The Bioscan 11(4): 2215-2218, 2016
AN INTERNATIONAL QUARTERLY JOURNAL OF LIFE SCIENCES
www.thebioscan.com

# RESPONSE OF AUXINS ON BANANA GENOTYPE TO MICROPROOGATION

**JADHAV SHRINIVAS S.*, PATIL RAMANANAD V., KHULE AMOL A. AND PRAJAPATI DHARA M.**
Department of Genetics and Plant Breeding, C.P. College of Agriculture,
Sardarkrushinagar Dantiwada Agricultural University, Sradarkrushinagar - 385 506, Gujarat
e-mail: Shrinivas.jadhav007@gmail.com

**KEYWORDS**
Banana
Micropropagation
Root proliferation
Auxins

**Received on :**
16.07.2016

**Accepted on :**
21.11.2016

***Corresponding author**

**ABSTRACT**
The present study investigate the response of different concentrations of Auxins on virus free plant regeneration.The culture meristem turned brown firstly in colour in 4-5 days then after 30-35 days grew into a green globular hard coat mass. The treatment containing 0.2 mg/l IBA + 0.5 mg/l IAA showed the best rooting medium, with values around 8.10 roots each explant on 14th days of inoculation. Medium supplemented with 0.2 mg/l IBA affected the second highest induced rooting in 62% of explants and 6.32 roots/explants were noted on 19th days of incubation. Furthermore, MS + 1.5mg/l IBA prompted rooting but the percentage response was reduced 58%havinginitiation was increased 20th days. Reduced concentration of 0.5mg/l IBA + 0.5mg/l IAA had also no promoting influence. Higher concentration of 1.5mg/l IBA + 0.2mg/l NAA, revealed reduced rate of response, similarly IBA at its different concentration revealed no better response with NAA at 0.2 or 0.5mg/l. plants were shifted to pots having mixture of Soil and vermicompost in 2:1 ratio showed cent percent survival.

## INTRODUCTION

The banana *(Musa spp.)* is a monocotyledonous herbaceous plant belonging to the section *Eusuma* under thefamily *Musaceae* (Purseglove, 1976) are one of the world's most important subsistence crops. It is originated in Malaysia through a complex hybridization process (Novak, 1992). It is the most important source of tropical fruits in the world as it is a staple food as well (Rahman *et al.*, 2013). Banana is of great nutritional value, rare combination of energy value, tissue-building elements, protein, vitamins and minerals. Good source of vitamin C helps to rebuild the immune system also increases the absorption of iron and increases the formation of blood, these two health benefits of bananas make it ideally suited for those with anemia or blood related problems. Furthermore, bananas do not contain even trace amounts of fat, cholesterol, or sodium which makes it a healthy food option even for restrictive diet plans (Sampath *et al.*, 2012). Propagation of banana through suckers is seriously limiteddue to low multiplication rate, clonal degradation and theperils of spreading disastrous diseases Nevertheless, planting materials of this cultivar is not easily available; therefore, its plantation is not so popular. In vitro culture is one of the great advantage for mass propagation of various vegetative propagated crops with advance in technology and science microprogation has become a popular to the same. Micropropogation is preferred over conventional method of propagation owing toits faster multiplication rate, uniformity in planting materialsand production of disease-free materials materials. Although conventional method of vegetative propagation hascommercial acceptability, to ensure an extremely rapid rate of multiplication, tissue culture technique has definite andindispensable advantage over the conventional method. This approach for banana plantlets is an excellent alternative to provide large number of planting materials to the farmers with gives growers advantages. The apical meristem or shoot-tip culture isvery efficient for rapid clonal propagation (Nandi *et al.*, 1998). Keeping in view these considerations, investigation was undertaken to study and analyze the response of auxins on banana genotype to microproogation.

## MATERIALS AND METHODS

### Preparation of media

MS (Murashige and Skoog, 1962) media supplemented withdifferent and various combinations of plant growth regulatorswere used. Inositol and sucrose wereadded freshly. Plant growth regulators from stock solutionswere added as per prerequisite. The pH of the solution wasadjusted to 5.8 using 1N NaOH or 1N HCl. Final volume of the solution washeated and agar (0.8 %) was dissolved to make the media.

### Culture conditions

The inoculated culture materials were kept in culture roommaintained at 25 ± 2°C and 60-70 % RH under 12 hours light and dark cycle for checking any kind of contamination, if observed it removed and prepare again.

**Collection and isolation of shoot-tips from suckers of genotype-** Two week old suckers of Grandnainewere taken from Botanical garden, Department of Genetics and Plant Breeding, C. P. College of Agriculture, Sardarkrushinagar Dantiwada Agricultural University, Sknagar-385506, Gujarat.

These suckers weretransported and excised at Biotechnology Laboratory of Department of Genetics and Plant Breeding. These explants were surface sterilized for 5 minutes with 50% commercial bleach (Clorox 5.75% NaOCl) to which few drops of Tween-20 were added.After complete washing with sterile water, explants were trimmed to final size of 3-5mmin the laminar flow.

**Induction of explants**

These explants were cultured MSmedia fortified differentwith combination and without combination of IBA, IAA and NAA. After two weeks whengrowth started, explants were shifted to multiplication medium. Multiplication mediumconsisted MS salts and vitamins enriched.Sub culturing was done afterevery two weeks and black tissues were removed prior to sub culturing.

**Hardening of plantlets**

After removing the medium under water, plants were shifted to pots having mixture of soil and vermicompost in 2:1 ratio. These pots were covered with polythene bags to maintain the humidity. These plants were acclimatized in green house for eight weeks.

**Statistical analysis**

Observations were made on alternate days and rooting percentages, numbers of roots per explants were calculated in different culture media. Fifteen plantlets were inoculated in each concentration and data were obtained from the three replication experiments. Data recordedfor different parameters were subjected to completely randomizeddesign (CRD) Panse and Sukhatme (2000).

## RESULTS AND DISCUSSION

Good and well condition raised plantletsfor root proliferation and development was cultured in MS medium supplemented with different concentrations combination and without combination of IAA, IBA and NAA. (Table no.1) The present finding of root proliferation in hormonalcombinations confirms the findings of Babylatha *et al*. (1997) who achieved 100 % rooting in MS mediasupplemented with various combinations of IBA, NAA and IAA. Ahsan *et al*. (1998) reported that the best response wasachieved in hormone free MS media for table banana whileBekheet and Saker (1999) reported thesuperiority of NAA over IAA and IBA in the in vitro rooting ofbanana plantlets. Lalrisanga *et al*. (2013) reported that the highest number of roots and 100% survival was found when MS supplement with growth regulator. All the media tested root proliferation within 14-15 days fromthe day of inoculation. The shortest days to root proliferationis14 days and longest days to root proliferation is 27 daysin MS media with growth regulator.The treatment containing 0.2 mg/l IBA + 0.5 mg/l IAA showed the best rooting medium, (Table no. 1) with values around 8.10 roots each explant on 14th days of inoculation in 87% of the plantlets (Fig. 4). Medium supplemented with 0.2 mg/l IBA affected the second highest induced rooting in 62% of explants and 6.32 roots/explants were noted on 19th days of incubationof all the media tested (Fig 3). MS media alone with growth regulators gave the lowest numberof roots with an average of only 2.11 roots per plantlet. MS media alone with growth regulators 0.5 mg/l IAA and 0.2, 0.5 mg/l NAA gave the lowest numberof roots with an average of only 1.30 and 1.74, 0.96roots per plantlet.Table 1 also shows that an increase in IBA, IAA or NAA concentration decreased the number of roots per explant.The higher rootinduction in the said media is probably due to the requirementof auxin in very low concentrations as earlier studies haveshown in micropropagation of different cultivars of banana has been carried out by different workers:Ahmed *et al*, 2014:Hussein, N. 2012; Kumar, *et al.,*2012;Ali,*et al*, 2011; Gallez *et al.,* 2004; Gubbuk, 2001; Browning, *et al*., 1987; Based on the above result in may be concluded that among the IBA is the best and if it is supplemented with IAA then more auspicious results were accomplished.

**Hardening**

The fully developed plantlets were in-vitro hardened for 28 days in MS media, then transferred to potting media under Green House conditions. A survival of 98-100% plantlets was observed in all the treatments. Some of the findings of earlier workersindicated a survival percentage ranging from 80-100 whenbanana rooted plantlets were transferred to ex vitro hardeningmedia under Green House or Shade House conditions (Molla *et al.,* 2004 and Acharjee *et al.,* 2004).The

**Table 1: Initiation of root in tissue culture raised plantlets**

| Growth Regulator | Days taken for root proliferation | | | % Responses | Number of root proliferation |
|---|---|---|---|---|---|
| | NAA | IBA | IAA | | |
| - | 0.2 | - | 19 | 62 | 6.32 |
| - | 0.5 | - | 20 | 58 | 3.40 |
| - | - | 0.2 | 22 | 48 | 2.70 |
| - | - | 0.5 | 27 | 35 | 1.30 |
| 0.2 | - | - | 22 | 33 | 1.74 |
| 0.5 | - | - | 27 | 26 | 0.96 |
| - | 0.2 | 0.2 | 19 | 49 | 6.10 |
| - | 0.5 | 0.2 | 22 | 44 | 3.10 |
| - | 0.2 | 0.5 | 14 | 87 | 8.10 |
| - | 0.5 | 0.5 | 17 | 65 | 5.10 |
| 0.2 | 0.5 | - | 18 | 66 | 3.46 |
| 0.5 | 0.5 | - | 17 | 64 | 3.30 |
| 0.5 | 0.2 | - | 25 | 47 | 2.10 |
| 0.2 | 1.5 | - | 18 | 62 | 4.40 |

**Figure 1: Explants of Banana**

**Figure 2: Multiple shoot and culture for Rooting**

**Figure 3: shoot showing initiation of roots**

**Figure 4: Shoots showing multiple roots**

highest average increase in height was found in the pottingmedia containing soil and vermicompost (2:1).

## REFERENCES


**Acharjee, S., Barooah, M. and Deka, P. C. 2004.** In vitro propagation of four *Musa* spp. of the North-East Region of India. *Ann. Biol.***20** (1): 1-6.

**Ahmed, S., Sharma, A., Bhushan, B., Wali, V.K., Bakshi, P. and Singh, A. K. 2014.** Studies on hardening and acclimitization of micropropagated plantlets of banana cv. *Grand naine*. *The Bioscan.* **9(3):** 965-967.

**Ahsan H., Jahan, M. A. A. and Hossain, M. T. 1998.** Acceleration of the process of in vitro root development in *Musa sapientum* var. Sagar. *Bangladesh J. Sci. Ind. Res.* **3:** 341-344.

**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 J. Biotechnology*. **10:** 15731-15738.

**Babylatha, A. K., Patel, B. M. and Shah, R. R. 1997.** In vitro propagation studies on banana cv. Basrai. *J. Appl. Hort. Navsari.* **3(1-2):** 12-22.

**Bekheet, S. A. and Saker, M. M. 1999.** Rapid mass micropropagation of banana. *Bull. Nat. Res. Centre Cairo.* **24(2):** 221-232.

**Browning, G., Ognjanov, V., Passey, A. and James, D. 1987.** Multiple Shoot and Root Regeneration from Pear Embryo Cotyledon Explants in Vitro. *J. Horticultural Science.* **62:** 305-311.

**Gallez, A., Runyoro, G., Mbehoma, C., Houwe, I. and Swennen, R. 2004.** Rapid Mass Propagation and Diffusion of New Banana Varieties among Small-Scale Farmers in North Western Tanzania. *African Crop Science J.* **12:** 7-17.

**Gubbuk, H. and Pekmezci, M. 2001.** The effects of different hormone types and concentrations on propagation of different banana clones by meristem culture. *Ziraat Fakultesi Dergisi, Akdeniz Universitesi.* **14(1):** 127-137.

**Hussein, N. 2012.** Effects of Nutrient Media Constituents on Growth and Development of Banana (*Musa* spp.) Shoot Tips Cultured in Vitro. *African J. Biotechnology*. **11:** 9001-9006.

**Kumar, A., Kumari, P. and Shukla, L. N. 2012.** In vitro rooting in the tissue culture raised plantlets of Malbhog cultivar of Banana. *Indian J. Innovations Dev*. **1(9):** 665-668.

**Lalrinsanga, R. Vanlaldiki, H. and Meitei, W. I. 2013.** In vitro shoot tip culture of banana cultivar Meitei Hei. *The Bioscan.* **8(3):** 839-844.

**Molla, M. M. H., Khanam, M. d., Khatun, M. M., Al Amin, M. and Malek, M. A. 2004.** In vitro rooting and ex vitro plantlet establishment of BARI banana 1 (*Musa* spp.) as influenced by different conc. of IBA. *Asian J. Plant Sci.* **3(2):** 196-199.

**Murashige, T. and Skoog, F. 1962**. A Revised Medium for Rapid Growth and Bio-Assays with Tobacco Tissue Cultures. *Physiologia Plantarum*. **15:** 473-497.

**Nandi, M., Joshi, V. J. and Chaudhari, A. N. 1998.** Field evaluation for growth and yield parameters of banana (*Musa* spp.) derived from tissue culture and conventional planting material. *Indian J. Agrc. Sci.* **68(10):** 684-686.

**Novak, F. J. 1992.** *Musa* (Bananas and Plantains). In: Hammerschlag, F.A. and Litz., R. E. (eds), Biotechnology of Perennial Fruit Crops. *CAB International, University Press, Cambridge*. U.K. pp. 449-488.

**Panse, V. G. and Sukhatme, P. V. 2000.** Statistical methods for agricultural workers. *Publication and information Division of ICAR, New Delhi.*

**Purseglove, J. W. C. 1976.** Tropical Crops: Monocotyledons.

*Longmans, N.Y.* pp. 273-283.

**Rahman, S., Biswas, N., Hassan, M., Ahmed, G., Mamun, A. and Islam, R. 2013.** Micro propagation of banana (*Musa* spp.) cv. Agnishwar by In vitro shoot tip culture. *International Research J. Biotechnology*. **4(2141-5153):** 83-88.

**Sampath, K., Debjit, B., Duraivel, S., and Umadevi, M. 2012.** Traditional and Medicinal Uses of Banana. *J. Pharmacognosy and Phytochemistry*. **1(3):** 51-63.