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RESEARCH ARTICLE

Impact of integrated weed management on growth, yield and economics of onion (*Allium cepa* L.)

■ S. K. Tyagi, G. S. Kulmi and A. R. Khire

SUMMARY

An experiment was conducted in the *Rabi* season of two consecutive years of 2019-20 and 2020-21, respectively to determine find out practically convenient and economic weed control measure for the onion growers. Treatments comprised T_1 Farmers' practice (pendimethalin 30% EC 1 kg ai/ha before transplanting+ 1HW at 25 DAT) and T_2 (oxyflurofen 23.5% EC @ 0.10 kg ai/ha + quizalofop ethyl 5% EC @ 0.05 kg ai/ha at 25 DAT + 1 HW at 45 DAT) replicated at ten farmers' field. Treatment T_2 (oxyflurofen 23.5% EC @ 0.10 kg ai/ha + quizalofop ethyl 5% EC @ 0.05 kg ai/ha at 25 DAT + 1 HW at 45 DAT) recorded significantly lowest weed density (32.59/m^2), highest plant height (52.50 cm), neck thickness (1.12 cm), bulb diameter (6.38 cm), bulb weight (92.57 g) and bulb yield (304.85 q/ha) as compared to treatment T_1. The highest net returns (Rs 2,04,391/ha) and B:C (3.04) were obtained with T_2.

Key Words : IWM, Growth, Onion, Oxyfluorfen, Quizalofop ethyl, Yield

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Onion (*Allium cepa* L.) of family Alliaceae having in origin in Central Asia. It is the most important vegetable bulb crop of the world for dietary purpose. In India onion occupies about 1285 thousand hectares having production of 23262.3 thousand metric tons with the productivity of 18.1 metric ton/hectare (Anonymous, 2018). Important onion growing states are Maharashtra, Madhya Pradesh, Karnataka, Bihar, and Rajasthan. Onion is slow growing, shallow rooted crop with narrow, upright leaves and non-branching habit. With such growth habit, onion cannot compete well with weeds. Owing to this, frequent irrigations and fertilizer application it suffers frequent flushes of weeds. Yield loss due to weed infestation is upto 40 to 80% (Channapagoudar and Biradar, 2007). The conventional methods of weed control (hoeing and weeding) are

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laborious, expensive and insufficient. On the other hand, use of herbicides alone does not prove effective because of their selectivity. Hence, an attempt was made to find out an appropriate combination of cultural and chemical weed control which is effective, efficient and economically feasible.

MATERIAL AND METHODS

The field experiment was conducted in the *Rabi* season of two consecutive years of 2019-20 and 2020-21. It was replicated on 10 farmers' fields in Khargone, Madhya Pradesh to determine the effect of integrated weed management on growth, yield and economic returns. The treatments comprised T_1 Farmers' practice (pendimethalin 30% EC 1 kg ai/ha before transplanting+ 1HW at 25 DAT) and T_2 (oxyflurofen 23.5% EC @ 0.10 kg ai/ha + quizalofop ethyl 5% EC @ 0.05 kg ai/ha at 25 DAT + 1 HW at 45 DAT). Forty-five days old seedlings of onion *'Agrifound light red'* were transplanted in December during both the years at a spacing of 15 cm×10 cm. The observations on weed density (no./sqm) was recorded at 90 days after transplanting in standing crop by using a quadrant of 50 cm x 50 cm at randomly selected five places in each plot. The data for vegetative parameters (plant height, neck thickness) were recorded at 90 DAT and yield parameters (bulb weight, bulb diameter and bulb yield) were recorded at harvest. To work out economics, prevailing market price was considered for outputs and inputs. The data on plant growth, yield and yield attributes, cost of cultivation, gross return, net return and benefit cost ratio were analysed as per paired "t" test of significance.

RESULTS AND DISCUSSION

The results obtained from the present investigation as well as relevant discussion have been summarized under following heads :

Effect of integrated weed management on weed population :

The prominent weed flora in onion fields were *Cynodon dactylon, Cyperus rotandus, Chenopodium album, Portulaca oleraceae, Amaranthus viridis, Euphorbia* spp., *Parthenium historophorous* etc. Similar types of weeds were also reported by Panse *et al.* (2014).

The data presented in Table 1 on weed parameters in onion revealed significant differences among the treatments. Significantly lower weed density (32.59/m^2) at 90 DAT was recorded in the plots treated under treatment T_2 (oxyflurofen 23.5% EC @ 0.10 kg ai/ha + quizalofop ethyl 5% EC @ 0.05 kg ai/ha at 25 DAT + 1 HW at 45 DAT). However, the highest weed density was recorded with the treatment T_1 (pendimethalin 30% EC 1 kg ai/ha before transplanting+ 1HW at 25 DAT).

Table 1: Effect of integrated nutrient management on weed density and growth attributes of onion (average of two years)

Treatments		Weed density (No./m^2)	Plant height (cm)	Neck Thickness (cm)	Bulb Diameter (cm)	Bulb weight (g)
T_1	pendimethalin 30% EC 1 kg ai/ha before transplanting+ 1HW at 25 DAT	67.16	52.50	1.04	5.15	81.71
T_2	oxyflurofen 23.5% EC @ 0.10 kg ai/ha + quizalofop ethyl 5% EC @ 0.05 kg ai/ha at 25 DAT + 1 HW at 45 DAT	32.59	59.92	1.12	6.38	92.57
	t-value	27.55638	8.731683	16.812488	85.883721	126.207604

The means of T_1 and T_2 are significantly different at $p < 0.05$

Table 2: Effect of integrated nutrient management on yield and economics of the different treatments (average of two years)

Treatments		Bulb yield (t/ha)	Cost of cultivation Rs./ha	Gross return Rs./ha	Net return Rs./ha	B:C ratio
T_1	Pendimethalin 30% EC 1 kg ai/ha before transplanting + 1HW at 25 DAT	25.25	98278	252500	154222	2.57
T_2	oxyflurofen 23.5% EC @ 0.10 kg ai/ha + quizalofop ethyl 5% EC @ 0.05 kg ai/ha at 25 DAT + 1 HW at 45 DAT	30.49	100459	304850	204391	3.04
	t-value	18.86529	-	-	-	-

The means of T_1 and T_2 are significantly different at $p < 0.05$

In case of weed management a combination of chemical and cultural weed control was found most effective at keeping the weed population under control during the critical crop growth period. Similar results reported by Kolhe (2001), Warade *et al*. (2006) and Tripathy *et al.* (2013).

Effect of integrated weed management on crop growth :

Integrated applications of oxyflurofen 23.5% EC @ 0.10 kg ai/ha + quizalofop ethyl 5% EC @ 0.05 kg ai/ha at 25 DAT + 1 HW at 45 DAT showed significant superiority over T_1 regarding crop growth and yield parameters. The highest plant height (52.92 cm), neck thickness (1.12 cm), bulb diameter (6.38 cm) and bulb weight (92.57 g) were observed with the treatment T_2. However, significantly the shortest crop growth in all aspects was recorded with T_1 (Table 1).

Increased crop growth and bulb weight with the integrated application of herbicide and hand weeding were due to favourable environment where crop to expressed better plant growth. This boost in crop growth was due to less crop weed competition at the earlier stage of crop growth. Integrated application of herbicide followed by hand weeding at critical crop growth period supressed the weeds and thus efficiently controlled the weed population, it hastened the crop growth and ultimately the quality. The findings are in confirmation with the Chandrika *et al.* (2009). Similar findings were also reported by Tripathy *et al.* (2013) and Panse *et al.* (2014).

Effect of integrated weed management on yield :

It is evident from the data presented in Table 2 that the significantly higher bulb yield (30.49 t/ha) was recorded in treatment T_2 (oxyflurofen 23.5% EC @ 0.10 kg ai/ha + quizalofop ethyl 5% EC @ 0.05 kg ai/ha at 25 DAT + 1 HW at 45 DAT) presented in Table 2 whereas treatment T_1 produced the lowest bulb yield (25.25 t/ha). Increase in bulb yield with hand weeding and herbicide can be attributed to reduction in weed density during the entire crop growth leading to increased growth and better yield attributes. These results are in close conformity with the Sukhadia *et al*. (2002) and Chopra and Chopra (2007).

Economics :

The data related on cost of cultivation, gross return, net return, benefit: cost ratio are presented in Table 2. The highest net monetary return of Rs 2,04,391/ ha was obtained with application of oxyflurofen 23.5% EC @ 0.10 kg ai/ha + quizalofop ethyl 5% EC @ 0.05 kg ai/ha at 25 DAT + 1 HW at 45 DAT with benefit: cost of 3.04. The cost of labourers for weeding got reduced with application of post emergence herbicides in combination with hand weeding, which resulted in reduced cost of cultivation and maximum B:C with treatment T_2. The results obtained are supported by the results of Pugalendhi *et al.* (2011); Patel *et al.* (2011) and Tripathy *et al.* (2013).

Conclusion:

On the basis of the results, it can be concluded that application of oxyflurofen 23.5% EC @ 0.10 kg ai/ha + quizalofop ethyl 5% EC @ 0.05 kg ai/ha at 25 DAT + 1 HW at 45 DAT was more effective, efficient and cost effective for weed control in onion.

REFERENCES

Anonymous (2018). *Horticultural Statistics at a Glance. Horticulture Statistics Division, Department of Agriculture,* Cooperation and Farmers Welfare, Ministry of Agriculture and Farmers Welfare, Government of India.

Chandrika, V. D., Reddy, Srinivasulu, Sagar, K.G. and Reddy, G. Prabhakara (2009). Influence of graded levels of nutrients, time of N application and weed management practices on weed dynamics, yield attributes and bulb yield of onion (*Allium cepa* L.). *Indian J. Weed Sci.,* **41**(1&2): 80–89.

Channapagoudar, B. B. and Biradar, N. R. (2007). Physiological studies on weed control efficiency in direct sown onion. *Karnataka J. Agril. Sci.,* **20** (2): 375- 376.

Chopra, Nssha and Chopra, N. K. (2007). Production of weed free mother bulb of onion (*Allium cepa* L.) through integration of herbicides and weeding. *Indian J. Agron.,* **52** (1): 80–82.

Kolhe, S. S. (2001). Integrated weed management in onion (*Allium cepa* L.). *Indian J. Weed Sci.,* **33** (1&2): 26–29.

Panse, R., Gupta, A., Jain, P. K., Sasode, D. S. and Sharma, S. (2014). Efficacy of different herbicides against weed flora in onion (*Allium cepa* L.). *J. Crop Weed.,* **10** (1): 163-166.

Patel, T. U., Patel, C. L., Patel, D. D., Thanki, J. D., Patel, P. S. and Jat Ram, A. (2011). Effect of weed and fertilizer

management on weed control and productivity of onion (*Allium cepa* L.). *Indian J. Agron.,* **56** (3): 267–272.

Pugalendhi, L., Sathiyamurty, Y.A., Sumathe, T. and Thangamani, C. (2011). Weed management studies in onion. *National Symposium. on Alliums*: Current Scenario and Emerging trends, 12-14th March, 2011, Pune, 257pp.

Sukhadi, N. M., Ramani, B. B. and Dudhantra, M. G. (2002). Response of onion (*Allium cepa* L.) to methods of sowing and weed management practices. *Indian J. Weed Sci.* 34 (1&2): 76–79.

Tripathy, P., Sahoo, B. B., Patel, D. and Dash, D. K. (2013). Weed management studies in onion. *J. Crop Weed,* **9** (2): 210-212.

Warade, A. D., Gonge, V. S., Jogdande, N. D., Ingole, P. G. and Karunakar, A. P. (2006). Integrated weed management in onion. *Indian J. Weed Sci.,* **38** (1&2): 92–95.