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Research Article

STANDARDIZATION OF PROPAGATION TECHNIQUES IN VELLERUKKU (CALOTROPIS PROCERA (AIT) AIT.F)

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ABSTRACT

A field experiment was conducted at Agricultural College and research Institute, Tamil Nadu Agricultural University, Killikulam, Tamil Nadu to standardize the vegetative propagation technique in vellerukku. Three types of cuttings viz., terminal, middle and basal cuttings and three types of growth regulators *viz.*, IBA, NAA @ 500 ppm and 1000ppm alone and in combination and control were used. The result revealed that the terminal cuttings treated with IBA 500 ppm registered the highest rooting percent (86.66 percent and 90.00 percent), number of roots (11.21 and 11.47), root length (23.75 cm and 24.98 cm), shoot length (29.40 cm and 30.64 cm) and survival percentage in the main field (68.13 percent and 71.20 percent) under both the environment *viz.* open and mist condition were recorded by the terminal cuttings treated with IBA 500 ppm. It was followed by terminal cuttings treated with IBA 1000 ppm. Whereas control (basal cuttings dipped in distilled water) recorded the lowest values of 18.20 and 23.28 percent of rooting, 7.03 and 7.08 number of roots, 16.14 cm and 17.12 cm root length, 19.54 cm and 20.03 cm shoot length 11.62 and 12.47 percent survival in the mainfield under both open as well as mist condition.

KEY WORDS: Vellerukku (Calotropis procera)-cuttings-growth regulators-IBA

INTRODUCTION

Vellerukku commonly known as milkweed or swallow-wort, is a common wasteland weed (9). It belongs to the family Ascalipiadaceae which includes 280 genera and 2000 species. Native to India grows wild up to 900 MSL throughout the country (7). A tall woody shrub leaves and stems are covered with thick white tomentosum. The plant is used in Ayurveda medicine with unique properties for the treatment of fevers, rheumatism, asthma and elephantiasis. The plant also contains cardio active glycoside calotropin, which has anti-tumor activity besides it act as expectorant and diuretic. The dried roots yield nauseous, bitter mucilaginous substances, which contains a yellow bitter resin, a black acrid resin, a crystalline colourless substances madaralbum and mudarine. This species is propagated through seeds as well as cuttings. Fruit is a dehiscent capsule scattering of seed is a major problem. Vegetative propagation by means of cutting is hardy and there is no detailed information available on vegetative propagation of calotropis. Propagation of the difficult to root plant species i.e. calotropis becomes commercially feasible with the establishment of the optimal propagation method. Synthetic auxins are utilized for several purposes in horticulture agriculture such as the formation of adventitious roots from stem cuttings of various plants, micro propagation of plant species, setting of fruit etc., (2). To overcome some of the inherent difficulties encountered by the cuttings to the root, synthetic auxin application may be helpful to stimulate root initiation in plants (3) particularly IAA, IBA and NAA in general promotes the callusing and further development of roots in stem cuttings (5 and 6). Chadha *et al.* (4) reported that indole 3-butyric acid (IBA) has been used more widely because it is nontoxic to plants over a wide concentration.

MATERIALS AND METHODS

A field experiment was conducted to standardize appropriate propagation techniques for *Calotropis procera*. The study was undertaken at the Department of Horticulture, Agricultural College and Research Institute, Killikulam, Tamil Nadu, India. The experiment consisted of three types of cuttings *viz.*, basal, middle and terminal and three types of growth regulators *viz.*, IBA and NAA @ 500 and 1000 ppm alone and in combination and control (distilled water). The cuttings were made of uniform size 25 cm having four buds. For each treatment 25 cuttings were used from all the three types of cuttings. While preparing the cuttings a smooth cut in each cutting was given on distal end and slanting cut was given at lower end just below the lower node. The prepared cuttings were dipped in the growth regulator solutions for 60 seconds. One set of treated cuttings were planted in the nursery bed and another set of cuttings were planted in polybags and kept in mist chamber for rooting. For control treatment the cuttings were dipped in distilled water for 60 seconds and kept for rooting under both the environment. The experiment was replicated thrice. Bio metrical observations *viz.*, per cent of rooting, number of roots, root length (cm), shoot length (cm) and main field surveillance were recoded and subjected to statistical analysis. Means for various treatments were compared by LSD Multiple Range Test.

Table 1: Effect of growth regulators on percent of rooting in velleruku cuttings (Calotropis procera)

Treatments	Percent of rooting (open)				Percent of rooting (mist)			
	Basal	Middle	Terminal	Mean	Basal	Middle	Terminal	Mean
IBA 500 ppm	29.27	54.90	86.66	56.94	36.53	56.55	90.00	61.02
IBA 1000 ppm	27.73	48.63	75.23	50.53	33.25	50.00	76.35	53.20
NAA 500 ppm	25.21	35.00	53.33	37.84	26.42	36.15	63.77	42.11
NAA 1000 ppm	26.65	30.35	33.33	30.11	27.30	30.83	46.50	34.87
IBA + NAA 500 ppm	28.40	35.76	60.20	41.45	31.74	40.48	70.00	47.41
IBA + NAA 1000 ppm	27.39	36.17	72.21	45.25	28.61	41.32	73.45	47.79
Control	18.20	20.17	33.33	23.90	23.28	26.75	40.00	30.00
Mean	22.31	37.28	59.18		29.59	40.29	65.72	
SEd	0.081	0.120	0.760		0.115	0.115	0.680	
CD (5%)	0.176	0.250	1.650		0.250	0.250	1.480	

Table 2: Effect of growth regulators on number of roots in velleruku cuttings (Calotropis procera)

Treatments	Number of roots (open)				Number of roots (mist)			
	Basal	Middle	Terminal	Mean	Basal	Middle	Terminal	Mean
IBA 500 ppm	9.21	9.40	11.21	9.94	9.71	11.02	11.47	10.73
IBA 1000 ppm	8.97	8.95	11.03	9.65	9.00	10.00	11.05	10.02
NAA 500 ppm	7.04	8.10	10.29	8.47	7.92	8.25	10.40	8.85
NAA 1000 ppm	8.20	8.09	9.75	8.68	8.65	8.20	9.94	8.93
IBA + NAA 500 ppm	8.92	8.45	10.78	9.38	8.94	8.48	10.93	9.45
IBA + NAA 1000 ppm	7.05	8.08	11.00	8.71	8.20	8.75	11.02	9.32
Control	7.03	7.35	8.94	7.77	7.08	7.45	8.99	7.84
Mean	8.06	8.34	10.42		8.50	8.87	10.54	
SEd	0.469	NS	0.55		NS	NS	NS	
CD (5%)	1.02		1.20					

Table 3: Effect of growth regulators on root length in velleruku cuttings (Calotropis procera)

Treatments	Root length (cm) (open)				Root length (cm) (mist)			
	Basal	Middle	Terminal	Mean	Basal	Middle	Terminal	Mean
IBA 500 ppm	19.22	21.20	23.75	21.39	22.20	22.85	24.98	23.34
IBA 1000 ppm	18.25	18.33	19.07	18.75	20.15	21.00	23.17	21.44
NAA 500 ppm	16.55	17.00	17.63	17.06	18.12	19.20	18.66	18.66
NAA 1000 ppm	17.16	16.90	17.60	17.22	18.93	19.03	18.45	18.80
IBA + NAA 500 ppm	18.07	18.56	18.04	18.22	19.00	19.24	19.03	19.09
IBA + NAA 1000 ppm	17.10	17.18	18.35	17.54	18.97	19.35	21.15	19.82
Control	16.14	16.82	17.52	16.82	17.12	17.74	18.04	17.63
Mean	17.49	18.08	21.35		19.21	19.77	20.49	
SEd	NS	0.70	0.69		1.05	0.71	0.97	
CD (5%)		1.53	1.51		2.28	1.55	2.11	

Table 4: Effect of growth regulators on shoot length in velleruku cuttings (Calotropis procera)

Treatments	Shoot length (cm) (open)				Shoot length (cm) (mist)			
	Basal	Middle	Terminal	Mean	Basal	Middle	Terminal	Mean
IBA 500 ppm	19.22	21.20	23.75	21.39	27.07	28.10	30.64	28.60
IBA 1000 ppm	18.25	18.93	19.07	18.75	25.55	26.03	29.17	26.81
NAA 500 ppm	16.55	17.00	17.63	17.06	23.20	24.15	24.05	23.80
NAA 1000 ppm	17.16	16.90	17.60	17.22	23.75	24.00	23.28	23.67
IBA + NAA 500 ppm	18.07	18.56	18.04	18.22	24.17	24.20	25.25	24.54
IBA + NAA 1000 ppm	17.10	17.18	18.35	17.54	23.70	24.15	26.32	24.72
Control	16.14	16.82	17.52	16.82	20.03	21.00	23.09	21.37
Mean	17.49	18.08	21.35		23.92	24.49	25.97	
SEd	NS	0.70	0.69		0.96	0.73	0.93	
CD (5%)		1.53	1.51		2.09	1.59	2.04	

Table 5: Effect of growth regulators on survival percent in velleruku cuttings (Calotropis procera)

Treatments	Survival Percent (open)				Survival Percent (mist)			
	Basal	Middle	Terminal	Mean	Basal	Middle	Terminal	Mean
IBA 500 ppm	21.09	43.09	68.13	44.10	27.21	45.28	71.20	47.89
IBA 1000 ppm	20.14	38.25	59.08	39.15	20.28	40.83	63.33	41.48
NAA 500 ppm	16.73	24.92	41.45	27.70	17.15	25.00	55.00	32.38
NAA 1000 ppm	15.00	20.78	25.28	20.35	16.34	21.09	38.24	25.22
IBA + NAA 500 ppm	20.01	25.30	43.14	29.48	20.55	32.58	52.82	35.32
IBA + NAA 1000 ppm	18.48	25.00	41.34	28.27	19.05	30.35	45.43	31.61
Control	11.62	13.20	20.69	15.17	12.47	16.40	32.56	20.47
Mean	17.58	27.22	42.73		19.01	30.21	51.22	
SEd	0.125	0.460	0.060		0.130	0.120	1.120	
CD (5%)	0.250	1.002	0.130		0.280	0.250	2.440	

RESULTS AND DISCUSSION

The results of the present study are presented in the table 1,2,3,4 and 5. From the result it was observed that types of cuttings significantly differed on rooting. Among the three types of cuttings tried the terminal cuttings performed better than other two types of cuttings *viz.*, middle and basal cuttings under both the environments *viz.*, open as well as mist condition. The terminal cuttings recorded higher rooting percentage (59.18 percent and 65.72 percent), number of roots (8.94 and 10.54), root length (21.35 cm and 24.89 cm), shoot length (20.49 cm and 25.97 cm) and survival percentage in the main field (42.73 percent and 51.22 percent) under both the environment viz. open and mist condition respectively. It was followed by middle cuttings. Whereas basal cuttings recorded the lowest values of 22.31 and 29.59 percent of rooting, 7.03 and 8.50 number of roots, 17.49 cm and 19.21cm root length, 22.25 cm and 23.92 cm shoot length and 17.58 and 19.01 percent survival in the mainfield under both open as well as mist condition.

Application of growth regulators had significantly influenced the rooting ability of vellerukku cuttings. Among the different types of growth regulators used, IBA @ 500 ppm registered higher rooting percent (56.94 percent and 61.02 percent), number of roots (9.94 and 10.73), root length (21.39 cm and 23.34 cm), shoot length (26.81 cm and 28.60 cm) and survival percentage in the main field (44.10 percent and 47.89 percent) under both the environment *viz.* open and mist condition respectively. It was followed by IBA 1000 ppm. Whereas control recorded the lowest values of 23.90 and 30.00 percent of rooting, 7.77 and 7.84 number of roots, 16.82 cm and 17.63 cm root length, 20.78 cm and 21.37 cm shoot length 15.17 and 20.47 percent survival in the mainfield under both open as well as mist condition. Superiority of IBA over NAA in rooting of cuttings was reported by (3). Ahamed [1] observed the significant influence of IBA on the root production of *Bougainvillea* glabra. These results are in line with the findings of (8) in Ficus hawaii and (11) in peach, who reported that IBA treated cuttings registered increased rooting percentage and root length.

The highest rooting percent (86.66 percent and 90.00 percent), number of roots (11.21 and 11.47), root length (23.75 cm and 24.98 cm), shoot length (29.40 cm and 30.64 cm) and survival percentage in the main field (68.13 percent and 71.20 percent) under both the environment *viz.* open and mist condition were recorded by the terminal cuttings treated with IBA 500 ppm. It was followed by terminal cuttings treated with IBA 1000 ppm. Whereas control (basal cuttings dipped in distilled water) recorded the lowest values of 18.20 and 23.28 percent of rooting, 7.03 and 7.08 number of roots, 16.14 cm and 17.12 cm root length, 19.54 cm and 20.03 cm shoot length 11.62 and 12.47 percent survival in the mainfield under both open as well as mist condition. The increased rooting percentage and root length observed by the IBA treatment might be attributed to the auction of IBA which might have caused hydrolysis and translocation of carbohydrates and nitrogenous substances at the base of cuttings and this resulted in accelerating cell elongation and cell division in suitable environment. Corroborative results also made by (9) in *Piper longum.*

From the results it was concluded that in vellerukku, terminal cuttings treated with IBA 500 ppm proved the best as compared to other types of cuttings and growth regulators.

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