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Changes in Photosynthetic Activity and Export of Carbon by Overexpressing a Maize Sucrose-Phosphate Synthase Gene under Elevated CO₂ in Transgenic Rice

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Abstract: To investigate whether increased sucrose-phosphate synthase (SPS) activity alters photosynthetic activity and/or the export of carbon from leaves under elevated CO₂ partial pressure ([CO₂]), we raised two lines of transgenic rice (H54-9 and H69-7), each overexpressing a maize SPS gene, and wild-type rice under ambient [CO₂] (35 Pa) and elevated [CO₂] (100 Pa). Under ambient [CO₂], no significant difference was observed between the transgenic and wild-type plants in the levels of sucrose or starch in leaves or the photosynthetic activity; but the carbon export rate was higher in H69-7 than in the wild-type. Under elevated [CO₂], photosynthetic activity increased in all plants, but the accumulation of starch was significantly repressed in H54-9, whose SPS activity was about 12.5 times higher than that of the wild-type. The carbon export rate was higher in both transgenic lines than the wild-type. We considered that increased SPS activity in rice plants would promote the export of carbon from leaves and, as a result, starch accumulation in the leaves would be suppressed and/or photosynthetic activity would be promoted under elevated [CO₂].

Keywords: [Elevated CO₂](#), [Export of carbon](#), [Rice](#), [Sucrose-phosphate synthase](#),
[Transgenic plant](#)

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