



Economical assessment of critical period for crop-weed competition in rainfed sesamum (*Sesamum indicum*)

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Abstract : A field experiment was conducted during 2010-11 and 2011-12 at Oilseed Research Station, Mamurabad farm, Jalgaon (M.S.) to assess critical period of crop-weed competition and find out ideal weeding time for rain fed sesamum. The results revealed that, 15 to 30 DAS were more crucial and critical period for crop-weed competition. Minimum loss (16.71%) was observed with weeding at 30 DAS and produced significantly more yield (553kg ha⁻¹) than weeding at 45 and 60 DAS. It also increased net monetary return (Rs 14332 ha⁻¹) and B:C ratio (1.86) which indicated that, hand weeding at 30 DAS economically more feasible than other growth stages for rainfed sesamum in the region.

Key Words : Sesamum, Crop-weed competition, Economics

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INTRODUCTION

Sesamum (*Sesamum indicum*) is one of the most important *Kharif* oilseed crop cultivated in Maharashtra under rainfed condition. It covers an area of 0.56 million ha with an annual production of 0.15 million tones and productivity of 268 kg ha⁻¹ (Damodaran and Hegade, 2010). In rainy season, weed emerges in succession almost throughout crop season. During seedling stage most of monocot and dicot weed suppress the growth of crop. Change in atmospheric CO₂, rainfall and temperature affect weed biology and their distribution or new weeds become problematic (Naidu, 2010). The critical period of crop-weed competition is an important principle of integrated weed management (Rao and Nagamani, 2010). It is period during which weed must be controlled and yield loss were never compensate by controlling weed below or beyond that period. Information pertaining to these aspects is not available on sesamum crop for the region. Under changing socio-economic situation in villages, economic evaluation of crop-weed competition had getting an importance. Hence, the experiment was conducted to assess critical period of crop-

weed competition in sesamum and find out ideal weeding time that will become economically more feasible for rain fed sesamum.

MATERIAL AND METHODS

The field experiment was conducted during the *Kharif* season of 2010-11 and 2011-12 at Oilseed Research Station, Mamurabad farm, Jalgaon(M.S.) under rainfed condition. The total rainfall received during growing season was 618 mm. The experimental site was deep black soil, clayey and moderately alkaline in reaction. The available soil N, P and K were 235.79, 23.30 and 345 kg ha⁻¹ respectively. The experiment was laid out in Randomized Block Design with 10 treatments (Table 1) replicated thrice. The sesamum variety JLT-7 (Tapi) was sown with spacing of 30 x 10 cm. The recommended dose of 50 kg N through urea was applied. Weed flora present in experimental field was dominated by broad leaves weed viz., *Amaranthus spinousa*, *Amaranthus polygamous*, *Euphorbia geniculata*, *Euphorbia hirta*, *Euphorbia thymifolia*, *Achyranthus aspera*, *Commelina bengalensis*, *Celosia argentia*, *Bidense pilosa* etc. Weed

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intensity was calculated with one square meter quadrat, before hand weeding in specified treatment and same was followed for other treatment at harvesting stage. The weed control efficiency (WCE) in terms of weed dry weight was worked out based on following formula:

$$\text{Weed control efficiency (WCE) \%} = \frac{\text{DMc} - \text{DMt}}{\text{DMc}} \times 100$$

where, DMc=Dry wt. of weed in unweeded control, DMt= Dry wt. of weed in treatment plot. The seed yield was worked out at final stage and economics of the treatment were worked out. The data were pooled over the season and presented in Table 1.

RESULTS AND DISCUSSION

Weed density and dry weight of weed was significantly more in un-weeded control during both season as well as when data were pooled over the season (Table 1). It was

observed that, weeding at 15 and 30 DAS significantly reduced weed intensity and dry weight of weed than weeding at 45 and 60 DAS and recorded higher weed control efficiency during both season and in pooled data. Baskaran *et al.* (2010) reported similar result with pre-emergence herbicidal application+ handweeding at 30 DAS in sesamum. Joseph *et al.* (2006) also observed significant reduction in weed intensity, weed dry matter and achieving high weed control efficiency than un-weeded control in sesamum and Srinivasrao *et al.* (2011) in groundnut due to lesser weed infestation and dry matter accumulation. It was also observed that, keeping field weed free up to 45 and 60 DAS significantly reduced weed intensity and dry weight of weed which reflect in improving weed control efficiency by 69.41 % to 74.43%.

Significantly higher seed yield was recorded with keeping weed free field throughout season (664kg ha⁻¹) and was at par with weed free period of 30,45,60 DAS and weeding at 30 DAS (Table 2). Keeping the field weed free during period of 5 to 6

Table 1 : Effect of weed management practices on weed density (number m⁻¹), total weed dry matter (g) and weed control efficiency (%) under rainfed condition in sesamum

Treatments	Weed density (number m ⁻¹)			Total weed dry matter (gm)			Weed control efficiency (%)		
	2010-11	2011-12	Pooled	2010-11	2011-12	Pooled	2010-11	2011-12	Pooled
T ₁ - Un-weeded control	92.33	87.61	89.97	852.90	874.38	863.64	--	--	--
T ₂ -Weeding at 15 DAS	55.00	46.81	50.91	324.54	309.14	316.84	61.94	64.64	63.29
T ₃ - Weeding at 30 DAS	57.67	57.48	57.58	376.70	386.24	381.47	55.76	55.82	55.79
T ₄ - Weeding at 45 DAS	72.67	70.60	71.64	442.56	445.21	443.89	48.22	49.08	48.65
T ₅ - Weeding at 60 DAS	78.00	83.62	80.81	498.11	484.25	491.18	41.50	44.62	43.06
T ₆ -Keeping weed free at 15 DAS	67.33	66.59	66.96	419.91	516.23	468.07	51.11	40.96	46.04
T ₇ - Keeping weed free at 15 DAS	50.33	47.63	48.98	228.47	415.20	321.84	61.55	52.51	57.03
T ₈ - Keeping weed free at 15 DAS	35.00	29.36	32.18	257.48	271.59	264.54	69.88	68.93	69.41
T ₉ - Keeping weed free at 15 DAS	24.33	18.21	21.27	218.28	224.38	221.33	74.52	74.33	74.43
T ₁₀ -Weed free (Throughout season)	--	--	--	--	--	--	100.00	100.00	100.00
S.E. ±	5.76	6.02	5.89	25.23	24.72	24.98	--	--	--
C.D. (P=0.05)	17.11	17.88	17.50	74.91	73.40	74.15	--	--	--

Table 2 : Effect of weed management practices on seed yield (kg ha⁻¹), net monetary return (Rs ha⁻¹) and B:C ratio of sesamum under rainfed condition

Treatments	Seed yield (kg ha ⁻¹)			Net monetary return (Rs ha ⁻¹)			B:C ratio		
	2010-11	2011-12	Pooled	2010-11	2011-12	Pooled	2010-11	2011-12	Pooled
T ₁ - Un-weeded control	292	259	276	2642	1422	2032	1.20	1.10	1.15
T ₂ -Weeding at 15 DAS	494	461	478	11252	10699	10976	1.71	1.67	1.69
T ₃ - Weeding at 30 DAS	566	540	553	14530	14133	14332	1.88	1.84	1.86
T ₄ - Weeding at 45 DAS	388	362	375	4221	3290	3755	1.25	1.16	1.21
T ₅ - Weeding at 60 DAS	294	299	297	-1462	-182	-1644	0.92	0.99	0.96
T ₆ -Keeping weed free at 15 DAS	477	436	457	10203	9405	9804	1.63	1.57	1.60
T ₇ - Keeping weed free at 15 DAS	639	637	638	17445	19046	18246	1.99	2.06	2.03
T ₈ - Keeping weed free at 15 DAS	643	648	646	17165	18734	17950	1.94	1.99	1.97
T ₉ - Keeping weed free at 15 DAS	657	656	657	17335	18348	17842	1.92	1.92	1.92
T ₁₀ -Weed free (Throughout season)	665	662	664	17375	18496	17936	1.92	1.93	1.93
S.E. ±	46.84	22.48	34.66	2314	2920	2630	0.14	0.065	0.10
C.D. (P=0.05)	139.09	64.50	101.80	6873	8385	7629	0.40	0.19	0.29

week is very crucial for realizing higher yield and fertilizer use efficiency of soybean (Nagaraju and Mohankumar, 2009). Data also indicated that, weeding at 15,45,60 DAS and un-weeded control reduced sesamum yield by 28.01%, 43.52%, 55.27% and 58.73%, respectively over throughout weed free treatment. Among hand weeding treatment, minimum loss (16.71%) was observed with weeding at 30 DAS, yields 553kg ha⁻¹ which was significantly more than weeding at 45 and 60 DAS. During seedling phase dicot weeds like *Celosia argentea*, *Amaranthus* spp., *Commelina bengalensis* might be compete with the crop plant for nutrient, water and space which suppress crop growth and reflected in yield loss. Delayed in weeding ie weeding at 45 and 60 DAS increased weed intensity, weed dry matter accumulation (Table 1), thereby increasing crop-weed competition and reduced seed yield. Keeping field weed free up to 30 DAS significantly increased net monetary return and B:c ratio (Table 2) which was at par with keeping field weed free throughout season, 45, 60 DAS and hand weeding at 30 DAS (Rs. 14332ha⁻¹ and 1.86, respectively) mainly due to increased in yield of sesamum.

Thus, the present study revealed that, 15 to 30 DAS are more crucial and critical period of crop-weed competition, hand weeding at 30 DAS economically more feasible than weeding at 15,45 and 60 DAS for rainfed Sesamum in the region.

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 ★★★★★ of Excellence ★★★★★

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