Journal of Crop and Weed, 9(2):210-212(2013)

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 1st in area, 2nd production and 3rd 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 aliments (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^{-2} area, fresh and dry weight of weeds m^{-2}) 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_4 (60.65cm), closely followed by T_6 (57.75cm) and T_1 (53.89cm) than rest of the treatments. Significantly shortest plant height of 42.64cm was observed in weedy check plots (T_8).Similar trend was also recorded in number of leaves $plant^{-1}$, significantly maximum in T_7 (12.17) and minimum in T_8 (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_1	Oxyflurofen 23.5EC @ 2ml l^{-1} before planting and second application at 30 DAT
T_2	Oxyflurofen 23.5EC @ 2mll^{-1} before planting and quizalofop ethyl 5EC @ 3.5 mll^{-1} at 30 DAT
T_3	Combined spray of oxyflurofen 23.5EC @ 1ml l^{-1} and quizalofop ethyl 5EC @ 1.75 mll^{-1} at the time of planting and at 30 DAT
T_4	Pendimethalin 30EC @ 5.0 mll^{-1} before planting and at 30 DAT
T_5	Pendimethalin 30EC @ 5mll^{-1} before planting + and quizalofop ethyl 5EC @ 3.5mll^{-1} at 30 DAT
T_6	Combined spray of pendimethalin 30EC @ 2.5mll^{-1} and quizalofop ethyl 5EC @ 1.75mll^{-1} at the time of planting and at 30 DAT
T_7	Oxyflurofen 23.5EC @ 2mll^{-1} before planting and one hand weeding at 40-60 DAT
T_8	Weedy check

DAT – Days after transplanting.

Email:ptripathy_ouat05@rediffmail.com
Short communication

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^{-1}	Average bulb weight (g)	Marketable bulb yield (qha^{-1})	Total bulb yield (qha^{-1})
T_1	53.29	10.20	81.67	145.31	170.82
T_2	49.54	10.23	84.33	141.13	170.32
T_3	46.45	9.63	73.00	128.12	145.98
T_4	50.18	10.47	65.00	120.60	145.58
T_5	47.79	10.27	84.33	145.56	169.77
T_6	57.75	10.93	88.00	159.41	190.87
T_7	60.65	12.17	90.33	182.37	206.92
T_8	42.64	9.13	65.00	69.23	118.66
SEm (±)	**4.62**	**0.68**	**8.13**	**9.09**	**14.34**
LSD (0.05)	**9.91**	**1.46**	**17.43**	**19.51**	**30.76**

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_8 and T_4) to 90.33g (T_7) with a mean value of 78.96g. Significantly heaviest bulb was recorded in T_7 (90.33g) than rest of the treatments except T_1, T_2, T_3, T_5 and T_6 (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_7 (182.37 and 206.92q ha^{-1}, respectively) than rest of the treatments. However, statistical parity was observed for total bulb yield in T_6 (190.87q ha^{-1}) only. On the other hand, significantly lowest yield of 69.20q ha^{-1} (marketable yield) and 118.66q ha^{-1} (total yield) was recorded in T_8, 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 $^{-2}$) was recorded in weedy check plot(T_8) while lowest in T_6 (297.33 m^{-2}). However, statistically parity were also observed among other weed treatment schedules *i.e.* T_7 (304.33 m^{-2}), T_5 (314.00 m^{-2}), T_4 (316.67 m^{-2}), T_1 (384.67 m^{-2}) and T_2 (400 m^{-2}) with T_6. 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^{-2}	Total fresh weight of weeds (g)	Total dry weight of weeds (g)	WCE	BC ratio
T_1	384.67	64.00	28.62	68.24	1.80
T_2	400.00	82.33	18.72	66.94	1.22
T_3	631.00	54.77	23.43	47.80	0.82
T_4	316.67	28.97	9.82	73.91	0.69
T_5	314.00	41.43	17.35	74.05	1.25
T_6	297.33	75.37	11.25	75.41	1.66
T_7	304.33	25.83	17.52	74.83	2.17
T_8	1209.67	158.00	43.53	--	--
SEm (±)	**87.39**	**11.46**	**5.11**		
LSD (0.05)	**187.46**	**24.58**	**10.97**		

The result on fresh and dry weed biomass (g m^{-2}) showed that different herbicide treatments had significant effects (Table 3). Significantly minimum fresh weed biomass was recorded in T_7 (25.83g m^{-2}) than rest of the treatments except T_4 (28.97g m^{-2}) and T_5 (41.43g m^{-2}) which were statistically *at par*, while maximum in T_8,the weedy check plot (158.00gm^{-2}). Similarly, significantly minimum dry weed biomass was recorded in T_4 (9.82g m^{-2}) than rest of the treatments except T_2 (18.72g m^{-2}), T_5 (17.35g m^{-2}), T_6 (11.25g m^{-2}) and T_7 (17.52g m^{-2}) which were statistically at par. Significantly maximum dry weed

biomass was observed in weedy check plot, T_8 (43.53g m^{-2}). 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_3) to 75.41 (T_6). Maximum WCE was recorded in T_6 (75.41), followed by T_7 (74.83), T_5 (74.65) and T_4 (73.91).The BC ratio estimated in different weed treatment practice over weedy check indicated maximum BC ratio of 2.17 in T_7 closely fallowed by 1.80 in T_1 and 1.66 in T_6. 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_7) or combined spray of pendimethalin 30EC + quizalofop ethyl 5EC at the time of planting and second application at 30 days after transplanting (T_6).

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*, 12-14th 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*, 12-14th 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*, 12-14th 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.