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# Weed Management in Onion (*Allium cepa* L.) in north eastern Transitional track of Karnataka

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**ABSTRACT**
*A field experiment was conducted at college of Horticulture, Bidar for two consecutive years during Kharif 2009 and 2010 to find out the efficient weed management in onion. Among the different weed management treatments weed free check recorded significantly lowest weed density, dry weight of weed and higher weed control efficiency compared to rest of the treatments. The growth and yield attributes viz., plant height, bulb weight and bulb diameters were recorded maximum in weed free check compared to rest for the treatments. Which was on par with pendimethalin 1.0 kg ha$^{-1}$followed by oxyfluorfen 0.25 kg ha$^{-1}$ at 25DAT with one hand wedding at 40 DAS.*
*Key words: Weed free check, weed control efficiency, bulb weight, bulb diameter, oxyfluofen*

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## INTRODUCTION

Onion is one of the most important commercial vegetable crops grown all over the world. In India onion occupies about 1.06 million hectare area having 15.12 million metric tons of production and average productivity of 14.2 tons per hectare [1]. The most important onion growing states in India are Maharashtra, Madhya Pradesh and Karnataka. This crop is slow growing, shallow rooted crop with narrow, upright leaves and non branching habit. Therefore, onion crop cannot compete with weeds for nutrient, water and sunlight. The due to practice of recommended irrigation and fertilizers allows for successive growth of weeds during cropping season in onion. The yield loss due to weed infestation has been recorded to the tune of 40 to 80 per cent [2]. The conventional methods of weed control (hoeing and weeding) are laborious, expensive and insufficient. On the other hand, use of herbicides alone does not prove effective for weed control because of their selectivity. Therefore, an attempt was made to find out the best method of weed management in onion through sequential application of herbicides.

## MATERIALS AND METHODS

The experiment was conducted during Kharif 2009 and 2010 at College of Horticulture, Bidar as part of student experimental technique course to study weed management practices in onion. The experimental soil were red lateritic with pH 6.5 to 7.0. The experiment was laid out in randomized block design with three replications having nine treatments viz., Pendimethalin 1.0 kg ha$^{-1}$, oxyfluorfen 250 g a.i. ha$^{-1}$ at 25 DAT, Pendimethalin 1.0 kg ha$^{-1}$ followed by one HW 40 DAT, oxyfluorfen 250 g a.i. ha$^{-1}$ at 25 DAT followed by one HW 40 DAT, Pendimethalin 1.0 kg ha$^{-1}$ followed by oxyfluorfen 250 g a.i. ha$^{-1}$ at 25 DAT, one hand weeding at 20 DAT, weed free check and weedy check. 45 days old seedling of varity telagi red were transplanted in month of August during 2009 and 2010 at a spacing of 45X10cm on ridges and furrows. Pendimethalin was applied before one week of

transplanting as pre-planting. The level of significance used in 'F' and 't' test were p=0.05. Critical difference values were calculated whenever the 'F' test was significant. The data was analyzed statistically for test of significance following the procedure described by Gomez [3].

## RESULTS AND DISCUSSIONS

### Effect on weeds

The prominent weed species in the experimental plot were *Parthenium hysterophorous, Cyperous rotundus, Amaranthus viridis, Euphorbia geniculata, Portulaca oleraciea, Phyllantus niruri*. All the treatements caused significant reduction in weeds except weedy checks. Significantly lower weed density was observed in weed free check(34.2 $m^{-2}$), however it was on par with sequential application of Pendimethalin 1.0 kg $ha^{-1}$ (80.1 $m^{-2}$)followed by oxyfluorfen 250 g a.i. $ha^{-1}$ $m^{-2}$) at 25 DAT. The treatment like oxyfluorfen 250 g a.i. $ha^{-1}$ at 25 DAT followed by one HW 40 DAT, Pendimethalin 1.0 kg $ha^{-1}$ followed by one HW 40 DAT and Pendimethalin 1.0 kg $ha^{-1}$ were on par with each other. Highest weed density and dry weight were recorded in weedy check(167.8 $m^{-2}$). Highest weed control efficiency was observed in weed free check (74.42)%) followed by Pendimethalin 1.0 kg $ha^{-1}$ followed by oxyfluorfen 250 g a.i. $ha^{-1}$ at 25 DAT(70.55%) (Table 1). These results are in conformity with the results of Nekar [4], Warade *et al.* [5], Kalhapure and Shete [6].

### Effect on crop growth

The pooled data of the two experiments years revealed significantly taller plants were observed in weed free check followed by pendimethalin 1.0 kg $ha^{-1}$ followed by oxyfluorfen 250 g a.i. $ha^{-1}$ at 25 DAT (45.5 cm) (Table 2) whereas lowest plant height was observed in weedy check (21.3 cm) which was on par with pendimethalin 1.0 kg $ha^{-1}$ followed by oxyfluorfen 250 g a.i. $ha^{-1}$ at 25 DAT, oxyfluorfen 250 g a.i. $ha^{-1}$ at 25 DAT followed by one HW 40 DAT, Pendimethalin 1.0 kg $ha^{-1}$ followed by one HW 40 DAT and Pendimethalin 1.0 kg $ha^{-1}$ followed by oxyfluorfen 250 g a.i. $ha^{-1}$ at 25 DAT were at par with each other. The weed free check recorded significantly higher bulb weight (74.5 g) and bulb diameter (6.13 cm) over rest of the treatments and significantly lowest was recorded with weedy check. The similar results were also reported by Mahmood *et al.* [7] and Chandrika *et al.* [8].

### Effect on yield

The higher bulb yield per hectare was observed in weed free check (26.13 t $ha^{-1}$) compared to rest of the treatments followed by pendimethalin 1.0 kg $ha^{-1}$ followed by oxyfluorfen 250 g a.i. $ha^{-1}$ at 25 DAT (24.76 t $ha^{-1}$) (Table 3). The weedy check recorded significantly lowest (8.55 t $ha^{-1}$) bulb weight compared to rest of the treatments. The treatment like oxyfluorfen 250 g a.i. $ha^{-1}$ at 25 DAT followed by one HW 40 DAT, Pendimethalin 1.0 kg $ha^{-1}$ followed by one HW 40 DAT and Pendimethalin 1.0 kg $ha^{-1}$ were on par with each other. Similar results were also recorded by Nekar [4], Chopra and Chopra [9], Kalhapure and Shete [6].

**Table 1. Effect of weed management on weed density, weed dry weight and weed control efficiency**

| Treatment | Weed density (No. $m^{-2}$) | | | Dry weight of weeds (g $m^{-2}$) | | | Weed control efficiency (%) | | |
|---|---|---|---|---|---|---|---|---|---|
| | 2009 | 2010 | Pooled | 2009 | 2010 | Pooled | 2009 | 2010 | Pooled |
| Pendimethalin 1.0 kg $ha^{-1}$ | 79.2 | 81.0 | 80.1 | 76.8 | 74.6 | 75.7 | 45.26 | 44.37 | 44.83 |
| oxyfluorfen 250 g a.i. $ha^{-1}$ at 25 DAT | 78.5 | 82.5 | 80.5 | 70.3 | 72.4 | 71.4 | 49.89 | 46.01 | 47.96 |
| Pendimethalin 1.0 kg $ha^{-1}$ *fb* one HW 40 DAT | 57.5 | 63.1 | 60.3 | 57.2 | 58.1 | 57.7 | 59.23 | 56.67 | 57.94 |
| oxyfluorfen 250 g a.i. $ha^{-1}$ at 25 DAT *fb* 40 DAT | 52.3 | 55.8 | 54.1 | 54.6 | 53.7 | 54.2 | 61.08 | 59.96 | 60.50 |
| Pendimethalin 1.0 kg $ha^{-1}$ *fb* oxyfluorfen 250 g a.i. $ha^{-1}$ at 25 DAT + one hand weeding at 20 DAT | 40.8 | 43.1 | 42.0 | 40.1 | 40.6 | 40.4 | 71.42 | 69.72 | 70.55 |
| weed free check | 35.2 | 33.1 | 34.2 | 34.8 | 35.4 | 35.1 | 75.20 | 73.60 | 74.42 |
| weedy check | 165.4 | 170.2 | 167.8 | 140.3 | 134.1 | 137.2 | 0.00 | 0.00 | 0.00 |
| C.D. at 5% | 10.2 | 11.5 | 10.9 | 13.1 | 13.8 | 13.2 | 9.24 | 8.53 | 8.27 |

## Economics

The BC ratio was maximum with application of pendimethalin 1.0 kg ha$^{-1}$ followed by oxyfluorfen 250 g a.i. ha$^{-1}$ at 25 DAT in their pooled (3.52) (Tabel 3). The weed free check recorded higher gross returns (163313 Rs ha$^{-1}$)) over all other treatments, it had BC ratio (3.26) lesser than treratment pendimethalin 1.0 kg ha$^{-1}$ followed by oxyfluorfen 250 g a.i. ha$^{-1}$ at 25 DAT(3.52).The lowest BC ratio (1.27) in weedy check. These results are in conformity with the results of Patel [10].

The study revealed that the significantly higher yield and monetary benefits were obtained with the sequential application of pendimethalin 1.0 kg ha$^{-1}$ followed by oxyfluorfen 250 g a.i. ha$^{-1}$ at 25 DAT. Therefore, this treatment was practically convenient and economically feasible for management of weeds in onion in north eastern transitional track of Karnataka.

**Table 2. Effect of weed management on growth and yield parameters**

| Treatment | Plant height (cm) | | | Bulb weight (g) | | | Bulb diameter (cm) | | |
|---|---|---|---|---|---|---|---|---|---|
| | 2009 | 2010 | Pooled | 2009 | 2010 | Pooled | 2009 | 2010 | Pooled |
| Pendimethalin 1.0 kg ha$^{-1}$ | 27.4 | 25.6 | 26.5 | 37.4 | 36.5 | 37.0 | 3.12 | 3.24 | 3.18 |
| oxyfluorfen 250 g a.i. ha$^{-1}$ at 25 DAT | 25.2 | 24.6 | 24.9 | 35.8 | 36.4 | 36.1 | 3.45 | 3.32 | 3.39 |
| Pendimethalin 1.0 kg ha$^{-1}$ *fb* one HW 40 DAT | 38.6 | 34.0 | 36.3 | 45.2 | 54.1 | 49.7 | 3.42 | 3.10 | 3.26 |
| oxyfluorfen 250 g a.i. ha$^{-1}$ at 25 DAT *fb* 40 DAT | 34.6 | 33.7 | 34.2 | 60.3 | 58.7 | 59.5 | 3.94 | 3.38 | 3.66 |
| Pendimethalin 1.0 kg ha$^{-1}$ *fb* oxyfluorfen 250 g a.i. ha$^{-1}$ at 25 DAT + one hand weeding at 20 DAT | 45.4 | 45.6 | 45.5 | 68.4 | 65.4 | 66.9 | 5.11 | 4.98 | 5.05 |
| weed free check | 50.4 | 50.1 | 50.3 | 76.4 | 72.6 | 74.5 | 6.51 | 5.74 | 6.13 |
| weedy check | 21.2 | 21.4 | 21.3 | 29.5 | 28.5 | 29.0 | 2.12 | 2.34 | 2.23 |
| C.D. at 5% | 4.3 | 4.1 | 4.2 | 3.01 | 2.96 | 3.0 | 0.17 | 0.18 | 0.18 |

**Table 3. Effect of weed management practices on economics of onion**

| Treatment | Bulb yield (t ha$^{-1}$) | | | Gross return (Rs/ha) | | | BC ratio | | |
|---|---|---|---|---|---|---|---|---|---|
| | 2009 | 2010 | Pooled | 2009 | 2010 | Pooled | 2009 | 2010 | Pooled |
| Pendimethalin 1.0 kg ha$^{-1}$ | 16.45 | 15.42 | 15.94 | 102813 | 96375 | 99594 | 2.44 | 2.29 | 2.36 |
| oxyfluorfen 250 g a.i. ha$^{-1}$ at 25 DAT | 16.41 | 15.03 | 15.72 | 102563 | 93938 | 98250 | 2.43 | 2.23 | 2.33 |
| Pendimethalin 1.0 kg ha$^{-1}$ *fb* one HW 40 DAT | 20.12 | 20.31 | 20.22 | 125750 | 126938 | 126344 | 2.98 | 3.01 | 3.00 |
| Oxyfluorfen 250 g a.i. ha$^{-1}$ at 25 DAT *fb* 40 DAT | 21.01 | 19.51 | 20.26 | 131313 | 121938 | 126625 | 3.12 | 2.89 | 3.00 |
| Pendimethalin 1.0 kg ha$^{-1}$ *fb* oxyfluorfen 250 g a.i. ha$^{-1}$ at 25 DAT + one hand weeding at 20 DAT | 24.15 | 25.37 | 24.76 | 150938 | 146063 | 148500 | 3.58 | 3.47 | 3.52 |
| weed free check | 25.69 | 26.57 | 26.13 | 160563 | 166063 | 163313 | 3.20 | 3.31 | 3.26 |
| weedy check | 8.98 | 8.12 | 8.55 | 56125 | 50750 | 53438 | 1.33 | 1.20 | 1.27 |
| C.D. at 5% | 2.07 | 2.12 | 2.08 | 1211 | 954 | 1074 | 0.21 | 0.15 | 0.19 |

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