

Integrated weed management in *kharif* ground nut [*Arachis hypogaea* (L.)]

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ABSTRACT

A field experiment was conducted during *kharif* season of 2006 at Agronomy farm, College of Agriculture, Pune. (MS) to study the effect of different weed control practices on growth, yield and quality of *kharif* groundnut. The results indicated that the growth, yield and quality parameters of *kharif* groundnut were superior with pre-emergence application of Pendimethalin @ 0.75 kg a.i. ha⁻¹ supplemented with hoeing at 25 DAS than rest of the weed control practices except weed free check and hoeing at 15 DAS with hand weeding at 25 DAS. Pre-emergence application of Pendimethalin @ 0.75 kg a.i. ha⁻¹ along with hoeing at 25 DAS was found most effective and economical for controlling weeds in *kharif* groundnut on clayey textured and slightly alkaline soils under Pune region.

Key words : Groundnut, Weeds, Pendimethalin, Quizalofop-p-ethyl, Imazethapyr.

INTRODUCTION

Groundnut (*Arachis hypogaea* L.) is a unique and important legume oil seed crop of India. Commercially and nutritionally it is very important source of oil (49 %) and protein (26 %). Groundnut kernels are rich in vitamins viz., A, B₁ and B₂. Even though the India is third largest producer of edible oil, per capita consumption of oil (6.6 kg) and productivity of groundnut (1042 kg ha⁻¹) are very low (Anonymus, 1990). In low productivity of groundnut, weeds accounts for 45 per cent (Rao, 1983). The yields are reduced by 70 per cent if cover by weed is more than 50 per cent (Prasad, 2002). Though physical methods of weed control are very effective they have certain limitations such as unavailability of laboures during peak period, high labour cost and unfavorable environment. Therefore, an experiment was carried out to find out the most effective and cheaper weed control practice combined with herbicides for harnessing the yield of *kharif* groundnut in terms of both quantity and quality.

MATERIALS AND METHODS

The field experiment was conducted during *kharif* season of 2006 at Agronomy farm, College of Agriculture, Pune (MS). The soil was clayey in texture and slightly alkaline with low available nitrogen (174.78 kg ha⁻¹), slightly high available phosphorus (22.47 kg ha⁻¹) and very high available potassium (392.56 kg ha⁻¹). The experiment was laid out in Randomized Block Design (RBD) with nine treatments replicated thrice. The gross and net plot size were 4.20 x 3.60 m² and 3.60 x 3.00 m², respectively. Sowing of groundnut was done by dibbling two kernels of variety TG-26 at 30 x 10 cm spacing using seed rate 100 kg ha⁻¹. All the recommended management practices

were followed. Pre-emergence application of Pendimethalin was done day after sowing and post emergence application of Quizalofop-p-ethyl and Imazethapyr herbicides were done at 15 days after sowing. All the growth parameters viz. plant height, plant spread, number of branches, number of functional leaves, leaf area per plant and dry matter per plant, yield attributes viz. number of pods per plant, dry pod yield g plant⁻¹ and dry pod yield q ha⁻¹ and quality observations viz. oil and protein yield were recorded periodically and at harvest. Leaf area per plant (dm²) was recorded periodically with the help of leaf area meter. While recording dry pods yield per plot the dry pods yield of observational plots was also considered. From these weights, dry pod yield ha⁻¹ was computed. Representative sample of five kg of kernel from each net plot was taken for estimation of oil content by Soxhlet Ether Extract Method (AOAC, 1980). The data recorded on different parameters were statistically analyzed (Panse and Sukhatme, 1967) for the test of significance at 0.05% probability level.

RESULTS AND DISCUSSION

Growth of groundnut measured in terms of plant height, plant spread, number of branches, number of functional leaves and leaf area per plant (Table 1) indicated that all these growth parameters were significantly higher in weed free check. This was followed by hoeing at 15 DAS plus hand weeding at 25 DAS and Pendimethalin (PE @ 0.75 kg a.i. ha⁻¹) plus hoeing at 25 DAS and were at par with each other. These growth parameters were significantly the lowest in weedy check than rest of the treatments. At harvest, significantly the highest (22.24 g) dry matter accumulation in groundnut plant was recorded in weed free check. It was followed

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Table 1 : Growth parameters of groundnut at harvest as influenced by different weed control methods

Treatments	Plant height (cm)	Plant spread (cm)	No. of branches	NL/P	LA/P (dm ²)	DM/P (g)
T ₁	22.96	23.22	4.46	13.06	3.21	19.79
T ₂	27.50	27.50	5.26	16.40	4.35	22.24
T ₃	26.87	26.51	4.86	16.13	4.23	21.47
T ₄	25.43	25.76	4.60	14.86	3.81	20.42
T ₅	26.52	26.84	5.06	15.60	3.96	21.07
T ₆	24.03	24.70	4.53	13.93	3.40	20.08
T ₇	25.34	25.84	4.60	14.86	3.82	20.51
T ₈	24.94	25.25	4.60	14.26	3.68	20.19
T ₉	26.14	26.23	4.60	15.06	3.89	20.83
S.E. +	0.36	0.05	0.11	0.19	0.07	0.03
C.D. (P=0.05)	1.08	0.17	0.34	0.57	0.21	0.10

Note :- NL/P – Number of leaves plant⁻¹, LA/P – Leaf area plant⁻¹, DM/P – Dry matter plant⁻¹

T₁ – Weedy check, T₂ – Weed free check, T₃ – Hoeing at 15 DAS plus hand weeding at 25 DAS,

T₄ – Pendimethalin (PE @ 1.00 kg a.i. ha⁻¹), T₅ – Pendimethalin @ 0.75 kg a.i. ha⁻¹ plus hoeing at 25 DAS, T₆ – Quizalofop-p-ethyl (PoE @ 0.045 kg a.i. ha⁻¹) at 15 DAS, T₇ – Quizalofop-p-ethyl (PoE @ 0.030 kg a.i. ha⁻¹) at 15 DAS plus hoeing at 25 DAS, T₈ – Imazethapyr (PoE @ 0.075 kg a.i. ha⁻¹) at 15 DAS, T₉ – Imazethapyr (PoE @ 0.075 kg a.i. ha⁻¹) at 15 DAS plus hoeing at 25 DAS, S.E. – Standard Error and C.D. – Critical Difference.

by hoeing at 15 DAS plus hand weeding at 25 DAS and Pendimethalin (PE @ 0.75 kg a.i. ha⁻¹) plus hoeing at 25 DAS. Weedy check recorded significantly the lowest dry matter than rest of the treatments.

All the growth attributing characters which were dominant in different weed control methods helped to bear more number of pods than weedy check. Total number of pods were observed maximum (13.00 plant⁻¹) in weed free check over rest of the treatments but was at par with Pendimethalin (PE @ 0.75 kg a.i. ha⁻¹) plus hoeing at 25 DAS (Table 2). These results were in close conformity with the results obtained by Refey and Prasad (1995) and Kadavkar (1999). The dry pod yield of groundnut recorded significantly the highest (19.97 g plant⁻¹ and 15.92 q ha⁻¹) in weed free check as compared to rest of the treatments. It was followed by hoeing 15 DAS

plus hand weeding at 25 DAS, Pendimethalin (PE @ 0.75 kg a.i. ha⁻¹) plus hoeing at 25 DAS which were at par with weed free check. Attarde *et al.* (2001) and Sonwalkar (2005) were also recorded similar results.

The haulm yield of groundnut was found significantly the highest in weed free check (10.42 q ha⁻¹) while it was the lowest in weedy check (8.47 q ha⁻¹). The protein and oil yield of groundnut was significantly maximum (2.70 and 5.20 q ha⁻¹) in weed free check as compared to rest of the treatments, while hoeing at 15 DAS plus hand weeding at 25 DAS and Pendimethalin (PE @ 0.75 kg a.i. ha⁻¹) plus hoeing at 25 DAS were at par with each other. The similar trend was observed by Girjesh and Patil (1989) and Kadavkar (1999).

In general, weed control methods *viz.* weed free check, hoeing at 15 DAS plus hand weeding 25 DAS and

Table 2 : Yield and quality parameters at harvest as influenced by different weed control methods

Treatments	No. of pods plant ⁻¹	DPY (g plant ⁻¹)	DPY (qha ⁻¹)	Haulm yield (q ha ⁻¹)	Protein content (%)	Protein yield (q ha ⁻¹)	Oil content (%)	Oil yield (q ha ⁻¹)
T ₁	10.70	16.11	13.14	8.47	23.68	2.00	49.73	4.21
T ₂	13.00	19.97	15.92	10.42	25.93	2.70	49.98	5.20
T ₃	12.20	19.08	15.64	10.19	25.50	2.60	49.92	5.09
T ₄	12.45	18.40	15.27	9.95	24.81	2.46	49.68	4.94
T ₅	12.60	19.02	15.55	10.09	25.31	2.55	49.79	5.02
T ₆	12.00	18.17	13.52	8.74	24.06	2.10	49.63	4.33
T ₇	11.60	18.21	14.17	9.18	23.62	2.17	49.77	4.57
T ₈	12.00	17.94	14.81	9.58	24.50	2.34	49.43	4.77
T ₉	12.20	18.83	15.37	9.99	25.34	2.53	49.81	4.97
S.E. +	0.14	0.11	0.21	0.04	0.17	0.07	0.05	0.07
C.D. (P=0.05)	0.43	0.34	0.64	0.12	N.S.	0.21	N.S.	0.21

Note:- DPY – Dry pod yield, Other details are given in Table 1.

Pendimethalin (PE @ 0.75 kg a.i. ha⁻¹) plus hoeing at 25 DAS were found effective over other methods. But if limitations of physical methods of weed control are considered then Pendimethalin (PE @ 0.75 kg a.i. ha⁻¹) plus hoeing at 25 DAS stood superior and economic than rest of the treatments. The similar results was also observed by Sonwalkar (2005).

Thus, it can be concluded that pre-emergence application of Pendimethalin @ 0.75 kg a.i. ha⁻¹ plus hoeing at 25 DAS is most effective weed control practice for harnessing yield of *kharif* groundnut in terms of both quantity and quality in vertisole under Pune region of Maharashtra.

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