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Varsha Minz
Department of Fruit Science, College of Agriculture, Indira Gandhi Krishi Vishwavidyalaya, Raipur, Chhattisgarh, India

Hemant Kumar Panigrahi
Department of Fruit Science, College of Agriculture, Indira Gandhi Krishi Vishwavidyalaya, Raipur, Chhattisgarh, India

Sangeeta
Department of Fruit Science, College of Agriculture, Indira Gandhi Krishi Vishwavidyalaya, Raipur, Chhattisgarh, India

Corresponding Author:
Varsha Minz
Department of Fruit Science, College of Agriculture, Indira Gandhi Krishi Vishwavidyalaya, Raipur, Chhattisgarh, India

Effect of different plant growth regulators and media on shooting of stem cuttings in dragon fruit

Varsha Minz, Hemant Kumar Panigrahi and Sangeeta

Abstract
An experiment was conducted to study the effect of different plant growth regulators and media on shooting of stem cuttings in dragon fruit (*Hylocereus undatus*) at Centre of Excellence on Protected Cultivation and Precision Farming, "Indira Gandhi Krishi Vishwavidyalaya, Raipur, Chhattisgarh. Dragon fruit cuttings treated with different plant growth regulators and media revealed that the cuttings grown in media M_2 -Soil: Sand: Cocopeat: Vermicompost (2:1:1:1) performed better than media M_1 - Soil: Sand: Cocopeat: FYM (2:1:1:1). Among different plant growth regulators, IBA @ 7000 ppm recorded minimum number of days taken to sprout initiation (35 days), maximum number of sprouts per cutting (1.72, 2.78, 3.64 and 4.22 at 30, 60, 90 and 120 DAP respectively), maximum length of shoot (9.42 cm, 12.78 cm and 18.28 cm at 60, 90 and 120 DAP respectively), maximum shoot fresh weight (123.74 g), maximum shoot dry weight (12.63 g) and maximum survival percentage (98.34%). The study revealed that IBA @ 7000 ppm and media M_2 -Soil: Sand: Cocopeat: Vermicompost (2:1:1:1) had significant effect on improving shooting of dragon fruit cuttings.

Keywords: Dragon fruit, Plant growth regulators, media

Introduction
The Dragon fruit (*Hylocereus undatus* Britton & Rose) is edible, fast growing, perennial epiphytic vine like cacti which belongs to family Cactaceae. Dragon fruit is known by many names in different countries, Thang loy in Vietnam, Pitajava in Venezuela, Tuna, Nopal, Pitajaya in Spain Junco, Tasajo in Mexico. It is also known as Pitaya, Strawberry pear, Night blooming cereus (Martin *et al.*, 1987) [2]. The English verncular name of *Hylocereus undatus* is a name used since around 1993, apparently resulting from prominent scaly spikes on the fruit exterior. The Dragon fruit is native to tropical and subtropical forest regions of Mexico and Central South America (Mirzahi *et al*, 1996) [3]. The fruit is well known for its rich nutrients contents as well as its antioxidant characteristics (Morton, 1987) [4]. Dragon fruit is believed to able to lower cholesterol concentration, to balance blood sugar concentration, to strengthen kidney function and bone, increasing the sharpness of the eyes as well as cosmetic ingredients (Suryono, 2006) [5]. Pitaya are terrestrial vine like cacti, having triangular green, fleshy jointed, many branched stems. Pitaya consists berry type of fruits with bright red skin stubbed with green scales and white or red flesh with numerative tiny black seeds. Dragon fruit can be propagated by seeds, this method is very simple but seeds are not true to type due to cross pollination (Andrade *et al*, 2005) [1]. Dragon fruit is propagated vegetatively, the most easiest and cheapest method of propagation is by cutting. Hence, the present investigation was carried out to study the effect of plant growth regulators and media on shooting of stem cuttings in dragon fruit.

Materials and Methods
The present investigation was carried out during the year 2019-20 at Centre of Excellence on Protected Cultivation and Precision Farming, "Indira Gandhi Krishi Vishwavidyalaya, Raipur, Chhattisgarh. The experiment laid out in" Factorial Completely "Randomized Design and replicated three times with 12 treatment" combinations of two factors, first factor was media *i.e.* M_1 – Soil: Sand: Cocopeat: FYM (2:1:1:1) and M_2 – Soil: Sand: Cocopeat: Vermicompost (2:1:1:1) and the second factor was plant growth regulator *i.e.* IBA @ 5000 ppm, IBA @ 7000 ppm, "NAA @ 100 ppm, IBA" @ 5000 ppm + NAA @ 100 ppm, IBA @ 7000 "ppm + NAA" @ 100 sand control.

Results and Discussion

The dragon fruit cuttings grown in both the medias which were under investigation with the influence of different concentrations of plant growth regulators showed that plant growth regulators were more effective than control for all growth parameters under study. IBA @ 7000 ppm concentration gave better results in cuttings grown in both of the medias followed by IBA @ 5000 ppm, IBA @ 7000ppm + NAA @ 100 ppm, IBA @ 5000 ppm + NAA @ 100 ppm and NAA @ 100 ppm whereas the least performance was observed in control treatment.

Table (1) showed the number of days taken to sprout initiation was found to be significant among treatment combinations. The cuttings grown in M_2 (soil + sand + cocopeat + vermicompost) media and treated with IBA @ 7000 ppm recorded minimum days to sprout (35 days), while it was maximum (55.92 days) in the cuttings grown in M_1 (soil + sand + cocopeat + FYM) media with control treatment.

Dragon fruit cuttings grown in M_2 (soil + sand + cocopeat + vermicompost) media and treated with IBA 7000 ppm performed significantly superior in shooting parameters *viz*., number of sprouts per cutting (1.72, 2.78, 3.64 and 4.22 at 30, 60, 90 and 120 DAP respectively)(table 2), length of shoot (9.42 cm, 12.78 cm and 18.28 cm at 60, 90 and 120 DAP respectively)(table 3), shoot fresh and dry weight, (123.74 g and 12.63 g) (table 1) and survival percentage (98.34%) (table 1). However, the above parameters were found to be poor in the cuttings grown in M_1 (soil + sand + cocopeat + FYM) media with control treatment.

Table 1: Effect of different PGR and media on number of days taken to sprout initiation, shoot fresh weight, shoot dry weight and survival percentage of dragon fruit cuttings.

Plant Growth Regulator Concentrations (P)	Number of days taken to sprout initiation			Shoot fresh weight			Shoot dry weight			Survival percentage		
	Media (M)		Mean	Media (M)		Mean	Media (M)		Mean	Media (M)		Mean
	M_1	M_2		M_1	M_2		M_1	M_2		M_1	M_2	
P_1 (IBA 5000ppm)	1.67	1.68	1.675	115.82	118.36	117.09	10.92	11.52	11.21	92.47	96.42	94.44
P_2 (IBA 7000ppm)	1.71	1.72	1.715	121.86	123.74	122.8	11.28	12.63	11.95	95.28	98.34	96.81
P_3 (NAA 100ppm)	1.51	1.52	1.515	106.27	111.61	108.94	6.18	8.24	7.21	81.85	83.14	82.49
P_4 (IBA 5000ppm + NAA 100ppm)	1.63	1.66	1.645	110.62	112.61	111.61	7.19	9.83	8.87	89.64	90.21	89.92
P_5 (IBA 7000ppm + NAA 100ppm)	1.65	1.67	1.66	112.83	113.68	113.25	9.97	10.86	10.41	91.92	93.29	92.10
P_6 (Control)	0.6	0.83	0.715	75.41	78.52	76.96	3.74	6.18	4.96	77.53	79.86	78.69
Mean	1.46	1.51		107.13	109.75		8.21	9.87		88.11	90.21	
	M	P	M × P	M	P	M × P	M	P	M × P	M	P	M × P
SE(m)	0.22	0.38	0.54	0.26	0.42	0.60	0.246	0.426	0.602	0.24	0.42	0.59
CD at 5%	0.64	1.10	1.56	0.71	1.23	1.74	0.712	1.234	1.745	0.70	11.22	1.72

Table 2: Effect of different PGR and media on number of sprouts per cutting in dragon fruit.

Plant Growth Regulator Concentrations (P)	30 DAP			60 DAP			90 DAP			120 DAP		
	Media (M)		Mean	Media (M)		Mean	Media (M)		Mean	Media (M)		Mean
	M_1	M_2		M_1	M_2		M_1	M_2		M_1	M_2	
P_1 (IBA 5000ppm)	1.67	1.68	1.675	2.73	2.76	2.74	3.33	3.36	3.34	4.05	4.18	4.11
P_2 (IBA 7000ppm)	1.71	1.72	1.715	2.74	2.78	2.76	3.62	3.64	3.63	4.18	4.22	4.20
P_3 (NAA100ppm)	1.51	1.52	1.515	2.63	2.68	2.65	3.26	3.31	3.28	3.77	3.85	3.81
P_4 (IBA 5000ppm + NAA100ppm)	1.63	1.66	1.645	2.71	2.72	2.71	3.30	3.32	3.31	3.82	3.92	3.88
P_5 (IBA 7000ppm + NAA100ppm)	1.65	1.67	1.66	2.72	2.73	2.72	3.31	3.32	3.318	3.88	3.96	3.92
P_6 (Control)	0.6	0.83	0.715	1.58	1.64	1.61	2.86	2.92	2.89	3.10	3.12	3.11
Mean	1.46	1.51		2.51	2.55		3.28	3.31		3.8	3.87	
	M	P	M × P	M	P	M × P	M	P	M× P	M	P	M× P
SE(m)	0.22	0.38	0.54	0.24	0.42	0.60	0.24	0.42	0.59	0.24	0.42	0.60
CD at 5%	0.64	1.10	1.56	0.71	1.23	1.74	0.70	1.21	1.72	0.71	1.23	1.74

Table 3: Effect of different PGR and media on length of shoot per cutting in dragon fruit.

Plant Growth Regulator Concentrations (P)	60 DAP			90 DAP			120 DAP		
	Media (M)		Mean	Media (M)		Mean	Media (M)		Mean
	M_1	M_2		M_1	M_2		M_1	M_2	
P_1 (IBA 5000ppm)	8.44	8.68	8.56	11.56	11.87	11.71	16.61	17.02	16.81
P_2 (IBA 7000ppm)	9.12	9.42	9.27	12.42	12.78	12.60	17.98	18.28	18.13
P_3 (NAA 100ppm)	6.16	6.24	6.20	8.31	7.61	7.96	13.03	13.42	13.22
P_4 (IBA 5000ppm + NAA 100ppm)	7.06	7.57	7.31	10.04	10.24	10.14	14.08	15.17	14.62
P_5 (IBA 7000ppm + NAA 100ppm)	7.18	7.75	7.46	10.21	10.68	10.445	15.58	16.23	15.90
P_6 (Control)	5.13	5.17	5.15	6.05	6.28	6.16	7.68	12.59	10.13
Mean	7.18	7.47		9.76	9.91		14.16	15.45	
	M	P	M × P	M	P	M × P	M	P	M× P
SE(m)	0.24	0.42	0.60	0.246	0.426	0.603	0.40	0.70	0.99
CD at 5%	0.71	1.23	1.75	0.71	1.23	1.74	1.17	2.03	2.87

Conclusion

From the present study, it is concluded that cuttings grown in M_2 (soil + sand + cocopeat + vermicompost) performed well in all aspect of shooting parameters and among six PGR

treatments, IBA @ 7000 ppm gave better results with respect to shooting of cuttings in dragon fruit.

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