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Productivity and Economics of Summer Groundnut (*Arachis hypogaea*) Cultivation as Influenced by Weed Management Practices

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Weed infestation is an important limiting factor in achieving potential productivity of groundnut (*Arachis hypogaea* L.) especially of bunch type varieties which have prostrate growth and consequently poor competitive ability. Unlike other crops, weeds interfere with pegging, pod development and harvesting of groundnut during different stages of crop growth besides competing for essential resources. Therefore, weeding has to be completed before pegging. Heavy yield losses due to weeds have been reported (Prusty *et al.*, 1990; Gnanamurthy and Balasubramaniyan, 1998). In Punjab, summer cultivation of bunch type varieties has been recommended due to their higher yield potential and lower incidence of diseases, particularly bud necrosis. However, in the groundnut growing areas, weeds particularly *Commelina benghalensis* are hindrance. Since cost of seeds is very high in groundnut and investment on manual weeding further reduces the profit margin, a viable and economic weed control strategy is required. Hence, this investigation was carried out at the Punjab Agricultural University, Ludhiana on loamy sand soil testing low in organic carbon, medium in available phosphorus and potassium. Agronomic practices recommended for the state by Punjab Agricultural University, except for treatments, were adopted.

The study comprised 16 treatments involving various doses of six herbicides, two hand hoeings at three and six weeks after sowing and weedy check allocated in randomized block design with three replications (Table 1). Trifluralin and fluchloralin were applied as pre-plant incorporation, whereas oxyfluorfen, pendimethalin, alachlor and linuron were applied as pre-emergence. Spanish bunch type groundnut variety SG 99 was sown on May 15, 2004 at a spacing of 30 x 15 cm. The gross plot size was 4.6 x 3.6 m and the net plot size was 4.0 x 3.0 m. *Eleusine verticillata* (48.6%), *Cyperus rotundus* (29.4%), *Cammelina benghalensis* (16.8%) and *Cynodon dactylon* (5.2%) comprised the dominant weed population.

All the weed control treatments significantly reduced the weed population at 30 days after sowing (DAS) and at harvest and weed dry matter recorded at harvest (Table 1). At 30 DAS, treatment comprising two hand hoeings (only one hand hoeing was given at 21 DAS upto this stage) resulted in significantly lowest weed population. Among herbicides, pre-plant application of trifluralin at 1.25 kg ha^{-1} resulted in lowest weed density which was at par with pre-emergence application of alachlor but significantly superior to all other herbicides (Table 1). At harvest different doses of herbicides failed to significantly influence the population and dry matter production of weeds. Oxyfluorfen at 0.75 kg ha^{-1}, trifluralin at 1.25 kg ha^{-1} and fluchloralin at 0.675 kg ha^{-1} recorded significantly lower dry matter than oxyfluorfen at 0.25 and 0.50 kg ha^{-1}, pendimethalin at 1.0 kg ha^{-1}, linuron at 0.75, 1.0 and 1.25 kg ha^{-1} and alachlor at 3.125 kg ha^{-1} but were at par with two hand hoeings. *E. verticillata* population was reduced to a great extent by herbicides except linuron. The most effective control of *C. benghalensis* was observed with higher dose of fluchloralin and both the doses of alachlor. Linuron at 0.75-1.0, alachlor at 2.50-3.125 and trifluralin at 1.25 kg ha^{-1} provided better control of *C. rotundus*, whereas *C. dactylon* population was lower with

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Table 1. Influence of treatments on weeds, pod yield and oil content and economics of groundnut

Herbicide	Dose (g ha^{-1})	Weed population (No. m^{-2})		Dry matter of weeds (g m^{-2}) at harvest	Pod yield (kg ha^{-1})	Oil content (%)	Net income (Rs. ha^{-1})	B : C ratio
		35 DAS	At harvest					
Oxyfluorfen**	0.25	7.2 (52)	5.4 (29)	52.5	2670	51.2	21464	1.35
	0.50	7.6 (58)	5.3 (27)	40.0	2650	52.1	20670	1.26
	0.75	7.6 (57)	4.8 (23)	18.4	2420	51.6	17005	1.01
Trifluralin*	1.00	7.4 (54)	4.9 (24)	32.6	2560	51.4	19575	1.21
	1.25	5.8 (33)	4.2 (17)	17.4	2630	51.4	20336	1.24
Pendimethalin**	0.75	8.1 (65)	4.6 (22)	31.3	2740	52.0	22004	1.34
	1.00	7.5 (55)	3.9 (14)	42.2	2370	51.4	16482	0.99
Linuron**	0.75	8.9 (79)	4.3 (18)	42.6	2100	51.2	13416	0.84
	1.00	7.6 (57)	4.0 (15)	44.8	2090	51.4	14044	0.87
	1.25	8.9 (79)	4.2 (17)	39.4	2090	52.0	12844	0.78
Fluchloralin*	0.675	8.2 (66)	4.5 (19)	19.5	2380	51.8	17360	1.08
	0.750	7.4 (55)	4.1 (17)	22.4	2930	52.3	24896	1.55
Alachlor**	2.50	6.7 (44)	4.7 (21)	33.2	2730	51.3	21532	1.29
	3.125	6.5 (41)	5.0 (25)	51.7	2560	51.8	18785	1.10
Two hand hoeings	3 & 6 WAS	3.9 (15)	3.9 (15)	32.0	3190	51.9	25158	1.29
Weedy	-	11.6 (135)	6.7 (45)	152.5	1850	52.1	10641	0.69
LSD (P=0.05)		1.1 (33)	1.1 (NS)	17.0	0450	NS	06521	0.40

*Applied as pre-plant incorporation.

**Applied as pre-emergence.

NS–Not Significant.

Figures in parentheses are original values.

trifluralin at 1.0-1.25, pendimethalin at 1.0 and linuron at 1.0-1.25 kg ha^{-1}.

Effect of different weed control treatments on yield attributes and oil content was non-significant. However, pod yield was significantly influenced by different treatments (Table 1). The highest pod yield (3190 kg ha^{-1}) obtained with two hand hoeings was 72% higher than weedy check and significantly superior to all treatments except fluchloralin at 0.75 and pendimethalin at 0.75 kg ha^{-1}. Oxyfluorfen and linuron caused phytotoxicity to groundnut plants but in case of oxyfluorfen, the plants recovered in due course of time. Phytotoxicity increased with increasing dose of herbicides. Ghosh (2000) also reported similar observation for oxyfluorfen at 0.2 kg ha^{-1}.

Two hand hoeings resulted in the highest net income (Rs. 25158 ha^{-1}) followed by fluchloralin at 0.75 kg ha^{-1} (Rs. 24896 ha^{-1}). However, B : C ratio was the highest in case of fluchloralin at 0.75 kg ha^{-1} (1.55) followed by oxyfluorfen at 0.25 kg ha^{-1} (1.35) and pendimethalin at 0.75 kg ha^{-1} (1.34). The lowest income and B : C ratio were recorded in case of weedy check. Pendimethalin at 1.0 kg ha^{-1} and all doses of linuron resulted in B : C ratio of less than one indicating losses.

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