A STUDY ON THE MICROPROPAGATION TECHNIQUES OF SOME MONOCOTYLEDONS (e.g. *MUSA*, *BAMBUSA* AND *ANANAS* SPECIES)

Dissertation

submitted in fulfilment of the requirements

for the degree of

MASTER OF PHILOSOPHY

UNIVERSITY OF COLOMBO

SRI LANKA

U.N.G. Gamage
Dept. of Botany
University of Colombo
Sri Lanka

24, July 1995

Abstract

Micropropagation is one component of plant biotechnology that has been commercially exploited on large scale on many fruit, vegetable, forest, ornamental and medicinal crop species. In commercial type cultivations, lack of suitable planting materials in sufficient quantities is the major constraint.

The present study involves establishing micropropagation techniques for the local cultivars of banana, pineapple and bamboo species.

In this study, meristem tips of healthy young sword suckers of banana were used to initiate proliferating bud cultures. Proliferation of shoot tips (meristem tips) were developed on Murashige and Skoog (MS) basic medium (1962) supplemented with benzyl amino purine (BAP, 2.5 mg/L) and indole acetic acid (IAA, 1.25 mg/L). Ten different local cultivars of *Musa* were tested in the above medium for their proliferation rates and according to the results, highest proliferation was shown by Binkehel (AAA) followed by Embul (AAB).

Proliferated shoots were regenerated on MS with BAP (1.25 mg/L) and IAA (1.25 mg/L). Plants were rooted on MS with indole butyric acid (IBA, 1.25 mg/L) and acclimatized in the green house. Plants, transferred to the field started bearing bunches at 10 months and the bunches were of average size.

In *in vitro* propagation of pineapple, Kew type, was established through meristem culture. Shoot tips were proliferated on MS liquid and semi solid media supplemented with BAP (2.5 mg/L) and TAA (1.25 mg/L). Statistical analysis showed that liquid medium was better than semi solid for plant multiplication. Plants were successfully regenerated on BAP (1.25 mg/L)and TAA (1.25 mg/L) semi solid medium solidified by agar (BDH) and locally available unpurified moss jelly. The study reveals the feasibility of moss jelly to agar (BDH). Rooted plants in TBA (1.25 mg/L) resumed independent growth after a short period of acclimatization in the green house.

Bambusa vulgaris (yellow bamboo) is a commonly cultivated and used bamboo species in Sri Lanka. Due to over exploitation and mismanagement, there is a rapid depletion of this species. Therefore, the importance of replanting and bamboo plantations are now realised. This would require large number of planting material continuously. The traditional propagation techniques are rather slow and laborious. A suitable micropropagation technique for clonal propagation offers a rapid means of propagation.

In the present study on propagation of *B. vulgaris* and *B. arundinacea* through nodal bud culture, single nodal segments of *B. vulgaris* were tested for the bud break, shoot growth and proliferation on basic Murashige and Skoog (MS) medium (1962) supplemented with different combinations and concentrations of growth regulators. Results suggest that cytokinin as well as gibberellin are important for bud

break. Bud multiplication was observed on MS with half macro with GA_3 (0.5 mg/L) + TBA (0.75 mg/L) + Adenine Sulphate (50 mg/L) in *Bambusa vulgaris*.

Somatic embryogenesis is another rapid mode of micropropagation system which has a great potential for commercialization. Plants regenerated from somatic embryos tend to show less variation when compared with other micropropagation systems.

Uppermost part of the proliferating buds (" Explant") of Musa was the starting material for the study. Upon transfer into MS liquid medium supplemented with 2,4-D (0.22 mg/L) + BAP (1.25 mg/L), the explant produced meristematic globules. The development of globules, their histology agreed with the criteria of a proembryo. Therefore they are termed as " proembryo like structures ". More research is needed to develop them into embryos and regenerate plants from them.