

# Petunia and pansy reactions to prolonged carbon dioxide enrichment

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Although crops often respond immediately to enriched CO<sub>2</sub> concentrations (e.g., increased photosynthesis), this initial response is often not sustained throughout production, thus reducing the benefit of

this input. For horticulture species, the timing and extent of these acclimation responses are still widely uncertain.

The objective of a new study was to determine species-specific acclimation responses to elevated CO<sub>2</sub> concentrations for pansy (*Viola ×wittrockiana* "Matrix Blue Blotch Improved") and [petunia](#) (*Petunia ×hybrida* "Dreams Midnight"). The research is [published](#) in the *Journal of the American Society for Horticultural Science*.

Although the average ambient CO<sub>2</sub> concentration currently exceeds 400 μmol·mol<sup>-1</sup>, concentrations in the greenhouse [environment](#) commonly decrease to less than 200 μmol·mol<sup>-1</sup> during production in the winter and early spring. However, the current atmospheric concentration does not maximize photosynthetic capacity; therefore, there is potential to enhance [plant growth](#) by enriching controlled environments with CO<sub>2</sub>.

Studies have shown that CO<sub>2</sub> concentrations between 800 and 1200 μmol·mol<sup>-1</sup> have great potential to increase plant growth, with concentrations more than 900 μmol·mol<sup>-1</sup> nearly eliminating photorespiration. However, previous studies have established that the most practical CO<sub>2</sub> concentration range for most species is 600 to 1000 μmol·mol<sup>-1</sup>. Early short-term studies showed that an economically efficient way to enhance ornamental plant growth in controlled environments was to increase the CO<sub>2</sub> concentration within this target range.

Although responses of horticulture species to long-term elevated CO<sub>2</sub> concentrations continue to be studied, further research is needed to identify the timing and extent of these species-specific responses to better understand CO<sub>2</sub> as an input for controlled environment production. An increase in biomass was observed for both petunia "Dreams Midnight" and pansy "Matrix Blue Blotch Improved" under an elevated CO<sub>2</sub> concentration compared with [ambient conditions](#) at all

days, but physiological acclimation to this input within 7 d of production likely limited the potential of this increase in biomass.

However, the results are constrained to the [environmental conditions](#) and container limitations used for this study, with the potential for sink limitations and interactions with other production inputs (e.g., temperature, nutrition) warranting further research to explain responses to elevated CO<sub>2</sub> concentrations for a diverse array of horticulture species. With this information, improved strategies for CO<sub>2</sub> enrichment that bypass acclimation limitations may be developed, which could increase production efficiency for controlled environments.

**More information:** David W. McKinney et al, Long-term CO<sub>2</sub> Enrichment Increases Biomass but Results in Rapid Physiological Acclimation of Petunia and Pansy, *Journal of the American Society for Horticultural Science* (2023). [DOI: 10.21273/JASHS05304-23](https://doi.org/10.21273/JASHS05304-23)

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