

Z. armanum do not have haemolytic properties and the lethal effect could be due to interference in other physiological processes.

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EFFECT OF GROUNDNUT ROOT EXUDATES ON DIFFERENT STRAINS OF RHIZOBIUM SP.

THE organic compounds exuded from plant roots are known either stimulate¹⁻³ or to inhibit⁴⁻⁵ rhizosphere microorganisms. Root exudates are also known to attract zoospores of fungi⁶⁻⁸ and specific bacteria. In the symbiotic relationship between legume roots and rhizobia, the seedling root exudates,

presumably, play a primary role in attracting the bacterial cells towards the root surface. Eggraat¹⁰ working with *Rhizobium leguminosarum* and pea seedlings showed that the bacterium was stimulated by homoserine liberated by the roots during emergence of lateral roots. In the present paper, the effect of root exudates of groundnut on four rhizobial strains *in vitro*, is reported.

Healthy seeds of groundnut variety TMV-2 were surface sterilized with 0.1% mercuric chloride, washed thoroughly through several changes of sterile distilled water and transferred to a specially revised apparatus for sterile culture of seedlings. The simple apparatus (Fig. 1) consisted of a glass test tube (20 × 5 cm)



FIG. 1

with 100 ml distilled water. A ring stand with three legs (height: 8 cm) improvised by bending ordinary glass rod was placed inside the test tube and a filter paper (Whatman No. 1) cone with a small 2 mm diameter hole punched at the apex was fitted to the ring stand so that the tip of the cone just touched the water. The test tube was fitted with cotton plug and the set up was autoclaved at 15 psi for 15 min and cooled,

One surface sterilized seed was placed in the centre of the cone aseptically. The seeds were allowed to germinate and form seedlings inside the test tubes placed in a growth cabinet fitted with fluorescent tubes regulated for 12 hrs. light per day. The plants were allowed to grow for 10 days and the liquid from the tube containing root exudates was transferred to a sterile 250 ml conical flask. It was concentrated at 40°C to half the original volume. The concentrated solution was used for testing its effect on the growth of selected strains of *Rhizobium* sp.

The rhizobial strains CB-1024, CB-530 (Australian strains), BU-1 and BU-2 (local isolates) were cultured in a broth of the following composition to raise inoculum: K_2HPO_4 0.5 g, $MgSO_4 \cdot 7H_2O$ 0.1 g, NaCl 0.2 g, $CaCl_2 \cdot 6H_2O$ 0.2 g, $FeCl_2$ 0.01 g, yeast extract 1 g, mannitol 10 g, distilled water 1 litre. 5 ml of inoculum was transferred to each of the triplicate 250 ml conical flasks containing 100 ml of broth. Another set of three flasks was treated with 5 ml of inoculum plus 1 ml of concentrated root exudate. After incubation of the flasks overnight in a rotary shaker, 5 ml aliquots were drawn from each flask and diluted with an equal volume of distilled water. The percentage transmission and optical density of the samples were measured with a spectrophotometer (Elico) using a 600 nm filter.

The results (Table I) indicate that the root exudates stimulate the growth of 3 strains of *Rhizobium* sp. CB-1024, CB-530 and BU-2, while they inhibit the growth of strain BU-1. The stimulation is more pronounced in strain CB-1024. The inhibitory effect on strain BU-1 is very significant. While the stimulatory effects of root exudates can easily be explained as a prerequisite for the establishment of the symbiotic relationship, the inhibitory effect on strain BU-1, presumably, indicates lack of compatibility between groundnut variety TMV-2 and the rhizobial strain.

TABLE I

The effect of groundnut root exudates on the growth of rhizobial strains grown in yeast-mannitol broth

| Rhizobium strain | Treatments | Percentage Transmission | Optical density |
|------------------|--------------|-------------------------|-----------------|
| CB-1024 | Control | 19.2 | 0.721 |
| | Root exudate | 15.2 | 0.824 |
| CB-530 | Control | 20.3 | 0.699 |
| | Root exudate | 20.0 | 0.699 |
| BU-1 | Control | 36.5 | 0.444 |
| | Root exudate | 56.0 | 0.252 |
| BU-2 | Control | 14.3 | 0.854 |
| | Root exudate | 12.6 | 0.921 |

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TWO INTERESTING FUNGI FROM AQUATIC HABITAT

DURING the survey of aquatic fungi on some submerged leaves and roots in water bodies of Andhra Pradesh, India, the authors have isolated two interesting fungi.

Diplocladiella scalaroides Arnaud (Fig. 1)

The conidium is 2-armed. Five of its eight cells are brown, but the basal cell is colourless. Each arm is terminated by an unpigmented hair like cell.

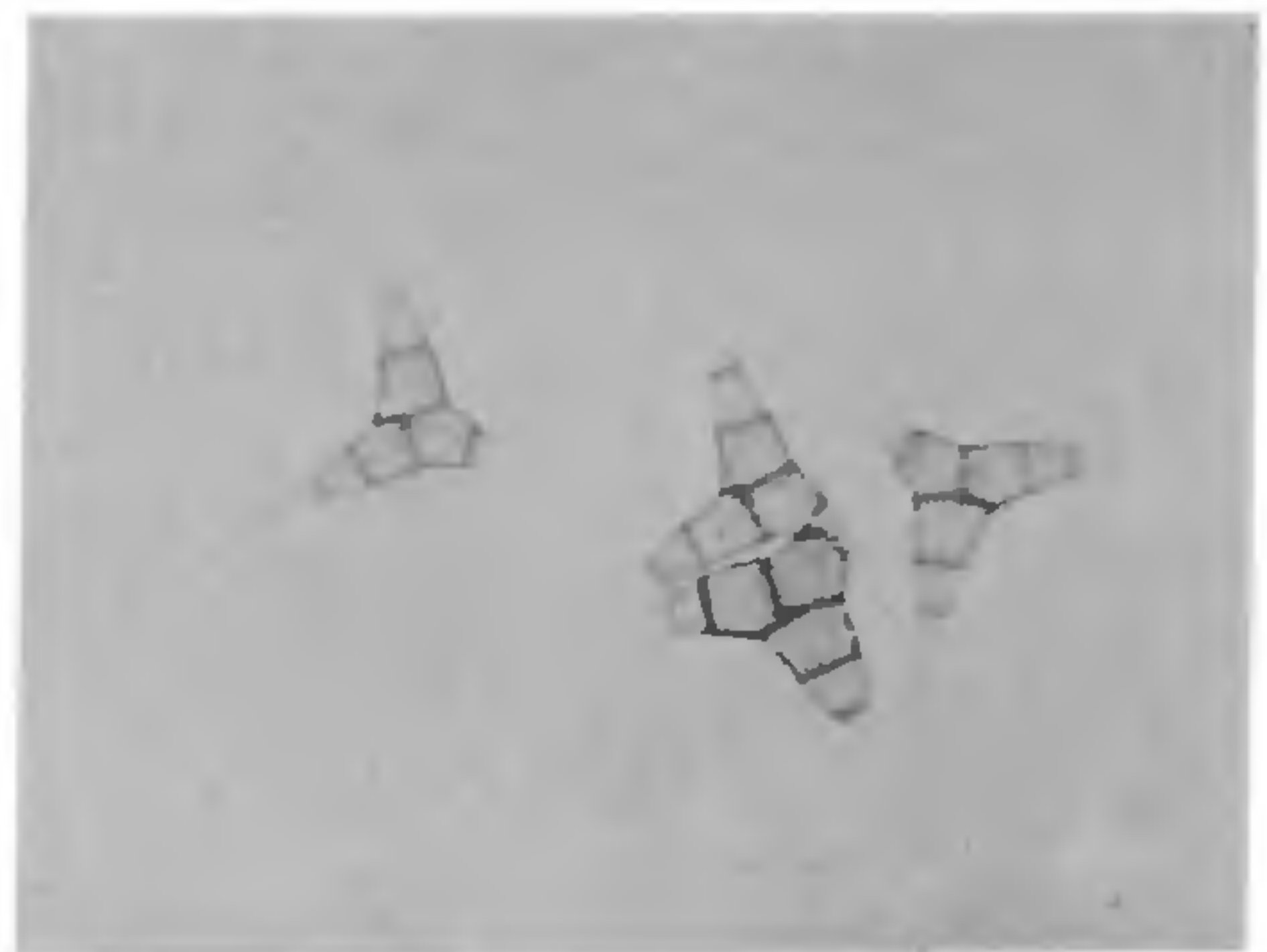


FIG. 1. Conidia of *Diplocladiella scalaroides* Arnaud ($\times 1,000$).