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Effect of Different Chemicals on Root Growth Success of Cuttings in Passion Fruit

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A B S T R A C T

The study conducted to know the effect of different chemicals on success of cuttings in passion fruit was carried out at Instructional-cum Research Farm, Department of Horticulture, College of Agriculture, Badnapur during the year 2015-2016. The experiment was laid out in Randomized Block Design with thirteen treatments replicated thrice, comprising each three treatments of IBA, NAA, Salicylic acid, Ethanol and control. The results of the investigation revealed that, there were significant variations in differences with shoot and root growth observations viz. dry weight of shoot (1.27g), length of root (12.75 cm), diameter of root (1.00 mm) superior in treatment T_1 (IBA 500 ppm) and dry weight of root (0.44g) in treatment T_2 (IBA 750 ppm). However, in treatment T_3 (IBA 1000 ppm) fresh weight of shoot (3.84 g), dry weight of shoot(1.41g), fresh weight of root (0.86 g) was observed significantly better.

Introduction

Passion fruit is a perennial climber, cultivated in the tropics. Flowers are borne singly in the axils of leaves at the terminal region of new growth. The vine, bears hen's egg-sized fruits in abundance. They are smooth, ovoid and purple-yellow on ripening. The rind afterwards shrinks and becomes wrinkled. The rind is bordered by white pith, and inside small, hard, black seeds are surrounded separately by a soft, slightly acid, fragrant and juicy orange-yellow pulp (Chadha, 2002). Passion fruits contain numerous small, black, wedge-shaped seeds that are individually surrounded by deep orange-coloured sacs that contain the juice, the edible part of the fruit. Passion fruit is either eaten fresh or used in commercial juice production. Passion fruit is a high acid food (pH 3.2) due to the predominance of two acids, citric (93-96 % of total) and malic (3-6 % of total) acids. Passion fruit also contains about 14.45 g sugar/100g of edible portion, including fructose, glucose and sucrose, along with seven other in trace amounts. The acids and sugars add to the

unique taste and serve as a preservative nature for the tropical fruit. Passion fruit is high in potassium, vitamin A, vitamin C, niacin and fiber and it is low in sodium, cholesterol and saturated fats (Joy *et al.,* 2010). The juice of passion fruit has an excellent flavour and is quite delicious, nutritious and liked for its blending quality. Passion fruits serve a good source of pro vitamin-A, ascorbic acid, riboflavin and niacin and also contains fair amount of minerals sodium, magnesium, sulphur and chlorides (Chand, 1980).

Campbell and Knight (1983) stated that vegetative propagation by cutting for passion fruit cultivation is feasible. The stakes for this purpose should have three nodes young, vigorous and free parts of disease which must these be kept in mist atmosphere. Other factors should also be taken into consideration for the success of the rooting, as the time of withdrawal of stakes, temperature, humidity, light and the quality of the substrate (Ruggiero and Martins., 1987).

Materials and Methods

The experiment entitle, "Effect of different chemicals on success of cuttings in passion fruit." was carried out at Instructional-cum Research Farm, Department of Horticulture, College of Agriculture, Badnapur, Dist Jalna. Vasantarao Naik Marathwada Krishi Vidyapeeth Parbhani, during the year 2015-2016. Geographically Badnapur is situated at 19^0 52`00`` North latitude and $75^0$ 44`00`` East longitudes 75.733 and at 498m altitude above sea level and has a sub-tropical climate. The average annual precipitation is 722 mm with 30 rainy days. The mean daily maximum temperature varies from 21.4^0C in December to 32.9^0C in March. The month of July, August and September were humid and moisture index was positive, winter was cool with moisture index oscillating to deficit side and rest of the period was dry Badnapur is grouped under scarcity zone. The experiment was carried out by planting the cuttings of passion fruit in polythene bags of size (5``× 7``). The polythene bags were punctured to improve the drainage and filled with garden mixture which was prepared by well mixing of one part of soil, one part of sand, one part of well-rotted FYM (1:1:1 proportion of soil, sand and FYM). Pre-treated lower portion of passion fruit cuttings (1-2 cm) was be treated with different concentration of chemicals by quick dip method for 3-5 seconds and al low to dry for 5 minutes were planted in polythene bags which were properly filled, labeled with tags and placed as per layout.

Results and Discussion

The observations were recorded on various aspects viz., fresh weight of shoot, dry weight of shoot, length of root, diameter of root, fresh weight of root, dry weight of root of cuttings. The all above observations are presented in table 1.

The highest fresh weight of shoot at 90 days data presented in Table 1 revealed that, maximum fresh weight of shoot (3.84 g) was observed in treatment T_3 (IBA 1000 ppm) and it was at par withT_{12} (3.28g), T_{11} (3.30g), T_9 (3.42g), T_{10} (3.44g), T_8(3.50g), T_7 (3.52g), T_4 (3.53g), T_5 (3.56g), T_6 (3.60g), T_1 (3.63g) and T_2 (3.82g) and significantly treatments. While, minimum fresh weight of shoot (3.21 g) was observed in the control i.e.T_{13}.

Maximum dry weight of shoot (1.41 g) at 90 days was observed in treatment T_3 (IBA 1000 ppm) and it was at par with T_1 (1.27 g) and T_2 (1.35 g).Which were significantly over rest of the treatments. While, minimum dry weight of shoot (0.48 g) was observed in treatment control i.e.$T_{13.}$

The data presented in Table 1 revealed that, maximum length of root (14.00 cm) was

observed in treatment T_2 (IBA 750 ppm) and it was at par with T_1 (12.75 cm). While, minimum length of root (13.25 cm) was observed in treatment control i.e. T_{13}.

Maximum diameter of root (1.75 mm) was observed in treatment T_4 (NAA 500 ppm) and it was at par with the treatment T_7 (0.72 mm), T_8 (0.79 mm), T_2 (0.80 mm), T_9 (0.90 mm), T_1 (1.00 mm), T_6 (1.10 mm) and T_5 (1.50 mm).

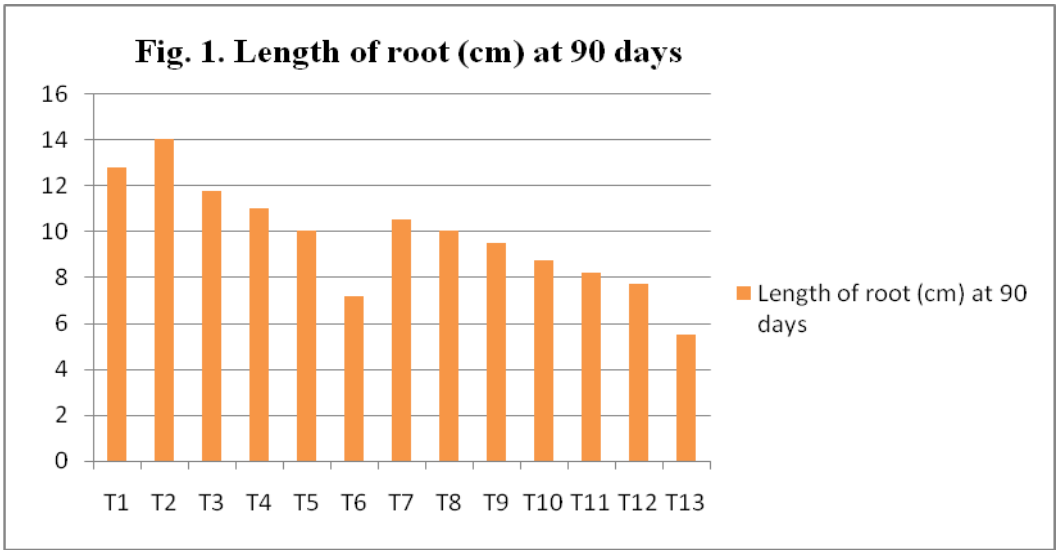
Which were significantly over rest of the treatments. While, minimum diameter of root (0.22 mm) was observed in treatment control i.e.T_{13}.

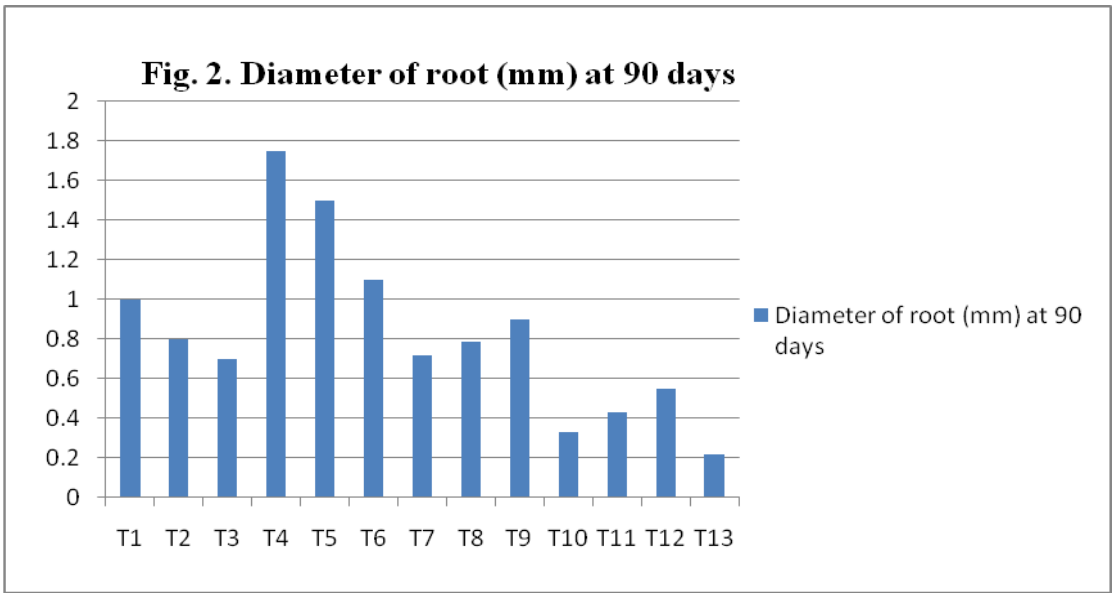
Maximum fresh weight of root (1.00 g) at 90 days was observed in treatment T_2 (IBA 750 ppm) and it was at par with T_3 (0.86g).Which were significantly superior over rest of the treatment. While, minimum fresh weight of root (0.19g) was observed in treatment control i.e. T_{13}.

Maximum dry weight of root (0.44g) at 90 days was recorded in treatment T_2 (IBA 750 ppm) which were significantly superior over rest of the treatments. While, minimum dry weight of root (0.06g) was recorded in treatment control i.e. T_{13} and data presented in table 1.

Table.1 Effect of chemicals on success of cuttings in passion fruit at 90 days

Tr.	Fresh weight of shoot (g)	Dry weight of shoot (g)	Length of root (cm)	Diameter of root (mm)	Fresh weight of root (g)	Dry weight of root (g)
T1	3.63	1.27	12.75	1.00	0.50	0.23
T2	3.82	1.35	14.00	0.80	1.00	0.44
T3	3.84	1.41	11.75	0.70	0.86	0.40
T4	3.53	0.76	11.00	1.75	0.44	0.31
T5	3.56	0.77	10.00	1.50	0.50	0.23
T6	3.60	0.79	07.15	1.10	0.57	0.26
T7	3.52	0.65	10.50	0.72	0.32	0.15
T8	3.50	0.72	10.00	0.79	0.38	0.19
T9	3.42	0.66	09.50	0.90	0.27	0.11
T10	3.44	0.63	08.75	0.33	0.25	0.10
T11	3.30	0.61	08.20	0.43	0.23	0.09
T12	3.28	0.58	07.70	0.55	0.23	0.07
T13	3.21	0.48	05.50	0.22	0.19	0.06
SE±	**0.21**	**0.07**	**0.71**	**0.35**	**0.04**	**0.01**
CD at 5 %	**0.62**	**0.22**	**2.09**	**1.05**	**0.14**	**0.03**





Maximum fresh weight of shoot (3.84 g) at 90 DAP was observed in treatment T_3 (IBA 1000 ppm), however it was at par withT_{12}(3.28g), T_{11}(3.30g), T_9(3.42g), T_{10}(3.44g), T_8(3.50g), T_7(3.52g), T_4(3.53g), T_5(3.56g), T_6(3.60g), T_1(3.63g) and T_2(3.82g) and significantly over minimum fresh weight shoot (3.21g) control i.e.T_{13}. This might be attributed that auxin increase plasticity of cell wall which in turn increases permeability of cell for moisture and nutrients resulted in enlargement of cell causing more growth of plant parts. Similar results were reported by Thota (2014) in fig and Jana (2015) in Asian pear.

Maximum dry weight of shoot (1.41 g) at 90 DAP was observed in treatment T_3 (IBA 1000 ppm), however it was at par with T_1 (1.27g) and T_2 (1.35g), which were significantly superior over rest of the treatments. While, minimum fresh weight (0.48g) was observed in treatment control i.e.T_{13}. These results may be attributed to the well-developed root system in such cuttings, which might have tended to promote shoot growth ensuring adequate mobilization of water and nutrients from the soil or substrate to the growing apices. Consequently, there is a faster growth rate of the newly emerged shoots. Similar

results were reported by Pratima and Rana (2011) in kiwifruit.

The maximum length of root (14.00 cm) was observed in treatment T_2 (IBA 750 ppm), which were significantly at par with T_1 (12.75 cm).While, minimum length of root (5.50 cm) was observed in treatment control i.e.T_{13}. Superiority in root length and diameter could be due to higher C: N ratio in the tissues of cuttings and greater food reserves in the root. As well as the auxin stimulates the initiation of lateral and adventitious roots because of their effect on cell division.

The results are in agreement with the findings reported by Bemkairema *et al.,* (2012) in passion fruit and Esitken *et al.,* (2003) in wild sour cherry.

Maximum diameter of root (1.75 mm) was observed in treatment T_4 (NAA 500 ppm), however it was at par with the treatment T_7 (0.72 mm), T_8 (0.79 mm), T_2 (0.80 mm), T_9 (0.90 mm), T_1 (1.00 mm), T_6 (1.10 mm) and T_5 (1.50 mm) and significantly superior over rest of the treatments. While, minimum diameter of root (0.22 mm) was observed in treatment control i.e. $T_{13.}$ This may be due to higher accumulation of photosynthates, metabolites and nutrients. Similar results were reported by Damar *et al.,* (2014) in pomegranate.

Maximum fresh weight of root (1.00 g) at 90 DAP was observed in treatment T_2 (IBA 750 ppm), which was at par with treatment T_3 and significantly superior over rest of the treatments. While, minimum fresh weight of root (0.19 g) was observed in treatment control i.e. T_{13}. Maximum fresh weight of root might be due to the fact that in these plants produced longer and more no. of roots. Similar results were reported by Parvez *et al.,* (2007) in peach and Pires *et al.,* (2010) in passion fruit.

Maximum dry weight of root (0.44 g) at 90 DAP was observed in treatment T_2 (IBA 750 ppm), which was significantly superior over rest of the treatments. While, minimum dry weight of root (0.06 g) was observed in treatment control i.e. T_{13}. The better response in rooting might to be due to the cumulative effect of auxins and the time of propagation in relation to environmental factors. Similar results were reported by Kumar *et al.,* (2008) in passion fruit and Saed (2010) in pomegranate.

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