

Influence of Organic Nutrients on Macropropagation of Banana

Tabasumbanu K.¹, Suhasini J.^{2*}, Anil I.S.¹, Sumangala K.³ and R.T. Patil⁴

¹Department of Fruit Science, College of Horticulture, Arabhavi (Karnataka), India.

²Department of Fruit Science, University of Horticulture Sciences, Bagalkot (Karnataka), India.

³Department of Plant Pathology, College of Horticulture, Arabhavi (Karnataka), India.

⁴Department of Floriculture Landscape Architecture, College of Horticulture, Arabhavi (Karnataka), India.

(Corresponding author: J. Suhasini*)

(Received: 06 October 2023; Revised: 02 November 2023; Accepted: 05 November 2023; Published: 15 December 2023)

(Published by Research Trend)

ABSTRACT: An experiment was carried out to assess banana varieties response to macropropagation technique using different organic nutrients, among different combinations of panchagavya, jeevamrutha and vermiwash, minimum number of days for first bud emergence (17.83 days), highest plantlets produced per corm (7.79), plant height (29.33 cm), shoot girth (28.27 mm), leaf length (27.81 cm), leaf breadth (15.11 mm) and leaf area (323.93 cm²) of primary plantlets significantly highest in V₁ (Grand Naine). Among the various treatments, the minimum number of days for first bud emergence (17.17 days), highest plantlets produced per corm (8.83), maximum plant height (25.58 cm), shoot girth (30.35 mm), leaf length (29.56 cm), leaf breadth (16.15 mm) and leaf area (363.22 cm²) of primary plantlets was observed in T₇ (Panchagavya 5% + jeevamrutha 5% + vermiwash 25%) and observed that the minimum number of days for first bud emergence (14.83 days), highest plantlets produced per corm (10.17), plant height (31 cm), shoot girth (31.48 mm), leaf length (30.50 cm), leaf breadth (16.72 mm) and leaf area (391.97 cm²) of primary plantlets was found in V₁T₇ (Grand Naine treated with panchagavya 5% + jeevamrutha 5% + vermiwash 25%).

Keywords: Organic Nutrients, Macropropagation of Banana, panchagavya, jeevamrutha,

INTRODUCTION

Banana (*Musa paradisiaca* L.) is one of the world's oldest fruit. The Arabic word "BANAN", which meaning "finger", is where the name "banana" originates. It is also referred to as the Adam's fig, the Apple of paradise and the wisdom tree. With more than 132 countries producing bananas, it is the most widely farmed tropical and subtropical fruit crop in the world. The banana is India's second-most important fruit crop after the mango in terms of output and productivity. Due to its availability throughout the year, low cost, variety, taste and nutritional and medicinal value, it is the most popular fruit among all social classes. The world produces 116.78 million tons of bananas and plantains over an area of 5.16 million ha, while India is the world's greatest producer with an area of 8.77 lakh hectares, production (317.79 lakh MT) and productivity (36.243 MT/ha) (Anonymous, 2020). India, China, Indonesia, Brazil, Ecuador, the Philippines, Mexico, Guatemala, Angola, Tanzania and Colombia are the top banana producers. Tamil Nadu, Maharashtra, Gujarat, Andhra Pradesh, Karnataka, Madhya Pradesh, Bihar, Uttar Pradesh, West Bengal and Assam are some of India's largest producers.

Organic farming has gained popularity in recent years as a result of the recognition of intrinsic benefits. Organic sources such as panchagavya, vermiwash, banana pseudostem sap, and jeevamrutha, used alone or in combination boosts soil fertility, growth and

production of banana. Natural farming or organic farming is gaining importance in view of sustained agriculture and maintaining ecological balance. It lies in a simple principle of utilizing cheap and local inputs with zero utilization of chemicals in any form like fertilizer, herbicide, pesticide, antibiotic and hormones etc. (Kesarwani, 2007).

MATERIAL AND METHODS

The investigation was carried out under the shade net at Department of Fruit Science, Kittur Rani Channamma College of Horticulture, Arabhavi, during February to August 2022-23. The rhizomes of Grand Naine and Ney Poovan banana, which are three months old, undergo eight different treatments (Jeevamrutha 5%, Panchagavya 5%, Vermiwash 25%, Jeevamrutha 5%+Panchagavya 5%, Jeevamrutha 5% + Vermiwash 25%, Panchagavya 5% + Vermiwash 25%, Jeevamrutha 5% + Panchagavya 5% + Vermiwash 25% Control). Treatments is applied at the time of planting (Dipping whole rhizomes in different treatments). FCRD (Factorial Completely Randomized Design) was followed with objective to study the influence of organic nutrients on rapid multiplication of quality shoots in banana.

Observations recorded are number of days taken for first bud emergence of primary, secondary and tertiary plantlets, number of days taken for secondary, tertiary decapitation and total number of primary, secondary and tertiary plantlets per corm.

RESULTS AND DISCUSSION

Statistically, significant results were obtained for all attributes in macropropagated banana is furnished in Table 1 and 2.

A. Number of days taken for first bud emergence

The analysis of the data unveiled that the time for the initial bud emergence was significantly shorter (17.83 days) in V₁ (Grand Naine), followed by V₂ (Ney Poovan) with a relatively longer duration (21.02 days) for the first bud to appear. A shorter duration of time, specifically (17.17 days), was observed for the first bud emergence after the primary decapitation in T₇ (Panchagavya 5% + jeevamrutha 5% + vermiwash 25%). In contrast, the longest period of time with a maximum (23.42 days), was required for the first bud to emerge in T₈ (control). The interaction between banana varieties and various organic nutrients yielded notable significant difference. For V₁T₇ (Grand Naine treated with panchagavya 5% + jeevamrutha 5% + vermiwash 25%), the duration for the first bud emergence was notably shorter (14.83 days). Conversely, the longest period, with a maximum number (25.50 days), was required for the first bud to emerge in V₂T₈ (Ney Poovan treated with water).

B. Total number plantlets per corm

The total number of plantlets generated per corm following the primary decapitation was markedly greater (7.79) in V₁ (Grand Naine) while, the lowest number (5.13) was observed in V₂ (Ney Poovan). In the context of various treatments involving organic nutrients, T₇ (Panchagavya 5% + jeevamrutha 5% + vermiwash 25%) yielded a greater number of plantlets (8.83) per corm following the primary decapitation while, the fewest plantlets (5.42) per corm were observed in T₈ (control). The interaction between banana varieties and various organic nutrients exhibited notable disparities. Specifically, V₁T₇ (Grand Naine treated with panchagavya 5% + jeevamrutha 5% + vermiwash 25%) recorded the highest number of plantlets (10.17) per corm while, the lowest number (4.50) was observed in V₂T₈ (Ney Poovan treated with water).

Minimum number of days for first bud emergence and days taken for secondary decapitation was noticed in T₇ (panchgavya 5%, jeevamrutha 5% and vermiwash 25%) This could be due to application of above said treatment contains cytokinin which reduces the apical dominance and enhance rapid proliferation of auxiliary and adventitious bud in banana (Osei, 2006).

Table 1: Influence of organic nutrients on plantlet regeneration in macropropagated banana.

Treatments	No. days for first bud emergence	Total number of primary plantlets/corm
Factor A (Variety)		
V ₁ (Grand Naine)	17.83	7.79
V ₂ (Ney Poovan)	21.02	5.13
S. Em±	0.08	0.06
CD @ 1%	0.24	0.18
Factor B (Treatments)		
T ₁ (Panchagavya 5%)	18.25	7.58
T ₂ (Jeevamrutha 5%)	19.42	5.33
T ₃ (Vermiwash 25%)	20.67	6.08
T ₄ (Panchagavya 5% + Jeevamrutha 5%)	18.42	6.08
T ₅ (Panchagavya 5% + Vermiwash 25%)	19.33	6.08
T ₆ (Jeevamrutha 5% + Vermiwash 5%)	18.75	6.25
T ₇ (Panchagavya 5% + jeevamrutha 5%+ vermiwash 25%)	17.17	8.83
T ₈ (control)	23.42	5.42
S. Em±	0.17	0.13
CD @ 1%	0.49	0.36
Interactions (Factor A × Factor B)		
V ₁ T ₁	16.50	8.83
V ₁ T ₂	17.50	7.50
V ₁ T ₃	19.50	7.00
V ₁ T ₄	17.83	7.33
V ₁ T ₅	17.83	7.33
V ₁ T ₆	17.33	7.83
V ₁ T ₇	14.83	10.17
V ₁ T ₈	21.33	6.33
V ₂ T ₁	20.00	6.33
V ₂ T ₂	21.33	4.50
V ₂ T ₃	21.83	5.17
V ₂ T ₄	19.00	4.83
V ₂ T ₅	20.83	4.83
V ₂ T ₆	20.17	4.67
V ₂ T ₇	19.50	7.50
V ₂ T ₈	25.50	3.17
S. Em±	0.24	0.18
CD @ 1%	0.69	0.51

Table 2: Influence of organic nutrients on plant height, shoot girth, leaf length, leaf breadth and leaf area of plantlets in macropropagated banana.

Treatments	Plant height (cm)	Shoot girth (mm)	Leaf length (cm)	Leaf breadth (mm)	Leaf area (cm ²)
Factor A (Variety)					
V ₁ (Grand Naine)	29.33	28.27	27.81	15.11	323.93
V ₂ (Ney Poovan)	25.67	27.31	25.77	13.46	264.51
S.Em±	0.39	0.25	0.132	0.162	4.400
CD @ 1%	1.11	0.73	0.38	0.467	12.676
Factor B (Treatments)					
T ₁ (Panchagavya 5%)	28.17	29.46	28.13	13.42	293.00
T ₂ (Jeevamrutha 5%)	27.00	27.59	27.38	13.71	287.40
T ₃ (Vermiwash 25%)	26.58	27.14	26.75	14.75	301.37
T ₄ (Panchagavya 5% + Jeevamrutha 5%)	28.17	29.11	26.13	14.66	289.96
T ₅ (Panchagavya 5% + Vermiwash 25%)	28.17	25.79	26.38	15.40	316.05
T ₆ (Jeevamrutha 5% + Vermiwash 5%)	28.00	27.23	26.38	15.33	306.12
T ₇ (Panchagavya 5% + jeevamrutha 5% + vermiwash 25%)	28.58	30.35	29.56	16.15	363.22
T ₈ (control)	25.33	25.65	23.63	10.88	196.62
S.Em±	0.77	0.51	0.26	0.324	8.80
CD @ 1%	2.22	1.46	0.76	0.934	25.35
Interactions (Factor A × Factor B)					
V ₁ T ₁	29.67	28.41	29.25	14.58	328.67
V ₁ T ₂	28.33	24.35	28.25	15.08	323.93
V ₁ T ₃	28.67	26.3	28.00	15.67	334.13
V ₁ T ₄	30.17	30.05	28.75	16.40	358.85
V ₁ T ₅	30.00	24.07	27.00	16.22	343.36
V ₁ T ₆	29.17	27.75	26.50	15.08	305.87
V ₁ T ₇	31.00	31.48	30.50	16.72	391.97
V ₁ T ₈	27.67	26.07	24.25	11.17	204.63
V ₂ T ₁	26.67	30.5	27.00	12.25	257.33
V ₂ T ₂	28.00	30.83	26.50	12.33	250.87
V ₂ T ₃	26.17	27.98	25.50	13.83	268.60
V ₂ T ₄	25.33	28.18	23.50	12.92	221.07
V ₂ T ₅	23.17	27.5	25.75	14.58	288.73
V ₂ T ₆	26.83	26.7	26.25	15.57	306.37
V ₂ T ₇	26.17	29.23	28.63	15.58	334.47
V ₂ T ₈	23.00	25.23	23.00	10.58	188.60
S.Em±	1.09	0.72	0.37	0.459	12.446
CD @ 1%	3.14	2.06	1.07	1.322	35.852

C. Vegetative parameters

The data concerning plant height (29.33 cm), shoot girth (28.27 mm), leaf length (27.81 cm), leaf breadth (15.11 mm) and leaf area (323.93 cm²) of primary plantlets showed significantly highest in V₁ (Grand Naine). In contrast, V₂ (Ney Poovan) had the minimum plant height (25.67 cm), shoot girth (27.31 mm), leaf length (25.77 cm), leaf breadth (13.46 mm) and leaf area (264.51 cm²) of primary plantlets.

Among the various treatments, the maximum plant height (25.58 cm), shoot girth (30.35 mm), leaf length (29.56 cm), leaf breadth (16.15 mm) and leaf area (363.22 cm²) of primary plantlets was observed in T₇ (Panchagavya 5% + jeevamrutha 5% + vermiwash 25%). On the other hand, the minimum plant height (25.33 cm), shoot girth (25.65 mm), leaf length (23.63 cm), leaf breadth (10.88 mm) and leaf area (196.62 cm²) of primary plantlets was recorded in T₈ (control). Regarding the interaction effect of varieties treated with organic nutrients, it was observed that the highest plant height (31 cm), shoot girth (31.48 mm), leaf length (30.50 cm), leaf breadth (16.72 mm) and leaf area (391.97 cm²) of primary plantlets was found in V₁T₇ (Grand Naine treated with panchagavya 5% + jeevamrutha 5% + vermiwash 25%). In contrast, the

minimum plant height (23 cm), shoot girth (25.23 mm), leaf length (23.00 cm), leaf breadth (10.58 mm) and leaf area (188.60 cm²) of primary plantlets was recorded in V₂T₈ (Ney Poovan treated with water).

The results were in accordance with Meena *et al.* (2012). Due to the positive effect of growth promoting hormones that accelerates the mobility of photosynthates that leads to higher vegetative growth. Similar trend was also reported by Natarajan (2002); Padmapriya *et al.* (2008) in coleus and phyllanthus, Vennila and Jayanthi (2008) in okra. It might be due to the fact that panchagavya and jeevamrutha are fermented liquid organic manure with high microbial load and effective microorganisms which could have enhanced the production of growth promoting substances such as auxins, gibberellins and cytokinin which causes the cell division and cell elongation.

CONCLUSIONS

Based on current study "Influence of organic nutrients on macropropagation of banana" it can be concluded that, Grand Naine variety of banana responded best for macropropagation because number of plantlets produced in Grand Naine was found more than the Ney Poovan, Panchagavya 5 per cent, jeevamrutha 5 per

cent and vermiwash 25 per cent was best combination for rapid multiplication of banana.

Acknowledgment. The author is highly thankful to College of Horticulture, Arabhavi, UHS, Bagalkot (Karnataka) for providing essential facilities and support during the experiment.

Conflict of Interest. None.

REFERENCES

- Anonymous (2020). *Horticultural Crop Statistic of India*, National Horticulture Board data base. National Horticulture Board, New Delhi.
- Kesarwani, A. (2007). Effect of organic nutrient management practices on the stalk yield and juice quality of sweet sorghum (*Sorghum bicolor* (L.) Moench) for ethanol production. *M. Sc. (Agri) Thesis*, University Agriculture Science, Bangalore, Karnataka.
- Meena, M. K., Chetti, M. B., Naik, D. S. and Nawallagatii, C. M. (2012). Role of plant growth regulators in agriculture: A review on morpho-physiological, quality and yield parameters in crops. *Res. J. Agric. Sci.*, 3(2), 316-321.
- Natarajan, K. (2002). *Panchagavya- A manual*, other Indian Press, Mapusa, Goa, India, pp. 333.
- Osei, J. K. (2006). Rapid field multiplication of plantains using benzyl adenine or coconut water-treated split corms. *Ghana J. Agric. Sci.*, 39, 189-202.
- Padmapriya, S., Balakumbahan, R., Rajamani, K. and Kumanan, K. (2008). Studies on influence of organic amendements and growth promoters on growth, yield and quality of coleus (*Coleus forskholii*) and keezhanelli (*Phyllanthus amarus*). Oral papers, *ISMPPH*, Tirupati, India.
- Vennila, C. and Jayanthi, C. (2008). Effect of integrated nutrient management on yield and quality of okra. *Res. Crops*, 7(1), 75-75.

How to cite this article: Tabasumbanu K., Suhasini J., Anil I.S., Sumangala K. and R.T. Patil (2023). Influence of Organic Nutrients on Macropropagation of Banana. *Biological Forum – An International Journal*, 15(12): 361-364.