Photosynthetic responses of *Larrea tridentate* to seasonal temperature extremes under elevated CO₂

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Summary

- Elevated CO₂ potentially decreases the effects of temperature stress on photosynthesis. Under both freezing and high temperatures previous studies have shown that elevated CO₂ can particularly enhance photosynthetic rates, although results from freezing studies are more variable.
- Here we show gas exchange responses of *Larrea tridentate* to elevated CO₂ over a 6-yr period when temperature stress events may have had a significant effect on photosynthesis in the field.
- Nighttime freezing air temperatures decreased subsequent daytime photosynthetic rates, stomatal conductance, and the maximum yield of PSII similarly under ambient and elevated CO₂. Further, we found no statistically significant relationship between leaf temperature and photosynthetic enhancement. Overall, the degree of photosynthetic enhancement under elevated CO₂ was directly proportional to the response of stomatal conductance to CO₂.
- Thus, elevated CO₂ does not significantly affect apparent physiological responses of *Larrea* to temperature extremes. However, because of the tight relationship between stomatal conductance and photosynthetic enhancement, potential climate change effects on stomatal conductance will significantly influence *Larrea* performance in the future.