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Integrated Weed Management Practices on Growth and Floral Parameters in Tuberose

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A B S T R A C T

A field investigation entitled "integrated weed management practices on growth and floral parameters in tuberose" was carried out in farmers field Chinnapudur, Dharmapuri (dit) during 2017-2018. The investigation was carried out to study the effect of pre and post emergence herbicides and their combination with hand weeding. The result of present investigation revealed that pre-emergence application of pendimethalin at 3 DAS *fb* hand hoeing + pendimethalin @ 1.5 kg ha^{-1} on 30, 90, 150, 210 DAP significantly reduced the weed population and recorded the good vegetative growth and floral parameters. Control plot caused the reduced growth and floral parameters.

Introduction

Flowers have been grown throughout the India for the various purpose. It plays important role in our heritage and culture ever since the ancient period. It is used for various purposes like garland making, workshop, interior decoration, cut flower making and used in various social functions. Floriculture is the art of growing the flower crops. Now a days floriculture industries fetches the higher income to the farmers. Tuberose (*Polianthes tuberosa* L.) is the important commercial flower crops is native of Mexico and belongs to the family Amaryllidaceae. Tuberose occupies the important place in the floriculture industry. It has a large economic potential in essential oil and cut flower industry. The

flowers emit a delightful fragrance are the source of tuberose oil. Its flower quality, spike production, fragrance, keeping quality and bulb production is severely affected by presence of weed throughout the growing period. Herbicides are the alternate way of weed control in flower cultivation. Rapid growth of weeds during the initial stage leads to the weed competition. Pre-emergence herbicide offers the alternate option to control weeds during the initial growth stage. The choice of post emergence herbicides is limited in tuberose. Therefore suitable method should be followed to control the weeds. Weeds could be controlled by hand weeding. However, hand weeding is laborious, time consuming, costly and tedious. Under these conditions, use of herbicides offers an alternative for possible effective control of weeds. Findings related to weed control in tuberose by the application of herbicides under Indian conditions is very less. Therefore, field experiment was conducted to study the integrated weed management practices on growth and floral parameters in tuberose.

Materials and Methods

A Field experiment was carried out during *rabi* seasons 2017-2018 at farmers field, Chinnapudur, Dharmapuri (dit) (12˚20'N latitude and 78˚18'E longitude) respectively to study the integrated weed management practices on growth and floral parameters in tuberose. The experiment was laid out in randomized block design and replicated thrice. The treatments comprised of ten different weed management practices *viz*., T_1- Pendimethalin @ 1.0 kg ha^{-1} on 3 DAP *fb* Paraquat 1.0 kg ha^{-1} on 30 and 150 DAP + quizalofop-ethyl 50g ha^{-1} on 90 and 210 DAP, T_2 - Pendimethalin @ 1.0 kg ha^{-1} on 3 DAP *fb* hand hoeing + pendimethalin @ 1.5 kg ha^{-1} on 30, 90,150, 210 DAP, T_3 - Pendimethalin @ 1.0 kg ha^{-1} on 3 DAP *fb* hand hoeing + alachlor @ 1.5 kg ha^{-1} on 30 and 150 DAP *fb* hand hoeing + Pendimethalin @1.5 kg ha^{-1} on 90 and 210 DAP. T_4 -Pendimethalin @ 1.0 kg ha^{-1} on 3 DAP *fb* hand hoeing + pendimethalin @ 1.5 kg ha^{-1} on 30 DAP *fb* Paraquat 1.0 kg ha^{-1} 120 DAP *fb* quizalofop-ethyl 50g ha^{-1} on 210 DAP, T_5 - Pendimethalin @ 1.0 kg ha^{-1} on 3 DAP *fb* hand hoeing + pendimethalin @ 1.5 kg ha^{-1} on 30, 120, 210 DAP, T_6 - Pendimethalin @ 1.0 kg ha^{-1} on 3 DAP *fb* Hand hoeing + pendimethalin @ 1.5 kg ha^{-1} on 30 DAP *fb* hand hoeing + alachlor @ 1.5 kg ha^{-1} on 120 DAP *fb* hand hoeing + pendimethalin @1.5 kg ha^{-1} on 210 DAP, T_7 - Atrazine @ 1 kg ha^{-1} on 3 DAP, T_8- Hand weeding at 30,90, 150, and 210 DAP, T_9 - Weed free check, T_{10} - Control. The soil type of the experimental field is sandy clay loam in texture, neutral in pH 7.12, low Ec (0.44 dSm^{-1}), low organic carbon (0.28 per cent) medium in available N (233.26) and in available P (14.80) and K content (290.52). Need based plant protection measures were given as per the crop protection guide. The growth attributes were recorded from five selected plants in each plot. Observations on weeds were recorded with the help of a quadrate (0.5 m x 0.5 m) placed randomly at two places (outside the net plot area) in each treatment. The data on weeds were subjected to square root transformation ("X+2) to normalize their distribution.

Results and Discussion

Weed flora

Broad leaved weeds and Sedges and were the predominant weeds observed throughout the crop growth period. The weed flora consists of two species of grasses, one species of sedges and six species of broad leaved weeds. The major grass weeds found in the experimental field were *Dactyloctenium aegyptium, Cynodon dactylon*. In sedges *Cyperus rotundus* is the key sedge weeds in the experimental trial.

Table.1 Effect of weed control treatments on total weed density and total weed dry weight (Kg ha^{-1}) during 2017-2018

T. No	Treatments	Total weed density (No m^{-2})	Total weed dry weight (kg ha^{-1})
T_1	Pendimethalin at 1.0 kg ha^{-1} on 3 DAP *fb* Paraquat at 1.0 kg ha^{-1} on 30 and 150 DAP + quizalofop-ethyl 50g ha^{-1} on 90 and 210 DAP	64.47 (4.60)	440.38 (12.06)
T_2	Pendimethalin at 1.0 kg ha^{-1} on 3 DAP *fb* hand hoeing + pendimethalin at 1.5 kg ha^{-1} on 30, 90,150, 210 DAP.	34.00 (3.43)	242.58 (9.02)
T_3	Pendimethalin at 1.0 kg ha^{-1} on 3 DAP *fb* hand hoeing + alachlor at 1.5 kg ha^{-1} on 30 and 150 DAP *fb* hand hoeing + Pendimethalin at 1.5 kg ha^{-1} on 90 and 210 DAP.	39.07 (3.65)	261.22 (9.35)
T_4	Pendimethalin at 1.0 kg ha^{-1} on 3 DAP *fb* hand hoeing + pendimethalin at 1.5 kg ha^{-1} on 30 DAP *fb* Paraquat at 1.0 kg ha^{-1} on 120 DAP *fb* quizalofop-ethyl at 50g ha^{-1} on 210 DAP.	62.04 (4.52)	447.34 (12.15)
T_5	Pendimethalin at 1.0 kg ha^{-1} on 3 DAP *fb* hand hoeing + pendimethalin at 1.5 kg ha^{-1} on 30, 120, 210 DAP.	53.59 (4.24)	314.51 (10.23)
T_6	Pendimethalin at 1.0 kg ha^{-1} on 3 DAP *fb* hand hoeing + Pendimethalin at 1.5 kg ha^{-1} on 30 DAP *fb* hand hoeing + Alachlor at 1.5 kg ha^{-1} on 120 DAP *fb* hand hoeing + Pendimethalin at 1.5 kg ha^{-1} on 210 DAP.	59.00 (4.45)	353.74 (10.82)
T_7	Atrazine at 1 kg ha^{-1} on 3 DAP.	81.07 (5.24)	452.47 (12.25)
T_8	Hand weeding on 30,90,150 and 210 DAP	58.24 (4.43)	295.11 (9.93)
T_9	Weed free check	0.0 (0.71)	0.0 (0.71)
T_{10}	Unweeded check	242.57 (8.98)	1103.54 (19.02)
	SEd	0.45	0.93
	CD(P= 0.05)	0.93	1.94

Data were subjected to $\sqrt{(X + 0.5)}$ transformation. Figures in parenthesis are means of transformed value

Table.2 Effect of weed control treatments on weed control efficiency during 2017-2018

T. No	Treatments	Weed control efficiency (%)			
		30DAP	90DAP	150 DAP	210DAP
T_1	Pendimethalin at 1.0 kg ha^{-1} on 3 DAP *fb* Paraquat at 1.0 kg ha^{-1} on 30 and 150 DAP + quizalofop-ethyl 50g ha^{-1} on 90 and 210 DAP	66.23	38.93	61.47	74.65
T_2	Pendimethalin at 1.0 kg ha^{-1} on 3 DAP *fb* hand hoeing + pendimethalin at 1.5 kg ha^{-1} on 30, 90,150, 210 DAP.	65.79	63.68	76.61	85.98
T_3	Pendimethalin at 1.0 kg ha^{-1} on 3 DAP *fb* hand hoeing + alachlor at 1.5 kg ha^{-1} on 30 and 150 DAP *fb* hand hoeing + Pendimethalin at 1.5 kg ha^{-1} on 90 and 210 DAP.	64.15	61.17	72.34	83.89
T_4	Pendimethalin at 1.0 kg ha^{-1} on 3 DAP *fb* hand hoeing + pendimethalin at 1.5 kg ha^{-1} on 30 DAP *fb* Paraquat at 1.0 kg ha^{-1} on 120 DAP *fb* quizalofop-ethyl at 50g ha^{-1} on 210 DAP.	64.56	38.59	66.14	74.42
T_5	Pendimethalin at 1.0 kg ha^{-1} on 3 DAP *fb* hand hoeing + pendimethalin at 1.5 kg ha^{-1} on 30, 120, 210 DAP.	64.04	44.63	69.67	77.9
T_6	Pendimethalin at 1.0 kg ha^{-1} on 3 DAP *fb* hand hoeing + pendimethalin at 1.5 kg ha^{-1} on 30 DAP *fb* hand hoeing + Alachlor at 1.5 kg ha^{-1} on 120 DAP *fb* hand hoeing + pendimethalin at 1.5 kg ha^{-1} on 210 DAP.	61.81	41.32	65.14	75.67
T_7	Atrazine at 1 kg ha^{-1} on 3 DAP.	64.82	24.34	56.59	66.57
T_8	Hand weeding on 30,90,150 and 210 DAP	39.8	49.83	61.33	75.99
T_9	Weed free check	100	100	100	100
T_{10}	Unweeded check	0	0	0	0

Data statistically not analysed

Table.3 Effect of weed control treatments on growth and flowering characters during 2017-2018

T. No	Treatments	No of days taken bulb emergence	No of leaves plant $^{-1}$	Diameter of flower	Weight of 100 florets
T_1	Pendimethalin at 1.0 kg ha^{-1} on 3 DAP *fb* Paraquat at 1.0 kg ha^{-1} on 30 and 150 DAP + quizalofop-ethyl 50g ha^{-1} on 90 and 210 DAP	6.13	35.23	3.27	122.85
T_2	Pendimethalin at 1.0 kg ha^{-1} on 3 DAP *fb* hand hoeing + pendimethalin at 1.5 kg ha^{-1} on 30, 90,150, 210 DAP	6.20	50.77	4.61	124.17
T_3	Pendimethalin at 1.0 kg ha^{-1} on 3 DAP *fb* hand hoeing + Alachlor at 1.5 kg ha^{-1} on 30 and 150 DAP *fb* hand hoeing + Pendimethalin at 1.5 kg ha^{-1} on 90 and 210 DAP	6.03	44.77	4.32	124.04
T_4	Pendimethalin at 1.0 kg ha^{-1} on 3 DAP *fb* hand hoeing + pendimethalin at 1.5 kg ha^{-1} on 30 DAP *fb* Paraquat at 1.0 kg ha^{-1} on 120 DAP *fb* quizalofop-ethyl at 50g ha^{-1} on 210 DAP.	6.23	35.27	3.41	123.41
T_5	Pendimethalin at 1.0 kg ha^{-1} on 3 DAP *fb* hand hoeing + pendimethalin at 1.5 kg ha^{-1} on 30, 120, 210 DAP.	6.37	41.57	4.07	121.48
T_6	Pendimethalin at 1.0 kg ha^{-1} on 3 DAP *fb* hand hoeing + Pendimethalin at 1.5 kg ha^{-1} on 30 DAP *fb* hand hoeing + Alachlor at 1.5 kg ha^{-1} on 120 DAP *fb* hand hoeing + Pendimethalin at 1.5 kg ha^{-1} on 210 DAP.	6.07	39.27	3.65	123.66
T_7	Atrazine at 1 kg ha^{-1} on 3 DAP.	6.27	31.30	3.20	124.19
T_8	Hand weeding on 30,90,150 and 210 DAP	6.20	42.90	3.71	123.77
T_9	Weed free check	5.73	51.43	4.67	125.37
T_{10}	Unweeded check	10.03	22.03	2.77	81.83
	SEd	0.38	1.63	0.15	5.13
	CD(P= 0.05)	0.80	3.38	0.32	10.64

The important broad leaved weeds were *Commelina benghalensis, Cleome viscosa, Convolvulus arvensis, Phyllanthus niruri* and *Trianthema portulacastrum* were found throughout the growing period. Similarly, such type of weed population was reports by Ritu Jain *et al.,* (2015) in tuberose.

Effect on weed

All the weed control treatments reduced the weed density significantly at all stages of crop growth. The weed density and dry weight were recorded at 30, 90,150 and 210 DAP. Among the herbicide treatment pre-emergence application of pendimethalin at the rate of 1 kg ha^{-1} at 3 DAP *fb* Hand hoeing + pendimethalin at 1.5 kg ha^{-1} on 30, 90, 150, 210 DAP recoded the reduced weed density and dry weight of weeds (Table 1). WCE were highest in weed free check. In herbicide treatment the higher weed control efficiency were obtained with the application of pendimethalin at the rate of 1 kg ha^{-1} at 3 DAP *fb* Hand hoeing + pendimethalin at 1.5 kg ha^{-1} on 30, 90,150, 210 DAP (T_2) (Table 2) these might be due to periodical removal of weeds and poor germination of weed seeds. These result similar with the findings of Anil Kumar *et al.,* (2012) in gladiolus. The WCE was lowest in the unweeded check (T10). These might be due to presence of weed flora throughout the growing period for its sound establishment.

Effect on crops

Weed management practices had a favourable effect on growth and floral parameters like days taken for sprouting, plant height, no of leaves $plant^{-1}$, days of first flowering, diameter of flower, 100 floret weight and flower yield ha^{-1}. Among the different treatments weed free check produced the highest plant height due to the absence of weeds throughout the crop growth period. Among the different herbicide treatment pre emergence application of pendimethalin at the rate of 1 kg ha^{-1} at 3 DAP *fb* Hand hoeing + pendimethalin at 1.5 kg ha^{-1} on 30, 90,150, 210 DAP (T_2) (Table 3) recorded the increased growth and floral parameters like days taken for sprouting, plant height, no of leaves $plant^{-1}$, days of first flowering, diameter of flower, 100 floret weight and flower yield ha^{-1} these might be due effect of herbicide on weeds. These result similar to the findings with (Nagapushpa *et al.,* 2018).

Therefore from these study it could be concluded that pre emergence application of pendimethalin at the rate of 1 kg ha^{-1} on 3 Days after planting *fb* Hand hoeing + pendimethalin at the rate of 1.5 kg ha^{-1} on 30, 90,150, 210 Days after planting (T_2) were found to be superior to suppress the weeds and to result in higher growth and flowering parameters in tuberose.

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