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# Integrated weed management in groundnut

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**ABSTRACT**

Field experiment was conducted to study the influence of integrated weed management practices on seed pod yield in groundnut at Agricultural Research station, Vaigaidam during *Rabi* 2011-12. Weed control efficiency was higher with pre-emergence application of oxyfluorfen at 0.25 kg/ha followed by hand weeding on 20 DAS and pendimethalin at 0.75 kg/ha followed by a hand weeding on 20 DAS at different intervals of 10, 25, 40 and 60 DAS. Weed density of sedge was significantly lowered with pre-emergence application of oxyfluorfen at 0.25 kg/ha on 3 DAS. Number of pods per plant and seed pod yield was significantly higher with pre-emergence application of pendimethalin at 0.75 kg/ha, alachlor 1.0 kg/ha) and oxyfluorfen at 0.25 kg/ha followed by hand weeding at 20 DAS. Layby application of pendimethalin at 0.75 kg/ha at 3 and 45 DAS after earthing up was also at par with pre-mergence herbicide followed by hand weeding. Phytotoxicity symptoms has been observed with layby application of oxyflourfen 0.25 kg/ha on 45 DAS after earthing up and this resulted lower yield even if this treatment has recorded lesser weed density.

**Key words**: Groundnut, Integrated weed management, Lay by application, Seed pod yield, Weed control efficiency

Groundnut is an important oil seed crop of India which is cultivated in nearly 6 million ha area with the production of 7.5 million tones and average productivity of 1.27 t/ha. Though India ranks first in the world under groundnut area and there is need to import 8.03 million tones of edible oil (Kalhapure *et al*. 2013). Weeds are the major cause of minimizing production and yield losses in groundnut (Gosh e*t al*. 2000).

Agricultural Research Station, Vaigaidam is one of the renowned centres for producing breeder seeds in groundnut. Major problem in seed production is labour shortage during the peak period of important operations like sowing, weeding and harvesting. For groundnut, there should be a weed free condition up to 40 DAS otherwise the reduction in growth and yield can't be compensated at later stage due to severe weed infestation. Thus a field experiment was conducted to evaluate suitable integrated weed management practices for increasing weed control efficiency and reducing labour usage in groundnut production.

## MATERIALS AND METHODS

Field experiment was conducted on integrated weed management practices on seed pod yield at Agricultural Research station, Vaigaidam during *Rabi'* 2011-12. The soil of the field experimental field was having pH (6.5), available N (242 kg/ha), $P_2O_5$ (11 kg/ha) and $K_2O$ (335 kg/ha).Treatments consisted of Pre-emergence application of pendimethalin 0.75 kg/ha, alachlor 1.0 kg/ha and oxyfluorfen 1.0 kg/ha followed by hand weeding on 20 DAS. To control late emerging weeds after 45 DAS, layby application of pendimethalin 1.0 kg/ha and oxyfluorfen 0.25 kg/ha was done since hand weeding was impossible due to peg penetration at later stage. The experiment was laid out in randomized block design with three replications. Groundnut variety *'TMV 7'* was sown. Crop was fertilized with 25:50:75 kg NPK ha under surface irrigation. Herbicides were applied using manually operated knapsack sprayer fitted with flat fan nozzle using spray volume of 600 L/ha. Weed density were recorded at 10, 25, 40 and 60 DAS. Economics was worked as per the prevailing market price.

## RESULTS AND DISCUSSION

### Effect on weeds

Predominant weeds identified in the experimental were *Chloris barbata, Panicum repens* and *Dactyloctenium ageyptium* among grasses. Among the sedges, *Cyperus rotundus* and *Cyperus esculentus* were predominant. Major broad leaved weeds were *Celosia argentia, Trianthema*

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*portulacastrum, Tridax procumbens, Euphorbia geniculata,Digera arvensis, Parthenium hysterophorus, Portulaca oleraceae, Phyllanthus niruri* and *Phyllanthus medraspatensis.*

Grass weed density was significantly lowered with pre-emergence application of pendimenthalin 0.75 kg/ha, alachlor 1.0 kg/ha and oxyfluorfen 0.25 kg/ha. Sedge weed density was significantly lowered with pre-emergence application of oxyfluorfen at 0.25 kg/ha on 3 DAS. Remaining all other treatments recorded significantly higher sedge weed population. Pre-emergence application of oxyfluorfen also influenced germination of *C. rotundus.* Broad-leaved weed density was also significantly lowered with pre-emergence application of pendimethalin 0.25 kg/ha, alachlor 1.0 kg/ha and oxyflourfen at 250 g/ha.

Total weed density was significantly lowered with pre-emergence application of oxyfluorfen 0.25 kg/ha than all other treatments. This might be due to reduced sedge weed population and broadleaved weed density comparatively than other test herbicides.

Grass weed density was significantly lowered with pre-emergence application of pendimethalin 0.75 kg/ha and oxyfluorfen 0.25 kg/ha *fb* a hand weeding on 20 DAS and hand weeding twice on 15 and 30 DAS. Post-emergence application of quizalofop-ehyl 0.25 kg/ha was also significantly lowered the grass weed density over all other treatments. Sedges weed was significantly lowered with pre-emergence application of oxyfluorfen 0.25 kg/ha on 3 DAS and hand weeding twice on 15 and 30 DAS. Broad-leaved weed density was also significantly lowered with pre-emergence application of pendimethalin 0.75 kg/ha, and oxyfluorfen 250 g/ha *fb* a hand weeding on 20 DAS and hand weeding twice on 15 and 30 DAS and layby application of oxyfluorfen 0.25 kg/ha on 3 and 45 DAS after earthing up is also on par.

Total weed density was significantly lowered with pre-emergence application of oxyfluorfen at 0.25 kg/ha and hand weeding twice on 15 and 30 DAS than all other treatments. This might be due to the reduction in sedge weed population and as well as broad-leaved weed density comparatively than other test herbicides. Hand weeding has better efficiency in controlling over all weed density.

Except unweeded control, all other treatments have recorded significantly lower grass weed density on 40 DAS and all other test herbicides are on par with each other. Sedge weed density was significantly lowered with pre-emergence application of pendimethalin 0.75 kg/ha and oxyfluorfen 0.25 kg/ha on 3 DAS *fb* hand weeding and as well as their sequential application on 45 DAS after earthing up.

**Table 1. Effect of different weed management practices on weed density per $m^2$ (no/$m^2$) on 10 and 30 DAS in groundnut during *Rabi* 2011-12**

| Treatment | 10 DAS | | | | 30 DAS | | | |
|---|---|---|---|---|---|---|---|---|
| | Grasses | Sedges | Broad-leaved | Total | Grasses | Sedges | Broad-leaved | Total |
| PE alachlor 1.0 kg/ha (sand application) + HW 20 DAS | 1.73 (1.0) | 2.77 (5.7) | 2.65 (5.0) | 3.70 (11.7) | 2.24 (3.0) | 3.7 (11.7) | 2.71 (5.3) | 4.32 (20.0) |
| PE alachlor 1.0 kg /ha + hand weeding in 20 DAS | 1.53 (0.3) | 2.45 (4.0) | 2.08 (2.3) | 2.94 (6.7) | 2.00 (2.0) | 3.27 (8.7) | 2.65 (5.0) | 3.92 (15.7) |
| PE pendimethalin 0.75 kg/ha + hand weeding on 20 DAS | 1.53 (0.3) | 2.65 (5.0) | 1.63 (0.7) | 2.83 (6.0) | 1.41 (0.0) | 3.32 (9.0) | 2.16 (2.7) | 3.61 (11.7) |
| Lay by pendimethalin 0.75 kg/ha + 0.75 kg/ha after earthing up on 45 DAS | 1.53 (0.3) | 2.58 (4.7) | 1.63 (0.7) | 2.77 (5.7) | 1.73 (1.0) | 2.7 (5.3) | 2.16 (2.7) | 2.77 (9.0) |
| PE oxyfluorfen 0.25 kg/ha + HW on 20 DAS | 1.53 (0.3) | 1.83 (1.3) | 1.41 (0.0) | 1.91 (1.7) | 1.83 (1.3) | 2.08 (2.3) | 1.83 (1.3) | 2.58 (5.0) |
| Layby oxyfluorfen 0.25 kg/ha + 0.25 kg/ha after earthing up on 45 DAS | 1.53 (0.3) | 2.16 (2.7) | 1.91 (1.7) | 2.58 (4.7) | 1.91 (1.7) | 2.71 (5.3) | 2.45 (4.0) | 2.83 (11.0) |
| PE pendimethalin 0.75 kg/ha + EPOE quizalofop-ethyl at 0.25 kg/ha on 20 DAS | 1.63 (0.7) | 2.65 (5.0) | 2.16 (2.7) | 3.22 (8.4) | 1.53 (0.3) | 3.11 (7.7) | 3.16 (8.0) | 4.43 (16.0) |
| Hand weeding twice (15 and 30 DAS) | 2.82 (6.0) | 2.77 (5.7) | 3.16 (8.0) | 4.65 (19.7) | 1.83 (1.3) | 2.00 (2.0) | 2.16 (2.7) | 2.82 (6.0) |
| Un weeded control | 3.46 (10.0) | 3.46 (10.0) | 4.51 (18.3) | 6.35 (38.3) | 4.16 (15.3) | 4.0 (14.0) | 5.29 (26.0) | 7.98 (55.3) |
| LSD (P=0.05) | 0.4 | 0.6 | 0.8 | 0.7 | 0.4 | 0.6 | 0.8 | 0.9 |

Figures in parentheses are mean of original values

**Table 2. Effect of different weed management practices on weed density per $m^2$ ($no/m^2$) on 40 and 60 DAS in groundnut during *Rabi 2011*- 12**

| Treatment | 40 DAS | | | | 60 DAS | | | |
|---|---|---|---|---|---|---|---|---|
| | Grasses | Sedges | Broad-leaved | Total | Grasses | Sedges | Broad-leaved | Total |
| PE alachlor 1.0 kg/ha (sand application) + HW 20 DAS | 1.73 (1.0) | 2.24 (3.0) | 3.27 (12.7) | 3.83 (12.7) | 2.16 (2.7) | 2.71 (5.3) | 3.27 (8.7) | 4.32 (16.7) |
| PE alachlor 1.0 kg/ha + hand weeding 20 DAS | 1.41 (0.0) | 2.24 (3.0) | 2.94 (6.7) | 3.42 (9.7) | 2.08 (2.3) | 2.45 (4.0) | 3.00 (7.0) | 3.92 (13.3) |
| PE pendimethalin 0.75 kg/ha + hand weeding on 20 DAS | 1.41 (0.0) | 2.71 (5.3) | 2.52 (4.3) | 3.42 (9.7) | 1.53 (0.3) | 2.58 (4.7) | 2.83 (6.0) | 3.61 (11.0) |
| Layby pendimethalin 0.75 kg/ha + 0.75 kg/ha after earthing up on 45 DAS | 1.63 (0.7) | 2.52 (4.3) | 2.38 (3.7) | 3.27 (8.7) | 1.53 (0.3) | 2.08 (2.3) | 2.24 (3.0) | 2.77 (5.7) |
| PE oxyfluorfen 0.25 kg/ha + HW on 20 DAS | 1.41 (0.0) | 1.91 (1.7) | 1.91 (1.7) | 2.31 (3.3) | 1.63 (0.7) | 1.91 (1.7) | 2.08 (2.3) | 2.58 (4.7) |
| Layby oxyfluorfen 0.25 kg/ha + 0.25 kg/ha after earthing up on 45 DAS | 1.41 (0.0) | 2.24 (3.0) | 2.52 (4.3) | 3.06 (7.3) | 1.53 (0.3) | 2.16 (2.7) | 2.24 (3.0) | 2.83 (6.0) |
| PE pendimethalin 0.75 kg/ha + EPOE quizalofop-ethyl 0.25 kg/ha on 20 DAS | 1.53 (0.3) | 3.00 (7.0) | 3.37 (9.3) | 4.32 (16.7) | 1.91 (1.7) | 2.77 (5.7) | 3.51 (10.3) | 4.43 (17.7) |
| Hand weeding twice (15 and 30 DAS) | 1.41 (0.0) | 2.38 (3.7) | 3.88 (12.7) | 4.28 (16.3) | 2.00 (2.0) | 2.31 (3.3) | 2.83 (6.0) | 3.64 (11.3) |
| Un weeded control | 4.04 (14.3) | 3.79 (12.3) | 5.54 (28.7) | 7.57 (55.3) | 4.32 (16.7) | 2.40 (17.3) | 5.45 (27.7) | 7.98 (61.7) |
| LSD (P=0.05) | 0.4 | 0.8 | 0.7 | 0.8 | 0.4 | 0.5 | 0.6 | 0.5 |

Figures in parentheses are mean of original values

Hand weeding twice has also recorded lesser sedge weed density than all other treatments. Broad-leaved weed density was also significantly lowered with pre-emergence application of pendimethalin 0.75 kg/ha and oxyfluorfen 0.25 kg/ha on 3 DAS and *fb* a hand weeding on 20 DAS and as well as their sequential application on 45 DAS after earthing-up.

Grass weed density was significantly lowered with pre-emergence application of pendimethalin 0.25 kg/ha, alachalor and oxyfluorfen 0.250 kg/ha *fb* a hand weeding on 20 DAS and as well as their layby application on 3 and 45 DAS after earthing up. Post-emergence application of quizalofop-ethyl 250 g/ha also reduced the grass weed density. Sedge weed population was significantly lowered with pre-emergence application of oxyfluorfen 0.25 kg/ha on 3 DAS followed by a hand weeding and as well as is sequential application on 45 DAS (T6) after earthing up. Hand weeding twice on 15 DAS also recorded lesser sedge weed density than all other treatments. Broad-leaved weed density was also significantly lowered with pre-emergence application of oxyfluorfen 0.25 kg/ha on 3 DAS *fb* a hand weeding at 20 DAS and as well as its sequential application at 45 DAS after earthing up overall other treatments. Layby application of pendimethalin 0.75 kg/ha on 3 and DAS after earthing up also reduce the broad-leaved weed density on 60 DAS over all other treatments.

Total weed density was also significantly lowered with pre-emergence application of oxyfluorfen 0.25 kg/ha on 3 DAS *fb* a hand weeding on 20 DAS and as well as its sequential application on 45 DAS after earthing up over all other treatments. Layby application of pendimethalin 0.75 kg/ha on 3 and 45 DAS after earthing up has also reduce the broad-leaved weed density on 60 DAS over all other treatments.

Weed control efficiency was higher with pre-emergence application of oxyfluorfen at 0.25 kg/ha *fb* hand weeding on 20 DAS and pendimethalin 0.75 kg/ha *fb* a hand weeding on 20 DAS at different intervals of 10,25,40 and 60 DAS.

**Effect on crop**

During *Rabi* 2011-12, number of pods per plant and seed pod yield was significantly higher with pre-emergence application of pendimethalin at 0.75 kg/ha, alachlor 1.0 kg/ha and oxyfluorfen at 0.25 kg/ha *fb* hand weeding on 20 DAS. Layby application of pendimethalin 0.75 kg/ha at 3 and 45 DAS after earthing up was also at par with pre-emergence herbicide followed by hand weeding. This might be due to lesser weed density observed at early crop stage and their consistent control over weeds at later stage. Phytotoxicity symptoms has been observed with layby application of oxyfluorfen at 0.25 kg/ha on 45 DAS after earthing up and crop was completely

**Table 5. Effect of different weed management practices on number of pods per plant and seed pod yield (kg/ha) in groundnut during *Rabi* 2011 - 12**

| Treatment | Number of pods per plant | Seed pod yield (t/ha) | B:C |
|---|---|---|---|
| PE alachlor 1.0 kg/ha (sand application) + HW 20 DAS | 22 | 1.48 | 2.50 |
| PE alachlor 1.0 kg /ha + hand weeding 20 DAS | 38 | 1.85 | 3.81 |
| PE pendimethalin 0.75 kg/ha + hand weeding on 20 DAS | 37 | 1.83 | 3.63 |
| Layby pendimethalin 0.75 kg/ha + 0.75 kg/ha after earthing up on 45 DAS | 36 | 1.83 | 3.65 |
| PE oxyfluorfen 0.25 kg/ha + HW on 20 DAS | 39 | 1.93 | 3.85 |
| Layby oxyfluorfen 0.25 kg/ha + 0.25 kg/ha after earthing up on 45 DAS | 13 | 0.97 | 1.97 |
| PE pendimethalin 0.75 kg/ha + EPOE quizalofop-ethyl 0.25 kg/ha on 20 DAS | 22 | 1.27 | 2.60 |
| Hand weeding twice 15 and 30 DAS | 38 | 1.84 | 2.75 |
| Unweeded control | 8 | 0.92 | 2.08 |
| LSD (P=0.05) | 9 | 0.34 | |

recovered at 7 Days after herbicide application and this reflected on lower yield even if this treatment has recorded lesser weed density.

Benefit cost ratio was higher with pre-emergence application of oxyfluorfen at 0.25 kg/ha *fb* hand weeding on 20 DAS. Due to reduced yield, layby application of oxyfluorfen at 0.25 kg at 3 DAS and 0.25 kg/ha after earthing up has recorded lower benefit cost ratio.

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