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Integrated weed management in onion

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ABSTRACT

A field experiment was conducted at 'C' Block Farm, Kalyani of Bidhan Chandra Krishi Viswavidyalaya during December 2002 to April 2003 to study the effect of herbicides integrated with manual weeding on onion. The treatment combinations were weedy check/control, hand weeding at 25 and 45 DAT, weed free, Oxyfluorfen @ 100 g a.i./ha as POE at 25 DAT, Pendimethalin @ 750 g a.i./ha as PP at 2 DBT, Agil @ 100 g a.i./ha as PE at 2 DAT, Oxyfluorfen + HW at 45 DAT, Agil + HW at 25 DAT and Oxyfluorfen + Agil. The most commonly noticed weeds were *Ageratum conyzoides, Amaranthus viridis, Argemone mexicana, Portulaca oleracea, Euphorbia hirta, Physalis minima, Cyperus rotundus, Digitaria sanguinalis, Echinochloa crusgali, E. colonum, and Eleusine indica.* The result revealed that integration of hand weeding at 45 DAT to initial Oxyfluorfen treatment significantly reduced weed population and biomass at harvest over the control. The highest bulb yield was obtained with weed free treatment followed by Oxyfluorfen + HW at 45 DAT which was *at par* with twice HW at 25 & 45 DAT while the season long crop-weed competition (control) reduced the bulb yield by 38.26%. Integrated method was proved to be superior to other herbicidal treatments to increase bulb length, diameter, weight and yield. Pre-emergence application of Pendimethalin @ 750 a.i./ha was found to be the most effective treatment among sole herbicidal treatments.

Weed competition in onion is a global problem and losses of yield due to weed are as high as 70-75% (Mani and Gautam, 1976). Onion has very poor capability to compete with weeds due to its short stature, non-branching habit, sparse foliage shallow root system and slow growth in the initial growth stage. Moreover, use of liberal doses of fertilizers and more frequent irrigation favour more weed growth. Very close planting of the crop and its shallow root system also make mechanical weeding quite ineffective, on the other hand seedlings sustain injury. Suppressions of crop growth can also be viewed if the weeds even present for two weeks. With this in view, the present investigation was aimed and undertaken to the study the effect of herbicides integrated with manual weeding on onion.

MATERIALS AND METHODS

A field experiment was conducted at 'C' Block Farm, Kalyani of Bidhan Chandra Krishi Viswavidyalaya during December 2002 to April 2003 in a sandy loam soil. The experiment was designed in randomized block design with three replications. The treatment combinations were weedy check/control, hand weeding (HW) at 25 and 45 days after transplanting (DAT), weed free, Oxyfluorfen @ 100g a.i./ha as post emergence (POE) at 25 DAT, Pendimethalin @ 750 g a.i./ha as pre-planting (PP) at 2 days before transplanting (DBT), Agil @ 100 g a.i./ha as pre-emergence (PE) at 2 DAT,

Oxyfluorfen + HW at 45 DAT, Agil + HW at 25 DAT and Oxyfluorfen + Agil. Seedlings of onion cv. Sukhsagar, a popular cultivar of this zone were transplanted on 23rd December, 2002 in a plot size of 4m x 2.2m each with its normal package of practices. The recommended fertilizer dose was 125:60:100 kg of NPK/ha. The crop was harvested on 20th April, 2003. Observations were made on types of weed flora, weed populations and dry matter taken on 50 and 75 DAT and harvesting, weed control efficiency (WCE), weed index (WI), yield attributes and yield of onion. To interpret the effect of different treatments, the data on various characters were analyzed following the method suggested by Panse and Sukhatme (1989).

RESULTS AND DISCUSSION

Different types of weed flora were observed in the experimental field during the course of study. The most noticed weeds were *Ageratum conyzoides* L., *Amaranthus viridis* L., *Argemone mexicana* L., *Portulaca oleracea* L., *Euphorbia hirta* L., and *Physalis minima* L. (among broad-leaved weeds) and *Cyperus rotundus* L., *Digitaria sanguinalis* (L.) Scop., *Echinochloa crusgali* (L.) Beauv., *E. colonum* L., and *Eleusine indica* (L.) Gaertn. (among narrow-leaved weeds).

The total weed population went on increasing with the increase in the age of the crop (Table 1). Weed free treatment obviously exhibited no weeds while the best result in relation to lowest number of weeds (33.33 nos.) was recorded with Oxyfluorfen + (HW) at 45 DAT treatment followed by hand weeding (HW) at 25 and 45 DAT (35.33 nos.). Reduced dry matter accumulation by weeds was observed in different weed control treatments. Perusal of data revealed that the treatment Oxyfluorfen + (HW) at 45 DAT gave the lowest dry weight at all stages of observation followed by twice hand weeding (HW) at 25 and 45 DAT. Among the three sole herbicides applied in this experiment, Pendimethalin showed its superiority in these respects. Lower weed population and dry weight in the integrated treatment of Oxyfluorfen + (HW) at 45 DAT may be attributed to initial suppression of weed growth resulting less crop-weed competition which was reflected in lower weed population, dry weight and weed control efficiency. Similar results have been reported by Singh *et al.* (1986) and Nadagouda *et al.* (1996). The ability of Pendimethalin to suppress the growth of all types of weed flora is due to its higher persistency in the soil in comparison with other sole herbicides applied in this study. The result is in conformity with the findings of Al-Kothayari and Hassan (1999).

Weed free treatment exhibited maximum values of all yield attributes being superior to other treatments while in control, it was always minimum (Table 2). Higher values for length, diameter and weight of bulb in this treatment may be attributed to the season long weed free situation resulting in better availability of light, nutrients, moisture and space for the growth of the crop. Pendimethalin was found to be the most effective than Oxyfluorfen, Agil or the combination of

Table 1 Effect of different treatments on total population and dry weight of weeds and weed control efficiency (WCE)

Treatment	Total population (nos./m^2)			Dry weight (g/m^2)			WCE (%)		
	50 DAT	75 DAT	Harvest	50 DAT	75 DAT	Harvest	50 DAT	75 DAT	Harvest
Control	96.00	118.66	130.00	29.80	56.04	66.36	-	-	-
HW at 25 & 45 DAT	11.33	28.66	35.33	0.19	6.76	12.16	99.36	88.14	81.67
Weed free	0.00	0.00	0.00	0.00	0.00	0.00	-	-	-
Oxyfluorfen @ 100g a.i./ha	50.66	66.66	86.00	16.20	34.47	42.43	45.63	39.56	36.06
Pendimethalin @ 750 g a.i./ha	20.00	31.33	44.00	4.55	10.75	15.91	84.73	81.15	76.02
Agil @ 100 g a.i./ha	46.66	59.33	71.33	10.17	25.34	33.11	65.87	55.79	50.10
Oxyflurfen @ 100 g a.i./ha + HW at 45 DAT	12.66	24.00	33.33	0.16	6.56	11.39	99.46	88.49	82.83
Agil @ 100 g a.i./ha + HW at 25 DAT	22.67	39.33	50.66	5.13	13.96	19.88	82.78	75.31	70.04
Oxyfluorfen @ 100 g a.i./ha + Agil @ 100 g a.i./ha	36.00	72.00	93.33	9.84	27.45	36.03	66.97	51.01	45.70
S.Em.(±)	2.194	2.539	2.285	0.669	0.782	0.985			
C.D. at 5%	6.579	7.611	6.851	2.004	2.346	2.954			
CV	11.555	8.993	6.548	13.702	6.720	6.471			

Table 2 Effect of different treatments on length, diameter and weight of bulb, total yield of bulb and weed index in onion

Treatment	Length (cm)	Bulb Diameter (cm)	Weight (g)	Bulb Yield (t/ha)	Weed Index (WI) (%)
Control	30.30	28.98	21.30	7.43	37.165
HW at 25 & 45 DAT	36.98	36.78	30.03	10.47	12.090
Weed Free	38.96	39.25	34.50	11.91	
Oxyfluorfen @ 100 g a.i./ha	33.11	31.81	23.00	8.19	31.234
Pendimethalin @ 750 g a.i./ha	35.81	35.66	28.16	9.73	18.304
Agil @ 100 g a.i./ha	33.96	31.86	24.66	8.53	28.295
Oxyfluorfen @ 100 g a.i./ha + HW at 45 DAT	37.03	37.17	31.16	10.77	9.572
Agil @ 100 g a.i./ha + HW at 25 DAT	35.16	33.22	27.90	9.64	19.059
Oxyfluorfen @ 100 g a.i./ha + Agil @ 100 g a.i./ha	33.56	31.60	23.83	8.24	30.814
S.Em.(±)	1.116	1.009	0.818	0.237	
C.D. at 5%	3.345	3.025	2.453	0.709	
CV	5.515	5.067	2.210	4.345	

both. This is because Pendimethalin was able to control all types of weed flora more efficiently than other two herbicides. The treatment Oxyfluorfen + (HW) at 45 DAT recorded the next best results in these relation which is mainly because of suppression of initial weed growth leading to less crop-weed compeititon. This treatment

was closely followed by HW at 25 & 45 DAT. All these attributes in control showed the lower values due to highest weed competition resulting in unfavourable growing condition for the crop. Similar to yield attributes, yield was influenced significantly with different treatments. Highest bulb yield (11.91 t/ha) was recorded from the weed free treatment followed by Oxyfluorfen + (HW) at 45 DAT (10.77 t/ha) and HW at 25 & 45 DAT (10.47 t/ha). Highest yield in weed free treatment is mainly because of utilization of resources in better way. Initial suppression of weed growth by Oxyfluorfen + (HW) at 45 DAT and HW at 25 & 45 DAT reflected in the increased yields in these treatments which could be supported by weed index as well. This result confirms the findings of Singh *et al.* (1998) and Ved Prakash *et al.* (2000). The effectivness of Pendimethalin may be attributed to higher persistence of the herbicide in the soil thereby suppressing the weed flora for longer duration resulting in less crop-weed competition and for this reason higher bulb yield was obtained.

It may be concluded from the above results that the tedious, cumbersome, costly and non-availability of labours at critical crop-weed competition stage in the hand weeding treatment may be replaced by Integrated Weed Management (IWM) system, by application of Oxyfluorfen @ 100 g a.i./ha as POE in the initial stage and one hand weeding at 45 DAT as it recorded statistically similar performance.

REFERENCES

Al-Kothayari, G. R. and Hassan, A. A. 1990. Chemical control of annual weeds in irrigated onion in Hadhramout Valley. *Arab J. Pt. Prot.* **8**(1) : 49-54.

Mani, V. S. and Gautam, K. C. 1976. A national strategy for weed control. *Pesticides*, **10** (6) : 15.

Nadagouda, B. T., Kurdikeri, C. B., Salakinkop, S. R., Hunshal, C. S. and Patil, S. L. 1996. Integrated weed management in drill sown onion (*Allium cepa* L.). *Farming Sys.* **12** (3-4) : 22-27.

Singh, H. R., Sinha, A. P. and Singh, S. P. 1986. Comparative efficacy of herbicides and hand weeding for control of weeds in onion. *Haryana J. Hort. Sci.* **15** (1/2) : 76-82.

Singh, R., Nandal, T. R. and Kohli, U. K. 1998. Efficacy and economics of some herbicides for weed control in onion (*Allium cepa* L.). *Annals Agril. Res.*, **19**(2) : 153-157.

Ved Prakash, Pandey, A. K. Singh, R. D. and Mani, V. P. 2000. Integrated Weed Management in winter onion under mid-hill conditions of North-Western Himalaya. *Indian J. Agron.* **45**(4) : 816-821.