



CHEMICAL AND CULTURAL WEED MANAGEMENT PRACTICES ON WEEDS AND YIELD OF GROUNDNUT

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Abstract

An experiment was conducted at farmer's field, Aladi village, Vridhachalam Taluk, Cuddalore District of Tamil Nadu, to study the performance of different herbicides and cultural practices on weeds and yield attributes of groundnut. The experiment was laid out in Randomised block design with three replications. The treatment comprised of T₁ - Unweeded control, T₂ - Two hand weeding at 15 DAS and 30 DAS, T₃ - Pre emergence application of pendimethalin @ 1.0 kg ha⁻¹ followed by hand weeding on 30 DAS, T₄ - Pre emergence application of oxyfluorfen @ 250g ha⁻¹ followed by hand weeding on 30 DAS, T₅ - Post emergence application of imazethapyr @ 100 g ha⁻¹ on 15 DAS, T₆ - Post emergence application of quizalofop-p-ethyl @ 50 g ha⁻¹ on 15 DAS, T₇ - Pre emergence application of pendimethalin @ 1.0 kg ha⁻¹ at 3 DAS followed by post emergence application of imazethapyr @ 100g ha⁻¹ at 15 DAS, T₈ - Pre emergence application of oxyfluorfen @ 250 g ha⁻¹ followed by post emergence application of imazethapyr @ 100 g ha⁻¹ at 15 DAS, T₉ - Pre emergence application of pendimethalin @ 1.0 kg ha⁻¹ followed by post emergence application of quizalofop-p-ethyl @ 50 g ha⁻¹ at 15 DAS, T₁₀ - Pre emergence application of oxyfluorfen @ 250 g ha⁻¹ at 3 DAS followed by post emergence application of quizalofop-p-ethyl @ 50 g ha⁻¹ at 15 DAS, T₁₁ - Post emergence application of imazethapyr @ 100 g ha⁻¹ at 15 DAS followed by hand weeding at 30 DAS, T₁₂ - Post emergence application of quizalofop-p-ethyl @ 50 g ha⁻¹ at 15 DAS followed by hand weeding at 30 DAS. Result indicated that pre-emergence application of Pendimethalin @ 1.0 Kg ha⁻¹ followed by hand weeding at 30 DAS significantly lowered the weed biomass at 15 and 45 DAS and provide higher weed control efficiency at all intervals and it was followed by two hand weeding at 15 and 30 DAS. The growth and yield attributes were increased under applications of Pendimethalin @ 1.0 Kg ha⁻¹ followed by hand weeding at 30 DAS. Unweeded control registered lower pod yield and higher weed index due to heavy competition of weeds

Key words: yield, *Arachis hypogaea*, Unweeded control

Introduction

Groundnut (*Arachis hypogaea* L.) is one of the important oil seed crops of the society accounting for about 67% of the oil seed production and 59% of edible oils. Groundnut is highly susceptible to weed competition than any other crop because its slow growth in initial stages and short plant growing and underground pod bearing habit. Weeds in groundnut fields comprise diverse plant species from grasses to broad leaved weeds and sedges and causing sustainable yield losses which are more in rainfed than irrigated groundnut. Weeds not only compete with crop for the resources but also interfere with pegging, pod development and harvesting. Thus, weeds are the foremost critical production factor in

groundnut cultivation. A number of methods are being adopted to manage the weeds whereas cultural and mechanical methods are laborious, time consuming and expensive. Employing the biological methods is not practical in field crops because of complexity of weed problems (Thimmegowda *et al.*, 2007). Chemical weed control although is one of the effective methods, continuous use of herbicides for weed control leads to residue hazards, weed shift and buildup of resistance in weed. In order to minimize the losses caused by weeds some new herbicides suitable for groundnut has been developed. In these conditions herbicides in combination with cultural practices offers economically suitable and effective weed control in groundnut.

Materials and method

Field experiment was carried out at farmer's field, Aladi village, Vrindhachalam Taluk, Cuddalore District of Tamil Nadu during *khariif* season. The soil of the experimental field was sandy loam clay in texture with pH of 6.5 and low, medium and high N, P₂O₅ and K₂O, respectively. The experiment was laid out in Randomised block design with three replications. The treatments consist of T₁ - Unweeded control, T₂ - Two hand weeding at 15 DAS and 30 DAS, T₃ - Pre emergence application of pendimethalin @ 1.0 kg ha⁻¹ followed by hand weeding on 30 DAS, T₄ - Pre emergence application of oxyfluorfen @ 250g ha⁻¹ followed by hand weeding on 30 DAS, T₅ - Post emergence application of imazethapyr @ 100 g ha⁻¹ on 15 DAS, T₆ - Post emergence application of quizalofop-p-ethyl @ 50 g ha⁻¹ on 15 DAS, T₇ - Pre emergence application of pendimethalin @ 1.0 kg ha⁻¹ at 3 DAS followed by post emergence application of imazethapyr @ 100g ha⁻¹ at 15 DAS, T₈ - Pre emergence application of oxyfluorfen @ 250 g ha⁻¹ followed by post emergence application of imazethapyr @ 100 g ha⁻¹ at 15 DAS, T₉ - Pre emergence application of pendimethalin @ 1.0 kg ha⁻¹ followed by post emergence application of quizalofop-p-ethyl @ 50 g ha⁻¹ at 15 DAS, T₁₀ - Pre emergence application of oxyfluorfen @ 250 g ha⁻¹ at 3 DAS followed by post emergence application of quizalofop-p-ethyl @ 50 g ha⁻¹ at 15 DAS, T₁₁ - Post emergence application of imazethapyr @ 100 g ha⁻¹ at 15 DAS followed by hand weeding at 30 DAS, T₁₂ - Post emergence application of quizalofop-p-ethyl @ 50 g ha⁻¹ at 15 DAS followed by hand weeding at 30 DAS.. Crop variety VRI 2 was used as the test crop during *khariif* season for the study Pre-

emergence application of pendimethalin and oxyfluorfen were applied to the respective plots on 3rd day after sowing and then irrigated. Post emergence herbicide imazethapyr and quizalofop ethyl was applied on 15th day after sowing with knapsack sprayer fitted with flat fan nozzle using 500 litres of water per hectore. Hand weeding on 15th and 30th day was done as per the treatment. The soil of the experimental site was sandy loamy soil having of 151.5 Kg N, 18 Kg P₂O₅ and 60, 90 kg K₂O with pH of 6.2 0.61 percent of organic carbon. The crop was sown 30 × 10 cm spacing and fertilized with 17: 34: 54 Kg of N, P and K ha⁻¹.

Result and discussion

The predominant category of weed was broad leaved weeds followed by grasses and sedges. The total number of weed species were 15 out of which *Cynodon dactylon*, *Dactyloctenium aegyptium*, *Panicum repens*, *Echinochola colonum* among the grasses *Cleome gynandra*, *Cleome viscosa*, *Phyllanthus niruri*, *Boerhaavia diffusa*, *Eclipta alba* and among the broad leaf weeds and *Cyperus rotundus* among the sedges were present in groundnut field.

Effect on weeds characters

The weed biomass under different herbicides and cultural practices significantly decreased when pre emergence application of pendimethalin @ 1.0 kg ha⁻¹ followed by hand weeding was adopted. The quantity of weed biomass accumulated by weeds under unweeded control was more at 15 and 45 DAS. This might be due effective suppression of weed growth at the early stage by pre emergence herbicides followed by its integration

Table 1: Weed biomass, Weed control index and weed index as influenced by different treatments

Treatment	Weed biomass		WCI		Weed Index
	15 DAS	45 DAS	15 DAS	45DAS	
T ₁ - Unweed control	141.27	270.25	-	-	66.58
T ₂ - Two hand weeding on 15 DAS & 30 DAS	43.77	71.05	69.01	73.70	6.05
T ₃ - Pendimethalin 1.0 kg ha ⁻¹ + HW on 30 DAS	30.11	51.25	78.68	78.44	-
T ₄ - Oxyfluorfen 250g ha ⁻¹ + HW on 30 DAS	77.26	106.55	45.31	60.57	11.42
T ₅ - Imazethapyr 100 g ha ⁻¹ on 15 DAS	111.31	233.21	21.21	13.58	13.91
T ₆ - Quizalofop-p-ethyl 50 g ha ⁻¹ on 15 DAS	120.21	252.55	14.90	6.54	49.01
T ₇ - Pendimethalin 1.0kg ha ⁻¹ + Imazethapyr 100g ha ⁻¹	56.12	89.55	60.27	66.97	11.75
T ₈ - Oxyfluorfen 250 g ha ⁻¹ + Imazethapyr 100 g ha ⁻¹	76.81	104.26	45.62	61.42	18.03
T ₉ - Pendimethalin.0kg ha ⁻¹ + Quizalofop-p-ethyl 50 g ha ⁻¹	99.41	139.66	29.63	48.32	31.15
T ₁₀ - Oxyfluorfen 250 g ha ⁻¹ + Quizalofop-p-ethyl 50 g ha ⁻¹	106.29	167.56	24.76	37.99	37.04
T ₁₁ - Imazethapyr 100 g ha ⁻¹ + HW on 30 DAS.	86.25	113.15	38.94	58.13	23.97
T ₁₂ - Quizalofop-p-ethyl 50 g ha ⁻¹ + HW on 30 DAS	93.91	121.25	33.52	55.1	29.85
S.Ed	6.49	9.47			
CD(P=0.05)	12.86	19.03			

Table 2: Plant height, crop DMP, total number of pods and number of matured pods as influenced by different treatments

Treatment	Plant height (cm)	Crop DMP Kg ha ⁻¹	Total no of pods	Matured pods
T ₁ - Unweed control	26.38	3581.66	6.93	4.61
T ₂ - Two hand weeding on 15 DAS & 30 DAS	44.10	5482.32	24.71	20.56
T ₃ - Pendimethalin 1.0 kg ha ⁻¹ + HW on 30 DAS	45.91	5671.29	25.86	21.78
T ₄ - Oxyfluorfen 250g ha ⁻¹ + HW on 30 DAS	42.12	5163.00	18.15	12.45
T ₅ - Imazethapyr 100 g ha ⁻¹ on 15 DAS	29.81	4097.87	14.07	7.66
T ₆ - Quizalofop-p-ethyl 50 g ha ⁻¹ on 15 DAS	29.12	3965.27	12.72	6.02
T ₇ - Pendimethalin 1.0kg ha ⁻¹ + Imazethapyr 100g ha ⁻¹	43.09	5368.34	23.82	18.72
T ₈ - Oxyfluorfen 250 g ha ⁻¹ + Imazethapyr 100 g ha ⁻¹	40.16	4921.20	23.57	17.77
T ₉ - Pendimethalin 0.0kg ha ⁻¹ + Quizalofop-p-ethyl 50 g ha ⁻¹	33.92	4353.71	18.11	12.11
T ₁₀ - Oxyfluorfen 250 g ha ⁻¹ + Quizalofop-p-ethyl 50 g ha ⁻¹	31.86	4288.34	17.71	11.03
T ₁₁ - Imazethapyr 100 g ha ⁻¹ + HW on 30 DAS.	38.11	4715.86	21.30	15.40
T ₁₂ - Quizalofop-p-ethyl 50 g ha ⁻¹ + HW on 30 DAS	36.02	4573.71	20.09	14.29
S.Ed	0.89	91.78	0.39	0.76
CD(P=0.05)	1.79	183.51	0.78	1.51

Table 3: Pod filling percentage, shelling percentage, pod and haulmyield as influenced by different treatments

Treatment	Pod filling percentage	Pod yield (Kg ha ⁻¹)	Haulm yield Kg ha ⁻¹	Shelling percentage
T ₁ - Unweed control	66.52	721.98	1090.11	74.51
T ₂ - Two hand weeding on 15 DAS & 30 DAS	85.06	2029.66	3855.10	74.82
T ₃ - Pendimethalin 1.0 kg ha ⁻¹ + HW on 30 DAS	84.22	2160.48	4212.51	74.81
T ₄ - Oxyfluorfen 250g ha ⁻¹ + HW on 30 DAS	68.59	1912.61	3537.20	74.78
T ₅ - Imazethapyr 100 g ha ⁻¹ on 15 DAS	54.44	1211.66	2119.25	74.61
T ₆ - Quizalofop-p-ethyl 50 g ha ⁻¹ on 15 DAS	47.32	1101.58	1707.44	74.58
T ₇ - Pendimethalin 1.0kg ha ⁻¹ + Imazethapyr 100g ha ⁻¹	78.58	1906.50	3527.02	74.76
T ₈ - Oxyfluorfen 250 g ha ⁻¹ + Imazethapyr 100 g ha ⁻¹	74.60	1770.90	2833.44	74.73
T ₉ - Pendimethalin 0.0kg ha ⁻¹ + Quizalofop-p-ethyl 50 g ha ⁻¹	66.86	1487.35	2454.12	74.68
T ₁₀ - Oxyfluorfen 250 g ha ⁻¹ + Quizalofop-p-ethyl 50 g ha ⁻¹	64.09	1360.20	2312.00	74.65
T ₁₁ - Imazethapyr 100 g ha ⁻¹ + HW on 30 DAS.	72.30	1642.58	2955.56	74.71
T ₁₂ - Quizalofop-p-ethyl 50 g ha ⁻¹ + HW on 30 DAS	70.39	1515.47	2500.52	74.64
S.Ed	0.42	59.02	141.98	0.10
CD(P=0.05)	0.84	126.90	283.85	NS

with cultural practices at lateral stage. This results are corroborate the finds of Pandian and Nambi (2002) and Patrop *et al.*, (2014). Pre-emergences application of pendimethalin @ 1.0 kg ha⁻¹ followed hand weeding on 30 DAS registered the highest WCI and this was followed by two hand weeding on 15 and 30 DAS. The yield level in pre- emergence application of pendimethalin 1.0 kg ha⁻¹ followed by hand weeding on 30 DAS was taken as base for computing weed index. Two hand weeding on 15 DAS and 30 DAS recorded the lowest weed index and it was followed pre emergence application of pendimethalin @ 1.0 kg ha⁻¹ followed by post emergence application of application imazethapyr @ 100 g ha⁻¹ on 15 DAS. The highest weed index was recorded in unweeded control. Use of herbicide and integrated weed control reduced the weed intensity and increases the crop growth

intensity there by uptake of nutrients by weeds reduced ultimately weeds registered lower weed biomass this may be the reason for the lower weed index in the treatment of two hand weeding on 15 and 30 DAS and pre emergence application of pendimethalin followed by post emergence application of application imazethapyr @ 100 g ha⁻¹ on 15 DAS. These results were in agreement with results of Kumar *et al.* (2013)

Effect on crop growth

Among weed management practices the pre-emergence application of pendimethalin @ 1.0 kg ha⁻¹ followed by hand weeding on 30 DAS recorded the highest plant height which was followed by two hand weeding on 15 and 30 DAS. Better growth might be maximum utilization of nutrients and resources on account

of weed competition free atmosphere availability in pre emergence application of pendimethalin followed by two hand weeding. The shortest plant height was recorded with unweeded control. Pre-emergence application of pendimethalin @ 1.0 kg ha⁻¹ followed by hand weeding on 30 DAS significantly produced higher dry matter production. This was due to lesser competition for nutrient and other growth factors by the weeds. The distinct reduction in weed dry matter, under pre-emergence application of pendimethalin followed by hand weeding on 30 DAS might have offered a weed free environment for groundnut. Thus the results are in accordance with the findings reported by Vyas *et al.*, (2014) and Nambi, (2017)

Effect on yield parameters

Pre emergence application of pendimethalin followed by hand weeding on 30 DAS significantly recorded more total number of pods per plant, number of matured pods per plant, pod filling percentage and shelling percentage. Higher accumulation of crop dry matter with better weed control by application of pendimethalin followed by hand weeding on 30 DAS produced more number of pods, shelling percentage and pod filling percentage. Pre emergence application of pendimethalin followed by hand weeding on 30 DAS recorded the highest pod and haulm yield. Higher pod yield may be due to application of broad spectrum selective herbicide might have prevent or suppressed the germination of weed species and further hand weeding provide weed free environment leads to improved of pod yield. Appreciable increase in pod and haulm yield with this treatment was also reported by

Mahendra *et al.* (2017)

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