



Research Article

Weed management studies in onion (*Rabi*)

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ABSTRACT : A field experiment was conducted during *Kharif* season 2010 at Main Agricultural Research Station, University of Agricultural Sciences, Dharwad to study the effect of herbicides on weed population, plant height, yield and bulb weight in onion. The data on weed management and yield revealed that Oxyflurofen 23.5 per cent EC application before planting + one hand weeding at 40-60 days after transplanting showed significant reduction in weed population, fresh weight of weeds and dry weight of weeds and also revealed that significant increase in plant height, number of leaves, marketable yield, total yield and average bulb weight.

KEY WORDS : Herbicides, Marketable yield, Total yield, Average bulb weight, Onion

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INTRODUCTION

The bulbous vegetable onion, *Allium cepa* var. *Cepa* L. (2n=16) is the most important species of *Allium* group and is regarded as the single most important vegetable spices in the world after tomatoes and is considered as top most export commodity among vegetables. Onion bulb is rich in minerals, especially calcium and phosphorus besides having fairly good quantities of carbohydrates, proteins and vitamin C. It forms an indispensable part of many diets of both vegetarian and non-vegetarian as a flavouring agent. It is consumed in raw form and salads regularly in small quantities comparable with that of hot pepper. The pungency in onion is due to a volatile compound known as allyl propyl disulphide, which is sulphur rich compound. It has got the effects of lowering the blood sugar fat and also having good coagulation effect. The good storage of dry onion has facilitated the world wide trade and is

always in demand even in the smallest local markets. Among many causes of low productivity, onion exhibits 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, short stature, non-branching habit, sparse foliage and shallow root system. This favours quick and fast growth of weeds in the initial stages and competition thus tends to be severe. Moreover, use of liberal dose of FYM, fertilizers and frequent irrigations creates favourable conditions for weed growth (Singh *et al.*, 1986). It is an established fact that weeds compete with crop plants for space, nutrients, moisture and light there by reduces the quality and quantity of yield (Moolani and Sachan, 1966). In onion, weeds emerge with transplanting of seedlings and grow along with them. This causes severe competition between the crop and weed (Bhan *et al.*, 1976). If the weeds are present throughout the crop growth period, there may be complete loss of marketable yield.

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EXPERIMENTAL METHODS

A field experiment was conducted during *Kharif* season 2010 at Main Agricultural Research Station, University of Agricultural Sciences, Dharwad with the objective to study

Table A : Treatment details

Sr. No.	Treatments
1.	Oxyfluroften 23.5% EC (Goal) application before planting and second application at 30 days after transplanting
2.	Oxyflurofen 23.6 [^] EC application before planting + Quizalofop ethyl 5% EC application before planting and second application at 30 days after transplanting.
3.	Combined spray of Oxyflurofen 23.5% EC and Quizalofop ethyl 5% EC at the time of planting and second application of 30 days after transplanting.
4.	Pendimethalin 30% EC (Stomp) application before planting and second application at 30 days after transplanting.
5.	Pendimethalin 30% EC application before planting + and Quizalofop ethyl 5% EC application at 30 days after transplanting.
6.	Combined spray of Pendimethalin 30% EC + Quizalofop ethyl 5% EC at the time of planting and second application at 30 days after transplanting.
7.	DOGR Recommended practices (Oxyflurofen 23.5% EC application before planting + one hand weeding at 40-60 days after transplanting)
8.	Weedy check

the effect of herbicides on weed population, Plant height, yield and bulb weight in onion. The details of materials used and techniques employed during the course of investigation are presented here. The experimental field was having black soil with adequate organic matter. The field was laid out in Randomised Block Design having eight treatments with three replications (Table A). The onion seeds were sown in nursery for 5 weeks, after 5 weeks of sowing, the seedlings were transplanted in broad bed furrow (BBF) in the main field. Each treatment had the plot size 1.25 x 5 m. The onion seedlings were transplanted with spacing of 15 x 10 cm with fertilizer dose of 125:50:50 NPK kg/ ha and FYM 7.5 t/ha.

EXPERIMENTAL RESULTS AND ANALYSIS

The obtained from the present investigation discussion have been presented under following heads:

Weed population at 90 DAS:

At 90 DAS, monocot and dicot weed population differed significantly due to weed control treatments.

Among the monocot weed control treatments (T7) DOGR Recommended practices (Oxyflurofen 23.5% EC application before planting + one hand weeding at 40-60 days after transplanting) recorded the lowest weed population (49.33) where as weedy check recorded the highest weed population (128.00) (Table 2). Apart from DOGR recommended practices, (T₂) Oxyflurofen 23.6[^] EC application before planting + Quizalofop ethyl 5 per cent EC application before planting and second application at 30 days after transplanting also recorded lowest monocot weed population which was at par with (T₃). Combined spray of Oxyflurofen 23.5 per cent EC and Quizalofop ethyl 5 per cent EC at the time of planting and second application of 30 days after transplanting, (T₄) Pendimethalin 30 per cent EC (Stomp) application before planting and second application at 30 days after transplanting and (T₆) Combined spray of Pendimethalin 30 per cent EC + Quizalofop ethyl 5 per cent EC at the time of planting and second application at 30

days after transplanting. This is in conformity with the findings of Shellek and Sanok (1986).

Among the dicot weed control treatments DOGR Recommended practices (Oxyflurofen 23.5 % EC application before planting + one hand weeding at 40-60 days after transplanting) recorded the lowest weed population which was at par with (T₂) Oxyflurofen 23.6[^] EC application before planting + Quizalofop Ethyl 5 per cent EC application before planting and second application at 30 days after transplanting. These results are in conformity with the findings of Putnam and Riely (1980). Apart from DOGR recommended practice, treatment (T₃). Combined spray of Oxyflurofen 23.5 per cent EC and Quizalofop ethyl 5 per cent EC at the time of planting and second application of 30 days after transplanting also recorded lowest dicot weed population which was at par with (T₄) Pendimethalin 30 per cent EC (Stomp) application before planting and second application at 30 days after transplanting and (T₆) combined spray of Pendimethalin 30 per cent EC + Quizalofop ethyl 5 per cent EC at the time of planting and second application at 30 days after transplanting. Where as weedy check recorded the highest weed population. It was mainly due to uninterrupted growth of weeds which made best use of growth resources. Reduction in the total weed density in DOGR recommended practices was due to the effective control of weeds by hand weeding that at crop weed competition period. These results corroborate with the findings of Nadagouda (1995).

Effect of herbicides on fresh weight of weeds:

Effect of herbicides on fresh weight of weeds differed significantly due to weed control treatments.

Among the monocot weed control treatments (T₇) DOGR recommended practices (Oxyflurofen 23.5% EC application before planting + one hand weeding at 40-60 days after transplanting) recorded the lowest fresh weight of weeds (85.63 g) where as weedy check recorded the highest fresh weight of weeds (201.00 g) (Table 2). Apart from DOGR recommended practices, (T₂) Oxyflurofen 23.6[^] EC application before planting + quizalofop ethyl 5 per cent EC application before planting

Table 1 : Effect of herbicides on growth parameters of onion

Sr. No.	Treatments	Plant height (cm)			No. of leaves		
		30 DAP	60 DAP	90 DAP	30 DAP	60 DAP	90 DAP
1.	T ₁	21.08	30.53	45.80	4.92	9.13	11.08
2.	T ₂	21.15	32.07	47.97	4.93	9.93	12.17
3.	T ₃	21.50	31.73	45.60	5.20	9.92	11.89
4.	T ₄	20.79	30.63	44.37	4.60	9.80	11.78
5.	T ₅	20.34	30.20	44.80	4.57	9.23	11.76
6.	T ₆	21.34	30.67	45.45	4.97	9.87	11.81
7.	T ₇	20.11	32.27	48.27	4.93	10.37	12.47
8.	T ₈	16.40	25.57	38.35	4.23	7.27	9.09
	S.E. \pm	0.42	0.67	1.01	0.20	0.41	0.44
	C.D. (P=0.05)	1.29	2.03	3.06	0.62	1.23	1.35

and second application at 30 days after transplanting also recorded lowest fresh weight of weeds which was at par with (T₃) combined spray of Oxyflurofen 23.5 per cent EC and Quizalofop ethyl 5 per cent EC at the time of planting and second application of 30 days after transplanting and (T₆) combined spray of Pendimethalin 30 per cent EC + Quizalofop ethyl 5 per cent EC at the time of planting and second application at 30 days after transplanting.

Among the dicot weed control treatments DOGR recommended practices (Oxyflurofen 23.5% EC application before planting + one hand weeding at 40-60 days after transplanting) recorded the lowest fresh weight of weeds (10.21g) which was at par with (T₂) Oxyflurofen 23.6^ EC application before planting + Quizalofop ethyl 5 per cent EC application before planting and second application at 30 days after transplanting and (T₃) combined spray of Oxyflurofen 23.5 per cent EC and Quizalofop ethyl 5 per cent EC at the time of planting and second application of 30 days after transplanting. Where as weedy check recorded the highest fresh weight of weeds (111.53 g) (Table 2).

Effect of herbicides on dry weight of weeds

Effect of herbicides on dry weight of weeds differed significantly due to weed control treatments.

Among the monocot weed control treatments (T₇) DOGR recommended practices (Oxyflurofen 23.5% EC application before planting + one hand weeding at 40-60 days after transplanting) recorded the lowest dry weight of weeds, this could be attributed to control of weeds by hand weeding at crop weed competition period, which resulted in reduced dry matter production by weeds, which was at par with (T₂) Oxyflurofen 23.6^ EC application before planting + Quizalofop ethyl 5 per cent EC application before planting and second application at 30 days after transplanting and (T₃) combined spray of Oxyflurofen 23.5 per cent EC and Quizalofop ethyl 5 per cent EC at the time of planting and second application of 30 days after transplanting (Table 2). These results corroborate with the findings of Tiwari *et al.* (1998).

Among the dicot weed control treatments DOGR recommended practices (Oxyflurofen 23.5% EC application before planting + one hand weeding at 40-60 days after transplanting) recorded the lowest dry weight of weeds which

Table 2 : Effect of herbicides on weed population and weight of weeds (in sqm)

Sr. No.	Treatments	Population of weeds per sqm (90 DAT)		Fresh weight of weeds (g) (90 DAT)		Dry weight of weeds (g) (90 DAT)	
		Monocot	Dicot	Monocot	Dicot	Monocot	Dicot
1.	T ₁	109.33	8.00	191.54	60.00	101.00	18.28
2.	T ₂	62.67	3.00	117.00	12.14	52.00	5.23
3.	T ₃	72.67	3.67	130.67	15.00	64.67	6.81
4.	T ₄	78.67	4.72	156.33	35.32	76.67	11.44
5.	T ₅	82.67	5.33	171.25	42.67	94.00	12.53
6.	T ₆	76.00	4.10	141.00	30.33	75.67	10.11
7.	T ₇	49.33	2.33	85.63	10.21	49.00	4.05
8.	T ₈	128.00	11.33	201.00	111.53	110.67	35.55
	S.E. \pm	8.80	0.47	13.22	6.89	9.46	3.69
	C.D. (P=0.05)	26.70	1.43	40.09	20.90	28.69	11.20

Table 3 : Effect of herbicides on yield parameters of onion

Sr. No.	Treatments	Marketable yield (q/ha)						Total marketable yield (q/ha)	Total yield (q/ha)	Average bulb weight (g)
		A grade	A Grade (%)	B grade	B Grade (%)	C grade	C Grade (%)			
1.	T ₁	7.13	3.67	64.77	30.88	61.23	28.46	150.83	194.30	95.67
2.	T ₂	32.07	12.15	89.73	38.20	87.33	40.62	200.93	264.00	108.40
3.	T ₃	24.40	10.24	81.53	37.64	78.93	38.01	177.30	238.30	102.00
4.	T ₄	12.20	5.67	77.37	33.92	65.33	30.24	163.17	215.17	97.30
5.	T ₅	10.20	5.09	75.40	33.33	63.00	28.83	160.50	200.33	97.27
6.	T ₆	21.13	9.21	80.83	35.41	72.07	33.08	174.67	218.50	99.87
7.	T ₇	35.53	13.04	104.10	41.10	89.07	44.46	204.97	272.50	120.67
8.	T ₈	3.67	2.74	25.80	19.25	50.93	23.98	80.40	134.00	94.67
	S.E. ±	1.95		6.79		7.09		11.39	11.79	9.59
	C.D. (P=0.05)	5.92		20.58		21.51		34.56	35.78	29.10

was at par with (T₂) Oxyflurofen 23.6[^] EC application before planting + Quizalofop ethyl 5 per cent EC application before planting and second application at 30 days after transplanting and (T₃) combined spray of Oxyflurofen 23.5 per cent EC and Quizalofop ethyl 5 per cent EC at the time of planting and second application of 30 days after transplanting, (T₄) Pendimethalin 30 per cent EC (Stomp) application before planting and second application at 30 days after transplanting and (T₆) combined spray of Pendimethalin 30 per cent EC + Quizalofop ethyl 5 per cent EC at the time of planting and second application at 30 days after transplanting. Where as weedy check recorded the highest dry weight of weeds (Table 2). It was mainly due to higher and uninterrupted growth of weeds viz., grasses, sedges, broad leaved and total weed population which made best use of the growth resources. These results are in conformity with the findings of Tiwari *et al.* (1998).

Effect of herbicides on growth parameters:

The data on plant height and number of green leaves recorded at 30, 60 and at 90 DAS as influenced by weed control treatments.

Among the weed control treatments, at 30 DAS, treatment (T₃) combined spray of Oxyflurofen 23.5 per cent EC and Quizalofop ethyl 5 per cent EC at the time of planting and second application of 30 days after transplanting recorded significantly taller plant height (21.50 cm) and higher number of green leaves (Table 1). This is due to combined effect of herbicides at the initial time. The results presented are in conformity with that of Abada *et al.* (1982).

At 60 and 90 DAS taller plant height and higher number of green leaves was obtained in (T₇) DOGR recommended practices (Oxyflurofen 23.5% EC application before planting + one hand weeding at 40-60 days after transplanting which was at par with (T₂) Oxyflurofen 23.6[^] EC application before planting + Quizalofop ethyl 5 per cent EC application before planting and second application at 30 days after transplanting. Apart

from DOGR recommended practices and (T₃) combined spray of Oxyflurofen 23.5 per cent EC and Quizalofop ethyl 5 per cent EC at the time of planting and second application of 30 days after transplanting. Where as weedy check recorded the lowest plant height and lower number of green leaves. Taller plant height and higher number of green leaves was due to the effective management of weeds by herbicides and hand weeding at the critical crop weed competition period. The results are in conformity with that of Schlesselman (1982).

Effect of herbicides on yield parameters of onion:

Yield is the net result of various interactions viz., soil characters, weathers parameters, crop-weed competition, leaf area and various metabolic and biochemical interactions taking place during crop growth. The observations recorded on yield components viz., total marketable yield, total yield and average bulb weight (g) differed significantly due to weed control treatments (Table 3).

The total marketable yield was significantly influenced by different weed control treatments. The highest total marketable onion yield was obtained in (T₇) DOGR recommended practices (Oxyflurofen 23.5 per cent EC application before planting + one hand weeding at 40-60 days after transplanting), it was mainly due to the effective control of weeds by the herbicide and hand weeding at crop weed competition period, which was at par with (T₂) Oxyflurofen 23.6[^] EC application before planting + Quizalofop ethyl 5 per cent EC application before planting and second application at 30 days after transplanting. These results corroborate with the findings of Singh *et al.* (1997). Apart from DOGR recommended practices, treatment (T₃) combined spray of Oxyflurofen 23.5 per cent EC and quizalofop ethyl 5 per cent EC at the time of planting and second application of 30 days after transplanting recorded highest total marketable yield which was at par with (T₄) Pendimethalin 30 per cent EC (Stomp) application before planting and second application at 30 days after transplanting,

(T₅) Pendimethalin 30 per cent EC application fore planting + quizalofop ethyl 5 per cent EC application at 30 days after transplanting and (T₆) combined spray of Pendimethalin 30 per cent EC + Quizalofop ethyl 5 per cent EC at the time of planting and second application at 30 days after transplanting. This was due to the combined effect of herbicides on weeds resulted in better yield of onion. Where as weedy check recorded the lowest total marketable yield.

The total yield was significantly influenced by different weed control treatments. The highest total onion yield was obtained in (T₇) DOGR recommended practices (Oxyflurofen 23.5 per cent EC application before planting + one hand weeding at 40-60 days after transplanting) which was at par with (T₂) Oxyflurofen 23.6[^] EC application before planting + Quizalofop ethyl 5 per cent EC application before planting and second application at 30 days after transplanting. Apart from DOGR recommended practices, treatment (T₃) combined spray of Oxyflurofen 23.5 per cent EC and Quizalofop ehtyl 5 per cent EC at the time of planting and second application of 30 days after transplanting recorded highest total yield which was at par with (T₄) Pendimethalin 30 per cent EC (Stomp) application before planting and second application at 30 days after transplanting. Where as weedy check recorded the lowest total onion yield.

The average bulb weight was significantly influenced by different weed control treatments. The highest bulb weight was obtained in (T₇) DOGR recommended practices (Oxyflurofen 23.5 per cent EC application before planting + one hand weeding at 40-60 days after transplanting) it was mainly due to the effective control of weeds by the herbicide and hand weeding at crop weed competition period, which was at par with (T₂) Oxyflurofen 23.6[^] EC application before planting + Quizalofop ethyl 5 per cent EC application before planting and second application at 30 days after transplanting. Increase in bulb weight was due to the effective management of weeds by herbicides and hand weeding at the criticle crop

weed competition period. The results presented are in conformity with that of Nadagouda (1995) and Singh *et al.* (1997).

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