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Effect of Weed Management Techniques in *kharif* Onion (*Allium cepa* L.)

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ABSTRACT

The study was conducted under On Farm Testing (OFT) at the farmer's field of adopted village Lachchhakheri of District Mandsaur (Madhya Pradesh) in kharif season of 2014, 2015 and 2016 to assess the effect of weed management treatments on yield of kharif onion (Allium cepa L.) and its weeds. The weed management treatment Oxyfluorfen @ 150 g ai/ha as pre emergence gave 46.31 percent higher bulb yield as compared to farmer's practice. Further, application of Oxyfluorfen @ 150 g ai/ha as pre emergence treatment gave significantly higher plant height, net return and B:C ratio as compared to all other treatments tested and significantly reduced the weed count and weed dry matter recorded at 75 DAS as compared to all other treatments tested.

Key Words: Herbicide, kharif season, Onion, Weed management.

INTRODUCTION

Onion (*Allium cepa* L.) is the most important species of Allium group. Madhya Pradesh is the leading onion growing state (Anon, 2016). Among many causes of low productivity, onion exhibited greater susceptibility to weed competition as compared to other crops due to its inherent characteristics such as slow germination, extremely slow growth in the initial stages, non-branching habit, sparse foliage and shallow root system. If weeds were present throughout the crop growth period, there might be complete loss of marketable yield. The reduction in bulb yield varied to the extent of 4 to 48 per cent depending upon the duration, intensity of weed growth and weed competition (Urraiya and Jha, 2017).

The hand weeding in onion was a common practice in India, but non-availability of labour during critical period of crop made hand weeding difficult leading to heavy yield losses. The critical period of crop-weed competition in onion lies between 15-60d after transplanting. Spraying of pre-emergence herbicides keep the crop in weed free conditions during early stages. Then, at later stages, hand weeding helped to reduce the cost of weeding and to keep the weed population below economic threshold level throughout the crop growth period. Therefore, an on farm trial was conducted to assess the possibility of pre-emergence herbicides with management practices for effective weed control in kharif onion.

MATERIALS AND METHODS

An On Farm Trial was conducted in kharif seasons of 2014, 2015 and 2016 in the adopted village Lachchhakheri by Krishi Vigyan Kendra, Mandsaur. This OFT was conducted at 10 farmer's fields with AFDR variety of kharif onion during all the years. The treatments were farmers' practice (hand weeding at 15, 30 and 45 DAS), Pendimethalin @ 1000 g ai/ha as pre-emergence and Oxyfluorfen @150g ai/ha as pre-emergence. All the herbicides were applied manually by knapsack sprayer fitted with flat fan nozzle using spray volume of 500l/ ha. The recommended package of practices were followed to raise the crop. The observation on weed dry matter and weed count were recorded at 75 DAS using quadrate (0.5 m X 0.5 m). Quadrate was randomly placed at two places in each plot.

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Table 1. Effect of weed management treatments on weeds in kharif onion.

Treatment	Weed dry matter (g/m2) at 75 DAS				Weed density (No/m2) at 75 DAS			
	2014	2015	2016	Pooled	2014	2015	2016	Pooled
Farmer's Practice	9.20	17.70	15.41	14.10	13.00	25.50	22.00	20.17
Pendimethalin @ 1000 g ai/ha as pre emergence	2.04	1.90	3.78	2.57	4.00	3.60	7.20	4.93
Oxyfluorfen @ 150 g ai/ha as pre emergence	1.57	1.32	2.91	1.93	3.00	2.50	5.00	3.50
S. Em. +	0.12	0.22	0.15	0.09	0.22	0.19	0.29	0.13
CD 5%	0.37	0.64	0.44	0.25	0.66	0.58	0.89	0.37

RESULTS AND DISCUSSION

Effect on weeds

The predominant weeds noticed in kharif onion were Echinochloa colonum, *Echinochloa crus-galli* L., Beauv., *Cyperus rotundus* L., *Cynodon dactylon* pers., *Saccharum spontaneum*, *Phyllanthus niruri, Euphorbia hirta* and *Parthenium hysterophorus*. Application of Oxyfluorfen@ 150g ai/ha as pre-emergence treatment found significantly superior with respect to lowest weed count and dry matter (Table 1). Further, Pendimethalin@ 1000g ai/ha as pre-emergence treatment also significantly reduced the weed count and weed dry matter as compared to farmers practice. These results were in close conformity with Kalhapure *et al* (2013) and Urraiya and Jha (2017).

Effect on yield of kharif onion

Application of Oxyfluorfen @150g ai/ha as pre-emergence treatment found significantly superior over Pendimethalin@ 1000g ai/ha as pre-emergence treatment followed by farmers' practice. It can be revealed (Table 2) that significantly highest bulb yield of kharif onion were observed under Oxyfluorfen@ 150g ai/ha as pre-emergence treatment (224.30q/ha) and Pendimethalin@ 1000g ai/ha as pre-emergence treatment as compared to farmer practice. Application of Oxyfluorfen @150 g ai/ha as pre-emergence treatment recorded 46.31 per cent higher bulb yield of kharif onion than farmers practice. Similar results were reported by Kalhapure *et al* (2013) and Prasad *et al* (2017).

Economics of onion crop

On the basis of pooled data (Table 3), Oxyfluorfen@ 150g ai/ha as pre-emergence treatment fetches the significantly highest net return and B:C ratio (Rs.2.95lakh/ha and 8.27) followed by Pendimethalin@ 1000g ai/ha as pre-emergence

Table 2. Effect of weed management treatments on plant height and bulb yield of kharif onion

Treatment	Plant Height (cm)				Bulb Yield (q/ha)			
	2014	2015	2016	Pooled	2014	2015	2016	Pooled
Farmer's Practice	55.0	35.0	40.0	43.3	165.0	145.0	150.0	153.3
Pendimethalin @ 1000 g ai/ha as pre emergence	62.0	41.0	47.0	50.0	207.5	186.0	182.0	191.8
Oxyfluorfen @ 150 g ai/ha as pre emergence	65.0	48.0	50.0	54.3	255.0	208.0	210.0	224.3
S. Em. +	2.44	2.92	2.51	1.41	2.44	2.92	2.51	1.41
CD 5%	7.24	8.68	7.46	4.97	7.24	8.68	7.46	3.97

Table 3. Effect of weed management on economics of kharif onion crop.

Treatment	Net return (Rs in Lakhs/ha)				B:C Ratio			
	2014	2015	2016	Pooled	2014	2015	2016	Pool
T-1 Farmer's Practice (Hand weeding at 15, 30 and 45 DAS)	2.13	1.83	1.85	1.94	7.17	6.31	5.56	6.35
T-2 Pendimethalin @ 1000 g ai/ha as pre emergence	2.77	2.45	2.30	2.50	9.02	8.09	6.28	7.80
T-3 Oxyfluorfen @ 150 g ai/ha as pre emergence	3.44	2.73	2.70	2.96	9.81	8.00	7.00	8.27
S. Em. +	0.04	0.04	0.04	0.02	0.104	0.123	0.088	0.057
CD 5%	0.11	0.13	0.11	0.06	0.309	0.366	0.262	0.160

treatment. The lowest B:C ratio was observed under farmers practice. Similar findings were also reported by Khang *et al* (2011).

CONCLUSION

On the basis of three years data, it may conclude that application of Oxyfluorfen @ 150 g ai/ha as pre emergence gave significantly higher plant height, bulb yield, net return and B:C ratio as compared to all other treatments tested and significantly reduced the weed count and weed dry matter in kharif onion crop.

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