

## RESEARCH NOTE

Weed Management Studies in Onion (*Allium cepa* L.)Rachna Singla<sup>1</sup> and Jaswinder Singh<sup>2</sup>

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## ABSTRACT

A field experiment was carried out during Kharif 2014 to find out practically convenient and economically feasible weed management practice in onion at Krishi Vigyan Kendra, Patiala. Different combinations of hand weeding with application of Pendimethalin 30 EC @ 1875ml/ha (pre-planting) and oxyfluorfen 23.5 EC @ 950ml/ha (post-emergence) were used in onion variety 'Punjab Naroya'. Weed free check treatment (three hand weeding at 20, 40 and 60 DAS) recorded significantly lowest weed density, dry weight of weed and higher weed control efficiency. All the growth attributes of onion viz., plant height, neck thickness, bulb weight and bulb diameter were recorded maximum in weed free. This treatment also recorded highest bulb yield and gross monetary return per hectare, however maximum B:C ratio was observed in treatment pendimethalin 30 EC @ 1875ml/ha (PP)+ Oxyfluorfen 23.5 EC @ 950ml/ha (POE)+ One hand weeding at 40 DAS.

**Key words :** Weed management; Hand weeding;

Onion (*Allium cepa* L.) is one of the most important commercial vegetable crops grown all over the world. 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. Onion is slow growing, shallow rooted crop with narrow, upright leaves and non branching habit. Due to this type of growth habit, onion crop cannot compete well with weeds. In addition to this, frequent irrigation water and fertilizer application allows for successive flushes of weeds in onion. 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. Yield loss due to weed infestation in onion has been recorded to the tune of 40 to 80% (Channapagoudar and Biradar, 2007). As

weeds decrease the profitability of onion crops, therefore, weed must be controlled well in time. 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. Hence an attempt was made to find out the appropriate combination of cultural and chemical weed management practices for weed control in onion which is practically effective and economically feasible for farmers.

## METHODOLOGY

Field experiment was conducted to compare various weed management practices in onion at Krishi Vigyan Kendra, Patiala during Kharif 2014-15. The experiment was laid out in Randomised Block Design. The eight treatments are presented in Table 1. Onion seedlings of variety, Punjab Naroya were transplanted in the plot on 7.11.2014 to 10.11.2014 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 (weed density and dry weight of weeds). The observed data were then subjected to statistical analysis (*Sukhatme and Amble, 1995*).

**Table 1. Treatment details of weed management in onion**

T1	Weed free Check (three hand weeding at 20, 40 and 60 DAT)
T2	One hand weeding @ 40 DAT*
T3	Pendimethalin 30 EC @ 1875ml/ha
T4	Oxyfluorfen 23.5 EC @ 950ml/ha
T5	Pendimethalin 30 EC @ 1875ml/ha + one hand weeding @ 40 DAT
T6	Oxyfluorfen 23.5 EC @ 950ml/ha + one hand weeding @ 40 DAT
T7	Pendimethalin 30 EC @ 1875ml/ha + one hand weeding @ 40 DAT+ oxyfluorfen 23.5 EC @ 950ml/ha
T8	Weedy check

\*DAT – Days after transplanting.

## RESULT AND DISCUSSION

*Effect on weeds* : The prominent weed species in the experimental plot were: *Chenopodium album*, *Portulaca oleracea*, *Euphorbia* spp., *Cynodon dactylon*, *Parthenium hysterophorous*, *Cyperus rotundas* and *Amaranthus viridis*. All treatments caused significant reduction in total weed density and dry weight of weeds as compared to unweeded control (Table 2). Significantly lower weed density was observed in weed free check (32), however it was followed by Pendimethalin 30 EC @ 1875ml/ha + one hand weeding at 40 DAS+ Oxyfluorfen 23.5 EC @ 950ml/ha (42). Highest weed density was recorded in weedy check (158). Similar observations were also made by *Kolhe (2001)* and *Warade et al. (2006)*. 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)*.

*Effect on Plant growth* : All the weed management treatments were significantly superior over control in respect of all growth attributes. Significantly taller plants were observed in weed free check followed by Pendimethalin 30 EC @ 1875ml/ha (PP)+ one hand weeding at 40 DAT+ Oxyfluorfen 23.5 EC @ 950ml/ha (POE) (65) closely followed by Oxyfluorfen 23.5

**Table 2. Effect of integrated weed management on various weed parameters in onion**

Treatment	Weed density (no./m <sup>2</sup> )	Dry weight (g/m <sup>2</sup> )
Weed free Check*	32	34
One hand weeding @ 40 DAT	72	74
Pendimethalin 30 EC @ 1875ml/ha	80	79
Oxyfluorfen 23.5 EC @ 950ml/ha	59	56
Pendimethalin 30 EC 1875ml/ha+ one hand weeding @ 40 DAT	53	55
Oxyfluorfen 23.5 EC @ 950ml/ha+ one hand weeding @ 40 DAT	55	58
Pendimethalin 30 EC @ 1875ml/ha+ one hand weeding @ 40 DAT+ Oxyfluorfen 23.5 EC @ 950ml/ha	42	41
Weedy check	158	155
CD @5 %	3.20	8.00

\* (three hand weeding at 20, 40 and 60 DAT)

**Table 2. Effect on various growths attributes in onion**

Treatment	Plant height (cm)	Dry matter (g/plant)
Weed free Check*	48	24.5
One hand weeding @ 40 DAT	33	15.6
Pendimethalin 30 EC @ 1875ml/ha	39	18.56
Oxyfluorfen 23.5 EC @ 950ml/ha	42	19.23
Pendimethalin 30 EC 1875ml/ha+ one hand weeding @ 40 DAT	45	18.89
Oxyfluorfen 23.5 EC @ 950ml/ha+ one hand weeding @ 40 DAT	49	19.87
Pendimethalin 30 EC @ 1875ml/ha+ one hand weeding @ 40 DAT+ Oxyfluorfen 23.5 EC @ 950ml/ha	65	22.54
Weedy check	21	9.56
CD @5 %	2.15	1.93

**Table 3. Effect o on bulb growth of onion**

Treatment	Bulb weight (g)	Bulb diameter(cm)
Weed free Check	87	6.88
One hand weeding @ 40 DAT	45	3.45
Pendimethalin 30 EC @ 1875ml/ha	56	3.56
Oxyfluorfen 23.5 EC @ 950ml/ha	60	3.87
Pendimethalin 30 EC 1875ml/ha+ one hand weeding @ 40 DAT	63	3.67
Oxyfluorfen 23.5 EC @ 950ml/ha+ one hand weeding @ 40 DAT	68	3.96
Pendimethalin 30 EC @ 1875ml/ha+ one hand weeding @ 40 DAT+ Oxyfluorfen 23.5 EC @ 950ml/ha	81	5.96
Weedy check	23	2.12
CD @5 %	2.23	0.33

EC @ 950ml/ha+ one hand wedding at 40 DAT (49) whereas lowest plant height was observed in treatment Weedy check (21). In respect of dry matter per plant, weed free check recorded significantly higher weight over rest of the treatments, it was on par with Pendimethalin 30 EC @ 1875ml/ha + one hand wedding at 40 DAT+ Oxyfluorfen 23.5 EC @ 950ml/ha. *Khokhar et.al. (2006)* and *Chandrika et al. (2009)* also reported similar results from their studies.

**Effect on bulb growth :** Significant variations were also observed for average bulb weight and bulb diameter. The average bulb weight in onion varies from (23.0 to 87.0 gm) and bulb diameter from 2.12 to 6.88 cm. Significantly higher bulb weight and bulb diameter were observed in weed free check (three hand weedings at 20, 40 and 60 DAT) over rest of the treatments, whereas weedy check recorded lowest and Pendimethalin 30 EC @ 1875ml/ha + one hand wedding at 40 DAT + Oxyfluorfen 23.5 EC @ 950ml/ha were at the second place for these growth attributes (Table 3). 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*). **Effect on yield :** The results also showed that treatment effect were significant in case of both marketable and total bulb yield in onion. Significantly higher bulb yield and marketable bulb yield per hectare were observed in weed free check over rest of the treatments (Table 4) followed by Pendimethalin 30 EC @ 1875ml/ha + one hand wedding at 40 DAS+ Oxyfluorfen 23.5 EC @ 950ml/ha whereas treatment weedy check produced lowest bulb yield per hectare and marketable bulb yield per hectare. These result in respect of yield attributes were in close conformity with the earlier findings of *Sukhadia et.al. (2002)* and *Chopra and Chopra (2007)*.

**Economics :** The benefit: cost ratio was maximum for Pendimethalin 30 EC @ 1875ml/ha+one hand wedding at 40 DAT+ Oxyfluorfen 23.5 EC @ 950ml/ha and this index was varied in the range of 1.26 to 2.87, when weeds in onion were controlled either by herbicides or by hand weeding (Table 5). Though weed free check (three hand weeding at 20, 40 and 60 DAS) fetched the higher gross monetary return ( 209300/- over all the other treatments, it had benefit: cost ratio (2.79) lesser than treatment Pendimethalin 30 EC @ 4 ml/litre + one

**Table 4. Effect on yield of onion**

Treatment	Bulb yield (t/ha)	Marketable yield (t/ha)
Weed free Check	32.2	29.9
One hand weeding @ 40 DAT	15.5	16
Pendimethalin 30 EC @ 1875ml/ha	16.25	17.8
Oxyfluorfen 23.5 EC @ 950ml/ha	18.66	19.56
Pendimethalin 30 EC 1875ml/ha+ one hand weeding @ 40 DAT	17.89	18.85
Oxyfluorfen 23.5 EC @ 950ml/ha+ one hand weeding @ 40 DAT	20.88	21.36
Pendimethalin 30 EC @ 1875ml/ha+ one hand weeding @ 40 DAT+ Oxyfluorfen 23.5 EC @ 950ml/ha	25.56	26.65
Weedy check	7.83	9.56
CD @ 5 %	1.09	0.60

**Table 5. Effect on economics of onion**

Treatment	Gross return (Rs /ha)	B : C ratio
Weed free Check	209300	2.79
One hand weeding @ 40 DAT	112000	2.06
Pendimethalin 30 EC @ 1875ml/ha	124600	2.81
Oxyfluorfen 23.5 EC @ 950ml/ha	136920	2.96
Pendimethalin 30 EC 1875ml/ha+ one hand weeding @ 40 DAT	131950	2.28
Oxyfluorfen 23.5 EC @ 950ml/ha+ one hand weeding @ 40 DAT	149520	2.45
Pendimethalin 30 EC @ 1875ml/ha+ Oxyfluorfen 23.5 EC @ 950ml/ha+ one hand weeding @ 40 DAT	186550	2.87
Weedy check	66920	1.26
CD @ 5 %	2549	0.48

hand wedding at 40 DAT+ Oxyfluorfen 23.5 EC @ 950ml/ha (2.87). It showed that treatment Pendimethalin 30 EC @ 1875ml/ha + one hand wedding at 40 DAT + Oxyfluorfen 23.5 EC @ 950ml/ha was practically convenient and economically feasible for control of weeds in onion. Similar results were reported by *Nandal and Singh (2002)* and *Patel et al. (2011)*.

**CONCLUSION**

Pendimethalin had good control of annual weeds for about a month after that weeds start appearing. Oxyfluorfen controlled few grasses and all broad leaved weeds effectively. Both the herbicides integrated with hand weeding at 40 DAS resulted in effective control of weeds which ultimately reflected in good crops.

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