-0.6 MPa than at -0.3 MPa. However, germination was not affected and the seeds attained 100% germination even under water stress conditions. Seed pre-soaking in water as well as solutions of GA_{4+7} significantly accelerated the rate of germination of unstressed seeds to a similar extent, but under stressing regimes GA_{4+7} proved to be effective (table 1).

Both root and shoot growth were reduced under water stress but shoot growth was more severely affected (table 1). Growth inhibition due to water stress is attributed to inhibition of cell elongation, cell division or both[6]. Seeds pre-soaked in water and GA_{4+7} showed improved growth under control as well as stress conditions. Higher concentrations of GA_{4+7} (75 and 100 ppm) proved generally better for improved root and shoot lengths (table 1). An increase in dry weight was also recorded in seedlings raised from soaked seeds than from unsoaked seeds. At a milder stress (-0.3 MPa), the dry weight of seedlings (roots + shoot) raised from water and GA_{4+7}-soaked seeds increased to a comparable extent but at -0.6 MPa and in control the higher concentrations of GA_{4+7} showed a better response.

The increased tolerance of germinating seeds and seedlings to water stress by gibberellic acid has also been shown for other plants[7,8]. Increased sensitivity to gibberellin may be connected with its decreased endogenous levels or an increased content of abscisic acid or other inhibitors in stressed seeds. Some growth stimulators can reduce inhibition of seed germination due to the presence of PEG and abscisic acid, and they can alleviate the effect of water stress[9,10]. Studies on endogenous levels of phytohormones, therefore, need to be undertaken.

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CASES OF POLYEMBRYONY IN COCOSOID PALMS

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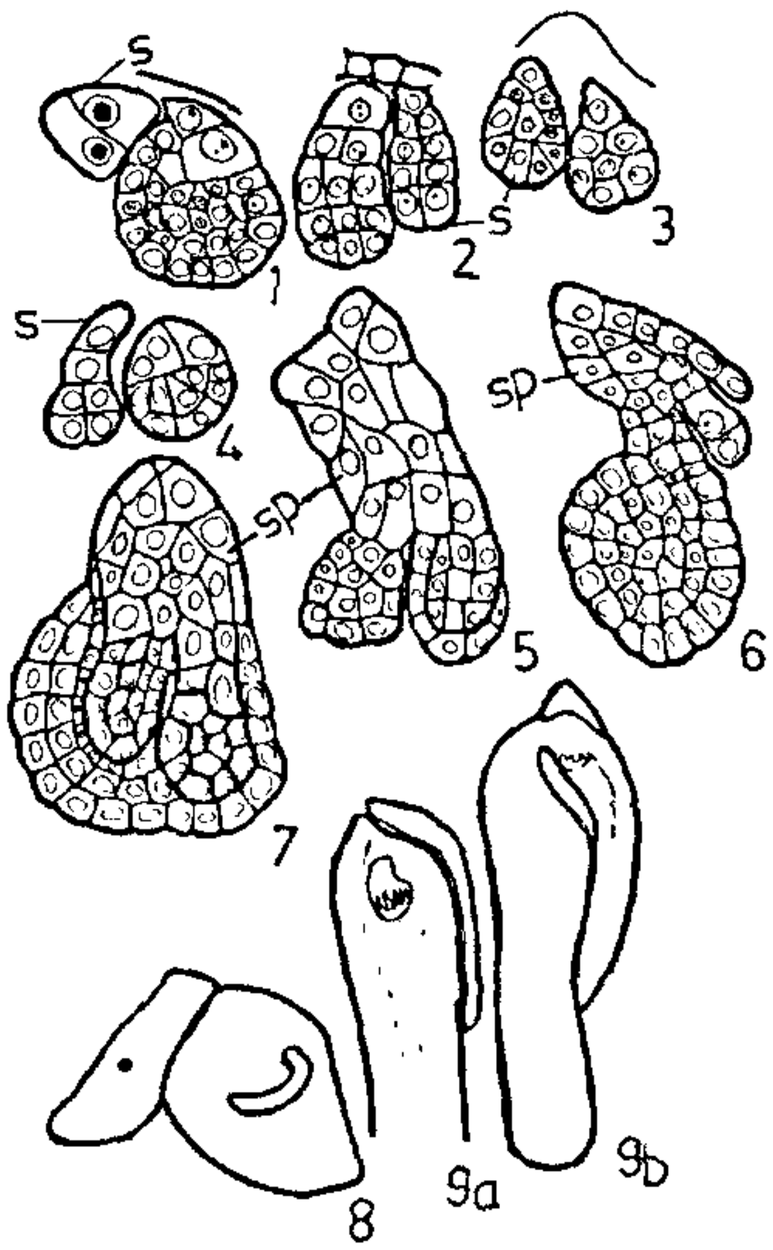
POLYEMBRYONY occurs rarely in Arecaceae. So far it has been reported in *Cocos nucifera*[1–4] and *Phoenix dactylifera*[5]. The present communication describes cases met with in *Syagrus coronata* Becc., *Arecastrum romanzoffiana* Cham. and *Arikuryroba schizophylla* Becc. during embryogenetic studies.



Figures 1–9. 1–3. *Syagrus coronata*, **1.** Two-celled synergid embryo(s) and globular zygotic embryo; **2,3.** Twin embryos below the micripyle; **4.** *A. schizophylla*. A filamentous synergid embryo by the side of globular zygotic embryo; **5–9.** *A. romanzoffiana*, **5–7.** Accessory embryos proliferating from massive suspensor (SP) of globular zygotic embryo; **8 and 9a, b.** Mature twin embryos attached at the radicular end.

Materials, collected from Pune and Bombay, were fixed in formalin acetic alcohol and processed for microtomy in the usual way. Sections (20–25 μm thick) were stained with haematoxylin and erythrosin.

In mature fruits of *A. romanzoffiana*, one occasionally finds two well-developed embryos attached to each other at the suspensor region each with its own shoot apex and radicle (figures 9a, b). The development of accessory embryo is due to proliferation of massive suspensor cells at globular stage of the zygotic embryo (figures 5–7). Though more than two embryonal masses develop up to the globular stage, yet in a majority of cases only one or sometimes two embryos develop to maturity; others degenerate. In *A. schizophylla* and *S. coronata* (figures 1–4) accessory embryos originate due to the activity of usually one but rarely both synergids. In most cases, synergid embryos lag behind the zygotic embryo in growth and degenerate at or prior to globular stage, leaving zygotic embryos to reach maturity.

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A METHOD FOR MAINTENANCE OF *PLASMOPARA VITICOLA* AND LABORATORY EVALUATION OF FUNGICIDES

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Downy mildew of grapes (*Plasmopara viticola* Burk. and Curt.), hitherto unrecorded in Punjab, was observed in a grape nursery at Ludhiana in April 1987. During August–September the disease also became severe on grown-up vines.

Being an obligate pathogen, it is difficult to be maintained throughout the year for evaluation of chemicals. For doing so young healthy leaves of a susceptible cv. *Thompson seedless* were washed with running tapwater, air-dried and placed on moist cotton, with their abaxial surface touching the cotton pads in 15 cm dia petri plates. Inoculation was done by putting 20 μl drops of sporangial suspension (4.5×10^4 sporangia/ml) with a micropipette. These were incubated in the growth room (temp. 22 ± 2°C, light period 12 h with flourescent tubes). The drops were removed 24 h after inoculation and air-dried for half an hour before fresh incubation. After 6 days, whitish growth of sporangiophores and sporangia appeared at the inoculated sites. The pathogen was thus maintained and multiplied by serial inoculations for use in fungicides and germplasm evaluation tests.

To determine the most susceptible stage of the leaf, 8 healthy leaves of *T. seedless* were taken from top downwards of a branch and inoculated as described earlier. The 4th and 5th leaves from top supported maximum sporulation of the fungus.

A simple leaf disc method was also devised for the fungicide evaluation. This method consisted of 90 mm dia petri plates lined with a thin layer of absorbent cotton wool in the lower lid which were separately treated with 20 ml solution of five different fungicides viz. (i) Aliette (80% aluminium tris ethyl phosphonate), (ii) Valiant [50% aluminium tris ethyl phosphonate + 25% N-(trichloromethyl thio) phthalimide + 4% 2-cyano-N-(ethylamino carbonyl)-2-(methoxyamino) acetamide at 500 μg/ml each], (iii) Mikal (50% aluminium tris ethyl phosphonate + 25% N-(trichloromethyl thio) phthalimide, (iv) Acylon [7.5% N-(2,6-dimethyl phenyl)-N-methoxyl acetyl alanine + 42.5% N-(trichloromethyl thio) phthalmide] and (v) Caltan (6% Ofurace + 45% N-(trichloromethyl thio) phthalimide at 200 μg/ml each). Plates without fungicides received distilled water only. Two plates were used for each treatment. Leaves of *T. seedless* (4th from top) were piled in eights and cut into discs with a 16 mm dia cork-borer. Eight discs (one pile) were used in each petri plate in the same sequence so that every disc represented one leaf and hence there was the same plant material in 10 or 12 plates used at a time. After 16 h of contact with fungicide, the discs were inoculated by putting a drop of inoculum (4×10^4 sporangia/ml) prepared from the artificially infected plants (figure 1). After 8 days of incubation, sporulation on each disc was graded following a 0–4 scale (0 = no sporulation; 4 = severe sporulation). While untreated discs supported heavy sporulation, all the fungicides tested except Valiant caused complete inhibition of the disease (figure 2).