

EFFECT OF INDOLE BUTYRIC ACID AND VARIETY ON ROOTING OF LEAFLESS CUTTING OF KIWIFRUIT UNDER ZERO-ENERGY-HUMIDITY-CHAMBER

K.K. Srivastava, Saima Hamid, Biswajit Das and K.M. Bhatt

*Division of Pomology, SKUAST (K), Shalimar Campus
Srinagar 191 121, Jammu & Kashmir*

INTRODUCTION

The kiwifruit (*Actinidia chinensis* Planch var. *Hispida*) indigenous to china belongs to family Actinidiaceae. It is dull brown in colour and very rich source of Vitamin C (100-420 mg/100g). Kiwifruit is almost free from disease and pest with long shelf life. Among different cultivars under cultivation 'Hayward' is one of the most popular cultivars due to its large size, attractive shape, superior flavour and longest shelf life quality. 'Tomouri' is a good pollinizer. Though, it was introduced in Shimla in 1963, yet due to lack of technical know how, cultivation could not gain popularity and its cultivation is still in infant stage. However, keeping in view non-availability of planting material, the present investigation was undertaken for standardization of ideal IBA concentration for rooting of leafless cutting under zero-energy-humidity-chamber.

MATERIAL AND METHODS

The present investigation was carried out at the Division of Pomology, SKUAST (K), Shalimar during the year 2003-2004. Leafless cuttings of 15-20 cm long (2-3 nodes) of 8-13 mm diameter, sub-apical and basal vine were taken in February. Twenty cuttings per treatment were dipped for 5 second in 4 concentrations of IBA-0, 4000, 4500 and 5000 ppm and evaluated under randomized block design (factorial) with three replications. Treated cuttings were placed in tray containing sterilized sand media and placed in zero-energy-humidity-chamber; water was sprayed to maintain proper humidity. Observations on days taken for sprouting, survivability of cutting (%), rooted cutting (%), number of primary and secondary root/cutting, average number of root/cutting, average root length, longest root length, average diameter of longest root, number of leaves at planting, number of leaves and shoot length 30 days after planting and ultimate survival of rooted cuttings were recorded.

RESULTS AND DISCUSSION

Main effect

The days taken to sprouting, survival of cuttings, rooted cutting percentage, number of primary and secondary roots cuttings, average number of roots and average root length were significantly influenced by different levels of IBA concentrations. The cuttings treated with five thousand-ppm IBA concentration took minimum duration in sprouting (8.75 days) where as longest (9.73 days) in control (table1). Rathore (1984) had also observe the enhanced rooting in Kiwifruit with IBA application. Highest survival of cutting (95.42%) was recorded in 5000 ppm IBA treatment where as untreated cuttings recorded minimum (79.16%) (Table 1). Higher survival may be due to high humidity in the zero-energy-humidity chamber, which thus minimize it water loss from their surface. Grange and Loach (1983), Rana and Jindal (2001) also noted similar observations in kiwi fruit. Different level of IBA produced significant effect on rooting percentage. Maximum percentage of rooted cuttings (65.42) was observed with 5000 ppm IBA, while untreated cuttings noted minimum (28.3) percentage of rooting was noted in control (Table 1). IBA helps in mobilizing reserved food material elongation of meristematic cells and differentiation of cambial initials into root primordial (Nanda, 1975). Maximum number of primary, secondary and average root number (7.68,49.0 and 75.0) (Table 1), respectively, were recorded at 5000 ppm IBA up to certain concentration (Kahlon and Singh, 1981; Rana and Jandal, 2001). Length of Longest root (9.5

cm) and diameter (0.88m) was recorded with application of 5000 ppm IBA, where as minimum (4.95cm) root length and diameter (0.30mm) were observed in control, respectively. The increase in length and diameter of root may be due to successful rooting of IBA treated cuttings. Rathore (1984) and Rana and Jindal (2001) also observed increase in root length and diameter with auxin treatment. Similarly maximum number of leaves at planting 30 DAP, shoot length 30 DAP and ultimate survivability per cent was recorded in 5000 ppm IBA treatment whereas minimum number of rooted cuttings was observed with control (table 2). These results are in agreement with those of Jawanda *et al.* 1990, Shukla and Bist (1994) and Panwar *et al.* (2001). Among the varieties, Hayward took minimum days (8.96) compared to 9.41 days in 'Tomouri' for sprouting. Maximum cutting survival, rooted cuttings (%), number of primary, secondary and average number of roots have been recorded in 'Hayward' as against Tomouri (Table 2). The difference in-rooting characters may be due to variation in genetic make-up of varieties. Rana and Jindal (2001) also observed the extent of rooting in kiwifruit cuttings, which was influenced significantly by cultivar difference.

Table 1. Effect of IBA treatment and varieties on sprouting, survival, rooting percent, number of primary, secondary and average number of roots per cutting

Treatment	Days taken to sprouting	Survival of cutting (%)	Rooted cutting (%)	No. of primary roots per cutting	No. of secondary roots per cutting	Average number of roots per cutting
Main effect of IBA (ppm)						
0 (I ₁)	9.73	79.16	28.33	2.67	15.5	18.12
4000 (I ₂)	8.99	83.08	47.08	3.80	21.45	25.3
4500 (I ₃)	9.30	86.70	57.08	5.40	43.15	48.60
5000 (I ₄)	8.74	95.42	65.42	7.68	49.0	57.0
LSD (0.05)	0.081	3.98	3.38	0.12	0.18	0.22
SE of mean difference+	0.41	1.99	1.69	0.06	0.09	0.13
Main effect of variety						
Hayward (V ₁)	8.96	89.37	61.45	5.4	37.0	42.45
Tomuri (V ₂)	9.41	84.8	37.5	4.38	27.5	31.9
LCD (0.05)	0.057	2.81	2.39	0.088	0.12	0.19
SE of mean difference+	0.028	1.40	1.19	0.044	0.06	0.09
Interaction effect						
I ₁ V ₁	9.44	83.3	35.0	2.85	17.4	20.24
I ₁ V ₂	10.02	75.0	21.7	2.5	13.5	16.0
I ₂ V ₁	8.70	88.3	61.7	4.3	23.9	28.35
I ₂ V ₂	9.3	88.3	32.5	3.2	19.0	22.3
I ₃ V ₁	9.2	89.16	71.7	6.3	49.3	55.7
I ₃ V ₂	9.3	84.16	42.5	4.5	37.0	41.53
I ₄ V ₁	8.5	96.7	77.5	8.1	57.3	65.5
I ₄ V ₂	8.98	24.20	53.3	7.2	40.6	47.82
LSD (0.05)	0.114	NS	4.8	0.18	0.26	0.39
SE of mean difference+	0.05		2.4	0.08	0.13	0.20

Table 2. Effect of IBA treatment and varieties on root length, diameter, growth and survivability of cuttings

Treatment	Average root length (cm)	Length of longest root (cm)	Average diameter of longest root (mm)	No. of leaves at planting	Shoot length at 30 days after planting	Survivability of rooted cuttings (%)
Main effect of IBA (ppm)						
0 (I ₁)	2.6	4.6	0.30	4.04	4.86	56.7

4000 (I ₂)	3.6	6.2	0.50	4.9	6.2	77.5
4500 (I ₃)	5.1	7.6	0.80	5.6	7.4	84.2
5000 (I ₄)	7.0	9.5	0.88	6.3	8.8	91.2
LSD (0.05)	0.099	0.06	0.03	0.066	0.068	4.3
SE of mean difference+	0.040	0.03	0.01	0.033	0.034	2.1
Main effect of variety						
Hayward (V ₁)	5.15	7.9	0.66	3.7	8.1	81.25
Tomuri (V ₂)	7.00	6.1	0.60	2.8	5.4	73.54
LSD (0.05)	0.07	0.049	0.02	0.05	0.05	3.06
SE of mean difference+	0.035	0.02	0.01	0.02	0.02	1.50
Interaction effect						
I ₁ V ₁	3.13	5.1	0.32	2.6	5.6	60.8
I ₁ V ₂	1.98	4.0	0.28	1.9	4.0	52.5
I ₂ V ₁	3.87	6.9	0.56	3.7	7.3	81.7
I ₂ V ₂	3.25	5.5	0.43	2.6	4.9	73.0
I ₃ V ₁	5.83	8.8	0.83	4.0	9.0	87.5
I ₃ V ₂	4.37	6.4	0.72	3.0	5.7	80.8
I ₄ V ₁	7.76	10.5	0.93	4.5	10.45	95.0
I ₄ V ₂	6.37	8.5	0.83	3.5	7.0	87.5
LSD (0.05)	0.14	0.085	NS	0.09	0.096	NS
SE of mean difference+	0.67	0.040		0.04	0.048	

Main effect of variety

Significantly maximum survival of cutting, rooted cutting and root number per cutting (table 1) and length of largest root, average root diameter, number. of leaves at planting time and 30DAP and survivability of rooted cutting (table 2) were recorded in Hayward as compared to Tomouri.

INTERACTION EFFECT

The IBA and variety interact significantly. In both the varieties early sprouting was recorded in cuttings treated with 5000 ppm IBA. Sprouting might be due to favorable condition in zero-energy-humidity-chamber. Interpretation of data revealed that non-significant interaction effect was observed in survival of cutting (%). Interaction effect of IBA concentration was found significant for number of primary root, secondary root, average number of root/cutting, average root length and length of longest root. However, interaction effect of IBA for average diameter of longest root and root and survivability (%) of rooted cuttings was non-significant. Maximum number of leaves number of leaf and shoot length 30 DAP were recorded when Hayward and Tomouri were treated with 5000 ppm IBA. The maximum survivability of rooted cutting may be due to better rooting of 'Hayward' with more leaves. The variation in the rooting characters of cultivars may be due to difference in the genetic make-up of varieties.

CONCLUSION

Kiwifruit leafless cutting treated with 5000 ppm IBA concentration significantly took minimum days to sprout and maximum survival of cutting percent, rooting and number of primary and secondary and average number of roots with diameter and survivability. The cultivar and concentration interact significantly with various rooting potential. Cultivar 'Hayward' responds well at 5000 ppm IBA concentration than 'Tomouri'.

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