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# Effects of NaCI, Na<sub>2</sub>SO<sub>4</sub>, H<sub>2</sub>SO<sub>4</sub>, and glucose on growth, photosynthesis, and respiration in the acidophilic alga Dunaliella acidophila (Volvocales, Chlorophyta)

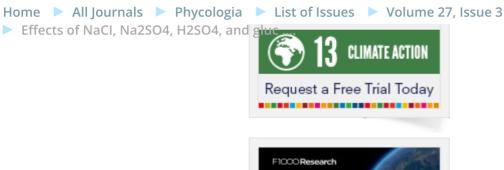
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### **Abstract**

Dunaliella acidophila, an acidophilic, unicellular green alga, was tested for its tolerance to the ionic solutes NaCl, Na<sub>2</sub>SO<sub>4</sub>, and H<sub>2</sub>SO<sub>4</sub> and to a nonionic, nonpermeant solute, glucose. Since the alga suffered from osmotic stress, slow adaptation was essential in order to allow growth at high solute concentrations. There was no significant effect related to the solute type. However, in adapted organisms salts affected growth more than did glucose at similar osmotic pressures. NaCl was more inhibitory than Na<sub>2</sub>SO<sub>4</sub>. Growth in media at a pH lower than 1.0 needed a period of adaptation. The lowest pH limit tolerated was pH 0.2. Adaptation to a high concentration of H<sub>2</sub>SO<sub>4</sub> gave rise also to an adaptation to other solutes. Moreover the effect of H<sub>2</sub>SO<sub>4</sub> concentration on growth rate is similar to that of Na<sub>2</sub>SO<sub>4</sub> Combined effects of temperature and solutes on the growth rate of D. acidophila indicated that the optimum temperature for growth is dependent on solute concentration in the medium. At 27°C the optimum solute concentration was 0.8 osmolality, and at this concentration the cells could grow even at 31°C. At a lower or higher osmolality there was a partial or complete inhibition of growth. The effects of solute on the photosynthetic and respiratory rates showed that

photosynthesis was not significantly affected, while a slow but constant increase of the respiratory rates resulted from increasing the osmolality of the medium.

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