Effect of some antialgal chemicals on growth of *Stigeoclonium tenue* Kütz. in laboratory cultures*

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Abstract. *Stigeoclonium tenue* Kütz., a chief inhabitant of metal polluted waters, was studied in culture to understand its tolerance towards certain metals such as copper, manganese, mercury, silver and zinc. This study was carried out also with two other chemicals DDT and CaOCl₂. The alga was inhibited by very low concentrations of HgCl₂, AgNO₃ and DDT while it tolerated high levels of other metals and CaOCl₂.

Keywords. *Stigeoclonium tenue* Kütz.; antialgal chemicals; algicides.

1. Introduction

*Stigeoclonium tenue* occurs in diverse habitats including polluted waters rich in organic and metallic wastes. The alga grows very well in α and β mesosaprobic regions (Budde 1930), and even in polysaprobic regions (Butcher 1955), the population density usually being more in mesosaprobic regions (McLean and Benson-Evans 1974). The alga seems also to tolerate a high metal pollution (McLean 1974). Palmer (1959) included this alga in his list of species indicating copper and chromium pollution. Fjerdingstad (1965) described this alga as a chemobiont resistant to copper and other metallic poisons. Whitton (1970a, b) demonstrated that *Stigeoclonium tenue* is resistant to high concentrations of copper, lead and zinc in the culture medium. In order to understand the significance of the occurrence of such an alga in areas polluted with metallic wastes, its behaviour in laboratory cultures towards certain metals such as mercury, silver, copper, zinc and manganese along with two algicides, viz., bleaching powder and DDT was studied.

2. Materials and methods

2.1. Culture

*Stigeoclonium tenue* obtained from the Culture Collection Centre, University Botany Laboratory, University of Madras, was raised in Bold's Basal medium (Bischoff and Bold 1963) and used for the tolerance tests.

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2.2. Tolerance tests

The following chemicals HgCl₂, AgNO₃, KMnO₄, CaOCl₂ and DDT were amended to Bold's Basal medium to give a concentration range of 0.1 ppm, 0.5 ppm, 1.0 ppm, 2.0 ppm, 4.0 ppm and 8.0 ppm. In addition 16.0 ppm of KMnO₄ and 25.0 and 50.0 ppm of CaOCl₂ and DDT were also tried. DDT and CaOCl₂ were added aseptically to the autoclaved medium. The required amount of HgCl₂ was dissolved in 1.0 N HCl before adding to the medium. CuSO₄ (1.6 ppm already present in the basal medium) was added in concentrations above 1.6 ppm such as 2.0 ppm, 4.0 ppm, 8.0 ppm, 16.0 ppm and 32.0 ppm. ZnSO₄ was similarly tried in concentrations above 8.0 ppm, such as 16.0 ppm, 32.0 ppm, 64.0 ppm, 128.0 ppm, 256.0 ppm and 512.0 ppm.

2.3. Inoculum and culture conditions

0.1 ml of algal suspension from 8 day-old culture was inoculated into 10 ml of medium containing different concentrations of the chemicals. The algal material in the suspension was so adjusted that the optical density of pigment extract of the inoculum always remained constant. Among the number of dilutions of algal suspension, the one that gave the required OD of pigment extract was chosen and in subsequent trials the algal suspension was suitably diluted to provide the same OD. Light of 2,000 lux in a 16/8 light-dark cycle was provided. Temperature was maintained at 26°C ± 1°C. For each treatment four replicates were maintained. Unamended Bold's basal medium served as control.

2.4. Estimation of growth

The algal pellet, collected after centrifugation of the contents of the culture tubes at 3000 rpm for 5 min, was cold-extracted in dark with 10 ml of absolute methanol. The optical density of the pigment extracts was taken on the 2nd, 4th, 8th, 12th and 16th days for each treatment, the ODs obtained for three replicates averaged and growth curves plotted. In the other replicate, observations on changes in cell dimensions and other morphological features were made on the same dates. At the end of the 2nd and 4th day the alga from each treatment was washed and then transferred to the basal medium. After 6–8 days the tubes were observed for growth. This was done to find out whether the particular chemical tested had an algistatic or algicidal effect (Whitton 1970a, b; Lakshminarayana et al 1972; Bisiach 1972).

3. Observations and results

Periodic observations of the alga in the basal medium revealed the following: The erect system of the alga is much more branched than the prostrate system in culture. The filaments of the prostrate system are often packed together to give a pseudoparenchymatous appearance and the branches of the erect system characteristically terminate in long hyaline hairs. Occasionally the lateral branch may be cork-screw-like or wavy. The branches are simple, alternate and/or opposite and usually develop from angular cells which are smaller than the others. Cells are barrel-shaped, sheathed and there is a constriction between adjacent