130 B

Histological analysis of callogenesis and somatic embryogenesis in plumule explant cultures of Cocos nucifera L. (coconut)

In vitro culture technology is the only means for vegetative multiplication of coconut. A protocol has been developed for plant regeneration *in vitro* from various tissues of coconut variety 'Sri Lanka Tall'. Despite this success, the plant regeneration efficiency is far from adequate and further refinement is needed. Therefore, the objective of this study was to analyze the plant regeneration process at cellular level and gain a better understanding of possible causes of low plant regeneration efficiency.

Plumules excised from mature zygotic embryos were used for the study. Callogenesis, somatic embryogenesis and plant regeneration were achieved using the protocol developed previously. Cultures were fixed at weekly intervals for histological studies.

Fifty percent explants produced callus. Thirty percent of callus produced somatic embryos and five percent regenerated plants. Histological analysis revealed that meristematic cells were formed by the division of provascular cells of plumular leaves. These cells were arranged in a cambium-like zone, breaking up of which gave rise to proembryos of multicellular origin. Alternatively, protodermal cells produced highly embryogenic cells, which could form proembryos of unicellular origin. Under the culture conditions established, only proembryos of multicellular origin developed into somatic embryos. Among the developed somatic embryos,

complete (bipolar) as well as incomplete (embryos without shoot pole) somatic embryos were present.

The study revealed that the response of coconut variety Sri Lanka Tall to culture conditions developed were comparable to those observed in culture systems of other coconut varieties and oil palm. The presence of bipolar structures confirmed that plant regeneration occurred through somatic embryogenesis. The occurrence of incomplete embryos might be one of the main reasons for low plant regeneration efficiency. Further studies are needed to improve bipolar somatic embryo formation and unicellular proembryo development.

Funding for training on histological studies provided by the Institute for Research and Development, Montpellier, France is acknowledged.