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Effect of pre and post emergence herbicides in rose weed management

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Abstract
A field experiment was conducted during 2015-16 to 2017-18 at AICRP on Floriculture, NARP, Pune to study the effect of pre and post emergent herbicide for weed management in rose cv. Gladiator. The experiment was conducted in Randomized Block Design with three replications in seven different treatments. The pooled results revealed that treatment Pendimethalin pre emergence @ 1.0 kg a.i./ha. followed by post emergence ethoxysulfuron 20.0 gm a.i./ha. at 30 DAS and hand weeding at 30 days interval starting from 75 days thereafter significantly minimized the weed biomass in rose and produced maximum plant height (61.30 cm), bud length (4.40cm), flower diameter (5.70 cm), flower stem length (53.40cm), number of flowers per plant (26.06) and vase life (5.60 days) in open cultivated rose.

Keywords: pre emergence, post emergence, herbicides, weeding, yield, vase life

Introduction
Rose is one of the most important ornamental as well as aromatic and medicinal plants, which is cultivated in protective and open conditions throughout the world. In India, 4330 ha. Area is under rose cultivation, producing 874 million stems valued at Rs. 44.00 crores in the state of Tamil Nadu, Karnataka, Maharashtra and West Bengal [1]. Commercially rose is grown for loose flower production in open field conditions. Weed management is a major problem in rose cultivation under this situation, because of perennial growth habit of rose weeds compete with crop for various growth factors such as nutrient, moisture, light, space, etc. and severely reduced crop growth, yield and quality [2]. Manual weed control is expensive, time consuming and laborious. However pre-emergence use of herbicide has been reported to be effective in reducing the weed growth and density in rose [3]. But the studies of both pre and post-emergent herbicides in rose is lacking. Therefore, the present investigation was carried out to study the efficacy of pre and post-emergence herbicides for weed control in rose under open cultivation.

Materials and Methods
The field experiment was conducted at AICRP on Floriculture, NARP, Ganeshkhind, Pune during 2014-15 to 2016-17. The six month old budded plants of rose cv. Gladiator were planted at 75 cm x 75 cm spacing in a plot size 2.04 m x 1.5 m. The application of 400: 200: 200 kg NPK /ha was given as per recommendation. Full dose of P and K and half dose of N were applied as basal and remaining dose of N were applied after the establishment of rose plant. The experiment was laid in Randomized Block Design in three replications. The experiment consisted seven treatments viz., T1. Atrazine pre emergence@ 1.0 kg a.i./ha. Followed by post emergence ethoxysulfuron 20.0 gm a.i./ha. at 30 DAS + hand weeding at 30 days interval starting from 75 days thereafter, T2. Pendimethalin pre emergence @ 1.0 kg a.i./ha. Followed by post emergence ethoxysulfuron 20.0 gm a.i./ha. at 30 DAS + hand weeding at 30 days interval starting from 75 days thereafter, T3. Imazethapyr @ 100 gm/ha. pre emergence followed by hand weeding at 30 days interval starting from 75 days thereafter, T4. Isoproturon pre emergence @ 1.0 kg a.i./ha. Followed by hand weeding at 30 days interval starting from 75 days thereafter, T5. Oxyfluorfen pre emergence @ 0.250 kg a.i./ha followed by hand weeding at 30 days interval; starting from 75 days thereafter, T6. Weed Free and T7. Control (Unweeded). The herbicides were sprayed with knapsack sprayer with flat- dash fan nozzle at a volume rate of 750 l water per ha. In weed free plots first hand- weeding was done at one month after planting and subsequently at 15 days interval to maintain the plot weed free for entire growth period. The observations on growth, yield, quality and weed biomass were

recorded and the pooled results of experiments were analyzed statistically.

Result and Discussion

Three years pooled data revealed that the all treatments reduced significantly weed biomass as compared to Control. The Fig 1 depicted that the significantly maximum reduction in weed count (63.25/m^2), fresh weight of weeds (110.57g) and dry weight of weeds (17.64g) was noted in treatment combine application of Pendimethalin pre emergence @ 1.0 kg a.i./ha. Followed by post emergence ethoxysulfuron 20.0 gm a.i./ha. At 30 DAS and hand weeding at 30 days interval starting from 75 days thereafter. Significantly maximum weed count (101.33m^2), fresh weight of weeds (190.72g) and dry weight of weeds (37.57g) were recorded in unweeded control. The positive effect of herbicide application on weed biomass [3] was noticed in rose [5].

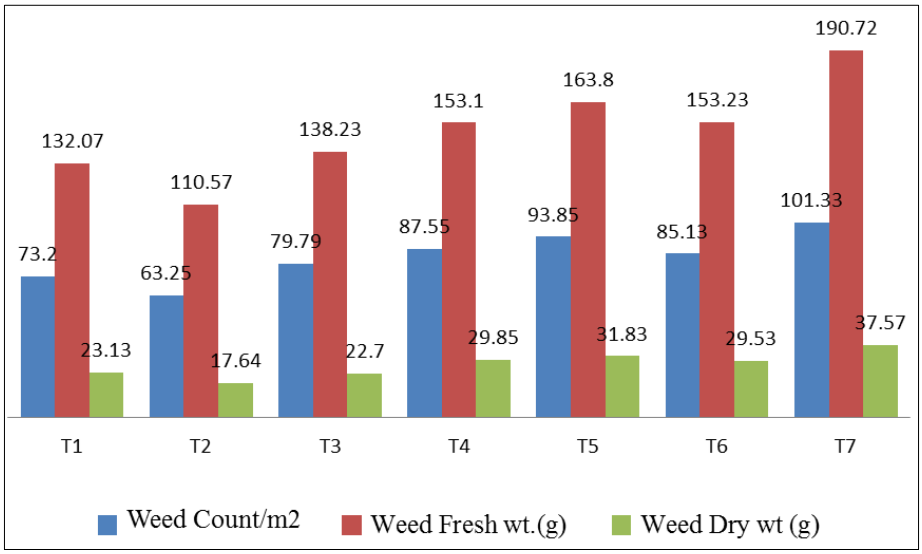

Fig 1: Effect of different treatment on weed biomass

The significant effect of pre and post emergence of herbicide application on growth, yield and quality in rose was presented in Table1 and Table 2. The significant difference in height of rose plant was recorded in all the treatments. However, the significantly maximum plant height (61.30cm) was produced by combine application of Pendimethalin pre emergence @ 1.0 kg a.i./ha. followed by post emergence ethoxysulfuron 20.0 gm a.i./ha. at 30 DAS and hand weeding at 30 days interval starting from 75 days thereafter treatment followed by application Imazethapyr @ 100 gm/ha. pre emergence followed by hand weeding at 30 days interval starting from 75 days thereafter (55.10cm) and Atrazine pre emergence 1.0 kg a.i./ha. followed by post emergence ethoxysulfuron 20.0 gm a.i./ha. at 30 DAS and hand weeding at 30 days interval starting from 75 days thereafter (53.63cm). The days to 50% flowering was influenced non- significantly, but less number of days (162.83days) taken for flowering was observed in combine application of Pendimethalin pre emergence @ 1.0 kg a.i./ha. followed by post emergence ethoxysulfuron 20.0 gm a.i./ha. at 30 DAS and hand weeding at 30 days interval starting from 75 days thereafter treatment. From the initial stage of plant growth, the reduction in weed population marked the difference in plant height was observed amongst the different treatments. Similar results were reported in China aster [4].

Table 1: Effect of pre and post emergence herbicides on growth and yield of rose

Treatments	Plant ht. (cm)				Days to flowering				Bud length (cm)				Flower dia. (cm)			
	2015-16	2016-17	2017-18	Pooled Mean	2015- 16	2016-17	2017-18	Pooled Mean	2015-16	2016-17	2017-18	Pooled Mean	2015-16	2016-17	2017-18	Pooled Mean
T1	54.80	52.50	53.60	53.63	164.70	160.30	246.40	190.47	3.50	3.80	3.60	3.63	5.20	5.00	5.20	5.13
T2	60.70	62.40	60.80	61.30	170.40	155.50	162.60	162.83	4.30	4.50	4.40	4.40	6.00	5.40	5.70	5.70
T3	56.40	53.70	55.20	55.10	175.80	168.70	172.80	172.43	3.60	3.70	3.60	3.63	5.60	5.10	5.30	5.33
T4	46.80	50.57	48.70	48.69	173.73	170.50	174.50	172.91	3.40	3.60	3.50	3.50	5.40	4.80	5.00	5.06
T5	49.40	51.60	52.20	51.07	180.30	182.40	184.40	182.37	2.80	3.00	3.50	2.87	4.80	4.88	4.80	4.82
T6	50.60	55.20	54.30	53.37	180.37	181.50	179.60	180.49	3.30	3.90	2.80	3.67	5.00	5.20	5.10	5.10
T7	45.80	48.40	49.30	47.83	183.60	185.60	183.50	184.23	2.60	2.80	3.80	2.70	4.90	4.00	4.40	4.43
SE ±	0.44	0.34	0.01	0.90	4.14	0.31	0.04	10.67	0.06	0.11	0.02	0.06	0.05	0.17	0.001	0.36
C.D. @ 5%	1.36	1.06	0.04	2.80	NS	0.96	0.12	NS	0.18	0.33	0.06	0.18	0.15	0.52	0.002	0.11

Table 2: Effect of pre and post emergence herbicides on yield and quality of rose

Treatments	Flower stem length (cm)				Flowers /pl.				Vase life (days)			
	2015-16	2016-17	2017-18	Pooled Mean	2015-16	2016-17	2017-18	Pooled Mean	2015-16	2016-17	2017-18	Pooled Mean
T1	40.70	44.80	43.70	43.07	4.50	31.20	32.40	22.70	4.30	4.20	4.40	4.30
T2	50.60	55.40	54.20	53.40	6.00	33.60	38.60	26.06	5.80	5.30	5.70	5.60
T3	47.40	49.20	48.60	48.40	4.00	31.80	33.60	23.13	4.90	4.50	4.60	4.67

T4	46.80	47.50	47.20	47.17	4.90	30.20	31.40	22.16	4.70	4.50	4.30	4.50
T5	40.50	42.40	41.60	41.50	4.50	29.70	28.80	21.00	4.00	4.43	4.40	4.28
T6	39.70	50.30	46.20	45.40	5.20	32.40	34.20	23.93	5.00	5.20	5.20	5.13
T7	35.40	40.70	42.30	39.47	3.80	30.20	31.30	21.76	4.40	4.10	4.20	4.23
SE ±	0.62	0.17	0.01	1.07	0.06	0.10	2.94	2.43	0.06	0.16	0.11	0.11
C.D. @ 5%	1.92	0.53	0.04	3.34	0.19	0.30	NS	0.78	0.19	0.49	0.35	0.35

The yield and quality characters viz. bud length, flower diameter, flower stem length, number of flower and vase life were significantly influenced by pre and post emergence herbicide application in combination with hand weeding in rose. The significantly maximum bud length (4.40cm), flower diameter (5.70cm), flower stem length (53.40cm) and number of flower per plant (26.06) was produced in Pendimethalin pre emergence @ 1.0 kg a.i./ha. followed by post emergence ethoxysulfuron 20.0 gm a.i./ha. at 30 DAS combine application of herbicide with hand weeding at 30 days interval starting from 75 days herbicidal application. Whereas, bud length (2.70cm), flower stem length (39.47cm) was found minimum in unweeded control and was at par with treatment Oxyfluorfen pre emergence @ 0.250 kg a.i./ha followed by hand weeding at 30 days interval starting from 75 days thereafter (2.87cm and 41.50cm, respectively). Whereas, significantly minimum number of flower per plant (21.00) was produced by treatment Oxyfluorfen pre emergence @ 0.250 kg a.i./ha followed by hand weeding at 30 days interval starting from 75 days thereafter and was at par with unweeded control (21.76). The significantly smallest flower (i.e. 4.43cm diameter of flower) was produced in unweeded control followed by treatment Oxyfluorfen pre emergence @ 0.250 kg a.i./ha followed by hand weeding at 30 days interval starting from 75 days thereafter (4.82cm). The yield and quality of rose flower was depressed in unweeded control treatment because of more weed count which computed with the crop plant and suppressed the growth and quality of rose. The better quality and yield of rose flower was obtained in combined application of Pendimethalin pre and post emergence ethoxysulfuron at 30 DAS of herbicide with hand weeding at 30 days interval starting from 75 days herbicidal application, as compared to other treatments because of effective weed control during the crop period and also nil or minimal phytotoxic effect on crop which resulted in better quality produce of rose. The above results are in close confirmatory with the findings in marigold [6] and gladiolus [7], who noticed the pre and post emergence herbicide application with hand-weeding reduced the weed population and enhanced the flower yield and quality. However, the pre-emergence use of pendamithalin recorded better results than atrazine in combination with of post-emergence use of herbicide and pre-emergence herbicide use alone with hand weeding in rose cv. Gladiator. The use of Pendimethalin produced the good yield and quality in gladiolus [7] and China aster [4].

Conclusion

It was concluded that better management of weed in open cultivated rose cv. Gladiator the Pendimethalin pre emergence followed by post emergence ethoxysulfuron at 30 DAS and hand weeding at 30 days interval starting from 75 days thereafter treatment significantly reduced total biomass of weed as well as produced higher yield of better quality rose flowers.

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