ABSTRACT

Ph.D. Thesis Entitled

"MICROPROPAGATION THROUGH CALLUS AND SUSPENSION CULTURE AND LATICIFER DEVELOPMENT OF Calotropis gigantea"

Submitted by ASHIS TARU ROY.

The present energy crisis has prompted intense exploration of latex-yielding plants which produce low molecular weight hydrocarbons. The present work deals with basic methodologies of micropropagation and the process of development of laticiferous ducts of a promising latex-yielding plant Calotropis gigantea (Linn.) R.Br.

An intensive study was undertaken to determine the nutritional requirements and culture conditions for callus initiation from various explants and its growth, morphogenesis and plantlet regeneration in vitro. A modified medium (MMS-C) was developed which promoted fast induction and growth of callus. MMS-C is essentially a medium which contains the inorganic constituents of MS medium with 25% more of total nitrogen plus the organic constituents of NN medium with higher quantities of thiamine and inositol. Moreover, on the basis of extensive trials, a protocol was developed for morphogenesis and vigorous plantlet regeneration which required a specific supply of growth regulators.

In order to establish a cell suspension culture and to promote embryogenesis in suspension, standard methods were used. It has been possible to obtain sustained multiplication of cells in long term culture. The induction of embryogenesis by variation of the culture medium and environmental condition has been achieved. These somatic embryos could be used for micropropagation of this latex-yielding plant.

In view of the fact that biochemical aspects are mirrors of dedifferentiation and subsequent differentiation, the soluble protein and isozyme patterns of peroxidase and esterase during callus initiation, callus developement and morphogenesis were studied by gel electrophoresis. The similarity and dissimilarity in the banding pattern of the gels are very informative and point to specific metabolic dispensation.

In order to obtain detailed information on the ultrastructure and development of the laticifer ducts and latex particles, both primary and mature tissues were studied with the aid of light and electron microscopy. It has been revealed that electron-dense latex particles develop from degenerating cellular organelles in the enlarged vacuoles of the elongated cells present in the ground and vascular tissues.

Key words: Latex-yielding plant, laticifer, micropropagation, callus, regeneration, suspension culture, somatic embryogenesis, isozymes.