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A high frequency plantlets regeneration protocol for banana (*Musa paradisiaca* L.) micropropagation

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ABSTRACT : The present study was carried out to develop a complete protocol for regeneration of plants through tissue culture technique (micropropagation) in banana. The shoot tip was inoculated on MS medium containing plant growth regulators of different concentrations like BAP (Benzyleaminopurine) (0-10.0 mg L^{-1}); kinetin (0-10.0 mg L^{-1}); and different combinations of BAP (0-10.0 mg L^{-1}) and NAA (α-Naphthelene acetic acid) (0.3-0.5 mg L^{-1}) again inflorescence tip was inoculated in the MS medium containing different concentrations of BAP (0-10.0 mg L^{-1}) and various concentrations (0-1.5 mg L^{-1}) of NAA were used to assess the effect of NAA on root regeneration. The highest frequency of shoot regeneration (52.25%), number of shoots regenerated per explant (3.25) and shoot length (4.69 cm) was observed from shoot tip explants cultured on MS medium supplemented with 5.0 mg L^{-1} BAP. Kinetin showed highest frequency of shoot regeneration (44.56%), number of shoots regenerated per explant (2.75) and shoot length (3.5 cm) from shoot tip explants at concentration of 5.0 mg L^{-1}. The addition of 5.0 mg L^{-1} BAP was found better than kinetin for shoot development from shoot tip or male inflorescence tip explants. MS medium containing 7.5 mg L^{-1} BAP + 0.3 mg L^{-1} NAA showed maximum shoot regeneration frequency than at other combination of BAP and NAA. Half strength MS medium containing 1.0 mg/l NAA was found suitable for root regeneration from shoots.

KEY WORDS : Musaceae, Micropropagation, Shoot tip, Male inflorescence, Regeneration

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Bananas (*Musa* spp.), belonging to the family Musaceae, are the perennial monocotyledons fruit crops commonly grown in the tropics. According to the Food and Agriculture Organization, 98 per cent of world's banana production was derived from developing countries. In international trade, bananas account for ~22 per cent of world's fresh fruit production and are ranked second most important fruit crop after citrus (FAO, 2010). India is the largest producer of banana, contributing about 27 per cent of world's total banana production. For commercialization, it is important that good quality bananas are produced consistently. Because of high degree of sterility and polyploidy of the edible varieties of banana (Stover and Simmonds, 1987), classical breeding is difficult. In order to augment conventional breeding and to avoid constraints imposed by some pests and pathogens, transgenic and *in vitro* approaches of breeding are being considered for its improvement (Tripathi, 2003). Mass propagation of selected genotypes, somoclonal variation techniques, genetic engineering and other biotechnological applications can be utilized for banana improvement and are based on reliable plant regeneration protocols. The majority of bananas planted for the fruit production are sterile and seedless; therefore, they are reproduced vegetatively using suckers. Sword suckers are considered to be the best planting material (Stover and Simmonds, 1987), but they are heavy and may be cumbersome to transport and may be infected with pests and diseases. Within a year, about 1000 plantlets can be produced from a single explant through micropropagation whereas, less than ten suckers results from natural multiplication that can be used for planting. These causes have been an impulse for the banana micropropagation technologies development that is effective way of propagating