

## EFFECT OF PRE-EMERGENCE HERBICIDES ON YIELD OF RAINFED SUNFLOWER

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### ABSTRACT

A field study on the effect of pre-emergence herbicides in rainfed sunflower showed that pre-emergence application of Thiobencarb at  $1.5 \text{ kg.ha}^{-1}$  was more effective in control of the weeds and produced significantly higher seed yield over other herbicides viz., Oxadizon, Fluchloralin at  $0.75$  and  $1.5 \text{ kg.ha}^{-1}$  respectively and Thiobencarb at  $0.75 \text{ kg.ha}^{-1}$ . The seed yield recorded by Thiobencarb at  $1.5 \text{ kg.ha}^{-1}$  was comparable with the seed yield obtained from farmers' method of two weeding.

KEY WORDS: Sunflower, Herbicides, Yield.

The concept of the use of herbicides in the efficient control of weeds in the early stages of the crop growth is getting momentum in the control of labour problem, effective utilisation of limited available soil moisture by the crop and unfavourable soil physical conditions for exclusively employing labour for manual weeding. Johnson (1972) found that the yield of sunflower was reduced by 35 per cent, when unweeded upto six weeks after sowing. Bedmar *et al.* (1981) recorded significant yield losses when weeds were left for 45 days after emergence. Herbicides offered a possibility of effective weed control during critical period of plant growth. This study was taken up to find out the relative advantage of the pre-emergence herbicides in controlling the weeds and seed yield of rainfed sunflower.

### MATERIALS AND METHOD

A field experiment was conducted at the Regional Research Station, Aruppukottai during Rabi season of 1983-1984 in a randomized block design replicated three times. Two levels of ( $0.75$  and  $1.5 \text{ kg.ha}^{-1}$ ) three pre-emergence herbicides viz., Fluchloralin (Basalin), Oxadiazon (Ronstar) and Thiobencarb (Saturn) were compared with farmer's method of weeding twice on 15th and 30th day after sowing and unweeded check.

The soil type is black cotton with deep clay in texture. The ruling sunflower variety K 2 was used as test variety. The rainfall received during the crop period was about 378.8 mm. Recommended crop management practices and need based plant protection measures were followed. The herbicides used in this study are of emulsifiable concentrate form. The application of herbicides was done through lay by method, as sand mix application, by mixing the calculated quantity of herbicides with sieved sand @  $50 \text{ kg.ha}^{-1}$ . The herbicide-sand mixture was applied as per treatments on third day after sowing the crop.

The moisture predominant weed species present in the study were *Trianthema portulacastrum*, *Corchorus trilocularis* followed by *Cyperus rotundus*, *Cynodan dactylon* and *Echinochloa crusgalli*.

The biometric observation such as weed count and dry matter production of weeds per unit area were recorded on 15th, 30th, 45th and 60th day after sowing, following the method suggested by Burnside and Wicks (1965). At harvest, plant height, stem diameter, head diameter, thousand seed weight and seed yield were recorded.

## RESULTS AND DISCUSSION

### *Effect of herbicides on weed population*

Herbicide application showed a significant reduction in the number of dicot weeds (Table 2) throughout the crop period and significantly lesser number of monocot weeds (Table 1) were found only up to 30 days of crop growth as compared to unweeded check. Beyond 30 days, herbicides application did not significantly influence on the number of monocot weeds. This was attributed to the herbicides tried which might have effective control over monocot weeds present at early stages of the crop. Relatively the lower dose ( $0.75 \text{ kg.ha}^{-1}$ ) of herbicides recorded numerically higher weed population compared to higher dose ( $1.5 \text{ kg.ha}^{-1}$ ) of herbicides. Among herbicides, Thiobencarb at  $1.5 \text{ kg.ha}^{-1}$  recorded lower weed population throughout the crop period, probably due to the prolonged persistence of herbicidal effect.

### *Effect of herbicides on growth and yield components*

The unweeded check recorded the lowest plant height, stem as well as head diameter and

thousand seed weight (Table 3) due to heavy infestation of weeds during crop growth. Herbicides treatment significantly influenced the plant height, thousand seed weight as compared to unweeded check. Among herbicides, Thiobencarb @  $1.5 \text{ kg.ha}^{-1}$  recorded maximum plant height, stem as well as head diameter and thousand seed weight, which were comparable to the farmers' method of two weedings. This might be attributed due to the lesser weed competition from the early stage of crop, which might have favoured better utilization of applied nutrients, sunlight and moisture, resulting in better early vigorous crop growth and yield components.

### *Effect of herbicides application on seed yield*

Data on seed yield (Table 3) revealed that pre-emergence application of Thiobencarb at  $1.5 \text{ kg.ha}^{-1}$  recorded significantly higher seed yield over unweeded check and other herbicides tried at  $0.75$  and  $1.5 \text{ kg.ha}^{-1}$ . The seed yield of  $724 \text{ kg.ha}^{-1}$  recorded by Thiobencarb  $1.5 \text{ kg.ha}^{-1}$  was comparable with the seed yield ( $710 \text{ kg.ha}^{-1}$ ) obtained from farmers' method of two weeding. This might be due to the weed control efficiency of Thiobencarb influencing in better and early vigorous crop growth, yield components and finally the seed yield.

## REFERENCES

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Table 1. Effect of pre-emergence herbicides on number of monocot weeds/m<sup>2</sup>

| Treatments  | 15th day |      | 30th day |      | 45th day |      | 60th day |       |
|---|----------|------|----------|------|----------|------|----------|-------|
|   | T        | O    | T        | O    | T        | O    | T        | O     |
| T <sub>1</sub> - Unweeded check (control)                                     | 7.07     | (50) | 8.89     | (79) | 9.64     | (93) | 10.44    | (109) |
| T <sub>2</sub> - Farmers' method (Hand weeding<br>twice on 15th and 30th day) | 7.14     | (51) | 6.08     | (37) | 4.12     | (17) | 5.57     | (31)  |
| T <sub>3</sub> - Fluchloralin @ 1.5 kg/ha                                     | 3.87     | (15) | 5.66     | (32) | 6.48     | (42) | 8.54     | (73)  |
| T <sub>4</sub> - Fluchloralin @ 0.75 kg/ha                                    | 4.24     | (18) | 6.00     | (36) | 7.48     | (56) | 9.43     | (89)  |
| T <sub>5</sub> - Oxadiazon @ 1.5 kg/ha  | 4.69     | (22) | 6.24     | (39) | 8.12     | (66) | 8.89     | (79)  |
| T <sub>6</sub> - Oxadiazon @ 0.75 kg/ha                                       | 5.09     | (26) | 6.56     | (43) | 8.48     | (72) | 9.36     | (88)  |
| T <sub>7</sub> - Thiobencarb @ 1.5 kg/ha                                      | 3.32     | (11) | 4.36     | (19) | 5.20     | (27) | 6.00     | (36)  |
| T <sub>8</sub> - Thiobencarb @ 0.75 kg/ha                                     | 4.12     | (17) | 4.47     | (20) | 5.48     | (30) | 6.40     | (41)  |
| SE <sub>p</sub> ±   | 0.86     | -    | 0.81     | -    | 2.91     | -    | 2.83     | -     |
| CD (0.05)   | 1.84     | -    | 1.73     | -    | NS       | -    | NS       | -     |

T = Transformed values

O = Original values given in parenthesis are round figures

Table 2. Effect of pre-emergence herbicides on number of dicot weeds/m<sup>2</sup>

| Treatments  | 15th day |      | 30th day |      | 45th day |      | 60th day |      |
|---|----------|------|----------|------|----------|------|----------|------|
|   | T        | O    | T        | O    | T        | O    | T        | O    |
| T <sub>1</sub> - Unweeded check (control)                                     | 4.12     | (17) | 4.69     | (22) | 6.16     | (38) | 6.40     | (41) |
| T <sub>2</sub> - Farmers' method (Hand weeding<br>twice on 15th and 30th day) | 4.00     | (16) | 2.00     | (4)  | 2.23     | (5)  | 4.00     | (16) |
| T <sub>3</sub> - Fluchloralin @ 1.5 kg/ha <sup>-1</sup>                       | 2.00     | (4)  | 3.87     | (15) | 4.00     | (16) | 4.69     | (22) |
| T <sub>4</sub> - Fluchloralin @ 0.75 kg/ha <sup>-1</sup>                      | 2.65     | (7)  | 4.35     | (19) | 4.80     | (23) | 5.29     | (28) |
| T <sub>5</sub> - Oxadiazon @ 1.5 kg/ha <sup>-1</sup>                          | 2.24     | (5)  | 4.00     | (16) | 5.00     | (25) | 5.48     | (30) |
| T <sub>6</sub> - Oxadiazon @ 0.75 kg/ha <sup>-1</sup>                         | 2.65     | (7)  | 4.24     | (18) | 5.10     | (26) | 5.74     | (33) |
| T <sub>7</sub> - Thiobencarb @ 1.5 kg/ha <sup>-1</sup>                        | 1.41     | (2)  | 2.65     | (7)  | 2.83     | (8)  | 3.16     | (10) |
| T <sub>8</sub> - Thiobencarb @ 0.75 kg/ha <sup>-1</sup>                       | 1.73     | (3)  | 3.16     | (10) | 3.61     | (13) | 4.12     | (17) |
| SE <sub>0</sub> ±   | 0.92     | -    | 0.74     | -    | 1.06     | -    | 1.29     | -    |
| CD (5%)   | 1.97     | -    | 1.59     | -    | 2.27     | -    | 2.77     | -    |

T = Transformed values

O = Original values given in parenthesis are round figures

**Table 3.** Effect of pre-emergence herbicides on growth characters, yield components and seed yield of unirrigated sunflower

| Treatments   | Plant height (cm) | Stem diameter (cm) | Head diameter (cm) | Thousand seed weight (g) | Seed yield (kg/ha <sup>1</sup> ) |
|--|-------------------|--------------------|--------------------|--------------------------|----------------------------------|
| T <sub>1</sub> Unweeded control  | 97.5              | 1.77               | 8.2                | 39.21                    | 552                              |
| T <sub>2</sub> Farmers 'method (Hand weeding twice on 15 <sup>th</sup> and 30 <sup>th</sup> day) | 122.4             | 2.11               | 11.7               | 48.37                    | 710                              |
| T <sub>3</sub> Fluchloralin @ 1.5 kg/ha <sup>1</sup>   | 113.8             | 1.83               | 10.7               | 45.11                    | 615                              |
| T <sub>4</sub> Fluchloralin @  | 115.2             | 1.95               | 11.1               | 47.21                    | 615                              |
| T <sub>5</sub> Oxadiazon @ 1.5 kg/ha <sup>1</sup>  | 114.8             | 1.93               | 10.9               | 45.06                    | 581                              |
| T <sub>6</sub> Oxadiazon @ 0.75 kg/ha <sup>1</sup>   | 115.3             | 2.00               | 11.0               | 47.13                    | 625                              |
| T <sub>7</sub> Thiobencarb @ 1.5 kg/ha <sup>1</sup>  | 120.9             | 2.14               | 11.5               | 48.53                    | 724                              |
| T <sub>8</sub> Thiobencarib @ 0.75 kg/ha <sup>1</sup>  | 117.3             | 2.00               | 11.4               | 47.81                    | 633                              |
| SED ±  | 4.17              | 0.44               | 1.4                | 0.93                     | 33                               |
| CD (5%)  | 8.94              | NS                 | 3.0                | 2.00                     | 71                               |

NS — Not significant