

## **PALM TISSUE CULTURE : POTENTIAL, PRIORITIES AND APPLICATIONS IN COCONUT AND OIL-PALM**

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**WITH** a view to standardizing a rapid clonal propagation technique for multiplying elite, disease-free coconut palms, experiments were conducted at this institute initially with floral tissues and embryos. Presently our efforts are concentrated on culture of tender leaf segments excised from one-year-old seedlings of 'West Coast Tall' variety as also of adult palms.

From floral primordia of immature rachilla explants taken from the first or second spathe after the spindle, shoot-like neo-formations with scale leaves were produced. However, these have not rooted satisfactorily so far and viable plantlets are yet to be produced (Iyer, 1982). From the cut-end of leaf segments nodular calli were induced in 2, 4-D containing media and their frequency could be enhanced to nearly 70% of the cultures planted in modified Eeuwens' medium containing higher inositol levels (300 mg/litre) under dark incubation. Profuse rooting was induced on transfer of these calli to media containing lowered auxin levels. However, the growth of this callus was very slow. On the other hand, the friable callus obtained from immature endosperm tissue of coconut is growing very rapidly without any organ differentiation as yet. Our aim is to induce somatic embryogenesis and normal plantlet regeneration (Kumar *et al.*, 1985).

In the oil-palm, scientists of Unilever Research Laboratory in the U.K., have succeeded in differentiating viable plantlets from callus induced on apical meristem, young leaf tissue, roots and immature inflorescences. However, the greatest success was obtained with root tissues. On the other hand, the IRHO scientists in France have reported better results with tender leaf tissues of oil-palm. Although the calli were slow growing, sectors of fast-growing callus were also noticed. Somatic embryogenesis leading to normal rooted plantlets was realized from leaf calli by IRHO workers, whereas the Unilever group reported shoot formation first from root calli followed by adventitious rooting. Nevertheless, the 30 elite clonal progenies obtained by the U.K. group and raised in Malaysia on some 20 ha are reported to be genetically uniform, and are estimated to yield 30% more than mixed seedling populations.

More recently, we have succeeded in inducing somatic embryogenesis

directly from tender seedling leaf tissues of coconut and viable plantlets have been produced (Raju *et al.*, 1984). In oil-palm too, somatic embryogenesis and plantlet formation have been obtained from callus induced on tender leaf explants (Raju *et al.*, 1986).

## REFERENCES

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## DISCUSSION

**M.V. Rao** : The question of multiplying coconut through tissue culturing may be discussed in detail in view of the serious problem posed by the Kerala root (wilt) disease and also because of the need to multiply as quickly as possible the high-yielding DXT hybrids. Out of the 10.8 million ha under coconut in the country, an estimated area of 2.2 million ha is affected by this disease. A large number of farmers in Kerala are affected. There is a serious concern at the national level on coconut (wilt) disease and also on the need for stepping up coconut yields which are low in India and particularly in Kerala. So far our attempts to grow coconut through tissue culture have been successful to a limited extent. We should pool all the talent in the country now to find a solution and raise coconut seedlings in test-tubes for mass multiplication. We may devote a little more time to discuss this issue in detail.

**G.M. Reddy** : In rice we could induce callus and regenerate plantlets from mature root. Is it possible in coconut?

**R.D. Iyer** : Recently, the scientists at Wye College (London Univ.) have reported somatic embryogenesis and plantlet formation in coconut root callus. At CPCRI too we have obtained callus in roots but no plantlets yet.

**H.C. Chaturvedi** : *Comment*—Drs Branton and Jennett Blake from the U.K. have recently reported the induction of regenerants in roots of coconut grown *in vitro*.

**D. Padmanabhan** : Supplementary information—The development of haustorium (in coconut embryo culture) can be suppressed by changing the

composition of the medium. This will obviate the difficulty of transplantation as mentioned by Fr. D'Souza.

*A.F. Mascarenhas*: I wonder whether millipore filtered coconut water was used. It could be helpful.

*R.D. Iyer*: It was tried but no significant improvement occurred.

*K. Nataraja*: Have any attempts been made to grow coconut embryo in just coconut water media with plain agar? If so, why no success?

*R.D. Iyer*: We have not tried this.

*V. Jagannathan*: It may be worth trying indole acetic acid-ascorbic acid conjugate for coconut tissue culture.

*P. Rethinam*: Of the 10.8 lakh ha of coconut cultivated in India, Kerala accounts for 6.6 lakh ha—of which 2.2 lakh ha have been affected by root (wilt). Thus roughly about 50 million seedlings would be required for replanting in the diseased areas. Even if we plan for 10-year replanting schedule we need 5 million seedlings every year. Now we know that D × T hybrids are performing better in the diseased area and so there is a need to produce the hybrid nuts. For producing this, we need 2,000 ha of seed garden. To establish this dwarf seed garden it will take 5—7 years. Then to produce D × T hybrids it will take a long time. If tissue culture comes to our help to produce seedlings on a large scale it will be easy to implement the programme. Though the progress made so far is limited, it is essential that basic tissue culture research on coconut should be strengthened.

*V. Jagannathan*: Is coconut water different if it is autoclaved or filtered?

*L.D'Souza*: There is no difference in response to coconut water. Root formation is inhibited by both types.

*Neera Bhalla-Sarin*: Coconut water as such, diluted with sterile waters autoclaved or millipore sterilized, did not help the growth of coconut embryos in our experiments. IAA conjugates help in the induction of callus and the subsequent differentiation in it.

*E.V.V.B. Rao*: Regarding the non-germination of coconut embryo when it is just put in coconut water, the possible reason could be non-availability of suitable microclimate like high humidity and temperature around the embryo and may not be due to lack of proper nutrition alone. Because under natural conditions the very same water is able to support the growth of embryos as is seen in coconut seed-store, where the unhusked coconuts do germinate.