

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

P.A. Sable, S. N. Jadhav and A.B. Purane

Department of Horticulture, College of Agriculture, Raichur 584 4102, India

(Received 10 April, 2014; accepted 30 May, 2014)

ABSTRACT

Effective weed control was attained under oxyfluorfen 0.26 kg a.i./ha with hand weeding (30 DAT), followed by oxyfluorfen 0.26 kg a.i./ha + oxyfluorfen 0.26 kg a.i./ha (30 DAT). The same treatments showed higher plant dry weight at 30, 60 and 90 days after transplanting (2.47, 10.52 and 12.71 g/plant respectively) and lower plant dry weight in control (unweeded) (1.40, 2.25 and 5.09 g/plant respectively). No significant differences were observed among the treatments regarding quality parameters.

Key words : Herbicides, Onion, Weed control.

Introduction

Weed management is serious problem in onion. Onion (*Allium cepa* L.) is poor competitor with weeds because of non branching habit, sparse foliage and shallow root system. Yield losses in onion due to the weeds have been reported to the extent of 10 to 70 per cent (Phogat *et al.*, 1989). Attempts were made during the present investigation to evaluate integrated weed control in onion crop.

Material and Methods

The field experiment investigation was carried out during *Kharif* season of 2010, with three herbicides (Butachlor, Pendimethalin and Oxyfluorfen) applied before transplantation. There were in all 9 treatments (Table 1). The experiment was laid out in Randomized Block Design with three replications. Twenty tonnes of FYM and recommended dose of fertilizers (100:50:50 kg NPK / ha) were added to the soil. The experimental plots were 3 x 2.6 m in size and the seedlings of variety Nasik Red were transplanted from nursery on September 25th, 2010 by keeping a distance of 15 cm from row to row and 10 cm from plant to plant.

The observations were recorded on weed count, weed dry weight, total plant dry weight and quality parameters. The weeds were dried in oven at 65-70 °C, till constant weight, and dry weight was recorded. The data were subjected for statistical analysis as described by Panse and Sukhatme (1987).

Results and Discussion

Weed Studies

The major monocot weeds observed were, *Cyperus rotundus* L., *Cynodon dactylon* L. *Echinochloa crusgalli* L. and *Brachiaria mutica* L. while the dicot weeds were *Euphorbia hirta* L., *Enuphorbia geniculata* L., *Acharanthus aspera* L., *Phyllanthus niruri* L., *Tridax procumbence* L., *Parthenium hesterophorus* L., and *Commelina bengalensis* L., were recorded

All the weed control treatments at 30, 60 and 90 days after transplanting had significantly lower weed population than unweeded control; the treatment oxyfluorfen 0.26 kg a.i. per hectare + hand weeding at 30 DAT and oxyfluorfen 0.26 kg a.i. per hectare + oxyfluorfen 0.26 kg a.i. per hectare recorded significantly less weed population (Table 1). Bhalla (1978) reported similarly. The treatments

with Butachlor recorded higher weed count. Lesser weed count in the Oxyfluorfen as herbicide with one hand weeding at 30 DAT might be due to suppression of weed growth.

The dry weight of weeds ($\text{g}/0.25 \text{ m}^2$) differed significantly at all crop growth stages (30, 60 and 90 DAT) due to weed control treatments. The treatment oxyfluorfen 0.26 kg a.i. per hectare + hand weeding at 30 DAT and oxyfluorfen 0.26 kg a.i. per hectare + oxyfluorfen 0.26 kg a.i. per hectare at 30 DAT, significantly recorded less weed dry weight than other treatments. (Table 1). These results are in confirmation with Verma and Singh, (1997) and Nandal and Singh, (2002). The significantly less weed dry weight under treatment Oxyfluorfen 0.26 kg a.i. per hectare + hand weeding at 30 DAT, was probably due to less weed population.

Dry weight of total plant (g /plant)

Dry weight of total plant, i.e. weight of bulb and foliage of plant (g /plant) recorded at different stages of crop growth are presented in (Table 2). The results indicated that dry weight of total plant differed significantly among the treatments at all stages of crop growth.

At 30, 60 and 90 days after transplanting, treatment unweeded control (T_8) recorded significantly lower dry weight of total plant respectively viz (1.40, 2.25 and 5.09 g/plant). Whereas treatment weed free check (T_7) recorded significantly highest dry weight of total plant respectively viz (2.74, 11.18 and 17.34 g/plant) which is followed by treatment oxyfluorfen 0.26 kg a.i. per hectare with hand weeding 30 DAT. i.e. (T_6) recorded the highest dry weight of total plant respectively viz (2.47, 10.52 and 12.71 g/plant). These results are in agreement with results of Nandal and Singh (2002). The higher yields with herbicides treatment might be due to higher efficacy of the chemicals in suppressing weeds growth.

Quality parameters

Colour intensity (3-dimensional scale L^* , a^* and b^*) and TSS ($^\circ\text{Brix}$)

The observations on quality parameters after the harvesting of crop namely colour intensity 3-dimensional scale L^* , a^* and b^* values of bulbs of onion and TSS are presented in Table 3.

In the 3-dimensional scale (L^* , a^* and b^*) the L^* being the lightness coefficient, ranging from 0 (black) to 100 (white), a^* represents greenness and redness (+100 for red and -80 for green) while b^*

Table 1. Effect of weed management practices on weeds count ($\text{no}/0.25 \text{ m}^2$) and weed dry weight ($\text{g}/0.25 \text{ m}^2$)

Tr. No.	Treatments	Weed count 30 DAT	Weed count 60 DAT	Weed count 90DAT	Weed dry weight 30 DAT	Weed dry weight 60 DAT	Weed dry weight 90 DAT
T_1	Butachlor 1 kg a.i./ha (PE) + oxyfluorfen 0.26 kg a.i./ha (30 DAT)	53 (7.31)	14 (3.81)	21 (4.64)	9.78 (3.20)	11.82 (3.51)	20.82 (4.61)
T_2	Butachlor 1 kg a.i./ha (PE) + hand weeding (30 DAT)	55 (7.45)	31 (5.61)	40 (6.36)	10.27 (3.28)	14.35 (3.85)	25.35 (5.08)
T_3	Pendimethalin 1 kg a.i./ha (PE) + oxyfluorfen 0.26 kg a.i./ha (30 DAT)	25 (5.05)	08 (2.92)	14 (3.81)	5.56 (2.46)	4.26 (2.18)	12.21 (3.56)
T_4	Pendimethalin 1 kg a.i./ha (PE) + hand weeding (30 DAT)	26 (5.15)	28 (5.34)	36 (6.04)	6.01 (2.55)	13.33 (3.72)	23.30 (4.87)
T_5	Oxyfluorfen 0.26 kg a.i./ha (PE) +oxyfluorfen 0.26 kg a.i./ha (30 DAT)	07 (2.74)	06 (2.55)	09 (3.08)	3.01 (1.87)	1.17 (1.29)	4.17 (2.16)
T_6	Oxyfluorfen 0.26 kg a.i./ha (PE) + hand weeding (30 DAT)	05 (2.35)	04 (2.12)	07 (2.74)	2.64 (1.77)	0.61 (1.05)	3.61 (2.02)
T_7	Weed free check	00 (0.71)	00 (0.71)	00 (0.71)	0.00 (0.71)	0.00 (0.71)	0.00 (0.71)
T_8	Unweeded control	80 (8.97)	119 (10.93)	127 (11.29)	39.86 (6.35)	112.13(10.6)	125.13(11.2)
T_9	One hand weeding (30 DAT)	78 (8.75)	49.0 (7.04)	84.32(9.21)	39.61 (6.33)	18.21 (4.33)	61.20 (7.85)
	S.Em \pm CD at 5%CV	0.712.1423.91	0.381.1514.62	0.381.1512.53	0.190.5810.51	0.381.1519.19	0.381.1514.25

*Figures in parentheses indicate square root transformed values $\sqrt{X+0.5}$

*DAT-Days after transplanting, * HW-Hand weeding; *PE- pre-emergence

Table 2. Effect of weed management practices on dry weight of plant (g/plant)

Tr. No.	Treatments	Plant dry weight 30 DAT	Plant dry weight 60 DAT	Plant dry weight 90 DAT
T ₁	Butachlor 1 kg a.i./ha (PE) + oxyfluorfen 0.26 kg a.i./ha (30 DAT)	2.00	6.09	7.29
T ₂	Butachlor 1 kg a.i./ha (PE) + hand weeding (30 DAT)	2.06	5.86	6.79
T ₃	Pendimethalin 1 kg a.i./ha (PE) + oxyfluorfen 0.26 kg a.i./ha (30 DAT)	2.05	7.79	10.72
T ₄	Pendimethalin 1 kg a.i./ha (PE) + hand weeding (30 DAT)	2.03	7.07	8.72
T ₅	Oxyfluorfen 0.26 kg a.i./ha (PE) + oxyfluorfen 0.26 kg a.i./ha (30 DAT)	2.55	9.94	12.48
T ₆	Oxyfluorfen 0.26 kg a.i./ha (PE) + hand weeding (30 DAT)	2.47	10.52	12.71
T ₇	Weed free check	2.74	11.18	17.34
T ₈	Unweeded control	1.40	2.25	5.09
T ₉	One hand weeding (30 DAT)	1.94	3.19	6.13
	S.Em±	1.19	0.38	0.38
	CD at 5%	0.58	1.15	1.15
	CV	15.59	9.39	6.87

*PE- pre-emergence, *DAT-Days after transplanting

Table 3. Effect of weed management practices on colour intensity of onion bulbs (L*, a*, b*) and TSS (^oBrix)

Tr. No.	Treatments	L* value	a* value	b* value	TSS of bulb
T ₁	Butachlor 1 kg a.i./ha (PE) + oxyfluorfen 0.26 kg a.i./ha (30 DAT)	41.10	21.06	6.39	12.73
T ₂	Butachlor 1 kg a.i./ha (PE) + hand weeding (30 DAT)	39.01	21.46	5.62	12.71
T ₃	Pendimethalin 1 kg a.i./ha (PE) + oxyfluorfen 0.26 kg a.i./ha (30 DAT)	37.44	21.46	5.53	12.71
T ₄	Pendimethalin 1 kg a.i./ha (PE) + hand weeding (30 DAT)	41.45	21.33	5.77	12.18
T ₅	Oxyfluorfen 0.26 kg a.i./ha (PE) + oxyfluorfen 0.26 kg a.i./ha (30 DAT)	44.85	22.53	5.55	12.51
T ₆	Oxyfluorfen 0.26 kg a.i./ha (PE) + hand weeding (30 DAT)	41.52	20.99	6.21	12.33
T ₇	Weed free check	36.41	21.14	5.30	12.21
T ₈	Unweeded control	48.66	21.44	6.18	12.45
T ₉	One hand weeding (30 DAT)	49.14	21.64	5.44	12.23
	S.Em±	0.96	0.29	0.11	0.19
	CD at 5%	3.97	NS	0.45	NS
	CV	3.95	2.37	3.33	2.67

*PE- pre-emergence, *DAT-Days after transplanting

represents yellowness and blueness (+70 for yellow and -80 for blue). No significant results were observed among the value a* and the TSS (^oBrix) of onion bulbs among the treatments

References

- Bhalla, P.L. 1978. Weed competition, crop losses and chemical and weed control in *Allium cepa* L. A review, *Pestology*. 11(11): 35-39.
- Nandal, T.R. and Singh, Ravinder 2002. Integrated weed management in onion under Himachal Pradesh conditions. *Indian J. Weed Sci* 34(1-2): 72-75.
- Panse, V.G. and Sukhatme, P.V. 1987. Statistical methods of agriculture workers, ICAR, New Delhi Publ.
- Phogat, B.S., Bhan, V.M. and Singh, Jode 1989. Efficacy of herbicides on weed in Kharif onion. *Indian J. Weed. Sci.* 21 (1&2): 78-79.
- Verma, S. K. and Singh, T. 1997. Effect of weed control measures and fertility on growth and productivity of rainy season onion. *Ind J. Agron.* 42: 540-543.