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STUDIES ON SIMULTANEOUS GRAFTING AND ROOTING OF PEACH ON FLORDAGUARD ROOTSTOCK

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ABSTRACT : The present study was conducted with a view to evaluate the rooting capacity of simultaneously grafted 'Flordaguard' rootstock with the aid of IBA treatments and to find out optimum time and concentration of IBA. Highest sprouting success in both Shan-e-Punjab and Earli Grande peach cultivars were recorded in 2000 ppm IBA treatment. Vegetative growth in terms of plant height & stem thickness and root growth was also found to be maximum in this treatment. Thus, it is concluded that peach plants can be propagated through simultaneous grafting and rooting on Flordaguard cuttings in 2nd week of January by dipping the basal portion of cuttings in 2000 ppm IBA for 2 minutes. This practice cut short the period of propagation by one year.

Keywords : *Prunus persica, IBA, Flordaguard cuttings, rooting, propagation.*

Peach is an important fruit crop of temperate climate, but it can be grown quite successfully in the sub-tropics as well due to availability of suitable cultivars and their production technology. Rootstock has an important effect on the performance of scion in peach, which includes growth rate, tree size, productivity, nutrient uptake, time of defoliation, bloom date, tree survival, nematode infestation, and resistance to bacterial and perennial canker (Dozier *et al,* 3). No rootstock can be rated as an ideal stock for all the situations. Historically, seedlings are being used as a rootstock and little attention is paid to the characteristics other than compatibility with scion. Seeds of 'Sharbati' are generally used as a rootstock due to its easy availability and compatibility with commercial peach cultivars. But, this rootstock is highly susceptible to root-knot nematodes. Recently, PAU has released a new rootstock 'Flordaguard' for peach. This rootstock is resistant to root knot nematodes and is also compatible with all the peach cultivars.

Peach is commercially propagated through budding and grafting on peach seedling rootstock. On a limited scale, it is clonally propagated through rooting of hardwood cuttings. In budding and grafting methods, the rootstock becomes fit for operation after one year and it takes about 2 years before the plants become ready for transplanting in the orchard. Simultaneous grafting and rooting has been successfully tried on the cuttings of peach rootstock 'Sharbati'. But, no information is available on the newly released peach rootstock 'Flordaguard'. Therefore, keeping in view the resistance of 'Flordaguard' rootstock against root knot nematodes and its need in promoting the fast upcoming peach industry, the present study was planned to evaluate the rooting capacity of simultaneously grafted 'Flordaguard' rootstock with the aid of IBA treatments.

MATERIALS AND METHODS

The present investigation was carried out at Fruit Research Farm, Department of Fruit Science, Punjab Agricultural University, Ludhiana during the year 2013-14. Hardwood cuttings (15-20 cm long) of peach rootstock 'Flordaguard' were taken from 6 year old trees on 5 th and 15 th January, 2013. These cuttings were tongue grafted with scions of Earli Grande and Shan-e-Punjab having 3-4 buds on them. After grafting, the 3/4 cm basal portion of the grafts were treated with different concentrations of IBA and were planted in the field. The IBA concentrations used were 100 ppm and 200 ppm (both 24 hour dip), 1000 ppm, 1500 ppm, 2000 ppm, 2500 ppm and 3000 ppm (all 2 minute dip). Observations on sprouting success, height of grafts, stem thickness and root length were recorded.

RESULTS AND DISCUSSION

The data presented in Table 1 shows that 2000 ppm IBA treatment resulted in significantly higher mean sprouting success (18.34% in both the cultivars) irrespective of time of planting during the present studies. The sprouting success of the grafts planted on 15 th January was found to be higher than those planted on 5 th January in all the treatments. The highest success rate (20%) in both Shan-e-Punjab and Earli Grande cultivars were recorded in 2000 ppm IBA treatment in the grafts planted on 15 th January and it was significantly higher than all the treatments. It was followed by 2500 ppm and 3000 ppm IBA treatment. All

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the grafts under control and 100 ppm IBA treatment died soon after sprouting. The data further shows that

Table 1 : Effect of IBA on sprouting success and plant height of simultaneous grafts of peach cultivars.

Treatments/ IBA concentrations (ppm)	Sprouting Success (%)						Height of the Grafts (cm)					
	Shan-e-Punjab			Earli Grande			Shan-e-Punjab			Earli Grande		
	5th Jan.	15th Jan.	Mean	5th Jan.	15th Jan.	Mean	5th Jan.	15th Jan.	Mean	5th Jan.	15th Jan.	Mean
T_1–Control	0.00	0.00	0.00	0.00	0.00	0.00	-	-	-	-	-	-
T_2–100 ppm IBA	0.00	0.00	0.00	0.00	0.00	0.00	-	-	-	-	-	-
T_3–200 ppm IBA	5.00	6.67	5.84	5.01	6.68	5.85	114.00	121.44	117.72	125.46	127.44	126.45
T_4–1000 ppm IBA	3.33	5.01	4.17	5.01	5.01	5.01	97.64	117.17	107.41	121.00	133.34	127.17
T_5–1500 ppm IBA	8.33	10.00	9.17	9.45	15.00	10.00	133.30	144.52	138.91	137.55	147.42	142.49
T_6–2000 ppm IBA	16.67	20.00	18.34	16.67	20.00	18.34	160.00	165.36	162.68	162.44	179.51	170.98
T_7–2500 ppm IBA	13.34	15.00	14.17	15.00	18.33	16.67	150.33	153.30	151.82	152.66	155.30	153.98
T_8–3000 ppm IBA	6.68	13.34	10.01	13.33	16.67	15.00	144.11	151.42	147.77	148.26	157.48	152.87
Mean	**6.67**	**8.75**	**7.71**	**8.06**	**10.21**	**9.14**	**99.92**	**106.65**	**103.29**	**105.92**	**112.56**	**109.24**

CD (P=0.05)

Varieties (A)	: NS	1.10
Time (B)	: 1.19	1.22
A × B	: NS	NS
Treatment (C)	: 2.23	1.62
A × C	: NS	2.29
B × C	: NS	2.29
A × B × C	: NS	3.23

Table 2: Effect of IBA on stem thickness and root length of simultaneous grafts of peach cultivars.

Treatments/ IBA concentrations (ppm)	Stem Thickness (cm)						Root Length (cm)					
	Shan-e-Punjab			Earli Grande			Shan-e-Punjab			Earli Grande		
	5th Jan.	15th Jan.	Mean	5th Jan.	15th Jan.	Mean	5th Jan.	15th Jan.	Mean	5th Jan.	15th Jan.	Mean
T_1 Control	-	-	-	-	-	-	-	-	-	-	-	-
T_2 100 ppm IBA	-	-	-	-	-	-	-	-	-	-	-	-
T_3 200 ppm IBA	0.81	0.79	0.80	0.87	0.84	0.86	31.35	34.47	32.91	43.27	47.37	45.32
T_4 1000 ppm IBA	0.68	0.84	0.76	0.81	0.88	0.85	33.42	36.61	35.02	37.93	41.59	39.76
T_5 1500 ppm IBA	0.74	0.87	0.81	0.87	0.89	0.88	32.34	37.76	35.05	38.83	44.16	41.50
T_6 2000 ppm IBA	0.87	0.91	0.89	0.93	0.95	0.94	39.40	44.43	41.92	46.49	47.31	46.90
T_7 2500 ppm IBA	0.77	0.83	0.80	0.84	0.87	0.86	31.44	35.37	33.41	39.38	37.44	38.41
T_8 3000 ppm IBA	0.68	0.77	0.73	0.79	0.83	0.81	38.54	39.64	39.09	43.76	45.57	44.67
Mean	**0.57**	**0.63**	**0.60**	**0.64**	**0.66**	**0.65**	**25.81**	**28.54**	**27.17**	**31.21**	**32.93**	**32.07**

CD (P=0.05)

Varieties (A)	: 0.86	0.68
Time (B)	: 0.26	0.97
A × B	: 0.37	NS
Treatment (C)	: 0.12	1.37
A × C	: 0.18	1.94
B × C	: 0.18	1.94
A × B × C	: 0.25	NS

IBA treatment had a significant effect in the height of the grafts. Maximum mean plant height (162.68 cm) in peach cv Shan-e-Punjab were recorded in 2000 ppm IBA and it was significantly higher than all other treatments. In Earli Grande cultivar also, plant height was found to be highest (170.98 cm) in this treatment on both the dates of planting. The mean plant height of the grafts planted on 15th January was found to be higher than those planted on 5th January in all the treatments.

The perusal of data in Table 2 reveals that IBA treatment had a little effect on the thickness of the grafts of peach cultivars during the course of these investigation. However, maximum mean stem thickness in both the peach cultivars (0.89 cm in Shan-e-Punjab and 0.95 cm in Earli Grande) was recorded in 2000 ppm IBA treatment and it was significantly higher than all other treatment. The stem thickness of the grafts in all other treatments were found to be statistically at par. The time of planting and cultivars also had no significant effect on stem thickness of the grafts.

In both Shan-e-Punjab and Earli Grande cultivars, the mean root length of the grafts planted on 15th January was found to be maximum (28.54 cm and 32.93 cm, respectively) and it was significantly higher than the grafts planted on 5th January (25.81 cm and 31.21 cm, respectively). In Shan-e-Punjab, maximum mean root length (41.92 cm) was recorded in 2000 ppm IBA and it was significantly higher than all other treatments. Similarly, in Earli Grande, 2000 ppm IBA gave best results (46.90 cm) as compared to all other IBA treatments. As far as cultivars are concerned, the mean root length of the Earli Grande grafts (32.07 cm) was found to be significantly higher than Shan-e-Punjab grafts (27.17 cm) irrespective of the time of planting and treatments. Higher success rate and vegetative growth of the grafts under 2000 ppm IBA treatment was due to better root system which enhanced the absorption of minerals and water from soil and enhanced growth. Poor root growth was responsible for the mortality of the grafts in control and in all IBA treatments.Wada *et al.* (9) reported that IBA promote root length by influencing the synthesis of enzymes concerned with cell enlargement which are triggered by auxins.

The examination of the study reveals that IBA treatment had a significant effect on sprouting success and growth of the grafts in peach. The success rate was found to be more in higher doses of IBA as compared to the lower doses in both the peach cultivars. All the grafts in control and 100 ppm IBA treatment died soon after planting. Highest success rate was observed in 2000 ppm IBA treatment and it was significantly higher than all the treatments in both the peach cultivars. The success rate of the grafts planted on 15th January were found to be higher than the grafts planted on 5th January in all the grafts. The plant height, stem thickness and root length of the grafts was also found to be higher in 2000 ppm IBA treatment in both the peach cultivars. These results are in agreement of those reported by Minhas *et al.* (5) and Kaundal *et al.* (4) who found highest sprouting success in Simultaneous grafts and semi-hardwood cuttings of peach, respectively.

Ryugo and Breen (8) reported that the principle role of IBA is to favour the synthesis of the specific proteins necessary for formation of root initials. Christensen *et al.* (2) also reported that cuticle structure of cutting might be responsible for rooting. Higher irradiance induced more development of cuticle which in turn inhibit the penetration and uptake of auxin from solution. Ray *et al.* (7) found that accelerated rooting with increased IBA concentration might be due to increased cell wall elasticity which further may have accelerated cell division and in terms increased number of roots to a certain level. Mohammad and Ayaz (6) observed that cuttings of peach rootstock Peshwar local and Nemaguard collected in February and treated with 2000 and 2500 ppm IBA, gave higher root number per cutting as compared to other treatments. Chauhan and Reddy (1) also found that 1000 ppm IBA treatment increased root number in 'Santa Rosa' plum.

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