

Effect of Indole Butyric Acid (IBA) and Types on the Rooting of Pear (*Pyrus communis* L.)

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Abstract

An experiment was conducted during 2004-05 with three types of cuttings, basal (C_1), semi—apical (C_2) and apical (C_3) and four IBA concentrations 0 (P_1), 50 (P_2), 100 (P_3) and 150 (P_4) ppm of IBA. Thus there were 12 treatments which were replicated thrice in randomized block design. Type of cutting, concentration of IBA and their interaction significantly increased number of roots. The final number of primary and secondary roots was significantly better in 100 ppm of IBA concentrations (18.96 and 24.30). The maximum number of primary and secondary roots (12.40, 29.80) was recorded in semi-apical cutting when treated at 100 ppm IBA. IBA of 100 ppm gave significantly longest root and shoot length per cutting and the interaction C_2P_2 (semi-apical cutting treated with 100 ppm IBA) showed the maximum length (12.30, 34.18 cm). Similarly, the maximum success percentage of cutting (90.83) in nursery. However, maximum success percentage of cuttings (95.00) was recorded in C_2P_2 (semi—apical cutting \times 100 ppm IBA).

Key words : Pear, IBA, Rooting, Cutting.

Pear (*Pyrus communis* L.) is an important temperate fruit ranking next to apple and is native of Western Asia. It belongs to the family Rosaceae. It is grown both in temperate and subtropical condition. In India, pear is grown from humid sub-tropical plain to cold dry temperate region, occupying an area of 23,000 hectare with an annual production of 200,000 metric ton (1). The productivity of major temperate fruit is around 5.5 to 6 t/ha. Pear is rich source of carbohydrates, protein, vitamins, maleic acid and minerals like Ca, P and Fe. Pear may be propagated by seed, grafting, budding, layering and cutting. Scion cultivar have proved more difficult to root than root stock (2). But it is commercially propagated by cut-

ting. It is produced in all the continents of the world in both temperate and sub-tropical regions. In India, the major producing states are Jammu and Kashmir, Himachal Pradesh, Uttar Pradesh, Punjab, Arunachal Pradesh, Manipur, Mizoram, Nagaland and Tamil Nadu. Though area under Jharkhand state is small, moreover climate and soil conditions are favorable for its production.

Methods

The present experiment was conducted in the experimental plots of Department of Horticulture, Birsa Agriculture university, Kanke, Ranchi during

Table 1. Number of primary and secondary roots per cuttings after 150 days.

Type of cuttings	Primary					Secondary				
	P_0	P_1	P_2	P_3	Mean	P_0	P_1	P_2	P_3	Mean
C_1	1.20	2.50	5.00	3.30	3.00	11.70	14.90	19.40	13.60	14.90
C_2	3.10	8.20	12.40	7.00	7.67	13.00	24.40	29.80	21.30	22.12
C_3	3.00	6.00	9.50	5.46	5.99	12.60	18.50	23.70	17.90	18.17
Mean	2.43	5.56	8.96	5.25	—	12.43	19.26	24.30	17.60	—
Factors		SE		CD (5%)		SE		CD (5%)		
C		0.20		0.59		0.70		2.07		
P		0.23		0.68		0.81		2.39		
C \times P		0.40		1.18		1.40		NS		
CV (%)			12.57				13.29			

Table 2. Root and shoot length (cm) per cutting.

Type of cutting	Root length (cm)					Shoot length (cm)				
	P ₀	P ₁	P ₂	P ₃	Mean	P ₀	P ₁	P ₂	P ₃	Mean
C ₁	0.90	3.00	6.50	2.80	3.30	8.30	14.40	15.46	13.14	12.82
C ₂	2.70	10.60	12.30	8.80	8.60	14.50	25.53	34.18	21.92	24.03
C ₃	2.40	6.00	9.10	5.00	5.62	12.61	18.54	21.30	17.49	17.48
Mean	2.00	6.53	9.30	5.53	—	11.80	19.49	23.65	17.52	—
Factors		SE		CD (5%)		SE		CD (5%)		
C		0.26		0.79		0.90		2.65		
P		0.31		0.91		1.04		3.06		
C × P		0.53		1.58		1.80		5.30		
CV (%)			15.98				17.28			

2004—05. The experiment was laid out in randomized block design with 12 treatments replicated thrice. The basal portion of cuttings were dipped into 50, 100 and 150 ppm concentrations of IBA solution for 24 hours. There after, IBA treated cuttings were planted into sand nursery bed on 15 December 2004 and left till 15 January 2005 for callus formation.

The cutting materials used in experiment were basal, semi-apical and apical cuttings. The cuttings obtained from the upper portion of the shoot, being tender and of current shoot growth were designated as apical (softwood). On the contrary, the lower portion of shoot the hardest one was designated as basal (hardwood). The middle portion of the soft and hardwood shoots provided the semi-apical (semi-hardwood) cutting. All the cuttings were of same thickness and of same age.

Results and Discussion

Number of Primary and Secondary Roots

Type of cutting, concentration of IBA and their interaction significantly increased number of roots. (Table 1) reveals that IBA 100 ppm gave significantly highest number of primary and secondary roots (8.96 and 24.30). It was followed by 50 ppm of IBA (5.56, 19.26), which was statistically at par with 150 ppm IBA over control. Among different types of cuttings, the semi-apical type exhibited maximum primary and secondary roots (7.67, 22.12), which was significantly superior to other types of cuttings. Interaction between types of cutting and IBA concentrations was found to be significant. The maximum number of primary and secondary roots (12.40, 29.80) was recorded in semi-apical cutting when treated 100 ppm IBA. The

results of the present investigation support the earlier work in guava (3).

Root and Shoot Length per Cutting (cm)

Table 2 shows that after 150 days of planting, the length of roots and shoot was significantly higher in all IBA concentrations, maximum being in 100 ppm IBA (9.30, 23.65 cm). However, the minimum length of roots was observed under control. Among different types of cuttings, semi-apical cutting gave significantly longest length (8.60, 24.03 cm). The interaction between type of cutting and IBA concentration also had significant influence in length of roots and shoot. Maximum length of root and shoot (12.30, 34.18 cm) was obtained in C₂P₂ (semi-apical cutting treated with 100 ppm IBA). The next superior length of root and shoot (10.61, 25.53 cm) was in C₂P₁ (semi-apical cutting treated with 50 ppm IBA) which was at par

Table 3. Average percentage of success in nursery. CV (%)=6.90. Figures in parentheses are transformed value.

Type of cuttings	Success percentage				
	P ₀	P ₁	P ₂	P ₃	Mean
C ₁	68.33 (55.82)	77.50 (61.71)	85.00 (67.67)	72.50 (58.43)	75.83 (60.91)
C ₂	71.67 (57.90)	90.00 (72.15)	95.00 (77.36)	87.50 (69.94)	86.04 (69.34)
C ₃	70.00 (56.84)	85.00 (67.67)	92.50 (74.25)	82.50 (65.56)	82.50 (66.08)
Mean	70.00 (56.84)	84.17 (67.18)	90.83 (73.09)	0.83 (64.64)	—
Factors		SE	CD (5%)		
C		1.30	3.81		
P		1.50	4.41		
C × P		2.60	NS		

with C₃P₂ (apical cutting treated with 100 ppm IBA). This finding was in close conformity with earlier findings (4).

Percentage of Success in Nursery

The observation on the average percentage of success of cutting in nursery were recorded after one month are presented in Table 3. revealed that success percentage of cutting was significantly influenced by IBA concentrations. Maximum success percentage (90.83) was observed with 100 ppm IBA, which was significantly superior to all other combinations of IBA . Among the different types of cuttings, result regarding percentage of success in nursery was statistically significant. The semi-apical cuttings gave significantly highest success percentage (86.04), which was at par with apical cuttings 82.50%. However, maximum success percentage of cuttings (95.00)

was recorded in C₂P₂ (semi-apical cutting × 100 ppm IBA), while the minimum success percentage of cutting was obtained in C₁P₀ (basal cutting without any treatment). Similar finding was observed earlier (5).

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