



Evaluation of post-emergence herbicides in rainy season groundnut

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ABSTRACT

An experiment was conducted at Oilseeds Research Station, Jalgaon during 2007 to 2009 in order to control groundnut associated weed growing in *Kharif* season. An experiment was done with seven treatments of pre and post-emergence herbicides comprising weedy check and weed free check replicated thrice in randomized block design (RBD) on medium clay loam soils with pH 8.1. The various weeds observed in groundnut field during *Kharif* season were, *Amaranthus viridis*, *Parthenium hysterophorus*, *Acalypha indica*, *Cyperus rotundus*, *Cynodon dactylon*, *Phyllanthus niruri*, *Commelina* spp., *Eragrostis* sp., *Celosia argenia* and *Euphorbia* sp. Among the grasses, *Cynodon dactylon* was predominant and among the sedges *Cyperus rotundus* was predominant. Among the different herbicides, pre-emergence application of pendimethalin 1.0 kg/ha + post-emergence application of imazethapyr 75 gm/ha at 20 DAS recorded maximum weed control efficiency (74%), minimum weed population (42.67/m²) and weed dry matter (185 g/m²). The same treatment combination recorded significantly higher dry pod yield (1997 kg/ha), gross returns (46445/ha) net returns (28705/ha) and B: C ratio 2.44.

Key words: Groundnut, Herbicide, Post-emergence, Pre-emergence, Weed control efficiency

Groundnut (*Arachis hypogaea* L.) is one of the most important oilseeds crops in India. Groundnut contributes more than 50% edible oil production of the country. The demand for edible oil is rising day by day. Area as well as productivity of this crop declined drastically. Therefore, concentrated efforts are being made to increase and to stabilise the oilseeds production. Groundnut is the most popular oilseeds crop of *Kharif* season. The National average productivity (1040 kg/ha) of groundnut in India (Anonymous 2009) was less than the world average (1600 kg/ha). Among the various factors responsible for low yields of groundnut, severe infestation of weeds during the early crop growth period is one of the constraints. Due to slow initial growth, it caught in rains which favours severe weed infestation. If the field left uncontrolled these may reduce the groundnut yields up to 78%. (Gnanamurthy and Balashbramanian 1998). Present investigation aims to control early weeds of the groundnut crop during rainy season with the help of combinations of pre and post applied herbicides.

MATERIALS AND METHODS

An experiment was conducted at research farm of Oilseeds Research Station, Mahatma Phule Krishi Vidyapeeth, Jalgaon during *Kharif* season of 2007 to 2009 in order to find suitable pre and post-emergence herbicide

for the control of weeds during early growth stage of groundnut crop. The experimental field was medium to deep clay loam soil with pH 8. Fertility status of experiment field was low in nitrogen (198 kg/ha), medium in phosphorus (20 kg/ha) and high in potash (685 kg/ha). The crop was raised with 25 kg/ha N and 50 kg/ha P₂O₅ with cultivar '*Phule Unap (JL-286)*'. A set of seven treatment combinations with pre-emergence pendimethalin and post-emergence herbicide imazethapyr and quizalofop-ethyl comprising weedy check and weed free check was made and replicated thrice in randomized block design (RBD).

The pre-emergence herbicides was sprayed immediately after sowing on wet soil and the post-emergence herbicides was applied 20 days after sowing with the help of knapsack sprayer with discharge rate of 500 l/ha. Weed population and weed dry matter, taken at 30 DAS and at harvest was recorded by using the quadrat measuring 1 m² per plot. The weed control efficiency (WCE) and B: C ratio was worked out.

RESULTS AND DISCUSSION

Weed flora

Weeds observed in the experimental field of groundnut during *Karif* season were: *Phyllanthus niruri*, *Euphorbia* spp., *Amaranthus* spp., *Celosia argenia*, *Parthenium hysterophorus*, *Bidens pilosa*, *Commelina* spp., *Cyperus rotundus*, *Cynodon dactylon* etc. Among the grasses *Cynodon*

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dactylon was predominant and *Cyperus rotundus* predominant among sedges. Suryawanshi *et al.* (2001) observed the similar weed flora in *Kharif* groundnut on medium clay loam soils of Khandesh region of Maharashtra.

Weed density and weed dry matter production

The treatment pre-emergence application of pendimethalin 1.0 kg/ha + post-emergence application of imazethapyr 75 gm/ha at 20 DAS recorded significantly least number of weed (42.67) and weed dry matter (167

gm/m²) than any other treatment except weed free check (21.3 and 88/m², respectively) (Table 1). This might be due to control of weeds during early growth stage by pre-emergence application of pendimethalin and post emergence application of imazethapyr at 20 DAS. The treatment combination of pre and post applied herbicide after sowing and 20 DAS was able to control the further infestation of weeds in groundnut crop. Further the crop covers the soil surface and smothers the growth of weeds results into least number of weeds at harvest.

Table 1. Pooled mean weed density, weed dry matter and weed control efficiency as influenced by different weed management practices

Treatment	Weed density at harvest (m ²)	Weed dry matter (g/m ²)	Weed control efficiency (%)	Weed index
T1: Unweeded control	95.5	580.8	0	65.0
T2: Weed free check	18.9	78.0	100	0.0
T3: Pendimethalin 1.0 kg/ha PE + 1 HW	45.2	176.2	70	14.3
T4: Quizalofop-ethyl 750ml/ha PE at 20 DAS	70.5	324.6	44	48.3
T5: Imazethapyr 750 ml /ha) PE at 20 DAS	51.5	177.9	66	22.8
T6: Pendimethalin 1.0 kg/ha PRE + T4	51.5	198.1	67	42.0
T7: Pendimethalin 1.0 kg/ha PRE +T5	42.7	185.1	74	14.8
LSD (P=0.05)	27.1	112.9	9.80	-

Table 2. Pooled mean dry pod, haulm yield and economics of groundnut as influenced by different treatments

Treatment	Dry pod yield (kg/ha)	Haulm yield (kg/ha)	Gross returns (₹)	Cost of production (₹)	Net returns (₹)	B:C ratio
T1: Unweeded control	821	4,378	21,971	17,944	4,027	1.22
T2: Weed free check	2,344	5,842	55,782	24,544	31,238	2.27
T3: Pendimethalin 1.0 kg/ha PE + 1 HW	2,008	5,480	47,549	22,629	24,920	2.10
T4: Quizalofop-ethyl 750ml/ha PE at 20 DAS	1,212	5,023	31,087	19,197	11,890	1.62
T5: Imazethapyr 750 ml/ha) PE at 20 DAS	1,810	5,436	44,193	19,456	24,737	2.27
T6: Pendimethalin 1.0 kg/ha PRE + T4	1,360	5,249	34,647	20,894	13,753	1.66
T7: Pendimethalin 1.0 kg/ha PRE +T5	1,997	5,448	49,779	21,074	28,705	2.36
LSD (P=0.05)	347	187	8,257	-	8,159	0.49

Weed control efficiency and weed index

The treatment T₇ pre-emergence application of pendimethalin 1.0 kg/ha + post-emergence application of imazethapyr 75 gm/ha at 20 DAS was recorded significantly highest weed control efficiency (74%) than any other weed control treatment (Table 1) except weed free check (100%). The lowest weed index was noticed in treatment of pendimethalin 1.0 kg/ha PRE + 1 HW (14.33) followed by pre-emergence application of pendimethalin 1.0 kg/ha + post-emergence application of imazethapyr 50 gm/ha at 20 DAS (14.80). The yield reduction up to 65% was recorded if field kept un-weeded. Ramkrishna *et al.* (1990) observed the similar trend in efficacy of herbicide in groundnut crop. This might be due to the continuous competition of groundnut crop with the obnoxious weed species for nutrient and moisture.

Yield and economics

Among the different herbicides, application of pendimethalin 1.0 kg/ha + post-emergence application of imazethapyr 75 gm/ha at 20 DAS recorded significantly higher dry pod yield (1997 kg/ha), gross returns (₹ 46445/ha), net returns (₹ 28705/ha and B:C ratio 2.44) than other treatment except weed free check (Table 2). The yield of

groundnut was mainly reduced due to the presence of weeds throughout the growing period. Ramkrishna *et al.* (1990) observed the similar trend in efficacy of herbicide in groundnut crop. This might be due to the continuous competition of groundnut crop with the obnoxious weed species for nutrient and moisture.

Efficient and profitable management of weeds through pre-emergence application of pendimethalin 1.00/ha + post-emergence application of imazethapyr 50 gm/ha at 20 DAS was most profitable way of controlling weeds in groundnut during rainy season.

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