Swing] 7. Trifoliates [*P. trifoliata* (L.) Raf.] 8. Rubidox trifoliata 9. Pomery trifoliata 10. *Atalantia monophylla* De Candolle 11. *A. ceylanica* (Arn.) Oliver 12. *Severinia buxifolia* Ten., 13. Limequates [*C. aurantifolia* (Christm.) Swing. X. *Fortunella margarita* (Lour.) Swing.] 14. *Eustis limequat* 15 Lakeland limequat and 16. Citranges, [*Poncirus trifoliata* (L.) Raf X. *C. sinensis* (L.) Osb.] viz Troyer citrange and Ekkateru citrange. All others were found susceptible.

Five seedlings of six months old from each of the above resistant varieties along with Cleopatra mandarin (*C. reticulata* Blanco.) which was found highly susceptible under field conditions during the present studies, were evaluated artifically by dusting the spores of the pathogen collected from heavily infected trees during February, 1984. All the sixteen varieties found resistant under field conditions were unaffected while heavy incidence of powdery mildew was observed in Cleopatra mandarin.

Petch has earlier reported the prevalence of the disease in Ceylon on mandarin oranges and sweet oranges but not on acidlime[2]. Present investigations also revealed the susceptibility of mandarins and sweet oranges and resistance of acidlime to the disease. The resistant sources now observed in Citrus, Atalantia, Severinia, Poncirus, Fortunella and some of their hybrids may be utilized in breeding for powdery mildew resistance.

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IN VITRO OVULE AND EMBRYO CULTURE OF *GOSSYPIUM*

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THE transfer of desirable traits from some wild species to cultivated cottons has met with considerable difficulties through conventional breeding methods because of abortion of hybrid embryo and endosperm at various developmental stages[1,2]. However, immature hybrid embryos and ovules can be excised and cultured *in vitro* to raise hybrid seedlings[3,4]. The present study was planned to identify appropriate conditions for growing young immature ovules and embryos of *Gossypium* species through *in vitro* culture techniques and to utilize this information in producing interspecific hybrids between otherwise incompatible species.

The experimental material comprised the cultivated diploid species of cotton, *G. arboreum*, var G27, *G. herbaceum* var SM 132 and the wild diploid *G. anomalum* Wawr ex Wawr and Peyr. The self-, and cross-pollinated ovules (2-, and 15-day old) of cultivated varieties, and of G 27 × SM 132 and G 27 × *G. anomalum* crosses were cultured on B5 medium[5] supplemented with 2, 4-D (2 mg/l); MS medium[6] supplemented with various combinations and concentrations of indole acid (IAA) and kinetin (KIN) and casein hydrolysate (250 mg/l). The 15-day old embryos were cultured on MS medium supplemented with various combinations and concentrations of IAA and KIN. The cultures were maintained at 25 ± 2°C and 55–65% relative humidity under diffused light and were examined daily. Well-established seedlings were transferred to pots containing sterilized soil and watered regularly with Hogland's nutrient solution.

The 2-day old ovules from self-pollinated as well as crossed flowers yielded excellent callus growth on B_5 + 2, 4-D (figure 1). The callus was creamy white in G 27, and hard and light brown in SM 132. It was excessively friable white in the cross G 27 × SM 132, but yellowish, loose and friable in G 27 × *G. anomalum*. The 15-day old ovules when cultured on MS medium supplemented with casein hydrolysate (250 mg/l) also yielded fast growing vigorous seedlings (figure 2). The 15-day old embryos of parents and their cross G 27 × SM 132 when cultured on MS medium supplemented with IAA (2 mg/l) + KIN (0.5 mg/l) developed into seedlings (figure 3). The percentage of embryos which produced plantlets was 82.9 in G 27, 74.3 in SM 132 and 72.9 in G 27 × SM 132. These plantlets assumed growth on transfer to soil (figure 4). MS medium supplemented with IAA (2 mg/l) + KIN (0.5 mg/l) produced best results for embryo culture, whereas B_5 medium supplemented with 2, 4-D (2 mg/l) resulted in excessive callus growth from ovules. This technique may be used to obtain hybrids between cultivated A genome species and other wild species of cotton to make available, most of the entire gene pool of genus *Gossypium*, to cotton geneticists and breeders.

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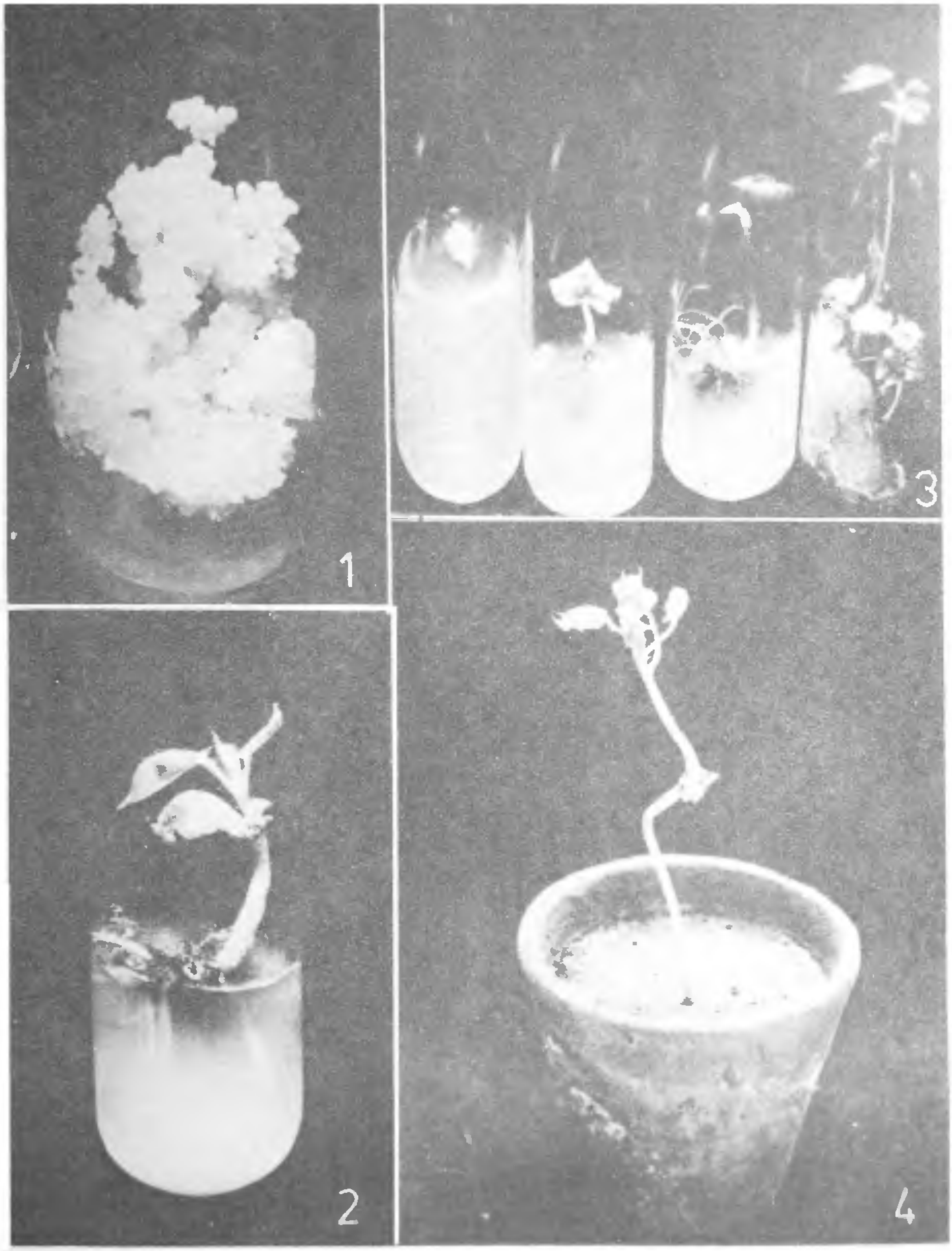

Figures 1–4. 1. Callus formation from ovules cultured two day after pollination on B_5 medium[5] supplimented with 2,4-D (2 mg/l). **2.** Seedling obtained from ovules cultured 15 days after pollination on MS medium supplemented with casein hydrolysate 250 mg/l. **3.** Different stages showing plant formation from 15-day old embryos cultured on MS + IAA 2 mg/l + kinetin 0.5 mg/l. **4.** Embryo derived plant after transfer into the pot.

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PROPAGATION IN *PROSOPIS CINERARIA* (L) MAC BRIDE BY AIR LAYERING

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PROSOPIS CINERARIA plays a significant role in the rural economy of the north-west arid region of the Indian subcontinent. Being an important constituent of the desert biome, it is a major source of top feed, fuel, timber and vegetable. As it is well adapted to the arid conditions the rural communities encourage the growth of this tree in their agricultural fields, pasture lands and village community lands. However, this tree is constrained by slow growth in initial stages and extremely poor regeneration.

Vegetative propagation is a valuable tool which facilitates basic genetic research and practical tree improvement programme. Studies conducted on vegetative propagation on *P. cineraria* in any form except through tissue culture[1] have so far are without any success. However, its ability to produce root suckers is a fair indication of its potential for vegetative propagation. The results of successful vegetative propagation through air layering are reported in this communication.

An experiment was planned with two twigs (5–7 mm and 10–15 mm diameter), control and two rooting hormones (3-indole-acetic acid (IAA) of 100 ppm concentration and Seradix B 3) and two covers (moss and clay). Each treatment was applied on 4 twigs of an approximately 40-year old tree during July and August, 1983 with a total of 48 air layers. Approximately 15 mm wide girdles were made on the twigs and the barks were removed. Both the rooting hormones were applied at the upper end of the girdle. The lump (clay or moss) was covered with polythene sleeves and tied firmly at both the ends to retain moisture inside (figure 1). These air layers were detached from the tree and planted in earthern pots filled with garden soil.

Root initiation was observed after a month (figure 2) in all the four hormone treatments in the twigs having 10–15 mm diameter, whereas in 5–7 mm diameter twigs rooting was not noticed. The success in the former may probably be attributed either to sufficient amount of reserved food material available and/or also due to high activity of meristematic tissue to cause good rooting in thicker twigs. Application of both the root hormones *i.e.* IAA and Seradix B 3 proved effective over the control. However, comparatively profuse rooting was observed in the twigs of 10–15 mm diameter treated with Seradix B 3 and covered with clay (figure 3). Establishment of air layers was also better in this treatment (figure 4). Successful rooting in July and August may be due to higher cambial activity during this period when high temperature is coupled with the high humidity[2]. Propagation of *P. cineraria* tree through air layering is not only quick but economic at the same time because seed formation is rare in a lopped tree. Tree lopping for animal fodder is a recurrent phenomenon. However, with the present technique the propagation can be done successfully on new twigs arising after lopping in subsequent monsoon season. This is the first attempt in air layering on this species. The results are of preliminary nature. Therefore, a need exists for future trials. The present study is, however, useful in demonstrating the scope of air layering for the clonal propagation in *P. cineraria*.

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