Effects of Temperature and Ph on the Growth of Heterotrophic Bacteria in Waste Stabilization Ponds

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Abstract

This paper presents the effects of temperature and pH on the growth of heterotrophic bacteria in *Chlorella vulgaris*-heterotrophic bacteria culture. The growth of heterotrophic bacteria was studied at 10, 15, 20 and 30°C, and pH was controlled from 3.0 to 11.5 in a series of fed-batch chemostat reactors supplied with glucose as the sole source of carbon. Samples were analyzed for heterotrophic bacteria by tryptone glucose extract agar in triplicate. The agar pH of 7.0 was the best for enumeration of heterotrophic bacteria. The bacteria grown at pH near neutral were more sensitive to the variation of agar pH than those grown at very alkaline pH. No significant difference in the number of cells capable of forming colonies was noted for incubation temperature of 20 and 35°C, but the lag time for colony formation was longer at 20°C. Samples for enumeration of heterotrophic bacteria collected from algal-bacterial systems such as waste stabilization ponds are recommended to be incubated at 35°C for 72 h. Depending on the pH of the culture, about 86–98% of the cells capable of forming colonies will be visible to the naked eyes after incubation at 35°C for 72 h. At the steady state conditions, heterotrophic bacteria were not sensitive to temperature in the range of 10–20°C. However, at 30°C, a notable competition for glucose between *Chlorella vulgaris* and heterotrophic bacteria was observed. This competition was responsible for the low bacterial density near neutral pH. No evidence was found to support the view that the discharge of bactericidal substances from *Chlorella vulgaris* was responsible for reduction of heterotrophic bacteria at high pH.

Keywords
Heterotrophic bacteria;
Temperature;
pH;
Algal-bacterial system;
Chlorella vulgaris;
Waste stabilization ponds;
Competition for substrate