Indian J. Weed Sci. **37** (1 & 2) : 133-134 (2005) *Short Communication*

Effect of Sowing Method and Weed Control Practices on Production Potential of Sesamum (*Sesamum indicum*) Based Intercropping System under Rainfed Condition

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Poor establishment of sesame due to rains, weed infestation and poor fertility management are some of the reasons for lower yield. Since the initial growth rate of sesame is slow, it is subjected to weed competition at the very early stage. Losses in sesame crop due to weeds are reported to be as high as 50-70% (Ghosh and Mukhopadhyaya, 1980). Intercropping with legume provides insurance against uncertainty. A suitable sowing method is the critical factor for realizing potential yield from intercropping (Sarkar *et al.*, 2003). Hence, the present study was undertaken to identify sowing method and weed control practice appropriate for sesame based intercropping system under rainfed condition.

A field experiment was conducted during **kharif** seasons of 2003 and 2004 under rainfed condition at the Oilseeds Research Station, Kangra, Himachal Pradesh. The soil was silty loam having pH 6.2. The treatments consisted of combinations of two cropping systems (sesame sole and sesame+blackgram), two sowing methods (broadcast and line sowing) and four weed control practices (weedy, two hand weedings at 20 and 40 DAS, alachlor at 1.5 kg ha^{-1} and alachlor at 1.5 kg ha^{-1} plus one hand weeding). In all, 16 combination treatments plus one additional sole blackgram treatment were tested in randomized block design with three replications. Sesame variety 'Brajeshwari' and blackgram variety 'UG 218' were sown on July 7, 2003 and July 2, 2004. In broadcast method of intercrop sowing the seeds of both crops on 50% area basis were mixed and spread uniformly. In line sowing, one row of sesame followed by one row of blackgram both 30 cm apart were planted behind plough. The herbicides were applied as pre-emergence in 600 l ha^{-1} spray volume. The fertilizer to sesame sole and intercropping was applied uniformly at 60 kg N, 40 kg P_2O_5 and 30 kg K_2O ha^{-1}.

The dominant weed flora of the experimental field included grassy weeds like *Panicum dichotomiflorum* (35%), *Echinochloa colonum* (25%), *E. crusgalli* (10%), *Cynodon dactylon* (10%) and sedges (15%) like *Cyperus iria* and *C. diformis*. Intercropping in sesame with blackgram significantly reduced the weed density (53.3%) and weed dry matter accumulation (51.3%) over sole sesame cropping (Table 1).This may be attributed to smothering effect of legume on weeds. Sowing of crops in line significantly decreased (19.8%) the weed number compared to broadcast method of sowing. Alachlor at 1.5 kg ha^{-1} plus one hand weeding recorded the lowest weed density (21.4 m^{-2}) and weed dry matter (8.5 g m^{-2}). Two hand weedings at 20 and 40 DAS decreased the weed density and dry matter accumulation by 57.5 and 60.4%, respectively, over weedy check.

The seed yield of sesame in sole cropping was significantly higher (31.6%) than that recorded in intercropping (Table 1). Sowing of sesame crop in line resulted in yield increase of 10.6% over broadcast sowing method. Highest seed yield (283.8 kg ha^{-1}) was obtained with alachlor at 1.5 kg ha^{-1} plus one hand weeding which was at par with alachlor at 1.5 kg ha^{-1} alone. Intercropping in sesame increased the total productivity by 197% over sole sesame cropping (Table 1). Total productivity did not differ significantly with various methods of sowing. Alachlor at 1.5 kg ha^{-1} plus one hand weeding resulted in highest total productivity (604.7 kg ha^{-1}). Alachlor at 1 .5 kg ha^{-1} alone and two hand weedings (20 and 40 DAS) were at par with respect to total productivity.

Pooled economic evaluation showed that by

spending just Rs. 430 per hectare more on intercropping, a net return of Rs. 18,814 ha^{-1} was obtained as compared to sole sesame cropping (Rs. 2,644 ha^{-1}). Broadcast method of sowing increased the net return by Rs. 578 ha^{-1} over line sowing due to saving of labour charges in sowing. Alachlor at 1.5 kg ha^{-1} plus one hand weeding gave the highest net return (Rs. 12,984 ha^{-1}) followed by alachlor alone (Rs. 11, 727 ha^{-1}).

Table 1. Effect of treatments on weeds and the crops (Mean of two seasons)

Treatment	Weed density (No. m^{-2})	Weed dry weight (g m^{-2})	1000-grain weight (g)		Seed yield (kg ha^{-1})		Sesame equivalent yield (kg ha^{-1})	Cost of production (Rs. ha^{-1})	Net returns (Rs. ha^{-1})
			Main crop	Intercrop	Main crop	Intercrop			
Cropping systems									
Sesame sole	8.2 (73)	5.2 (28)	1.98	-	263	-	263	5776	2644
Sesame+blackgram	5.4 (34)	3.5 (14)	1.93	34.3	200	665	782	6206	18814
LSD (P=0.05)	0.74	0.5	0.39		17		39		
Sowing methods									
Line sowing	6.4 (48)	4.1 (19)	1.96	34.4	243	648	527	6416	10440
Broadcast	7.2 (60)	4.6 (23)	1.95	34.3	220	682	518	5566	11018
LSD (P=0.05)	0.74	NS	0.39		17		NS		
Weed control									
Weedy check	10.4 (111)	6.6 (44)	1.88	33.2	152	599	414	5376	7875
Hand weeding 20 & 40 DAS	6.4 (47)	3.9 (17)	1.94	34.3	230	664	521	6350	10329
Alachlor 1.5 kg ha^{-1}	5.8 (35)	3.8 (14)	1.98	35.0	260	663	550	5875	11727
Alachlor 1.5 kg ha^{-1} + one hand weeding	4.6 (21)	3.0 (9)	2.03	34.9	284	734	605	6365	12984
LSD (P=0.05)	1.1	7.6	0.06		25		55		

Figures in parentheses are original values. NS–Not Significant.

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