



# IMPACT OF WEED FLORA IN GROUNDNUT (*ARACHIS HYPOGAEA* L.) IN CLAY LOAM SOILS IN DHARMAPURI DISTRICT, TAMIL NADU, INDIA

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## Abstract

A field experiment was conducted during *Kharif*, 2017 to evaluate the suitable herbicides that for the control weeds effectively and economically in groundnut. Application of low dose herbicides can reduce the toxic effect. Among the different herbicidal treatments that the application of low dose herbicides as early post emergence was recorded the higher plant height (28.36 and 48.75 cm), leaf area index (4.17 and 5.49) and dry matter production (2476 and 4939 kg ha<sup>-1</sup>) at 30 DAS and 60 DAS, respectively and was found to be effective and economically feasible for weed management in groundnut.

**Key words :** Groundnut, Herbicides, Weed management, Yield.

## Introduction

Groundnut (*Arachis hypogaea* L.) is known as the King of Oilseeds. It is considered to be one of the most important food legume and oilseed crops of India. Commercially and nutritionally it is very important source of oil (49%) and protein (26%). Globally, India ranks first in area and second in production after china. It is cultivated in 5.31 million ha area with the production of 6.96 million tonnes and average productivity of 1.31 tonnes ha<sup>-1</sup> (DES, 2013). The principle reason for lower productivity was losses of commodity during various stages of crop production. Cultivation of groundnut as rainfed crop, lack of knowledge among the farmers about cultivation of groundnut with modern technology, lack of unawareness of improved varieties and improper fertilization etc. are some causes of lower productivity of groundnut in India. Along with these, the major cause of minimizing production is severe weed infestation during cropping. Weeds compete with crops for the resources like sunlight, space, moisture and nutrients not only throughout the growing season, but also create problem during digging and inverting procedures and reduced harvesting efficiency. Groundnut having less crop canopy during the first 6 weeks of crop growth favours strong competition

with weeds and cause substantial yield loss. Therefore, timely weed control during this critical period become necessary for attaining maximum yield. (Etejere *et al.*, 2013).

Pre-plant or pre emergence chemical weed management using selective herbicides like fluchloralin and pendimethalin followed by one hand weeding is a common practice in groundnut. However, disturbing the soil during manual weeding, in the early stages, exposes the groundnut crop to new flushes of weeds. These late emerging weeds seriously affect the pegging and pod development and disrupt digging and harvesting operations and difficult to strip the pods from vines. Apart from competition for nutrients and other inputs, these late emerging weeds infest the land with weed seeds and make the land less productive in the subsequent seasons. There also exists another situation wherein the pre emergence application could not be done owing to continuous rains or for other reasons. Early post emergence herbicides offer great scope to tide over these situations.

## Materials and Methods

The field experiment entitled “Impact of weed flora in groundnut (*Arachis hypogaea* L.) in clay loam soils of Dharmapuri District” was conducted during Kharif

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2017 at farmers field of Echanampatti village of palacode taluk, Dharmapuri district of Tamil nadu. The soils of field experiment was clay loam having pH (7.8), available N (70 kg ha<sup>-1</sup>), P<sub>2</sub>O<sub>5</sub> (20 kg ha<sup>-1</sup>) and K<sub>2</sub>O (130 kg ha<sup>-1</sup>). Ten treatment combinations viz., T<sub>1</sub> – pre emergence application of pendimethalin 1.0 kg ha<sup>-1</sup> at 3 DAS fb post emergence application of quizalofop ethyl 100 g ha<sup>-1</sup>, T<sub>2</sub>- pre emergence application of pendimethalin 1.0 kg ha<sup>-1</sup> at 3 DAS fb hand weeding on 45 DAS, T<sub>3</sub>- EPOE of sodium acifluorfen + clodinofof propergyl 900 g ha<sup>-1</sup> at 15 DAS, T<sub>4</sub> - EPOE quizalofop ethyl + imazethapyr 100 g ha<sup>-1</sup> at 15 DAS, T<sub>5</sub>- EPOE of sodium acifluorfen + clodinofof propergyl 900 g ha<sup>-1</sup> at 15 DAS fb hand weeding on 45 DAS, T<sub>6</sub>- EPOE quizalofop ethyl + imazethapyr 100 g ha<sup>-1</sup> at 15 DAS fb hand weeding on 45 DAS, T<sub>7</sub>- pre emergence application of pendimethalin 1.0 kg ha<sup>-1</sup> at 3 DAS fb EPOE of sodium acifluorfen + clodinofof propergyl 900 g ha<sup>-1</sup> at 25 DAS, T<sub>8</sub>- pre emergence application of pendimethalin 1.0 kg ha<sup>-1</sup> at 3 DAS fb EPOE quizalofop ethyl + imazethapyr 100 g ha<sup>-1</sup> at 25 DAS, T<sub>9</sub>-Two hand weedings (20 and 40 DAS) and T<sub>10</sub>- Unweeded control were tested in a Randomized Block Design (RBD) with three replications. Groundnut variety ‘TMV 7’ was sown with spacing of 30 × 10 cm. The crop was fertilized with 17: 34: 54 kg NPK ha<sup>-1</sup> under surface irrigation. Herbicides were applied using manually operated knapsack sprayer fitted with flat fan nozzle using spray volume of 500 l ha<sup>-1</sup>. Observations were taken at 30 and 60 DAS and at maturity.

## Results and Discussion

The various observations recorded on the growth parameters and weed flora of *Kharif* groundnut as influenced by various treatments are presented and discussed here under.

### Weed flora

Weed flora of the experimental field consisted of broad-leaved weeds, grasses and sedges. Among the different weed species, the major broad leaved weeds consisted of *Digera arvensis*, *Commelina benghalensis*, *Amaranthus viridis*, *Boerheavia diffusa*, *Parthenium hysterophorus*, *Acalypha indica*, *Trianthema portulacastrum*, *Phyllanthus niruri* and *Leucas aspera* followed by grassy weeds *Cynodon dactylon*, *Echinichloa colanum*, *Digitaria sanguinalis*, *Dactyloctenium aegyptium* and a sedge (*Cyperus rotundus*).

### Weed population under different treatments

A critical review of the table 1 clearly shows that at 30 and 60 DAS. Among the various weed management

treatments tried, the lowest weed population were recorded under treatment T<sub>9</sub>- hand weeding at 20 and 40 DAS (21.42 m<sup>-2</sup>) and this was onpar with T<sub>7</sub>- pre emergence application of pendimethalin @ 1.0 kg a.i ha<sup>-1</sup> at 3 DAS + EPOE of sodium acifluorfen + clodinofof propergyl @ 900 g ha<sup>-1</sup> at 25 DAS (21.54 m<sup>-2</sup>) was found significantly superior over all other weed management practices at 30 and 60 DAS. The probable reason for obtaining lowest weed population under this might be due to lesser weed competition faced by groundnut crop as pre emergence application of pendimethalin resulted in better weed management during initial stages of crop growth and the late emerging weeds are managed by EPOE of Sodium Acifluorfen + Clodinofof Propergyl at 25 DAS. Similar results were also reported by Sumathi *et al.* (2000) and Mishra *et al.* (2012). The highest weed population were recorded under T<sub>10</sub>- control at 30 and 60 DAS (226.12 m<sup>-2</sup>).

### Weed dry weight

Minimum weed dry weight of 198.07 and 255.45 kg ha<sup>-1</sup> were observed at 30 and 60 DAS, respectively under T<sub>9</sub>- hand weeding at 20 and 40 DAS this was found to be onpar with T<sub>7</sub>- pre emergence application of pendimethalin @ 1.0 kg a.i ha<sup>-1</sup> at 3 DAS + EPOE of sodium acifluorfen + clodinofof propergyl @ 900 g ha<sup>-1</sup> at 25 DAS (201.60 and 283.29 kg ha<sup>-1</sup> at 30 and 60 DAS) whereas, the maximum weed dry weight of 644.9 and 896.45 kg ha<sup>-1</sup> at 30 and 60 DAS under T<sub>10</sub>- unweeded control.

### Weed control efficiency

The highest weed control efficiency was recorded under T<sub>9</sub>- hand weeding at 20 and 40 DAS (87.08 and 84.20 %) at 30 and 60 DAS and this was onpar with T<sub>7</sub>- pre emergence application of pendimethalin @ 1.0 kg a.i ha<sup>-1</sup> at 3 DAS + EPOE of sodium acifluorfen + clodinofof propergyl @ 900 g ha<sup>-1</sup> at 25 DAS (87.01 and 84.15 %). The probable reasons for obtaining highest weed control efficiency under T<sub>7</sub> might be due to lesser weed competition faced by groundnut crop reported by Rao *et al.* (2011).

### Weed index

The weed management practices exerted significant influence on weed index. Lower weed index (2.03 per cent) was recorded under hand weeding twice at 20 and 40 DAS (T<sub>9</sub>), which was found to be statistically on par to that obtained in the treatment T<sub>7</sub>- pre pendimethalin 1.0 kg ha<sup>-1</sup> at 3 DAS fb EPOE of sodium acifluorfen + clodinofof propergyl 900 g ha<sup>-1</sup> at 25 DAS (4.07 per cent). Unweeded control (T<sub>10</sub>) recorded the higher weed index of 62.51 per cent.

**Table 1 :** Effect of weed management practices on weed parameters.

T.No.	Weed population (m <sup>-2</sup> )		Weed dry weight (kg ha <sup>-1</sup> )		Weed control efficiency (%)		Weed index (%)
	30 DAS	60 DAS	30 DAS	60 DAS	30 DAS	60 DAS	
T <sub>1</sub>	32.59 (5.71)	51.72 (7.22)	270.22	376.13	80.34	74.71	12.55
T <sub>2</sub>	48.26 (6.98)	61.82 (7.89)	363.15	406.22	70.90	69.77	17.96
T <sub>3</sub>	99.31 (9.99)	133.72 (11.58)	573.58	783.46	40.12	34.62	32.77
T <sub>4</sub>	98.90 (9.96)	133.52 (11.57)	568.98	719.97	40.36	34.71	31.33
T <sub>5</sub>	68.90 (8.33)	92.58 (9.64)	493.75	643.12	58.45	54.73	25.74
T <sub>6</sub>	48.58 (7.00)	61.97 (7.90)	367.19	499.55	70.70	68.72	19.51
T <sub>7</sub>	21.54 (4.69)	32.40 (5.73)	201.60	283.29	87.01	84.15	4.07
T <sub>8</sub>	32.39 (5.76)	51.61 (7.21)	266.42	372.95	80.47	74.76	10.74
T <sub>9</sub>	21.42 (4.68)	32.31 (5.72)	198.07	255.45	87.08	84.20	2.03
T <sub>10</sub>	226.12 (15.05)	326.97 (18.09)	644.9	896.45	-	-	62.51
S. Ed	0.46	0.43	3.96	5.68	-	-	-
CD (p=0.05)	0.97	0.90	8.34	10.45	-	-	-

\*Figures in parenthesis indicates original value.

**Table 2:** Effect of weed management practices on growth parameters.

T.No.	Plant height (cm)		Leaf area index		DMP (kg ha <sup>-1</sup> )	
	30 DAS	60 DAS	30 DAS	60 DAS	30 DAS	60 DAS
T <sub>1</sub>	23.56	42.95	3.37	4.48	2394.88	4780.80
T <sub>2</sub>	19.91	38.11	2.83	3.68	2334.29	4670.11
T <sub>3</sub>	12.01	23.77	1.35	1.70	2132.83	4389.38
T <sub>4</sub>	12.76	25.29	1.50	1.89	2148.06	4409.90
T <sub>5</sub>	15.42	31.25	2.05	2.69	2248.27	4523.55
T <sub>6</sub>	18.06	36.35	2.62	3.48	2314.14	4631.81
T <sub>7</sub>	28.36	48.75	4.17	5.49	2476.20	4939.61
T <sub>8</sub>	25.47	44.90	3.62	4.70	2422.94	4825.80
T <sub>9</sub>	30.84	50.76	4.47	5.74	2506.41	4985.61
T <sub>10</sub>	9.32	17.23	0.81	1.08	1932.83	4239.15
SE <sub>d</sub>	1.22	1.49	0.23	0.19	21.10	22.19
CD <sub>(0.5)</sub>	2.57	3.13	0.49	0.40	44.33	46.63

### Effect of weed management practices on groundnut

#### Plant height

The data (table 2) obtained during the investigation on plant height revealed that it was significantly influenced by weed management practices. Among the various weed management practices tried, hand weeding twice at 20 and 40 DAS (T<sub>9</sub>) registered taller plants of 30.84 and 50.76 cm during 30 and 60 DAS and (T<sub>7</sub>) pre emergence application of pendimethalin 1.0 kg ha<sup>-1</sup> at 3 DAS fb EPOE of sodium acifluorfen + clodinafop propargyl 900 g ha<sup>-1</sup> (28.36 and 48.75cm) which were on par with each other but statistically superior over rest of the treatments. Use of herbicides and hand weeding improved the growth components significantly as compared to unweeded control as a result of less weed

density and growth, which provided ample space, light and nutrients for root growth, nodulation, optimum extension of leaves, branches and dry weight of plant parts in groundnut as suggested by Wesley *et al.* (2008). Unweeded control (T<sub>10</sub>) recorded significantly least plant height of 9.32 and 17.23 cm at 30 and 60 DAS, respectively.

#### Leaf area index

The treatments altered the LAI of groundnut significantly during crop growth period. Among the various weed management treatments tried, hand weeding twice at 20 and 40 DAS (T<sub>9</sub>) registered maximum LAI of 4.47 and 5.74 at 30 and 60 DAS, respectively and (T<sub>7</sub>) pre emergence application of pendimethalin 1.0 kg ha<sup>-1</sup> at 3 DAS fb EPOE of sodium acifluorfen + clodinafop propargyl 900 g ha<sup>-1</sup> (4.17 and 5.49) which were on par with each other but significantly superior over all other treatments.

The timely and effective control of weeds is expected to have better availability of nutrients, moisture and solar radiation to the crop plants, thereby increasing total chlorophyll content, photosynthetic rate and nitrate reductase activity, leading to higher supply of carbohydrates which resulted in increased growth attributes than unweeded control (Channappagoudar *et al.*, 2008). The minimum leaf area index of 0.81 and 1.08 were recorded under T<sub>10</sub> – control at 30 and 60 DAS, respectively.

#### Dry matter production (kg ha<sup>-1</sup>)

Hand weeding twice at 20 and 40 DAS (T<sub>9</sub>) recorded higher DMP of 2506.41 and 4985.61 kg ha<sup>-1</sup> at 30 and 60 DAS, respectively which was on par with T<sub>7</sub>- pre emergence application of pendimethalin 1.0 kg ha<sup>-1</sup> at 3

DAS fb EPOE of sodium acifluorfen + clodinofof propergyl 900 g ha<sup>-1</sup> (2476.20 and 4939.61 kg ha<sup>-1</sup>). T<sub>10</sub>-unweeded control recorded the least DMP of 1932.83 and 4239.15 kg ha<sup>-1</sup> at 30 and 60 DAS, respectively.

### Conclusion

Based on this findings, it may be concluded that, pre emergence application of pendimethalin @ 1.0 kg a.i ha<sup>-1</sup> at 3 DAS + early post emergence application of sodium acifluorfen + clodinofof propergyl @ 900 g ha<sup>-1</sup> at 25 DAS gave maximum net return on rupee invested. Chemical method of weed control was a cheaper and economical. It is also a best option during constraints of labour scarcity in Indian agriculture.

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