

INFLUENCES OF GROWTH CONDITIONS ON THE  
PIGMENTATION OF *DUNALIELLA SALINA*

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## ABSTRACT

*Dunaliella salina* is a unicellular, halophilic green alga that contains chlorophylls *a* and *b*, and a wide range of carotenoids. The carotenoids function as antennae in photosynthesis, as well as photo-protective agents against high light and free radical species. Lutein and zeaxanthin are high-value carotenoids that have potential for the development of nutraceuticals and pharmaceuticals. Previous studies have shown that *Dunaliella* halophiles accumulate large amounts of carotenoids, including lutein and zeaxanthin, when exposed to stressful growth conditions. As a consequence, strategies are needed for the economical production of these high-value pigments. This research investigated the influences of growth conditions on the pigmentation of select *D. salina* strains, and the possibility of using them as commercial sources of lutein and zeaxanthin. The latter was accomplished by performing chemostat, screening, batch-culture grow-out, and xanthophyll cycle studies. The screening study revealed that lutein:Chl *a* ratios in *D. salina* were maximized under low light and low nutrient conditions, while zeaxanthin:Chl *a* ratios were enhanced under high light conditions, regardless of nutrient level. The chemostat study showed that xanthophyll production by *D. salina* could be maximized by increasing growth rate. The carotenoid-to-Chl *a+b* ratios determined for *D. salina* were similar to those obtained in a previous study. Based on the findings of these experiments, a two-step strategy is proposed for achieving high xanthophyll yields for *D. salina*.