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Vegetative propagation in Karanja (*Pongamia pinnata* L.)

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ABSTRACT

The present study reports fast multiplication of *Pongamia pinnata* through vegative propagation to produce desirable genetically identical individuals. Stem cuttings with varying thickness viz., <1cm, 1-1.5cm and >1.5cm were treated with different concentrations (50,100,200,400,600,800 and 1000ppm) of auxins (IBA and NAA) along with distilled water (control). IBA and NAA at 800ppm showed the best result compared to other treatments. IBA treatment responded better as compared to NAA. Supra optimal level of auxins treatment causing reduction in rooting.

Key words: *Pongamia pinnata,* vegetative propagation, stem cutting, Indole-3-butyric acid (IBA), α Naphthaline acetic acid (NAA)

INTRODUCTION

Among the potential tree born oil species (TBOs) *Pongamia pinnaa* (Karanja) is a medium sized, partially deciduous tree. It is native of India, Burma, Malaya and Indonesia. It is most suitable species for planting in catchments area of river streams, reservoirs, lakes, roadsides and as an ornamental tree. It can be grown on wasteland in general but on the saline and alkali soils in particular. It has capacity to tolerate abundant soils moisture. If it is planted along the bounds of wetlands, it increases the fertility of the land as it furnishes good manure on the site (Sharma, 1959). It has a wide range of medicinal use. It flowers in April-May and ripened fruits area available up to May-June in next year. The planning commission (Govt. of India) has also been selected as a promising species for bio-diesel production. Oil content in Karanja ranged from 25 to 40%. It is mainly grown by seed. Karanja seed produce pongam oil, which is successfully used to generate power and to run vehicle, tanning industries for dressing leathers (Russel, 2004 and Handa *et al.,* 2006). Multiplication of CPTs through seed is not sufficient to desired level in short period. In such cases vegetative propagation will be important to produce genetically identical individual is short period. The present investigation is an effort in this direction.

MATERIAL AND METHOD

The experiment was conducted during February to April 2006 under polyhouse at Department of Forestry, Rajendra Agricultural University, Pusa, Samastipur, Bihar (25°59'N latitude 85°48' E longitude at altitude of 52.95 m above mean sea level). The climate of the area was typical monsoon type with three seasons viz., rainy (July-October), winter (November-February) and summer (March-June). Long term mean annual rainfall was 1170 mm of which 85% was received during the rainy seasons. Mean monthly temperature ranged between 2.9°C (in January) and 36.8°C (in June). Branch cutting having length 20-50cm of fifteen year old CPTs of Karanja provenance from Deopar with

Table 1: Effect of different soaking treatment of auxins on thin (<1cm diameter) stem cutting for Karanja sprouting and rooting.

Soaking Treatment	Sprouting (%) in days				Rooting in days							
	30	45	60	75	30		45		60		75	
					Rooting (%)	Root length (cm)	Rooting (%)	Root length (cm)	Rooting (%)	Root length (cm)	Rooting (%)	Root length (cm)
IBA												
0 (Control)	8.5	13.1	20.4	26.8	-	-	-	-	48.0	9.5	55.0	11.2
50ppm	3.2	10.4	14.5	21.5	-	-	-	-	36.0	2.5	38.2	3.4
100ppm	4.5	12.4	16.8	23.6	-	-	-	-	38.0	3.5	40.1	4.2
200ppm	6.4	15.2	18.5	25.3	-	-	-	-	40.0	4.1	44.2	5.8
400ppm	8.1	17.5	26.4	30.4	-	-	-	-	42.0	6.5	45.0	8.1
600ppm	10.4	18.8	35.6	38.5	-	-	-	-	45.0	8.2	49.1	10.5
800ppm	12.5	21.4	38.1	43.6	-	-	-	-	50.0	10.8	60.0	13.5
1000ppm	7.2	12.8	20.5	26.7	-	-	-	-	40.0	5.0	44.0	6.4
Mean(x)	7.6	15.2	23.85	29.55	-	-	-	-	42.38	6.26	46.95	7.89
S.D.	1.68	1.87	2.86	2.68	-	-	-	-	2.14	1.67	2.63	1.83
C.V.(%)	22.11	12.30	11.99	9.07	-	-	-	-	5.05	26.68	5.60	23.19
NAA												
0 (Control)	6.5	11.4	17.5	23.0	-	-	-	-	43.0	7.5	47.4	9.5
50ppm	2.0	4.1	6.5	8.8	-	-	-	-	28.0	2.0	30.1	2.5
100ppm	3.0	6.5	8.8	11.4	-	-	-	-	30.0	2.0	33.2	3.4
200ppm	4.2	8.1	12.5	16.8	-	-	-	-	32.0	3.2	35.1	4.5
400ppm	6.0	10.4	16.2	22.8	-	-	-	-	36.0	4.5	38.2	5.5
600ppm	7.2	12.8	18.4	25.1	-	-	-	-	40.0	5.5	41.5	7.1
800ppm	8.4	14.4	22.5	28.3	-	-	-	-	44.4	8.0	49.5	10.2
1000ppm	3.5	6.2	8.4	12.5	-	-	-	-	35.0	4.5	38.0	6.5
Mean(x)	5.1	9.24	13.85	18.59	-	-	-	-	36.05	4.71	39.13	6.15
S.D.	1.45	1.83	2.30	2.59	-	-	-	-	2.37	1.43	2.51	6.15
C.V.(%)	28.43	19.81	16.61	13.93	-	-	-	-	6.57	30.36	6.41	26.02

Table 2: Effect of different soaking treatment of auxins on medium (1-1.5cm diameter) stem cutting for Karanja sprouting and rooting.

Soaking Treatment	Sprouting (%) in days				Rooting in days							
	30	45	60	75	30		45		60		75	
					Rooting (%)	Root length (cm)	Rooting (%)	Root length (cm)	Rooting (%)	Root length (cm)	Rooting (%)	Root length (cm)
IBA												
0 (Control)	10.2	15.4	25.1	32.5	-	-	-	-	5.0	12.2	62.0	14.5
50ppm	4.1	12.4	18.5	24.6	-	-	-	-	40.0	4.8	44.0	6.5
100ppm	6.2	14.5	21.4	27.8	-	-	-	-	45.0	6.5	48.0	8.4
200ppm	8.6	17.8	24.5	28.4	-	-	-	-	48.0	7.1	54.0	10.2
400ppm	10.2	19.1	36.4	30.5	-	-	-	-	51.0	8.5	56.0	12.1
600ppm	12.1	22.4	39.5	44.1	-	-	-	-	54.0	10.8	58.0	13.8
800ppm	14.5	25.0	42.4	48.5	-	-	-	-	60.0	14.5	65.0	16.4
1000ppm	11.2	16.5	30.4	38.5	-	-	-	-	45.0	6.1	48.0	8.5
Mean(x)	69.64	17.89	29.65	34.36	-	-	-	-	49.13	8.81	54.38	11.30
S.D.	1.76	1.98	2.85	2.82	-	-	-	-	2.40	1.76	2.62	1.80
C.V.(%)	18.26	11.07	9.61	8.21	-	-	-	-	4.88	20.20	4.82	15.93
NAA												
0 (Control)	8.2	14.0	20.8	24.2	-	-	-	-	44.0	9.5	52.0	11.8
50ppm	3.0	5.5	8.4	10.8	-	-	-	-	32.0	2.8	35.0	4.8
100ppm	4.1	7.4	10.5	14.8	-	-	-	-	35.0	3.5	38.0	6.4
200ppm	6.0	10.5	13.4	25.1	-	-	-	-	38.0	5.5	42.1	7.1
400ppm	7.5	13.2	18.3	25.1	-	-	-	-	42.0	6.5	44.5	8.5
600ppm	9.1	16.2	22.4	28.5	-	-	-	-	45.0	8.5	47.0	10.5
800ppm	10.2	18.5	27.4	35.1	-	-	-	-	48.0	10.0	55.0	12.4
1000ppm	5.0	8.8	12.2	16.4	-	-	-	-	40.0	5.5	45.0	8.5
Mean(x)	6.64	11.76	16.68	21.89	-	-	-	-	40.5	6.48	44.83	8.75
S.D.	1.54	2.05	2.48	2.72	-	-	-	-	2.24	1.58	2.50	1.58
C.V.(%)	23.19	17.43	14.87	12.43	-	-	-	-	5.53	24.38	5.58	18.06

Table 3: Effect of different soaking treatment of auxins on thick (>1.5cm diameter) stem cutting for Karanja sprouting and rooting.

Soaking Treatment	Sprouting (%) in days				Rooting in days							
	30	45	60	75	30		45		60		75	
					Rooting (%)	Root length (cm)	Rooting (%)	Root length (cm)	Rooting (%)	Root length (cm)	Rooting (%)	Root length (cm)
IBA												
0 (Control)	15.8	25.4	40.2	48.4	-	-	-	-	64.4	10.0	68.0	12.5
50ppm	6.4	18.3	26.5	35.4	-	-	-	-	55.4	6.2	58.1	7.2
100ppm	8.0	20.2	31.4	42.3	-	-	-	-	58.1	7.5	62.3	8.5
200ppm	13.0	25.4	38.5	48.5	-	-	-	-	61.4	8.2	65.5	10.8
400ppm	16.0	30.5	44.5	55.1	-	-	-	-	65.0	10.2	68.4	13.3
600ppm	17.5	33.4	48.4	57.5	-	-	-	-	70.2	14.4	74.8	17.5
800ppm	19.4	40.2	66.4	75.5	-	-	-	-	75.0	16.5	80.5	20.2
1000ppm	15.0	22.6	35.2	47.8	-	-	-	-	60.0	7.5	63.0	9.1
Mean(x)	13.89	2.7	41.39	51.28	-	-	-	-	63.69	10.06	67.58	12.36
S.D.	2.06	2.61	3.39	3.33	-	-	-	-	2.46	1.84	2.68	2.05
C.V.(%)	14.83	96.67	8.19	6.49	-	-	-	-	3.86	18.29	3.85	16.59
NAA												
0 (Control)	14.1	26.4	38.5	45.6	-	-	-	-	58.0	9.5	62.0	11.2
50ppm	4.1	14.4	23.5	30.4	-	-	-	-	40.0	3.1	43.0	8.1
100ppm	6.5	16.2	25.4	35.5	-	-	-	-	46.0	4.4	48.0	10.5
200ppm	9.1	20.4	32.5	38.3	-	-	-	-	50.0	6.1	53.4	12.3
400ppm	13.4	25.5	37.4	42.2	-	-	-	-	53.0	8.5	55.0	13.2
600ppm	15.5	26.3	38.2	46.4	-	-	-	-	54.0	10.2	58.0	15.1
800ppm	18.1	38.4	62.2	46.4	-	-	-	-	60.0	12.0	66.4	16.8
1000ppm	14.4	18.5	30.4	44.4	-	-	-	-	50.0	6.0	53.0	11.5
Mean(x)	11.9	23.26	36.01	44.04	-	-	-	-	51.38	7.48	54.85	12.34
S.D.	2.12	2.68	3.35	3.30	-	-	-	-	2.45	1.69	2.64	1.59
C.V.(%)	17.82	11.52	9.30	7.49	-	-	-	-	4.77	22.59	4.81	12.88

varying thickness viz. <1/cm, 1-15cm and <1.5cm were taken end leaves were removed. The top cut ends were sealed with molten wax to reduce the water loss. The experiment was conducted in completely randomized block design (8 IBA × 8NAA × 3 replication ×10 cutting each replicate = 1920 cutting). Stem cutting were treated with different concentration of IBA and NAA solution at 50, 100, 200, 400, 600, 800 and 1000 ppm for twenty-four hours by dipping 5cm basal portion in the solution. The treated cuttings were planted in ordinary nursery bed having sand and FYM mixture (1:1). The observations were recorded for sprouting (%), rooting (%) and root length (cm) at 15, 30, 45, 60 and 75 days. The cutting were irrigated twice a day regularly to avoid desiccation and treated with Bavistin (0.2%) solution at every fortnightly interval to avoid fungal infection.

RESULTS AND DISCUSSION

Study on vegetative propagation in Karanja (*Pongamia pinnata*) indicates the response of different treatments is respect to sprouting (%), rooting (%) and root length (Table 1,2 and 3). Generally, sprouting was initiated after 30 days while rooting after 60 days of treatments. Thick stem cutting (<1.5 diameter) showed best sprouting and rooting response at 800ppm of IBA and NAA at 75 days after treatment indicating optimal level. The IBA treatment showed better result compare to NAA Supra-optimal level treatments causing reduction in rooting. Similar result were reported by Nanda *et al.,* (1968) in forest tree.

Present investigation suggested thickness (<1.5cm diameter) of Karanja stem cutting and 800ppm IBA and NAA treatment for 24 hours soaking may be exploited for quick vegetative progotation.

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