

Study on rooting behaviour of different types of cutting of Dragon fruit at different period of year

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ABSTRACT

A study was conducted on Red Fruit type of dragon fruit in a private farm at Onda block of Bankura district of West Bengal with the view to find out best propagation period in a year and which part of the stems are suitable to give higher plant stand. Results of one year of investigation revealed that maximum number alive cuttings were obtained when cuttings were collected from middle part of three angled main stem in the month of November and December. Besides, the cuttings can be taken from the shoots which were arisen from three angled main stem at 90° angle in November also resulted in maximum percentage of alive cuttings with maximum root length.

Keywords: Dragon fruit, Month, Cuttings, Root length, 3-angle stem

INTRODUCTION

Dragon fruit is a member of the family Cactaceae and perennial, climbing cactus with triangular (3- sided), green, fleshy, jointed, many-branched stem. It is a long day plant with beautiful night blooming flower that is nicknamed as “Noble Woman” or “Queen of the Night”. Dragon fruit is considered a promising crop to be grown commercially in dry regions (Vaillant *et al.*, 2005). It is one of the newly introduced exotic fruit crop in India and is being cultivated mainly in the states of Maharashtra, Gujarat, Andhra Pradesh, Karnataka and Tamil Nadu. Aerial roots grow from the base of the stems, providing anchorage for the plants (Zee *et al.*, 2004). Dragon fruit is valuable for treating different types of diseases and has significant economic value (Suryono, 2006). It is usually propagated by seeds or cuttings. Seed propagation method is very simple, but seeds are not true to type due to cross pollination and seeds are stored for about 28 days without losing viability (Andrade *et al.*, 2005). So, it is generally propagated by stem cuttings which may be planted directly in the field or in pots (Zee *et al.*, 2004). Due to heterozygous nature of fruit crops, use of vegetative propagated planting material is the scientific practices (Singh and Singh, 2006; Singh

and Singh 2007). Therefore, large number of plantlets with healthy shoot and root system can be produced to meet the demand of increasing commercial cultivation through vegetative propagation methods. According to Ghosh and Bera, 2015 different season influence propagation methods like grafting and air layering for different crop. The stem section of pitaya forms aerial roots which adhere to the surface upon which they grow or climb. Healthy mature stem segments of 6 - 15 inches are used. A slanted cut is made at the stem base, this is left in a shaded area for about 5-7 days to dry and heal before being planted out directly in the field. Successful cutting propagation has been associated with the ideal collection date of cuttings (Sharma and Aier 1989; Howard 1996; Rosier *et al.*, 2004). A study was conducted mainly to know about which month will give maximum successful cutting and which plant part exert better rooting.

MATERIALS AND METHODS

The present investigation was carried out in a private farm at Onda block of Bankura district of West Bengal in 2018-19. The experimental site was located at an altitude of 74m (243ft) above mean sea level and geographically situated at 23°08' N latitude 87°12' E longitude. The climate is tropical savannah and is comparatively quite dry

from other parts of the state. Drought is a common occurrence. The cuttings are taken in every month of the year and from different parts of three angle stem. Four replications were taken for each treatment. In each replication 20-cuttings were used. Top soil, sand, cow dung at the rate of 1:2:1 were mixed thoroughly and soil mixture was filled in each polythene bag (25 cm long and 12 cm width) upto three fourth of its length. Water was applied over the cuttings daily morning and evening. The study was conducted on Red Fruit type of dragon fruit. Cuttings were collected from 10-12 months old shoot of 3- years' old plant. Cuttings were shade dried for two day prior to planting to dry the ooze coming from the fresh cuttings. Cuttings (20cm length) are planted every month using 3-types of cuttings viz., (i) the shoots which were arisen from three angled main stem at 90° angle; (ii) Last part of three angled main stem and (iii) Middle part of three angled main stem. Depth of planting of cuttings was 7-8cm.

Observations were recorded at 90 days after planting of cuttings. Ten sprouted cuttings were randomly selected for recording the observations from each replication of every treatment throughout the study. The observations included were, average number of roots formed, percentage of cuttings alive 90 days after planting in polybag (calculated using the formula, number of cuttings alive /total number of cuttings planted x 100), length of roots (measured with the help of measuring scale from the base to the tip of root and the mean length was calculated and expressed in centimetres). Percentage of success of cuttings was considered on the basis of cuttings were alive. The data obtained were statistically analysed by adopting the factorial Randomized Block Design method as suggested by Panse and Sukhatme (1978). Critical difference values were calculated where ever F-test was found to be significant at 5 per cent level of probability.

RESULTS AND DISCUSSION

The results on rooting behaviour of cuttings taken in different months from three- types of stem have been presented in Table 1, 2 and 3 respectively. The statistical analysis indicated that there were significant differences between the

different plant parts for all the root parameters. It was found that cuttings taken from middle part of three angled main stem (T3) produced significantly maximum percentage of alive cuttings (100%) for five months (November, December, January, February and March). In general, it was noted that the months of September and October resulted in lowest survival percentage of cuttings irrespective of types of cuttings. T1 (The shoots which were arisen from three angled main stem at 90° angle) also exert better result than T2 (Last part of three angled main stem) in case of rooting % mentioned in Table 1. According to the Le Bellec, (2003) also suggested that if cuttings are at least 50 to 70 cm in length and are regularly watered gives satisfactory rooting. If all these conditions are provided around 90% of the cuttings ensure rooting. All the treatment showed 100% rooting success in November, December and February. According to the previous worker (Wang and Zhao, 2012) it was stated that cuttings taken in the month of February having more C:N ratio. Total carbohydrate and total nitrogen levels, and C/N ratio (Druege *et al.*, 2004; Rapaka *et al.*, 2005) have been reported to influence the adventitious rooting of plant species. It was also supported by Kumar, 2016. Cuttings taken from many deciduous plants and narrow-leaved evergreens from late fall to early winter are likely to root well. At this stage, shoot growth has slowed down and the stem has begun to harden, resulting in the accumulation of adequate carbohydrate reserves to support root growth. The relatively lower nitrogen levels also make cuttings less susceptible to rotting. Many studies showed that rooting response also correlates with the interactions between endogenous plant hormones (Guo *et al.*, 2004; Tsipouridis *et al.*, 2006). Auxin is believed to play a central role in the formation of adventitious root (Weigel *et al.* 1984). Maximum root length was observed 30.00 cm by T1 in the month of November mentioned in Table 2. Seran and Thiresh, (2015) also revealed that the average value of longest root length ranged from 11.0 cm to 22.0 cm. All treatment showed maximum root length in the month of November (T1-30.00cm, T2-25.00cm and T3- 20.00cm). Maximum number of root observed in T3 (3.0) in July month than T1 and T2 respectively.

Table 1: Success percentage of cuttings (from different parts of stem) planted in different months

Date of propagation (M)	T ₁ (% of success)	T ₂ (% of success)	T ₃ (% of success)
Nov., 2017	100	50	100
Dec., 2017	100	100	100
Jan., 2018	50	90	100
Feb., 2018	100	100	100
March, 2018	90	70	100
April, 2018	80	70	60
May, 2018	80	70	50
June, 2018	80	80	90
July, 2018	60	40	50
Aug., 2018	50	30	50
Sept., 2018	40	30	20
Octo., 2018	30	30	10
SE(d)	1.23	2.46	4.25
CD	2.43	4.87	8.43

*T₁: The shoots which were arisen from three angled main stem at 90° angle, T₂: Last part of three angled main stem and T₃: Middle part of three angled main stem

Table 2: Average length of roots of cuttings (from different parts of stem) planted in different months

Date of propagation (M)	T ₁ Average length of roots (cm)	T ₂ Average length of roots (cm)	T ₃ Average length of roots (cm)
Nov., 2017	30	25	15
Dec., 2017	16	17	20
Jan., 2018	9	16	18
Feb., 2018	15	13	12
March, 2018	14	19	12
April, 2018	20	0	12
May, 2018	15	13	0
June, 2018	20	17	19
July, 2018	18	0	13
Aug., 2018	16	0	13
Sept., 2018	16	0	0
Octo., 2018	14	0	0
SE(d)	0.56	1.12	1.94
CD	1.11	2.22	3.85

*T₁: The shoots which were arisen from three angled main stem at 90° angle, T₂: Last part of three angled main stem and T₃: Middle part of three angled main stem

Table 3: Average number of roots per cuttings (from different parts of stem) planted in different months

Date of propagation (M)	T1 Average number of roots per cutting	T2 Average number of roots per cutting	T3 Average number of roots per cutting
Nov., 2017	1	1	1
Dec., 2017	1	1	1
Jan., 2018	1	2	1
Feb., 2018	1	1	1
March, 2018	1	2	1
April, 2018	2	0	1
May, 2018	2	2	0
June, 2018	1	1	1
July, 2018	2	0	3
Aug., 2018	1	0	2
Sept., 2018	1	0	0
Octo., 2018	1	0	0
SE(d)	0.04	0.07	0.12
CD	0.07	0.14	0.24

*T₁: The shoots which were arisen from three angled main stem at 90° angle, T₂: Last part of three angled main stem and T₃: Middle part of three angled main stem

CONCLUSION

From this present investigation it is concluded that to get maximum number of planting material for vegetative propagation cuttings should be taken from middle part of three angled main stem in the month of November and December. Beside this cutting also can be taken from the shoots which were arisen from three angled main stem at 90° angle in November to get maximum % successful rooted cuttings with maximum root length.

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