Oxytetracycline hydrochloride (OHC) was used to study its effect on the diseased plants. The tetracycline was applied through wick feeding and spray. Concentrations of 100, 250, 500, 750 and 1000 ppm oxytetracycline were sprayed to run-off on the foliage, on alternate days for 6 weeks. Distilled water was used for the control. In the wick feeding method, 50, 100, 250 and 300 ppm of oxytetracycline hydrochloride was used. Fresh solutions were added to the bottles each day for 6 weeks. Five plants were used for each treatment. All the infected plants treated with oxytetracycline showed change in the colour of the leaves from white to green, 20-25 days after treatment and continued up to 40 days. When the treatment was stopped, typical symptoms again reappeared. Wick feeding was found to be more effective than spraying.

Naturally infected *U. panicoides* plants were used for hot water treatment. Stems with roots were treated with hot water at 40, 50, 55 and 60°C for 10 minutes. Six plants were used in each treatment. After treatment, the plants were individually potted in sterilized soil and observed for the remission of symptoms. All the infected plants treated in hot water for 10 min at 40, 45 and 50°C produced healthy sprouts. Very few plants survived after treatment at 55°C and none at 60°C. The new sprouts showed normal green leaves for 2 to 3 weeks. Thereafter, the leaves gradually turned white. No colour change of the leaves was observed in the control.

The temporary remission of symptoms by hot water and tetracycline treatments, indicates that mycoplasma-like organism is the probable cause of *U. panicoides* yellowing. Work is in progress to find out the vectors and to establish its relation with other yellows type disease of Gramineae like, grassy shoot of sugarcane, and yellow dwarf disease of rice.


**SYNERGID EMBRYO IN DIOSCOREA COMPOSITA HEMSL.**

K. THIRUMARAN AND K. K. LAKSHMANAN

Department of Botany, Bharathiar University, Coimbatore 641 041, India

Occurrence of embryos from synergids has often been reported¹. They may be haploid, developing

---

**Figure 1. Polyembryony in D. composita.**

A. Embryo sac showing zygotic embryo (ZE) at micropylar end. (X 160). B. Twin embryos, one derived from the egg and the other from synergid (SE) (X 200).
directly from the synergid cells without fertilization or may be diploid due to syngamy. Scanning the embryological literature on Dioscoreaceae reveals that polynuclearity occurs only in *Trichopus zeylanicus*, a monotypic genus which has been raised to the rank of family Trichopodaceae. The present report is on the occurrence of synergid embryos in *Dioscorea composita*.

The development of the zygotic embryo in *D. composita* will be reported elsewhere. Rarely, one of the synergids, more or less the same size of the egg cell behaves like an egg in developing into an embryo. The zygotic embryo as well as the synergid one develop equally, remain side by side, and present more or less the same architecture. In both the cases, well-developed multicellular, multisierate suspensor can be observed. The development of the endosperm is as in the monoembryonate seeds.

It could not be ascertained whether the synergid embryo is haploid or diploid. If it is diploid, it should be due to the entry of more than one pollen tube into the same embryo sac which however warrants cytological confirmation.

One of the authors (K. T.) is grateful to the University Grants Commission, New Delhi for financial assistance.

1 February 1982


**BIOLOGICAL CONTROL OF ANTHRACNOSE DISEASE OF JUTE**

BHASWATI BHATTACHARYYAA AND
R. P. PURKAYASTHA
Department of Botany, University of Calcutta, Calcutta 700 019, India

The control of plant diseases by chemicals can be spectacular but this is relatively a short-term measure. Moreover, the accumulation of harmful chemical residues sometimes cause serious problems. Biological methods, on the other hand, can be economic, self-perpetuating and usually free from residual side effects.1,2,3

The jute leaf surface was screened for the isolation of microorganisms antagonistic to the anthracnose fungus *Colletotrichum coronha*. Leaves were washed in sterile distilled water in a mechanical shaker, the washings concentrated by centrifugation and plated on PDA or NA medium in Petri dishes following serial dilutions. The Petri dishes were incubated at 30°C for 48hr-96hr and the microbial colonies developed on the agar plates were transferred aseptically to PDA or NA slants.

Thirty-two strains of twenty fungal species and 15 of 9 bacterial species were isolated from jute leaves throughout the crop season. These organisms were paired separately with *C. coronha* on PDA medium (pH 5-6). A well-marked space of aversion was evident when *C. coronha* was paired with *Aspergillus nidulans* or *Penicillium oxalicum*, thus indicating an antagonistic reaction. Further tests on the culture filtrate of these organisms, however, revealed that the inhibition of the growth of *C. coronha* was due to a marked change in the pH of these culture filtrates. Among the bacterial isolates, *Bacillus megaterium* (str. B-23) completely inhibited the growth of *C. coronha*. This bacterium, when tested against the other jute phytosphere fungi by similar dual culture experiments, reduced their growth by 85-90% on PDA medium. Only *Rhizopus stolonifer*, *Aspergillus spp.* and *Alternaria* sp. showed some tolerance to *Bacillus megaterium* B-23. This bacterium was therefore used for biological control of anthracnose disease.

The potentially antagonistic bacterium was tested *in vitro* against *C. coronha* by measuring the percentage germination of conidia and germ tube growth in the cell free culture filtrate of the bacterium. The bacterium was grown for 7 days in Czapek Dox medium and the bacterial cells removed by centrifugation at 15,000 rpm for 15 mins. Fifty percent of the supernatant was sterilised by autoclaving for 15 mins at 15 psi. pressure (at 121-6°C) and the rest by a Sintered glass filter (G-5). The filtrate and the autoclaved solutions were tested against *C. coronha*.7 There was a 80% reduction in germination and a 66% reduction in germ tube length in the cold sterilised culture filtrate in relation to sterile distilled water control. Autoclaved culture filtrate slightly reduced germination (17%) of the *C. coronha* conidia. It appears that the active principle is partially thermolabile.

To isolate the active principle, equal volumes of the cell-free culture filtrate (unheated) were extracted with four different organic solvents - ethyl acetate, chloroform, hexane and petroleum ether. The solvent fractions and the corresponding aqueous fractions were evaporated under reduced pressure in a rotary film evaporator, the residues dissolved in 1 ml of 0.01M phosphate buffer (pH 6.0) and the aliquots tested against spores of *C. coronha*. The ethylacetate fraction showed maximum inhibitory activity (94% reduction in germination and 77% reduction in germ tube length) which was evident even after four times dilution. Further dilutions, however, showed