

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

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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

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

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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 ⁻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 (T₈ and T₄) to 90.33g (T₇) with a mean value of 78.96g. Significantly heaviest bulb was recorded in T₇ (90.33g) than rest of the treatments except T₁, T₂, T₃, T₅ and T₆ (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 T₇ (182.37 and 206.92q ha⁻¹, respectively) than rest of the treatments. However, statistical parity was observed for total bulb yield in T₆ (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

T₈, 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 (T₈) while lowest in T₆ (297.33 m⁻²). However, statistically parity were also observed among other weed treatment schedules i.e. T₇ (304.33 m⁻²), T₅ (314.00 m⁻²), T₄ (316.67 m⁻²), T₁ (384.67 m⁻²) and T₂ (400 m⁻²) with T₆. 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 T₇ (25.83g m⁻²) than rest of the treatments except T₄ (28.97g m⁻²) and T₅ (41.43g m⁻²) which were statistically at par, while

maximum in T₈, the weedy check plot (158.00g m⁻²). Similarly, significantly minimum dry weed biomass was recorded in T₄ (9.82g m⁻²) than rest of the treatments except T₂ (18.72g m⁻²), T₅ (17.35g m⁻²), T₆ (11.25g m⁻²) and T₇ (17.52g m⁻²) which were statistically at par. Significantly maximum dry weed

biomass was observed in weedy check plot, T₈ (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 (T₃) to 75.41 (T₆). Maximum WCE was recorded in T₆ (75.41), followed by T₇ (74.83), T₅ (74.65) and T₄ (73.91). The BC ratio estimated in different weed treatment practice over weedy check indicated maximum BC ratio of 2.17 in T₇ closely followed by 1.80 in T₁ and 1.66 in T₆. 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 (T₇) or combined spray of pendimethalin 30EC + quizalofop ethyl 5EC at the time of planting and second application at 30 days after transplanting (T₆).

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