ISSN (Online): 2455-7838
SJIF Impact Factor (2017): 5.705

EPRA International Journal of

Research & Development

(IJRD)

Monthly Peer Reviewed & Indexed International Online Journal

Volume: 3, Issue:8, August 2018

Published By :
EPRA Journals

SJIF Impact Factor: 5.705 Volume: 3 | Issue: 8 | August | 2018 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)

IN VITRO PROPAGATION OF *MUSA* SPP. CV. CHAMPA

Bikram Keshari[1]
[1]Plant Physiology and Biochemistry division, Regional Plant Resource Centre, Nayapalli, Bhubaneswar- 751015, Odisha, India.

Bikram Pradhan[2]
[2]Plant Physiology and Biochemistry division, Regional Plant Resource Centre, Nayapalli, Bhubaneswar- 751015, Odisha, India.

Bandita Deo[3]
[3]Plant Physiology and Biochemistry division, Regional Plant Resource Centre, Nayapalli, Bhubaneswar- 751015, Odisha, India.

ABSTRACT
The main objective of the study was to perceive the effects of different phytohormone used during in vitro propagation of Musa spp. cv. Champa using the meristematic segment. Champa variety is one of the highly demanded banana variety grown in parts of Odisha. After growing the in vitro cultures on different medium supplemented with BAP, Kinetin, IAA and ADS, explants showed better growth and proliferation in Murashige and Skoog Medium containing BAP in comparison to other medium. Best result was obtained during initial culture medium supplemented with BAP at 3 mg/l. Medium containing 3mg/l BAP + 100 mg/l ADS showed highest percentage of growth rate. MS medium supplemented with 3 mg /l BAP + 0.25 mg/IAA + 100 mg/l ADS got highest number of proliferated shoots. During rooting culture micropropagated shoots culture on MS medium with 1 mg/l IAA showed outstanding results.
KEYWORDS: *Musa spp.*; *in vitro;* micro propagation; MS medium; plant hormone.

INTRODUCTION

Banana account approximately 20-22 % of the fruit production in the international markets and is one of the major economical cash crops. It is world's second largest fruit crop which is produced over millions metric tons annually (**Banana Market Review and Banana Statistics 2012-2013, FAO, 2014**). The cultivar species of banana which are widely cultivated belongs to diploid species of genus *Musa acuminata* (AA) and *Musa balbiciana* (BB) originated in Asia (**Simmonds, 1962; George *et al.*, 2000**). Banana species are commonly propagated through vegetative parts (Suckers) because all the cultivate banana varieties are triploid and have sterile seeds (**Muhammad *et al.*, 2013**).

But traditional vegetative propagation methods for banana was noted to have disadvantageous impacts such as transmission of diseases, low production, and many more (**Hussein, 2012**). The disadvantages arising from vegetative breeding process can be treated by propagating banana through *in vitro* propagation (tissue culture) which offers elite planting material by mass propagation (**Ali *et al.*, 2011**). The present study was conducted for optimization of protocols for proliferation of Champa spp.. in Murashige and Skoog medium by using different plant growth hormones.

MATERIALS AND METHODS

For the *in vitro* micro propagation of Champa, suckers of selected disease free plants from different areas of eastern coasts of Odisha were collected. 2-3 months old sword suckers with an average height of 30-45 cm with 5-6 cm wide were used as explants. Explants were processed first and washed with detergent (Labolene) and treated with Bavistin for 1 hr. Further for surface sterilization 0.5% Sodium hypochloride was used for 30 mins followed by 0.1 % mercuric chlorite for 30 mins. After washing thrice in sterile distilled water in aseptic condition (under Laminar Air flow), the explants were inoculated aseptically in MS Medium. The phytohormones used for the shoot culture studies would be Benzyl Amino Purine (BAP), Kinetin (KN), Indole -3-acetic acid (IAA), etc. for the initial culture the concentration and combination of plant hormones used along with MS medium were as follows: 1 mg/l BAP + 100 mg/l ADS, 3 mg/l BAP + 100 mg/l ADS, 1 mg/l KN + 100 mg/l ADS, 3 mg/l KN + 100 mg/l ADS. Different concentration of hormones supplemented in MS medium during multiplication culture of *Musa* spp. cv. Champa explants were as follows: 1 mg/l BAP + 0.25 mg/l IAA + 100 mg/l ADS, 3 mg/l BAP + 0.25 mg/l IAA + 100 mg/l ADS, 1 mg/l KN + 0.25 mg/l IAA + 100 mg/l ADS and 3 mg/l KN + 0.25 mg/l IAA + 100 mg/l ADS. The mediums were autoclaved at 121°C and 15 psi for 20 minutes. The culture bottles containing the explants were kept in culture rack. The culture was maintained at 22°C to 25°C, 16 hr photo period of 35-50µEm-2s-1 intensity provided by cool white fluorescent tubes.

RESULTS AND DISCUSSION

The result of the study showed that after 5-10 minutes of inoculation secretion of phenolic compound was seen on the whitish portion of the explant as it turned into light brown.

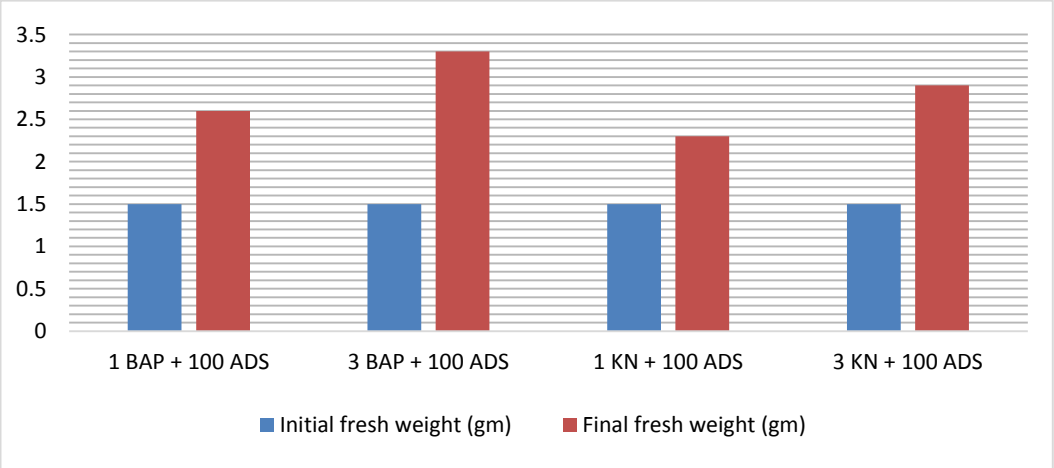

Fig. 1: Growth of *Musa* cv. Champa explants during initial culture after 2 weeks of inoculation.

After 7-8 days all explants in initial mediums got swelled up and changed to green. Out of all 4 different initial medium the best medium for culture establishment was 3 mg/L BAP where explants showed better growth and proliferations in comparison to other medium. Highest final fresh weight 3.3 gm (Fig. 1) of explants in 3 mg/L BAP + 100 mg/L ADS medium (P2). Poor response was marked in explants grown on medium with low Kinetin content (1 mg/L) where lowest final fresh weight (2.3 gm) was marked among all the explants cultured on other mediums. During Multiplication stage growth and proliferation of explants were seen after 7-9 days after inoculation in all the 4 different mediums. It was observed that the explants didn't form large numbers of shoot buds during multiplication culture.

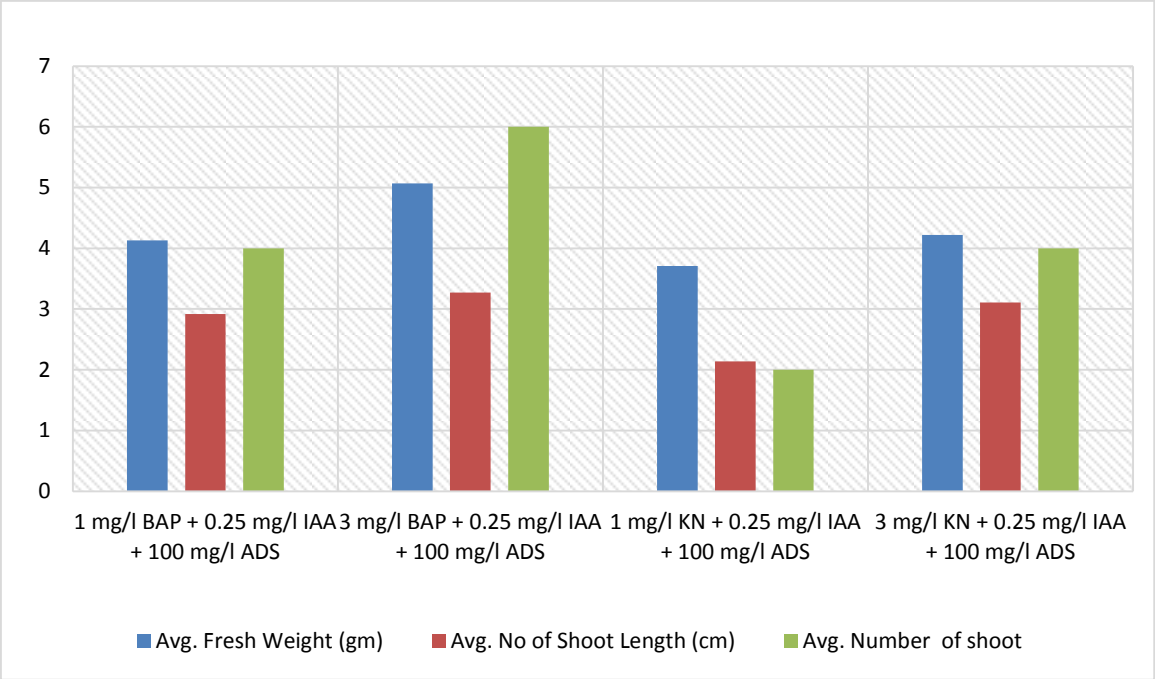

Fig. 2: Shoot proliferation in *Musa* cv. Champa explants during multiplication culture.

The lest percentage of response (70 %) as well as shoot buds number (2) was marked in culture medium supplied with 1 mg/L KN. Medium containing only BAP and IAA were marked by inducing shoot proliferation. Highest number of shoot (6) was observed in explants cultured on medium supplied with 3 mg/l BAP + 0.5 mg/l IAA + 100 mg/l ADS along with highest percentage of response (90 %) (Fig. 2).

Robert *et al.* (2013) reported that the highest multiple shoot induction was found in MS +5 mg/l BAP shoots while MS + 1 mg/l NAA + 0.2 mg/l BAP gave the longest regenerated shoots after 45 days of incubation. The developed shoots were cultured in MS medium with different auxins concentration for root induction and growth.

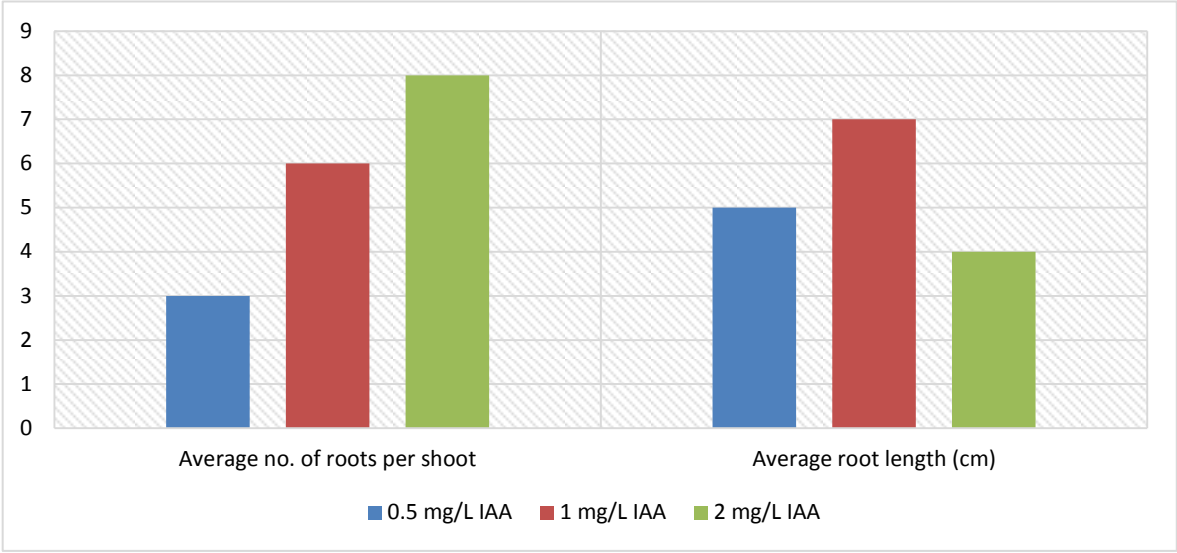

Fig. 3: Root induction in IAA (1 mg/l) medium in Champa shoots.

The best results were marked in shoots grown in MS medium containing 1 mg/l IAA (Fig. 3). In an average of 6 numbers of roots per shoot was observed in IAA 1 mg/L medium with short days of response (8 days) and the average length of roots was 7 cm. Effect of auxins (IAA) used for root induction was less on growth and elongation of shoots and leaves. The length of shoots varied from 4 – 5 cm and number of leaves varied from 2 – 4 nos. It took 3-4 weeks for complete development of roots during rooting culture of Champa.

CONCLUSION

From the above experiments it is concluded that for rapid propagation of *Musa* spp. cv. Champa plant growth hormone BAP was most effective in comparison to other hormones. It is also observed that the Champa explants have high phenolic secretion during initial as well as multiplication phase. A broad analysis on *in vitro* propagation of Champa and detection of secondary metabolites in phenolic secretion of Champa may be carried out in future.

ACKNOWLEDGEMENT

Authors are thankful to Government of Odisha, Department of Forestry and Environment for providing funds and Regional Plant Resource Centre for the kind help and co-operation.

REFERENCE

1. *Ali, A., Sajid, A., Naveed, N. H., Majid, A., Saleem, A., Khan, U. A., Jafery, F. I. and Naz, S., (2011). Initiation, Proliferation and Development of Micro-Propagation System for Mass Scale Production of Banana through Meristem Culture. African Journal of Biotechnology, 10, 15731-15738. http://dx.doi.org/10.5897/AJB11.2079.*
2. *Banana Market Review and Banana Statistics 2012-2013, FAO, 2014. Food and Agricultural Organization of the United Nations.*
3. *George, R., Domergue, R., Ferriere, N. and Cote, F. X., (2000). Morpho-histological study of the different constitutes of a banana (Musa AAA, cv, Grande naine) embryogenic cell suspension. Plant Cell Rep., 19: 748-754.*
4. *Hussein, N., (2012). Effects of Nutrient Media Constituents on Growth and Development of Banana (Musa spp.) Shoot Tips Cultured in Vitro. African Journal of Biotechnology, **11**, 9001-9006.*
5. *Iqbal, Muhammad Munir, Muhammad, A., Hussain, I., Bilal, H., (2013). "Optimization of In Vitro Micropropagation Protocol for Banana (Musa Sapientum L.) Under Different Hormonal Concentrations and Growth Media". IJAIR, 2(1): 23-27.*
6. *Murashige, T., Skoog, F., (1962). A revised medium for rapid growth and bioassays with tobacco tissue culture. Physiol Plant., 15: 473 – 497.*
7. *Robert, L., Vanlaldiki, H. and Meitei, W. I., (2013). In vitro shoot tip culture of banana cultivar meiteihei. The Bioscan. 8(3): 839-844.*
8. *Simmonds, N. W., (1962). The evolution of the bananas .LongMans, Green and Co.,Ltd.London, pp: 170.*