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Maintenance of Complex Life Cycles via Cryptic Differences in the Ecophysiology of Haploid and Diploid Spores of an Isomorphic Red Alga

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Abstract:

Recognition of the wide diversity of organisms that maintain complex haploid-diploid life cycles has generated interest in understanding the evolution and persistence of such life cycles. We empirically tested the model where complex haploid-diploid life cycles may be maintained by subtle / cryptic differences in the vital rates of isomorphic haploid-diploids, by examining the ecophysiology of haploid tetraspores and diploid carpospores of the isomorphic red alga *Chondrus verrucosus*. While tetraspores and carpospores of this species did not differ in size or autofluorescence, concentrations of phycobiliproteins of carpospores were greater than that of tetraspores. However, tetraspores were more photosynthetically competent than carpospores over a broader range of photosynthetic photon flux densities (PPFDs) and at PPFDs found at both the depth that *C. verrucosus* is found at high tide and in surface waters in which planktonic propagules might disperse. Theses results suggest potential differences in dispersal potential and reproductive success of haploid and diploid spores. Moreover, these cryptic differences in ecological niche portioning of haploid and diploid spores contribute to our understanding of some of the differences between these ploidy stages that may ultimately lead to the maintenance of the complex haploid-diploid life cycle in this isomorphic red alga.

Keywords: diplohaplontic, ecological niche partitioning, macroalgae, photosynthesis, pigments, Rhodophyta