Research Paper :

Study on different weed flora in physical and chemical methods of weed control in onion

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SUMMARY

A field experiment was carried out during *Rabi* season of 2001-2002 at the Instructional Farm, ASPEE College of Horticulture and Forestry, Gujarat Agricultural University, Navsari Campus, Navsari. The treatments comprising of two spacing *viz.*, 10 x10 cm and 15 x 10 cm and ten weed control treatments *viz.*, T_1-Pendimethalin @ 1.00 kg a.i. ha^{-1} (pre-emergence), T_2- Pendimethalin @ 1.00 kg a.i. ha^{-1} (post-emergence at 20 DATP), T_3-Alachlor @ 1.00 kg a.i. ha^{-1} (pre-emergence), T_4-Alachlor @ 1.00 kg a.i. ha^{-1} (post-emergence at 20 DATP), T_5-Oxyfluorfen @ 0.20 kg a.i. ha^{-1} (pre-emergence), T_6-Oxyfluorfen @ 0.10 kg a.i. ha^{-1} (post-emergence at 20 DATP), T_7-One hand weeding at 20 days after transplanting, T_8-Two hand weeding at 20 and 40 days after transplanting, T_9-Two hand weeding at 20 and 40 days after transplanting + Soil stirring and T_{10}-Unweeded control. All 20 treatment combinations were arranged in Factorial Randomized Block Design (FRBD) with three replication. The monocot weeds *viz.*, C*ynadon dactylon*, *Echinoclua cros-galli*, *Sorghum halpense* L., *Echinocola colonum*, *Digitaria obsendens* and dicot weeds *viz.*, *Phyllanthus maderaspatien*, *Ephorbia hirta*, *Amaranthus viridis*, *Digera arvensis*, *Trianthema portulacastrum*, *Convolvulus arvensis*, *Physalis minima* and sedges *viz.*, *Cyprus rotundus* were the major weed flora of the experimental field and different herbicides applied as pre-emergence or post-emergence influenced significantly the population of these weeds.

Key words :
Onion, Weed flora, Weedicides

Onion (*Allium cepa* L.) is an important bulbous vegetable crop grown in India from the ancient times. The crop is grown for green vegetable as well as mature bulbs. It is popular *salad* crop and also widely used as a cooked vegetable in soups, stews and casseroles as flavouring in many dishes. The outstanding characteristics of onion are the pungency which is due to volatile oil known as "Allyl-propyl-disulphides". Because of its importance in cookery, onion is called "queen of the kitchen" by Germans. Onion contains 87.5 per cent water and provides energy to the extent of 49 calories, proteins 1.4 g, calcium 32 g, vitamin A 20 I.U., riboflavin 0.12 mg, niacin 0.1 mg, albuminoides 1.2 mg and ash 0.4 mg per 100 g of fresh edible portion (Singh, 1989).

The growth and yield of any cultivated crop are mainly influenced by genetical and cultural or management factors. The first factor deals with various plant breeding techniques for the improvement in crop varieties. The second factor, deals with the supply of adequate nutrition, irrigation, cultivation, plant population, plant protection and weed control etc. These factors have been exploited by various research workers with varied success. However, efforts are still continued in these directions to gain further higher profitable yields.

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, competing for nutrients and sunlight. Hence, there is imperative need to screen out suitable herbicides for weed control along with manual weeding/soil stiring in onion bulb crop under different spacings. Keeping abreast with the above mentioned facts, the present investigation was under taken to study density of weed flora in different treatments in onion.

MATERIALS AND METHODS

An experiment was conducted in the Instructional Farm, ASPEE College of Horticulture and Forestry, Gujarat Agricultural University, Navsari during *Rabi* season of 2001-2002. The experimental field was fairly leveled and uniform. The soils of Navsari campus are heavy deep black, moderately drained, clay in nature and rich in organic matter and potassium, having good water holding

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capacity. The soil cracks heavily on drying after being wet.

Other details and lay out :

- No. of treatments: 20
- Spacing : S_1: 10 x 10 cm S_2 : 15 x 10 cm
- Experimental design : Factorial Randomized Block Design
- Replication : Three
- Plot size : Gross : 3.0m x 1.8m
  Net : 2.4m x 1.2m
- Total no. of plots : 60
- Variety : Local red

Details of weed control treatments :

T_1 = Pendimethalin 30 EC @ 1.00 kg a.i. ha^{-1} (pre-emergence)

T_2 = Pendimethalin 30 EC @ 1.00 kg a.i. ha^{-1} (post-emergence at 20 DATP)

T_3 = Alachlor 30 EC @ 1.00 kg a.i. ha^{-1} (pre-emergence)

T_4 = Alachlor 30 EC @ 1.00 kg a.i. ha^{-1} (post-emergence at 20 DATP)

T_5 = Oxyfluorfen 23.5 EC @ 0.20 kg a.i. ha^{-1} (pre-emergence)

T_6 = Oxyfluorfen 23.5 EC @ 0.10 kg a.i. ha^{-1} (post-emergence at 20 DATP)

T_7 = One hand weeding at 20 days after transplanting

T_8 = Two hand weeding at 20 and 40 days after transplanting

T_9 = Two hand weeding at 20 and 40 days after transplanting + soil stiring

T_{10}= Unweeded control

Six week old healthy uniform seedlings were used for transplanting. Transplanting was done in wet soil at 10 x 10 cm and 15 x 10 cm spacing as per treatment. Upper one third portion seedlings were removed at the time of transplanting to reduce the transpiration and better establishment of crop. Well decomposed farm yard manure was applied uniformly and incorporated into the soil at the time of ploughing to all the experimental plots at the rate of 25 t/ha. Fertilizer were applied @ 75 kg N, 50 kg P_2O_5 and 75 kg K_2O ha^{-1} in the form of urea, diammonium phosphate and murate of potash, respectively. A full dose of phosphorus and potash and half dose of nitrogen were applied uniformly to individual plots after transplanting. Remaining half quantity of nitrogen was top dressed at 30 days after transplanting (DATP). Weed population counts were taken from an area of one square metre from the net plot of each treatment at 30, 60, 90 DATP and at harvest. Fresh weeds were collected from one square metre area in each experimental plot at 60 DATP

Table 1: Effect of spacing and weed control treatments on weed population at 90 DATP

Treatments	Weed population (m^{-2}) ($\sqrt{x+1}$ transformed values)		
	Monocot	Dicot	Sedges
Spacing			
S_1 (10 x 10 cm)	4.21 (16.72)	4.08 (15.64)	5.03 (24.30)
S_2 (15 x 10 cm)	5.67 (31.14)	5.52 (29.47)	6.56 (42.03)
S.E $\pm$	0.73	0.53	0.56
C.D. (P=0.05)	0.20	0.15	0.16
Weed control treatments			
T_1 = Pendimethalin @ 1.00 kg ha^{-1} Pre-emergence	4.49 (19.16)	3.97 (14.76)	4.94 (23.40)
T_2 = Pendimethalin @ 1.00 kg ha^{-1} Post-emergence	4.99 (23.90)	4.70 (21.09)	5.75 (32.06)
T_3 = Alachlor @ 1.00 kg ha^{-1} Pre-emergence	4.91 (23.10)	4.64 (20.52)	5.81 (32.75)
T_4 = Alachlor @ 1.00 kg ha^{-1} Post-emergence	5.04 (24.40)	5.15 (25.52)	6.28 (38.43)
T_5 = Oxyflluorfen @ 0.20 kg ha^{-1} Pre-emergence	4.87 (22.71)	4.64 (20.52)	5.65 (30.92)
T_6 = Oxyflluorfen @ 0.10 kg ha^{-1} Post-emergence	5.16 (25.62)	5.48 (29.03)	5.92 (34.04)
T_7 = One hand weeding at 20 DATP	4.73 (21.37)	4.60 (20.16)	5.61 (30.47)
T_8 = Two hand weeding at 20 and 40 DATP	4.82 (22.23)	4.81 (22.13)	5.71 (31.60)
T_9 = Two hand weeding at 20 and 40 DATP + Soil stirring	4.56 (19.79)	4.15 (16.22)	5.26 (26.66)
T_{10} = Unweeded control	5.86 (33.33)	5.87 (33.45)	7.04 (48.56)
S.E $\pm$	0.16	0.12	0.13
C.D. (P=0.05)	0.46	0.34	0.36
C.V. %	7.87	6.97	5.68
Interaction – S x WCT	Sig.	Sig.	Sig.

S = Spacing WCT = Weed control treatment DATP = Days After Transplanting Sig. - Significance
(Figures in parenthesis refers to actual weed population)

Table 2 : Effect of spacing and weed control treatments on weed population at harvest

Treatment	Weed population (m^{-2}) ($\sqrt{x+1}$ transformed values)		
	Monocot	Dicot	Sedges
Spacing			
S_1 (10 x 10 cm)	3.45 (10.90)	4.12 (15.97)	3.35 (10.22)
S_2 (15 x 10 cm)	4.69 (20.99)	5.80 (32.64)	4.74 (21.46)
S.E $\pm$	0.10	0.23	0.7
C.D. (p=0.05)	0.29	0.33	0.17
Weed control treatments			
T_1 = Pendimethalin @ 1.00 kg ha^{-1} Pre-emergence	3.73 (12.91)	4.15 (16.22)	3.67 (12.46)
T_2 = Pendimethalin @ 1.00 kg ha^{-1} Post-emergence	4.01 (15.08)	5.09 (24.90)	3.81 (13.51)
T_3 = Alachlor @ 1.00 kg ha^{-1} Pre-emergence	3.96 (14.68)	4.96 (23.60)	3.87 (13.97)
T_4 = Alachlor @ 1.00 kg ha^{-1} Post-emergence	4.24 (16.97)	5.31 (27.19)	4.46 (18.89)
T_5 = Oxyfllluorfen @ 0.20 kg ha^{-1} Pre-emergence	3.88 (14.05)	4.85 (22.52)	4.08 (15.08)
T_6 = Oxyfllluorfen @ 0.10 kg ha^{-1} Post-emergence	4.53 (19.52)	5.37 (27.83)	4.45 (18.80)
T_7 = One hand weeding at 20 DATP	4.20 (16.64)	4.92 (23.20)	3.98 (14.84)
T_8 = Two hand weeding at 20 and 40 DATP	3.92 (14.36)	4.73 (21.37)	3.86 (13.89)
T_9 = Two hand weeding at 20 and 40 DATP + Soil stirring	3.53 (11.46)	4.56 (19.79)	3.55 (11.60)
T_{10} = Unweeded control	4.70 (21.09)	5.67 (31.14)	5.03 (24.30)
S.E $\pm$	0.10	0.83	0.13
C.D. (p=0.05)	0.29	0.23	0.38
C.V. %	6.12	7.05	8.11
Interaction – S x WCT	Sig.	Sig.	Sig.

S = Spacing WCT = Weed control treatment DATP = Days After Transplanting
(Figures in parenthesis refers to actual weed population) Sig. - Significance

and at harvest. Weeds were sun dried for about 9 to 10 days and dry weight was recorded. Different weed flora were identified and recorded.

RESULTS AND DISCUSSION

Weed population of monocot, dicot and sedges at all stages *viz.*, 30, 60, 90 days after transplanting and at harvest were found significantly minimum in closer spacing of 10 x 10 cm. S_2T_1 interaction was also found to be significant for monocot, dicot and sedges weeds (Table 1).

The monocot weeds *viz.*, C*ynadon dactylon* (L) Pers., *Echinoclua cros-galli*, *Sorghum halpense* L., *Echinoclua colonum* Link, *Digitaria obsendens* Scop and dicot weeds *viz.*, *Phyllanthus maderaspatien* sis, *Ephorbia hirta* L. *Amaranthus viridis* L., *Digera arvensis* Fork., *Trianthema portulacastrum* L., *Convolvulus arvensis* L., *Physalis minima* L. and sedge *viz.*, *Cyprus rotundus* L. were the major weed flora of the experimental field and different herbicides applied as pre-emergence or post-emergence influenced significantly the population of these weeds (Table 2). Similar results were also reported by Patel *et al*. (1983) and Kumar *et al*. (1992).

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