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Weed management studies in kharif onion (*Allium cepa* L.) on growth attributes

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Abstract

The present investigation entitled "Weed management studies in kharif Onion (*Allium cepa* L.)" was conducted at Horticulture Complex, Dept. of Horticulture, Maharajpur, Jawaharlal Nehru Krishi Vishwa vidyalaya, Jabalpur (M.P.) during the year 2016-17. The treatments consisted of Ten combination of different agro input management practices viz., Oxyflurofen 23.5% EC + one hand weeding at 40-60 DAT (T₁), Oxyflurofen 23.5% EC + one hand weeding at 30 DAT + Quizalofop Ethyl 5% EC at 60 DAT (T₂), Pendimethalin 30% EC + one hand weeding at 30 DAT + Quizalofop Ethyl 5% EC at 60 DAT (T₃), Black Plastic Mulch (T₄), Organic Mulch- 6 t/ha (T₅), Weedy check (T₆), Silver Plastic Mulch (T₇), Organic Mulch- 9 t/ha (T₈), Organic Mulch- 12 t/ha (T₉), Weed free check (T₁₀), Significantly the highest plant height were recorded 32.69 cm (T₄), 49.77 cm (T₁₀) and 54.07 cm (T₁₀) for different stages *i.e.* 30, 60 and 90 DAT. The minimum plant height were recorded 28.05 cm (T₆), 38.28 cm (T₆) and 43.92 cm (T₆) for different stages *i.e.* 30, 60 and 90 DAT. The maximum number of leaves per plant were recorded 5.00 (T₄ & T₁₀), 7.67 (T₁₀) and 9.00 (T₁₀) for different stages *i.e.* 30, 60 and 90 DAT, respectively. The minimum number of leaves per plant were recorded 4.00 (T₃, T₅, T₆, T₈ & T₉), 6.00 (T₅, T₈ & T₉) and 6.67 (T₆) for different stages *i.e.* 30, 60 and 90 DAT.

Keywords: oxyflurofen, quizalofop ethyl, pendimethalin and Onion

Introduction

Onion (*Allium cepa* L., 2n = 16) is one of the most important bulb crop grown all over the world. It belongs to the family Alliaceae and considered to be originated in Central Asia. It is an indispensable item in every kitchen used as salad, culinary purpose for flavoring as spices in pickles, sauce and vegetable. In India, it is being cultivated as annual crop for bulb production and as biennial crop for seed production. It is a naturally packaged vegetable consisting of fleshy, concentric scales which are enclosed in paper-like wrapping leaves, connected at the base by a flattened stem disc.

India ranks first in area and second in production of onion with about 19.9% share after China in the world. The average productivity of India is 16.3 MT/ha, which is low as compared to other onion producing countries of the world. It is cultivated in an area of 1320.13 thousand ha with a production of onion 20931.25 thousand MT out of which Maharashtra is the leading state and covers an area of 522 thousand ha with a production of 6529 thousand MT followed by Madhya Pradesh, Karnataka, Rajasthan and Gujarat. In Madhya Pradesh, it is grown in about 118 thousand ha with a production 2848 thousand MT. (NHRDF Database 2015-16).

The average productivity of India is 16.3 MT/ha, which is low as compared to other onion producing countries of the world. There are several factors which influence the production of onion. Standardization of agro techniques particularly nutrient management is one of the main constraints. Among the macro and micronutrients, nitrogen, phosphorus, potassium and sulphur are pre-requisite. Onion responded to nitrogen and sulphur positively in terms of yield and quality of bulbs (Nasreen *et al.*, 2007) [4].

Herbicides play an important role in weed management in onion. Early season weed competition significantly reduces onion bulb yield. Most weed seeds germinate over a long time and pre-emergence herbicides with their relatively short residual life, may not control weeds long enough to optimize onion yield. The post emergence herbicides may be needed along with other control measures. Chemical weed control is regarded to be better than hand weeding due to drudgery of involved in weeding and unavailability of labour at peak period of weed infestation. In this aspect, application of new and wide spectrum herbicide alone or in combination may give satisfactory weed control. In Madhya Pradesh, onion is adversely affected mostly by weeds. The weeds grow in all the places of onion fields. Dominant weed species associated with onion are *Cyperus rotundas*, *Cynodon dactylon*, *Dinebraretro flexa*,

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Digeraarvensis, *Boerhaviadiffusa*, *Parthenium hysterophorus*, *Chenopodium album*, *Medicago denticulate* and *Rumaxdentatus*.

Material and Methods

1. Plant height (cm)

Ten plant were randomly selected from each treatment in each replication and plant height was measured from ground level up to tip of longest leaf with the help of meter scale at 30, 60 and 90 days after transplanting.

2. Number of leaves

All the photosynthetically active green leaves of five selected and tagged plants were counted each treatment and replication. The number of leaves per plant was recorded at 30, 60 and 90 days after transplanting.

Results and Discussion

Growth Parameters

1. Plant height (cm)

The mean plant height under different treatments of herbicides is given in Table 4.16 and Figure.16. Plant height was recorded at 30, 60 and 90 days after transplanting. The analysis of variance is given in Appendix - V. It is explicit from the perusal of the Table 4.14 that this character responded significant among the different treatments.

At 30 days after transplanting, the significantly the maximum 33.37 and 32.69 cm plant height was recorded in the treatment T₁₀ (weed free check) and T₄ (black plastic mulch) respectively. While it was noted minimum 28.05 cm in the treatment T₆ (weedy check).

At 60 DAT, treatment T₁₀ (weed free check) and T₄ (black plastic mulch) were recorded significantly the maximum 49.77 and 45.83 cm plant height, respectively and which were at par with each other. While it was noted the minimum 38.28 cm in the treatment T₆ (weedy check).

At 90 days after transplanting, treatment T₁₀ (weed free check) was recorded significantly maximum 54.07 cm plant height followed by T₄ (black plastic mulch) (50.55 cm), T₇ (silver plastic mulch) (49.54 cm) as compared to other treatment. While it was noted minimum 43.92 cm in the treatment T₆ (weedy check).

Plant height is the one of the most important character of the plant growth. The maximum plant height was exhibited in weed free check plot and was superior over other treatments and being at par with the black plastic mulch treatment. All the treatments significantly increased the plant height over weedy check because it had reduced the weed population without causing injury to the crop. Results indicated that the increased plant growth would be due to effective weed control and reduction in competition stress. Similar findings were also reported by Anisuzzaman *et al.* (2009) [2], Job *et al.* (2016) [3].

Table 1: Plant height as affected by different treatments

Treatments	Treatments	Dose	Plant height (cm) at		
			30 DAT	60 DAT	90 DAT
T ₁	Oxyflurofen 23.5% EC + one hand weeding at 40-60 DAT	150g a.i./ha	31.54	44.84	48.27
T ₂	Oxyflurofen 23.5% EC + one hand weeding at 30 DAT + Quizalofop Ethyl 5% EC at 60 DAT	150g a.i./ha + 50g a.i./ha	32.03	45.40	48.42
T ₃	Pendimethalin 30% EC + one hand weeding at 30 DAT + Quizalofop Ethyl 5% EC at 60 DAT	750g a.i./ha + 50g a.i./ha	31.23	44.74	47.20
T ₄	Black plastic mulch	-	32.69	45.83	50.55
T ₅	Organic mulch- 6 t/ha	-	29.67	39.95	44.06
T ₆	Weedy check	-	28.05	38.28	43.92
T ₇	Silver plastic mulch	-	32.48	45.41	49.54
T ₈	Organic mulch- 9 t/ha	-	30.67	39.99	46.49
T ₉	Organic mulch- 12 t/ha	-	30.80	43.22	47.14
T ₁₀	Weed free check	-	33.37	49.77	54.07
	S.Em±	-	0.48	0.79	0.93
	C.D.5% level	-	1.42	2.35	2.77

2. Leaves per plant

The data on leaves per plant has been depicted in Table 4.17 and diagrammatically exhibited Fig. 17 ANOVA has also been presented in Appendix - V.

At 30 days after sowing, the significantly maximum 5.00, 5.00, 4.67 and 4.67 leaves per plant were recorded in the

treatment T₁₀ (Weed free check), T₄ (black plastic mulch), T₇ (silver plastic mulch) and T₂ (Oxyflurofen 23.5% EC + one hand weeding at 30 DAT + Quizalofop Ethyl 5% EC at 60 DAT) respectively and which were at par with each other. While it was noted minimum 4.00 leaves per plant in the treatment T₆ (weedy check).

Table 2: Number of leaves per plant as affected by different treatments

Treatments	Treatments details	Dose	Number of leaves per plant at		
			30 DAT	60 DAT	90 DAT
T ₁	Oxyflurofen 23.5% EC + one hand weeding at 40-60 DAT	150g a.i./ha	4.33	6.33	7.67
T ₂	Oxyflurofen 23.5% EC + one hand weeding at 30 DAT + Quizalofop Ethyl 5% EC at 60 DAT	150g a.i./ha + 50g a.i./ha	4.67	6.33	8.00
T ₃	Pendimethalin 30% EC + one hand weeding at 30 DAT + Quizalofop Ethyl 5% EC at 60 DAT	750g a.i./ha + 50g a.i./ha	4.00	6.33	7.67
T ₄	Black plastic mulch	-	5.00	7.33	8.00
T ₅	Organic mulch- 6 t/ha	-	4.00	6.00	7.00
T ₆	Weedy check	-	4.00	5.33	6.67
T ₇	Silver plastic mulch	-	4.67	6.67	8.00
T ₈	Organic mulch- 9 t/ha	-	4.00	6.00	7.00

T ₉	Organic mulch- 12 t/ha	-	4.00	6.00	7.67
T ₁₀	Weed free check	-	5.00	7.67	9.00
	S.Em±	-	0.22	0.23	0.20
	C.D.5% level	-	0.66	0.70	0.60

As regards to 60 DAS, treatment T₁₀ (weed free check) was recorded significantly maximum 7.67 leaves per plant, followed by T₄ (black plastic mulch) (7.33) and T₇ (silver plastic mulch) (6.67) as compared to other treatment. While it was noted minimum 5.66 leaves in the treatment T₆ (weedy check).

At 90 days after sowing, the significantly maximum 9.00 leaves per plant were recorded in the treatment T₁₀ (weed free check), while T₄ (black plastic mulch) (9.35), whereas T₇ (silver plastic mulch) and T₂ (Oxyflurofen 23.5% EC + one hand weeding at 30 DAT + Quizalofop Ethyl 5% EC at 60 DAT) contains same number that is 8.00 leaves per plant. It was noted minimum 6.67 leaves per plant in the treatment T₆ (weedy check).

The number of leaves per plant increased significantly in the different treatments of herbicides, mulching and hand weeding with advance in growth period. The maximum number of leaves per plant was recorded in the weed free check treatment was significantly superior over other treatments but it was at par with plastic mulch treatments followed by treatment T₂ (Oxyflurofen 23.5% EC + one hand weeding at 30 DAT + Quizalofop Ethyl 5% EC at 60 DAT). However, the lowest number of leaves per plant was noted in weedy check plot. The increasing number of leaves per plant would be due to the effective weed control and reduction in compositional stress. The findings are in close proximation to that of Anisuzzaman *et al.* (2009) [2], Rajabalariani *et al.* (2012) [5], Job *et al.* (2016) [3].

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