

## Effect of integrated weed management in *Rabi* onion (*Allium cepa* L.)

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### ABSTRACT

A field experiment was conducted during *Rabi* season at Agronomy farm College of Agriculture, Pune (M.S.) to study the effect of different weed control practices on growth, yield and yield attributes of onion. The results indicated that the application of two hand weeding at 20 and 40 days after transplanting was significantly superior for weed control followed by spraying of pendimethalin 30 EC @ 1 kg a. i. ha<sup>-1</sup> as pre plant incorporation + one hand weeding at 40 days after transplanting in *Rabi* onion in clayey textured and slightly alkaline soils under Pune region.

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**Key words :** Onion, Weeds, Pendimethalin, Pre plant incorporation, Hand weeding

### INTRODUCTION

Onion (*Allium cepa* L.) is one of the most widely used vegetable in the world. Onion is consumed in salad, pickles and chutney. It has a high nutritive value as it contains proteins, carbohydrates, minerals like calcium and vitamin A, riboflavin, ascorbic acid and thiamine. It is a commercial vegetable crop, which is extensively cultivated in India. It is grown over an area of 3.13 lakh ha with total production of 45.5 lakh tones (Anonymous, 2000). Weeds compete severely with this crop for essential plant nutrients, sunlight and thus reduce the bulb yield from 48 to 85 per cent, depending upon the duration of crop, weed competition, weather condition and intensity of weeds (Bhalla, 1978). Though hand weeding is effective, however, it is difficult due to narrow row spacing. Therefore, in recent years herbicides are very commonly used as a mean to overcome the farm labour pressure besides its beneficial effects in controlling the competition of weeds with main crop at critical growth stage (Shetty *et al.*, 1977).

### MATERIALS AND METHODS

The field experiment entitled effect of integrated weed management on growth yield and yield attributing characters of onion (*Allium cepa* L.) was conducted during *Rabi* 2002 at Agronomy Farm, College of Agriculture, Pune (MS). The soil was clayey in texture and slightly alkaline with low available nitrogen (200.00 kg ha<sup>-1</sup>), medium in available phosphorus (18.44 kg ha<sup>-1</sup>) and very high available potassium (402.40 kg ha<sup>-1</sup>). The experiment was laid out in Randomized Block Design

(RBD) with eight treatments (Table 1) replicated thrice. The gross and net plot size were 3.0 x 1.8 m<sup>2</sup> and 2.4 x 1.2 m<sup>2</sup>, respectively. Seven weeks old, healthy uniform seedlings were used for transplanting. Transplanting of variety N – 2 – 4 – 1 was done in dry soil at 15 x 10 cm spacing. All the recommended management practices were followed. Pre-planting herbicide pendimethalin 30 EC @ 1kg a.i. ha<sup>-1</sup> and oxyflourfen 23.5 EC @ 0.2 kg a.i. ha<sup>-1</sup> were sprayed one day before transplanting and same dose of above herbicides was sprayed in post emergence treatment at 20 days after transplanting through 500 litres of water ha<sup>-1</sup>. Weed control efficiency of each treatment was calculated by using formula given by Gautam and Mishra (1995).

### RESULTS AND DISCUSSION

The growth attributes (Table 2) *viz.*, plant height, number of functional leaves and neck thickness were significantly improved under the treatment; two hand weeding at 20 and 40 DAT than rest of the treatments except pendimethalin (PPI) + one hand weeding at 40 DAT. This might be due to no weed competition and the lowest values in unweeded control might be due to continuous competition of weeds resulted in reduced growth of plant due to poor exposure to sunlight. Similar trend was also observed by Manjunath *et al.* (1989) and Prakash *et al.* (2000). The dry matter production of bulb was significantly more with the treatment two hand weeding at 20 and 40 DAT as compared to rest of the treatments, particularly during advanced growth stages. Similar results were also observed by Manjunath *et al.*

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**Table 1 : Treatment details with their symbol**

Symbol	Treatments	Time of application or operation	Dosages (kg a.i. ha <sup>-1</sup> )
T <sub>1</sub>	Pendimethalin	PPI	1.0
T <sub>2</sub>	Pendimethalin	PPI + POE (20 DAT)	1.0
T <sub>3</sub>	Pendimethalin + hand weeding (1)	PPI + HW (40 DAT)	1.0
T <sub>4</sub>	Oxyflourfen	PPI	0.2
T <sub>5</sub>	Oxyflourfen	PPI + POE (20 DAT)	0.2
T <sub>6</sub>	Oxyflourfen + hand weeding (1)	PPI + HW (40 DAT)	0.2
T <sub>7</sub>	Two hand weedings	20 DAT and 40 DAT	-
T <sub>8</sub>	Unweeded control	-	-

**Table 2 : The growth attributes of onion at harvest as influenced by different weed control treatments**

Treatments	Plant height (cm)	Number of functional leaves	Neck thickness (cm)	Dry matter per plant
T <sub>1</sub>	69.03	11.53	1.06	14.47
T <sub>2</sub>	74.13	13.33	1.09	14.63
T <sub>3</sub>	77.46	14.20	1.00	14.75
T <sub>4</sub>	68.20	11.16	1.03	14.40
T <sub>5</sub>	71.00	13.03	1.08	14.54
T <sub>6</sub>	75.73	13.83	1.11	14.68
T <sub>7</sub>	80.10	14.60	0.09	14.95
T <sub>8</sub>	60.80	6.80	0.01	8.32
S.E.±	1.15	0.74	0.05	0.007
C.D. (P=0.05)	3.45	2.22	0.93	0.02

(1989).

The major weed flora of monocot weeds like *Panicum isachmi*, *Cynadon ductylon*, *Cyprus rotundus* and dicot weeds *Amaranthus polygamus*, *Convolvulus arvensis* L., *Tridax procumbens* L., *Parthenium hysterophorus*, *Euphorbia hirta* and *Acalypha indica* were observed in experimental plot. Weed population per m<sup>2</sup> from 30 DAT till harvest was significantly lowest in treatment two hand weedings at 20 and 40 DAT than other treatments. Similar trend was also observed by Singh *et al.* (1998) and Rapparini *et al.* (2000). Significantly lowest dry weight of weeds (g m<sup>-2</sup>) was recorded in the treatment two hand weedings at 20 and

40 DAT and it was at par with pendimethalin (PPI) + POE (20 DAT), pendimethalin (PPI) + one hand weeding at 40 DAT and oxyflourfen PPI + one hand weeding at 40 DAT treatments. Similar trend was also observed by Prakash *et al.* (2000) and Kolhe (2001). The highest weed control efficiency was observed with two hand weedings at 20 and 40 DAT (65.02 %) while the lowest weed control efficiency was observed with unweeded control (0.0 %). This may be due to total elimination of weeds at the critical stages of crop growth. Similar findings were also reported by Amrutkar *et al.* (1998). The weed index was lowest in two hand weeding treatment (0.0) while, the highest with unweeded control

**Table 3 : The different parameters of weed at harvest as influenced by different weed control treatments**

Treatments	Weed population/m <sup>2</sup>	Dry matter of weed (g /m <sup>2</sup> )	Weed control efficiency (%)	Weed index (%)
T <sub>1</sub>	59.66	696.00	57.41	17.38
T <sub>2</sub>	53.00	614.33	62.41	5.97
T <sub>3</sub>	42.33	578.66	64.59	1.35
T <sub>4</sub>	70.00	725.00	55.63	19.26
T <sub>5</sub>	54.00	647.33	60.39	7.61
T <sub>6</sub>	45.33	601.33	63.20	2.79
T <sub>7</sub>	41.33	571.66	65.02	-
T <sub>8</sub>	79.66	1634.33	-	57.78
S.E.±	0.07	0.44	-	-
C.D. (P=0.05)	0.23	1.33	-	-

**Table 4 : The yield and yield attributes of onion at harvest as influenced by different weed control treatments**

Treatments	Polar diameter (cm)	Equatorial diameter (cm)	Dry matter of bulb (g)	Average wt. of bulb (g)	Bulb yield (q ha <sup>-1</sup> )
T <sub>1</sub>	15.20	18.30	9.64	55.86	238.57
T <sub>2</sub>	15.90	19.00	9.81	67.86	271.52
T <sub>3</sub>	16.40	20.20	9.95	70.06	284.85
T <sub>4</sub>	15.00	19.80	9.58	52.93	233.12
T <sub>5</sub>	15.70	18.60	9.71	57.91	266.78
T <sub>6</sub>	16.20	20.30	9.84	69.35	280.69
T <sub>7</sub>	16.80	19.20	10.49	71.21	288.76
T <sub>8</sub>	13.40	16.10	5.58	41.83	121.91
S.E. <sub>±</sub>	0.44	0.80	0.03	0.42	0.69
C.D. (P=0.05)	1.34	2.40	0.10	1.27	2.07

(57.78). lower weed index was found in herbicides with one HW than that of herbicides alone viz., pendimethalin (PPI) + one HW at 40 DAT registered the lowest weed index (1.35). Similar findings were reported by Nagagouda *et al.* (1996) and Kolhe (2001) (Table 3).

Important yield contributing characters (Table 4) viz., mean polar diameter, equatorial diameter, dry matter of bulb, average weight of bulb and bulb yield at harvest were significantly more with the treatment two hand weeding at 20 and 40 DAT than other treatments, followed by the treatments of pendimethalin (PPI) + one hand weeding at 40 DAT and oxyflourfen (PPI) + one hand weeding at 40 DAT recorded the highest yield attributes and bulb yield than rest of the treatments. The treatment with two hand weeding showed best results like wise the application of herbicides combined with one hand weeding gave similar results as compared to other treatments. This might be due to integrated approach indicating that the combination of herbicides + one HW at 40 DAT was good for controlling the weeds in onion. These results are in conformity with the findings of Maw *et al.* (1996), Prakash *et al.* (2000) and Kolhe (2001).

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