

Effect of herbicides on weed intensity, weed control efficiency and yield in *Kharif* onion cv. Phule Samarth

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Onion is one of the important vegetable crop. The onion bulbs has more demand in domestic market as well as in export market. In India, the onion was grown on an area of 10.64 lak ha with production of 151.18 lak tons with average productivity of 14.2 t/ha. The major onion producing States are Maharashtra, Karnataka, Gujarat, Bihar, Madhya Pradesh, Andhra Pradesh, Rajasthan and Haryana. Maharashtra covers an area of 4.15 lakh ha with an annual production of 4905.0 thousand metric tons. With average productivity of 11.8 t/ha (Anonymous, 2011), *kharif* onion which is 20% of total onion production in Maharashtra, plays crucial role in filling supply gap from October to February. The productivity of *kharif* onion is very low as compared to *rabi* and summer seasons, because it is affected by rain diseases, pest and weeds. Weeds apart from being a nuisance, compete with crop plants for available soil moisture, nutrients, space and light. This is generally reflected in a drastic reduction in yield and quality of the final produce. Further more, they serve as alternate host for several diseases and pests. Timely hand weeding becomes impracticable during the *kharif* season due to frequent rains. Also the hand weeding is tedious and costly in closely spaced crops like onion which may disturb the shallow root system of onion. On the contrary, chemical weed control was found to be a cheaper and less laborious option. The integrated methods of weed control offer the possibilities of increasing crop production under weed free environment by keeping the crop more healthy by suppressing the weeds. Hence, this is imperative need to screen out suitable herbicides along with their doses for weed control in combination with manual weeding/soil stirring in onion. Keeping the above mentioned facts, the present investigation was undertaken to evaluate different

herbicides and their doses for controlling weeds in *kharif* onion.

An experiment was conducted at All India Coordinated Research Project on Vegetable Crops, Mahatma Phule Krishi Vidyapeeth, Rahuri (Maharashtra) during the year 2008 in *kharif* season with plot size of 2.25x2.25 m. and 15x10 cm. spacing in randomized block design with three replications. The seeds of onion cultivar Phule Samarth was sown for nursery raising on 23/06/2008 and the transplanting was done on 23/08/2008 in flat beds. The three herbicides viz., Pendimethalin 38.7% CS @ 1.25, 1.50 and 1.75 l/ha, Pendimethalin 30% EC @ 2.5 l/ha and Oxyflourfen @ 1.0 and 0.625 l/ha were applied to the experimental plot immediately after transplanting followed by irrigation. The unsprayed unweeded control plot was also kept as control. Eight week old healthy and uniform seedlings were used for transplanting. Upper one third portion of seedlings were removed at the time of transplanting to reduce the transpiration losses and better establishment of crop. All packages of practices to raise good crop was done in the experiment and weed control treatments were applied. Weed population counts were taken from an area of one sq.m. quadrant from centre of a plot of each treatment and in each replication, and number of weeds per quadrant was worked out and Weed control efficiency (WCE) was calculated based on following formula.

$$\% \text{ WCE} = \frac{\text{Weed control in untreated plot} - \text{weed control in treated plot}}{\text{Weed control in untreated plot}} \times 100$$

The weed dry matter production was recorded after counting of weed and removing all weeds from quadrant sun dried for few days and then weight of each dried sample was recorded (g/plot). Different weed flora were identified and recorded. The observation on weed population, weed intensity, % WCE and yield observation

were recorded. The data obtained was subjected to statistical analysis by using Panse and Sukhatme (1985).

The data recorded on total grasses weed population /m² on grasses viz., *Echinochola* spp, *Dinebra arabica*, *Brachiaria mutica*, *Eragratis minor*, etc. and % weed control efficiency was depicted in Table 1. The maximum number of grasses mentioned above were recorded in unweeded plots i.e. 41.3, 48.4 and 54.6 for 20, 40 and 60 days after application, respectively on the contrary, the minimum number was encountered in the treatment Pendimethalin 38.7% CS @ 1.75 l/ha i.e. 5.2, 5.2 and 6.0 for 20, 40 and 60 days after application. The maximum weed control efficiency (%) in grasses was recorded in treatment Pendimethalin 38.7% CS @ 1.75 l/ha viz., 87.41, 89.26 and 89.01 for 20, 40 and 60 days after application of herbicide, respectively which was followed by Oxyflourfen 23.5% EC @ 1.0 l/ha viz., 80.63, 81.82 and 83.52 for 20, 40

and 60 days after application of herbicide. All kinds of grasses was observed in weedy check treatment. Similar results were also reported in onion by Vashi *et al.* (2011).

The data on total broad leaf weeds population /m² broad leaf weeds viz. *Amaranthus* spp, *Portulaca oleracea*, *Parthenium hysterophorus*, *Physalis minima*, etc. and % weed control efficiency for broad leaf weeds was depicted in Table 2. The weed population was statistically significant for 20, 40 and 60 days after application of herbicides. The maximum number of broad leaf weeds was recorded in unweeded check i.e. 24.2, 25.2 and 27.4 for 20, 40 and 60 days after application of herbicides, respectively while it was minimum in the treatment oxyflourfen 23.5% EC @ 1.0 l/ha i.e. 3.0, 3.6 and 4.2 after 20, 40 and 60 days after application of herbicide followed by the treatment Pendimethalin 38.7% CS @ 1.75 l/ha i.e. 5.2, 5.8 and

Table 1: Effect of different herbicides on total grasses weed population and weed control efficiency in *kharif* onion.

T. No.	Treatment	Weed population /m ²			% Weed Control Efficiency (Grasses)		
		20 days after application	40 days after application	60 days after application	20 days after application	40 days after application	60 days after application
T ₁	Pendimethalin 38.7% CS @ 1.25 l/ha	18.6	19.5	21.2	54.96	59.71	61.17
T ₂	Pendimethalin 38.7% CS @ 1.50 l/ha	8.2	8.8	9.4	80.15	81.82	82.78
T ₃	Pendimethalin 38.7% CS @ 1.75 l/ha	5.2	5.2	6.0	87.41	89.26	89.01
T ₄	Pendimethalin 30% EC @ 2.5 l/ha	8.6	11.8	11.8	79.18	75.62	78.39
T ₅	Oxyflourfen 23.5% EC @ 1.0 l/ha	8.0	8.8	9.0	80.63	81.82	83.52
T ₆	Oxyflourfen 23.5% EC @ 0.625 l/ha	9.6	11.2	13.4	76.86	76.86	75.46
T ₇	Untreated check	41.3	48.4	54.6	-	-	-
	S. E. ±	0.89	0.95	0.80	-	-	-
	C.D. at 5%	2.7	3.0	2.5	-	-	-

Table 2: Effect of different herbicides on total broad leaf weeds population and weed control efficiency in *kharif* onion.

T. No.	Treatment	Weed population /m ²			% Weed Control Efficiency (broad leaf weeds)		
		20 days after application	40 days after application	60 days after application	20 days after application	40 days after application	60 days after application
T ₁	Pendimethalin 38.7% CS @ 1.25 l/ha	8.2	8.6	9.2	66.12	65.87	66.42
T ₂	Pendimethalin 38.7% CS @ 1.50 l/ha	7.4	8.0	8.2	69.42	68.25	70.07
T ₃	Pendimethalin 38.7% CS @ 1.75 l/ha	5.2	5.8	6.4	78.51	76.98	76.64
T ₄	Pendimethalin 30% EC @ 2.5 l/ha	7.8	8.6	9.0	67.77	65.81	67.15
T ₅	Oxyflourfen 23.5% EC @ 1.0 l/ha	3.0	3.6	4.2	87.60	85.71	84.67
T ₆	Oxyflourfen 23.5% EC @ 0.625 l/ha	6.8	7.2	7.4	71.90	71.43	72.99
T ₇	Untreated check	24.2	25.2	27.4	-	-	-
	S. E. ±	0.90	0.67	0.54	-	-	-
	C.D. at 5%	2.8	2.10	1.60	-	-	-

6.4 after 20, 40 and 60 days after application of herbicide. The maximum weed control efficiency (%) i.e. 87.60, 85.71 and 84.67 for 20, 40 and 60 days after application was recorded by Oxyflourfen 23.5% EC @ 1.0 l/ha followed by the treatment Pendimethalin 38.7% CS @ 1.75 l/ha viz., 78.51, 76.98 and 76.64% for 20, 40 and 60 days after application of herbicide. Similar results were also reported by Patel *et al.* (1983) and Kumar *et al.* (1992).

The weed dry matter (g/plot) and yield (kg/plot) and yield (q/ha) was recorded in Table 3. The yield data was statistically significant as influenced by different herbicide application in *kharif* onion cv. Phule Samarth. The maximum weed dry matter (g/plot) was recorded in untreated check (715.0) while it is minimum in Pendimethalin 38.7% CS @ 1.75 l/ha (12.3) followed by Oxyflourfen 23.5% EC @ 1.0 l/ha (14.2). It is suggesting that the herbicides is more effective in controlling the weeds in *kharif* onion. The highest yield was observed in treatment Pendimethalin 38.7% CS @ 1.75 l/ha (248.22 q/ha) followed by Oxyflourefen 23.5% EC @ 0.625 l/ha (239.6 q/ha) as compared to untreated check (107.32 q/ha). From the above findings, it is clear that the herbicides viz., Pendimethalin and Oxyflourfen was found effective in controlling the weed population of grasses and broad leaf weeds in onion and thereby increasing the yields as compared to untreated check in *kharif* onion. Similar results were also reported

Table 3 : Effect of different herbicides on Weed Dry Matter (g/plot) and Yield (q/ha) in *kharif* onion.

T. No.	Treatment	Weed Dry Matter (g)/ Plot	Yield kg/plot	Yield (q/ha)
T ₁	Pendimethalin 38.7% CS @ 1.25 l/ha	22.5	11.56	228.34
T ₂	Pendimethalin 38.7% CS @ 1.50 l/ha	16.4	12.33	243.62
T ₃	Pendimethalin 38.7% CS @ 1.75 l/ha	12.3	12.56	248.22
T ₄	Pendimethalin 30% EC @ 2.5 l/ha	19.8	10.35	204.44
T ₅	Oxyflourfen 23.5% EC @ 1.0 l/ha	14.2	12.13	213.33
T ₆	Oxyflourfen 23.5% EC @ 0.625 l/ha	15.8	10.80	239.60
T ₇	Untreated check	715.0	5.43	107.32
	S. E. \pm	-	0.70	13.82
	C.D. at 5%	-	2.16	42.66

by Patel *et al.* (1983), Kumar *et al.* (1992) and Vashi *et al.* (2011). Based on the results on weed population, percent weed control efficiency and onion bulb yield it can be concluded that Pendimethalin 38.7% CS @ 1.75 l/ha and 1.50 l/ha and Oxyflourfen 23.5% EC @ 1.0 l/ha and 0.625 l/ha were effective in controlling the weeds in *kharif* onion.

Onion (*Allium cepa* L.) is one of the important vegetable crop in India and worldwide. It has more demand in domestic market as well as in export market. Weeds apart from being a nuisance, compete with crop plant for available soil moisture, nutrients, space and light. This is generally reflected in a drastic reduction in yield and also serve as alternate hosts for several diseases and pests. Timely hand weeding becomes impracticable during *Kharif* season due to frequent rains. Use of herbicides to control weeds was found to be a cheaper and less laborious method. To control weeds in *Kharif* onion, the different herbicides and their doses, a study was undertaken at AICRP on Vegetable Crops, MPKV, Rahuri during *Kharif* season of 2008. It was found that the maximum weed control efficiency in grasses (89.01%) was noticed by Pendimethalin 38.7% CS @ 1.75 l/ha followed by Oxyflourefen 23.5% EC @ 1.0 l/ha (83.52%). The maximum weed control efficiency in broad leaf weeds was recorded in treatment Oxyflourfen 23.5% EC @ 1.0 l/ha (84.67%) followed by Pendimethalin 38.7% CS @ 1.75 l/ha (76.64%). Hence, it is concluded that the herbicides Pendimethalin 38.7% CS @ 1.75 l/ha and Oxyflourfen 23.5% EC @ 1.0 l/ha was found effective in controlling weeds in *Kharif* onion which ultimately increase the yield in onion.

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