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MASS PRODUCTION OF BANANA (MUSA SP.) THROUGH BIOTECHNOLOGICAL TECHNIQUES

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ABSTRACT: Meristematic tip with leaf primordial from 13 clones of desert banana (Musa spp.) were evaluated for in-vitro propagation techniques accelerates the production of disease-free banana (Musa spp.) clones through shoot tips. It was observed that apices cultured on solid MS media supplemented with 20µM BAP/1produced 3-8 shoots. Longitudinal splitting of shoots induced shoot clusters. Shoot elongation and rooting were obtained on media containing 1µM IBA/1 and 40gm/1 sugar (commercial). The regenerated plants were transferred to jiffy pots and kept in growth chamber for two weeks for acclimatization. Plants were then transplanted in field.

Keywords: *Mass Production, Banana, Biotechnology, Techniques*

INTRODUCTION: Banana is the one of major fruits of Pakistan. The cultivated area of banana in Sindh is about 26300 hectares with 102000 of fruit production (Annony- mous, 2002). The average yield of banana per unit area is low because of non-availability of high yielding and disease resistance clones. In recent past, spread of banana bunchy top disease (BBTV) in the province of Sindh has adversely affected the banana crop due to which the cultivation of banana was reduced up to 60% and consequently its production was decreased up to 90% (Khushk *et al;* 1993). Thus availability of disease free plants has become a major problem for banana cultivation in Sindh.

The genetic improvement of banana by conventional breeding is hampered because of sterility and parthenocarpic development of fruit (Rowe, 1984; Shephered, 1987). For the renaissance of this crop, new strategic including implementation of biotechnology may be a suitable approach to achieve the goal. Biotechnological techniques allow the manipulation of genetic material to impart desirable traits with greater accuracy in a much shorter time than is possible with conventional breeding methods (Hansen, 1986; Novak, et. al., 1993; Khatri, et. al., 1997), up to 90% (Khushk et. al., 1993). Thus availability of disease free plant has become a major problem for banana cultivation in Sindh.

In this paper tissue culture techniques utilizing shoot as a primary explant producing thousands of clonal plants in a short period of time with main objectives to develop an efficient system for the in-vitro propagation of banana in large number of plants for field establishment have been described.

MATERIAL AND METHODS:

The work has been developed with cultivars of Basrai, (commercial clones of Sindh) GN60 A, SH3362, FHIA-01,

FHIA-17, FHIA-18, FHIA-23, SH3640, GCTCV-119, GCTCV-215, GCTCV-106, GCTCV-247 and SH 3436-9. The *in-vitro* materials were provided by INIBAP, Belgium. The explants were obtained from young developing suckers/corns consisting of shoot tip. These explants were washed and sterilized according to Khatri et. al., (1997). The explants were cultured in MS medium and incubated at 25 ± 2°C under 16 h photoperiod. The culture media used were:

Establishment medium: MS 40mg/1 Cystein HCl+5 µM/1 IAA+10µM/1 BAP+40 gm/1 sugar

Establishment medium: MS 40mg/1 Cystein HCl + 20 µM/1 BAP + 40gm/1 sugar.

Rooting medium: MS+1µM/1 IBA+ 40 gm/1 sugar. Plants after root development were acclimatized in room climate and transplanted to soil condition.

RESULTS AND DISCUSSION

(a) ***Establishment phase:***

The colour of survived explant changed from creamy white to green 7-10 days. Shoot tips initially cultured on solid medium showed tendency to produce phenolic compounds in all clones tested oxidized rapidly and resulting in the death of explants.

(b) **Multiplication Phase:** At low concentration of BPA 10µM/1 only one or two shoots were regenerated in most of the cultivar while at higher concentration (20µM/1) enhanced multiplication of hoot bud was noticed with concomitant suppression of the shoot elongation. Addition of BAP at 20µM/1 concentration was most effective for the production of shoots. Splitting of shoots strongly induced multiple shoot formation (Siddiqui et. al., 1991; 1993). Earlier reports on the importance of apical dominance indicate that the destruction of apical dominance by removing the domes was essential for the production of multiple shoot initials in cv. Cavendish. Swamy et. al., (1983) reported that the removal of apical dome is not essential for multiple shoot formation. The multiplication rate of shoot meristem tip is a genotype dependent phenomenon. Khatri et al., (1997) reported that in general two types of multiple budding could be distinguished i) proliferation ii) prolixferation of "Plantules". In present study we find that the clone containing B genome (FHIA-01) showed low multiplication rate (Table-1). Aguila et. al., (2002) reported the similar results. Highest multiplication rate was observed in Basarai and lowest was found in FHIA-01 and GCTCV-247.

(c) ***Rooting Phase:*** Root formation was observed in multiplication medium but profused roots were easily induce with in 7-10 days when plantlets about 3-5cm in length were cultured separately in rooting medium. The plantlets with well-developed root system were transplanted in the field. The plantlets vigorously grown in the field and did not show any symptoms of BBTD.

Table: Multiplication rate of Musa cultivars studied in vitro in different cycles of cultures

Clones	No. of Explants	Original culture			Multiplication rate 1st subculture		
		Ave	Range	Total	Ave.	Range	Total
Basrai	10	05	3-8	50	05	3-8	250
SH3362	10	04	3-6	40	04	3-6	160
GN60 A	10	04	2-4	40	04	2-4	160

FHIA-01	10	02	1-3	20	02	1-3	40
FHIA-17	10	03	3-5	30	03	3-5	90
FHIA-18	10	04	3-6	40	04	3-6	160
FHIA-23	10	03	1-4	30	03	1-4	90
SH3640	10	03	2-4	30	03	2-4	90
SH3436-9	10	04	3-6	40	04	3-6	160
GCTCV-106	10	03	2-4	30	03	2-4	90
GCTCV-119	10	04	3-7	40	04	3-7	160
GCTCV-215	10	03	2-4	30	03	2-4	90
GCTCV-247	10	02	1-3	30	02	1-3	40

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