

What is the purpose of our research?

The overall objective of this research is to develop and disseminate specific CO₂ protocols for controlled environment production of everbearing strawberries that will enhance yield and fruit quality.

To do this, we have grown two cultivars of strawberry under ambient and enriched CO₂ concentrations during the reproductive growth stage.



Figure 1. Hydroponic strawberry production in growth chambers at the CSU Spur campus.

Join our email list to receive updates on our strawberry tasting panels!



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 We got 
something
berry
special

In the CEA lab at SPUR, we have been growing strawberries in controlled environments for research.



What is carbon dioxide (CO₂)?

Carbon dioxide (CO₂) is the invisible gas that we breathe out. It is present in normal outdoor (ambient) air at a concentration of approximately 421 parts per million (ppm). For plants to grow, they need CO₂ from the ambient air and water from the soil to create sugars for growth. As part of this process of photosynthesis, they also release oxygen into the air for us to breathe!

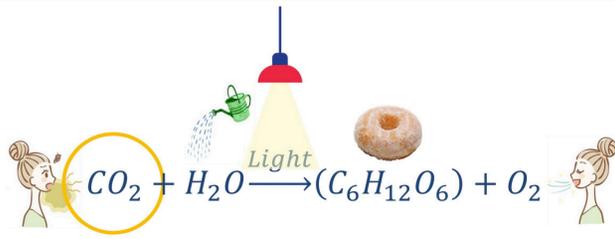


Figure 2. Diagram showing the chemical equation for photosynthesis.

Ambient CO₂ levels have been increasing for years due to human activities like burning fossil fuels. Elevating, or enriching, CO₂ over what is normally found in the air has been shown to increase photosynthesis and plant growth of many crops.

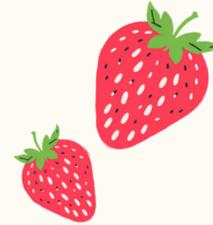


Table 1. *Fragaria ×annassa* (strawberry) 'Albion' fruit number and weight harvested from plants grown under either an ambient (450 ppm) or enriched (900 ppm) CO₂ concentration.

	Fruit Number	Average Fruit Weight (grams)
44 days of treatment		
Ambient	51	19.2
Enriched	19	32.84
51 days of treatment		
Ambient	59	12.78
Elevated	56	20.44

This table shows how many fruit we harvested from plants in different CO₂ treatments and what the average weight of those fruits were right after harvest. The elevated CO₂ level is double what is normally found in the ambient air (900 ppm).

According to the table, an elevated CO₂ concentration appears to increase fruit weight while the ambient concentration may increase the number of fruit harvested per plant.

Other potential benefits of CO₂ enrichment include greater natural resource use efficiency and improved nutritional and sensory qualities like flavor and aroma. However, these benefits may be species specific and may not persist throughout production. Because the amount of CO₂ available to plants can be carefully controlled in CEA, we are interested in applying the minimum concentration necessary to optimize photosynthesis and fruit yield, which ultimately means growing more with less.