Desiccation-Tolerant Plants under Elevated Air CO_2: A Review

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This article summarises present knowledge of the ecophysiological responses to elevated atmospheric CO_2 of desiccation tolerant (DT) plants. It deals primarily with lichens and bryophytes, as the most prominent groups of DT photosynthetic organisms, but includes some comment on algae and vascular DT plants. Results of research on DT plants are compared with those on desiccation sensitive vascular C_3 plants, the most widely investigated group in the field of global change. Both DT and non-DT plants show an immediate positive response of photosynthesis to elevated CO_2, but in both groups the longer term effect is generally reduced (or even reversed) by down-regulation or feedback inhibition of photosynthesis, or other limitations on production and growth. In bryophytes and lichens, enhanced short-term photosynthesis may or may not be reflected in increased production; bryophytes have limited source-sink differentiation, and lichens invest excess photosynthate in secondary metabolites. DT plants may gain some advantage from elevated CO_2 at both low and excessive water contents. Neither theoretical considerations nor experimental results suggest that elevated atmospheric CO_2 will lead to any substantial shift in the balance of advantage between DT and non-DT plants.