundus*, and *Echinochloa crusgalli* were recorded. All the weed control treatments proved significantly effective in reducing the population and dry weight of weeds as compared to weedy check. Two hand weeding (at 15 and 30 DAS) significantly reduced weed population at 30, 60 DAS and harvest stage over rest of treatments. Although, this treatment was found on par with quizalofop-ethyl in combination with one hand weeding in case of weed dry weight. Yadav (2004) also reported lowest weed dry matter and highest weed control efficiency under pre-emergence application of pendimethalin 0.5 kg/ha + 1 HW at 40 DAS. Among integrated weed management practices, quizalofop-ethyl + 1 HW produced lower weed popula-

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tion which was significantly superior over remaining treatments except trifluralin and pendimethalin with one hand weeding. Whereas, they were also on par among themselves. Among alone herbicides, quizalofop-ethyl recorded lowest value of weeds population, which was at par with trifluralin and both were significantly superior over pendimethalin. Weed control efficiency of treatments varied from 61.3 to 95.6%. Two hand weeding at 15 and 30 DAS resulted in higher value of weed control efficiency followed by quizalofop-ethyle + 1 HW, trifluralin + 1 HW and pendimethalin + 1 HW at 30 DAS. Sootrakar *et al.* (1995) also reported that HW 3 times (25, 40 and 55 DAS) resulted in the lowest weed counts and the highest weed control efficiency (98.8%). Weed control treatment may

be attributed to kill and check the growth of weeds due to application of herbicides resulting in reduction in dry matter and increased weed control efficiency. Similar, finding was also reported by Chauhan and Gurjar (1998).

Effect on crop

All the weed control treatments produced significantly more capsules/plant, seed/capsule, test weight and seed yield kg/ha than weedy check. Two hand weeding at 15 and 30 DAS resulted in significantly highest value in capsules/plant, test weight and seed yield over rest of the treatments. Although this treatment was found on par with trifluralin + 1 HW and quizalofop-ethyle + 1 HW in case of seeds per capsule. Narkhede (2000) observed that cul-

Table 1. Effect of weed control treatments on weed population, weed dry matter and weed control efficiency (%) in sesame (pooled data of two years)

Treatment	Dose (kg/ha)	Weed population (no./m ²)			Weed dry weight (g/m ²)	Weed control efficiency (%)
		30 DAS	60 DAS	Harvest		
Trifluralin (PPI)	0.75	29.8	17.3	13.8	60.4	66.7
Pendimethalin (PE)	0.75	44.8	25.9	17.2	70.2	61.3
Quizalofop-ethyl at 20 DAS	0.05	28.4	17.5	13.4	63.1	65.2
Trifluralin + 1 HW at 30 DAS	0.75	6.8	8.8	5.5	34.2	81.2
Pendimethalin + 1 HW at 30 DAS	0.75	10.5	10.8	7.8	42.5	76.6
Quizalofop-ethyl + 1 HW at 30 DAS	0.05	7.5	7.2	4.2	28.5	84.3
Trifluralin + one hoeing at 30 DAS	0.75	15.4	11.7	8.2	51.16	71.9
Pendimethalin + one hoeing at 30 DAS	0.75	18.3	13.6	10.3	53.9	70.3
Weed free (2 HW at 15 and 30 DAS)	-	4.4	2.7	2.1	8.0	95.6
Weedy check	-	109.9	86.3	51.2	181.4	0.0
LSD (P=0.05)		2.25	2.14	1.37	21.0	-

Table 2. Effect of different weed control treatments on yield attributes, yields, net returns and B:C ratio of sesame (pooled data of two years)

Treatment	Dose (kg/ha)	No. of capsules/plant	No. of seeds/capsule	Test weight (g)	Seed yield (t/ha)	Net returns (x10 ³ ₹/ha)	B:C ratio
Trifluralin (PPI)	0.75	25.4	48.8	2.46	0.65	19.50	2.90
Pendimethalin (PE)	0.75	25.5	49.8	2.39	0.61	17.02	2.59
Quizalofop-ethyl at 20 DAS	0.05	28.2	50.6	2.48	0.65	18.59	2.68
Trifluralin + 1 HW at 30 DAS	0.75	33.3	52.4	2.71	0.88	28.74	3.46
Pendimethalin + 1 HW at 30 DAS	0.75	29.4	51.4	2.65	0.81	24.70	3.04
Quizalofop-ethyl + 1 HW at 30 DAS	0.05	34.0	52.6	2.70	0.88	27.84	3.23
Trifluralin + one hoeing at 30 DAS	0.75	27.6	49.4	2.57	0.75	23.39	3.12
Pendimethalin + one hoeing at 30 DAS	0.75	28.2	48.9	2.55	0.72	21.26	2.85
Weed free (2 HW at 15 and 30 DAS)	-	38.1	54.4	2.77	0.99	31.98	3.42
Weedy check	-	20.3	41.8	2.25	0.41	9.79	2.06
LSD (P=0.05)		1.78	2.50	0.05	0.04	-	-

tural practices *i.e.* two hand weeding and hoeing in sesame significantly gave higher seed yield than rest of the integrated weed management practices. Among integrated weed management practices, quizalofop-ethyle with one HW produced higher number of capsules/plant, seeds/capsule, test weight and seed yield kg/ha which were statistically at par with trifluralin with 1 HW followed by pendimethalin + 1 HW treatments. Among herbicide alone, quizalofop-ethyle recorded significantly higher number. of capsules/plant over treatments trifluralin and pendimethalin. However, this treatment was on par with trifluralin in case of test weight and seed yield kg/ha. While in case of seeds/capsule, the affect was found to be non-significant. Application of herbicide and cultural practices resulting in reduced crop weed competition and creating good environment for better growth of the plant which gave higher yield of sesame. These results are in conformity with the findings of Sootrakar *et al.* (1995)

Monetary returns

All the weed control treatment gave higher monetary returns compared to weedy check because of reduced crop weed competition. Saharia and Bayon (1996) recorded that in sesame integrated control resulted in an increased in net return (₹ 4396/ha) as compare to no weeding. Two hand weeding at 15 and 30 DAS resulted highest net return (₹ 31980/ha) followed by trifluralin 0.75 kg/ha - + 1 HW, quizalofop-ethyl 0.05 kg/ha + 1 HW and pendimethalin 0.75 kg/ha + 1 HW While B:C ratio was higher under trifluralin 0.75 kg/ha + 1 HW (3.46) *fb* 2 HW at 15 and 30 DAS and quizalofop-ethyl 0.05 kg/ha + 1 HW at 30 DAS because cost of treatment of trifluralin + 1 HW at 30 DAS

was lower as compared to 2 HW at 15 and 30 DAS treatment. Narkhede *et al.* (2000) obtained similar results.

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