

Effect of plant growth regulators hormone on sprouting and rooting of cutting grown *Jatropha gossypifolia* (L)

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ABSTRACT

Jatropha gossypifolia Linn. is an important ancestress of *J. curcas*, and biodiesel plant, vegetative propagation is an important method to produce genetically identical individual within short period of time. Different concentration of IBA and NAA. i.e 50, 100, 200, 400, 600, 800 and 1000 ppm with distilled water were tried for vegetative propagation. 100ppm IBA and NAA showed the best result compared to other treatments. IBA shows better sprouting than NAA. IBA gave better rooting survival percentage and root length than NAA at 100ppm concentration.

Key words: *Jatropha gossypifolia*, auxins, vegetative propagation, stem cuttings.

INTRODUCTION

Under present changing situation, depleting natural resources of fossil fuel will pose a major problem to human population, production of fuel from ecofriendly environment and sustainable source has become most important for identifying alternatives to petroleum fuel. Recently it has gained economic importance of promising bio-diesel producing *Jatropha* species belong to family Euphorbiaceae. The genus *Jatropha* is a morphologically diverse germs, comprising of 160-175 species of shrubs, rhizomatous sub-shrub and herbs (Kumar and Swarnkar 2003). *Jatropha gossypifolia* Linn. (Euphorbiaceae) is vernacularly called Bellyache bush (English), Bherenda/Verenda (Hindi), Labherendra (Bengali), Nela-amide (Talegu) and Atalai (Tamil). It is native of Brazil but commonly naturalized in many part of India. It is common woody shrub growing abundantly. It is bushy gregarious shrub varied 0.9-1.8m in height, leaves palmately 3-5lobed, 20cm long and equally wide at first brown shining. Later turned green margins of leaves, petiole and leaf blade covered with glandular

hairs flowers dark red, crimson or purplish, in glandular corymbose cymes, capsule 0.9mm long, 3-10bed, truncate at both ends, seed grayish red with a caruncle, *Jatropha* can grow well in range of and most importantly it is not browsed by animals (Henning 2002, Patil 2004) short, upto six feet high with stout glabrous branches and glandular, often purple-tinged to have (Hutchinson and Daniel, 1958). The roots, stems and leaves of these plants are used to treat jaundice, gonorrhoea and oral infection. It could also be used as diuretic and purgative (Irvine 1961). Therefore a sustainable and cost effective viable production technology needs to identify the high yielding plants in terms of number of fruit per plant which can be very well utilized for further improvement programme because *Jatropha* seedling grown by seed take at least 2 to 2.5 years so start fruiting while plant grown by stem cutting start fruiting with six month only. Vegetative propagation has added advantage in establishment of clonal seeds orchard, clonal banks, propagation of exceptional hybrids and of selected plants on large scale (Gera *et al.*, 2000). Growing of seedling stocks from multiplication of promising CPTs of RAU

Table 1: Effect of different soaking treatment on (1-1.5cm) thick *Jatropha gossipifolia* cutting for sprouting and rooting.

Soaking treatment	Sprouting (%) in days			Rooting in days			Survival % of plant after 90 days						
	15	30	45	60	15	30		45	60				
	Rooting (%)	Root length (cm)	Rooting (%)	Root length (cm)	Rooting (%)	Root length (cm)	Rooting (%)	Root length (cm)					
IBA													
Oppm	3.2	10.6	25.2	30.5	5.2	0.25	18.1	1.62	38.2	3.5	52.2	4.5	45
50 ppm	6.5	20.1	32.1	45.2	10.2	0.42	25.5	2.25	44.5	4.5	65.4	5.8	51
100 ppm	10.0	35.5	55.5	70.5	12.5	0.52	28.5	2.55	48.5	4.8	68.2	6.5	62
200 ppm	8.2	22.2	35.3	52.5	11.4	0.48	26.5	2.45	46.5	4.6	66.5	6.2	57
400 ppm	6.4	20.6	28.4	46.4	10.5	0.73	24.2	2.25	44.6	4.2	62.5	5.8	54
600 ppm	4.2	18.1	26.2	35.5	8.6	0.35	23.5	1.88	42.5	3.8	56.4	5.6	50
800 ppm	3.5	16.2	24.5	31.5	7.6	0.28	22.2	1.76	40.2	3.5	48.5	5.5	45
1000 ppm	2.6	15.5	18.4	26.5	6.4	0.24	21.5	1.65	38.5	3.2	45.5	4.6	42
Mean	5.57	19.22	30.7	42.32	9.05	0.37	23.76	2.05	42.93	3.95	58.12	5.56	50.75
SD	2.46	5.44	10.51	13.58	2.37	0.10	3.0	0.34	3.51	0.63	8.14	0.65	6.32
CV(%)	44.16	28.30	34.23	32.08	26.18	27.02	12.62	16.58	7.33	15.94	14.00	11.69	12.45
NAA													
Oppm	2.2	5.1	15.2	20.3	2.2	0.12	6.5	0.80	8.3	2.2	22.2	3.56	20
50 ppm	7.5	18.2	32.5	33.2	5.5	0.25	13.2	1.24	16.5	2.25	38.4	4.65	32
100 ppm	8.6	28.3	40.6	50.6	8.6	0.30	15.5	1.42	22.5	2.45	46.5	5.40	45
200 ppm	6.4	25.1	35.2	40.4	6.8	0.26	14.2	1.25	18.5	2.35	42.2	5.32	38
400 ppm	5.3	23.5	26.1	35.5	5.6	0.25	13.5	1.18	16.2	2.20	35.4	5.15	33
600 ppm	4.6	21.2	24.0	28.4	4.5	0.23	11.2	1.12	14.8	2.15	30.5	4.25	28
800 ppm	3.8	18.2	22.3	26.8	4.0	0.18	10.5	1.10	21.6	1.85	28.4	4.12	24
1000 ppm	2.5	10.5	12.1	20.5	3.5	0.10	9.5	0.95	10.8	1.54	26.5	3.56	23
Mean	5.11	18.76	26.0	29.7	5.03	0.39	11.76	1.13	15.02	2.12	33.76	4.50	30.37
SD	2.14	7.20	9.76	13.43	1.87	0.066	2.73	0.17	4.19	0.27	7.77	0.69	7.82
CV(%)	14.87	38.38	37.54	45.22	36.81	16.92	23.21	15.04	27.89	12.73	23.01	15.33	25.78

JG in short period can be achieved through stem cutting with induced rooting by phytohormone. With the view, an attempt on vegetative propagation through stem cutting was undertaken for fast, rooting response in stem cutting *J. gossypifolia* under condition of north Bihar.

MATERIAL AND METHODS

The experiment was conducted during April-May 2007 under poly-house, department of forestry, R.A.U, Pusa, Samastipur, Bihar, Branch cutting having length 20-50cm of 5 years old plant were taken from pusa with thickness range of 1-1.5cm, the top cut end were sealed with molten wax to reduce water loss. Stem cutting were treated by known concentration of IBA and NAA solution for twenty four hour by dipping 5cm basal portion in the solution. The treated cutting were planted in ordinary nursery bed have sand and FYM mixture (1:1), the experiment was laid out in completely randomized block design 8 IBA × 8NAA × 3 replication × 20 cutting in each replicate = 3840 cutting). The observation were recorded for sprouting (%) rooting(%) and root length(cm) at 15, 30, 45 and 60 days interval, the cutting were irrigated once a day regularly to avoid desiccation and treated with Bavistin (0.2%) solution at every fortnightly interval to avoid fungal infection. After 60 days daily irrigation were stopped and plant kept for hardening, irrigation was provided after 10 days interval, and after 30 days survival percentage were calculated.

RESULTS AND DISCUSSION

Perusal of mean data of *J. gossypifolia* cutting, record best sprouting was in case of 100 ppm IBA which was greater than 100ppm NAA in all day's interval and over all concentration (Table 1). Best rooting was observed in case of 100ppm IBA than 100 PPM NAA at all days of interval and also at all concentration of IBA and NAA. Similar results were reported in *Jatropha curcas* by Narian and Watna (1983) infra-optimal level causing reduction in rooting, similar result were found by Nanda *et al.*, (1968). Best root length was also observed in case of 100 ppm NAA over 100ppm IBA at all days of interval and also at all concentration. Data recorded on the rooting sprouting root length and survival percentage of *J. gossypifolia* presented in Table 1, revealed that maximum sprouting, rooting, root length and survival percentage were obtained in the cutting treated with IBA with compared to NAA. The result showed that IBA is superior over NAA for all parameter, however both treatment performed better over control. The result exhibited quite difference among the different concentration should of the growth regulator. The maximum sprouting, rooting, root an length and survival percentage were recorded that 100ppm IBA treatment for 24 hours soaking may be exploited for quick vegetative propagation and better survival percentage. In the present studies increased rooting percentage compared to control may be due to induction of hydrolysis and mobilization of nutrient factor to site of application, promoting thereby, root initiation. Role of auxin in enchancing callusing and rooting has been reported by Nanda *et al.*, (1968).

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