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Effect of Different Concentrations of Napthalmic Acetic Acid (NAA) and Indole Butyric Acid (IBA) on Success and Growth of Semihard Wood Cutting of Lemon (*Citrus limon*)

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Abstract

For rapid, easy and true to type multiplication of lemon semi hard wood cutting was taken and treated with different concentrations of NAA (1,000, 1,250 and 1500 ppm) and IBA (2,000, 2500 and 3,000 ppm) for 30 minutes with chalk powder slurry. The treated cuttings were then planted in raised nursery beds of sandy loam soil. Different observations were taken after 75 days of planting. Maximum survival (89.83%), maximum number of branches (5.08), leaves (34.30) and roots (35.66) were observed in the cutting treated with IBA at 2,500 ppm. Maximum leaf chlorophyll content (45.41 mg/100 g), stem diameter (10.64 mm) and root diameter (2. 68 mm) in the cuttings were observed under same treatment. Highest average length of roots (15.83 cm), maximum root dry weight (1.48g) and shoot dry weight (22.73 g) were also observed in same treatment. Higher values of most of the characters were recorded under NAA at 1,250 ppm treatment. Besides, higher dose of IBA showed an inhibitory effect on most of the characters.
Key words : Lime, Cutting, NAA, IBA.

Lemon (*Citrus limon*) is an important commercial fruit crop in India. The fruit is well known for its sour and a flavored Juice, which is canned in large scale as frozen concentrated juice or mixed pulps. The juice is an important source of valuable organic acids (mainly citric acid) and vitamin C (ascorbic acid). lemon oil is most important citrus oil used for flavoring purposes. Thus the growing demand of fruit of lemon is causing the area expansion under lemon cultivation. Hence good quality healthy planting material is highly required as good quality healthy planting material can provide early and good quality high fruit yield. Though air layering is common practice of propagation in lemon but making cutting from semi hard wood stem is most easy and successful propagation method in lime. But rooting and growth of cutting along with success rate may be improved by treating the cutting with NAA, IBA and many other phytohormones. So the present experiment was undertaken to study the effect of different concentrations of NAA, IBA and to find out the best treatment for greater success with best growth of the cutting.

Methods

The investigation was made at experimental farm of Uttar Banga Krishi Viswavidyalaya, Pundibari, Coochbehar West Bengal, during 2006-07 and 2007-08. The semi hard wood cuttings of 15 cm length were taken form 10 years old lemon plants. The cuttings were then treated with different concentrations of NAA (100, 1,250 and 1,500 ppm) and IBA (2,000, 2,500 and 3,000 ppm) with chalk power slury at lower slanting cut portion for 30 minutes. The treated cuttings were planted in the raised nursery beds at 15 cm × 15 cm spacing. Six different phytohormone concentrations as six treatments along with only chalk powder (with out phytohormone) as control were used for the experiment. Each treatment was divided into three replications and 100 cuttings were taken as a single replication. After 75 days of planting observations like survivality, number of branches, stem diameter, number of leaves, leaf chlorophyll content, average length of roots, average number of roots diameter, dry weight of shoot and root were taken.The data

Table 1. Survivability and growth characters of semi hard wood cuttings of lemon (*Citrus limon*) under different concentration of NAA and IBA.

Treatments (ppm)	Survivability (%)	Number of branches	Stem diameter (mm)	Number of leaves	Leaf chlorophyll content (mg/100g)	Number of roots	Number of root primary branches	Root length (cm)	Root diameter (mm)	Dry weight of shoot (g)	Dry weight of root (g)
NAA 1000	78.00	4.66	8.24	30.56	40.66	30.00	42.66	13.73	1.94	19.36	1.31
NAA 1250	82.83	4.63	8.92	33.16	43.35	29.66	47.00	15.35	1.95	21.64	1.35
NAA 1500	77.66	3.23	9.24	25.81	40.85	24.00	50.33	12.20	1.75	19.98	1.31
IBA 2000	69.83	3.46	9.59	24.03	4.66	29.00	43.66	11.15	2.06	18.68	1.43
IBA 2500	89.83	5.08	10.64	34.30	45.41	35.66	61.00	15.83	2.68	22.73	1.48
IBA 3000	75.16	3.73	8.57	27.13	39.71	22.00	40.33	13.00	1.64	17.35	1.96
Control	67.16	2.76	7.42	19.58	36.73	13.66	24.66	11.08	2.22	16.30	1.10
CD at 0.05	4.11	0.43	0.87	1.38	1.53	3.16	7.51	1.10	0.25	1.25	0.03

were statistically analyzed in randomized block design as suggested by Gomez and Gomez (1).

Results and Discussion

The result of experiment is presented in Table 1.

Survivability

The data on survivability of the cutting under different phytohormone treatments reveal that maximum rate of survivavility (89.83%) was observed in the cuttings treated with IBA at 2,500 ppm but higher survivability (82.83%) was also observed under NAA at 1,250 ppm treatment. Lowest survivavility was recorded in control treatment. Maximum survivability of leaf bud cutting was observed by Nath (2) by treating the cutting of Assam lemon with 3,000 ppm IBM.

Root Growth Characters

Average number of root and primary branches of roots were significantly highest (35.66 and 61.00 respectively) in the cuttings treated with IBA at 2,500 ppm. Average root length and root diameter were minimum (15.83 cm and 2.68 mm respectively). Dry weight of roots was also highest (1.96 g) in IBA treated cutting at 2,500 ppm; 100% rooting was recorded by Ozcan et al. (3) in semihard wood cuttings of flying dragon trifoliate orange; 60.88% of rooting was observed in marcots of spamish lime when treated with 1.6—4.5% IBA by Larson et al. (4).

Shoot Growth Chareters

Manimum number of branches (5.08) and stem diametor (10.64 mm) were recorded in the cuttings treated with IBA at 2,500 ppm. Highest leaf chlorphyll content (45.41 mg/100g)and shoot dry weight (22.93 g) were also recorded in the same treatment. Maximum values of the most of shoot growth characters were higher in the cuttings treated with NAA at 1,200 ppm.

Concusion

As the cuttings treated with IBA at 2,500 ppm showed the highest survival percentage, better growth of root system and shoot system, IBA at 2,500 ppm is the most suitable treatment for semi hard wood cutting of lemon to get the healthy planting materials.

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