EFFECT OF SUMMER PRUNING ON THE QUALITY AND PERFORMANCE OF ROSE CULTIVARS

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ABSTRACT

An experiment was conducted to investigate the effect of summer pruning on the quality and performance of rose cultivars at the Ornamental Horticulture Nursery Farm, NWFP Agricultural University, Peshawar, Pakistan to observe ten rose cultivars for their performance with and without summer pruning. The experiment was laid-out in Randomized Complete Block Design (RCBD) with split plot arrangement having 2 factors. There were two treatments i.e. pruning in summer and no pruning in summer. Among the cultivars that received summer pruning, cv. Lintern was the earliest to sprout (in 6.50 days). Maximum number of petals per flower (31.36) and number of flowers (20.05) were recorded in unpruned plants, while the summer pruned plants produced minimum results for all the mentioned parameters. Among the cultivars, maximum number of petals (47.59), number of flowers (26.64) and plant height (125.00 cm) were recorded in cv. Baby Bray. Cv. Lintern produced flowers with maximum persistence (11.06 days) and cv. Sharif Asma produced the biggest flowers (7.08 cm in diameter). Minimum flowers (5.55), with smallest size (5.15 cm in diameter) were observed in cv. Lintern, whereas cv. Bright Smile produced minimum petals (10.31 per flower) with minimum flower persistence (5.03 days) during the summer seasons.

Key Words: **Rose, Rosa hybrida, Pruning, Cultivars**

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INTRODUCTION

Rose (*Rosa hybrida* L.) belongs to the family Rosaceae and is one of the most important woody perennials including shrubs, bushes of various size ramblers and climbers as well as very small plants known as miniatures (Encyclopedia Americana, 1984; Gibson, 1984). 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). Prunning 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).

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. Chimonidou *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).

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 present experiment was conducted to study the effect of summer pruning, on quality of cut roses, observe the overall performance of rose cultivars and to find out the interaction of pruning frequency and rose cultivars for their optimum performance.

MATERIALS AND METHODS

The research project titled "Effect of summer pruning on the quality and performance of different rose (Rosa spp.) cultivars" was conducted at Horticultural Nursery Farm, Agricultural University, Peshawar, Pakistan during 2005-2006. The performance of ten rose cultivars was studied with non-conventional summer pruning. The experiment was laid out in Randomized Complete Block Design (RCBD) having two factors arranged in a split plot manner. The rose cultivars were arranged in main plots, while the pruning was subjected to sub-plot. There were ten treatment combinations and eight plants of each cultivar in each plot. In August, four plants of each cultivar in each treatment were pruned, while four plants were left unpruned. The data were collected during the summer season.

The experiment was replicated four times and the rose cultivars used were Bright Smile, Fellowship, Black Nigret, Lintern , Bridal Neck, Day Dream, Baby Bray, Smear Gold, Trust 2000 and Sharif Asma. During the research trial, experimental data were record on days to sprouting, number of petals, flower diameter (cm), number of flowers, flower persistence (days) and plant height (cm). All the recorded data were analyzed using Analysis of Variance (ANOVA) and the means were separated by Least Significant Difference (LSD) test (see Jan, *et al*., 2009). Statistical computer software, MSTATC (Michigan State University, USA) was applied for computing both the ANOVA and LSD.

RESULTS AND DISCUSSION

Data collected were analysed statistically and the mean values of all the studied parameters were summarised into Table I. The results are discussed as under.

Days to Sprouting

The mean values revealed that different rose cultivars exhibited highly significant ($P \leq 0.001$) effect over days required for sprouting. The results showed that sprouting was accomplished earlier with minimum days (6.50) in cv. Lintern, while the cv. Day Dream took longer days to sprout (10.38 days). Though all the 10 cultivars of roses were subjected to the equal advantages of climate, soil nutrient and cultural practices, the variation in days to sprouting was presumably due to their genetic constitution which results in some cultivars better adaptation to the existing climate in terms of early or late sprouting. Similar results were observed by Khattak *et al*., (1995) and Khattak and Khattak (2001) who showed that rose cultivars sprouted differently in both their experiments. It is worth mentioning that data on days to sprouting were only recorded for those which were pruned in summer (one factor RCBD analysis). The unpruned plants data could not be recorded. So in this case, results for unpruned and pruned and the interaction are not available.

Days to Flowering

The data regarding days to flowering, Table I shows that the different rose cultivars had a highly significant ($P \leq 0.01$) effect on flowering time. It is visible from the mean values that maximum (39.50) days to flowering were taken by cv. Baby Bray, closely followed by cv. Day Dream. The rest of the cultivars behaved alike where cv. Bright Smile was the earliest to flower taking minimum (28.00) days to flowering. The variation in flowering time may be due to the varietal characteristics of these cultivars. These results are in accordance with those of Khattak and Khattak (2001) who also found variation in different rose cultivars pertaining to their flowering time.

Table I ***Effect of summer pruning on the quality and performance of rose cultivars. Means in their respective groups followed by different letters are significantly different (P≤0.01 or P≤0.001: upper case, and P≤0.05: lower case) according Least Significant Difference (LSD) test***

CULTIVARS	Days to sprouting	Days to flowering	Number of petals	Flower diamete (cm)	Number of flowers	Flower persistence (days)
Bright Smile	8.4 BC	28.0 B	10.3 F	6.1 CD	19.5 B	5.0 D
Fellowship	9.8 AB	31.4 B	17.3 EF	7.1 A	15.6 CD	7.7 BC
Black Nigret	9.8 AB	30.1 B	25.2 BCD	6.2 BC	9.6 F	6.7 C
Lintern	6.5 C	30.9 B	46.8 A	5.2 F	5.6 G	11.1 A
Bridal Neck	9.0 AB	32.9 AB	31.6 B	6.0 CD	19.4 B	7.9 BC
Day Dream	10.4 A	38.8 A	28.8 BC	5.3 EF	18.2 BC	8.8 B
Baby Bray	8.8 AB	39.5 A	47.6 A	5.3 EF	20.6 A	7.8 BC
Smear Gold	9.9 AB	34.5 AB	23.3 CDE	5.8 CDE	12.6 DEF	8.9 B
Trust 2000	9.3 AB	31.6 B	20.8 DE	6.8 AB	13.5 DE	6.9 C
Sharif Asma	8.5 AB	33.3 AB	47.3 A	7.1 A	11.1 EF	7.6 BC
Significance	***	**	***	***	***	***
LSD Values	0.91	7.07	7.18	0.62	3.50	1.64
PRUNING						
Unprunned	×	×	31.4 a	5.9 B	20.1 A	8.0
Prunned	×	×	28.4 b	6.4 A	10.3 B	7.7
Significance	×	×	*	***	***	NS
INTERACTION						
Cv x Pruning	_	_	***	NS	***	*

NS: non significant *: significant at P≤.05 **: significant at P≤.01 ***: significant at P≤.001
×: Data not available

Number of Petals per Flower

As reported in Table I, the different rose cultivars (P≤0.001), as well as, pruning P≤0.05) had significant effects on the number of petals flower^{-1}. However, the interaction between the cultivars and pruning was also significant. A comparison of the cultivars revealed that maximum (47.6) petals were produced by cv. Baby Bray, closely followed by cultivars Sharif Asma and Lintern producing 47.3 and 46.8 petals per flower respectively. Cultivars Bridal Neck, Day Dream and Black Nigret behaved alike producing 31.6, 28.8 and 25.2 petals per flower respectively, while cv. Bright Smile produced minimum (10.13) petals. It is thus apparent from that results that cv. Baby Bray showed superiority over the other cultivars of rose. We are aware with the fact of nature that even single cultivars of the same species did not assign similar respond under the same environment. Hence putting forward the fact, the cultivars may respond differently to the environmental conditions. Pruning also significantly affected the number of petals. Maximum number of petal per flower (31.36) was counted in unpruned plants, while it declined to 28.42 petals per flower in pruned plants. The main reason for the best performance of unpruned plant could be that unpruned plants stored energy and used it for vigorous growth and production of more petals, whereas, the pruned plants were more exhausted, compared to unpruned ones, exhibiting poor growth and less petals per flower.

The interaction between cultivars and pruning (data not shown) exhibited highly significant results. Maximum (57.50) petals per flower were examined in unpruned plants of cv. Sharif Asma, while minimum (9.94) were found in prunned plant of cv. Bright Smile. From the results, it is obvious that cv. Sharif Asma, when left to unpruned, grows bigger and thus produced more petals.

Flower Diameter

Statistical analysis revealed that the flower diameter was significantly (P≤0.001) different for both the cultivars and pruning. Among the cultivars, maximum flower diameter (7.1 cm) was recorded for two cultivars i.e. Sharif Asma and Fellowship. These were followed by cv. Trust 2000 and cv. Black Nigret producing flower diameters of 6.8 cm and 6.2 cm, respectively, whereas cultivars Day Dream and Baby Bray both produced 5.3 and Smear Gold produced 5.8 cm flower diameter. Minimum flower diameter (5.2 cm) was exhibited by cv. Lintern. This may be due to the varietal characteristics of the different cultivars, which varied from one another in terms of flower diameter. Hessayon (1988) also reported varying flower diameters in different rose cultivars. Pruning also had significant effect on flower diameter. Maximum diameter (6.4 cm) was measured in pruned plants, while minimum (5.9 cm) was recorded in unpruned plants. It is thus apparent form 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.

Number of Flowers

The number of flowers was significantly affected by the different rose cultivars (P≤0.001), as well as, pruning (P≤0.001) Table I. However, the interaction between the cultivars and pruning was also significant. Maximum flowers (20.6) were produced by cv. Baby Bray, followed by cultivars Bright Smile, Bridal Neck and Day Dream, which behaved alike producing 19.5, 19.4 and 18.2 flowers per plant respectively. Minimum value (5.6) was recorded in cv. Lintern. The maximum flowers in cv. Baby Bray were perhaps produced due to its better adaptability in the environment compared to others. 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. Maximum (20.1) flowers per plant were counted in treatments with unpruned plants, whereas minimum flowers (10.3) were observed in pruned plants. Here, it is worth mentioning that the pruned plants were cut back to about 22 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.

Interaction between pruning and rose cultivars also had significant effect on flower number. Maximum flowers per plant (43.5) were counted in unpruned plants of cv. Baby Bray, whereas minimum (5.2) flowers per plant were observed in pruned plants of cv. Litern (data not shown). From the results, it obvious that individual effects of pruning and rose cultivars interact when some cultivars, such as Baby Bray, which are left to unpruned will grow longer and produce more flowers than others.

Flower Persistence

The data pertaining to flower persistence are also given in Table I. The flower was significantly affected by the different rose cultivars (P≤0.001), while the effect of pruning was not significant. Moreover, the interaction between the cultivars and pruning was also significant. Maximum flower persistence (11.1 days) was noted in cv. Linren, while minimum (5.0 days) were found in cv. Bright Smile. Many of the other cultivars, including Fellowship, Bridal Neck, Day Dream, Baby Bray, Smear Gold and Sharif Asma behaved alike; this parameter is quite beneficial from gardening point of view. The higher value recorded in cv. Lintern might be because the plant produced flowers with strongly held petals which retained on the plant for longer period than other rose cultivars. Khattak *et al*., (1995) also observed that some rose cultivars had longer flower persistence than others in their study on ten different rose cultivars.

The interaction between cultivars and pruning was also found to be significant. Maximum flower persistence (12.8 days) was observed in unpruned plants of cv. Lintern, while minimum persistence (5.0 days) was recorded in both the pruned and unpruned plants of cv. Bright Smile (data not shown). Again cultivars interaction with pruning effect, the cv. Lintern exhibited superior response when it was left unpruned.

CONCLUSION AND RECOMMENDATIONS

On the basis of the results obtained it is concluded that 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. In this case summer pruning cannot be recommended and further research work is suggested to be done in this connection.

Among all the ten rose cultivars, Baby Bray and Lintern produced maximum petals, Fellowship and Sharif Asma gave maximum flower size, Baby Bray produced maximum flowers and Lintern gave maximum persistence. So they are recommended for Peshawar region for the mentioned reasons.

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