

International Journal of Advanced Biochemistry Research



ISSN Print: 2617-4693
ISSN Online: 2617-4707
NAAS Rating (2026): 5.29
IJABR 2026; SP-10(8): 2227-2233
www.biochemjournal.com
Received: 01-05-2026
Accepted: 05-06-2026

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In vitro organogenesis of banana Cv. Konkan safed velchi by using male floral organ

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DOI: <https://www.doi.org/10.33545/26174693.2026.v10.i8Sy.9728>

Abstract

An efficient approach for *in vitro* organogenesis of banana Cv. Konkan safed velchi was standardized utilizing male floral organs viz meristems and fingers. Sterilization treatment with 70% ethanol (60 sec), 10% sodium hypochlorite (10 min) and 0.2% mercuric chloride (6 min) yielded the highest aseptic cultures with 88.67% in meristems and 83.33% in fingers explants. MS medium supplemented with 2.0 mg/l 2,4-D and 0.5 mg/l NAA induces maximum callus (58.67%) in meristems derived explants within 46.67 days. Shoot regeneration was also observed highest (83.67%) on MS medium supplemented with 4.5 mg/l BAP in meristems. Fingers derived explants resulted low response for induce callus (24%) and shoot regeneration (73.00%) on same medium. MS medium supplemented with 5.0 mg/l BAP and 1.0 mg/l kinetin shows highest multiplication rate (8.33). Successfully rooting (87.67%) was observed on medium supplemented with 2.0 mg/l IBA and 0.5 mg/l NAA. This standardized protocol offers a route to large-scale, disease-free multiplication of banana Cv. Konkan safed velchi.

Keywords: Cv. Konkan safed velchi, *in vitro* organogenesis, male floral organ, plant growth regulators

Introduction

Banana (*Musa* spp.) is one of the most extensively cultivated fruit crops in India. Maharashtra is one of the major Banana producing states in the country and contributes substantially to India's banana production (Ministry of Agriculture and Farmers Welfare 2026) [1], Cv. Konkan safed velchi an AB genome cultivar famous in the Konkan region of Maharashtra for its thin peel, sweeter creamy pulp and great market demand (Patil *et al.*, 2012; Hinge *et al.*, 2022) [12, 4], Banana is traditionally propagated through side suckers. This method however is slow and also prone to spreading soil-borne diseases, making it difficult to supply the year-round demand for healthy planting material.

In vitro organogenesis offers a practical way allowing rapid, disease-free true-to-type production of plantlets. Among the explants used for banana tissue culture, the male floral organ is appealing because it develops inside protective bracts above ground and is consequently less vulnerable to contamination than sucker derived material. While sterilizing and regeneration techniques currently exist for Konkan safed velchi suckers (Koli *et al.*, 2014) [7] an equivalent protocol for its male floral organ has not been worked out. The present work was therefore taken up to standardize surface sterilization and *in vitro* regeneration covering callus induction, shoot initiation, multiplication and rooting using the male floral organ of Cv. Konkan safed velchi.

Materials

Plant material and genotype

The study was carried out on the banana Cv. Konkan safed velchi. Healthy male floral buds were collected from the College of Horticulture, Dr. Balasaheb Sawant Konkan Krishi Vidyapeeth (DBSKKV), Dapoli. Dist. Ratnagiri (M.S.), work was conducted at the Plant Biotechnology Centre, Dapoli, during 2024-2026.

Explants

Meristems and fingers excised from the male floral organ were used as explants, trimmed to a suitable size. These explants are surface sterilized and inoculated on medium to check aseptic cultures.

Culture media

Murashige and Skoog (1962) ^[11], basal medium supplemented with 3.0% sucrose, 0.6% agar and the required plant growth regulators was used throughout experiment. The pH was adjusted to 5.8-5.9 before autoclaving, at 121 °C and 1.5 kg/cm² for 20 minutes.

Experimental conditions

Cultures were maintained in a culture room where 25±2 °C temperature, under a 16/8-hour light/dark cycle with 1600 lux illumination from fluorescent lamps (7200 K).

Methods

Preparation of explants and surface sterilization

The collected floral organs were bring to the laboratory. The outer bracts were carefully removed to expose the meristems and fingers. The explants were initially treated with 70% alcohol (30 sec), followed by treatment with Tween-20 (15 min) and thorough washing distilled water. They were then treated with 0.2% Bavistin to reduce the possibility of fungal contamination. Further surface sterilization was carried out inside a laminar airflow cabinet using twelve different treatments (T₀-T₁₁), consisting of varying concentrations and exposure periods of ethanol, Sodium hypochlorite and mercuric chloride, as detailed in (Table 1). After sterilization, the explants were rinsed several times with sterile DDW to remove any residual sterilizing agents. The percentage of aseptic culture establishment was assessed seven days after inoculation.

Callus induction

The aseptically established explants were inoculated onto MS medium containing different concentrations and combination of BAP, 2,4-D and NAA. A total of ten treatments (C₁-C₁₀), including an untreated control, were evaluated for their ability to induce callus formation. The percentage of explants producing callus and the number of days required for callus induction were recorded separately for meristems and fingers.

In vitro regeneration

The callus developed explants were transferred to MS medium supplemented with different concentrations of BAP ranging from 2.0 to 7.0 mg/l. Twelve treatments (I₁-I₁₂), including an untreated control, were tested to determine the most effective BAP concentration for shoot regeneration.

Shoot regeneration percentage and the number of days required for regeneration were recorded three weeks after inoculation.

In vitro shoot multiplication

The regenerated shoots were subcultured onto fresh MS medium at 45days intervals. Different concentrations of BAP and kinetin were tested individually, followed by their combinations of BAP (4-6 mg/l) with kinetin. These treatments were evaluated for their effects on shoot multiplication rate and average shoot height.

In vitro rooting

Healthy and well-developed shoots obtained from the multiplication stage were transferred to MS medium supplemented with different concentrations of IBA and NAA, applied individually as well as in combination. A total of seventeen rooting treatments (R₁-R₁₇) were evaluated to determine their effectiveness on *in vitro* roots developments. The percentage of rooting and the number of days required for root initiation were recorded for each treatment.

Statistical analysis

The experiment was conducted using a Completely Randomized Design (CRD) with three replications. Percentage data were subjected to arcsine transformation. The treatment means were compared using the critical difference (CD) at the 1% level of significance, following the method described by Gomez and Gomez (1984) ^[3].

Results

Effect of surface sterilization on aseptic culture establishment

Contamination was a major challenge during the establishment of aseptic cultures and the success of culture initiation varied considerably with the sterilization treatment used (Table 1). The control treatment (T₀), in which explants were washed only with distilled water, failed to produce aseptic cultures. Among the different treatments T₁₁, consisting of 70% ethanol for 60 seconds followed by 10% Sodium hypochlorite for 10 minutes and 0.2% HgCl₂ for 6 minutes, resulted in the highest percentage of aseptic cultures, with 88.67% in meristems and 83.33% in fingers. The next best response was observed in T₁₀, which differed from T₁₁ mainly in the duration of HgCl₂ treatment (4 min) and recorded 83.00% and 81.67% aseptic cultures in meristems and fingers, respectively. Overall, the results indicated that the combined use of ethanol, Sodium hypochlorite and mercuric chloride improved aseptic culture establishment. However, excessive concentrations or prolonged exposure to sterilizing agents may cause tissue injury and adversely affect explant survival.

Table 1: Effect of sterilization treatments on percent aseptic culture.

Tr. No	Sterilants	Concentrations	Time	Aseptic cultures	
				Percent Meristems	Percent Fingers
T ₀	Washing with DDW (control)	-	30 min	0.00 (0.00)	0.00 (0.00)
T ₁	Ethanol	70%	30 sec	7.00 (15.31)	3.00 (9.88)
	NaOCl	5%	2 min		
T ₂	Ethanol	70%	60 sec	14.33 (22.20)	11.67 (19.94)
	NaOCl	5%	5 min		
T ₃	Ethanol	70%	60 sec	18.00 (25.09)	25.00 (29.98)
	NaOCl	10%	5 min		
T ₄	Ethanol	70%	60 sec	24.67 (29.77)	32.67 (34.84)
	NaOCl	10%	10 min		
T ₅	Ethanol	70%	60 sec	35.00 (36.26)	36.33 (37.05)
	NaOCl	10%	20 min		
	HgCl ₂	0.1%	2 min		
T ₆	Ethanol	70%	60 sec	58.00 (49.58)	52.00 (46.13)
	NaOCl	10%	10 min		
	HgCl ₂	0.1%	5 min		
T ₇	Ethanol	70%	60 sec	61.33 (51.53)	61.67 (51.73)
	NaOCl	10%	10 min		
	HgCl ₂	0.1%	10 min		
T ₈	Ethanol	70%	60 sec	65.00 (53.71)	68.00 (55.53)
	NaOCl	10%	10 min		
	HgCl ₂	0.15%	5 min		
T ₉	Ethanol	70%	60 sec	71.67 (57.82)	77.33 (61.55)
	NaOCl	10%	10 min		
	HgCl ₂	0.15%	10 min		
T ₁₀	Ethanol	70%	60 sec	83.00 (65.63)	81.67 (64.62)
	NaOCl	10%	10 min		
	HgCl ₂	0.20%	4 min		
T ₁₁	Ethanol	70%	60 sec	88.67 (70.30)	83.33 (65.89)
	NaOCl	10%	10 min		
	HgCl ₂	0.20%	6 min		
SE(m)				0.569 (0.445)	0.822 (0.603)
CD at 1%				1.671 (1.305)	2.414 (1.771)

Effect of plant growth regulators on callus induction

The control treatment (C₁), consisting of hormone-free MS medium, did not show any callus induction in any explants. This indicates that the presence of exogenous plant growth regulators was necessary to stimulate callus induction in banana explants. Among the treatments evaluated, C₇ (MS + 2.0 mg/l 2,4-D + 0.5 mg/l NAA) produced the best response, with 58.67% callus induction in meristems and 24.00% in fingers. It also required the least time for callus induction,

with 46.67 days in meristems and 57.33 days in fingers. Increasing the NAA concentration to 1.0 mg/l (C₈) or increasing 2,4-D to 2.5 mg/l (C₉ and C₁₀) resulted in a reduction in callus induction, indicating that higher concentrations of these growth regulators were less suitable for callus development. Overall, meristems showed better and faster callus formation than fingers, which may be attributed to the greater proportion of actively dividing cells present in meristematic tissues.

Table 2: Effect of plant growth regulators on callus induction.

Tr. No.	Medium combinations	Male floral organs			
		Meristems		Fingers	
		Percent Callus induction	Days required for callus induction	Percent Callus induction	Days required for callus induction
C ₁	MS (control)	0.00 (0.00)	0.00	0.00 (0.00)	0.00
C ₂	MS + 2.0 mg/l BAP	22.67 (28.42)	58.33	6.67 (14.95)	67.67
C ₃	MS + 2.5 mg/l BAP	37.33 (37.65)	57.67	8.33 (16.77)	66.00
C ₄	MS + 3.0 mg/l BAP	42.67 (40.77)	56.00	13.00 (21.09)	63.33
C ₅	MS + 2.0 mg/l 2,4-D	48.00 (43.84)	54.67	16.67 (24.08)	61.00
C ₆	MS + 2.5 mg/l 2,4-D	55.67 (48.23)	48.33	20.33 (26.79)	58.67
C ₇	MS + 2.0 mg/l 2,4-D + 0.5 mg/l NAA	58.67 (49.97)	46.67	24.00 (29.31)	57.33
C ₈	MS + 2.0 mg/l 2,4-D + 1.0 mg/l NAA	56.33 (48.62)	52.33	19.00 (25.83)	64.00
C ₉	MS + 2.5 mg/l 2,4-D + 0.5 mg/l NAA	46.00 (42.69)	54.00	14.33 (22.23)	66.67
C ₁₀	MS + 2.5 mg/l 2,4-D + 1.0 mg/l NAA	43.33 (41.15)	58.67	8.67 (17.11)	68.33
SE(m)		0.76 (0.439)	0.782	0.577 (0.464)	0.408
CD at 1%		2.258 (1.306)	2.322	1.715 (1.378)	1.213

Effect of plant growth regulators on shoot regeneration

After successful callus formation, the concentration of BAP played an important role in determining shoot initiation (Table 3). The hormone-free treatment (I₁) did not produce any shoots, indicating that an external source of cytokinin was required for shoot regeneration at this stage. Shoot regeneration gradually increased with increasing BAP concentration and reached its maximum at 4.5 mg/l BAP (I₇). This treatment recorded the highest regeneration

response, with 83.67% shoot initiation in meristems and 73.00% in fingers. It also resulted in the earliest shoot regeneration, taking 28.33 days for meristems and 37.67 days for fingers. However, further increases in BAP concentration from 5.0 to 7.0 mg/l resulted in a decline in both regeneration percentage and regeneration rate. This reduction may be due to an excessive cytokinin level, which could disturb the hormonal balance required for proper differentiation and shoot development.

Table 3: Effect of plant growth regulators on *in vitro* shoot regeneration.

Tr. No.	Medium combinations	Male floral organs			
		Meristems		Fingers	
		Percent Regeneration	Days required for regeneration	Percent Regeneration	Days required for regeneration
I ₁	MS (control)	0.00 (0.00)	0.00	0.00 (0.00)	0.00
I ₂	MS + 2.0 mg/l BAP	55.67 (48.23)	58.00	51.33 (45.75)	54.67
I ₃	MS + 2.5 mg/l BAP	67.00 (54.92)	54.33	55.67 (48.24)	52.33
I ₄	MS + 3.0 mg/l BAP	74.33 (59.55)	48.67	58.33 (49.78)	46.00
I ₅	MS + 3.5 mg/l BAP	78.67 (62.47)	36.33	67.00 (54.92)	47.67
I ₆	MS + 4.0 mg/l BAP	82.33 (65.12)	34.00	68.67 (55.94)	42.00
I ₇	MS + 4.5 mg/l BAP	83.67 (66.14)	28.33	73.00 (58.67)	37.67
I ₈	MS + 5.0 mg/l BAP	81.00 (64.13)	33.67	69.33 (56.36)	41.33
I ₉	MS + 5.5 mg/l BAP	77.67 (61.77)	38.00	66.67 (54.72)	45.67
I ₁₀	MS + 6.0 mg/l BAP	76.00 (60.67)	44.67	64.33 (53.31)	49.00
I ₁₁	MS + 6.5 mg/l BAP	68.67 (55.94)	51.33	57.67 (49.39)	51.33
I ₁₂	MS + 7.0 mg/l BAP	64.33 (53.31)	56.67	53.00 (46.70)	53.67
SE(m)		0.701 (0.468)	0.861	0.776 (0.466)	0.844
CD at 1%		2.057 (1.373)	2.527	2.278 (1.369)	2.479

Effect of plant growth regulators on multiplication rate

During subculturing, the individual application of BAP and kinetin showed a clear effect on shoot multiplication and shoot growth (Table 4a). The multiplication rate increased with increasing cytokinin concentration up to an optimum level, reaching 7.49 shoots at 5.0 mg/l BAP and 6.88 shoots at 6.0 mg/l kinetin. In contrast, average shoot height showed a gradual decline with increasing BAP concentration, decreasing from 7.73 cm in the control to 2.70 cm at the highest BAP concentration. This indicates an inverse relationship between shoot proliferation and shoot elongation, where higher cytokinin levels promoted the formation of more shoots but restricted their elongation.

Table 4(a): Effect of plant growth regulators on shoot multiplication.

Tr. No.	Medium combinations	Multiplication rate	Avg. shoot height (cm)
S ₁	MS (control)	1.44	7.73
S ₂	MS + 1 mg/l BAP	1.98	5.87
S ₃	MS + 2 mg/l BAP	2.59	4.63
S ₄	MS + 3 mg/l BAP	4.24	4.37
S ₅	MS + 4 mg/l BAP	4.56	4.10
S ₆	MS + 5 mg/l BAP	7.49	3.43
S ₇	MS + 6 mg/l BAP	6.26	2.70
S ₈	MS + 1 mg/l Kin	1.92	6.67
S ₉	MS + 2 mg/l Kin	2.25	6.13
S ₁₀	MS + 3 mg/l Kin	3.06	5.90
S ₁₁	MS + 4 mg/l Kin	3.26	5.37
S ₁₂	MS + 5 mg/l Kin	5.77	4.40
S ₁₃	MS + 6 mg/l Kin	6.88	3.13
SE(m)		0.459	0.404
CD at 1%		1.343	1.182

The combined application of BAP and kinetin further enhanced rate of shoot multiplication (Table 4b). Among the combination treatments, SM₃ (MS + 5.0 mg/l BAP + 1.0 mg/l kinetin) produced the highest multiplication rate of 8.33 shoots, which was greater than that obtained with either cytokinin applied individually. This suggests that the appropriate combination of BAP and kinetin had a synergistic effect on shoot multiplication. However, further increases in the concentrations, observed in treatments SM₄-SM₆, resulted that the decline multiplication rate. A similar reduction was observed in shoot height, which decreased from 3.50 cm in SM₁ to 1.17 cm in SM₆. These results suggest that higher cytokinin concentrations favour shoot proliferation but may negatively affect shoot elongation.

Table 4(b): Effect of combination of cytokinin on rate of shoot multiplication.

Tr. No.	Medium combination	Multiplication rate	Avg. shoot height (cm)
SM ₁	MS + 4 mg/l BAP + 1 mg/l Kin	2.38	3.50
SM ₂	MS + 4 mg/l BAP + 2 mg/l Kin	4.34	2.57
SM ₃	MS + 5 mg/l BAP + 1 mg/l Kin	8.33	2.27
SM ₄	MS + 5 mg/l BAP + 2 mg/l Kin	6.81	2.10
SM ₅	MS + 6 mg/l BAP + 1 mg/l Kin	5.01	1.53
SM ₆	MS + 6 mg/l BAP + 2 mg/l Kin	3.22	1.17
SE(m)		0.512	0.213
CD at 1%		1.594	0.662

In vitro rooting and root development

In vitro rooting responses varied considerably with the type and concentration of auxins added to the culture medium (Table 5). In the auxin-free control (R₁), only 36.33% of the shoots produced roots within 43 days. The addition of IBA and NAA individually improved rooting, although IBA was more effective than NAA at the tested concentrations. At 2.0 mg/l, IBA in treatment R₅ resulted 62.17% rooting, compared with 56.33% obtained with NAA in R₉. A much better rooting response was observed when both auxins were used in combination. Treatment R₁₆ (MS + 2.0 mg/l IBA + 0.5 mg/l NAA) showed the highest rooting percentage of 87.67%, while R₁₇ (MS + 2.0 mg/l IBA + 1.0 mg/l NAA) recorded 85.00% rooting. In both treatments, root induction occurred earlier, within approximately 26 days. The shoots developed under R₁₆ and R₁₇ also showed better root growth, with more roots well-developed root and relatively uniform development. The enhanced rooting response under the combined treatments may be due to the complementary action of IBA and NAA, where IBA mainly promotes root initiation, while NAA helps in further development and growth of the roots.

Table 5: Effect of plant growth regulators on *in vitro* rooting.

Tr. No.	Medium Combinations	Percent Rooting	Days required for root induction
R ₁	MS (control)	36.33 (37.05)	43.00
R ₂	MS + 0.5 mg/l IBA	42.70 (40.78)	41.67
R ₃	MS + 1.0 mg/l IBA	52.67 (46.51)	37.33
R ₄	MS + 1.5 mg/l IBA	57.00 (49.01)	35.33
R ₅	MS + 2.0 mg/l IBA	62.17 (52.02)	33.00
R ₆	MS + 0.5 mg/l NAA	38.33 (38.24)	40.70
R ₇	MS + 1.0 mg/l NAA	47.00 (43.26)	39.00
R ₈	MS + 1.5 mg/l NAA	53.37 (46.91)	31.67
R ₉	MS + 2.0 mg/l NAA	56.33 (48.62)	32.70
R ₁₀	MS + 0.5 mg/l IBA + 0.5 mg/l NAA	54.67 (47.66)	36.67
R ₁₁	MS + 1.0 mg/l IBA + 0.5 mg/l NAA	61.77 (51.78)	34.33
R ₁₂	MS + 1.5 mg/l IBA + 0.5 mg/l NAA	75.33 (60.22)	33.44
R ₁₃	MS + 0.5 mg/l IBA + 1.0 mg/l NAA	57.00 (49.01)	37.67
R ₁₄	MS + 1.0 mg/l IBA + 1.0 mg/l NAA	67.33 (55.13)	33.33
R ₁₅	MS + 1.5 mg/l IBA + 1.0 mg/l NAA	82.33 (65.16)	28.67
R ₁₆	MS + 2.0 mg/l IBA + 0.5 mg/l NAA	87.67 (69.43)	26.67
R ₁₇	MS + 2.0 mg/l IBA + 1.0 mg/l NAA	85.00 (67.19)	26.00
SE(m)		1.001 (0.633)	0.806
CD at 1%		2.89 (1.826)	2.326

Discussion

Koli *et al.*, (2014) ^[7] observed that a sequential treatment involving more than one sterilizing agent was more effective than the use of a single sterilant while standardizing protocols for Safed Velchi and Grand Naine. Similarly, Babu *et al.*, (2019) ^[2] reported a comparable response in banana var. Nanjangudu Rasabale. These findings support the general observation that contamination in banana explants difficult to control using a single sterilizing agent. A carefully planned sequence of sterilization treatments can therefore provide better aseptic culture establishment while

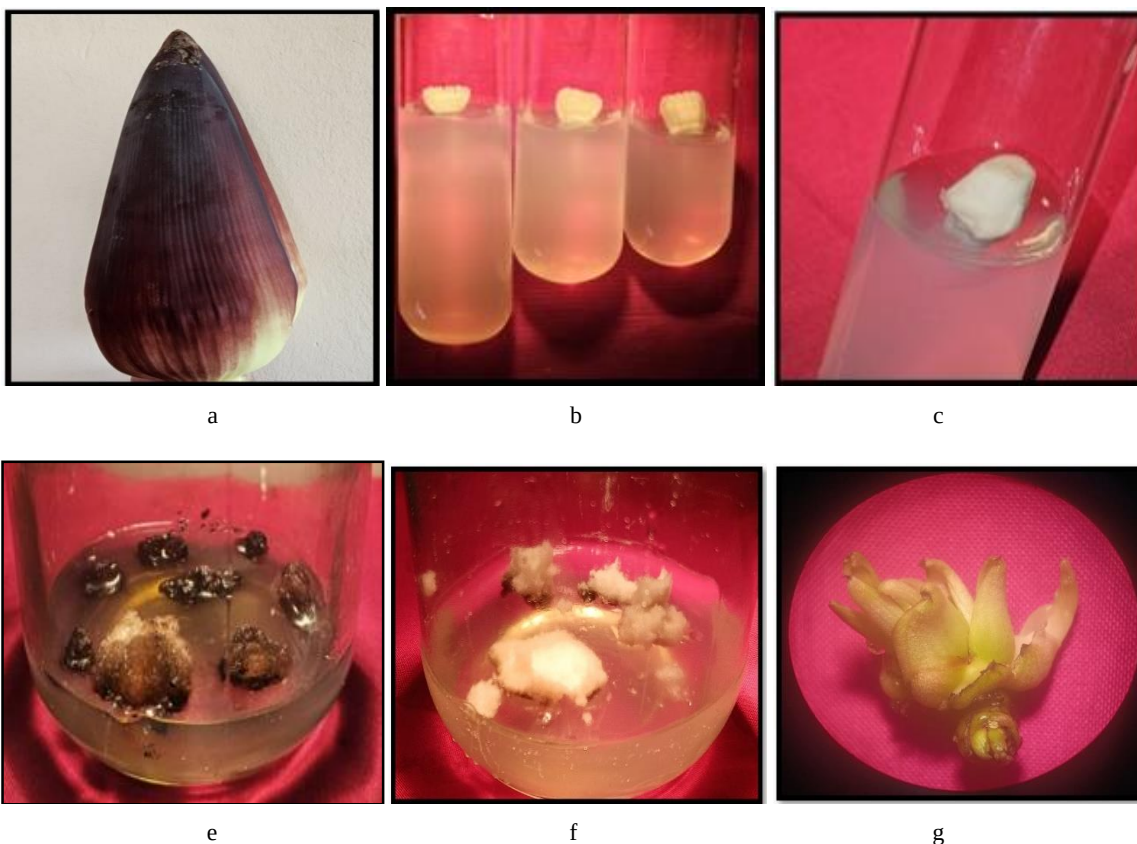
reducing the risk of damage to the explant tissues.

The present findings on callus induction were in agreement with the observations of Kumar *et al.*, (2019) ^[8] in banana Cv. Grand Naine, where MS medium supplemented with 2.0 mg/l 2,4-D and 0.5 mg/l NAA produced the highest callus formation. These findings support the observation that an optimum combination of auxins promotes better callusing than cytokinins alone, while excessive auxin concentrations reduce the callus response. A similar pattern was observed in the present study, as callus formation was highest at an optimum auxin concentration and declined when the concentration was increased further. This indicates that an appropriate balance of auxins is important for inducing effective dedifferentiation and subsequent callus development in banana explants.

The effect of BAP on shoot initiation observed in the present study was in agreement with the findings of Iqbal *et al.*, (2013) ^[5] who reported that a moderate level of BAP was more suitable for banana micropropagation than very low or high concentrations. In the present experiment, shoot regeneration gradually increased with BAP concentration and reached its maximum at 4.5 mg/l, after which the response decreased at higher concentrations. This suggests that shoot initiation depends strongly on maintaining an appropriate cytokinin level in the culture medium. During the multiplication stage, BAP alone resulted in better shoot proliferation than kinetin alone, which was also reported by Muhammad *et al.*, (2007) ^[9]. Interestingly, the combined use of BAP and kinetin produced an even higher multiplication

rate than either cytokinin used individually, indicating a beneficial interaction between the two growth regulators. Similar enhancement in shoot multiplication through the combined use of BAP and kinetin was reported by Kelta *et al.*, (2018) ^[6] in banana cultivars Poyo and Giant Cavendish. The better rooting response obtained with the combined application of IBA and NAA was consistent with the findings of Mulugeta *et al.*, (2018) ^[10], who reported that IBA and NAA, applied individually or in combination, significantly enhanced root formation in banana cultivars Poyo and Grand Naine compared with the control. Overall, the present results indicate that banana Cv. Konkan Safed Velchi shows a rooting response pattern similar to that reported for other banana cultivars. However, the optimum concentrations and combinations of growth regulators may vary with cultivar and therefore need to be standardized specifically for each genotype.

A clear trend throughout the study was the better performance of meristems compared with fingers. Meristems showed higher responses in terms of aseptic culture establishment, callus induction, shoot initiation and multiplication. This better response may be related to the highly active and less differentiated nature of meristematic tissues, which allows them to respond more readily to culture conditions and growth regulators. In contrast, finger tissues are relatively more differentiated and therefore may require more time and favourable conditions to initiate regeneration.



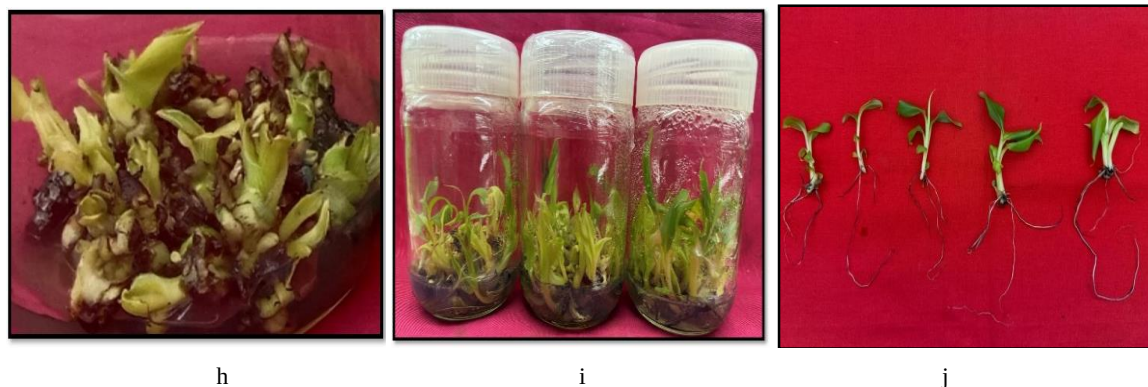


Image 1: (a) Explant of Cv. Konkan safed velchi (b) *in vitro* fingers inoculation (c) *in vitro* meristem inoculation (d) *in vitro* callus induction from meristems (e) *in vitro* callus induction from fingers (f) *in vitro* shoot regeneration (g) *in vitro* shoot regeneration from callus (h) *in vitro* shoot multiplication (i) *in vitro* rooting.

Conclusion

The present study successfully established a practical and reproducible *in vitro* regeneration protocol for banana Cv. Konkan Safed Velchi using male floral organs as explants. The highest aseptic culture establishment was achieved through sequential sterilization of explants with 70% ethanol, 10% sodium hypochlorite and 0.2% HgCl₂. For callus induction, MS medium supplemented with 2.0 mg/l 2,4-D and 0.5 mg/l NAA produced the best response, whereas 4.5 mg/l BAP was most effective for shoot initiation. In multiplication stage, the combination of 5.0 mg/l BAP and 1.0 mg/l kinetin resulted in the highest shoot multiplication. MS medium containing 2.0 mg/l IBA and 0.5 mg/l NAA shows best response in rooting phase. Meristem explants consistently performed better than fingers throughout the different stages of *in vitro* culture, indicating their greater suitability for regeneration. Overall, the standardized protocol provides a reliable and efficient approach for the rapid multiplication and large-scale production of healthy and uniform planting material of banana Cv. Konkan safed velchi.

Acknowledgments

The authors thank to the Dr. Balasaheb Sawant Konkan Krishi Vidyapeeth, Dapoli, for the laboratory facilities and support during this work.

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