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Growth Regulators and Sucrose Influence on Rooting and Sprouting of Karonda (*Carissa carandas* L) cuttings

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Abstract: *Influence of different concentration of growth regulators and sucrose on rooting and sprouting of karonda cuttings was studied at Dr YSRHU, Rajendranagar, Hyderabad.Semi hardwood cuttings of Karonda were treated with various concentrations of sucrose and growth regulators viz., 2 and 4 per cent sucrose, 7000, 8000 and 9000 ppm IBA and 1000, 2000 and 3000 ppm NAA along with control (water dip) and were planted in polybags which was kept under shade.In various growth regulator treatments IBA 8000 ppm resulted in maxium shoot height (14.57), longest root per cutting (6.56 cm) and highest rooting percentage (34.44 %).Early sprouting (10.12 days) and maximum number of leaves was found in 4 percent sucrose (13.45).*

Keywords: *Growth regulators, rooting, sprouting, karonda.*

INTRODUCTION

Karonda(*Carissa carandas* L Syn. *Carissa congesta* W**)** isamember of family Apocynaceae. It is an exceedingly hardy shrub indigenous to India. The crop can be grown for making beautiful juvenile hedge and because of the presence of axiliary spines it can be a verygood bio-fence (Sharma and Banyal, 10). Karonda is rich source of iron (39.10 mg/100 g) and carbohydrates (67.10 mg/100 g edible portion), the raw and ripe fruits are used to prepare preserved products like jam, jelly, squash and pickle (Peter, 7). The fruits are also said to possesant is corbutic property and is useful in burning sensation, skin diseases, scabies and pruritus (Nalawadi and Jayashella, 5; Imran *et al.*, 2).

Asexual propagation through cuttings in karonda is a challenging task as it is very difficult to root plant and rooting does not occur easily, therefor present investigation was carried out with aobjective to study effect of various concentrations of growth ragulators and sucrose on rooting and sprouting of karonda cuttings.

MATERIALS AND METHODS

The experiment was laid out in Randomised block design with nine treatments and three replications at college of horticulture, Rajendranagar, Dr YSRHU, Hyderabad. Treatments included different concentrations of IBA i.e. 7000, 8000 and 9000 ppm, NAA *i.e.* 1000, 2000 and 3000 ppm, sucrose *i.e.* 2% and 4% and control (water dip). The growth regulator concentrations were prepared by dissolving respective quantities of IBA and NAA in small amount of ethyl alcoholand the volume in each concentration was made up to one litre by adding distilled water. Sucrose solutions of 2 and 4 per cent were prepared by dissolving 20 and 40 g of sucrose respectively in distilled water and the volume in each concentration was made up to one litre with distilled water.

Uniform, healthy and disease and pest free semi-hardwood cuttings of pencil size thickness were selected from mother plants from Agricultural Research Institute, Rajendranagar in August. Semi-hardwood cuttings of 20 cm length having 4 to 5 nodes were taken. Black polythene bags of 15 × 22 cm size and 300 gauge thickness were filled with potting

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mixture of red soil, FYM and sand in a proportion of 1:1:1 along with 1 g of carbendazim per cubic meter of potting mixture as prophylactic measure to prevent the disease occurrence and were kept under shade condition. The basal 1.5-2.0 cm portion of the cuttings was treated with different treatments immediately after detaching from the plant and planted in polybags containing potting mixture.

Weeding and watering was done at regular intervals as per need. The potting medium was drenched with carbandazim (0.15%) at fortnightly interval to check disease incidence. The following observations after two months of establishment of cutingswere taken *viz*., shoot height (cm), length of longest root (cm), rooting percentage, days taken for sprouting and number of leaves. All the collected observations were statistically analysed.

RESULTS AND DISCUSSION

The results from the study ongrowth regulators and sucrose influence on rooting and sprouting of Karondacuttings were statistically sighnificant andpresented below (Table 1).

SHOOT HEIGHT (CM)

The data presented in Table 1. revealed that highest shoot height (cm) was recorded with (T_4) IBA 8000 ppm (14.57) which was at par with (T_5) IBA 9000 ppm (14.55), T_2 (14.52) and T_3(14.36). Lowest shoot height was recorded in control T_9 (12.33). It confirms that growth regulators produced more shoot height followed by 4% sucrose when compared to control. The increase in shoot height may be attributed to the well developed root system in such cuttings which might have tended to promote shoot growth by ensuring adequate mobilization of water and nutrients from the soil or substrate to the growing apex. Consequently, there is a faster growth rate of the newly emerged shoots as reported by Pratimaand Rana (8) in Kiwifruit.

DAYS TAKEN FOR SPROUTING

Significant difference was recorded on number of days taken for sprouting (Table 1). Early sprouting was observed with treatment T_2 (10.12 days) followed by T_4 (12.25 days). However, maximum number of days taken for sprouting was recorded with T_9 (15.48 days). Early sprouting with sucrose might be due to the reason that sucrose is a good source of carbohydrate which supply direct energy to the cuttings which leads to early sprouting. This supports earlier work by Wiegel*et al*. (16) that carbohydrate helps in auxin transport as well as growth of shoots and roots.

NUMBER OF LEAVES

The observations presented in Table 1 concluded that highest number of leaves per cutting was found in (T_2) 4% sucrose (13.45) which was close to IBA 8000 ppm, while the lowest number of leaves were recorded in (T_9) control (6.33). The more number of leaves with sucrose might be because of more number of sprouts with same treatment. The better performance with the use of sucrose could be explained by the larger carbon skeleton provided by this carbohydrate, resulting in higher availability of biosynthetic building blocks. (Correa *et al*., 1).

LENGTH OF LONGEST ROOT (CM)

The data regarding length of longest root revealed that in general maximum length of root was obtained with IBA 8000 ppm and minimum was recorded with control (Table 1). The increase in length of roots in

Table 1

Effect of growth regulators and sucrose on days taken for sprouting, number of leaves, shoot height (cm), length of longest root (cm) and rooting percentage (%) of karonda cuttings

Treatments	Days taken for sprouting	Number of leaves	Shoot height	Length of longest root	Rooting percentage
T_1- Sucrose 2%	14.35	9.67	12.76	4.82	27.78
T_2 – Sucrose 4%	10.12	13.45	14.52	6.31	33.33
T_3 – IBA 7000 ppm	13.25	10.78	14.36	6.12	31.11
T_4 – IBA 8000 ppm	12.25	12.99	14.57	6.56	34.44
T_5 - IBA 9000 ppm	13.21	12.89	14.55	6.35	32.22
T_6 – NAA 1000 ppm	14.00	10.20	13.32	5.06	28.89
T_7 - NAA 2000 ppm	13.94	10.33	13.87	5.16	30.00
T_8 - NAA 3000 ppm	14.09	9.77	13.17	4.84	27.78
T_9 - control/ water dip	15.48	6.33	12.33	2.57	13.33
Mean	13.41	10.71	13.72	5.31	28.76
SEm±	0.17	0.47	0.08	0.15	1.86
CD @ 5%	0.51	1.42	0.26	0.46	5.64

cuttings treated with growth regulators may be due to the enhanced hydrolysis of carbohydrates, accumulation of metabolites at the site of application, synthesis of new proteins, cell enlargement and cell division induced by the auxins (Singh *et al*., 11). Kesari*et al.* (3) studied the investigative effect of auxin on rooting of Pongamiapinnata and concluded that auxin concentrations affects the beginning rooting, number of roots and length of roots.

On other hand the better response of sucrose might be because carbohydrates are necessary ''building blocks'' and energy source for plant tissues. The availability of carbohydrates is often considered exclusively as an energetic requirement and carbon skeleton source to drive root development (Correa *et al*., 1).

ROOTING PERCENTAGE (%)

The data pertaining to rooting percentage as influenced by sucrose and growth regulators were statistically significant and presented in Table 1. The highest rooting percentage (34.44 %) was noticed in T_4 (IBA 8000 ppm) followed by sucrose 4 per cent. Lowest rooting(13.33 %) was in T_9 control. Auxins enhanced rooting in cuttings of many tree species has been reported by numerous research workers (Loach, 4;Uniyal*et al*., 13). It is well known that auxins increase the mobilization of reserve food materials by increasing the activity of hydrolytic enzymes, which as a consequence stimulate rooting of stem cuttings (Nanda *et al*., 6).

The response of IBA could be explained as it is slowly destroyed by the auxin destroying enzyme linked system. (Sharma *et al*., 9) Likewise Weaver (15) suggested that, since IBA translocates poorly, it is retained near the site of application and is therefore very effective. The application of IBA may have an indirect influence by enhancing the speed of transformation and movement of sugar to the base of cuttings and consequently rooting as mentioned by Torkashvand and Shadparvar (12) in hibiscus.

On other hand sucrose treatment was also effective in karonda rooting. The rooting in woody cuttings is chiefly influenced by the concentration of carbohydrate. Sucrose is good source of carbohydrate which gives direct energy to the cuttings. High sugar level affect rooting by reducing the level of nitrogen which is essential for rooting process (Yeboah*et al*., 17). This may be the reason due to which sucrose produced higher rooting percentage compared to control. These findings were also in accordance with Verma*et al*. (14).

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