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OCCURRENCE OF ANTIBACTERIAL AND ANTIFUNGAL ACTINOMYCETES IN CULTIVATED SOILS OF WEST BENGAL

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Soils harbour innumerable interacting microorganisms which produce a balance at normal environmental conditions. Antibiosis is one of the characteristic phenomenon of these interacting microorganisms. The significance of this phenomenon in relation to the root diseases of various crops have been investigated by a number of workers (Stanford 1959). Some of them became successful in controlling certain diseases either by amending the soil with organic matter to make favourable nutritional conditions for the growth of the antagonisis (Ludwig, 1965) or by directly applying the antagonists to the soil (Sanford, 1959). These investigations suggest that antibiosis in soil may regulate the incidence of root diseases to a large extent. The occurrence of antagonistic microorganisms as an important part of the microbial community in the fields with very low incidence of root diseases, might be expected. Since antimomycetes are strong antagonists in comparison to fungi and bacteria (Sanford, 1959), the predominant antagonists in these fields may be the actinomyctes. With these views in mind, the antagonistic actinomycetes of some cultivated soils of West Bengal have been studied.

Soil samples were collected aseptically from the fields located in two districts in West Bengal (24-Parganas and Nadia) during the month of July, after two or three showers. The samples were then air-dried, sieved and kept in sterilized containers. Serial dilutions plates (upto 10^{-6}) were prepared with each of these samples in Thornton's media adjusted at *p*H 7.4 (McLean and Cook, 1952). The plates were incubated at 25°C. for 7 days. Actinomycetes were isolated from these plates and grown in Hay infusion-peptone agar slants. The antagonistic nature of these isolates were tested following 'Streak' and 'cup' assy methods. Using *Staphylococcus aureus* Rosenbach, *Escherichia Coli* (Migula) Castellani and Chalmers, *Vibrio cholerae* Neisser, *Eberthella typhie* Buchanan, *Curvularia lunata* (Walker) Boedijn, *Alternaria solani* (Ell. & Mart) Jones & Grout, *Fusarium vasinfectum*, *Atkinson* and *Aspergillus niger* Van Tieghem as test microorganisms. In the 'streak' method, each isolate of actinomycetes were grown in a horizontal line at one end of the plate containing either beef extract agar (for bacteria) or Thornton's (for fungi) media. After a few days of incubation test organisms were grown in vertical lines in each plate. The plates containing the test bacteria were incubated at 37°C. and those containing the test fungi were incubated at 25°C. The inhibition of growth of the test organisms was recorded after sufficient

period of incubation. In the 'cup' assay method, the isolates of actinomycetes were grown in liquid media for 5 days, and the culture media were then taken as crude antibiotics produced by the respective isolates. The spores of the test fungi and bacteria were seeded in the plates containing suitable media. Small holes were made aseptically in these plates with a cork borer. Not more than 2 holes were made in each plate. 1 ml. of each crude antibiotic solution was pipetted to each hole. The plates were incubated at suitable temperatures for a long period and the zones of inhibition of growth of the test organisms around each hole, was measured.

The results are given in the Table 1.

Table 1. *Antagonistic actinomycetes in the selected soils*

Serial No.	Source of soil samples	Total no. of soil samples collected	Average *p*H of soil solutions	% of antagonistic isolates	% of antibiotic producing isolates	% of isolates producing anti-fungal compounds
I	Baraset (24-Parganas).	8	6.8—7.4	59	19	88
II	Habra (24-Parganas).	11	7.2—7.5	30	16	64
III	Basuldanga (24-Parganas).	7	7.2—7.8	38	—	—
IV	Krishnagar (Nadia).	5	6.5—6.8	31	47	100

Appreciable occurrence of antagonistic actinomycetes in the selected fields is evident from the Table 1. 30–55% of the actinomycetes isolated from the different sources showed anatogonistic activities to the test fungi and bacteria. A great variation was observed, however, in the percentage of antibiotic producing isolates. 19%, 16% and 47% of the antagonistic actinomycetes can produce antibiotics in the liquid media in case of the isolates from the sources I, II and IV while that from the source III do not produce any under identical conditions. Similar line of difference also existed between the agronomical characters of the fields under study. So far as the fertilization status and crop yields are concerned, fields I and II were similar. Field III was least fertilized and crop yield was low and field IV was well fertilized yielding good crops annually.

It is very interesting to note further, that irrespective of the sources, most of antibiotics produced in the liquid media, were antifungal in nature. This occurrence of antifungal antibiotic producing actinomycetes in the field under study, seems to be very suggestive with respect to crop yield and natural antibiotics in the cultivated soils.

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