

## Weed management studies in onion (*Allium cepa* L.)

P. TRIPATHY, B. B. SAHOO, D. PATEL AND D. K. DASH

All India Network Research Project on Onion and Garlic,  
College of Horticulture, OUAT  
Chiplima, Sambalpur, Odisha

Received: 07-06-2013, Revised: 04-11-2013, Accepted: 6-12-2013

**Keywords:** *Allium cepa*, economics, oxyflurofen, pendimethalin, quizalofop ethyl, WCE

Onion (*Allium cepa* L.) is an important export oriented vegetable among the cultivated *Allium* in India. India ranks 1<sup>st</sup> in area, 2<sup>nd</sup> production and 3<sup>rd</sup> in export in the world. Recent research has suggested that onions in the diet may play vital role in preventing coronary heart diseases and other ailments (Sangha and Bariag, 2003). Although India is a leading country in area and production but the productivity is very low as compared to other leading countries in the world due to many factors. One of the main limiting factors is weed infestation. Weeds compete with onion crop for nutrients, soil moisture, space, light and considerably reduce the bulb yield, quality and value of the crop through increased production and harvesting costs (Hussain, 1983). Due to smaller leaf size, slow growth and very shallow rooted system onions can not compete well with weeds particularly at early stages of growth (Appleby, 1996). Losses caused by weeds have been estimated to be much higher than those caused by insect pests and diseases. Generally, the bulb yield of onion reduced by 30-60% due to weed infestation. As weeds decrease the profitability of onion crops, therefore, weed must be controlled well in time. A good weed management programme is essential for good onion production. This study was therefore, conducted to compare the effectiveness of different control methods of weeds in onion crop.

Field experiment was conducted to compare various weed management practices in onion under

AINP on Onion and Garlic at College of Horticulture of OUAT, Chiplima, Odisha during *rabi* 2011-12. The experiment was laid out in Randomised Block Design. The eight treatments are presented in table-1. Onion seedlings of variety, Agrifound Dark Red were transplanted in the plot on 02.10.2011 to 03.10.2011 with a spacing of 15×10cm. All recommended packages of practices were adapted uniformly to all the treatment except weed management practices to raise a good crop. The data was recorded for vegetative parameters (plant height and number of leaves), yield parameters (average bulb weight, marketable bulb yield and total bulb yield) as well as weed parameters (number of weeds m<sup>-2</sup> area, fresh and dry weight of weeds m<sup>-2</sup>) from individual plots of each replication treatment wise. The observed data were then subjected to statistical analysis (Sukhatme and Amble, 1995).

The data presented in table-2 on vegetative and yield parameters in onion revealed significant variations among the treatments. Significantly highest plant height was recorded in T<sub>4</sub> (60.65cm), closely followed by T<sub>6</sub> (57.75cm) and T<sub>1</sub> (53.89cm) than rest of the treatments. Significantly shortest plant height of 42.64cm was observed in weedy check plots (T<sub>8</sub>). Similar trend was also recorded in number of leaves plant<sup>-1</sup>, significantly maximum in T<sub>7</sub> (12.17) and minimum in T<sub>8</sub> (9.13). The results clearly indicated the adverse effect of weed infestations in onion crop, which in term affected the bulb yield.

**Table 1: Treatment details of weed management studies in onion**

Notations	Treatment details
T <sub>1</sub>	Oxyflurofen 23.5EC @ 2ml l <sup>-1</sup> before planting and second application at 30 DAT
T <sub>2</sub>	Oxyflurofen 23.5EC @ 2ml l <sup>-1</sup> before planting and quizalofop ethyl 5EC @ 3.5 ml l <sup>-1</sup> at 30 DAT
T <sub>3</sub>	Combined spray of oxyflurofen 23.5EC @ 1ml l <sup>-1</sup> and quizalofop ethyl 5EC @ 1.75 ml l <sup>-1</sup> at the time of planting and at 30 DAT
T <sub>4</sub>	Pendimethalin 30EC @ 5.0 ml l <sup>-1</sup> before planting and at 30 DAT
T <sub>5</sub>	Pendimethalin 30EC @ 5ml l <sup>-1</sup> before planting + and quizalofop ethyl 5EC @ 3.5ml l <sup>-1</sup> at 30 DAT
T <sub>6</sub>	Combined spray of pendimethalin 30EC @ 2.5ml l <sup>-1</sup> and quizalofop ethyl 5EC @ 1.75ml l <sup>-1</sup> at the time of planting and at 30 DAT
T <sub>7</sub>	Oxyflurofen 23.5EC @ 2ml l <sup>-1</sup> before planting and one hand weeding at 40-60 DAT
T <sub>8</sub>	Weedy check

Email: ptripathy\_ouat05@rediffmail.com  
Short communication

DAT – Days after transplanting.

**Table 2: Effect of weed management practices on growth and yield of onion cv. Agrifound Dark Red**

Treatments	Plant height (cm)	No. of leaves plant <sup>-1</sup>	Average bulb weight (g)	Marketable bulb yield (qha <sup>-1</sup> )	Total bulb yield (qha <sup>-1</sup> )
T <sub>1</sub>	53.29	10.20	81.67	145.31	170.82
T <sub>2</sub>	49.54	10.23	84.33	141.13	170.32
T <sub>3</sub>	46.45	9.63	73.00	128.12	145.98
T <sub>4</sub>	50.18	10.47	65.00	120.60	145.58
T <sub>5</sub>	47.79	10.27	84.33	145.56	169.77
T <sub>6</sub>	57.75	10.93	88.00	159.41	190.87
T <sub>7</sub>	60.65	12.17	90.33	182.37	206.92
T <sub>8</sub>	42.64	9.13	65.00	69.23	118.66
<b>SEm (±)</b>	<b>4.62</b>	<b>0.68</b>	<b>8.13</b>	<b>9.09</b>	<b>14.34</b>
<b>LSD (0.05)</b>	<b>9.91</b>	<b>1.46</b>	<b>17.43</b>	<b>19.51</b>	<b>30.76</b>

Significant variations were also observed for average bulb weight, marketable and total bulb yield in onion (Table 2). The average bulb weight in onion varies from 65.00g (T<sub>8</sub> and T<sub>4</sub>) to 90.33g (T<sub>7</sub>) with a mean value of 78.96g. Significantly heaviest bulb was recorded in T<sub>7</sub> (90.33g) than rest of the treatments except T<sub>1</sub>, T<sub>2</sub>, T<sub>3</sub>, T<sub>5</sub> and T<sub>6</sub> (73.00 to 88.00g) which were statistically *at par*. Weeds seriously affected bulb weight and drastically reduced yield. The variability is due to effectiveness of weed control methods which ultimately increased the nutrient availability for the crop (Marwat *et al.*, 2003). The results also showed that treatment effect were significant in case of both marketable and total bulb yield in onion. Significantly highest marketable and total bulb yield was recorded in T<sub>7</sub> (182.37 and 206.92q ha<sup>-1</sup>, respectively) than rest of the treatments. However, statistical parity was observed for total bulb yield in T<sub>6</sub> (190.87q ha<sup>-1</sup>) only. On the other hand, significantly lowest yield of 69.20q ha<sup>-1</sup> (marketable yield) and 118.66q ha<sup>-1</sup> (total yield) was recorded in

T<sub>8</sub>, the weedy check plot. The results are in agreement with Halmagean *et al.* (2008), Marwat *et al.* (2003), Dudi *et al.* (2011) as well as Chattopadhyay *et al.* (2011).

The statistical analysis of data on weed parameters showed significant effect of different weed management schedules in onion (Table 3). The result indicated that significantly highest weed density (120.67 m<sup>-2</sup>) was recorded in weedy check plot (T<sub>8</sub>) while lowest in T<sub>6</sub> (297.33 m<sup>-2</sup>). However, statistically parity were also observed among other weed treatment schedules *i.e.* T<sub>7</sub> (304.33 m<sup>-2</sup>), T<sub>5</sub> (314.00 m<sup>-2</sup>), T<sub>4</sub> (316.67 m<sup>-2</sup>), T<sub>1</sub> (384.67 m<sup>-2</sup>) and T<sub>2</sub> (400 m<sup>-2</sup>) with T<sub>6</sub>. The variability in weed population in different treatments can be attributed to the fact that the herbicides which could effectively kill most the weeds more effective in reducing the weed density as the field was infested by all kinds of weeds. Similar results were also reported by Verma and Singh (1997).

**Table 3: Effect of weed management practices in onion cv. Agrifound Dark Red**

Treatments	Weed biomass m <sup>-2</sup>	Total fresh weight of weeds (g)	Total dry weight of weeds (g)	WCE	BC ratio
T <sub>1</sub>	384.67	64.00	28.62	68.24	1.80
T <sub>2</sub>	400.00	82.33	18.72	66.94	1.22
T <sub>3</sub>	631.00	54.77	23.43	47.80	0.82
T <sub>4</sub>	316.67	28.97	9.82	73.91	0.69
T <sub>5</sub>	314.00	41.43	17.35	74.05	1.25
T <sub>6</sub>	297.33	75.37	11.25	75.41	1.66
T <sub>7</sub>	304.33	25.83	17.52	74.83	2.17
T <sub>8</sub>	1209.67	158.00	43.53	--	--
<b>SEm (±)</b>	<b>87.39</b>	<b>11.46</b>	<b>5.11</b>		
<b>LSD (0.05)</b>	<b>187.46</b>	<b>24.58</b>	<b>10.97</b>		

The result on fresh and dry weed biomass (g m<sup>-2</sup>) showed that different herbicide treatments had significant effects (Table 3). Significantly minimum fresh weed biomass was recorded in T<sub>7</sub> (25.83g m<sup>-2</sup>) than rest of the treatments except T<sub>4</sub> (28.97g m<sup>-2</sup>) and T<sub>5</sub> (41.43g m<sup>-2</sup>) which were statistically *at par*, while

maximum in T<sub>8</sub>, the weedy check plot (158.00gm<sup>-2</sup>). Similarly, significantly minimum dry weed biomass was recorded in T<sub>4</sub> (9.82g m<sup>-2</sup>) than rest of the treatments except T<sub>2</sub> (18.72g m<sup>-2</sup>), T<sub>5</sub> (17.35g m<sup>-2</sup>), T<sub>6</sub> (11.25g m<sup>-2</sup>) and T<sub>7</sub> (17.52g m<sup>-2</sup>) which were statistically *at par*. Significantly maximum dry weed

biomass was observed in weedy check plot, T<sub>8</sub> (43.53g m<sup>-2</sup>). The data also revealed that all the treatments were effective in controlling the weeds biomass as compared to control, weedy check plot. Similar results have been reported by Malik *et al.* (1981) as well as Verma and Singh (1997).

The result on weed control efficiency (WCE) and BC ratio (Table 3) showed variability among different weed management schedules in onion. The WCE varies from 47.80 (T<sub>3</sub>) to 75.41 (T<sub>6</sub>). Maximum WCE was recorded in T<sub>6</sub> (75.41), followed by T<sub>7</sub> (74.83), T<sub>5</sub> (74.65) and T<sub>4</sub> (73.91). The BC ratio estimated in different weed treatment practice over weedy check indicated maximum BC ratio of 2.17 in T<sub>7</sub> closely followed by 1.80 in T<sub>1</sub> and 1.66 in T<sub>6</sub>. Similar results were also reported by Pugalendhi *et al.* (2011) under Coimbatore condition.

The present study exhibit that different weed management practices significantly reduced weed density and increase onion bulb yield with either application of oxyflurofen 23.5EC before planting + one hand weeding at 40-60 days after transplanting (T<sub>7</sub>) or combined spray of pendimethalin 30EC + quizalofop ethyl 5EC at the time of planting and second application at 30 days after transplanting (T<sub>6</sub>).

#### ACKNOWLEDGEMENTS

We gratefully acknowledge the Orissa University of Agriculture and Technology, Odisha for the research facilities provided and to the Director, Directorate of Onion and Garlic Research (ICAR), Rajgurunagar, Pune, India for providing the financial and other facilities to carry out this study under AINRP on Onion and Garlic.

#### REFERENCES

Appleby, A. P. 1996. Ullman's Encyclopaedia of Industrial Chemistry. *Weed Count*, **28** :165-02.

- Chattopadhyay, S., Mahalanabish, S., Bhuina, P., Santra, P. and Maity, T. K. 2011. Bio-efficacy of herbicides in onion. *Nat. Symp. on Alliums: Current Scenario and Emerging trends*, 12-14<sup>th</sup> March, 2011, Pune, pp. 256-57.
- Dudi, B.S., Dhankar, S.K. and Singh, J. 2011. Effect of weed management practices on yield and its component in onion on Hisar-2. *Nat. Symp. on Alliums: Current Scenario and Emerging trends*, 12-14<sup>th</sup> March, 2011, Pune, pp. 254-55.
- Halmagean, L., Beldea, V. and Sipa, V. 1993. Experimental results on weed controlled in vegetable crops. *Seria Agricultura and Horticultura*, **47**:175-90.
- Hussain, F. 1983. Biochemical constituent (allelopathy) a less understood ecological factor in Agro-ecosystems. *Progr. Farm.*, **3**:33-37.
- Malik, Y.S., Singh, P.K. and Pandita, M.L. 1981. Chemical weed control studies in onion. *Ann. Conf., Indian Soc. of Weed Sci.*, pp. 32.
- Morwat, K.B., Gul, B., Khan, A.I. and Hussain, Z. 2003. Efficacy of different herbicides for controlling weeds in onion. *Pakistan J. Weed Sci. Res.*, **9**: 225-28.
- Pugalendhi, L., Sathiyamurty, Y.A., Sumathe, T. and Thangamani, C. 2011. Weed management studies in onion. *Nat. Symp. on Alliums: Current Scenario and Emerging trends*, 12-14<sup>th</sup> March, 2011, Pune, pp. 257.
- Sangha, J.K. and Bering, P. 2003. Efficacy of multipledietry therapies in reducing risk factor for coroner heart disease. *J. Human Eco.*, **14**: 33-36.
- Sukhatame, P.V. and Amble, V.N. 1995. *Statistical Methods for Agricultural Workers*. ICAR, New Delhi, pp. 145-56.
- Verma, S.K. and Singh, T. 1997. Efficacy of weed control measures and fertility on growth and production of rainy season onion (*Allium cepa* L.). *Indian J. Agron.*, **42**: 540-43.