BIO-EFFICACY OF HERBICIDES ON WEED DYNAMICS IN TUBEROSE (POLIANTHES TUBEROSA)

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Abstract: One of the main constraints in the commercial cultivation of flower crops is weeds. Weeds cause irreparable damage to crops by competing for water, nutrients, light and space, besides acting as alternate hosts to a number of pathogens and insect pests. Manual weeding is time consuming and costly as the labor is scarce. Hence, it is imperative to employ alternative methods of weed control in tuberose cultivation irrespective of size of the holdings. Chemical weed control is one of the alternative methods of weed control in flower crops. As tuberose being a monocot, having lesser spread and height, faces tough competition by weeds. Keeping this in view a field experiment was conducted during 2013-14 at University of Agricultural Sciences, Dharwad during *Kharif* season. In the present investigation, alachlor, pendimethalin and oxyfluorfen herbicides were used as pre-emergent which were sprayed day after planting and imazethapyr, oxyflourfen and pyrithiobac were used as post-emergent and sprayed once at 20 days after planting. The weed control treatments tested in the present experiment differed significantly for flower yield. The treatment Viz., Pendimethalin 30 EC @ 1 kg a.i/ha, Alachlor 50 EC @ 1.5 kg a.i/ha and weed free check gave higher flower yield (4.18 t/ha).The lowest flower yield (0.59 t/ha) was obtained in weedy check plot. This is due to severe weed competition which ultimately resulted in lower yield. Among the herbicide treatments, Pendimethalin 30 EC @ 1 kg a.i/ha and Alachlor 50 EC @ 1.5 kg a.i/ha recorded the highest net returns and marginal returns.

Keywords: Herbicide, Pre-Emergent, Post-Emergent, Weed.

Introduction: In India, tuberose is grown extensively in Karnataka, West Bengal, Andhra Pradesh, Tamil Nadu and Maharashtra. To a lesser account, it is also grown in Haryana, Delhi, Uttar Pradesh and Punjab. In Karnataka it is grown in an area of nearly 2.0 million hectares with an annual production of about 13.11 metric tonnes of flowers. In Karnataka it is being cultivated in Bengaluru, Chitradurga, Kolar, Mysuru, Mandya, Dharwad, Belagavi, Davangere and other districts.

One of the main constraints in the commercial cultivation of flower crops is weeds. Weeds cause irreparable damage to crops by competing for water, nutrients, light and space, besides acting as alternate hosts to a number of pathogens and insect pests.. Manual weeding is time consuming and costly as the labor is scarce. Hence, it is imperative to employ alternative methods of weed control in tuberose cultivation irrespective of size of the holdings. Chemical weed control is one of the alternative methods of weed control in flower crops. As tuberose being a monocot, having lesser spread and height, faces tough competition by weeds.

The yield of cut flowers is of utmost importance to meet the needs of markets. The fresh tuberose flowers are used in large quantities in the metropolitan cities like Bengaluru, Mumbai, kolkata, Delhi and channai. The tuberose growth and development is influenced by climate, nutritional status, crop composition fertility status

of soil management weed flora and other factors such as frequent irrigation, liberal use of manures and fertilizers in cultivation, in turn those also need to favorable condition for luxurious growth of weeds.
More often fields get so much infested with the weeds, that crop production becomes uneconomical unless they are controlled. Thus weed spose greatest hazard by competing with tuberose plant for water, light and nutrients. Besides the increase in the cost of cultivation reduce the yield and quality of tuberose. Weed management is one of the most expensive items in production of tuberose. Hand weeding is normally taken up to keep the crop free from weed compotation. The process of weeding operation requires every hook and corner of land to be covered by labor. This is indeed very expensive and accounts for 20-25 per cent of the total cost of production. Weeding has to be carried out expeditiously within short period of time during which the availability of labour will normally be inadequate, thus the use of herbicide and integrated methods appear to be a better substitute for this age old tiresome practice.

The science of weed control has advanced considerably during the past two decades. A number of herbicides have been advocated for control of weeds in flower crops. However detailed information on the suitable herbicides, mulches and effect of chemicals and their appropriate dosage, time of application is not fully available to the farmers use. Considering the economic importance of tuberose, the present study was taken up with the following objectives.

1) To study the effect of pre and post emergent herbicides on growth and yield of tuberose
2) To study the bio efficacy of pre and post emergent herbicides on weed dynamics in tuberose.
3) To work out the economics of use of pre and post emergent herbicides in tuberose.

Material Methods: The present field experiment was conducted during 2013-14 at Medicinal and Aromatic Plants Block, Saidapur farm, University of Agricultural Sciences, Dharwad during *Kharif* season on weed management in tuberose (*Polianthes tuberosa* Linn.) Cv. Prajwal. The experiment was laid out in Random Complete Block Design (RCBD) with three replications. Eight treatments were formed by using different weedicides as pre and post emergent sprays. Spacing maintained was 30 cm x 20 cm. In the present investigation, three weedicides namely, alachlor, pendimethalin and oxyfluorfen were used as pre-emergent which were sprayed day after planting and three weedicides imazethapyr, oxyflourfen and pyrithiobac were used as post-emergent and sprayed once at 20 days after planting. In hand weeding treatments, weeding was done with *kurpi* at weekly interval. Weedicide treatments were compared with weed free check where the weeds were removed throughout the crop growth period as and when it was required and in unweeded treatment no such weed management practices were carried out.

Results and Discussion: ***Weed Flora:*** In the experimental plots, the predominant weed infestation was of monocots followed by diocts. Among the monocots, *Dinebra spp., Cyperus rotundus* L., and *Digetaria marginata* L., and the dicots like *Portulca oleracea* L., *Acanthospermum hispidum DC, Cleome spp., Physalis minima, Trianthema portulacasterm* L., *Mullugo pentaphylla* L., *Alternenthera sessilis* L., *Digera arvensis* L., *Amaranthus viridis, Commelina benghlensis* L., *Digera arvensis* L., *Euphorbia hirta* L., *Bidens pilosa* L., *Ageratum conyzodies* L., and *Lagasca mollis,* were the predominant weeds in tuberose. Presence of similar monocot and dicot weed flora was also observed previously by Mithilesh Kumar *et al.*, (2010) in tuberose.

***Effect on Weed*:** Among weed control treatments application of Pendimethalin 30 EC @ 1 kg a.i/ha, Alachlor 50 EC @ 1.5 kg a.i/ha and weed free check resulted in reduction in weed count as compared to other herbicidal treatments. At all crop growth stages, weedy check plot had significantly higher weed count and higher dry matter of weeds. In general, the weed population and weed dry weight were reduced with the application of herbicides. Application of Imazethapyr 10 SL @ 75 g a.i/ha and Oxyfluorfen 23.5 EC @ 75 g a.i/ha were very effective on dicot weeds. The total dry weight of weeds differed significantly at all stages of growth. However, weedy check (control) recorded maximum dry weight of weed indicating higher density and luxurious growth of weeds. Weed control efficiency significantly differed due to weed control treatments. Application of Pendimethalin 30 EC @ 1 kg a.i/ha, Alachlor 50 EC @ 1.5 kg a.i/ha and weed free check recorded the highest weed control efficiency. Weed index was low in weed free treatment. Among weed control treatments Pendimethalin 30 EC @ 1 kg a.i/ha, Alachlor 50 EC @ 1.5 kg a.i/ha and weed free check recorded the lowest weed index. Similar type of results was also reported by Murthy and Gowda (1992) in tuberose, Basavaraju (1989) in chinaster and Koutepas (1982) in gladiolus and Yadav and Bose (2015) in tuberose.

Growth and Yield Parameters of Tuberose: Weed free check, Pendimethalin 30 EC @ 1 kg a.i/ha and Alachlor 50 EC @ 1.5 kg a.i/ha recorded maximum number of leaves, leaf area, plant height and highest dry weight of plant. In weed free check treatment the first floret was opened followed by Pendimethalin 30 EC @ 1 kg a.i/ha and Alachlor 50 EC @ 1.5 kg a.i/ha. Spike length which differed significantly and was maximum in weed free check treatment, Pendimethalin 30 EC @ 1 kg a.i/ha and alachlor 50 EC @ 1.5 kg a.i/ha.

Yield and Quality of Tuberose: The quality parameters such as number of florets per spike and flower diameter were significantly increased with weed control treatments. There was remarkable increase in yield of flower spike due to application of Pendimethalin 30 EC @ 1 kg a.i/ha, Alachlor 50 EC @ 1.5 kg a.i/ha and weed free check treatments.

Conclusion: Pre-emergent application of Pendimethalin 30 EC @ 1 kg a.i/ha, Alachlor 50 EC @ 1.5 kg a.i/ha and weed free check resulted in higher flower yield besides given effective weed control. Next best promising herbicides were Oxyfuorfen 23.5 EC @ 75 g a.i/ha (PE) and imazethapyr 10 SL @ 75 g a.i/ha. (POE). These herbicides were promising in controlling weeds in tuberose and would play an important role in the areas where labour is too scarce and costly. The herbicide Pendimethalin 1.00 kg a.i/ha may be used to control weeds in tuberose cultivation on commercial scale. By considering crop toxicity effect on plant growth and development, based on profit and rupee spent, Alachlor 1.00 kg a.i/ha may be used for management of weeds.

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Table 1: Effect of Weed Control Treatments on Weed Attributes and Yield Characters in Tuberose cv Prajwal

Treatments	Dry wt of weed at 120 DAP	Weed control efficiency at 120 DAP	Weed index at 120 DAP	Flower yield per hectare (Laks)	Flower yield (T/ha)
T_1 – Alachlor 50 EC @ 1.5 kg a.i /ha.(PE)	**120 DAP**	78.83	39.21	1.27	3.549
T_2 – Pendimethalin 30EC @ 1kg a.i/ha (PE)	7.63	84.30	37.72	1.29	3.673
T_3 – Oxyfluorfen 23.5 EC @ 75 g a.i/ha (PE)	5.66	72.49	40.71	1.25	3.431
T_4 - Imazethapyr 10 SL @ 75g a.i/ha (POE)	9.93	76.04	42.20	1.23	3.296
T_5 - Oxyfluorfen 23.5 EC @ 75 g a.i/ha (POE)	8.66	74.69	45.18	1.19	3.104
T_6 – Pyrithiobac 10 EC @ 62.5 g a.i/ha (POE)	9.13	70.90	47.68	1.15	2.910
T_7- weed free check	10.5	97.23	0.00	1.34	4.180
T_8- Weedy check	1.00	0.00	99.91	0.45	0.598
S. Em ±	36.13	2.30	0.57	0.66	0.04
CD at 5 %	0.84	7.00	1.73	2.02	0.13

PE – Pre emergence POE – Post emergence

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