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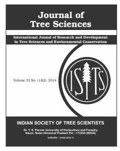

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Influence of growth regulators on propagation of culm- and branch cuttings of *Bambusa vulgaris*

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ABSTRACT

Experiments were conducted to find out the effect of three growth regulators such as IAA, IBA and NAA each at six different concentrations viz. 50,100, 150, 200, 250 and 300 ppm along with control on propagation of culm cuttings as well as branch cuttings of *Bambusa vulgaris*. The binodal cuttings were dipped in different growth regular solutions for 24 hours and the treatments were evaluated after 90 days of planting. No growth regulator treatment could exert significant influence on the culm cuttings with regard to propagation. There is no need of treating the cuttings of *B vulgaris* with growth regulators for successful propagation. Soaking the culm cuttings with normal water for 24 hours is suitable method for large scale propagation. However, IAA 100 treatment was found effective for propagation of culm–branch cuttings.

Key words:

Bamboo, *Bambusa vulgaris*, cutting, growth regulators, propagation

INTRODUCTION

The growth regulators play an important role in cell division, elongation, growth and development of plants including bamboos. Vegetative propagation of different bamboo species through growth regulator treatments have been reported by many researchers Surendran et al. (1983, 1986), Nath et al. (1986), Kumar et al. (1988), Jayasree Gopalkrishnan (1989), Seethalakshmi et al. (1988), Nagarajaiah et al. (1994), Chauhan and Kumar (2005). *Bambusa vulgaris* Schrader ex Wendland (Common bamboo), an important cultivated bamboo species of the world is propagated vegetatively because it does not produce viable seed (Koshy and Jee 2001 and Bhol 2006). It is propagated by culm cutting, offset, branch cutting, rhizome and also tissue culture techniques are useful. Propagation by culm cutting and branch cutting are comparatively more feasible methods for common man, therefore present study study was planned to explore the role of growth regulators on propagation of culm- and branch cutting of *B.vulgaris.*

MATERIALS AND METHODS

The investigation was conducted in Orissa University of Agriculture and Technology, Bhubaneswar, India to find out the effect of three growth regulators such as IAA, IBA and NAA each at six different concentrations viz. 50,100, 150, 200, 250 and 300 ppm along with untreated control on propagation of culm as well as branch cuttings of *Bambusa vulgaris*. The binodal cuttings were dipped in different growth regulator solutions for 24 hours. The growth regulator solutions of different concentrations were prepared by dissolving required weighed quantity of growth regulators in ethyl alcohol (95%) and then adding de-ionized water. Two separate experiments, one for culm cutting and another for branch cutting, were conducted under Completely Randomised Design. The cuttings were planted in nursery beds during 1st week of April. The culm cuttings filled in with the solution/water inside the culm cavity making hole were placed horizontally in nursery bed keeping the hole upward. The culm cuttings were kept parallel to one another at a distance of 30 cm. The holes were covered by ordinary polythene strips of about 12 cm × 8 cm size. Then the cuttings were covered with 2-3 cm soil layer completely. Branch cuttings, after treatment with growth regulators were placed horizontally in nursery bed at a distance of 30 cm. The cuttings were covered with 1-2 cm of soil layer. Regular irrigation was done in nursery beds for 3 months during which plants developed from cuttings. Partial shade, allowing about 60% light, was provided over the nursery beds. The cuttings were evaluated after 3 months of planting in 1st week of July.

RESULTS AND DISCUSSION

Influence on culm cuttings

The results in Table 1 show that different growth regulator treatments did not exert significant influence on the culm cuttings with regard to propagation. Only one parameter i.e. height of dominating culm could be differentiated under different treatments. However, no treatment could significantly enhance the height over control. The IAA 50 registered maximum height growth (136.1 cm) after 90 days of planting which was at par with control (132.0 cm). It is understood that culm cuttings of *B. vulgaris* with sufficient reserve food materials and possibly with some endogenous growth regulators might have helped in similar responses of growth regulator with that of control. It was evinced from the observations that there is no need of treating the culm cuttings of *B vulgaris* with growth regulators for successful propagation. Gulabrao et al. (2012) and Kaushal et al. (2011) also reported similar results with *B. vulgaris*. The control i.e. soaking the cuttings with normal water for 24 hours is suitable method for large scale propagation by culm cuttings.

Results obtained by Jayasree Gopalkrishnan (1989) are in contradiction with the present findings with regard to number of roots in IAA 50.

Influence on culm-branch cuttings

There was considerable variation in different propagation attributes excepting the sprouting period of branch cuttings (Table 1). The survival was highest (67.5%) in IAA 100 (Photo 1) whereas it was lowest (50%) in IBA 200, IBA 250, IBA 300, NAA 250 and NAA 300.

Photo 1. Rooted branch cutting of IAA 100

Table 1. Effect of growth regulator treatments on propagation of culm- and branch cuttings of *B. vulgaris* (90 days after planting)*

Treatment	Sprouting period of cuttings (days)	Survival % of cuttings	No. of shoots/ node	Height of dominating shoot (cm)	Collar diameter of dominating	Shoot biomass/ node (g)	No. of roots/ node	Length of dominating root (cm)	Root biomass/ node (g)	Total biomass/ node (g)	Quality Index of plant
Control	11	100.0	2.9	132.0	0.71	30.22	15.6	35.2	5.08	35.30	0.184
	(16)	(60.0)	(0.67)	(35.25)	(0.218)	(1.609)	(4.10)	(12.3)	(0.132)	(1.741)	(0.01001)
IAA 50	11	100.0	2.9	136.1	0.72	31.38	15.9	34.9	5.14	36.52	0.187
	(16)	(65.0)	(0.72)	(42.52)	(0.255)	(2.022)	(4.50)	(13.5)	(0.157)	(2.179)	(0.01213)
IAA 100	11	100.0	2.9	131.2	0.70	30.20	15.6	34.5	5.00	35.20	0.182
	(16)	(67.5)	(0.78)	(48.14)	(0.277)	(2.221)	(5.82)	(14.3)	(0.215)	(2.436)	(0.01323)
IAA 150	11	100.0	3.2	124.2	0.67	28.62	14.8	33.8	4.75	33.37	0.174
	(16)	(60.0)	(0.67)	(40.22)	(0.247)	(1.801)	(4.70)	(12.3)	(0.149)	(1.950)	(0.01114)
IAA 200	11	100.0	3.2	122.3	0.66	28.15	14.6	32.6	4.68	32.83	0.172
	(16)	(60.0)	(0.67)	(35.52)	(0.218)	(1.602)	(4.70)	(12.0)	(0.141)	(1.743)	(0.01000)
IAA 250	11	100.0	3.5	118.4	0.64	27.23	14.1	31.6	4.50	31.73	0.166
	(16)	(60.0)	(0.67)	(35.22)	(0.216)	(1.588)	(4.72)	(11.5)	(0.136)	(1.724)	(0.00987)
IAA 300	11	100.0	3.5	110.4	0.60	25.38	13.0	29.5	4.21	29.59	0.156
	(16)	(57.5)	(0.68)	(31.52)	(0.193)	(1.433)	(4.72)	(11.0)	(0.132)	(1.565)	(0.01899)
IBA 50	11	100.0	2.8	134.2	0.72	30.92	16.0	35.6	5.20	36.12	0.188
	(16)	(60.0)	(0.69)	(36.04)	(0.222)	(1.625)	(4.20)	(12.3)	(0.130)	(1.755)	(0.01004)
IBA 100	11	100.0	2.8	130.1	0.70	30.02	15.5	35.1	5.02	35.04	0.183
	(16)	(60.0)	(0.69)	(38.18)	(0.235)	(1.730)	(4.26)	(12.3)	(0.135)	(1.865)	(0.01064)
IBA 150	11	100.0	2.8	130.0	0.70	30.04	15.4	35.0	5.02	35.08	0.183
	(16)	(57.5)	(0.69)	(33.28)	(0.204)	(1.504)	(4.60)	(11.5)	(0.137)	(1.641)	(0.00942)
IBA 200	11	100.0	2.9	126.2	0.68	29.10	15.1	33.6	4.85	33.95	0.177
	(16)	(50.0)	(0.67)	(31.56)	(0.192)	(1.432)	(4.68)	(10.0)	(0.121)	(1.553)	(0.00881)
IBA 250	11	100.0	3.0	119.4	0.64	27.52	14.2	32.4	4.60	32.12	0.167
	(16)	(50.0)	(0.67)	(29.52)	(0.181)	(1.339)	(4.82)	(9.0)	(0.112)	(1.451)	(0.00829)
IBA 300	11	100.0	3.0	117.3	0.63	27.02	13.9	31.2	4.51	31.53	0.165
	(16)	(50.0)	(0.67)	(29.08)	(0.177)	(1.312)	(4.88)	(8.8)	(0.110)	(1.431)	(0.00812)
NAA 50	11	100.0	2.5	132.8	0.71	30.70	15.8	35.4	4.98	35.84	0.185
	(16)	(60.0)	(0.68)	(37.54)	0.232)	(1.696)	(4.18)	(12.0)	(0.130)	(1.826)	(0.01265)
NAA 100	11	100.0	2.5	128.2	0.69	29.56	15.1	34.2	4.82	34.38	0.179
	(16)	(62.5)	(0.72)	(40.02)	(0.242)	(1.880)	(4.20)	(12.5)	(0.136)	(2.016)	(0.01142)
NAA 150	11	100.0	2.7	117.8	0.63	27.16	14.1	31.8	4.27	31.43	0.163
	(16)	(65.9)	(0.68)	{39.54)	(0.246)	(1.788)	(4.25)	(12.5)	(0.138)	(1.926)	(0.01092)
NAA 200	11	100.0	2.9	115.2	0.62	26.54	13.7	31.1	4.18	30.72	0.160
	(16)	(60.0)	(0.67)	(33.56)	(0.207)	(1.514)	(4.25)	(12.3)	(0.135)	(1.649)	(0.00951)
NAA 250	11	100.0	3.0	112.1	0.60	25.84	13.1	30.2	4.02	29.86	0.155
	(16)	(50.0)	(0.67)	(31.22)	(0.192)	(1.408)	(4.33)	(12.0)	(0..132)	(1.540)	(0.00889)
NAA 300	11	100.0	3.2	107.3	0.58	24.75	12.7	28.4	3.86	28.61	0.149
	(16)	(50.0)	(0.67)	(31.10)	(0.192)	(1.404)	(4.50)	(11.5)	(0.131)	(1.535)	(0.00889)
SE(m)±	-	-	-	1.4	-	-	-	-	-	-	-
	-	(0.808)	(0.007)	(0.631)	(0.003)	(0.025)	(0.066)	(0.242)	(0.002)	0.026	(0.0003)
CD $_{(0.05)}$	NS	NS	NS	4.0	NS	NS	NS	NS	NS	NS	NS
	NS	(2.401)	(0.022)	(1.877)	(0.011)	(0.076)	(0.199)	(0.719)	(0.007)	(0.080)	(0.00100)

* Figures in parenthesis are the values of culm branch cuttings

As regards to shoot growth parameters, number of shoots per node was maximum under IAA 100 (0.78). The height of dominating shoot reached maximum (48.14 cm) followed by IAA 50 (42.22 cm), IAA 150 (40.22 cm) and NAA 100 (40.02 cm).

The collar diameter of dominating shoot was appreciably higher (0.277 cm) with IAA 100 over others while it was lower in IBA 200 to 300 and NAA 250 to 300. The different growth regulator treatments exerted remarkable variations on shoot biomass production. IAA 100 put maximum shoot biomass (2.221 gm) per node of branch cutting and lower values were found under IBA 250 and IBA 300.

The root growth parameters such as number of roots, length of dominating root and root biomass varied significantly under different growth regulator treatments. These parameters were observed maximum under IAA 100 followed by IAA 50.

The total biomass per branch node was also observed significantly higher under IAA 100 (2.436 gm) followed by IAA 50 (2.179 gm) and NAA 100 (2.016 gm).

The quality index of plants propagated under various treatments differed significantly. IAA 100 produced remarkably better quality plants with quality index of 0.0132 followed by NAA 50 (0.0126), IAA 50 (0.0121) and NAA 100 (0.0114).

It was observed from the effect of various growth regulator treatments on branch cuttings that IAA 100 excelled over other treatments in propagation of the culm–branch cuttings of *B. vulgaris*. Successful propagation of culm-branch cutting of bamboo has been achieved using growth regulators by several workers like Agnihotri and Ansari (2000), Singh et al. (2002) and Hossain et al. (2005). In this study significant differences in all the growth and quality parameters excepting sprouting period were observed over the check among all the treatments. The success of different growth regulators in terms of survival percent of branch cutting was significantly higher as compared to check in IAA 50 and 100 ppm and NAA 100 and NAA 150 ppm. However, as regards to growth and quality parameters better performance was recorded in IAA and NAA 50 and 100 ppm. IBA 100 ppm only responded significantly to height of shoot, collar diameter of shoot, shoot and root biomass.

CONCLUSION

There is no need of treating the culm cuttings of *B. vulgaris* with growth regulators for propagation. The soaking of cuttings with normal water for 24 hours is suitable method for large scale propagation by culm cuttings. IAA 100 was found more suitable in propagation of the culm–branch cuttings of *B. vulgaris*.

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