Influence of Time and Intensity of Pruning on Quality and Postharvest Performance of Cut Rose

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ABSTRACT

A field investigation was carried out during July 2008 to April 2009 in the farmer field of Gunjanagar-5, Chitwan, Nepal to evaluate the influence of time and intensity of pruning on quality and postharvest performance of cut rose cv. Super Tata (Rosa hybrida). The field experiment was laid out in a completely randomized block design with nine treatment combinations and replicated thrice. The treatments comprised of three dates of pruning i.e. 30th July, 15th August and 30th August and three pruning intensities i.e. heavy (6 buds per plant), medium (12 buds per plant) and light (18 buds per plant). Postharvest study was conducted in all the above treatments and repeated thrice at the central laboratory of IAAS, Rampur. Both time and intensity of pruning significantly affected quality and postharvest performance. Flowers stem diameter, fresh and dry weight of flower stem were found higher in July 30th pruned rose plants while, flower stem length was found longer (47.67cm) in August 15th ones. Flowers stem length (50.33cm) and diameter (0.60cm), length (2.91cm) and diameter (2.29cm) of floral bud, fresh and dry weight of flower stem were found highest from heavily pruned plants. The flowers from heavily pruned plants had early bud opening (4.53 days), highest floral diameter (9.13cm) and longest vase life (10.64 days). From this study, it revealed that highest quality cut flowers can be produced by heavy pruning whereas more quantity can be achieved by light pruning.

Key words: Time of pruning, intensity of pruning, vase life of flower

INTRODUCTION

Roses are symbol of beauty, fragrance and are used to convey the message of love (Arora, 2007). Rose is one of the nature's beautiful creations and is universally acclaimed as the Queen of Flower (Yadav *et al.,* 1989). The demand of rose cut flower is 2500-4000 sticks per day in Kathmandu and about 180 ropanies land is covered under rose cultivation (Joshi, 2009). Pruning is a major horticultural practice in rose cultivation (Edmond *et al.,* 1994). The different dates of pruning seem to have influenced flower yield and quality subsequently (Mukhophadhyay, 1990. Pruning rose plants in different dates was helpful in staggering the harvest of cut flowers. Several researchers have reported increased flower production with light pruning and quality blooms with severe pruning.

Postharvest life of cut flower is an important aspect in cut rose production. The specific Preharvest factors affecting vase life of cut flowers are genetic (Gelder, 1998), environmental (Mortensen and Fjeld, 1998) and agronomic factors such as soil, fertilizer, pruning, irrigation, plant protection measures and harvesting practices (Nowak and Rudnicki, 1990). Flower production is highly technical; lack of knowledge on these aspects leads to the poor quality of the produce and also increases the cost. Farmers get very low price of their produces. Availability of cut flower in market is low in quality as well as in quantity. There is no standard time and intensity of pruning for the market oriented quality rose production in Nepal. Therefore, this research was conducted to determine the optimum time and intensity of rose pruning for efficient growth, yield and quality of cut flower in a farmer's field in Gunjanagar-5, Chitwan, Nepal from July 2008 to March 2009.

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MATERIALS AND METHODS

The commonly grown rose cultivar in Chitwan 'Super Tata' having yellow color flower, one year old rose plants were taken as a test crop for the experiment. The treatment combinations of time and intensity of rose pruning were selected as treatments. There were 9 plants in each experimental plot and observation was taken from 3 middle plants. The individual plant was pruned three times at 15 days interval viz. Pruning on 2008 July 30, Aug. 15 and Aug. 30 to different intensities i.e., 6, 12 and 18 buds in each plant. The field experiment was laid out in a completely randomized block design having two factors with nine treatment combinations replicated thrice.

The rose plants were pruned to allow the intensity as desired. After pruning, cut ends were painted with fungicide paste (Bordeaux paint). All the intercultural operations such as hoeing, weeding, topdressing, irrigation, earthing up and mulching were done regularly. Flowers were harvested from Nov. 2008 to Apr. 2009 manually during evening retaining 10-12cm stem from the branch attachment. Observations were recorded for several vegetative, yield and quality parameters.

Postharvest study was conducted with five replications, repeating thrice at the central laboratory of IAAS, Rampur. The research material was cut rose stems from nine different treatment combinations of time and intensity of pruning. Glass bottles 320ml volume were taken as vase and distilled water was used for evaluation. In the laboratory, the harvested flower stems were given slant cut at uniform length of 30cm. Leaves were trimmed from the lower section of the stem retaining the uppermost three lobed leaves (Halevy and Kofranek, 1977). Dethroning was done to make easy handling of rose stems. After putting the cut flower (10cm dipped), the level of distilled water was maintained at 300ml in glass bottle. The head of the glass bottle was wrapped with aluminum foil and covered with cotton scab to prevent evaporative loss. Flowers were kept for evaluation in a well-ventilated room. The source of light was day light and from fluorescent tube light and the day length was maintained at 12hr. Temperature and relative humidity of the test room were measured daily with the help of thermo hygrometer. The transpiration loss of water was refilled everyday with the help of measuring rod. Flower vase life was measured 24hr after keeping the cut flowers in the vase. Each day, flowers were inspected for the vase life, bud opening, diameter of flower, water up-take, neck bending and flower quality.

RESULTS AND DISCUSSION

Quality parameters

Flower stem characteristics

The rose plants pruned on August 15 produced flowers having longest stem (47.67cm) which was at par with rose plants pruned on July 30 (47.11cm) and shortest stem (42.00cm) was produced from rose plants pruned on August 30 (Fig. 1) after harvest. Deepauw (1985) reported that the stem length of rose was only slightly affected by time of pruning.

The rose plants pruned retaining 6 buds produced flowers having longest stem (50.33cm) whereas shortest stem (41.00cm) was produced from rose plants pruned retaining 18 buds (Fig. 2). The rose plants pruned on July 30 produced flowers having highest stem diameter (0.58cm) and smallest stem diameter (0.48cm) was produced from rose plants pruned on August 30 (Fig. 1). Fig. 2 showed that the rose plants pruned retaining 6 buds produced flowers having highest stem diameter (0.60cm) and smallest stem diameter (0.47cm) was produced from rose plants pruned retaining 18 buds.

This might be due to the availability of more nutrients to each stem on rose plant that under heavy pruning than light pruning. Similar result was found by Bajwa *et al.,* (1998). The increase in flower stem length and diameter may be due to lesser number of stem produced and therefore, more nutrients coming to the share of each stem on heavily pruned rose plant. Similar result have been reported by Bajawa and Sarowa, 1977; Gupta and Singh, 1987.

Fig.1: Effect of time of pruning on flower stem length and flower stem diameter of cut-rose cv. Super Tata (*Rosa hybrida*) in Chitwan (2008/09).

Fig.2: Effect of intensity of pruning on flower stem length and flower stem diameter of cut-rose cv. Super Tata (*Rosa hybrida*) in Chitwan (2008/09).

The rose plants pruned retaining 6 buds produced flowers having highest leaf numbers in flower stem (15.67) whereas lowest leaf numbers in flower stem (11.33) was produced from rose plants pruned retaining 18 buds. This result might be due to the production of longer stem by the heavily pruned rose plants and thus has higher surface area for the production of leaves than light pruned.

Table 1: Effect of intensity of pruning on flower bud characteristics and fresh and dry weight of cut rose stem cv. Super Tata (*Rosa hybrida*) in Chitwan (2008/09).

Intensity of pruning	Flower bud characteristics		Fresh and dry weight of cut rose stem	
	Length of flower bud (cm)	Diameter of flower bud (cm)	Fresh weight (gm)	Dry weight (gm)
6 buds	2.911a	2.298a	14.53a	3.556a
12 buds	2.578b	2.043b	12.12b	3.013a
18 buds	2.233c	1.900c	10.30c	2.310b
CV%	10.92	6.72	11.16	18.45

[a] Means in the column followed by same letter in each treatments do not differ significantly at (p=0.05) by DMRT. SEM=Standard error of mean, LSD=Least significant difference and CV=Coefficient of variance.

Flower bud characteristics and fresh and dry weight of cut rose stem

The rose plants pruned retaining 6 buds produced flowers having highest flower bud length (2.91cm) and diameter (2.29cm) whereas smallest flower bud length and diameter (2.23cm and 1.90cm) was produced from rose plants pruned retaining 18 buds(Table 1). Higher amount of carbohydrates available for the individual flower stem in heavily pruned rose plants might have contributed to better vigor of plant having longer and bigger flower bud. Mukhopadhyay *et al.,* (1987) also agreed with this result.

The statistical analysis showed that, fresh and dry weight of cut rose flower was found to be significantly influenced by different intensities of pruning (Table 1). The rose plants pruned retaining 6 buds produced flowers having highest fresh and dry weight (14.53 gm and 3.55 gm) whereas lowest fresh and dry weight (10.30 gm and 2.31 gm) was produced from rose plants pruned retaining 18 buds. Higher fresh and dry weight of flower stem in heavily pruned rose plants might be related with higher stem length, stem diameter, leaf number in flower stem and flower bud length and diameter than medium and lightly pruned rose plants.

There was progressive increment in the number of petals per flower with increase in severity of pruning.

Postharvest performance

The longest vase life was found in the rose flowers produced from heavily pruned plants (10.64 days) followed by medium (9.87 days) and shortest vase life (9.05 days) was found from the lightly pruned ones. The variation in vase life of cut rose may be due to the availability of carbohydrate concentration for metabolic reactions. The flowers from heavily pruned plants have higher stem length and diameter, bud length and diameter. Thus, this might be contributed for the higher concentration of carbohydrate. Vase life of cut flowers is positively correlated with sugar concentration in petals (Ichimura *et al.,* 1999).

Effect of carbohydrate on the extension of flower vase life is known to be associated with improved water balance and inhibition of ethylene production (Dilley and Carpenter, 1975). Low level of carbohydrates induces endogenous ethylene production and increases flower senescence (Fjeld, 1991).

Table 2: Effect of intensity of pruning on postharvest performance of cut-rose cv. Super Tata (*Rosa hybrida*) in Chitwan (2008/09).

Treatments (Intensity of pruning)	Vase life (days)	Duration of bud opening (days)	Floral diameter (cm)
6 buds	10.64a	4.539c	9.139a
12 buds	9.870b	5.025b	8.593b
18 buds	9.058c	5.473a	8.139c
CV%	6.25	8.11	5.47

[a] Means in the column followed by same letter in each treatments do not differ significantly at (p=0.05) by DMRT. SEM=Standard error of mean, LSD=Least significant difference and CV=Coefficient of variance.

The earliest bud opening was found in the flowers from heavily pruned (4.53 days) followed by medium (5.02 days) whereas, longest time to bud opening was observed from the lightly pruned rose plants (5.47 days). Variation on days to flower bud opening might be influenced by carbohydrate concentration and similar variation has been observed in rose varieties (Ichimura *et al.,* 2002).

The highest floral diameter was found in the flowers from heavily pruned rose plants (9.13cm) followed by medium pruned (8.59cm) and lowest floral diameter was found from the lightly pruned rose plants (8.13cm). This variation might be due to variation in size of flower stem and bud. The variation in floral diameter has influence on the water uptake and that influence the vase life (Pun *et al.,* 2009).

CONCLUSIONS

Time of pruning affects all the quality parameters of rose. The early pruned (July 30) rose plants performed significantly better as compared to other dated of pruning in all aspects. Similarly, the performance of rose flowers was also found significantly different with various intensities of pruning. Among the three intensities, heavily pruned (6 buds in each plant) rose plants performed better in all vegetative growth, yield and quality attributing characteristics. Likewise, postharvest performance of flowers produced from heavily pruned rose plants was found superior as compared to other two intensities. This suggests that pruning of rose is an important aspect in cut flowers production. Sequential pruning can produce rose flowers at successive desired time. Grower should prune heavily to produce quality cut flowers whereas higher quantity of rose flowers can be achieved by

light pruning. In Chitwan condition, cut rose growers can prune their rose plants after rainy season to produce cut rose targeting festivals and marriage months leaving 10-12 buds in each plant for quantity and quality of cut flower.

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