FORM-B: INFORMATION FOR SCIENTIFIC COMMUNITY

01.	Experiment No. and Title (As per CJA)	:	13.4.3.55 and Rapid multiplication of *Dendrocalamus hamiltonii* through *invitro* regeneration techniques from nodal explants
02.	Budget Head	:	352/12029
03.	Collaborative department, if any	:	Department of Forest Biology and Tree Improvement, College of Forestry, NAU, Navsari
04.	Location and Agro-climatic sub-region	:	Tissue Culture Facilities (ELP), College of Forestry, NAU, Navsari and AES – III (Heavy Rainfall Zone), South Gujarat.
05.	Background information	:	**Bamboo,** monocotyledonous plant of the family **Poaceae**, is an important forest tree with multifarious use in daily life so called **poor's Man timber** and having largest use in the paper and pulp. Large scale use of bamboo in paper and pulp industry has led to a situation where replacements and raising of new stands has fallen away behind the rate at which the bamboo culms are being cut. Bamboos are propagated through…… **1. Seed,** but has long and unpredictable flowering habit, low viabily and has inborn microbial infestation. **2. Vegetative Propagation**, but not efficient on economic scale.(offset and culms cutting) To cope with the increasing need for propagating material, the use of in-vitro technique is being followed. So by successful micro-propagation, elite bamboo species could be multiplied according to the commercial need ***Dendrocalamus hamiltonii*** **Habitat & distribution** Occurs in fine-textured soil in semi-evergreen forests. Grows abundantly and well in the North East and Himachal Pradesh. **Culm** The culm is large, up to 30 m tall, dull green. **Flowering** The flowering cycle is 30-40 years. commonly and periodically **Uses** Used as edible shoot, for roofing and construction purposes.
06.	Objectives	:	➢ Standardizing the micro propagation technique for rapid multiplication of *Dendrocalamus hamiltonii* through *invitro* regeneration techniques from nodal explant

07.	Principal investigator and associates	:	**PI:** Dr. Jayesh Pathak, Assistant Professor (Agroforestry) **Co-PIs:** Dr. S. K. Jha, Associate Professor (Forest Biology) & HoD - FBTI Dr. M. B. Tandel, Assistant Professor (Forestry) & HoD - SAF Dr. V. B. Patel, Assistant Professor (Biotechnology) Dr. R. S. Chauhan, Assistant Professor (Tree Improvement)
08.	Experimental period	:	From 2017 to 2023
09.	Season of experiment	:	NA
10.	Crop and Variety	:	Bamboo Species - *Dendrocalamus hamiltonii*
11.	Experimental details		

	(a)	Treatments	:	**(a) Contamination Control Treatments** **C_1 -** Mercuric Chloride (0.1%) for 3 Min **C_2 -** Mercuric Chloride (0.1%) for 4 Min **C_3 -** Mercuric Chloride (0.1%) for 5 Min **C_4 -** Absolute Alcohol (70%) for 30 Sec + Mercuric Chloride (0.1%) for 3 Min **C_5 -** Absolute Alcohol (70%) for 30 Sec + Mercuric Chloride (0.1%) for 4 Min **C_6 -** Absolute Alcohol (70%) for 30 Sec + Mercuric Chloride (0.1%) for 5 Min **(b) Shoot Multiplication Treatments** **T_1 -** MS + 0.5 mg/l BAP **T_2 -** MS + 1.0 mg/l BAP **T_3 -** MS + 2.0 mg/l BAP **T_4 -** MS **+** 3.0mg/l BAP **T_5 -** MS + 4.0 mg/l BAP **(c) Rooting Treatments** **T_1** – MS + 1 mg/l IBA + 0.25 % Activated charcoal **T_2** – MS + 0.1% IBA+ 2% Sucrose **T_3** – MS + 1 mg/l IBA + 1 mg/l NAA + 2% Sucrose **T_4** – MS + 1 mg/l IBA + 1 mg/l NAA **T_5** – MS + 1.5 mg/l NAA + 3 mg/l IBA + 2% Sucrose **T_6** – MS + 1 mg/l NAA + 0.3% Activated charcoal **T_7** - MS + 20 mg/l IBA **T_8** - MS + 0.5mg/l IBA **T_9** – MS + 1 mg/l BAP + 3 mg/l NAA **T_{10}** – MS + 1.8 mg/l NAA + 10 mg/l Coumarin **T_{11}** – MS + 1.8 mg/l NAA **T_{12}** – MS + 1 mg/l BAP + 1 mg/l NAA + 3% Activated charcoal **T_{13}** – MS + 3 mg/l NAA+ 2% Sucrose **T_{14}** – MS + 0.2 mg/l NAA + 0.2 mg/l IBA + 10 mg/l Coumarin **T_{15}** - ½ MS + 1.8 mg/l NAA + 2 mg/l IBA + 10 mg/l Coumarin + 2 % Sucrose **T_{16}** - ½ MS + 0.5 mg/l IBA + 0.5 mg/l NAA + 2 % Sucrose **T_{17}** - ½ MS + 1 mg/l IBA + 0.5 mg/l NAA + 2 % Sucrose **T_{18}** - ½ MS + 0.5 mg/l NAA **T_{19}** - ½ MS + 1 mg/l NAA **T_{20}** - ½ MS + 1 mg/l IBA **T_{21}** - ½ MS + 2 mg/l IBA **T_{22}** - MS + 3 mg/l IBA **T_{23}** - MS + 4 mg/l IBA **T_{24}** - MS + 5 mg/l IBA **T_{25}** - ½ MS + 3 mg/l IBA **T_{26}** - ½ MS + 3 mg/l IBA + 3 mg/l NAA + 2% Sucrose **T_{27}** - ½ MS + 3 mg/l IBA + 10 mg/l Coumarin **T_{28}** - ½ MS + 0.2 mg/l IB **T_{29}** - ½ MS + 1 mg/l IBA + 1 mg/l NAA **T_{30}** - ½ MS + 2 mg/l IBA + 1 mg/l NAA **T_{31}** - ½ MS + 5 mg/l IBA + 1 mg/l NAA **T_{32}** - MS + 8µM BAP + 1µM NAA + 100 µM IBA **T_{33}** - ½ MS + 8µM BAP + 1µM NAA + 100 µM IBA

				(d) Acclimatization Treatments **A_1 -** FYM + Soil + Sand (1:1:1) **A_2 -** FYM+ Soil (1:1) **A_3 -** FYM + Soil + Coco Coir (1:1:1) **A_4 -** Soil + sand + Vermicompost (1:1:1)	
	(b)	Experimental Design	:	Completely Randomized Design		
	(c)	Replications	:	3		
	(d)	Plot size (if applicable)	:	Gross	-	____ m x ____ m
				Net	-	____ m x ____ m
	(e)	Spacing	:	NA		
	(f)	Seed rate (kg/ha)	:	NA		
	(g)	Manuring				
		(i) FYM (t/ha)	:	NA		
		(ii) N, P and K (kg/ha)	:	NA		
12.	Year-wise cultural details					
	(a)	Date of				
		(i) Sowing	:	NA		
		(ii) Harvesting	:	NA		
	(b)	Number of irrigations (Year-wise)	:	NA		
	(c)	Number of weedings	:	NA		
	(d)	Number of inter culturing	:	NA		
	(e)	Previous crop and fertilizer applied (year-wise)	:	NA		
13.	Soil analysis (if applicable) Depth-wise			:		
	Parameters			Initial		After
	(a)	pH	:	NA		NA
	(b)	EC	:	NA		NA
	(c)	Organic carbon	:	NA		NA
	(d)	Available N	:	NA		NA
	(e)	Available P_2O_5	:	NA		NA
	(f)	Available K_2O	:	NA		NA
	(g)	Any other		NA		NA
14.	Input analysis			NA		
15.	Year-wise general conditions					
	(a)	Pest and diseases	:	NA		
	(b)	Plant stand	:	NA		
	(c)	Seasonal conditions	:	NA		
	(d)	Rainfall distribution	:	NA		
16.	Results (Table/s with statistical analysis and Interpretation)		:			
	RESULTS AND INTERPRETATION:					
16.1	**Contamination Control**					

16.1.1	➢ Mean data for contamination control treatments of *Dendrocalamus hamiltonii* by *invitro* regeneration techniques from nodal explants are presented in following table 1 (a), (c), (d) and (e). Maximum number of shoots (2.21), length of longest shoot (5.35 cm), highest establishment per cent (92.22 %) and lowest contamination per cent (7.78 %) were recorded significantly in treatment **C_6 -** Absolute Alcohol (70%) for 30 Sec + Mercuric Chloride (0.1%) for 5 Min in pooled analysis. Also, similar trend was followed in individual years. ➢ Whereas, minimum number of days to sprout of shoot was recorded in **C_4 -** Absolute Alcohol (70%) for 30 Sec + Mercuric Chloride (0.1%) for 3 Min (5.21 days) in pooled analysis [table 1 (b)]. Similar trend was followed for individual years. However, individual years and interaction effect (Y × T) was found non-significant. ➢ Moreover, treatment **C_5 -** Absolute Alcohol (70%) for 30 Sec + Mercuric Chloride (0.1%) for 4 Min followed for number of shoots (1.83), establishment per cent (79.44 %) and contamination per cent (20.56 %) in pooled analysis. Similar trend was followed for individual years for all above parameters. ➢ While, treatment **C_1 -** Mercuric Chloride (0.1%) for 3 Min followed for number of days taken to sprout (5.33) and **C_3 -** Mercuric Chloride (0.1%) for 5 Min for length of longest shoot in pooled analysis (4.77 cm). Similar trend was followed for individual years for both parameters. ➢ Whereas, shortest length of shoot (3.90 cm), lowest establishment (58.89 %) and highest contamination (41.11 %) were recorded in **C_4 -** Absolute Alcohol (70%) for 30 Sec + Mercuric Chloride (0.1%) for 3 Min for pooled analysis. Similar trend was followed for individual years for all above parameters. ➢ While, minimum number of shoots were recorded in **C_1 -** Mercuric Chloride (0.1%) for 3 Min (1.53) and maximum days taken for spouting of shoot were recorded in **C_5 -** Absolute Alcohol (70%) for 30 Sec + Mercuric Chloride (0.1%) for 4 Min (5.54) in pooled analysis and similar trend was followed in individual years for both parameters. ➢ However, interaction effect (Y × T) was found non-significant for all contamination control parameters.
16.2	**Shoot Multiplication**
16.2.1	➢ Mean data for multiplied shoot of *Dendrocalamus hamiltonii* by *invitro* regeneration techniques from nodal explants are presented in table 2. Maximum number of multiplied shoots was recorded significantly in shoot multiplication treatment **T_5 -** MS + 4.0 mg/l BAP in individual years (10.28 & 10.61) and in pooled analysis (10.44) which, was followed by **T_4 -** MS + 3.0mg/l BAP in individual years (7.56 & 7.77) and in pooled analysis (7.66). ➢ Whereas, minimum number of multiplied shoots were recorded in **T_1 -** MS + 0.5 mg/l BAP in individual years (3.84 & 3.77) and pooled analysis (3.80). ➢ While, interaction effect (Y × T) was found non-significant.
16.3	**Root initiation and establishment**
16.3.1	➢ Mean data for rooting per cent, number of roots and length of longest root of *Dendrocalamus hamiltonii* by *invitro* regeneration techniques from nodal explants are presented in table 3. There were 33 rooting treatment combinations applied for rooting parameters of *Dendrocalamus hamiltonii*. Among them, only **T_{26}** - ½ MS + 3 mg/l IBA + 3 mg/l NAA + 2% Sucrose have responded for rooting parameters. Whereas, another treatment combinations were not responding for rooting.
16.4	**Acclimatization / Hardening**
16.4.1	➢ Mean data for acclimatization of *Dendrocalamus hamiltonii* by *invitro* regeneration techniques from nodal explants are presented in table 4. Highest survival per cent were recorded significantly in acclimatization treatment **A_4 -** Soil + sand + Vermicompost (1:1:1) in individual years (78.89 % & 81.11 %) and in pooled analysis (80.00 %) which was followed by **A_1 -** FYM + Soil + Sand (1:1:1) in individual years (64.44 % & 62.22 %) and pooled analysis (63.33 %). ➢ Whereas, lowest survival per cent were recorded in **A_2 -** FYM+ Soil (1:1) individual years (43.33 % & 41.11 %) and pooled analysis (42.22 %). ➢ While, interaction effect (Y × T) was found non-significant.

Table 1 (a). Effect of contamination control treatments on number of shoots of *Dendrocalamus hamiltonii*

Treatments	2022	2023	Pooled
C_1 - Mercuric Chloride (0.1%) for 3 Min	1.36	1.70	1.53
C_2 - Mercuric Chloride (0.1%) for 4 Min	1.48	1.81	1.64
C_3 - Mercuric Chloride (0.1%) for 5 Min	1.59	1.92	1.76
C_4 - Absolute Alcohol (70%) for 30 Sec + Mercuric Chloride (0.1%) for 3 Min	1.58	1.97	1.77
C_5 - Absolute Alcohol (70%) for 30 Sec + Mercuric Chloride (0.1%) for 4 Min	1.66	2.01	1.83
C_6 - Absolute Alcohol (70%) for 30 Sec + Mercuric Chloride (0.1%) for 5 Min	2.10	2.32	2.21
SEM (±)	0.048	0.034	0.029
CD @ 5%	0.15	0.10	0.09
SEM (Y X T)			0.042
CD (Y X T) @ 5%			NS
CV %	5.14	2.98	4.02

Table 1 (b). Effect of contamination control treatments on number of days taken for sprouting of *Dendrocalamus hamiltonii*

Treatments	2022	2023	Pooled
C_1 - Mercuric Chloride (0.1%) for 3 Min	5.28	5.38	5.33
C_2 - Mercuric Chloride (0.1%) for 4 Min	5.28	5.41	5.34
C_3 - Mercuric Chloride (0.1%) for 5 Min	5.44	5.58	5.51
C_4 - Absolute Alcohol (70%) for 30 Sec + Mercuric Chloride (0.1%) for 3 Min	5.13	5.28	5.21
C_5 - Absolute Alcohol (70%) for 30 Sec + Mercuric Chloride (0.1%) for 4 Min	5.53	5.55	5.54
C_6 - Absolute Alcohol (70%) for 30 Sec + Mercuric Chloride (0.1%) for 5 Min	5.39	5.31	5.35
SEM (±)	0.134	0.105	0.085
CD @ 5%	NS	NS	NS
SEM (Y X T)			0.012
CD (Y X T) @ 5%			NS
CV %	4.33	3.35	3.87

Table 1 (c). Effect of contamination control treatments on length of longest shoot (cm) of *Dendrocalamus hamiltonii*

Treatments	2022	2023	Pooled
C_1 - Mercuric Chloride (0.1%) for 3 Min	4.20	4.45	4.33
C_2 - Mercuric Chloride (0.1%) for 4 Min	4.01	4.10	4.06
C_3 - Mercuric Chloride (0.1%) for 5 Min	4.87	4.68	4.77
C_4 - Absolute Alcohol (70%) for 30 Sec + Mercuric Chloride (0.1%) for 3 Min	3.95	3.86	3.90
C_5 - Absolute Alcohol (70%) for 30 Sec + Mercuric Chloride (0.1%) for 4 Min	4.54	4.57	4.55
C_6 - Absolute Alcohol (70%) for 30 Sec + Mercuric Chloride (0.1%) for 5 Min	5.35	5.37	5.36
SEM (±)	0.098	0.134	0.083
CD @ 5%	0.30	0.41	0.24
SEM (Y X T)			0.118
CD (Y X T) @ 5%			NS
CV %	3.80	5.16	4.54

Table 1 (d). Effect of contamination control treatments on establishment per cent (%) of *Dendrocalamus hamiltonii*

Treatments	2022	2023	Pooled
C_1 - Mercuric Chloride (0.1%) for 3 Min	62.22	57.78	60.00
C_2 - Mercuric Chloride (0.1%) for 4 Min	67.78	64.44	66.11
C_3 - Mercuric Chloride (0.1%) for 5 Min	73.33	70.00	71.67
C_4 - Absolute Alcohol (70%) for 30 Sec + Mercuric Chloride (0.1%) for 3 Min	61.11	56.67	58.89
C_5 - Absolute Alcohol (70%) for 30 Sec + Mercuric Chloride (0.1%) for 4 Min	80.00	78.89	79.44
C_6 - Absolute Alcohol (70%) for 30 Sec + Mercuric Chloride (0.1%) for 5 Min	93.33	91.11	92.22
SEM (±)	1.757	1.434	1.134
CD @ 5%	5.41	4.420	3.31
SEM (Y X T)			1.604
CD (Y X T) @ 5%			NS
CV %	4.17	3.56	3.89

Table 1 (e). Effect of contamination control treatments on contamination per cent (%) of *Dendrocalamus hamiltonii*

Treatments	2022	2023	Pooled
C_1 - Mercuric Chloride (0.1%) for 3 Min	37.78	42.22	40.00
C_2 - Mercuric Chloride (0.1%) for 4 Min	32.22	35.56	33.89
C_3 - Mercuric Chloride (0.1%) for 5 Min	26.67	30.00	28.33
C_4 - Absolute Alcohol (70%) for 30 Sec + Mercuric Chloride (0.1%) for 3 Min	38.89	43.33	41.11
C_5 - Absolute Alcohol (70%) for 30 Sec + Mercuric Chloride (0.1%) for 4 Min	20.00	21.11	20.56
C_6 - Absolute Alcohol (70%) for 30 Sec + Mercuric Chloride (0.1%) for 5 Min	6.67	8.89	7.78
SEM (±)	1.757	1.434	1.134
CD @ 5%	5.41	4.420	3.31
SEM (Y X T)			1.604
CD (Y X T) @ 5%			NS
CV %	11.25	8.23	9.71

Table 2. Effect of shoot multiplication treatments on number of multiplied shoot of *Dendrocalamus hamiltonii*

Treatments	2022	2023	Pooled
T_1 - MS + 0.5 mg/l BAP	3.84	3.77	3.80
T_2 - MS + 1.0 mg/l BAP	4.49	4.86	4.67
T_3 - MS + 2.0 mg/l BAP	5.24	5.63	5.44
T_4 - MS + 3.0mg/l BAP	7.56	7.77	7.66
T_5 - MS + 4.0 mg/l BAP	10.28	10.61	10.44
SEM (±)	0.191	0.246	0.156
CD @ 5%	0.60	0.77	0.46
SEM (Y X T)			0.220
CD (Y X T) @ 5%			NS
CV %	5.26	6.53	5.95

Table 3. Effect of rooting treatments on various rooting parameters of *Dendrocalamus hamiltonii*

Treatments	Rooting percentages (%)		No. of roots		Length of longest root (cm)	
	2022	2023	2022	2023	2022	2023
T_1 – MS + 1 mg/l IBA + 0.25 % Activated charcoal	0.00	0.00	0.00	0.00	0.00	0.00
T_2 – MS + 0.1% IBA+ 2% Sucrose	0.00	0.00	0.00	0.00	0.00	0.00
T_3 – MS + 1 mg/l IBA + 1 mg/l NAA + 2% Sucrose	0.00	0.00	0.00	0.00	0.00	0.00
T_4 – MS + 1 mg/l IBA + 1 mg/l NAA	0.00	0.00	0.00	0.00	0.00	0.00
T_5 – MS + 1.5 mg/l NAA + 3 mg/l IBA + 2% Sucrose	0.00	0.00	0.00	0.00	0.00	0.00
T_6 – MS + 1 mg/l NAA + 0.3% Activated charcoal	0.00	0.00	0.00	0.00	0.00	0.00
T_7 - MS + 20 mg/l IBA	0.00	0.00	0.00	0.00	0.00	0.00
T_8 - MS + 0.5mg/l IBA	0.00	0.00	0.00	0.00	0.00	0.00
T_9 – MS + 1 mg/l BAP + 3 mg/l NAA	0.00	0.00	0.00	0.00	0.00	0.00
T_{10} – MS + 1.8 mg/l NAA + 10 mg/l Coumarin	0.00	0.00	0.00	0.00	0.00	0.00
T_{11} – MS + 1.8 mg/l NAA	0.00	0.00	0.00	0.00	0.00	0.00
T_{12} – MS + 1 mg/l BAP + 1 mg/l NAA + 3% Activated charcoal	0.00	0.00	0.00	0.00	0.00	0.00
T_{13} – MS + 3 mg/l NAA+ 2% Sucrose	0.00	0.00	0.00	0.00	0.00	0.00
T_{14} – MS + 0.2 mg/l NAA + 0.2 mg/l IBA + 10 mg/l Coumarin	0.00	0.00	0.00	0.00	0.00	0.00
T_{15} - ½ MS + 1.8 mg/l NAA + 2 mg/l IBA + 10 mg/l Coumarin + 2 % Sucrose	0.00	0.00	0.00	0.00	0.00	0.00
T_{16} - ½ MS + 0.5 mg/l IBA + 0.5 mg/l NAA + 2 % Sucrose	0.00	0.00	0.00	0.00	0.00	0.00
T_{17} - ½ MS + 1 mg/l IBA + 0.5 mg/l NAA + 2 % Sucrose	0.00	0.00	0.00	0.00	0.00	0.00
T_{18} - ½ MS + 0.5 mg/l NAA	0.00	0.00	0.00	0.00	0.00	0.00
T_{19} - ½ MS + 1 mg/l NAA	0.00	0.00	0.00	0.00	0.00	0.00
T_{20} - ½ MS + 1 mg/l IBA	0.00	0.00	0.00	0.00	0.00	0.00
T_{21} - ½ MS + 2 mg/l IBA	0.00	0.00	0.00	0.00	0.00	0.00
T_{22} - MS + 3 mg/l IBA	0.00	0.00	0.00	0.00	0.00	0.00
T_{23} - MS + 4 mg/l IBA	0.00	0.00	0.00	0.00	0.00	0.00
T_{24} - MS + 5 mg/l IBA	0.00	0.00	0.00	0.00	0.00	0.00
T_{25} - ½ MS + 3 mg/l IBA	0.00	0.00	0.00	0.00	0.00	0.00
T_{26} - ½ MS + 3 mg/l IBA + 3 mg/l NAA + 2% Sucrose	**87.78**	**85.58**	**12.93**	**12.74**	**5.75**	**5.62**
T_{27} - ½ MS + 3 mg/l IBA + 10 mg/l Coumarin	0.00	0.00	0.00	0.00	0.00	0.00
T_{28} - ½ MS + 0.2 mg/l IB	0.00	0.00	0.00	0.00	0.00	0.00
T_{29} - ½ MS + 1 mg/l IBA + 1 mg/l NAA	0.00	0.00	0.00	0.00	0.00	0.00
T_{30} - ½ MS + 2 mg/l IBA + 1 mg/l NAA	0.00	0.00	0.00	0.00	0.00	0.00
T_{31} - ½ MS + 5 mg/l IBA + 1 mg/l NAA	0.00	0.00	0.00	0.00	0.00	0.00
T_{32} - MS + 8µM BAP + 1µM NAA + 100 µM IBA	0.00	0.00	0.00	0.00	0.00	0.00
T_{33} - ½ MS + 8µM BAP + 1µM NAA + 100 µM IBA	0.00	0.00	0.00	0.00	0.00	0.00

Table 4. Effect of acclimatization treatments on survival per cent (%) of *Dendrocalamus hamiltonii*

Treatments	2022	2023	Pooled
A_1 - FYM + Soil + Sand (1:1:1)	64.44	62.22	63.33
A_2 - FYM+ Soil (1:1)	43.33	41.11	42.22
A_3 - FYM + Soil + Coco Coir (1:1:1)	54.44	55.56	55.00
A_4 - Soil + sand + Vermicompost (1:1:1)	78.89	81.11	80.00
SEM (±)	1.667	2.940	1.690
CD @ 5%	5.435	9.590	5.066
SEM (Y X T)			2.390
CD (Y X T) @ 5%			NS
CV %	4.79	8.49	6.88

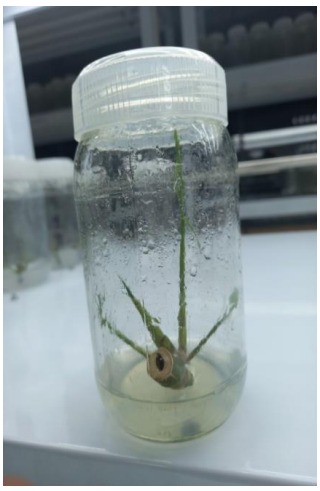
17.	Economics	:	NA
18.	**Conclusion**	:	

- Culture establishment in MS Basal media were overall performed well in the contamination control treatment **C_6 -** Absolute Alcohol (70%) for 30 Sec + Mercuric Chloride (0.1%) for 5 Min for the parameters of number of shoots (2.21), length of longest shoot (5.35 cm), establishment per cent (92.22 %) and contamination per cent (7.78 %). Whereas, number of days taken for sprouting were found better in **C_4** - Absolute Alcohol (70%) for 30 Sec + Mercuric Chloride (0.1%) for 3 Min (5.21 days).
- Shoot multiplication were recorded maximum in **T_5 -** MS + 4.0 mg/l BAP (10.44).
- Rooting parameters were responding to **T_{26} -** 3mg/l IBA + 3mg/l IAA + 2% Sucrose among applied 33 rooting treatment combinations.
- Survival per cent were recorded higher in the acclimatization treatment **A_4 -** Soil + sand + Vermicompost (1:1:1) (80.00 %).

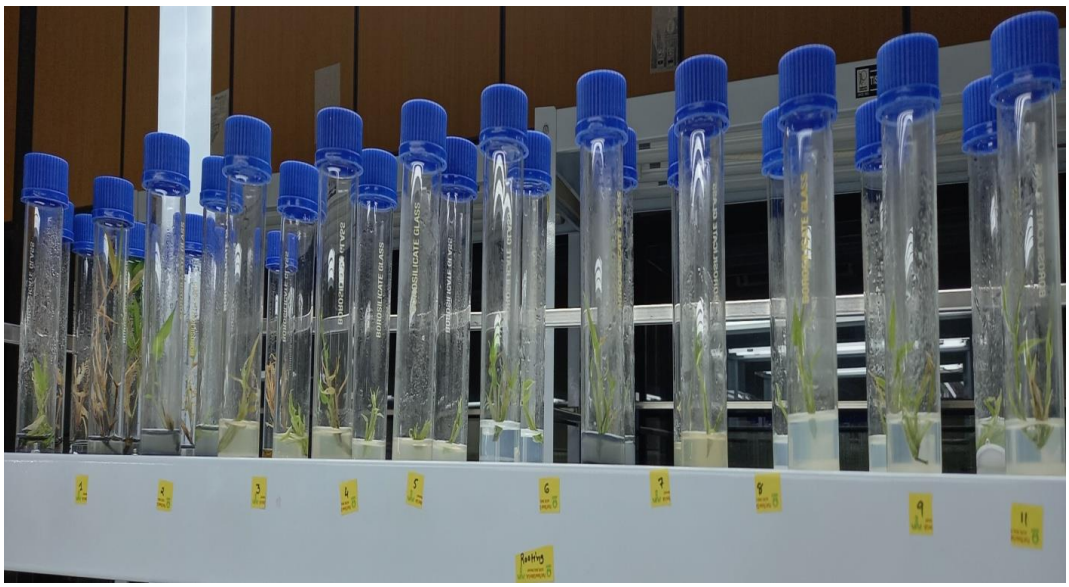
19.	**General recommendation for the farmers (English and Gujarati)/Information for scientific community (English)**	:	

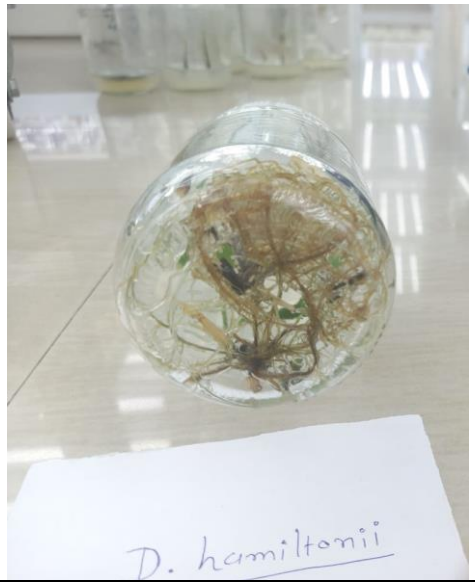
It is advised to scientific community and tissue culture industries involved bamboo tissue culture to use basal MS media for establishment and contamination control treatment *i.e* **C_6 -** Absolute Alcohol (70%) for 30 Sec + Mercuric Chloride (0.1%) for 5 Min; shoot multiplication treatment *i.e* **T_5 -** MS + 4.0 mg/l BAP; rooting treatment *i.e* **T_{26} -** 3mg/l IBA + 3mg/l IAA + 2% Sucrose and acclimatization treatment *i.e* **A_4 -** Soil + sand + Vermicompost (1:1:1) for rapid multiplication of *Dendrocalamus hamiltonii* through *invitro* regeneration techniques from nodal explants.

20. Photographic plates

	Plate 1. Rapid multiplication of *Dendrocalamus hamiltonii* through *invitro* regeneration techniques from nodal explants
20.1	**Culture initiation**  
20.2	**Shoot multiplication**  

20.3	**Rooting**





20.4 **Acclimatization**

Primary Hardening

Secondary Hardening

20.5 **Measurement of shoot height and root length**