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Modellingthe relationship between CO_2assimilation and leaf anatomical properties in tomato leaves

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Highlights

- We use anatomical, gas exchange and fluorescence data to simulate CO_2 assimilation.
- Our model includes the release of (photo)respired CO_2outside the stroma.
- Stroma resistance and exposed surface areas influence CO_2 assimilation.
- Assumed stromal diffusivity and pathway lengths, and curvatures affect predictions.
- 3-D models are needed to include the localization of respiration.

Abstract

The CO_2 concentration near Rubisco and, therefore, the rate of CO_2 assimilation, is influenced by both leaf anatomical factors and biochemical processes. Leaf anatomical structures act as physical barriers for CO_2 transport.Biochemical processes add or remove CO_2 along its diffusion pathway through mesophyll. We combined a model that quantifies the diffusive resistance for CO_2using anatomical