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RESPONSE OF ROSE VAR. GLADIATOR TO DIFFERENT MONTHS OF PRUNING IN NORTHERN ZONE OF KARNATAKA, INDIA

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ABSTRACT

The study was conducted to analyze the impact of different pruning months on the growth and yield of Rose var. Gladiator at Main Horticultural Research and Extension Centre, UHS, Bagalkot during 2016-2018. The experiment was laid out in Randomized Block Design with three replications, comprising 12 treatments. The results obtained were significant for all the vegetative, floral and yield parameters. Among the different pruning months, the number of stems was found to be highest in plants pruned in June (29.23 No's). Plants pruned in December had the longest stem length (112.15 cm), followed by those pruned in June (108.77 cm), while the shortest stem length was observed in July pruned plants (68.30 cm). The highest intermodal length (3.34 cm) was observed in plants pruned in June, while the least was in January pruned plants (2.24 cm). Among all the pruning months, maximum flowers (31.52) and early bud initiation (27.72 days) were observed in rose cultivar pruned in June. However, the minimum value (21.70) was recorded in February pruned plants. The vase life of flowers was found to be maximum (7.44 days) in June pruned plants, which was on par with those pruned in December (7.22 days) and minimum (4.78 days) in March pruned plants.

***Keywords*:** Rose var. Gladiator, growth and yield, pruning

Introduction

Rose is one of the most important beautiful flower crops in the world and universally acclaimed as "Queen of Flowers" because of its beauty and fragrance. The diversity in the plant growth habit, flower shape and colour, fragrance, slow opening of flowers have made roses to be so popular that it is grown to meet the demand of cut blooms and other requirements. In India, they are produced on commercial scale for cut flower, loose flower, essential oil extraction, rose water and gulkand preparation. Besides they are used in the preparation of bouquets, garland, veni and floral wreaths. Roses are important for landscaping and the garden are considered to be incomplete without roses (Gibson, 1984), they are trained on arches and arbours.

Rose (*Rosa* spp.) is one of the most economically important genus of ornamental, aromatic and medicinal plants of about 200 species and 20,000 cultivars widely distributed all over the world (Cuizhi and Robertson, 2003; Ritz *et al*., 2005). Among the top commercially cultivated varieties, Rose cv. Gladiator is one of the popular hybrid tea roses cultivated in India for cut flowers because of large size flowers with long stalk, attractive colour and long vase life.

In commercial cultivation of roses, apart from genetic makeup and nutrition, training and pruning play a very important role. Training and pruning influence growth, flowering and fruitfulness and overall quality of the product. A portion of the plant is removed to give shape and to divert the energy from one to other parts, to promote superior quality flower production. In rose, pruning consists of two operations thinning out and shortening of stems. It ensures the removal of unproductive growth and helps to produce of large number of strong and healthy shoots which will bear large flowers and improve the quality of blooms. The purpose of rose pruning is control of plant

growth and development, to facilitate growing operations or for commercial reasons i.e. timing fluctuations in demand for roses during different seasons or days (e.g. San Valentine's days, Mother's day) (Zieslin *et al*., 1975). In different cultivars of roses pruning is done principally to alter the growth phases, to facilitate new growth, to produce vigorous shoots and profuse flower bud initiation (Gibson, 1984), depending on the variety the type and timing of pruning varies. Repeated blooming roses such as Hybrid Tea and Floribunda roses need heavy annual pruning during December-January (Schneider and Dewolf, 1995). Pruning is used for the size control of rose plants and also to increase the percentage of high quality cut flowers. Roses should be pruned when the new buds start to swell up and it varies from place to place and season/ time.

Hence the present study was conducted with the objective to determine the appropriate pruning time to enhance the growth and flowering of rose var. 'Gladiator'. The plants were pruned to understand the influence of different season/ time for quality flower production under northern dry zone of Karnataka.

Materials and Methods

The experiment was conducted on three year old plantation of hybrid tea rose cv. 'Gladiator' at Floriculture Block, MHREC, University of Horticultural Sciences, Bagalkot. The experiment was laid out in Randomized Complete Block Design (RCBD) with twelve treatments which were replicated thrice. As treatments, every month plants were pruned at 45 cm height by using secateurs and observations were recorded on monthly basis. All standard agricultural practices like weeding, topdressing, irrigation was followed according to university package of practices. Removed all dead, diseased and damaged branches and pruned the plants at 45 cm height by giving sharp cut at an angle of about 45^{o} about 5mm above a strong healthy eye pointing outward. Every pruned branch was smeared with copper oxy chloride (Blitox) paste to avoid pest and disease infestation. During the research trial, experimental data were recorded on number of stems, stem length (cm), stem girth (mm), internodal length (cm) and number of leaves/plant and other flower parameters. The experimental data was analyzed with Analysis of Variance (ANOVA).

Results

Growth parameters

The rose plants play a significant role in the production of stems, and the number of stems produced by these plants varies across different months of pruning. The highest number of stems (29.23 No's) was observed in the June pruned plants, which was on par with the December pruning (28.58 No's). On the other hand, the least number of stems (20.83 No's) was recorded during February pruning.

Stem length is a crucial factor that determines the quality of rose flowers, as cut flower roses are graded and marketed based on their stem length. Predicting the stem length at the harvest could help growers forecast crop pricing and potential cash flow. Different months of pruning significantly affected the stem length of rose plants, with December pruned plants showing the longest stems (112.15cm), followed by June pruned plants (108.77 cm). The shortest stems (68.30cm) were noticed in July pruned plants.

Stem girth is another important attribute that varies across different months of pruning. June pruned plants showed the maximum stem girth (10.66mm), which was on par with the October pruned plants (10.49 mm). In contrast, the January pruned plants showed the least stem girth (8.15 mm). Different months of pruning also had a significant impact on the intermodal length of rose plants.

The highest intermodal length (3.34 cm) was observed in June pruned plants, followed by October pruning (3.32 cm), while the least was noticed in January (2.24 cm) pruned plants. Finally, the production of leaves was also affected by different months of pruning. The maximum leaf count (144.83) was observed in June pruned plants, which was on par (135.50) with May month pruning, while the least count (108.50) was noticed in July pruned plants.

Flowering and yield parameters

Number of days to bud initiation or flowering is an important criterion to be analyzed for earliness or late flowering on the plants. In general, roses take anywhere between 25-40 days for bud initiation. The experiment conducted shows that early pruning in June (27.72 days) and August pruning (27.73 days) had similar bud initiation times, while late bud initiation was observed in March pruning (30.04 days).

Various features such as bud length, bud and flower diameter, weight of flowers, and vase life are considered essential criteria for grading flowers. The higher the quality parameters, the higher the price in the market. Each of these quality parameters is determined by specific pre-and post-harvest conditions that may vary for different flowers. The study shows that bud length was significantly influenced by different months of pruning, with the maximum bud length (3.99 cm) observed in June pruned plants, which was on par with October pruned plants (3.88 cm),

while the least bud length (3.01 cm) was observed in March pruned plants. Similarly, different months of pruning had a significant effect on bud and flower diameter, with maximum bud and flower diameter (20.18 mm & 10.20 cm) recorded in June and October pruned plants, respectively. However, the minimum was recorded in February (15.70 mm & 7.00 cm) pruned plants.

The data pertaining to the weight of flowers was also significantly affected by different months of pruning, with the maximum weight of flowers (12.38 g) observed in June pruned plants followed by October pruning (11.87 g), while lower weight was recorded in March (9.92 g). Furthermore, different months of pruning had a significant effect on the vase life of roses. The maximum vase life of flowers (7.44 days) was recorded in June pruned plants, which was on par with December pruned plants (7.22 days), and the minimum (4.78 days) was observed in March pruned plants. Lastly, the number of flowers produced by the rose cultivar was significantly affected by different months of pruning, with the maximum flowers (31.52) produced in June pruning. This was on par (30.82) with December pruned plants, while the minimum value (21.70) was recorded in February pruning.

Discussion

In most part of India roses is commonly pruned during October and in Bangalore region it is done two times in a year during April and October. The purpose of rose pruning is plant growth and development control, to facilitate growing operations or for commercial reason, i.e. timing fluctuations in demand for roses during different seasons or days (e.g. San Valentine's days, Mother's day) (Zieslin *et al*., 1975). It was observed that pruned plants had better overall health and higher production capacity. This may be attributed to high photosynthetic light reaction, a large number of metabolic sinks and a higher turgor than non-pruned plants (Calatayud *et al*., 2008). The movement of carbohydrates and their accumulation in different parts of woody plants are affected by environmental conditions and plant treatments. By means of shoot pruning, light penetration and distribution within the canopy are improved and older leaves are exposed more to incident irradiation. Older leaves may have different responses to irradiation than younger leaves. Mor and Halevy (1979) and Bozarth *et al*. (1982) have suggested that this also was observed in rose plants.

Stalk length is one of the important parameters which determines the whole flower head quality and price of the flowers. In our present study, stalk length was highest in December pruned plants followed by June month. This might be due to the availability of more nutrients. The results were also in accordance with the report by Adhikari *et al* (2014).

The total profit of the grower depends on the total number of flowers. So from the present investigation highest numbers of flowers were obtained in the June month pruned plants. This might be due to pruned plants have more photosynthetic capacity as reported by Guleria (2016). As reported by Mundhe *et al*. (2018), it could be due to cytokinin accumulation in the flower producing shoots as a pruning effect and this could increase the flowering rate per plant. Similar findings were also shown by Shyamalee *et al*. (2021).

Table 1: Growth and yield of rose var. Gladiator as affected by different months of pruning

Sl. No.	Month of pruning	Pooled data of two years (2016-18)				
		No. of Stems	Stem length (cm)	Stem girth (mm)	Inter nodal length (cm)	No. of leaves / plant
1	January	22.28	105.90	8.15	2.24	126.17
2	February	20.83	95.47	8.98	2.43	119.33
3	March	23.12	101.27	9.92	2.48	120.83
4	April	23.67	107.28	8.63	2.30	116.83
5	May	23.60	104.87	10.15	2.55	135.50
6	June	29.23	108.77	10.66	3.34	144.83
7	July	22.07	68.30	9.44	2.65	108.50
8	August	22.03	79.98	9.76	3.02	115.33
9	September	23.12	78.45	9.96	3.12	122.17
10	October	26.90	89.95	10.49	3.32	124.50
11	November	26.80	83.45	10.06	3.02	124.83
12	December	28.58	112.15	10.48	3.22	133.83
S. Em±		1.85	4.67	0.35	0.16	3.15
CD 5%		**3.83**	**6.05**	**0.72**	**0.33**	**6.53**
CV		**9.30**	**9.70**	**4.38**	**6.94**	**3.11**

Table 2: Flower quality parameters of Rose var. Gladiator after pruning

Sl. No.	Month of pruning	Pooled data of two years (2016-18)						
		No. of days to flower bud initiation	Bud length (cm)	Bud diameter (mm)	Flower diameter (mm)	Weight of flowers (g)	Vase life (days)	No. of flowers/ plant
1	January	28.76	3.40	18.87	7.66	10.94	6.55	24.48
2	February	29.82	3.09	15.70	7.10	10.37	5.44	21.70
3	March	30.04	3.01	16.98	7.00	10.19	4.78	24.22
4	April	29.99	3.43	15.88	8.01	9.92	5.22	22.51
5	May	29.70	3.44	16.61	7.54	10.58	6.00	27.93
6	June	27.72	3.99	20.18	8.88	12.38	7.44	31.52
7	July	28.09	3.50	16.91	7.41	10.67	6.34	27.22
8	August	27.73	3.63	17.39	8.02	11.50	6.89	27.87
9	September	28.08	3.55	19.44	8.96	11.32	6.78	27.95
10	October	28.35	3.88	20.20	10.20	11.87	7.33	29.97
11	November	28.98	3.47	17.70	9.12	11.43	6.89	28.85
12	December	28.15	3.55	19.92	9.13	11.16	7.22	30.82
S.Em±		0.27	0.14	0.61	0.41	0.47	0.46	1.30
CD 5%		**0.54**	**0.34**	**1.26**	**0.84**	**1.42**	**0.95**	2.70
CV		**1.12**	**5.59**	**4.15**	**6.08**	**5.14**	**8.80**	5.893

Conclusion

In this experiment season/ month/ time of pruning has affected all the vegetative and flowering characters in cv. Gladiator. The number of stems, stem length, girth and intermodal length, no. of leaves, no. of flowers/ plant were comparatively low in plants which were pruned between January-May and have gradually increased after June. This may be because of prevailing climatic factors like more light, temperature and water. Similar results were observed by Khattak *et al.* (2011) who showed that the summer pruning had a substantial effect on certain important parameters i.e. flower diameter and flower number. Summer pruning could improve the flower size but adversely affected the number of flowers and petals.

On the basis of our investigation, it is proved that rose plants pruned during June month had showed positive results on both vegetative and flowering attributes as well as yield of flowers. Further, pruning during winter months especially October to December produced superior quality flowers. However, summer pruned plants during February –March was low in yield and quality of flowers. This study suggests that pruning the rose cv Gladiator between June and December is better for production of good quality flowers and yield.

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