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Original Research Article

Weed Management in Groundnut with Tank-Mix Application of Post Emergence Herbicides

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Keywords

Groundnut, Herbicides, Post-emergence, Pre-emergence, Weed control efficiency

A B S T R A C T

A field investigation was carried out at Oilseed Research Unit farm, Dr. Panjabrao Deshmukh Krishi Vidyapeeth, Akola during the *Kharif* season of 2016. The investigation was carried out to study the relative efficacy of herbicides on weed control in groundnut as well as to study its effect on growth and yield of groundnut. The experiment was laid out in randomized block design with ten treatments replicated thrice. Among the herbicidal treatments, Pendimethalin @ 1.5 kg a.i./ha (PE) + Imazethapyr @ 0.075 kg a,i./ha at 20-30 DAS was found to be effective in controlling weeds, higher weed control efficiency (72.53%) and lowest weed index (14.33%). The plant height (26.23 cm) and yield attributes like Dry matter plant^{-1} (17.79 g), no. of pods/plant (24.53), 100 kernels weight (43.61) and dry pod yield (2135 kg/ha) was recorded higher in Pendimethalin @ 1.5 kg a.i./ha (PE) + Imazethapyr @ 0.075 kg a.i./ha at 20-30 DAS in all over herbicidal treatments. Application of Pendimethalin @ 1.5 kg a.i./ha (PE) + Imazethapyr @ 0.075 kg a.i./ha at 20-30 DAS was found most economical with maximum values of GMR (1,06,802 Rs/ha), NMR (73,539 Rs/ha) and B:C ratio (3.21) except weed free.

Introduction

Groundnut or peanut is commonly called the poor man's nut. It is an important oilseed and food crop, native to South America and has never been found uncultivated. Groundnut is an upright or prostrate annual plant. It is generally distributed in the tropical, sub-tropical and warm temperate zones. The oil content of the groundnut seed varies from 44 to 50 per cent depending on the varieties and agronomic practices. Developing countries account for 96 per cent of the global groundnut area and 92 per cent of the global production. Asia accounts for 58 per cent of the global groundnut area and 67 per cent of the groundnut production with an annual growth rate of 1.28 per cent for area, 2.00 per cent for production and 0.71 per cent for productivity. World peanut production totals 27 million tonnes during 2014-2015 with India being the world's second largest producer after China (Anon.2015).

In India, groundnut production and productivity has seen wide fluctuations in recent years, mainly due to changing rainfall patterns and stiff competition with other cash crop and availability and preference for cheaper edible oils. During the year 2015-2016, there was a production of 71.80 lakh

tonne of groundnut from an area of 44.45 lakh ha with a yield of 1753 ka ha^{-1} (Anonymous 2015). On an average the loss of groundnut production in the country due to weeds has been estimated to the tune of 70 per cent (Prasad 2002) and 80 per cent (Sukhadia *et al.* 1998). Present investigation aims to study the tank mix application of post-emergence herbicides for efficient weed control in Groundnut.

Materials and Methods

An experiment was conducted at the farm of Oilseed Research Unit, Dr. Panjabrao Deshmukh Krishi Vidyapeeth, Akola during the *Kharif* season of 2016 in order to improved weed control practices that include chemical weed control with newer formulations and herbicide mixtures.

The soil of experimental field characterized as clay loam in texture, having slightly alkaline pH (7.9), moderate organic carbon status (0.40%), low nitrogen content (225.29 kg/ha), medium available phosphorus content (17.92 kg/ha), high potassium status (384.62 kg/ha). Groundnut (TAG-24) was sown on 29th June 2016 at 30 x 10 cm^2 spacing with 25:50:00 NPK kg/ha. The experiment was laid out in randomized block design with ten treatments replicated thrice. The treatment conbinations with pre-emergence pendimethalin and post-emergence herbicide imazethapyr and quizalofop-ethyl comprising weedy check and weed free check was made. The pre-emergence herbicide was sprayed immediately after sowing on wet soil and the post-emergence herbicides was applied 20-30 days after sowing with the help of knapsack sprayer. Weed population and weed dry matter, taken at 20 days interval from sowing and at harvest was recorded by using quadrate measuring 1 m^2 per plot. The weed control efficiency (WCE) and weed index (WI) was worked out.

Results and Discussion

Weed flora

In the experimental field, predominant weed flora were *Euphorbia geniculata, Achyranthus aspera, Parthenium hysterophorus, Digera arvensis, Argemone Mexicana, Phyllanthus niruri, Celosia argentia* among the dicot weeds, and *Cynadon dactylon, Ischaemum pilosum, Digitaria sanguinalis, Panicum spp, Commelina benghalensis,* among the monocot. Kasar *et al*. (2009) observed the similar weed flora in groundnut.

Weed density and weed dry matter production

The application of pendimethalin @ 1.5 kg a.i./ha (PE) + imazethapyr @ 0.075 kg a.i./ha at 20-30 DAS recorded significantly least monocot, dicot and total weed count and weed dry matter than any other herbicidal treatment except weed free. This might be due to control of weed during early growth stage by pre-emergence application of pendimethalin and post-emergence application of imazethapyr at 20-30 DAS. The treatment combination of pre and post applied herbicide after sowing and 20-30DAS was able to control the further infestation of weed in groundnut crop. Further the crop covers the soil surface and smothers the growth of weeds result into least number of weed at harvest, Malunjkar *et al.,* (2012).

Weed control efficiency (WCE) and weed index (WI)

Among the herbicidal treatment, pendimethalin @ 1.5 kg a.i./ha (PE) + post-emergence application of imazethapyr @ 0.075 kg a.i./ha at 20-30 DAS was recorded significantly higher weed control efficiency (72.53%) than any other weed control treatment except weed free (96.41%).

Table.1 Weed density, weed dry matter, weed control efficiency and weed index in groundnut as influenced by different treatments

Treatments	Weed density/ m^2 at harvest			Weed dry matter weight at harvest (g/m^2)	Weed control efficiency (%)	Weed index (%)
	Monocot	Dicot	Total			
T_1 - Pendimethalin @ 1.5 kg a.i./ha (PE) + Imazethapyr @ 0.0 75 kg ai/ha at 20-30 DAS	17.33	13.33	30.67	31.02	72.53	14.33
T_2 - Pendimethalin @ 1.5 kg a.i./ha (PE) + Quizalofop ethyl @ 0.050 kg ai/ha at 20-30 DAS	18.67	14.33	33.00	32.11	70.44	16.08
T_3 - Pendimethalin @ 1.5 kg a.i./ha (PE) + Imazethapyr (50%) + Quizalofop ethyl (50%) at 20-30 DAS	20.67	15.67	36.33	32.94	67.46	19.10
T_4 - Pendimethalin @1.5 kg a.i./ha (PE) + Imazethpyr (60%) + Quizalofop ethyl (40%) at 20-30 DAS	21.00	16.33	37.33	34.45	66.57	21.97
T_5 - Pendimethalin @ 1.5 kg a.i./ha (PE) + Imazethapyr (40%) + Quizalofop ethyl (60%) at 20-30 DAS	19.67	15.67	35.33	36.29	68.35	22.28
T_6 - Imazethapyr (50%) + Quizalofop ethyl (50%) at 20-30 DAS	23.33	17.67	41.00	40.38	63.28	27.86
T_7 - Imazethapyr (60%) + Quizalofop ethyl (40%) at 20-30 DAS	22.00	18.00	40.00	44.36	64.19	29.31
T_8 - Imazethpyr (40%) + Quizalofop ethyl (60%) at 20-30 DAS	23.33	18.33	41.67	46.59	62.69	28.18
T_9-Weedy check	70.33	41.33	111.67	168.27	-	56.97
T_{10}-Weed free	1.33	2.67	4.00	3.81	96.41	-
S.E(m)±	0.80	0.37	0.89	1.75	-	-
C.D. at 5%	2.40	1.12	2.66	5.20	-	-
G.M.	23.76	17.33	41.10	47.02	-	-

Table.2 Effect of different weed management practices on growth, Yield and economics of groundnut

Treatment	Plant height (cm)	No. of pods/plant	100 Kernels weight (g)	Pod yield (kg/ha)	Gross returns (Rs./ha)	Net returns (Rs./ha)	B:C ratio
T_1 - Pendimethalin @ 1.5 kg a.i./ha (PE) + Imazethapyr @ 0.075k g a.i./ha at 20-30 DAS	26.23	24.53	43.61	2135	106802	73539	3.21
T_2 - Pendimethalin @ 1.5 kg a.i./ha (PE) + Quizalofop ethyl @ 0.050 kg a.i./ha at 20-30 DAS	25.37	22.80	41.73	2091	104845	71845	3.18
T_3 - Pendimethalin @ 1.5 kg a.i./ha (PE) + Imazethapyr (50%) + Quizalofop ethyl (50%) at 20-30 DAS	25.07	21.27	42.2	2016	101087	67157	2.98
T_4 - Pendimethalin @1.5 kg a.i./ha (PE) + Imazethpyr (60%) + Quizalofop ethyl (40%) at 20-30 DAS	25.10	20.60	41.54	1944	97579	63719	2.88
T_5 - Pendimethalin @ 1.5 kg a.i./ha (PE) + Imazethapyr (40%) + Quizalofop ethyl (60%) at 20-30 DAS	24.70	20.93	40.88	1937	97119	63259	2.87
T_6 - Imazethapyr (50%) + Quizalofop ethyl (50%) at 20-30 DAS	24.53	18.53	41.2	1798	90690	57950	2.77
T_7 - Imazethapyr (60%) + Quizalofop ethyl (40%) at 20-30 DAS	24.33	17.53	41.25	1762	88837	56167	2.72
T_8 - Imazethpyr (40%) + Quizalofop ethyl (60%) at 20-30 DAS	24.77	20.20	41.03	1790	90349	57679	2.76
T_9- Weedy check	23.33	16.03	39.79	1072	54360	24377	1.81
T_{10}- Weed free	27.97	25.37	49.69	2492	123905	84372	3.14
S.E(m)±	0.52	1.19	0.44	21.98	950.3	950.3	-
C.D. at 5%	1.56	3.53	1.31	65.33	2823	2823	-
G.M.	25.14	20.78	42.29	1903	95557	62006	2.83

The lowest weed index (14.33%) was noticed in treatment pendimethalin @ 1.5 kg a.i./ha (PE) + imazethapyr @ 0.075 kg a.i./ha at 20-30 DAS followed by pendimethalin @ 1.5 kg a.i./ha (PE) + quizalofop-ethyl @ 0.050 kg ai/ha at 20-30 DAS (16.08%). This might be due to pre-emergence and post-emergence application of herbicides that have longer effect on controlling the monocot as well as dicot weeds population and thereby increasing weed control efficiency. These results are in agreement with the results reported by Malunjkar *et al.* (2012), Kumar *et al.* (2013) observed the similar trend in efficiency of herbicide in groundnut crop.

Yield and economics

Among the herbicidal treatments, Pendimethalin @ 1.5 kg a.i./ha (PE) + Imazethapyr @ 0.075 kg a.i./ha at 20-30 DAS recorded significantly higher dry pod yield (2135 kg/ha), GMR (106802 Rs./ha), NMR (73539 Rs./ha) and B:C ratio (3.21) than other treatment except weed free. The yield of groundnut was mainly reduced due to the presence of weeds throughout the growing period. Kalhapure *et al.* (2013) observed the similar trend in efficiency of herbicide in groundnut crop.

In conclusion, pendimethalin @ 1.5 kg a.i./ha (PE) + Imazethapyr @ 0.075 kg a.i./ha at 20-30 DAS proved practically more convenient and economically best feasible weed management practices for groundnut. Considering the present condition of scaricity and high cost of labours, quality of weed control, yield and B:C ratio of cultivation of groundnut.

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