

Micro Propagation of cv. Basrai (Banana) Using Growth Hormones

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Received date: December 26, 2016; Accepted date: March 17, 2017; Published date: March 28, 2017

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Abstract

The micro propagation response of cv. Basrai (Banana) was studied. The suckers were taken as explants and were cultured on MS with 4, 5, 6 ml of BAP. At the interval of four weeks, removal of black tissues was done. After the cleaning sub culturing was done. At each subculture, data were recorded by counting the number of new shoots produced. Shoot tips of different rhizomes under *in vitro* condition behaved different. Some cultures give more response while others less and produced less number of shoots. After five sub-culturing from each shoot tip 112 plants were produced, on an average.

Keywords: Basrai; Basal medium; Culture; Rhizome; Shoot

Introduction

In early nineties, 60% of banana field's area of Pakistan (Sindh) was under high attack of Banana Bunchy Top Virus (BBTV) which caused banana bunchy top virus disease and results in 90% decrease in its production. Mostly the plants having bunchy tops were infected by this virus due to their less flexible leaves and having rigidity in the leaves. As a consequence heavy loss in production by BBTV, farmers moved towards the cultivation of other crops like cotton and sugarcane but this choice was also not profitable as compared to banana. So to get rid of this virus, efforts were made by planting disease free plants. One perspective was to import healthy germplasm from other countries, but imported germplasm could not grow under local environment due to high alkaline nature of soil. The second approach was to fulfil the requirement of farmers by cleaning the existing germplasm and multiply them at higher rates. The micro propagation of banana plantlets is an excellent alternate approach adopted in many countries of the world like Israel, France, Australia and Cuba [1-4]. Shoot tip and male floral apices can play a vital role for micro propagation of banana [5,6]. According to Novak et al. [7] regeneration and somatic embryogenesis can take place in liquid medium. The rate of multiplication is the important factor that affects the efficiency of micro propagation system. It is also reported by Israeli et al. and Mendes et al. [1,8] that rate of banana multiplication depend on genotype along with it variable behavior has been noticed among the *in vitro* cultures initiated from same genotype of banana. Therefore present trial was designed to study the multiplication rates of banana shoot tips taken from different suckers under *in vitro* conditions during successive sub-culture of cv. Basrai.

Materials and Methods

This research trial was conducted on banana plantlets at NARC, Islamabad. 200 suckers were taken in total as ex-plant. Suckers of cv. Basrai with the age of four week were collected from the banana fields near Thatta district of Sindh (Pakistan), and then transported to NARC excised and then peeled off to the size of 4 cm at the base and 5 cm

long consisting of single shoot tip. After surface sterilized for 15 min with 50% commercial bleach (Clorox 5.75% NaOCl), these explants were treated with few drops of Tween-20 and then shaken for 15 min. After shaking explants were again washed with sterile water and then trimmed to final size of 3-5 mm in the laminar flow cabinet, cultured on MS as a basal medium with 4, 5, 6 ml of BAP while IAA 1.5 mg l⁻¹ constant for shoot multiplication. Cultures were incubated in liquid medium at 25 ± 2°C for 16 hours photoperiod. Explants were shifted to multiplication when growth started. The recipe of multiplication medium was MS salts along with 5.0 mg l⁻¹ BAP enriched vitamins. After every four weeks black tissues were removed and sub culturing was done. Counting of number of shoots was done after every subculture. The rate of multiplication was calculated as the ratio of shoot number at the end of subculture to the initial number of shoots. After taking five subcultures, the shoots were shifted to rooting medium. Rooting medium concentrations were 1, 1.5, 2, 2.5 ml IAA. Within two weeks prolific roots were observed. Under water the rooting medium was removed plants were transported to polythene bags having mixture of sterilized clay and sand 1:1 ratio. Plants were acclimatized in green house by covering these bags to maintain humidity for eight weeks. The data calculated was analyzed by Analysis of Variance (ANOVA) in complete randomized design. The means were compared at p<0.05 using least significant difference [9].

Results and Discussion

After the first four weeks of culturing, the external leaf primordia of explants were changed from off white to green, with increase in its size. At the base of explants blackening was noticed due to phenolic compounds. Only on culture No. 2 multiplication was recorded and two shoots were emerged on it. Data about shoot multiplication up to fifth sub culturing was presented in Table 1.

Results showed that one cultured shoot tip has a potential to produce 112 ± 96.26 plants on the average after five sub culturing (Figure 1).

It was noted that in terms of multiplications all the explants did not show similar behavior under *in vitro* condition. Culture No. 2 was observed most productive (235 shoots) followed by Culture No. 1 (188

shoots) while the least shoots (21) were observed in culture No. 5. In shoot numbers the standard deviation depicts an increase in variability at each subculture among the explants. The standard deviation increased from 0.55 to 96.26 was due to cumulative difference in rate of multiplication. It is reported that spp., genotypes show difference in multiplications [4,10]. In our study, as presented in Table 1, multiplication rate was varied amongst explants of same genotype. The dissimilarities in rate of growth may be due to physiological behavior of different rhizomes. Mendes et al. [8,11] also observed similar differences in multiplication rate amongst same genotype for the cultivars, Maca and Nanicao respectively.

Explants	Sub-Culturing				
	1st	2nd	3rd	4th	5th
1	2	3	15	102	188
2	1	5	22	125	235
3	1	6	6	10	26
4	2	2	6	17	90
5	1	2	8	18	21
Total	7	18	57	272	560
Mean	1.4	3.6	11.4	54.4	112
S.D	0.55	1.82	6.99	54.65	96.26

Table 1: Number of shoots in each subculture from banana cv. Basrai.



Figure 1: Micro propagation of banana.

Therefore from the results obtained it was noticed that the cultures showing higher multiplication rate in first two or three sub culturing maintained this behavior in the next sub culturing. From the economical point of view, the cultures giving increased multiplication rate may be continued in the upcoming period initially. Milarly cultures showing low potential for multiplication initially may be disposed in the start to save time, space and other resources.

Conclusion

The micro propagation response of cv. Basrai (Banana) was studied. The suckers were taken as explants and were cultured on MS with 4, 5, 6 ml of BAP. At the end of our experiment we concluded that shoot tips of different rhizomes under *in vitro* condition behaved different moreover, some cultures give more response while others less and produced less number of shoots. This research will be helpful for the farmers to grow banana plants for their livelihood.

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