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Oceanologia, 17 (1983)
PL ISSN 0078-3234

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EXTRACELLULAR EXCRETIONS OF ALGAE AS A FACTOR REGULATING THE GROWTH OF ALGAE CULTURES*

EKSTRACELULARNE WYDZIELINY GLONÓW JAKO CZYNNIK REGULUJĄCY WZROST KULTUR GLONÓW**

Summary

Streszczenie

An attempt was made to determine the effect of extracellular algal excretions on the growth of Chlorella pyrenoidosa, Scenedesmus quadricauda, Dictyosphaerium pulchellum, Selenastrum capricornutum and Anabaena variabilis monocultures, and to investigate the mutual interaction of algae grown in polycultures. Algae were cultivated in the laboratory, at a temperature of 24°C, continuously illuminated at 1500 lx. Growth was measured by counting the algal cells in a Bürker cell, and using the drop method for Anabaena variabilis.

The filtrate of Dictyosphaerium pulchellum had a heteropromoting effect on the algae studied. Filtrates of Scenedesmus acutus and Chlorella pyrenoidosa demonstrated an inhibitory action. Filtrates obtained from Scenedesmus quadricauda, Hormidium flaccidum and Anabaena variabilis either stimulated or inhibited algal growth. Autoinhibition of growth was observed: this was much more distinct in Anabaena variabilis than in Chlorella pyrenoidosa. In the initial phase, the growth of Chlorella pyrenoidosa and Anabaena variabilis showed no great differences; in Scenedesmus quadricauda, Selenastrum capricornutum and Dictyosphaerium pulchellum, growth rates became differentiated from the second day of cultivation onwards.

Many authors maintain that algae grown in polycultures mutually modify their growth. In most cases mutual growth inhibition takes place. This was also observed during the present investigations. The growth curves of the separate components cultivated in polycultures differed, depending on the species involved, although their growth was usually worse than in monocultures of these organisms. Only

* Paper published in: Acta Hydrobiol., 21, 1979, 3.
** Praca opublikowana w języku angielskim: Acta Hydrobiol., 21, 1979, 3.

Scenedesmus acutus, growing together with Chlorella pyrenoidosa and Hormidium flaccidum, and Chlorella pyrenoidosa growing with Hormidium flaccidum, demonstrated growth similar to that in monocultures. The observed relationships are in agreement with the remarks made earlier concerning the action of filtrates on monocultures. However, the growth curves for the individual algae differed in the two experiments, as there was a high concentration of extracellular excretions in the filtrates, which acted on the monocultures immediately, whereas in the polyculture, these substances accumulated only gradually. The resultant reaction of the algae in polycultures also depended, to a large extent, on the interaction between the different species, which is closely related to the physical properties of the organisms.