

**Research Note :****REGENERATION OF KAGZI LIME (*Citrus aurantifolia* Swingle) THROUGH STEM CUTTINGS WITH THE AID OF IBA AND PHB****Diwaker* and P.N. Katiyar***Department of Horticulture, C.S. Azad University of Agriculture and Technology, Kanpur, U.P., India.***E-mail: annu6381@gmail.com*

ABSTRACT : Maximum percentage of cuttings sprouted (24.33%) and maximum number of roots per cutting (7.67) were recorded with treatment IBA 2000 ppm+PHB 1000 ppm. The treatment with PHB 1000 ppm recorded minimum percentage of sprouting (8.83 %). Maximum number of sprouts per cutting (7.67) was observed with T₇ and its minimum number (2.67) was noted under control. The length and diameter of primary root (9.33 cm and 2.80 mm) were also noted maximum under 2000 ppm IBA + 1000 PHB. The diameter of sprout (3.53 mm) and the size of leaves in terms of their length and width (5.67 cm, and 3.83 cm, respectively) was maximum with IBA 1500 ppm + PHB 1000 ppm. The maximum dry matter accumulation in the roots (132.33 mg) was with IBA 2000 ppm whereas, the cutting treated with IBA 2000 ppm + PHB 1000 ppm expressed the highest survival (77.00%) of rooted cuttings.

Keywords: IBA, PHB, kagzi lime, cutting, survival.

Citrus is one of the most important and delicious fruit crops of the world. Its high nutritive and medicinal values have made this fruit almost indispensable throughout the world. Citrus fruits have prominent place and extensively grown in tropical and subtropical regions. Since most of the citrus species are polyembryonic and produce both gametic and nucellar seedlings. Various types of citrus of commercial importance are propagated differently. Vegetative method of reproduction differs from sexual reproduction in that while the later involves meiosis and in the former new cells are formed by the mitotic only (Hartmann and Caster, 2).

Synthetic plant growth substances have opened new vistas and these days vegetative reproduction of plants have become easy through the use of bio regulators. Various types of growth substances like Auxin, IBA, IAA and NAA are usually used to stimulate root initiation alone or in combination in different fruit plants (Sandhu and Singh, 3; Chauhan and Maheswari, 1).

Among the growth regulators IBA is commonly used. Keeping in view the above facts present investigation was under taken.

Investigation was conducted to study the root

and shoot development in stem cuttings of Kagzi lime (*Citrus aurantifolia* Swingle) by using plant hormone IBA and PHB alone and in combination. The experiment was laid out in CRD with three replications during the year of 2006-07 in the Horticulture garden of C.S. Azad University of Agriculture and Technology, Kanpur, U.P., India. Stem cuttings of Kagzi lime were collected from shoots of spring flush and the planting was done on 20th August, 2006.

The material comprised of 22 cm long (4-6 buds) hard wood cuttings of Kagzi lime. The cuttings were planted in polythene bag filled with a mixture of river sand and soil (1 : 1). Leaves and thorn were completely removed from the cuttings. Lower basal cut was made horizontally at the right angle to the axis. The upper cut was given just above the bud and slanting at the opposite side of the bud.

Indole butyric acid (IBA) and P-hydroxy benzoic acid (PHB) were used for treating the cuttings. The concentration of IBA and PHB, taken for experiment were IBA-1000, 1500, 2000 ppm and PHB 1000 ppm and control-(distilled water).

Stock solution of IBA was prepared dissolving the IBA @ 2 g/litre in distilled water before

Table 1: Effect of various concentration of IBA and PHB on regeneration of citrus cuttings.

Treatment	Per cent of cuttings sprouted	Number of sprouts per cutting	Number of roots per cutting	Length of primary root	Diameter of primary roots	Diameter of Thickest sprout	Number of leaves per cutting	Length of leaf	Width of leaf	Fresh weight of roots (mg)	Dry weight of roots (mg)	Survival percent of cutting
Control (T ₀)	11.00	2.67	3.67	4.67	1.00	2.40	6.67	4.33	2.67	180.00	98.00	50.33
IBA 1000 ppm (T ₁)	17.16	4.67	5.00	6.33	1.33	2.57	10.33	4.43	3.13	211.33	110.33	60.33
IBA 1500 ppm (T ₂)	20.66	5.00	5.67	6.67	1.33	3.00	12.00	4.97	3.37	288.00	119.33	64.3
IBA 2000 ppm (T ₃)	23.33	7.00	7.00	7.33	1.67	3.37	15.33	5.50	3.63	320.67	132.33	76.00
PHB 1000 ppm (T ₄)	8.83	3.67	3.67	4.33	1.20	2.57	12.00	4.47	3.00	198.67	103.00	61.00
IBA 1000 ppm + PHB 1000 ppm (T ₅)	17.33	4.67	7.00	7.33	1.67	2.70	16.00	4.87	3.50	222.00	120.67	62.67
IBA 1500 ppm + PHB 1000 ppm (T ₆)	21.33	5.67	7.33	7.33	2.63	3.53	17.00	5.67	3.83	325.33	127.33	68.00
IBA 2000 ppm + PHB 1000 ppm (T ₇)	24.33	7.67	7.67	9.33	2.80	3.47	15.00	5.47	3.63	301.00	119.67	77.00
C.D. (P=0.05)	2.67333	1.4990	1.32199	1.58008	0.65435	0.40439	2.37102	0.32574	0.31204	14.40824	8.47961	3.49766

dissolving the IBA in the distilled water, it was dissolved in a little amount (10-20 ml) of ethyl alcohol. For this about 10 ml of absolute ethyl alcohol was added with IBA @ 2g in flask gradually and was constantly shaken till it dissolved completely. The lower concentration i.e. 1500 and 1000 ppm were prepared by diluting the stock solution. Similarly to prepare the 1000 ppm of PHB, 500 mg PHB was taken in a volumetric flask and solution was prepared in above manner. The amount of PHB, thus required and prepared was 500 ml.

The basal end of cuttings was treated with IBA (1000, 1500 and 2000 ppm) and PHB (1000 ppm) alone or in combination by following quick dip method. For control, the cuttings were treated with distilled water only.

The results (Table 1) revealed that maximum percentage of cuttings sprouted (24.33%) was recorded with treatment of IBA 2000 ppm + PHB 1000 ppm followed by IBA 2000 ppm (T₃). The treatment with PHB 1000 ppm (T₄) recorded minimum percentage of sprouting (8.83%). Maximum number of sprouts per cutting (7.67) was observed with T₇ followed by T₃ (7.00) and minimum number (2.67) was noted under control (T₀). The number of roots per cutting (7.67) was noted maximum with T₇ treatment as compared to all other treatment. The cuttings under control produced the maximum number of roots (3.67). The maximum length and diameter of primary root (9.33 cm and 2.80 mm, respectively) were recorded under T₇ treatment followed by T₆ while it was minimum (4.33 cm and 1.00 mm, respectively) under control. The diameter of sprout was maximum (3.53 mm) under IBA 1500 ppm + PHB 1000 ppm treatment followed by T₇ (3.47 mm). The number of leaves per cutting was maximum (17.00) under T₆ followed by T₅, T₃ and T₇. Umrao (4) had also concluded that higher concentration of IBA resulted better rooting in hardwood cuttings of pomegranate.

Regarding the size of leaves in terms of their length and width, it was recorded maximum (5.67

cm and 3.83 cm, respectively) when treated with IBA 1500 ppm + PHB 1000 ppm. The cuttings under control produced relatively smaller leaves (4.33 cm and 2.67 cm, respectively). The maximum fresh weight of roots per cutting (326.00 mg) was noted with the treatment T₆ followed by T₃. However, minimum fresh weight (180.00 mg) was recorded under control (T₀). The maximum dry matter accumulation in the roots (132.33 mg) was observed under T₃ treatment (IBA 2000 ppm), whereas it was minimum (98.00 mg) under control. The cuttings treated with IBA 2000 ppm + PHB 1000 ppm expressed the highest survival of rooted cuttings (77.00 %) followed by T₃ (76.00%).

It can be concluded that the treatment of IBA 2000 ppm in conjunction with PHB 1000 ppm would be effective for root initiation, sprout growth and ultimate survival of rooted cuttings of Kagzi lime.

REFERENCES

1. Chauhan, K.S. and Maheshwari, D.L. (1970). Effect of certain plant growth regulators, seasons on types of cuttings and root initiation and vegetative growth in stem cuttings of Peach cv. 'Sharbati'. *Indian J. Hort.*, **27** (3-4): 136-140.
2. Hartmann, H.T. and Kester, D.E. (1978). Treating cuttings with growth regulators. *Plant Propagation Principles and Practices*, pp. 292.
3. Sandhu, A.S. and Singh, Zora (1986). Effect of Auxin on the rooting and sprouting behavior of stem cuttings of sweet lime. *Indian J. Hort.*, **43** (3-4): 224-226.
4. Umrao, V.K. (1995). IBA enhances rooting in pomegranate cuttings. *Ann. Arid Zone*, **38**(1) : 87-88.