The Pharma Innovation Journal 2022; 11(12): 5214-5216

www.ThePharmaJournal.com

The Pharma Innovation

ISSN (E): 2277-7695
ISSN (P): 2349-8242
NAAS Rating: 5.23
TPI 2022; 11(12): 5214-5216

www.thepharmajournal.com
Received: 15-10-2022
Accepted: 19-11-2022

Dapurkar ND
M.Sc. (Horti.) Scholar, Department of Horticulture, College of Agriculture, Parbhani, VNMKV, Parbhani, Maharashtra, India

Shinde VN
Assistant Professor, VNMKV, Parbhani, Maharashtra, India

Pisal SS
M.Sc. (Horti.) Scholar, Department of Horticulture, College of Agriculture, Parbhani, VNMKV, Parbhani, Maharashtra, India

Naik KM
M.Sc. (Horti.) Scholar, Department of Horticulture, College of Agriculture, Parbhani, VNMKV, Parbhani, Maharashtra, India

Corresponding Author:
Dapurkar ND
M.Sc. (Horti.) Scholar, Department of Horticulture, College of Agriculture, Parbhani, VNMKV, Parbhani, Maharashtra, India

Effect of potting media and foliar application of nutrients in banana (*Musa paradisiaca* L.) for secondary hardening

Dapurkar ND, Shinde VN, Pisal SS and Naik KM

Abstract
An experiment was carried out to study the effect of potting media and foliar nutrients on growth and survival of tissue cultured banana plantlets during secondary hardening. The experiment was comprised of three levels potting media and three levels of foliar nutrients with Factorial Randomized Block Design (FRBD). The experimental results revealed that potting media M3 *i.e.*, soil + sand + FYM recorded highest plant height (27.96 cm), pseudostem girth (4.49 cm), number of leaves (7.11), leaf area (63.29 cm2), survival (95.67%), number of roots (9.16), length of primary roots (23.83 cm) and root mass (26.09 g). Among the different foliar nutrients F2 *i.e.*, potassium nitrate (13:00:45) recorded highest plant height (26.07 cm), pseudostem girth (4.30 cm), number of leaves (6.92), leaf area (53.91 cm2), survival (94.33%), number of roots (8.08), length of primary roots (21.80 cm) and root mass (24.76 g). Among all interactions (M3F2) soil + sand + FYM with potassium nitrate (13:00:45) recorded highest plant height (29.90 cm), pseudostem girth (4.55 cm), number of leaves (7.27), leaf area (66.94 cm2) and survival (96.70%), number of roots (9.3), length of primary roots (24.8 cm) and root mass (26.2 g).

Keywords: Banana tissue culture plantlets, secondary hardening, potting media, foliar nutrient

Introduction
Banana is a fruit that grows on herbaceous plants in the *Musa* genus. Natural hybridization between two diploid species, *M. acuminata* and *M. balbisiana*, produced the majority of cultivated bananas (Simmonds 1996) [1]. It is a favorite fruit of all classes due to its year-round availability, affordability, varietal range, flavor, nutritional and medicinal benefits. It has also good export potential. Banana has a long history and is deeply rooted in Indian culture and customs. The banana is known as '*Kalpavrish*' because of its socioeconomic importance and diverse uses (Singh 2009) [2].

Tissue culture has been used to boost crop yields in a variety of banana cultivars with varying degrees of effectiveness. Individual plantlets must be transferred to a potting media mixture and acclimatized using a variety of methods (Kanwar and Kumar, 2008) [3]. The ultimate success of *in vitro* propagation lies in the successful establishment of plants in the soil. Physiological adaptation of an animal or plant to changes in climate or environment, such as light, temperature, or altitude, is known as acclimatization. Banana plantlets are being acclimated to greenhouse and outdoor conditions from cultured vessels in this scenario. Plantlets developed through micropropagation in relatively airtight vessels under specific condition, such as increased air humidity and lower irradiance than in standard growth. When microshoots are transferred to ex vitro surroundings, they are subjected to abiotic stress as well as biotic stress. The cultured plants have non-functional stomata, a weak root system, and a poorly formed cuticle, high mortality is found when microshoots are transferred to ex vitro settings (Mathur *et al.* 2008) [4].

A good potting medium, must meet all the basic plant requirements and needs to supply plants with a means of support, good drainage, adequate air circulation, and storage of water and nutrients. Also, banana is a heavy feeder of plant nutrients, particularly the nitrogen and potassium, with phosphorus coming in second. Because banana plants are nutrient-deficient, correct plant feeding scheduling is critical for achieving maximum growth. Foliar feeding can be a useful management method for influencing pre-reproductive growth phases. Early foliar sprays can improve field establishment and good crop.

With this view, the present experiment was undertaken to study effect of different potting media and foliar nutrients for secondary hardening treatments on *in vitro* propagated banana

plantlets for better survival and vegetative growth. Keeping these facts in a view, the proposed study was planned.

Materials and Method

A present investigation on "Effect of potting media and foliar application of nutrients on banana for secondary hardening" was undertaken at tissue culture centre, Vasantrao Naik Marathwada Krishi Vidyapeeth, Parbhani during the year 2021-2022. The experiment was laid out in Factorial randomized block design (FRBD) with nine treatments replicated thrice. The experiment was comprised of three levels of potting media *i.e.,* soil + sand + red soil (M1), soil + sand + cocopeat (M2), soil + sand + FYM (M3) in 2:1:1 proportion and three levels of foliar nutrients *Viz*, mono-potassium phosphate (00:52:34) (F1), potassium nitrate (13:00:45) (F2) and mono-ammonium phosphate (12:61:00) (F3) at 0.5% concentration. After primary hardening for 11-12 weeks, the plantlets from micro pots are, dipped in fungicide solution (0.2% Bavistin) and planted in black polyethylene bags of thickness 150 gauge of size 15 cm diameter and 30 cm height is filled with potting media like cocopeat, FYM and red soil with different proportions of sand and soil as per treatment combinations. When plants are 2-3 weeks old, liquid water-soluble fertilizers like Mono potassium phosphate (00:52:34), Potassium nitrate (13:00:45), and Mono ammonium phosphate (12:61:00) are applied as foliar spray in the concentration of 0.5%. Two sprays of foliar nutrient were applied at 14 days interval. Plantlets were sufficiently watered and kept in 70 per cent shade net. The observations regarding on plant height, pseudostem girth, number of leaves, leaf area, survival, number of primary roots, length of root and mass of roots were recorded and statistically analyzed (Panse and Sukhatme, 1985) [5].

Results and Discussion

Result presented in Table 1 reveled that maximum plant height (27.96 cm), pseudostem girth (4.49 cm), number of leaves (7.11), leaf area (63.29 cm2), survival (95.67%) is enhanced by the potting media M3 (soil + sand + FYM) that might be due to the presence of organic matter sources, providing strength and essential nutrients for survival to the *in vitro* raised plantlets. Better performance of FYM may be attributed to its ability to improve biological properties of the soil. These results were in conformity with the results obtained by Parkhe *et al.*, (2018) [6] in banana for secondary hardening. Similarly number of roots (9.16), length of primary roots (23.83 cm) and root mass (26.09 g) is significantly higher in treatment M3 (soil + sand + FYM). Better root growth may be due to FYM attributed to the general improvement in the physical and chemical properties of the rooting medium (Dileep *et al*., 1994) [7]. On the other hand, sand may be responsible for producing sufficient aeration. Hence, mixing soil, sand and FYM might have helped in giving better grip for the roots, ample aeration and sufficient organic matter. Reports by Ahmed *et al*. (2014) [10] and Parkhe *et al.*, (2018) [6] supports the results of present study.

Among the different foliar nutrients F2 *i.e.,* potassium nitrate (13:00:45) recorded highest plant height (26.07 cm), pseudostem girth (4.30 cm), number of leaves (6.92), leaf area (53.91 cm^2), survival (94.33%) This may be due to nitrogen which is responsible for the formation, growth and development of cells and accelerating the synthesis of chlorophyll and amino acid which are associated with major photosynthetic process of plantlets, it helps to increase in the formation of meristemetic tissues. And potassium is required for the activation of over 60 enzymes involved in the formation of carbohydrates, translocation of sugars, various enzyme actions, the tolerance to certain diseases, mechanisms to overcome the abiotic stress, cell permeability and several other functions. Plants absorb nitrogen in large amounts. Therefore, ammonium nitrate fertilizer can keep nitrogen levels steady to keep feeding plants rich in nutrients which need to generate a healthy growth. Similar results were reported by Jackson *et al*. (2004) [8] in *in vitro* raised plantlets of banana. Similarly highest number of roots (8.08), length of primary roots (21.80 cm) and root mass (24.76 g) is recorded by treatment F2 *i.e.,* potassium nitrate (13:00:45) similar studies were carried out by Kadam *et al*. (2010) [9].

Among the treatment combinations, combination M3F2 *i.e.*, soil + sand + FYM with potassium nitrate (13:00:45) recorded highest plant height (29.90 cm), pseudostem girth (4.55 cm), number of leaves (7.27), leaf area (66.94 cm^2) and survival (96.70%), number of roots (9.3), length of primary roots (24.8 cm) and root mass (26.2 g).

Table 1: Effect of potting media and foliar nutrient on growth of banana plantlets.

Particulars	Characters							
	Plant height (cm)	Pseudo- stem girth(cm)	No. of leaves	Leaf area (cm2)	Survival (%)	Number of roots	Length of primary roots(cm)	Root mass(g)
Potting media (M)								
M1 (soil+sand+red soil)	20.42	3.89	6.41	39.65	91.55	6.10	14.83	20.61
M2 (soil+sand+ cocopeat)	24.92	4.19	6.82	49.41	87.44	7.84	21.28	23.80
M3 (soil+sand+FYM)	27.96	4.49	7.11	63.29	95.67	9.16	23.83	26.09
S.E m ±	0.30	0.02	0.02	0.76	0.95	0.09	0.34	0.44
CD @ 5%	0.89	0.06	0.06	2.26	1.34	0.28	1.01	1.32
Foliar nutrient (F)								
F1 (00:52:34)	25.00	4.18	6.78	51.67	91.89	7.65	20.22	23.61
F2 (13:00:45)	26.07	4.30	6.92	53.91	94.33	8.08	21.80	24.76
F3 (12:61:00)	22.23	4.09	6.63	46.77	88.44	7.36	17.93	22.12
S.E m ±	0.30	0.02	0.02	0.76	0.95	0.09	0.34	0.44
CD @ 5%	0.89	0.06	0.06	2.26	1.34	0.28	1.01	1.32
Interaction (M×F)								
M1F1	22.20	3.88	6.43	40.50	91.00	5.90	15.00	20.40
M1F2	23.00	3.95	6.60	41.15	93.00	6.90	16.80	23.50
M1F3	16.00	3.85	6.20	37.29	90.70	5.50	12.70	17.90

M2F1	25.00	4.18	6.87	48.03	88.30	7.80	22.10	23.70
M2F2	25.30	4.42	6.89	53.64	93.30	8.00	23.80	24.60
M2F3	24.50	3.98	6.69	46.56	80.70	7.70	17.90	23.10
M3F1	27.80	4.48	7.04	66.48	96.30	9.20	23.60	26.70
M3F2	29.90	4.55	7.27	66.94	96.70	9.30	24.80	26.20
M3F3	26.20	4.45	7.01	56.46	94.00	8.90	23.10	25.30
S.E m ±	0.52	0.03	0.04	1.31	1.64	0.16	0.59	0.76
CD @ 5%	1.54	0.10	0.1	3.92	2.33	0.49	1.75	2.29

Conclusion

From the present investigation it can be concluded that the potting media M3 (soil + sand + FYM) significantly enhanced growth and survival. Among the different foliar nutrients, F2 (13:00:45) recorded significantly maximum growth and survival. Combination M3F2 *i.e.*, soil + sand + FYM with potassium nitrate (13:00:45) performed best for the growth characters and highest survival, which is an ultimate goal of any experiment.

References

1. Simmonds NN. Compositional Changes in Banana (*Musa* spp.) Fruits during Ripening. African Journal of Biotechnology. (http://www.academic journals.org/AJB), 1996, 8(5).
2. Singh HP, Mustafa M. Research and development in banana and plantain National and International scenario. In: Banana new innovations. New Delhi, Westville Publishing House, 2009.
3. Kanwar JK, Kumar S. in vitro propagation of gerbera a review, Hort. Sci. 2008;35(1):35-44.
4. Mathur A, Mathur AK, Verma P, Yadav S, Gupta M, Darokar MP. Biochemical hardening and genetic findelity testing of micro cloned progeny of *Chlorophytum borivilianum*. African J Biotech. 2008;7:1046-1053.
5. Panse VG, Sukhatme PV. Statistical method for agriculture workers. New Delhi. Published by ICAR, 1985, 157-164.
6. Parkhe S, Dahale M, Ningot E, Gawande S. Study of different Potting mixture on hardening of banana tissue culture plantlets and its field performances. International Journal of Current Microbiology and Applied Science. 2018;6:1941-1947.
7. Dileep M, Sudhakara K, Santhoshkumar AV, Nazeema KK, Ashokan PK. Effect of seed size, rooting medium and fertilizers on the growth of seedlings of silk cotton (*Ceiba pentandra* L.). Indian J Forestry. 1994;17(4):293-300.
8. Jackson AS, Carlos RR, Janice GC, Tânia BN. Efect of dolomiotic limestone and potassium nitrate in the initial development of seedlings of 'Prata-anã' (AAB) banana tree from in vitro culture Rev. Bras. Frutic.- 2004;26(1):150-154.
9. Kadam AB, Singh DB, Kade RA. Effect of plant growth regulators and potassium nitrate on growth of seedling of Kagzi lime, Asian J Hort. 2010;5(2):431-434.
10. Raheem AR, Vishnu PA, Ahmed AM. Impact of product packaging on consumer's buying behavior. European journal of scientific research. 2014 Mar;122(2):125-34.