

## Performance of different herbicides in onion as affected by method of application

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### ABSTRACT

An investigation on weed management studies in onion (*Allium cepa*) was carried out during *rabi* seasons of 2006-07 and 2007-08 at CCS Haryana Agricultural University, Hisar. Early post-emergence application (10 DAT) of oxadiargyl at 100 g/ha, pre-emergence application of oxadiargyl at 120 g/ha, oxyfluorfen at 250 g/ha, trifluralin at 1000 g/ha and pendimethalin at 1000 g/ha applied through spray supplemented with one hand weeding at 45 days after transplanting (DAT) resulted in significant reduction in population of *Chenopodium album*, *Coronopus didymus*, *Chenopodium murale* and *Melilotus indica* and higher bulb yield. Bioefficacy of all herbicides applied by spray method was more as compared to sand mix broadcast application.

**Key words :** Onion, Oxadiargyl, Pendimethalin, Oxyfluorfen, Weeds

Onion, an important spicy vegetable commercial crop of Haryana is severely infested with weeds resulting in heavy yield reductions. Due to closer planting and shallow root system of onion, manual weeding is expensive and time consuming. So herbicide control of weeds assumes great significance. Among the used and newly registered herbicides, identifying a most efficient herbicide for weed control and its selectivity to crop is most important. Further, the effectiveness of applied herbicide depends on the application techniques. With a view to evaluate different herbicides and their application techniques, present investigation was undertaken.

### MATERIALS AND METHODS

Experiment consisting of five herbicides at different application rates and two methods of application (Table 1) was conducted during *rabi* 2006 and 2007 at Vegetable Research Farm of CCS, Haryana Agricultural University, Hisar. Seventeen treatments replicated thrice were arranged in a randomized block design keeping a plot size of 5 x 4 m. Eight week old seedlings of variety *Hisar-2* were transplanted on January 15 and 10 in the first and second years, respectively, at a spacing of 15 x 15 cm. As per treatment, all the pre-emergence herbicides were either applied by broadcasting by mixing sand at 150 kg/ha or by spray with flat fan nozzle using 800 liters of water/ha. Oxadiargyl at 100 and 120 g/ha was also applied 10/days after transplanting. One hoeing at 6 weeks after transplanting (45 DAT) was given in all herbicide treated plots. Data on visual weed control (%) were recorded at 90 DAP the crop. In weed free treatment, plots were kept weed free by giving weeding as and when required. The phytotoxic effect of herbicides on onion was recorded on

0-10 scale where 0 = no adverse effect of herbicide on crop and 10 = severe adverse effect of herbicide on crop at 10 and 25 DAP. Since the treatment effects in both the years under study were same, so pooled analysis of data was made the parameters like weed index was calculated from the following formulae:

$$\text{Weed Index (\%)} = \left( \frac{X-Y}{Y} \right) \times 100$$

Where, X = Bulb yield from weed free plot and Y = Bulb yield from treatment.

### RESULTS AND DISCUSSION

The predominant weeds of experimental field were *Chenopodium album*, *Coronopus didymus*, *Chenopodium murale*, *Melilotus indica*, *Cyperus rotundus* and *Convolvulus arvensis*. Per cent control of weeds was not much affected due to method of application of oxadiargyl either at 100 or 120 g/ha. Efficacy of pendimethalin and alachlor was more when applied through spray but oxyfluorfen and trifluralin applied through spray proved more effective as compared to sand mix application. Findings of experiments conducted under All India Coordinated Weed Control Programme at Tamil Nadu centre showed excellent control of weeds in transplanted onion due to application of pendimethalin through sand mix broadcast, oxyfluorfen and oxadiargyl through pre-emergence spray (Anonymous 2002). Pre-emergence application of pendimethalin at 1.0 kg/ha either through sand mixing or spray, oxyfluorfen at 250 g/ha, pre-emergence spray of trifluralin at 1.0 kg/ha and oxadiargyl at 100 and 120 g/ha applied at 10 DAT as post emergence spray supplemented with one hoeing proved very effecting in minimizing population of weeds and

**Table 1. Density of different weeds and bulb yield of onion as affected by weed control treatments (pooled date of 2006 and 2007)**

| Treatment     | Dose (g/ha) | Method of application | Time of application | Visual control of weeds (%) | Weed density(no./m <sup>2</sup> ) at 30 DAT |                   |                  | Bulb yield (kg/ha) | Phytotoxicity rating |        | Weed Index (%) |
|---------------|-------------|-----------------------|---------------------|-----------------------------|---|-------------------|------------------|--------------------|----------------------|--------|----------------|
|               |             |                       |                     |                             | <i>C. album</i>                             | <i>C. didymus</i> | <i>C. murale</i> |                    | 10 DAT               | 20 DAT |                |
| Pendimethalin | 750         | Spray                 | Pre-em              | 66.5                        | 0.7   | 34.1              | 0                | 16340              | 0                    | 0      | 35.50          |
| Pendimethalin | 750         | Sand mix              | Pre-em              | 72.5                        | 0.7   | 26.4              | 2.4              | 17250              | 0                    | 0      | 28.40          |
| Pendimethalin | 1000        | Spray                 | Pre-em              | 88.0                        | 0   | 12.2              | 0                | 20370              | 0                    | 0      | 8.71           |
| Pendimethalin | 1000        | Sand mix              | Pre-em              | 86.0                        | 0   | 16.6              | 0                | 19470              | 0                    | 0      | 13.70          |
| Oxadiargyl    | 100         | Spray                 | Pre-em              | 78.0                        | 4.7   | 18.3              | 0                | 18220              | 0                    | 0      | 21.60          |
| Oxadiargyl    | 100         | Sand mix              | Pre-em              | 80.0                        | 0   | 4.4               | 0                | 18890              | 0                    | 0      | 17.30          |
| Oxadiargyl    | 120         | Spray                 | 10 DAT              | 91.0                        | 0   | 0                 | 0                | 21220              | 0                    | 0      | 4.32           |
| Oxadiargyl    | 120         | Spray                 | Pre-em              | 91.0                        | 1.4   | 10.4              | 0                | 19970              | 0                    | 0      | 10.90          |
| Oxadiargyl    | 120         | Sand mix              | Pre-em              | 91.5                        | 1.3   | 8.0               | 0                | 21820              | 0                    | 0      | 1.51           |
| Alachlor      | 750         | Spray                 | Pre-em              | 59.0                        | 12.7  | 61.0              | 14.0             | 16570              | 0                    | 0      | 33.60          |
| Alachlor      | 750         | Sand mix              | Pre-em              | 65.0                        | 10.6  | 37.3              | 12.5             | 17320              | 0                    | 0      | 27.84          |
| Trifluralin   | 1000        | Spray                 | Pre-em              | 86.5                        | 1.3   | 41.0              | 0                | 19310              | 0                    | 0      | 14.70          |
| Trifluralin   | 1000        | Sand mix              | Pre-em              | 60.0                        | 24.0  | 65.2              | 0                | 18490              | 0                    | 0      | 20.00          |
| Oxyfluorfen   | 250         | Spray                 | Pre-em              | 92.0                        | 2.0   | 3.4               | 0                | 20100              | 0.4                  | 0      | 10.10          |
| Oxyfluorfen   | 250         | Sand mix              | Pre-em              | 84.0                        | 3.8   | 3.2               | 0                | 19720              | 0.2                  | 0      | 12.30          |
| Weed free     | -           | -                     | -                   | 100.0                       | 0.0   | 0                 | 0                | 22150              | 0                    | 0      | 0              |
| Weedy Check   | -           | -                     | -                   | 0                           | 74.0  | 106               | 26.2             | 13400              | 0                    | 0      | 65.30          |
| LSD (P=0.05)  | -           | -                     | -                   | -                           | 1.5   | 4.9               | 3.8              | 1160               | -                    | -      | -              |

\* One hoeing at 45 DAT was common to all treatments except weed free and weedy check, DAT - Days after transplanting

increased bulb yield of onion (Table 1) Kathiresan *et al.* (2004) have also reported excellent efficacy of oxadiargyl against weeds in transplanted onion applied pre-emergence at 90 g/ha without any phytotoxic effect on crop. None of the herbicide except oxyfluorfen caused any phytotoxic symptoms in terms of leaf yellowing, leaf curling, leaf tip drying *etc.* as observed on 10 and 25 DAT. However, oxyfluorfen although proved very effective against weeds but caused slight yellowing followed by chlorotic symptoms phytotoxicity. Symptoms were more in spray mode than sand mix application but these symptoms disappeared after 25 DAT and did not result any decrease in bulb yield. These results are in agreement with the findings of Nandal and Singh (2002). Efficacy of early post emergence application of oxadiargyl against *Coronopus didymus* was more as compared to its pre-emergence application of trifluralin and pendimethalin. Among herbicide treatments, maximum bulb yield (21250 kg/ha) was recorded with early post-emergence application of oxadiargyl at 100 g/ha which was at par with pre-emergence application of this herbicide at 120 g/ha, pre-emergence use of pendimethalin

at 100 g/ha and spray of oxyfluorfen at 250 g/ha. Among herbicide treatments, efficacy of alachlor was poor (59-65%) and sand mix application of trifluralin at 1.0 kg/ha gave only 60% control of weeds as against 86.5% achieved through spray of this herbicide at same dose. Weed index in herbicide treatments was maximum (35.5%) in pre-emergence spray of pendimethalin at 750 g/ha and minimum (1.51%) in pre-emergence application of oxadiargyl at 120 g/ha applied through sand mix application.

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