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Short communication

Studies on vegetative propagation of *Rosa canina*

Z. Izadi, H. Zarei and M. Alizadeh*

Dept. of Horticulture Science, Gorgan University of Agricultural Sciences and Natural Resources, Gorgan, Iran

ABSTRACT

Current research was performed with the goal of investigating latest vegetative propagation method dogrose (*Rosa canina*), which mainly used as rootstock for hybrid tea scion varieties. A mixture of cocopeat and perlite was found effective for rooting stem cuttings having a size of 10 cm and with two leaves. Treatment of graft portion with 5000 ppm IBA in stentling method showed higher graft success (68.7%) and root number (2.09) with cv. Dolcevita. IBA treatment at the graft portion was more successful than control cuttings and was ready for transplant, *i.e.*, 20 days earlier.

Key words: Rose, rooting media, cutting length, stenting, IBA.

The genus *Rosa* comprises hundreds of species and thousands of cultivars. Roses are undoubtedly, one of the most economically and favorite flowers in the floriculture industry. Rose plants are propagated by seed, stem cutting, grafting, budding, cutting-graft (stenting), cutting-budding, root grafting and tissue culture (Nazari *et al*., 11). In grafted plants, vigour of the genotype used as stock is transferred to the scion and thus influences its grown and productivity (Cabreva, 4). Dog rose is the most important rootstock for the Dutch cut rose industry. This study focused on effect of some factors (cutting size, rooting media, auxin treatment on the grafting portion) on the Dog rose cutting and stentling success. There are many physiological and environmental factors that influence adventitious root formation (Couvillon, 6). One of the most important factors on successful rooting of cuttings is having good rooting-medium. Different medium and their mixture are used for rooting bed. Physical structure of the medium is directly or indirectly effective on rooting. Rooting is correlated to appropriate content of oxygen in the medium. Cutting length, node position and leaf area were considered to be the important factors affecting rooting (Raza-ul-Haq, 12). Auxin treatment of graft portion is known to influence the cell division and development of vascular tissues (Mckenzie and Deyholos, 10). In the final stage of graft formation, functional vascular connections are created due to auxin. Therefore, the present study was undertaken using dog rose rootstock and a scion variety for improving the success as graflting.

Two commercially important specie of rose, dogrose and Dolcevita (cut flower and greenhouse rose) were used for experiments. All experiments were performed in late September 2011, in an Experimental Greenhouse of the Gorgan University of Agricultural Sciences and Natural Resources. Experiment was based on a completely randomized design with three replications, where each replication consisting of 15 cuttings under mist system. Shoots pruned from the stock plants in the morning, were immediately placed in the bucket filled with fresh tap water. Then cuttings (10 cm long and 4 mm dia.) were prepared with at least two leaves. Bottom of the cuttings were wounded by clipper on opposite side of the base. The cuttings were treated for 5 sec. with 5,000 ppm indole-3-butyric acid (IBA) dissolve in 50% ethanol. The cuttings were then inserted in mixture of cocopeat + perlite (1:2) and perlite media under mist system. In order to protect the cuttings from fungal diseases, cuttings and media were treated with 3000 ppm carbendazim. Intermittent mist was operated for 2 min. at every 45 min. from 7:00 AM to 8:00 PM daily and twice around midnight. Throughout the experimental period, the humidity and temperature of the greenhouse were measured using a digital thermometer and hygrometer. The mean temperature and humidity during the study period were 30°C and 70% respectively. Cuttings were collected after 25 days and examined for rooting percentage, root number and root length. All cuttings with roots longer than 0.5 cm were included in measurement.

Another experiment was undertaken to note the effect of cutting size on rooting. Cuttings were prepared in two sizes, *viz*., 5 and 10 cm length. These cuttings were prepared without leaf and were planted in perlite medium. In other experiment, the semi-hardwood stem cuttings with at least two nodes and 4 mm dia. of dog rose were used for rootstock. The scions with one node and one leaf (including two leaflets) collected from cut rose cv. Dolcevita at faded

*Corresponding author's E-mail: guasnir@gmail.com

flower stage. The scion sticks were then appropriated to the thickness of rootstock. Scions then were grafted (omega grafting method) onto 4 cm length cuttings of the rootstocks. Scions and rootstocks with acceptable smooth cut could be grafted together with the maximum overlap of the cambium layer. The end of rootstock and grafting portion were treated with 5000 ppm IBA. Plastic tape was used for wrapping the grafted portion. Immediately after grafting, the cut surface was thoroughly covered by grafting wax. Stentlings[1] rooted in the cocopeat-perlite (in 1:2 ratio) medium. Temperature, humidity and all other conditions of the greenhouse were the same as the above experiments. The grafting union took place around 57 days in the mentioned conditions and in control cuttings, however this was seen for about 37 days in treatments receiving IBA in grafting portion. Root number, root length, rooting and healing percentage were recorded. SAS software was used for the analysis of data. Comparing of means were done with Duncan's test.

Analysis of data showed that rooting media had no significant effect on the root length and root number, but significant effect on rooting percentage (Table 1). Media influenced the percentage of Dog rose cuttings that rooted, as reported for a number of woody ornamental species. The medium can influence the percentage rooting and type of root system (Copes, 5). Intermittent mist system is commonly used to reduce transpiration and water loss from cuttings during the propagation. A problem with this system is over wetting of the rooting medium. Water and air compete for pore space in medium and oxygen availability may be reduced as the volume of water in the medium is increased. Results of several researches have showed that physical characteristics of media including; particle size, are less important in rooting performance than are air and water content. Oxygen deficiency or over wetting of planting medium may led to propagation failure (William *et al*., 12). There are several other important elements like N, P, Ca, Mg, Mn, B, Zn, which confirmed for having key role in the process of rooting (Blazich, 3).

Cocopeat was noted as the best growing media alone or as mixtures and had acceptable pH, electrical conductivity, ideal C:N ratio (Awang *et al*., 1), although in current research mineral element content of the rooting medium wasn't tested, however the lowest concentration of N, P and K is related to perlite substrate (Blazich, 3), but cocopeat has been recognized to have high water holding capacity, which causes poor air-water relationship, leading to low aeration within the medium, thus affecting the oxygen diffusion to the roots. Incorporation of coarser materials into cocopeat could improve the aeration status of media (Awang *et al*., 1). It seems a mixture of organic and mineral material could prepare good condition for rooting of the cuttings. Although there was no significant difference between root length and root number of two growing media, mixture of cocopeat-perlite helped in increasing the rooting percent of Dog rose cutting.

Investigation of cutting size on rooting of Dog rose showed that effect of treatment on number of root, percentage of rooting were significant but treatment did not have significant effect on rooting (Table 2). Cuttings with 10 cm size produced root and their vegetative bud became active and produced leaf, whereas 5 cm cuttings gave only roots, without leaf growth. This might be due to higher nutritional reserve for both processes. Effect of leaf on rooting can be related to photosynthesis, producing carbohydrate and phyto-hormones. The rooting capacity of many cuttings have been correlated to their carbohydrates and auxins helping to initiate root primordia (Bartolini *et al*., 2). Results of several researches have showed that root growth is only affected by current photosynthesis and not by reserves formed previously in leaves (Lopez and Runkle, 9). In addition to carbohydrate, leaf synthesizes, which controls or influences most aspects of plant development and physiology (Keller *et al*., 7). Auxin influences cell division and root initiation hence, cuttings which were treated with IBA promotes rooting. More root number and growing shoots on cuttings were noted with 10 cm length cutting.

Root number, root length, success of graft indicated that the samples, which were treated with IBA in their graft portion, had maximum root and the highest rooting percentage in contrast to control cuttings. Treatment of IBA on grafting portion, had no significant effect on the number of leaves (Table 3). After 37 days after grafting, 68% cuttings treated with IBA in graft portion, the healing process was completed, whereas only 25% of was noted in control. On the other hands treatment of graft portion with IBA resulted in callus formation, resulting in swelling and the vascular connection formed was early. Auxin is often considered as the main phyto-hormone involved in the regulation of cambial activity and its promotory effect on cambial cell division. Cambium sensitivity to auxin appears directly linked to the ability of cambial cell to polar transport of the regulator (Lachaud *et al*., 8). In the current study, vascular contact occurred in IBA treated cuttings earlier than control, whereas in scions containing leaf, auxin and carbohydrate produced in leaf, moves to grafting portion and base of stock. It helps unity of graft and interaction

[1]Stenting is a plant propagated through cutting-grafting method.

Table 1. Effect of rooting media on root length, root number and rooting percentage in *Rosa canina*.

Treatment	Root number	Root length (cm)	Rooting percentage
Cocopeat-perlite	8.04[a]	3.56[a]	84[a]
Perlite	10.26[a]	2.55[a]	79[b]

*Column values with similar alphabets are not significant using the Duncan's test

Table 2. Effect of cutting size on root length, number of root, percentage of root (non simillar letter at table showed there are significant different at the 5% level using the Duncan's test).

Treatment	No. of roots	Root length (cm)	Rooting (%)
5 cm cutting	1.39[b]	0.68[a]	59[b]
10 cm cutting	2.15[a]	1.31[a]	82[a]

*Column values with similar alphabets are not significant using the Duncan's test

Table 3. Effect of IBA treatment on grafting place for rooting.

Treatment	Root No.	Root length (cm)	No. of leaflet	Grafting take (%)
Treated sample	2.09[a]	1.67[a]	1.69[a]	68.7[a]
Control sample	1.00[b]	1.25[b]	1.56[a]	25[b]

*Column values with similar alphabets are not significant using the Duncan's test

of endogenous IAA with exogenous applied IBA for emergence of root primordia. Stentlings which were well rooted in the cocopeat-perlite and also helped in the unity of grafts. The stentlings with IBA treatment at the graft portion were more successful than control cuttings and were ready for transplant, 20 days earlier.

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