

## Research Article

### Effects of Time and Severity of Pruning on Growth and Branch Development of Rose (*Rosa spp.*)

Hamid Reza Zekavati

Department of Agriculture, Shirvan Branch, Islamic Azad University, Shirvan, Iran

**Abstract:** An experiment was conducted to investigate the effects of time and severity of pruning on growth and branch development of rose, at the Ferdowsi University, Mashhad, Iran in 2012. The experiment was designed based on Randomized Complete Block Design (RCBD). This study was replicated four times (January, February, March, April) and 2 type of pruning (heavy and light) and the rose cultivar used was miniator. Results of pruning-experiments showed significant differences in the parameters. Among the type of pruning, heavy pruning was produced maximum results for all the mentioned parameters. Among the time of pruning, maximum number of flowers (188.75) and plant height (63.9 cm) were recorded in January month. Minimum flowers (136.25), with smallest size (1.95 cm in diameter) were observed in April month. On the basis of the results obtained it is concluded that winter pruning had a substantial effect on certain important parameters i.e., flower diameter and flower number.

**Keywords:** Miniator cultivar, plant height, pruning, severity

## INTRODUCTION

Pruning is a very important and necessary step towards rose beneficial growth and increases the aesthetic values like profuse and larger blooms with inspiring colour and quality of the flowers (Gibson, 1984; Anderson, 1991). Malhotra and Kumar (2000) reported that pruning intensity has a definite role in regulating flower production in roses. Pruning is usually done in winter (January) before starting new growth in the spring. The summer pruning (August) is rarely used throughout the world as it exhausts the plants and hinders physiological activities. Chimionidou *et al.* (2000) observed that when flower stem was removed by pruning, flower initiated shortly after the start of axillary bud growth. However, Terada *et al.* (1997) reported that after the cut flower and pruning, growth rate decreased immediately. On the other hand, Uma and Gowda (1987) reported hard pruning delayed flowering while influenced other flower characters such increased length, bud length and diameter. Pruning in different rose cultivars are done principally for altering the growth phases to facilitate new growth and make it vigorous and profuse flower bud initiation, depending on the variety (Gibson, 1984). Roses need different types and timing of pruning depending on their variety (Hessayon, 1988). Repeated blooming roses such as floribunda and hybrid tea roses need a heavy annual pruning that is done in December-January (Schneider and Dewolf, 1995). Pruning also increases the percentage of high quality cut flowers (Han *et al.*, 1997). Pruning can also be used for the size control of

rose plants (Horan *et al.*, 1995). Roses should be pruned when the new buds start to swell up (Denison, 1979).

Rose (*Rosa spp.*) is one of the most economically important genus of ornamental, aromatic and medicinal plants with about 200 species and 20,000 cultivars widely distributed all over the world (Cuizhi and Robertson, 2003; Ritz *et al.*, 2005). There is a tremendous diversity of growth habit, flower form and colour among roses. Rose is the most popular of all the flowers because of its beauty and fragrance and is called the "Queen of Flowers" (Schneider and Dewolf, 1995). Roses are immensely important for landscaping and no garden is considered complete without roses (Gibson, 1984). Roses respond well to pruning and are believed strictly to be pruned every year regularly. The judicious removal of leaves, branches, buds, flowers and undesirable parts of the plant to increase its usefulness is termed as pruning (Schneider and Dewolf, 1995). Pruning is the management of plant structure and fruiting wood and involves removal of plant's top and root system to facilitate and increase its usefulness (Hessayon, 1988).

Different rose cultivars respond differently to sequences of pruning. Hard pruning is recommended for newly planted bush roses of the hybrid tea, grandifloras and floribunda tribes (Hessayon, 1988). Growers often use hard pruning to produce blooms for exhibition (Gibson, 1984). Moderate pruning is the accepted method for treatment of established garden roses, floribundas, hybrid teas, grandifloras and tree roses all respond best to this pruning practice (Denison, 1979). In Peshawar, it is a common observation that

due to this high temperature flowers performance is not satisfactory during the months of May-August i.e., flower size and shape is affected and petals are scorched (Khattak, 1991). Thus the flowering period is restricted to the months of March and April. Availability of quality cut flowers throughout the year needs to be explored. The main purpose of rose pruning is plant growth control to facilitate cultural operations. Cane renewal by stimulating "bottom breaks" and timing of flower production are also important aspects of growth control by pruning. The influence of the severity and time of pruning on subsequent flower production and renewal of shoots have frequently been reported (Kohl and Smith, 1970; Degeyter, 1975; Eccher and Lumiani Mignani, 1977). The present experiment was conducted to study the effects of time and severity of pruning on growth and branch development of rose. The purpose of this study was to determine the effect of severity of pruning on the growth characteristics of rose.

#### MATERIALS AND METHODS

The research project titled "Effect of time and severity of pruning on growth and branch development of rose (*Rosa* spp.)" was conducted at the Ferdowsi University, Mashhad, Iran in 2012. The experiment was designed based on Randomized Complete Block Design with four replications (RCBD). The experiment was replicated four times (10 January, 10 February, 10 March, 10 April) and 2 type of pruning: heavy (15 cm above the soil level) and light (40 cm above the soil level) and the rose cultivar used was miniator. During the research trial, experimental data were recorded on flower diameter (cm), number of flowers, number of branch, colour of flower and plant height (cm). First, remove all dead, diseased and damaged branches. Disease or weather damage usually appears as a dark discoloration in the pith of the cane. Remove sections ¼ inch above an outward-facing bud eye, going down the cane until the pith is cream colored like a fresh cut apple. Renewal shoots of more than 25 cm in length per plant were counted at the flowering stage of each treatment to record number of branches per plant. Occasionally, this means removing the entire cane down to the crown. Each year, the oldest branch can be removed at its base, which promotes growth of a new cane. Reduce the length of the remaining canes by about half. Any remaining leaves should be removed. Then, remove all leaves and other pruning debris from

the beds to help prevent disease. All the recorded data were analyzed with Analysis of Variance (ANOVA) procedures using the Statistical Software Package (SAS 9.1) and used Excel software to draw graphs. The differences between the means were compared by Least Significant Difference (LSD) ( $p \leq 0.05$ ).

#### RESULTS AND DISCUSSION

Data collected were analyzed statistically and the mean values of all the studied parameters were summarized into Table 1. Analysis of variance showed that the time and type of pruning as well as plant growth regulators had significant effects on plant height ( $p < 0.01$ ). The interaction between the time and type of pruning was not significant. Maximum height (63.9) was produced by rose cultivar in January month and with heavy pruning. Minimum value (53.8) was recorded in April (Fig. 1 and 2). Pruning at the first week of January led to more growth length than April month. Whereas, pruning at the first week of February caused shorter height of flower branch than January month. These results showed that an adequate time is necessary in which branches can grow longer enough having more flower buds resulting in higher yield. Similar result was also reported by Paul *et al.* (1995). Other studies of responses to pruning or insect defoliation have commonly reported that diameter growth is more affected than height growth (Langstrom and Hellqvist, 1991; Majid and Paudyal, 1992).

The number of flowers was significantly ( $p \leq 0.01$ ), affected by the time and type of pruning (Table 1). However, the interaction between the time and type of pruning was also significant ( $p \leq 0.01$ ). Maximum flowers (188.75) were produced by miniator cultivar in January month with heavy pruning. Minimum value (136.25) was recorded in April and with light pruning (Fig. 3). Similar results were observed by Khattak and Khattak (2001) who showed that the number of flowers in rose cultivars was affected differently; Pruning also had a significant effect. Here, it is worth mentioning that the pruned plants were cut back to about 40 cm and while they were sprouting and producing branches, the unpruned plants were still flowering.

The pruned plants were not flowering for around a month time and during this time the unpruned ones were flowering and those flowers were counted. That is one of the reasons why the unpruned produced more flowers. Mortensen and Gislerod (1994) also observed that hard pruning in July decreased the yield and stem length of flowers.

Table 1: Variance analysis (ANOVA) of different traits

S.O.V	df	Plant height	Number of flower	Flower diameter	Number of branch
Block	11	5.82 **	31.07 **	21.2 <sup>ns</sup>	4.52*
Type of pruning	1	2992.66**	793.50**	432.6 <sup>ns</sup>	5.04 <sup>ns</sup>
Time of pruning	3	187.95**	2102.02**	1201.7**	104.80**
Pruning*time	3	48.02 <sup>ns</sup>	276.63*	154.9 <sup>ns</sup>	12.40 <sup>ns</sup>
Error	77	18.07	38.52	30.7	5.21
CV (%)	-	9.47	19.31	25.02	16.49

\*, \*\*: Significantly different at 0.05 and 0.01 probability levels, respectively

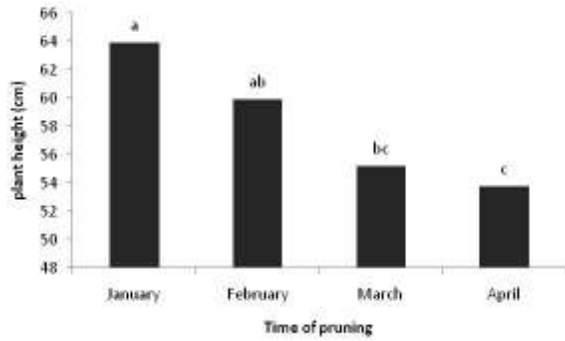


Fig. 1: The main effect of time of pruning on the plant height of rose

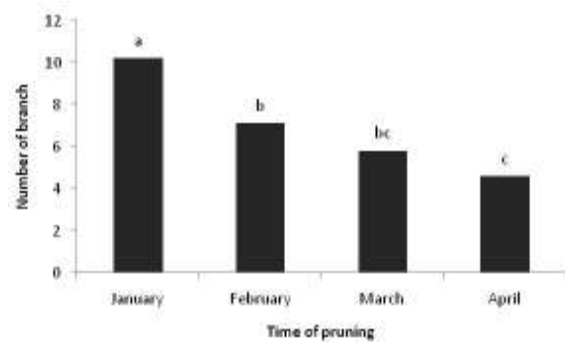


Fig. 5: The main effect of time of pruning on the number of branch of rose

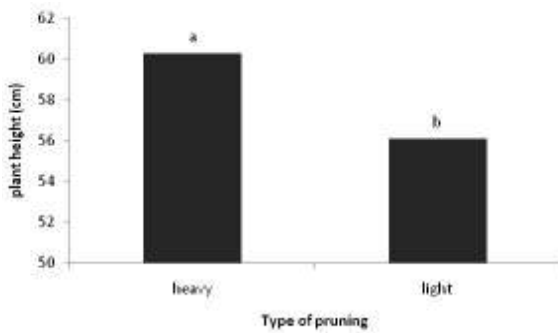


Fig. 2: The main effect of type of pruning on the plant height of rose

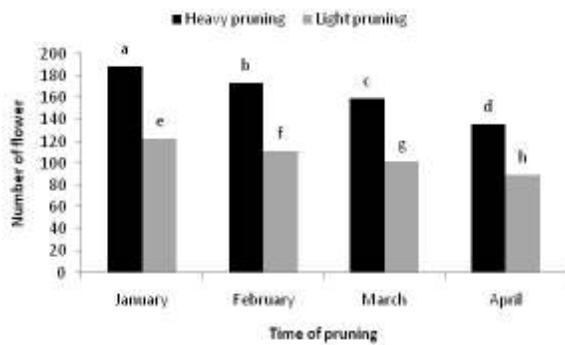


Fig. 3: The interaction effect of time and type of pruning on the number of flower of rose

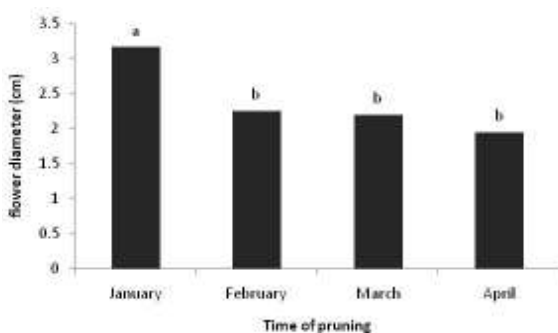


Fig. 4: The main effect of time of pruning on the flower diameter of rose

Statistical analysis revealed that the flower diameter was significantly ( $p \leq 0.01$ ) different for time of pruning (Table 1). Maximum flower diameter (3.16 cm) was produced by miniator cultivar in January month. Minimum value (1.95 cm) was recorded in April (Fig. 4). The interaction between the time and type of pruning was not significant. Hessayon (1988) reported varying flower diameters in different rose cultivars. It is thus apparent from the results that maximum diameter was observed in double pruned plants. Physiologically, fresh buds after pruning grow vigorously compared to older branches. Pruning mainly encourages the new growth with higher amount of plant reserved food materials, which are coincided with diameter. That might be the most plausible reasons. The number of branch was significantly ( $p \leq 0.01$ ) affected by the time of pruning (Table 1). Maximum branches (10.25) were produced by miniator cultivar in January month and minimum value (4.6) was recorded in April (Fig. 5). Hassanein (2010) reported that among the tested times, the second time of rose pruning achieved three weeks after the beginning of Autumn, gave significantly the highest number of renewal shoots and flowering buds per plant followed by the first time achieved at the beginning of Autumn.

On the basis of the results obtained it is concluded that winter pruning had a substantial effect on certain important parameters i.e., plant height, flower diameter and flower number. Winter pruning could improve the flower size and positive affected the number of flowers. In this case winter pruning cannot be recommended and further research work is suggested to be done in this connection. However, further research, covering a range of pruning severities, is required.

## REFERENCES

- Anderson, G.A., 1991. Charcateristics of English roses during their first year of establishment. OARDC special circular. Ohio Agric. Res. Dev. Center., 137: 28-29.

- Chimonidou, D.P., M. Bodson and M.N. Verhoyen, 2000. Correlation between internal and external stages of rose development. *Acta Hort.*, 515: 233-244.
- Cuizhi, G. and K.R. Robertson, 2003. *Rosa linnaeus*, Sp. Flora China, 9: 339-381.
- Degeyter, L., 1975. De Snoei van Kasrozen. B.V.O. Meded., 80: 1-6.
- Denison, E.L. 1979. Principles of Horticulture. Macmillan Pub. Co., New York, 2: 202-216.
- Eccher, T. and I. Lumiani Mignani, 1977. Ricerche sperimentali sulla potatura delle rose per fiore r eciso. *Riv. Ortoflorofruttic. Ital.*, 61: 1-11.
- Gibson, M., 1984. Growing Roses. Croom Helm Ltd., Provident House, Burrell Row, Beckenham, Kent, England BR3 1AT.
- Han, Y.Y., J.H. Woo, Y.G. Sim, K.B. Choi and B.S. Choi, 1997. Effects of non-irrigation and pruning methods during summer dormancy on yield and quality of cut rose. *J. Korean Soc. Hort. Sci.*, 38: 527-532.
- Hassanein, M.A., 2010. Improved quality and quantity of winter flowering in rose (*Rosa spp.*) by controlling the timing and type of pruning applied in autumn. *World J. Agric. Sci.*, 6(3): 260-267.
- Hessayon, D.G., 1988. The Rose Expert. Pub. Publications, Britanica House, Waltham Cross, Herts, England.
- Khattak, A.M., 1991. Performance of different exotic rose cultivars under the climatic conditions of Dera Ismail Khan. M.Sc. Thesis, Gomal University, D.I. Khan, Pakistan.
- Khattak, A.M. and M.A. Khattak, 2001. Performance of ten exotic rose cultivars under the climatic condition of Kohat. *Pak. J. Biol. Sc.*, 1: 7-8.
- Kohl, I.L.C. and D.E. Smith, 1970. Rose Plant Renewal. *Roses Inc. Bull.*, pp: 24-25.
- Langstrom, B. and C. Hellqvist, 1991. Effects of different pruning regimes on growth and sapwood area of Scots pine. *Forest Ecol. Manag.*, 44: 239-254.
- Majid, N.M. and B.K. Paudyal, 1992. Pruning trial for acacia mangium wildlife plantation in peninsular Malaysia. *Forest Ecol. Manag.*, 47: 285-293.
- Malhotra, R. and R. Kumar, 2000. Effect of pruning height, shading and polythene covering on growth and flower production of rose cv. Raktagandha. *J. Orna. Hort.*, 3: 94-99.
- Mortensen, L.M. and H.R. Gislerod, 1994. Effects of summer lighting, plant density and pruning method on yield and quality of greenhouse roses. *Gartenbauwissenschaft.*, 59: 275-279.
- Paul, T.M., M.A.A. Siddique and A.Q. John, 1995. Effect of severity and time of pruning on growth and flower production of *Rosa damascena* Mill. An important aromatic plant. *Adv. Plant Sci.*, 8: 28-32.
- Ritz, C.M., H. Schmuths and V. Wissemann, 2005. Evolution by reticulation: European dogroses originated by multiple hybridization across the genus *Rosa*. *J. Hered.*, 96(1): 4-14.
- Schneider, P. and G.P. Dewolf, 1995. Taylor's Guide to Roses. Houghton Mifflin Co., 215 Park Avenue South, New York, USA.
- Terada, M., Y. Kageyama and K. Konishi, 1997. The relationship between growth of a rose plant and its nutrient and water uptake in hydroponic culture. *J. Japan. Soc. Hort. Sci.*, 66: 149-155.
- Uma, S. and J.V.N. Gowda, 1987. Studies on the effect of pruning, nutrients and their interaction on growth and flowering of rose cv. Super Star. *Mysore J. Agric. Sci.*, 21(4): 455-460.