

Influence of weed management practices on yield attributes and pod yield of groundnut

E. SOMASUNDARAM*, R. CHANDRASEKARAN, M. KUMAR, R. KRISHNAN, M. MOHAMED AMANULLAH¹ AND M. MEYYAPPAN

Department of Agronomy, Tamil Nadu agricultural University, COIMBATORE (T.N.) INDIA

ABSTRACT

Field experiments were conducted at Coconut Research Station, Tamil Nadu Agricultural University, Aliyarnagar, during *Rabi*-summer seasons of 2005-06, 2006-07 and 2007-08 to study the effect of different weed management practices on the yield attributes and yield of groundnut. The experiments were laid out in a randomized block design replicated thrice. The treatments comprised of the use of pre and post emergence herbicides such as pendimethalin, fluchloralin and imazethapyr, intercropping of greenmanures such as sunnhemp and daincha and incorporation on flowering along with mulching with dry stubbles, hand weeding twice at critical stages of weed growth compared with unweeded control and weed free check. The results of the experiments revealed that pre-emergence application of fluchloralin @ 0.9 kg a.i. ha⁻¹ along with one hand weeding on 45 DAS recorded the least weed dry matter, highest pod number, shelling percentage, pod and haulm yield during all the three years of study. However, it was comparable with pre-emergence application of pendimethalin @ 1.0 kg a.i. ha⁻¹ along with one hand weeding on 45 DAS.

Key words : Groundnut, Weed management, Weed dry matter, Yield attributes, Yield.

INTRODUCTION

Groundnut (*Arachis hypogaea* L.) is an important oil seed crop of India. India is the second largest producer of groundnut accounting for 38% of the total area (7.7 million hectares) and 31% production (6.7 million tonnes) of the world (Throat, 2004). The average productivity in India is 977 kg ha⁻¹ (Alam, 2002). Groundnut is known for its rich source of vegetable fats, protein and also for its use as cattle feed and concentrated organic manure.

The productivity of groundnut under irrigated condition is not stable due to various reasons. Among them, weed infestation is considered to be one of the reasons. Yield loss in groundnut due to weed infestation amounts to 70 % (Kalaiselvan *et al.*, 1989). Weeds not only compete with crops for resources like moisture, nutrients, light and space but also interfere with pegging, pod development and harvest. The critical period of weed competition in groundnut was found to be 4-8 weeks after sowing (Prusty *et al.*, 1990). Cultural method of weed control is a common method followed in groundnut. These practices are time consuming, expensive and tedious. The other alternate method is using herbicides to control weeds. But, continuous use of herbicides might result in soil pollution problems in the long run. The integrated weed management involving pre-plant herbicides with varying doses followed by intercultivation offers a viable alternative. Hence, the present investigation was taken up to study the effect of different weed management practices on the yield attributes and yield of groundnut.

MATERIALS AND METHODS

Field experiments were carried out at Coconut Research Station, Aliyarnagar, Tamil Nadu Agricultural University, Tamil Nadu, India, during *Rabi*-summer seasons of 2005-06, 2006-07 and 2007-08 to study the effect of different weed management practices on the yield attributes and yield of groundnut. The treatments comprised of pre and post emergence herbicides such as pendimethalin, fluchloralin and imazethapyr, intercropping of greenmanures such as sunnhemp and daincha and incorporation on flowering along with one mulching with dry stubbles, hand weeding twice at critical stages of weed growth compared with unweeded control and weed free check. The experiments were laid out in a randomized block design replicated thrice.

The soil of the experimental field was sandy loam, low in available nitrogen (226 kgha⁻¹), and medium in available phosphorus (12.5 kg ha⁻¹) and potassium (258 kg ha⁻¹). The pH of the experimental field was 7.3 with a bulk density of 1.34 g cc⁻¹. Mechanical analysis showed that the experimental field had 14.20% clay, 7.90% silt, 46.0% fine sand and 31.1% coarse sand. Farm yard manure @ 12.5 t ha⁻¹ and gypsum 400 kg ha⁻¹ were applied uniformly to all the plots irrespective of the treatments. Fertilizers were given as basal in the previously opened furrows. All the other cultural operations were carried out as per the recommendations. Observations on weed density, yield attributing characters, pod and haulm yield of groundnut were recorded and presented.

* Author for correspondence. Present Address : Coconut Research Station, ALIYARNAGAR (T.N.) INDIA

¹ Faculty of Agriculture, Annamali University, ANNAMALAI NAGAR (T.N.) INDIA

RESULTS AND DISCUSSION

The results obtained from the present investigation are summarized below :

Weed flora and weed dry matter :

The weed flora of the experimental field categorized on 25 DAS is presented in Table 1. The weeds were grouped into grasses, sedges, and broadleaved weeds. The predominant weeds were *Chloris barbata*, *Cynodon dactylon* and *Dinebra retroflexa* among grasses, *Cyperus rotundus* and *Cyperus difformis* in

| Table 1 : Weed flora of the experimental field | |
|--|---------------|
| Weeds | Family |
| Grasses | |
| <i>Chloris barbata</i> | Graminae |
| <i>Cynodon dactylon</i> | Graminae |
| <i>Dactyloctenium aegyptium</i> | Graminae |
| Sedges | |
| <i>Cyperus rotundus</i> | Cyperaceae |
| <i>Cyperus difformis</i> | Cyperaceae |
| Broad leaved weeds | |
| <i>Amaranthus viridis</i> | Amaranthaceae |
| <i>Cleome gynandra</i> | Capparidaceae |
| <i>Lagasca mollis</i> | Compositae |
| <i>Commelina benghalensis</i> | Commelinaceae |
| <i>Portulaca oleracea</i> | Portulacaceae |
| <i>Parthenium hysterophorus</i> | |
| <i>Trianthema portulacastrum</i> | Aizoaceae |
| <i>Boerhaavia diffusa</i> | |

sedges and *Trianthema portulacastrum*, *Lagasca mollis* and *Parthenium hysterophorus* among broadleaved weeds.

The impact of treatments on dry matter of weeds varied significantly among different stages of crop growth during all the three years of study (Table 2). In 2005-06, pendimethalin @ 1 kg a.i. ha⁻¹ + hand weeding on 45 DAS recorded the least weed dry matter as compared to other methods of weed control. This was followed by fluchloralin @ 0.9 kg a.i. ha⁻¹ + hand weeding at 45 DAS and both were comparable. The maximum weed dry matter was observed under unweeded control. However, during 2006-07 and 07-08, weed free check and pre emergence application of pendimethalin @ 1.0 kg a.i. ha⁻¹ + hand weeding at 45 DAS recorded the least dry matter and were comparable with each other. This is mainly attributed to efficient control of weeds in the early stages by herbicides and later by hand weeding which reduced the dry matter. The maximum weed dry matter was observed under unweeded control in all the years of study. Similar results were reported by Nimje (1982)

Yield attributes :

Pre-emergence application of fluchloralin @ 0.9 kg a.i. ha⁻¹ along with one hand weeding at 45 DAS has recorded significantly higher pod number, 100 kernel weight and shelling percentage in all the three years of study (Table 3 and 4). However, it was comparable with pre-emergence application of pendimethalin @ 1.0 kg a.i. ha⁻¹ along with one hand weeding on 45 DAS. The least

Table 2. : Effect of different weed management practices on weed dry matter (g m⁻²) in groundnut during Rabi-summer seasons of 2005-08

| Treatments | 2005-06 | | 2006-07 | | 2007-08 | |
|--|---------|--------|---------|--------|---------|--------|
| | 25 DAS | 45 DAS | 25 DAS | 45 DAS | 25 DAS | 45 DAS |
| W ₁ – Unweeded control | - | - | 4.32 | 6.32 | 4.28 | 6.02 |
| W ₂ – Weed free check | - | - | 1.82 | 2.15 | 1.50 | 1.85 |
| W ₃ – Pendimethalin @ 1 kg a.i. ha ⁻¹ + 1 HW on 45 DAS | 1.41 | 2.23 | 1.85 | 2.40 | 1.56 | 2.10 |
| W ₄ – Fluchloralin @ 0.9 kg a.i. ha ⁻¹ + 1 HW on 45 DAS | 1.41 | 2.38 | 3.50 | 5.25 | 1.46 | 4.15 |
| W ₅ – Intercrop with Sunnhemp between the rows and incorporation on 25 DAS + 1HW on 45 DAS | 3.04 | 4.43 | 3.10 | 5.00 | 2.94 | 3.15 |
| W ₆ – Intercrop with Daincha between the rows and incorporation on 25 DAS + 1HW on 45 DAS | 2.98 | 4.61 | 3.00 | 4.68 | 3.20 | 4.35 |
| W ₇ – Stubble mulching @ 5t ha ⁻¹ 10 DAS | 2.82 | 4.47 | 3.30 | 5.00 | 3.20 | 4.50 |
| W ₈ – Stubble mulching @ 5t ha ⁻¹ after 1 st HW | 3.59 | 4.89 | 3.00 | 4.50 | 2.95 | 4.00 |
| W ₉ – Hand weeding on 20-25 DAS and on 45 DAS | 3.47 | 4.96 | 2.98 | 4.30 | 2.65 | 4.55 |
| W ₁₀ – Control | 3.61 | 5.97 | 2.80 | 4.20 | 2.90 | 4.14 |
| W ₁₁ – Pre emergence application of Pndimethalin + imazethapyr @ 75 g a.i. ha ⁻¹ on 20 DAS | - | - | 1.89 | 2.51 | 1.78 | 2.65 |
| S.E. ± | 0.14 | 0.48 | 0.45 | 0.68 | 0.44 | 0.70 |
| C.D. (P=0.05) | 0.31 | 1.04 | 0.97 | 1.47 | 0.96 | 1.50 |

Table 3 : Effect of different weed management practices on yield attributes of groundnut during Rabi-summer seasons of 2005-08

| Treatments | Pod number plant ⁻¹ | | | 100 kernel weight (gm) | | |
|---|--------------------------------|---------|---------|------------------------|---------|---------|
| | 2005-06 | 2006-07 | 2007-08 | 2005-06 | 2006-07 | 2007-08 |
| W ₁ – Unweeded control | - | 10.2 | 9.40 | - | 26.5 | 26.0 |
| W ₂ – Weed free check | - | 11.8 | 15.8 | - | 34.8 | 34.8 |
| W ₃ – Pendimethalin @ 1 kg a.i. ha ⁻¹ + 1 HW on 45 DAS | 15.8 | 15.4 | 17.2 | 37.9 | 37.2 | 37.9 |
| W ₄ – Fluchloralin @ 0.9 kg a.i. ha ⁻¹ + 1 HW on 45 DAS | 16.5 | 16.1 | 18.2 | 38.5 | 38.2 | 38.0 |
| W ₅ – Intercrop with Sunnhemp between the rows and incorporation on 25 DAS + 1HW on 45 DAS | 12.1 | 12.6 | 14.1 | 31.5 | 33.0 | 33.5 |
| W ₆ – Intercrop with Daincha between the rows and incorporation on 25 DAS + 1HW on 45 DAS | 12.0 | 12.4 | 12.8 | 32.5 | 33.8 | 32.2 |
| W ₇ – Stubble mulching @ 5t ha ⁻¹ 10 DAS | 10.2 | 10.8 | 11.6 | 33.6 | 34.2 | 33.6 |
| W ₈ – Stubble mulching @ 5t ha ⁻¹ after 1 st HW | 9.8 | 10.6 | 10.6 | 33.5 | 34.0 | 33.5 |
| W ₉ – Hand weeding on 20-25 DAS and on 45 DAS | 14.0 | 14.8 | 15.0 | 36.8 | 35.8 | 36.8 |
| W ₁₀ – Control | 8.5 | 8.2 | 8.5 | 28.5 | 30.4 | 30.5 |
| W ₁₁ – Pre emergence application of Pndimethalin + imazethapyr @ 75 g a.i.ha ⁻¹ on 20 DAS | - | 16.0 | 16.8 | - | 35.2 | 35.6 |
| S.E. ± | 0.55 | 0.52 | 0.62 | 1.48 | 1.54 | 1.56 |
| C.D. (P=0.05) | 1.18 | 1.12 | 1.33 | 3.18 | 3.34 | 3.35 |

Table 4 : Effect of different weed management practices on pod yield, haulm yield and shelling percentage of groundnut during Rabi-summer seasons of 2005-08

| Treatments | Pod yield (Kg ha ⁻¹) | | | Haulm yield (Kg ha ⁻¹) | | | Shelling (%) | | |
|---|----------------------------------|---------|---------|------------------------------------|---------|---------|--------------|---------|---------|
| | 2005-06 | 2006-07 | 2007-08 | 2005-06 | 2006-07 | 2007-08 | 2005-06 | 2006-07 | 2007-08 |
| W ₁ – Unweeded control | - | 1415 | 1320 | - | 2486 | 2650 | - | 57.5 | 55.0 |
| W ₂ – Weed free check | - | 1850 | 1850 | - | 3050 | 3850 | - | 66.9 | 65.5 |
| W ₃ – Pendimethalin @ 1 kg a.i. ha ⁻¹ + 1 HW on 45 DAS | 2285 | 2160 | 2120 | 4944 | 3840 | 4650 | 68.5 | 68.2 | 68.5 |
| W ₄ – Fluchloralin @ 0.9 kg a.i. ha ⁻¹ + 1 HW on 45 DAS | 2495 | 2320 | 2387 | 5197 | 4233 | 4780 | 69.8 | 69.0 | 69.2 |
| W ₅ – Intercrop with Sunnhemp between the rows and incorporation on 25 DAS + 1HW on 45 DAS | 1786 | 1886 | 1987 | 3859 | 3720 | 4250 | 65.7 | 66.0 | 67.7 |
| W ₆ – Intercrop with Daincha between the rows and incorporation on 25 DAS + 1HW on 45 DAS | 1752 | 1904 | 1752 | 3785 | 3547 | 3650 | 66.5 | 66.8 | 65.5 |
| W ₇ – Stubble mulching @ 5t ha ⁻¹ 10 DAS | 1642 | 1702 | 1723 | 3590 | 3627 | 3600 | 64.2 | 65.0 | 60.8 |
| W ₈ – Stubble mulching @ 5t ha ⁻¹ after 1 st HW | 1645 | 1820 | 1677 | 3518 | 3430 | 3625 | 65.8 | 66.4 | 65.6 |
| W ₉ – Hand weeding on 20-25 DAS and on 45 DAS | 2135 | 2050 | 1903 | 4609 | 4080 | 4850 | 68.3 | 67.6 | 68.3 |
| W ₁₀ – Control | 1590 | 1520 | 1450 | 3435 | 3480 | 3150 | 57.8 | 59.2 | 60.0 |
| W ₁₁ – Pre emergence application of Pndimethalin + imazethapyr @ 75 g a.i.ha ⁻¹ on 20 DAS | - | 1840 | 1828 | - | 3980 | 4520 | - | 64.8 | 65.6 |
| S.E. ± | 231 | 224 | 208 | 321 | 354 | 340 | 2.52 | 2.40 | 2.81 |
| C.D. (P=0.05) | 496 | 469 | 447 | 689 | 742 | 730 | 5.04 | 4.86 | 6.03 |

weed dry matter due to efficient weed control from the early stages in the above treatments has led to better yield attributes. Similar results were also reported by Nimje (1982) and Kori *et al.* (1997).

Pod and haulm yield:

Among the different weed control methods tested, pre emergence application of fluchloralin @ 0.9 kg a.i. ha⁻¹ + one hand weeding on 45 DAS recorded significantly

higher pod and haulm yield followed by pre-emergence application of pendimethalin @ 1.0 kg a.i. ha⁻¹ with one hand weeding on 45 DAS (Table 4). The least weed dry matter recorded under pre emergence application of fluchloralin @ 0.9 kg a.i. ha⁻¹ followed by hand weeding at 45 DAS might have enhanced the yield attributes and pod yield. However, it was comparable with pre-emergence application of pendimethalin @ 1.0 kg a.i. ha⁻¹ with one hand weeding at 45 DAS and hand weeding twice (20 and 45 DAS). This is mainly attributed to efficient control of weeds in the early stages by herbicides and later by hand weeding which reduced the dry matter and ultimately to better yield attributes and yield. Similar results were reported by Nimje (1982), Kori *et al.* (1997) and Senthilkumar (2009). The least yield attributes and pod yield was recorded under unweeded control, which also recorded the maximum weed dry matter

Conclusion :

From the results of the study conducted for three years, it can be concluded that pre-emergence application of fluchloralin @ 0.9 kg a.i. ha⁻¹ along with one hand weeding at 45 DAS was found to be a suitable weed management technology for *Rabi*-summer sown groundnut of Coimbatore district of Tamilnadu

REFERENCES

- Alam, G. (2002).** Technology generation and IPR Issues, State of Indian farmers – A millennium study, pp: 89-90.
- Kalaiselvan, P.R., Ramalingam, S. and Bhat, M.Y. (1989).** Influence of weed competition in different states on growth and yield of groundnut. *Andhra Agric. J.*, **34** (2): 197-198.
- Kori, R.N., Salkinkopp, S.R., Potdar, M.P. and Ekbote, S.E. (1997).** Effect of weed control on nutrient uptake, weed weight and yield of groundnut. *World Weeds* **4**: 149-153.
- Nimje, P.M. (1992).** Effect of weed control and nitrogen on weed growth and yield of groundnut. *Indian J. Agron.*, **37** (3): 484-488.
- Prusty, J.C., Lenka Behera, D. and Misra (1990).** Chemical weed control in *Kharif* groundnut. *Indian J. Weed Sci.*, **22**: 92-93.
- Senthilkumar, N. (2009).** Effect of plant density and weed management practices on production potential of groundnut (*Arachis hypogaea* L.) *Indian J. Agric. Res.*, **43** (1): 57-60.
- Throat, S.T. (2004).** Effect of irrigation regimes, weed management and regulators on protein and dry pod yields of groundnut under polythene mulch. *IAN*, **24**:45-47.

Received : September, 2009; Accepted : December, 2009