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Title: Arial (Font); 14 pt (Size); Bold (Style); Center location; Double space; Capitalize the first letter of all title words.

Effect of Shading during Stenting Propagation on Rooting and Subsequent Growth of Two Rose Cultivars

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Abstract: Arial (Font); 12 pt (Size); Bold (Style);

Abstract This study was conducted to investigate the effect of light intensity during a winter season on rooting and subsequent growth of stenting propagated cut rose (*Rosa hybrida* Hort.) cultivars 'Pink Aurora' and 'Yellow King' in an effort to develop an efficient stenting propagation method for domestic rose cultivars. To facilitate graft joining, both base of scion and top of rootstock, removed of leaves, were cut together at a 45° angle. Single node scions, each with a five-leaflet leaf, were grafted on Rosa indica 'Major' as the rootstock. A scion-rootstock union was stuck in a rockwool cube (5 cm × 5 cm × 5 cm, Grodan, Denmark) on Dec. 29, 2008 and was placed in a graft-take chamber for five days before being moved to a misted greenhouse bench. Plants were grown under 0, 35, or 55% shading of the incident sunlight. Rooting and growth were affected by the light intensity and cultivar. In both cultivars, rooting and root growth were accelerated and % rooting increased under higher light intensities. No shading generally showed the highest percent rooting, shoot length, shoot weight, length of longest root, and root weight. The greatest rooting and subsequent growth of stentingpropagated plants were found in the 0% shading. The results suggested that shading was not necessary during a winter season production.

Text: Arial (Font); 11 pt (Size); Plain (Style). Please provide an abstract of 1550 to 1600 letters (including blanks). The abstract should not contain any undefined abbreviations or unspecified references. Do not put any figures and tables into abstract.

Additional key words: cut rose, cutting-graft, light intensity, photosynthetic photon flux density

Additional key words: Arial bold (Font); 11 pt (Size); Italic (Style).

Keywords (text): Please provide 5 to 7 keywords which can be used for indexing purposes. Key words should not be used if they used in title.

Introduction

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Successful adventitious rooting during stenting propagation depends upon several factors, including the physiological condition of the stock plants and the environmental conditions during adventitious root formation. Factors affecting rooting in the stenting propagation are node position, number of leaflets left and picking time on the cuttings, light intensity, temperature, humidity, medium, and plant growth regulators. Also, it is well known that the original leaf left on single node softwood stem cuttings of roses has a strong effect on survival and rooting of cuttings (Moe 1973).

Introduction (text): Arial (Font); 11 pt (Size); Plain (Style); 1.5 space; Indentation (First line 2.5 ch). Please provide an introduction of more than 2500 letters (including blanks).

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Tables & Figures

Figure parts should be denoted by upper-left hand corner with capital bold letters (A, B, C, etc.) Do not use small letter (a, b, c, etc.).

Fig. 1.: Arial (Font); 11 pt (Size); Bold (Style).

Fig. 1. Course of stenting used in Rosa hybrida: A, preparation of harvested scion and rootstock; B, both base of the scion and top of the stock cut simultaneously at a 45° angle for grafting; C, uniting the cut surface of a scion and a rootstock using a piece of split tube; D, wrapping the united and tubed area with parafilm; and E, grafted tissues stuck in a rockwool cube and placed on a fogged propagation bench.

Figure (text): Arial (Font); 11 pt (Size); Plain (Style).

Table 1. Effect of shading (%) during propagation on the growth of two rose cultivars measured at 62 days after stenting.

Cultivar	Shading (%)	Shoot length (cm)	No. of roots	Length of longest root (cm)	Chlorophyll (SPAD)	Fresh wt. (g)		Dry wt. (g)	
						Shoot	Root	Shoot	Root
'Pink Aurora'	0	8.7 ab[z]	3.6 bc	5.9 bc	28.6 a	0.54 b	0.20 bc	0.18 a	0.07 b
	35	7.7 ab	4.3 ab	5.3 c	29.6 a	0.39 c	0.24 bc	0.12 a	0.07 b
	55	6.9 b	3.3 bc	4.9 c	31.8 a	0.34 c	0.16 c	0.10 a	0.05 b
'Yellow King'	0	9.8 a	5.1 a	7.7 a	29.1 a	0.74 a	0.44 a	0.27 a	0.15 a
	35	8.3 ab	4.1 b	7.1 ab	29.9 a	0.55 b	0.26 b	0.18 a	0.08 b
	55	6.5 b	2.7 c	5.7 bc	31.9 a	0.35 c	0.16 c	0.11 a	0.05 b
F-testy	Cultivar (A)	NS	NS	**	NS	**	**	NS	**
	Shading(B)	*	**	*	NS	***	***	NS	***
	A×B	NS	*	NS	NS	NS	**	NS	**

[z]Mean separation within columns by Duncan's multiple range test at p = 0.05.
[y]NS, *, **, ***, Nonsignificant or significant at p = 0.05, 0.01, or 0.001, respectively.

Table: Arial (Font); 11 pt (Size); Bold (Style).
Figure (text): Arial (Font); 11 pt (Size); Plain (Style).

Materials and Methods

Materials and Methods: Arial (Font); 12 pt (Size); Bold (Style); Center (Location)

Plant materials

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Plant materials, grown in a commercial rose farm (Dowon Rose Farm, Gimhae, Korea), consisted of flowering stems with full-grown leaves and just opening flowers. After normal harvesting, each individual stem was kept apart and cut into sections with a five-leaflet leaf and a dormant bud. First grade flowering shoots

were harvested at the stage when two sepals were free from the flower bud (Jensen and Hansen 1971). Two cultivars of domestic cut rose used in this study were a standard cultivar 'Pink Aurora' and a spray cultivar 'Yellow King'. Rosa indica 'Major' was grown as a rootstock material in a commercial greenhouse (Borame Rose Farm, Gimhae, Korea). The softwood material was harvested at a stage when leaves are well developed and thorns can be broken off easily (van de Pol et al. 1986).

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Results and Discussion

Results and Discussion:
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Fig. 2 shows effect of shading (%) on the shoot and root growth of cut roses measured at 62 days after stenting. The shading used in stenting propagated roses was significantly affected to shoot length, number of roots, length of the longest root, fresh weights of shoot and root, and root dry weight (Table 1). In both cultivars, rooting and root growth were accelerated and percent rooting increased under higher light intensities (Fig. 3). Similar results were reported by Moe (1973) who described that rooting of 'Roswytha' rose cuttings was enhanced at increased irradiance. Choi et al. (2000) reported that time for root development decreased and percent rooting increased under higher light intensities. Bredmose (1998) also reported an enhanced response resulting from increased photosynthetic photon flux density (PPFD) for rose cuttings. Generally, high light intensities promoted photosynthesis necessary for root development (Veierskov et al. 1982), while excessively high light intensities were not good for rooting because of water stress (Mudge 1995).

Results and Discussion (text): Arial (Font); 11 pt (Size); Plain (Style); 1.5 space; Indentation (First line 2.5 ch). Please provide an introduction of More than 3000 letters (including blanks)

Acknowledgements

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