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The role of glycerol in osmoregulation of the acidophilic alga *Dunaliella acidophila* (Volvocales, Chlorophyta): effect of solute stress on photosynthesis, respiration and glycerol synthesis

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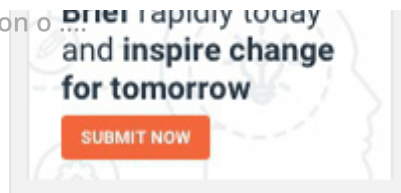


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Abstract

Cells of *Dunaliella acidophila*, an acidophilic and halotolerant green alga, which can grow at pH as high as 2.5 and as low as 0.2 (corresponding to 1.2 M H₂SO₄) accumulate glycerol when exposed to or grown in medium supplemented with glucose, NaCl, Na₂SO₄ or H₂SO₄. The cellular response was not dependent on the type of solute, but only on the solute concentration. When cells were exposed to hypertonic media, synthesis of glycerol commenced at once and continued until a new osmotic equilibrium was established between the cell sap and the medium. Only in hypertonic solution approaching lethal levels was a delay in the glycerol synthesis observed. The transition to hypertonic media showed an initial inhibition of photosynthesis and respiration followed by a full recovery of these activities. The inhibition and the time of recovery were dependent on the extent of hypertonic stress, no significant difference being shown by the solute type. In the same time scale, glycerol synthesis continued up to osmotic equilibrium and was affected only when cells were exposed to limiting hypertonic stress.

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