EFFECT OF DIFFERENT PRUNING DATES ON GROWTH AND FLOWERING OF *Rosa centifolia*

Adnan Younis[1], Atif Riaz[1,*], Salman Aslam[1], Muhammad Ahsan[1], Usman Tariq[1], Fariha Javaid[1], Muhammad Nadeem[1] and Mansoor Hameed[2]

[1]Institute of Horticultural Sciences, University of Agriculture, Faisalabad-38040, Pakistan;
[2]Department of Botany, University of Agriculture, Faisalabad-38040, Pakistan
[*]Corresponding author's e-mail: atiff23@gmail.com

Flower production is generally correlated with pruning of flowering plants. The present research work aimed to explore the ideal date of pruning which produce plants with excellent growth and flowering characteristics of *Rosa centifolia* during winter months where most scented flowers are disappear and marketing is lucrative. Pruning experiment was carried out on most important rose flower specie *Rosa centifolia* at Faisalabad during 2010-2012. The experiment was laid out in Randomized Complete Block Design (RCBD) with five different pruning dates during winter months i.e. second week of December, end of December, second week of January, end of January and second week of February. Plants that were pruned during the end of December dominate all growth parameters (plant height, number and length of branches, days to first bud emergence and number of buds plant $^{-1}$) and flowering characteristics (number, diameter and weight of flowers) that were studied in this experiment. Overall plant growth was also the best in plants when pruned at the end of December. It seems all dates of pruning during winter improve plant growth and development but end of December proved best pruning time in *Rosa centifolia.*
Keywords: Roses, pruning time, vegetative growth, flower quality

INTRODUCTION

Roses are associated or symbolized of love, attractiveness, companionship, sincerity, romance, grace and spirituality (Chuizhi and Robertson, 2003; Ritz *et al*., 2005). Rose is a woody perennial plant which belongs to the genus Rosa, the family *Rosaceae* and sub family is *Rosoideae.* Genus Rosa has more than 200 species and 20,000 cultivars which are widely distributed throughout the world (Gault and Syngy, 1971). Different species and hybrid varieties are all widely grown for their beauty of different colors and fragrance with different atmospheric conditions (Younis *et al*., 2006). There are many different colors and different sizes of rose flower. Temperature between 15°C to 30°C is considering best condition for roses. Roses can be grown below 15°C but the interval among the flushes make longer and bullheads are produced, while above 30°C , they can be grown by providing high humidity and low evaporation but the flower are small size (Martin,1990; Lerner and Dana, 2003; Younis *et al*., 2009). Roses are cultivated for the multiple uses, e.g. for the medical industries, perfuming industry, cut flower, garden plant, indoor plant and making different types of food products (Khan and Rehman, 2005; Nybon, 2009; Younis, 2006).
Pruning is an important step because it increases the rose growth and its aesthetic value, e.g. increase flower size, quality and color of flower (Gibson, 1984; Anderson, 1991). It is a practical and economical technique that not only for

the control of plant growth but also for commercial purpose as fluctuation in timing demand for roses during altered seasons (Hassanein, 2010). It is also amaneuver based on scientific principles to increase the overall recital and performance of plants (Nantakumar and Balakrishnan, 1998). Pruning is carried out in a way that the lower branches take the sufficient light to make the food, to improve the shape of the plant, to remove the disease and broken branches of the plant and to make the plant more healthier (Calatayud *et al*., 2007). The nutrient cycle effected by the style of pruning (Admasu and Struikb, 2000). The plants which are pruned have higher flower buds, N-P-K and sugar level (Hossain and Mizutani, 2008).
Pruning done at right time and in specific amount provide fuel for the initiation of flowering by sufficient ventilation leading to least susceptibility of plant to diseases. Hassanein (2010) studied that pruning effect the growth and quality of flowers. The result of his study showed that the pruning which was done at the start of autumn produced more and longer time of flowering. The pruning which was done after 15 weeks produced poor growth. The pruning which was done after the starting of autumn give the maximum number of flowers and the number of shoots and buds also maximum in the plants. The objective of present study was to find out the most suitable pruning dates in winter season that improves the growth and flowering quality of Rosa cultivar (*Rosa centifolia*).

MATERIALS AND METHODS

Experimental site: The present study was carried out on ten years old shrubs of rose cultivar (*Rosa centifolia*) of pink and scented flower cultivated at Rosa project, Institute of Horticultural Sciences, University of Agriculture, Faisalabad during, December 2010 to March 2012 to improve the quality and quantity of rose cultivar (*Rosa centifolia*) flowering during whole year.

Experimental design and methodology: Treatments were set according to Randomized Complete Block Design (RCBD). In this experiment, five different dates of pruning of rose shrub was selected during winter season that was considered as treatment. There was two weeks of intervals among all treatments and plants was pruned on the second week of December (T_1), end of December (T_2), second week of January (T_3), at end of January (T_4) and second week of February (T_5). There were thirty plants in each treatment and total numbers of plants in the experiment were one hundred and fifty and each treatment was replicated thrice. All standard agricultural cultural practices like irrigation, weeding, fertilization, hoeing, plant protection measures etc. of rose production were done similarly as recommended in all treatments. Data regarding parameters of vegetative (plant height, number of branches plant $^{-1}$, length of branches plant $^{-1}$, days to first bud emergence, number of buds plant $^{-1}$), flower (number of flowers plant $^{-1}$, flower diameter, fresh weight of flower) and overall plant growth and development were studied. Characteristics of plant growth was measure through visual observation which depending upon the development of growing buds, flower size, plant height, number of branches and number of flowers. The data analyzed by calculating average with the help of score ranging from 1 to 4. 1 for poor quality, 2, 3 and 4 scores were for good, very good and excellent quality respectively.

Statistical analysis: Data obtained were analyzed using Fisher's analysis of variance technique. Means were compared for significance by using Least Significance Difference (LSD) test at 5% probability level (Steel *et al.*, 1997).

RESULTS

Effect of different dates of pruning on vegetative growth: Composed data concerning different characteristics of plant were collected and subjected to the statistical analysis where the analysis of variance (ANOVA) illustrated significant effect ($P<0.05$) at 5% probability level. Treatment averages were evaluated by using the LSD test and the results were showed in the table 1. Tallest plants (141.87cm) were produced in T_2 (pruned on 31 December) followed by T_5 (pruned on 15 February) which gave height of 139.57 cm (Table 1). T_1 and T_3 (pruned at 15 December and 15 January) gave plant height of 138.30 and 137.38 cm, respectively, while T_4 (pruned on 31 January) gave the minimum height (135.77 cm) of plant. Evaluation of means regarding number of branches plant $^{-1}$, T_2 again performed well in this character also with 44.93 branches. T_4 performed well and produced equal number of branches (44.26) with the top treatment followed by T_3 and T_1 with 36.93 and 36.86 numbers of branches plant $^{-1}$ respectively while the T_5 gave the lowest number of branches that was 36.06 as shown in Table 1. For length of branches plant $^{-1}$ T_2 produced more length (117.63cm) than all other treatments followed by T_4, T_1 and T_5 with length of 114.27, 113.87 and 112.60 cm, respectively (Table 1). Shortest length of branches (111.87 cm) was observed in T_3 which was pruned 15 January.

Plants in T_2 (pruned on 31 December) and T_3 (pruned on 15 January) produced buds in minimum number of days (16.30 and 16.53 days, respectively) as compared to the other treatments while T_5 (pruned on 15 February) took maximum days (18.80) for producing new buds after pruning. T_4 and T_1 (pruned on 31 January and 15 December) with 17.70 days and 18.46 days were found to be significantly similar to one another as shown in table 1. For number of buds plant $^{-1}$, T_2 produced more buds plant $^{-1}$ (25.23) followed by T_4 with 24 buds, T_3 with 21.93 and T_5 with 21.06 buds while T_1 produced lowest number of buds plant $^{-1}$ (20.46) as compared with all other treatment (Table 1).

Effect of different dates of pruning on flower characteristics: Mean comparison of treatments regarding number of flowers plant^{-1}representssuperiority of T_2 over all other treatments (Fig. 1). Results showed that T_2 produced

Table 1. Effect of different pruning dates on vegetative growth of *Rosa centifolia*

Pruning Dates	Plant height (cm)	Number of branches plant $^{-1}$	Length of branches plant $^{-1}$	Days to first buds emergence	Number of buds plant $^{-1}$
15 December	138.30 bc	36.867 b	113.87 b	18.46 a	20.46 c
31 December	141.87 a	44.933 a	117.63 a	16.30 c	25.23 a
15 January	137.73 bc	36.933 b	111.87 b	16.83 c	21.93 bc
31 January	135.77 c	44.267 a	114.27 ab	17.70 b	24.00 ab
15 February	139.57 ab	36.067 b	112.60 b	18.80 a	21.06 bc
LSD Value	3.22	7.12	3.68	0.60	3.06

556.60 flowers plant^{-1}, followed by T$_4$ having 546.67 flowers plant^{-1}. T$_3$ and T$_1$ produced statistically similar number of flowers plant^{-1} while the T$_5$ produced minimum number of flowers plant^{-1} (514.97).

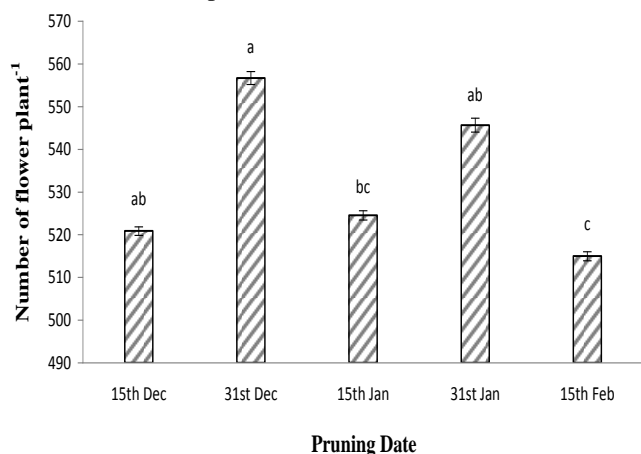February) obtained the second last position with fresh flower weight of 1.90 g (Fig. 3).

Figure 1. Effect of different pruning dates on number of flower plant^{-1} of *Rosa centifolia*

For diameter of flower, T$_2$ had a lion share for producing largest size of flower (5.25cm) among all other treatments. T$_5$ and T$_3$ ranked 2nd and 3rd with producing flower diameter of 5.01cm and 4.83cm respectively (Fig. 2). T$_1$ and T$_4$were statistically similar with producing minimum diameter of flower (4.64 and 4.63cm, respectively).
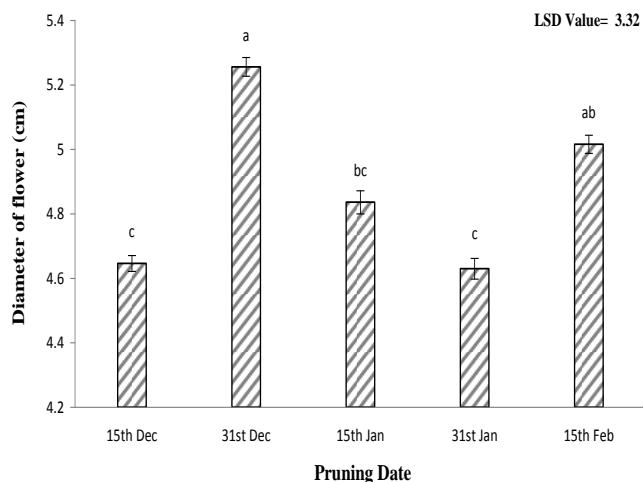

Figure 2. Effect of different pruning dates on diameter of flower of *Rosa centifolia*

Plants which were pruned on 31 December (T$_2$) showed maximum fresh weight of flower (2.13 g) followed by T$_1$ and T$_3$ with fresh flower weight of 2.00 g each which was statistically similar with one another while T$_4$ which was pruned at 31 January gave the minimum fresh flower weight among all the treatments that was 1.86 g. T$_5$ (pruned on 15
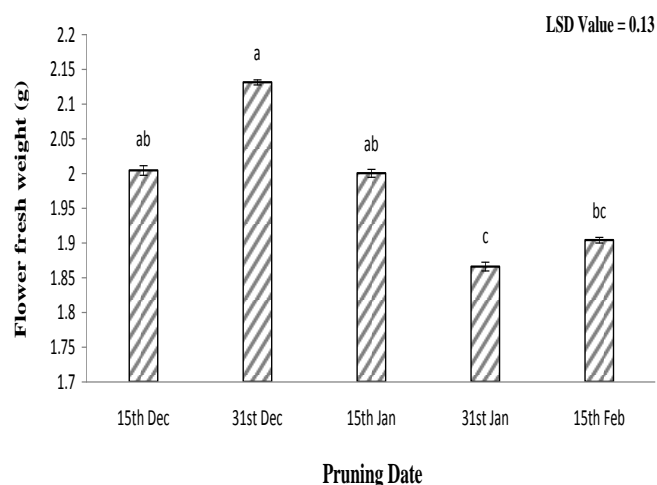

Figure 3. Effect of different pruning dates on fresh weight of flower of *Rosa centifolia*

Evaluation of various pruning treatments revealed that T$_2$ (pruned on 31 December) showed excellent plant growth with highest score of 3.93 among all the treatments (Fig. 4). T$_4$ (pruned on 31 January) and T$_5$ (pruned on 15 February) having the same plant growth with score of 3.70 each and T$_1$ (pruned at 15 December) gain good score (3.66) while the treatment T$_3$ (pruned on 15 January) obtained the minimum score (3.56) of plant growth among all other treatments.
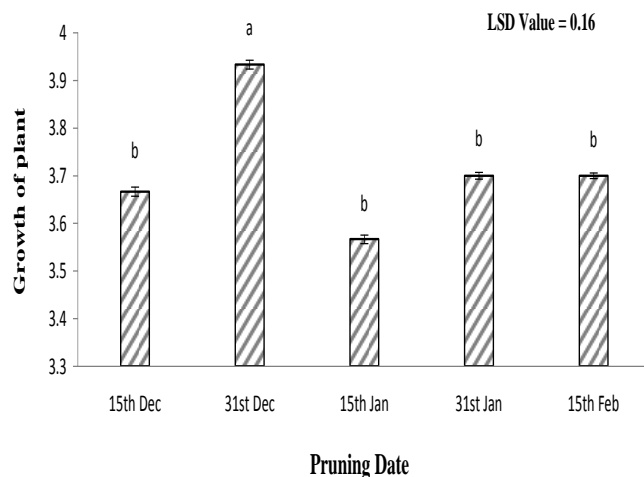

Figure 4. Effect of different pruning dates on plant growth of *Rosa centifolia*

DISCUSSION

Pruning is very important agricultural practice to maintain the health and shape of the plant. By proper timing of

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pruning, one can increase the yield and quality of flower. Rose flowers bump into a great mandate all over the year especially during winter season where most flowers are extinct and more chances of profitable marketing (Hassanein, 2010; Shafiq *et al*., 2006). Pruning is a useful technique used for restarting growth and stimulating flowering of plants since antique times (Parsons, 1956). Current results were synonymous to the findings of Saffari *et al*., (2004) who concluded that pruning during early winter season increases the plant height and other vegetative characteristics of plants. Pruning in winter increase the number of branches in rose plants, which is unswerving with the results of Saffari *et al*. (2004). More number of branches resulted more flower yield as the number of flowering bud increases. Thus, it appears that flower yield depends on number of branches. Due to pruning in early winter thickness of flower cane appear that affects the stem length of rose flowers. Holley (1973) noted 10 cm increase in stem length for each millimeter increase in diameter of mother cane and these findings also support our results. Result showed that plants which were pruned on end of December and mid of January produce earlier bud formation. Our result are accordance with the result of Martinez and Wool (2003) who observed that when Pistacia shrub pruned on mid of winter season then earlier bud production take place.

Ratikanth (2005) noted that the flower yield could be improved by 13.3 to 28.2% over the yields of plants pruned on first week of January. Yet, the highest flower yield was always in September regardless of pruning season. These results were very similar with our conclusions where maximum numbers of flowers were obtained when plants were pruned on mid-January and lowest flower yield produced by plants which were pruned mid-February. There were not very significant difference in diameter of flowers due to different pruning dates but it is very clear from this experiment and other existing literature that maximum diameter was obtained in pruned plants. Physiologically, fresh buds after pruning grow robustly as compared to older branches. Pruning mostly boosts the new growth with higher amount of plant reserved food materials, which are accorded with diameter. That might be the most conceivable reasons (Khattak *et al*., 2011). The results were according to the conclusion of Maguire (2007) who concluded that pruning in winter season produce maximum flower diameter. Flower weight significantly influenced by the pruning time and the plants which pruned at the start of winter produce maximum fresh weight of flowers. These results are in accordance with the result of Bhattacharjee (1985) and Saffari *et al*. (2004) who concluded that plants pruned in winter season produced maximum fresh weight of flowers. Pruning date had noteworthy effects on plant growth and quality of flower production (Hassanein, 2010). Maximum growth occurred when all cultural practices (i.e pruning, weeding, fertilization etc.) were applied at proper time and stage of

growth and development. Our results coordinated with the findings of Nantakumar and Balakrishnan (1998) who concluded that rose plants pruned on start of winter produce maximum growth. These conclusions also matched with the results of Holley (1959) who observed rose growth were excellent when pruned in early winter.

Conclusions: From the above results of this experiment, it is concluded that pruning during end of December of winter season was best for producing highest vegetative growth of plant and to develop flowers with improved quality and quantity of *Rosa centifolia*.

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