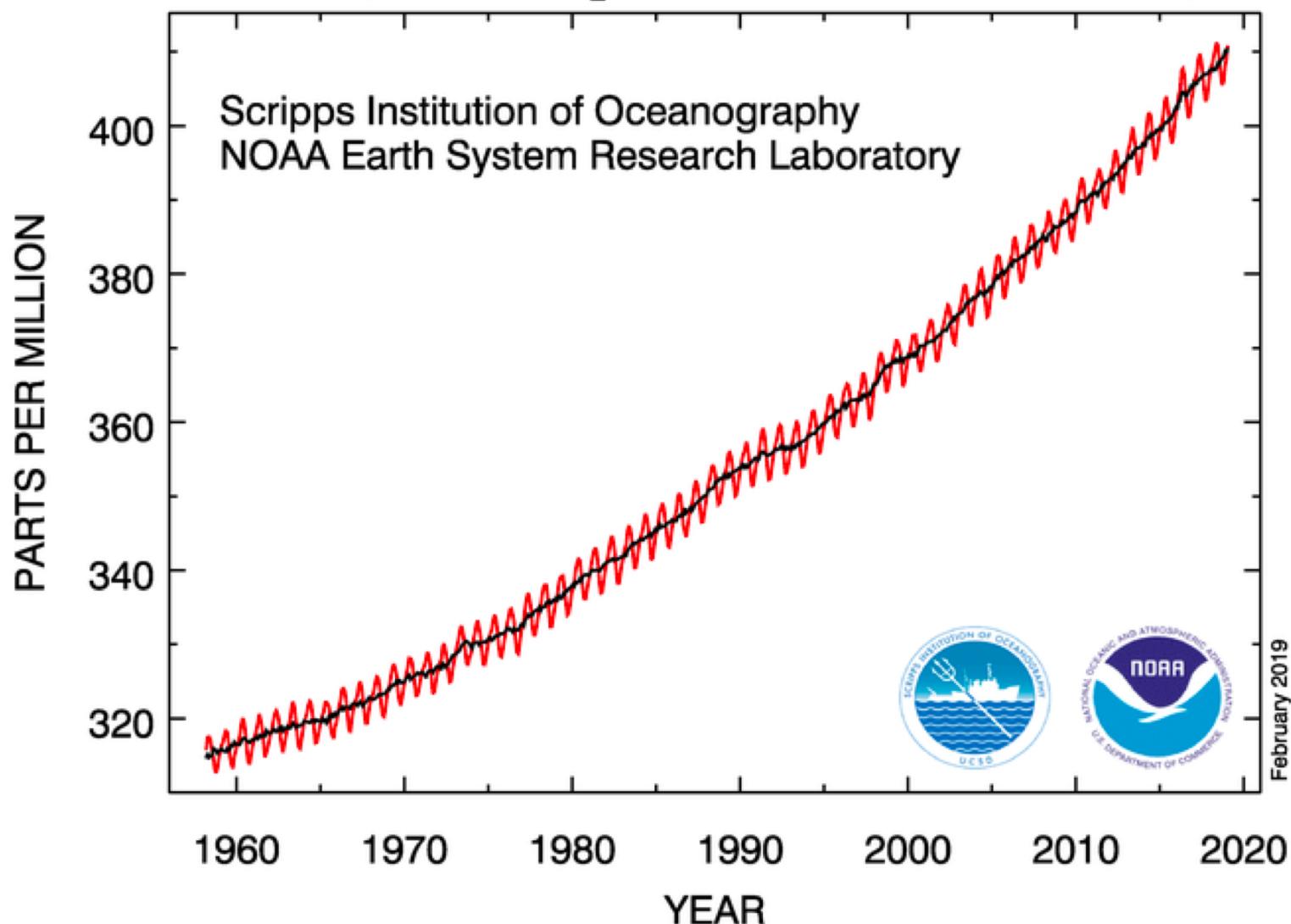


# The curious case of plant responses to carbon dioxide

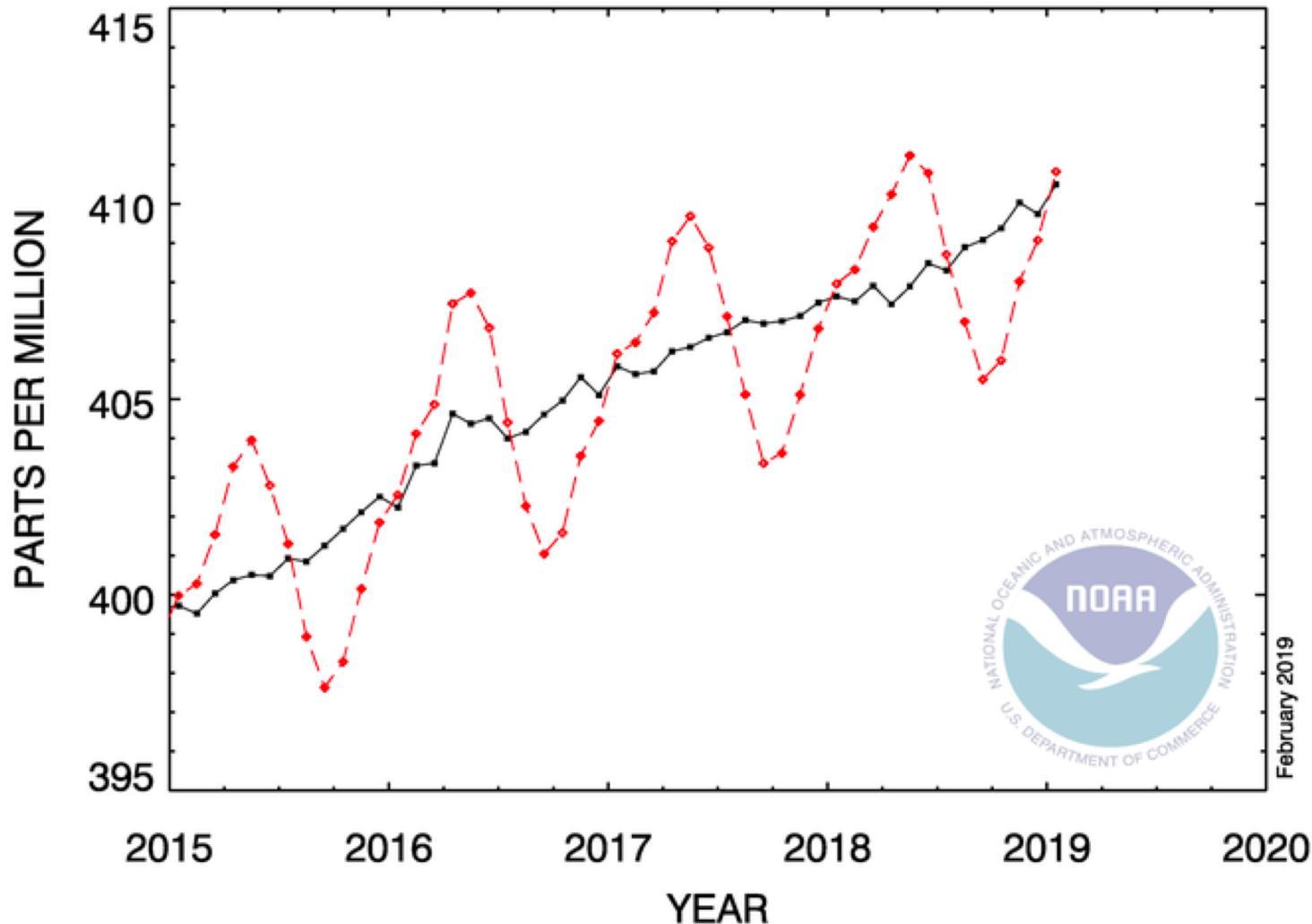


Why should we care about plant responses to CO<sub>2</sub>?

# Atmospheric CO<sub>2</sub> at Mauna Loa Observatory

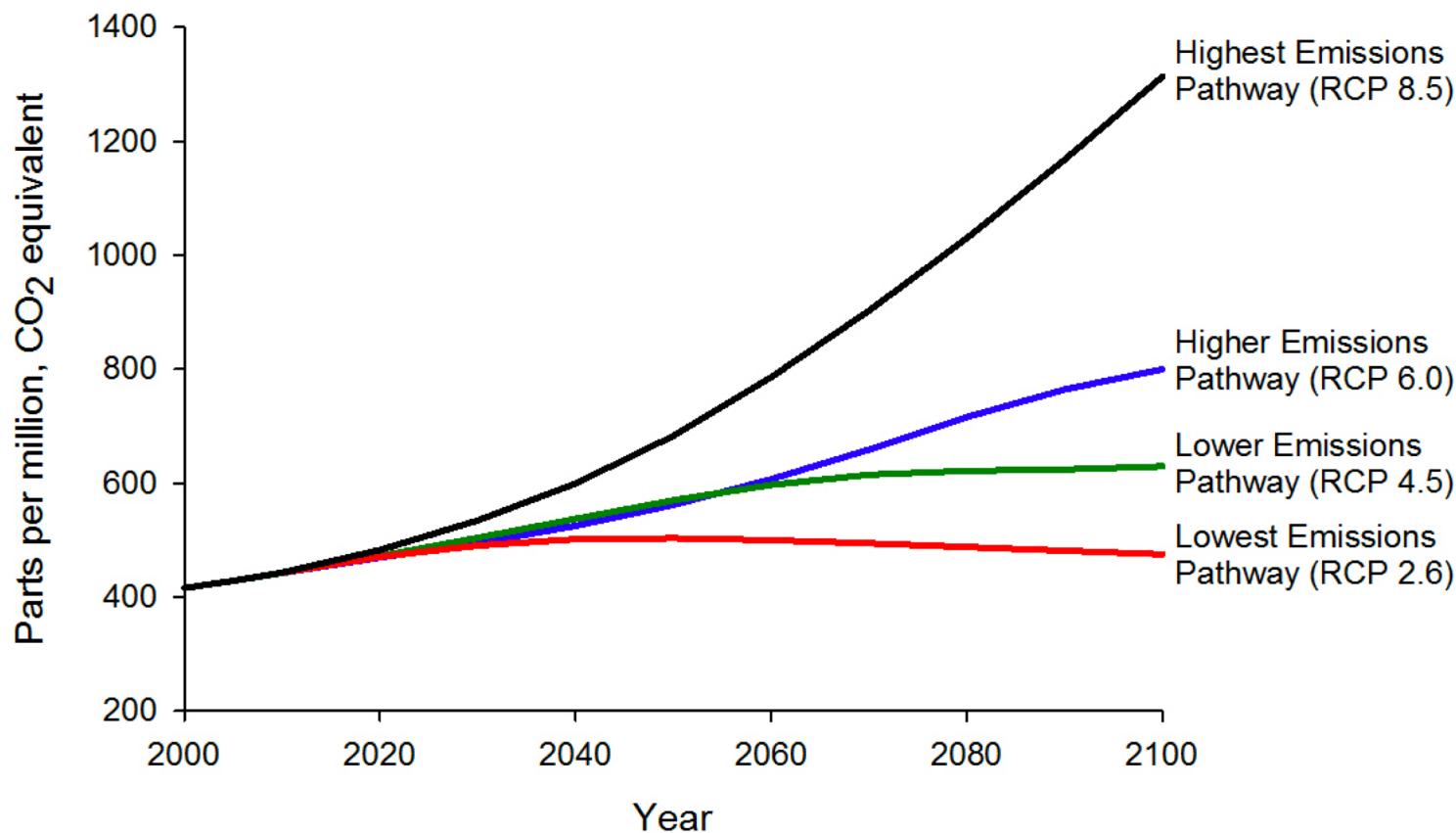


## RECENT MONTHLY MEAN CO<sub>2</sub> AT MAUNA LOA

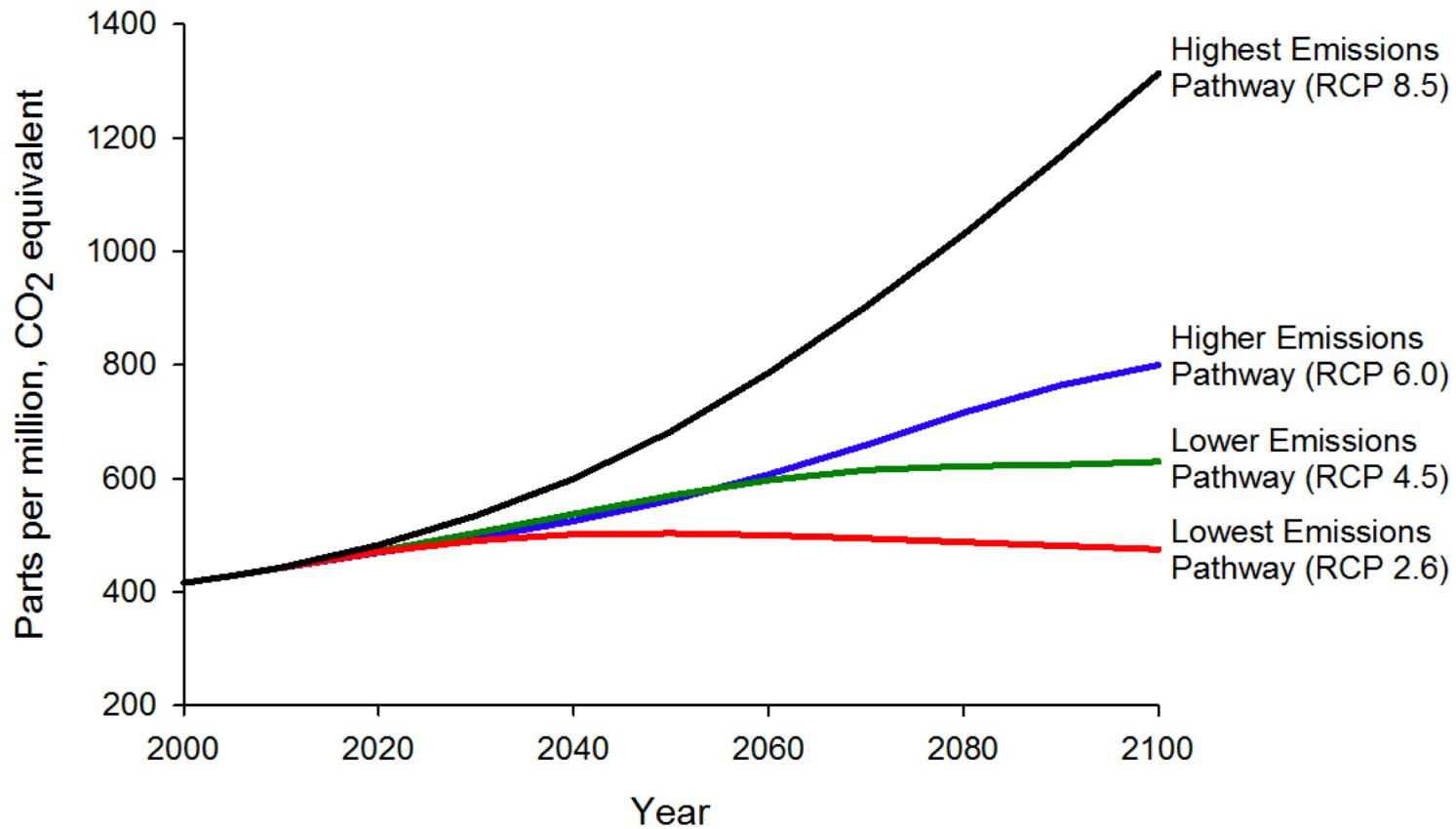


What causes the variations in the red line?

## Projected Atmospheric Greenhouse Gas Concentrations



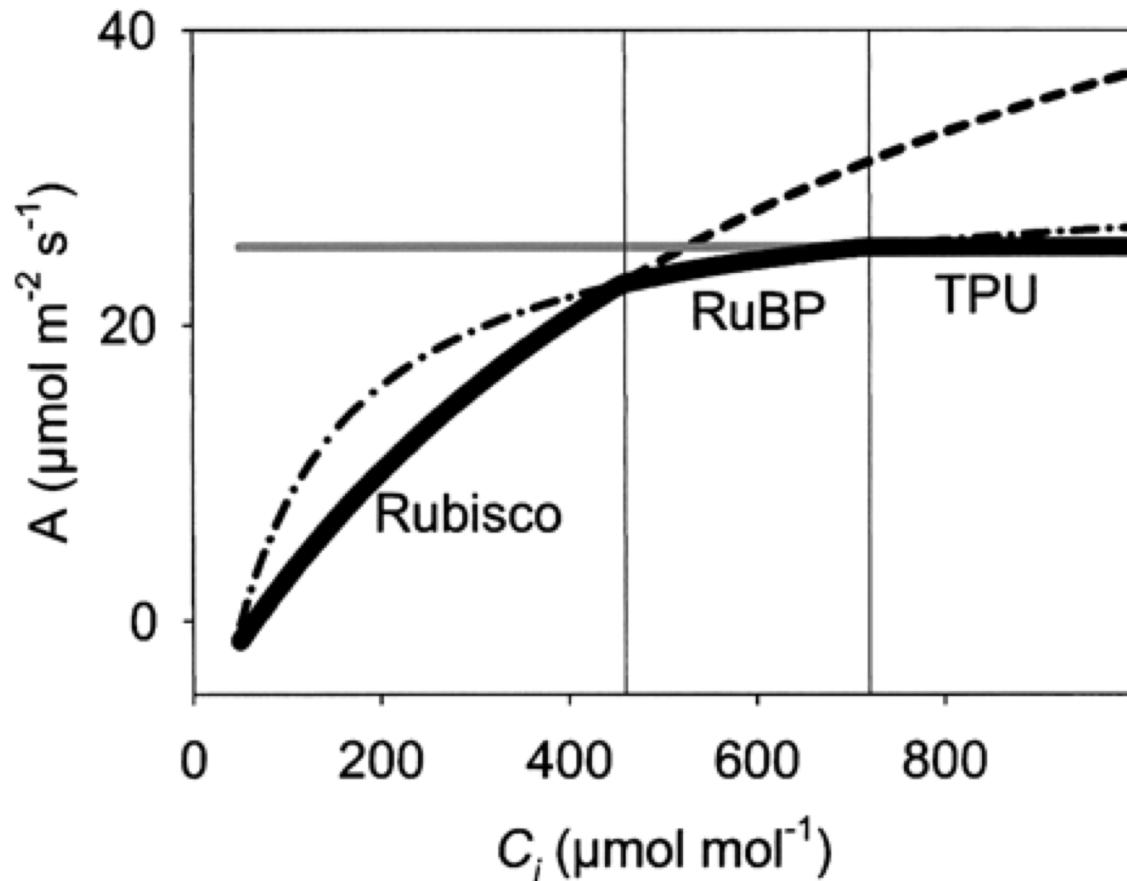
## Projected Atmospheric Greenhouse Gas Concentrations



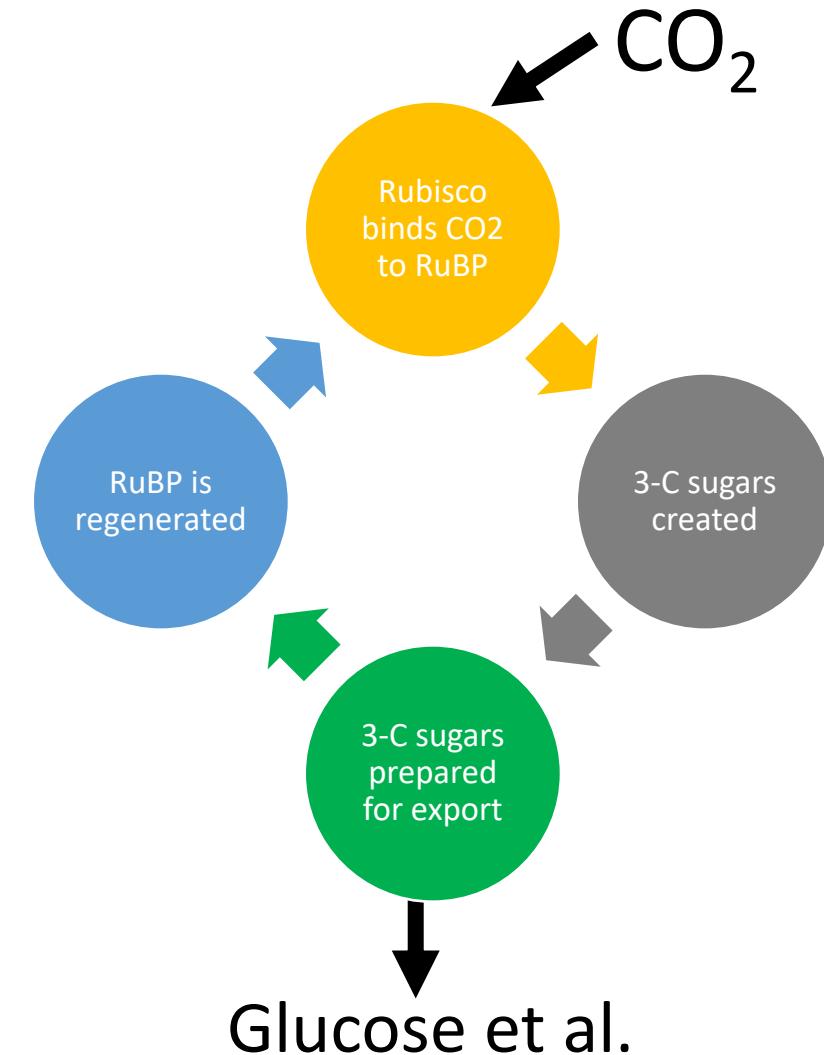
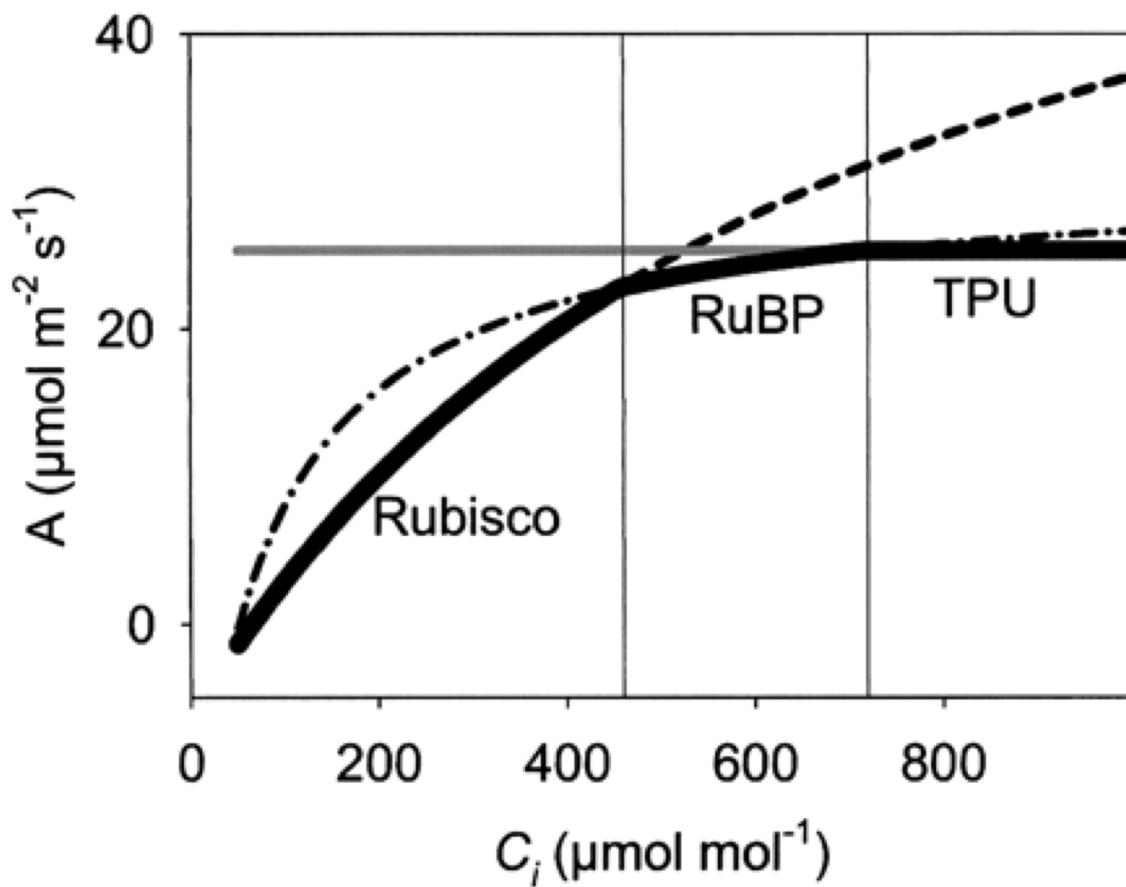
What do you  
expect the plant  
response to be?

Short-term plant response to elevated CO<sub>2</sub>: the A-Ci curve

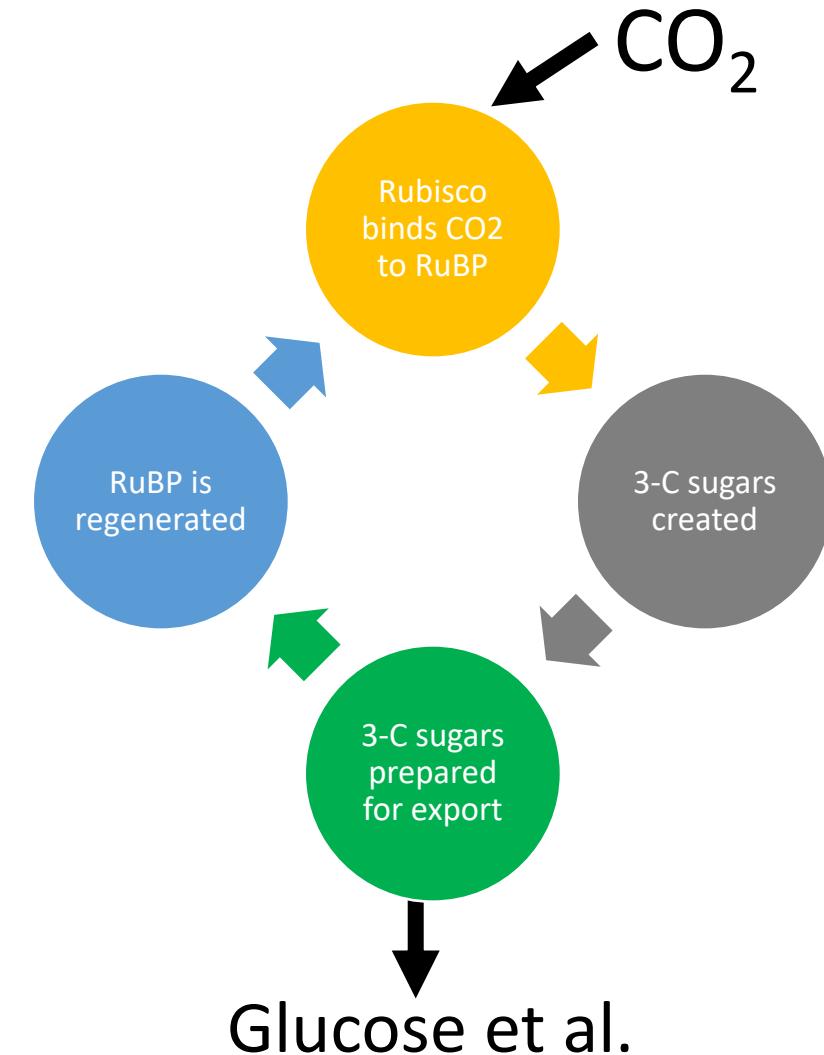
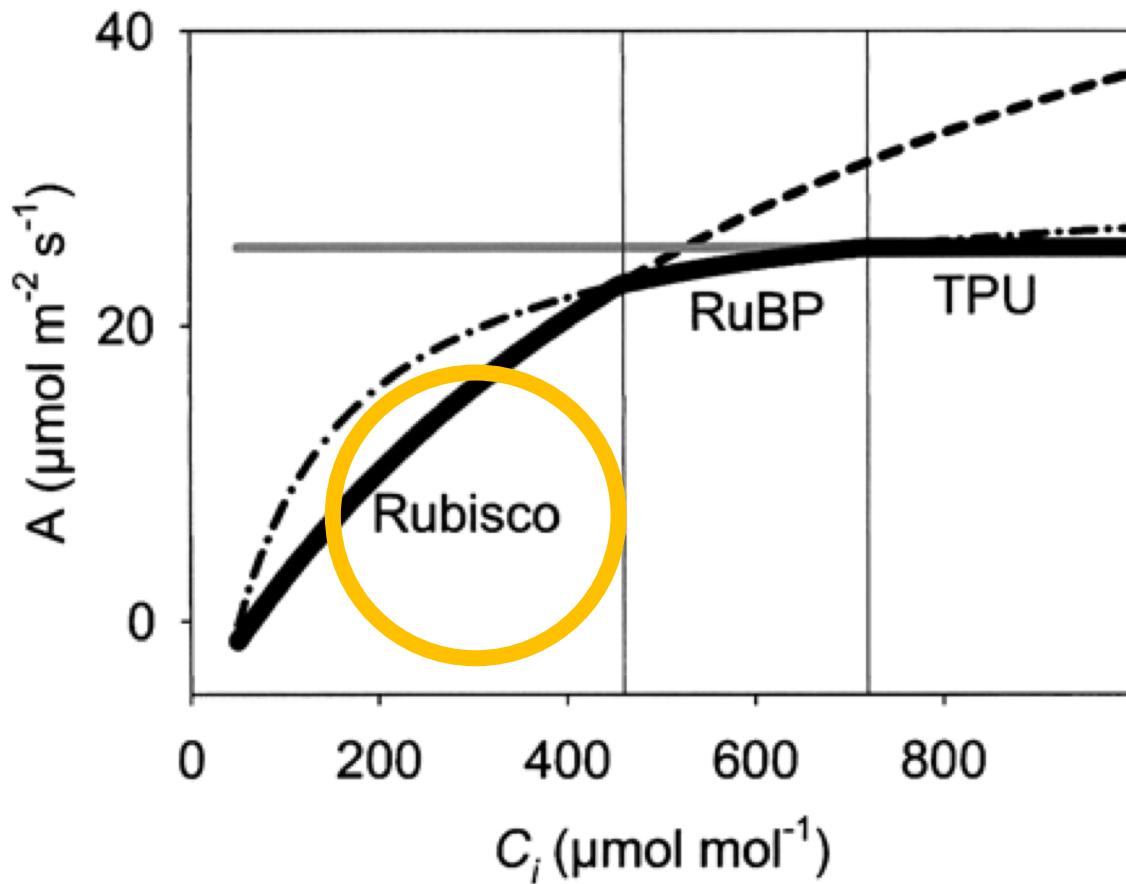
# Short-term plant responses to CO<sub>2</sub>: the A-C<sub>i</sub> curve



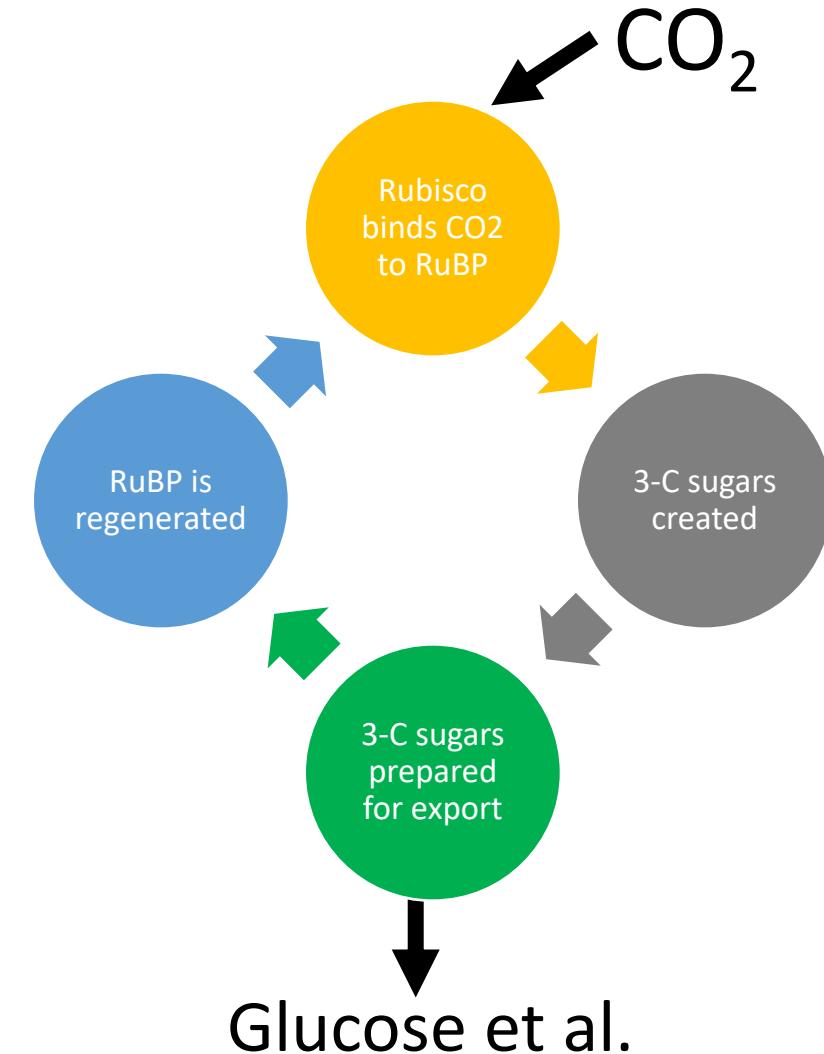
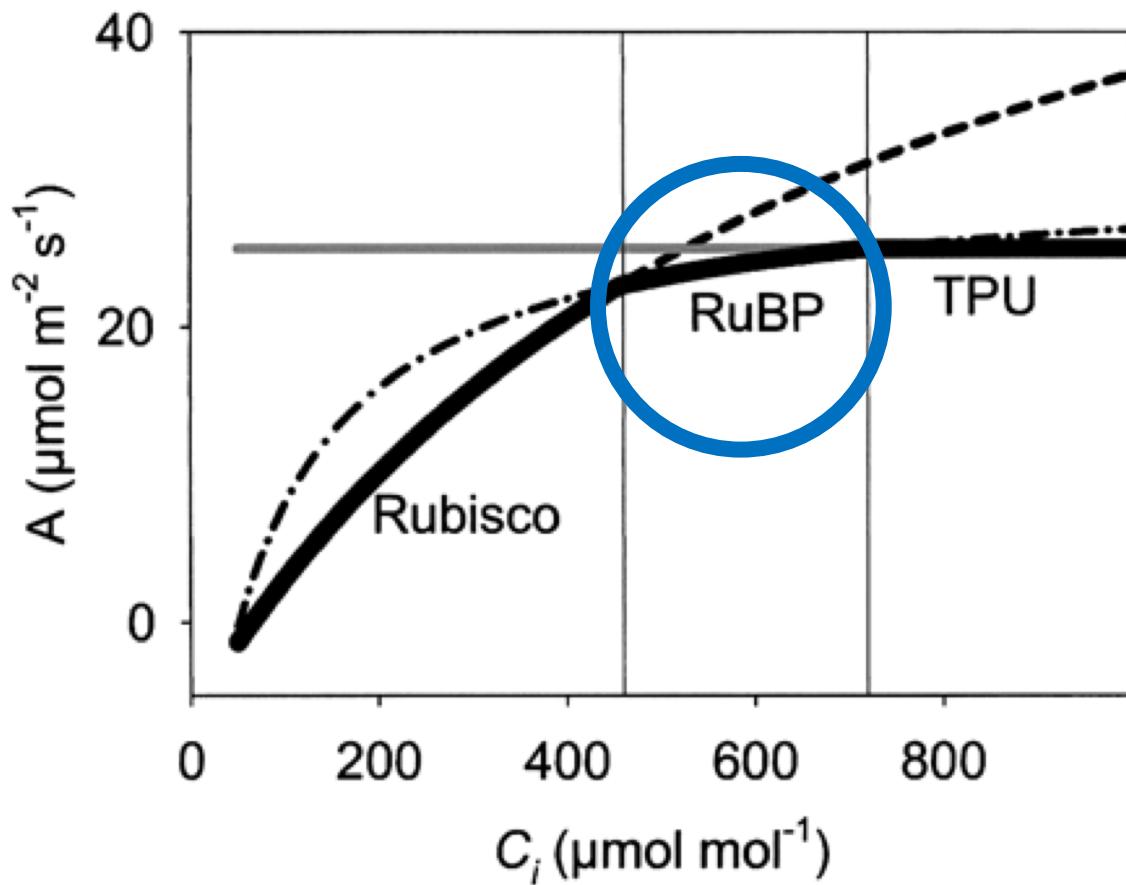
# Short-term plant responses to CO<sub>2</sub>: the A-C<sub>i</sub> curve



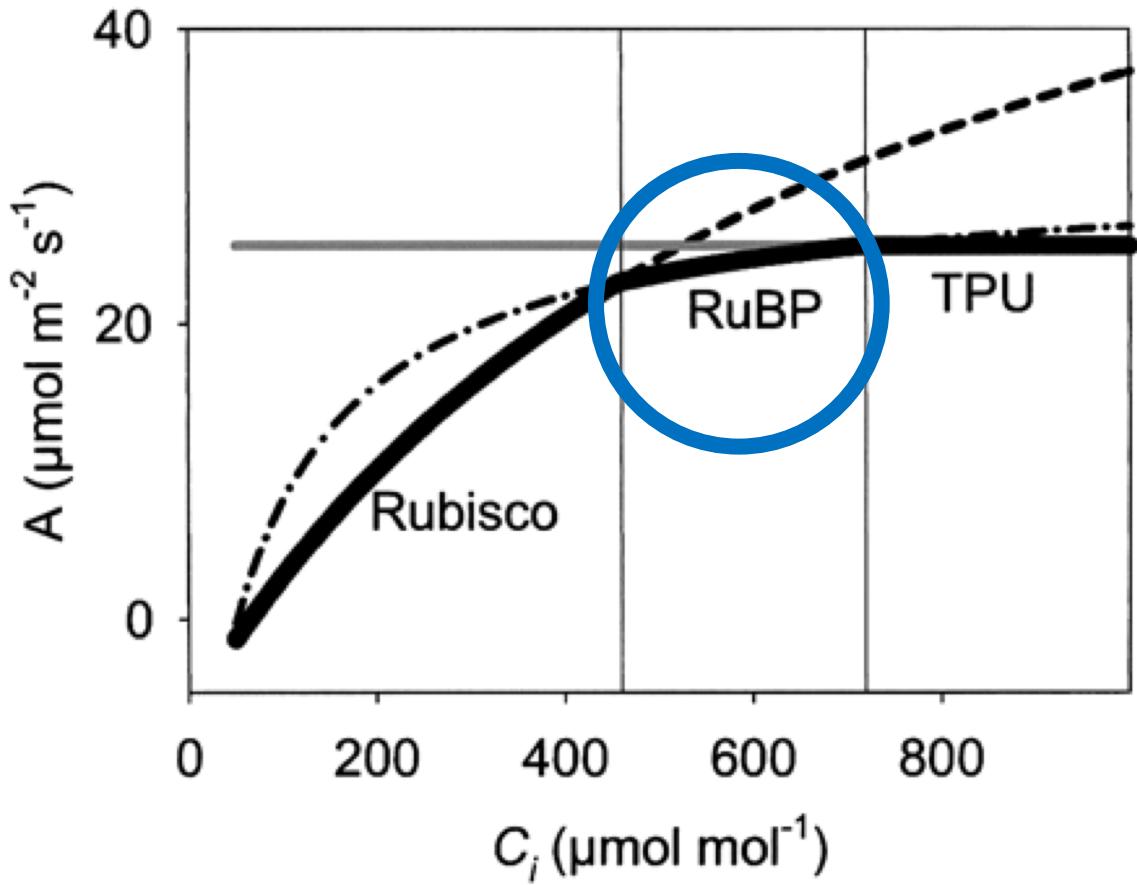
# Short-term plant responses to CO<sub>2</sub>: the A-C<sub>i</sub> curve



# Short-term plant responses to CO<sub>2</sub>: the A-C<sub>i</sub> curve

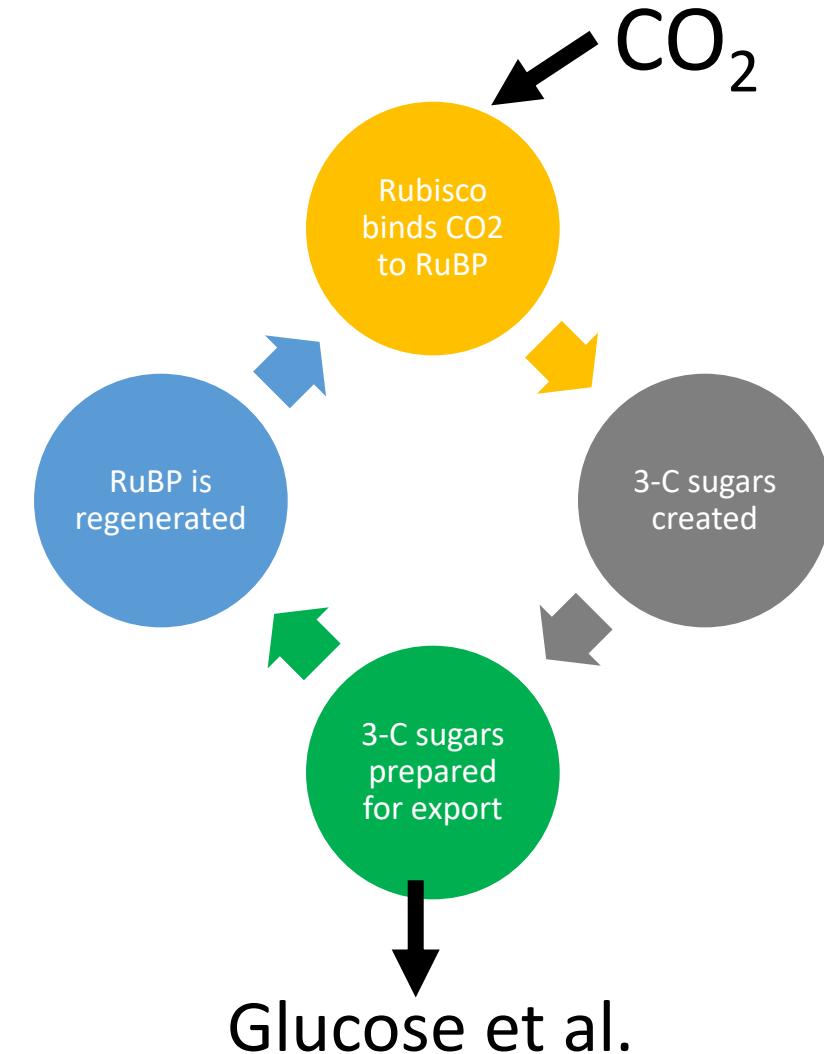
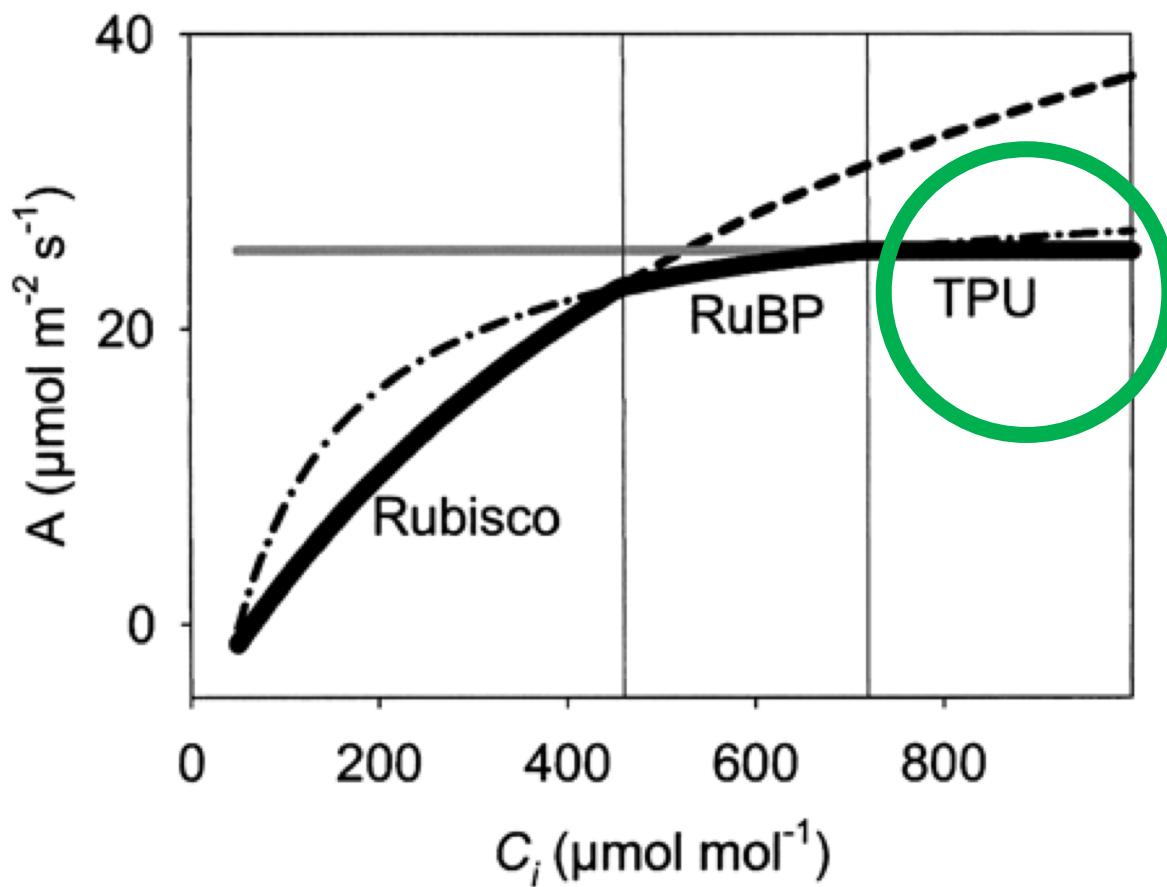


# Short-term plant responses to CO<sub>2</sub>: the A-C<sub>i</sub> curve



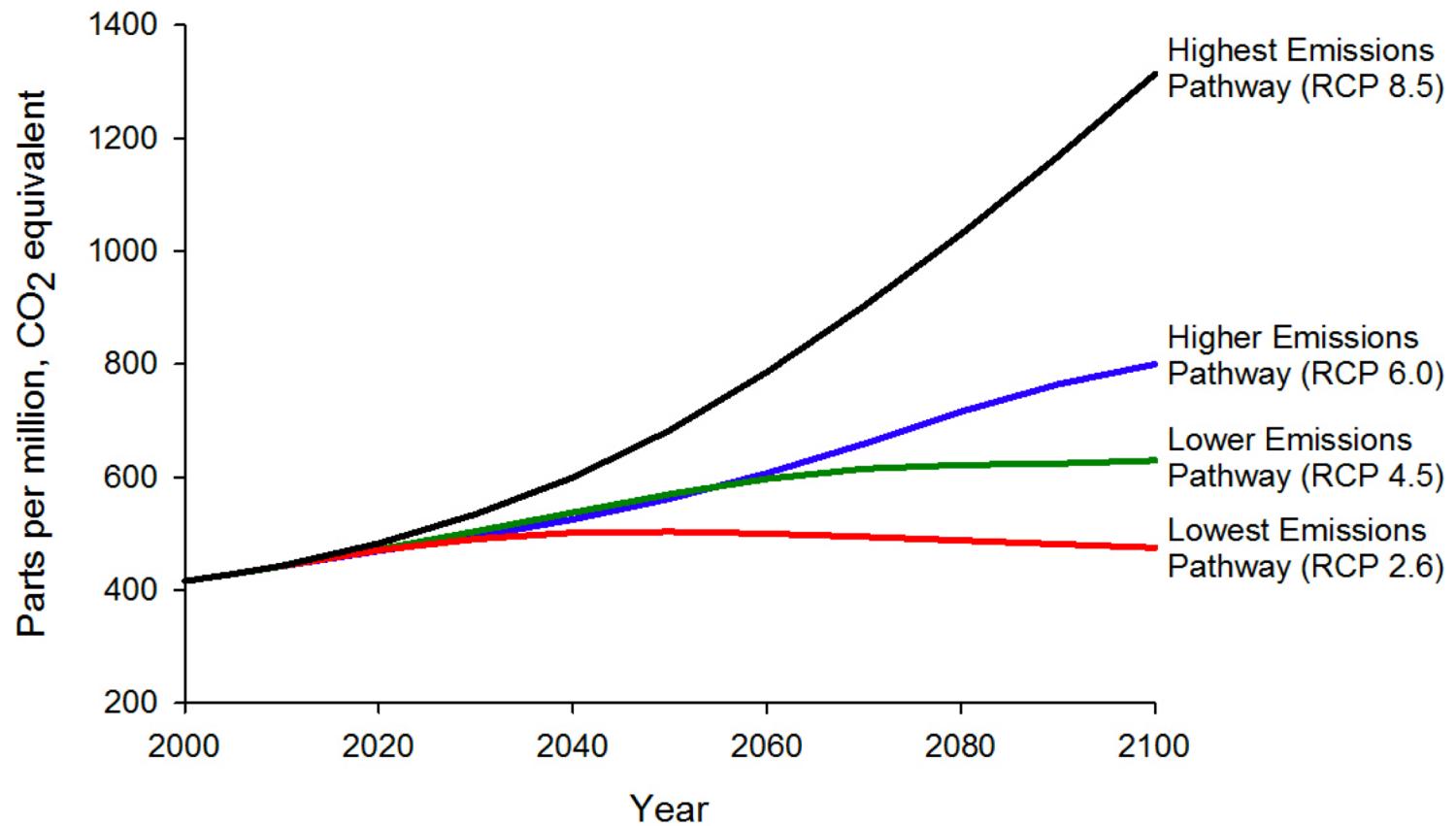
Hold on: What  
is strange about  
the RuBP  
regeneration  
response to  
CO<sub>2</sub>?

# Short-term plant responses to CO<sub>2</sub>: the A-C<sub>i</sub> curve

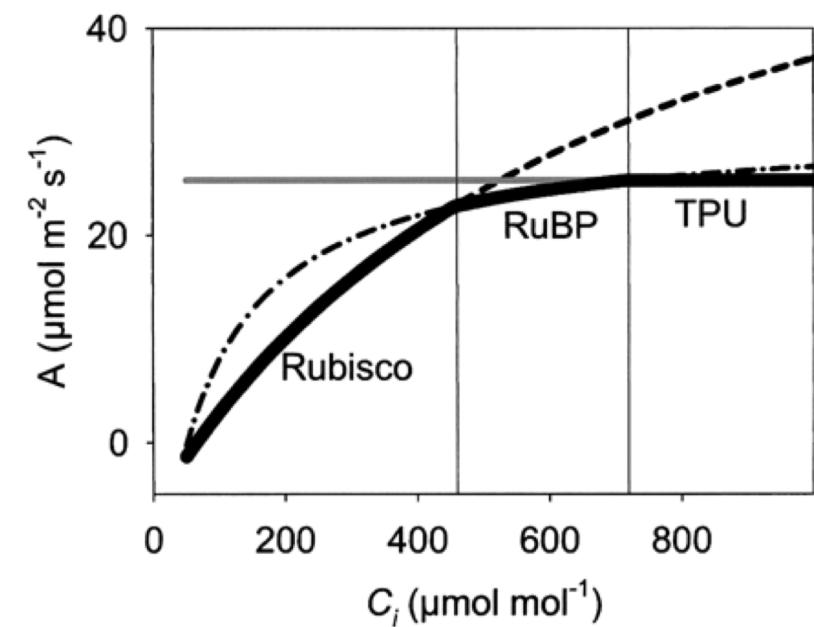


This response is relatively  
consistent across species and  
fairly easy to measure!

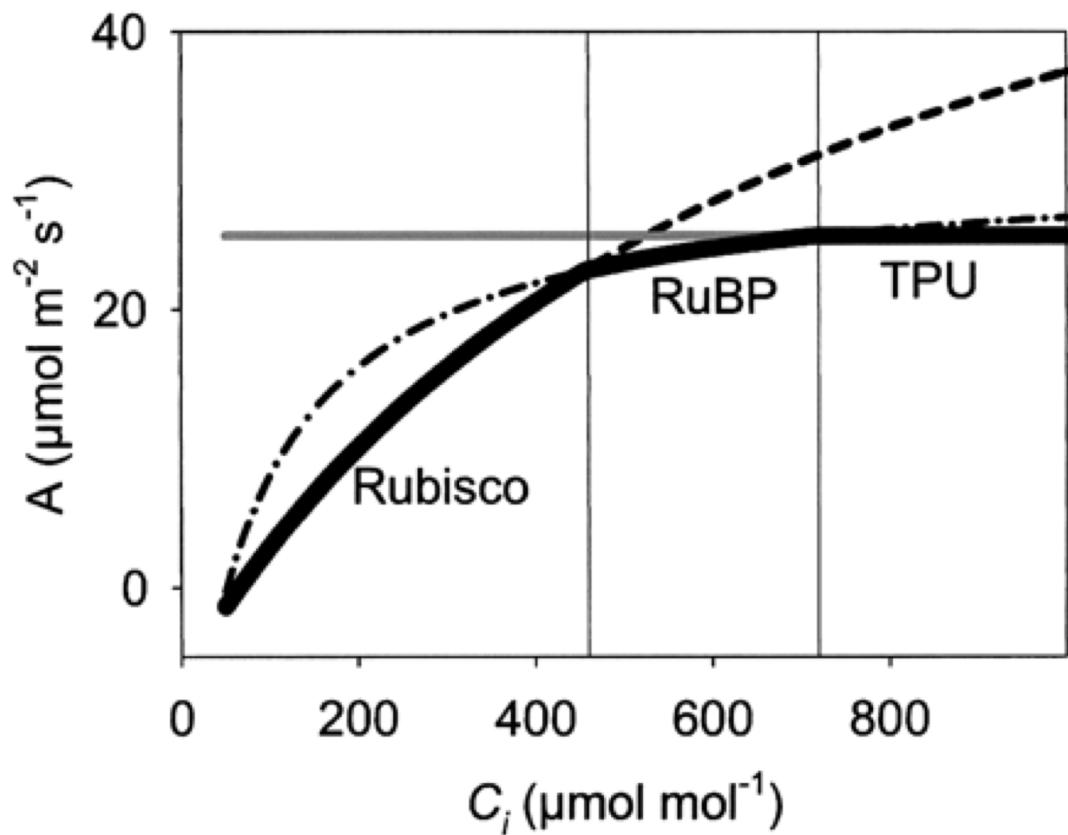
## Projected Atmospheric Greenhouse Gas Concentrations



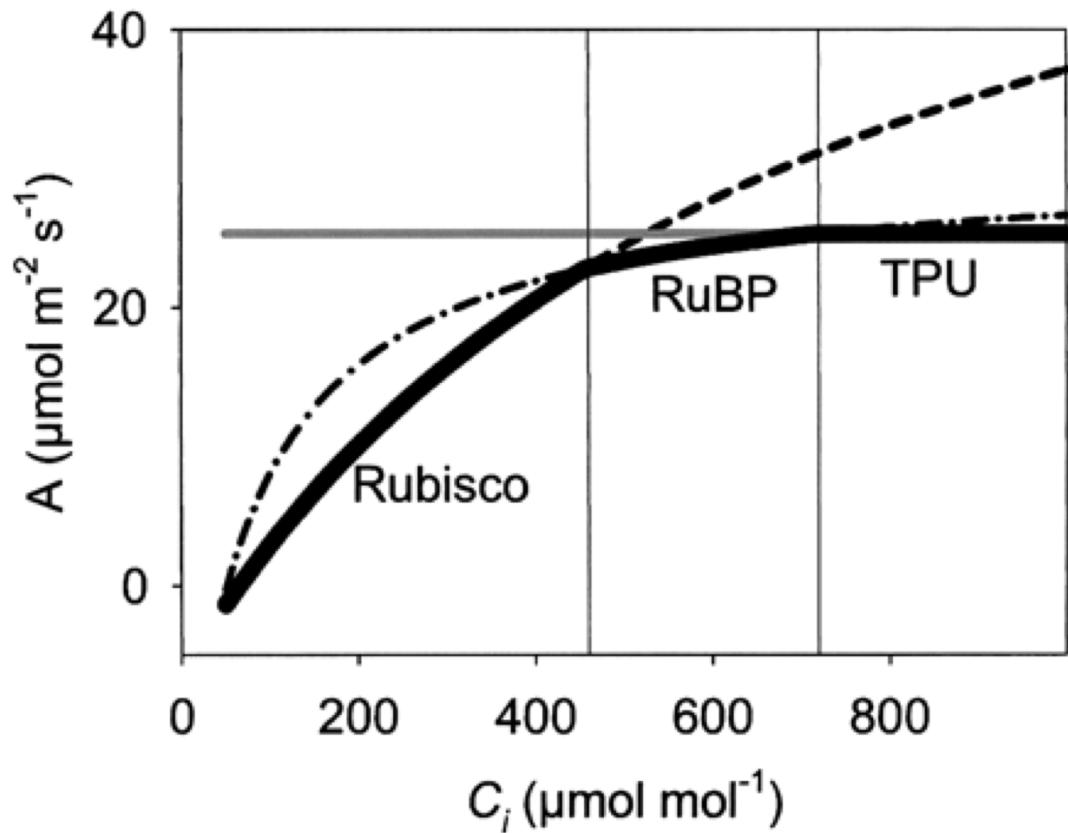
What do you  
expect the plant  
response to be?



# How might the long-term response to elevated CO<sub>2</sub> differ?



# How might the long-term response to elevated CO<sub>2</sub> differ?

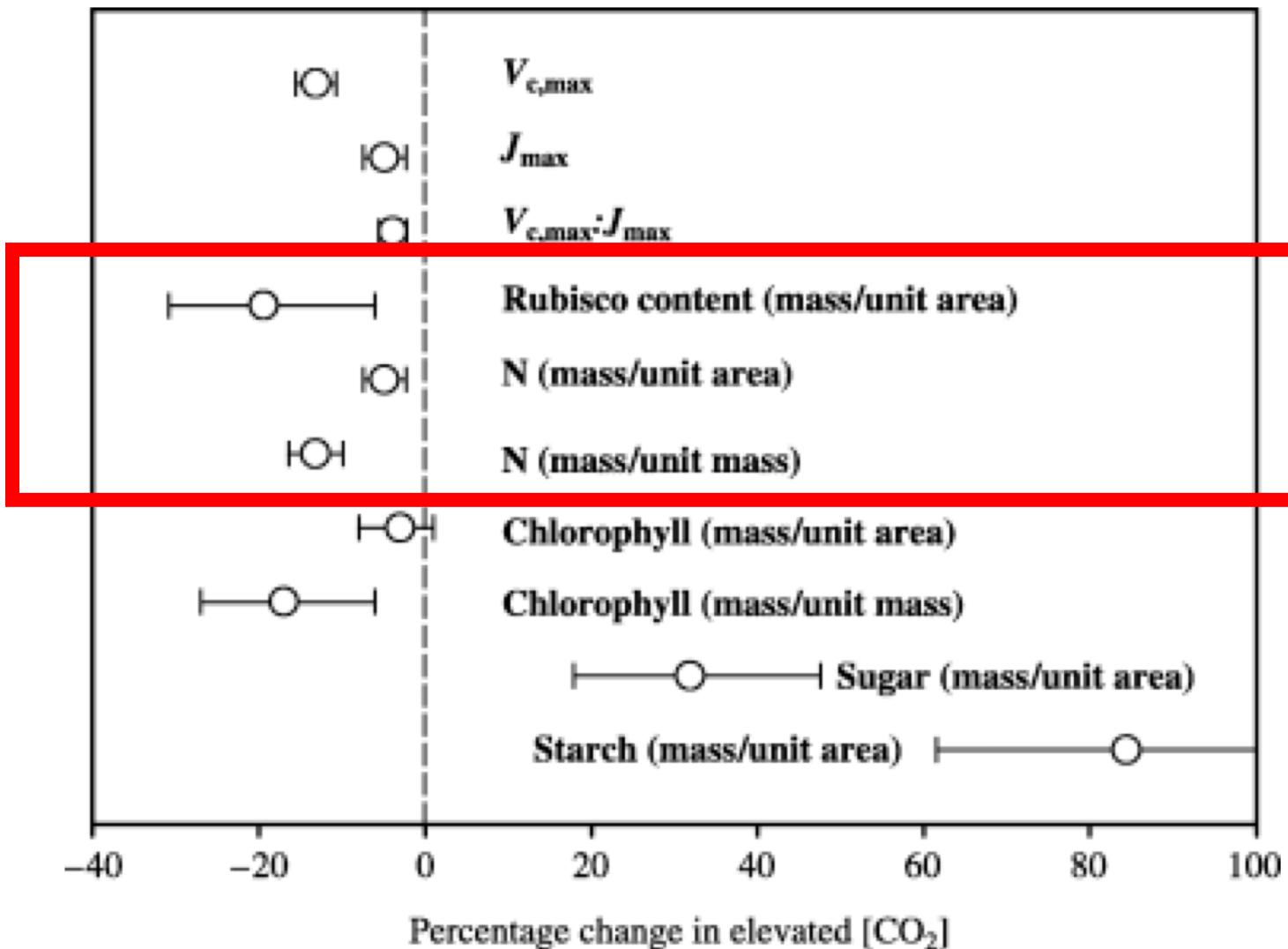


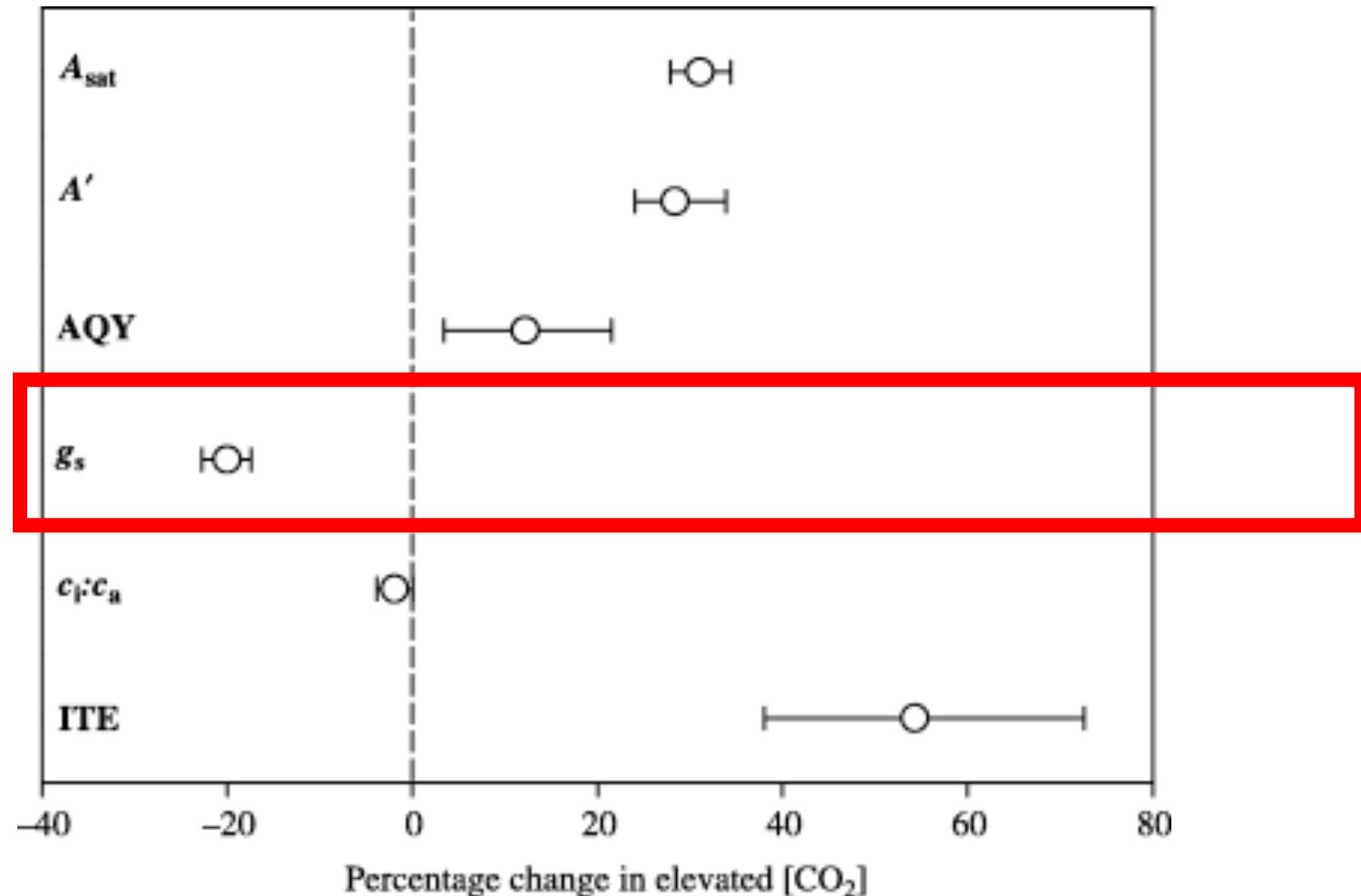
Things to consider:

- Each component represents a within leaf investment
- Plants generally aim for efficiency
- RuBP regeneration is principally determined by light availability
- Rubisco is an expensive enzyme (lots of N)
- It's costly to use water

# Free Air CO<sub>2</sub> enrichment (FACE) experiments

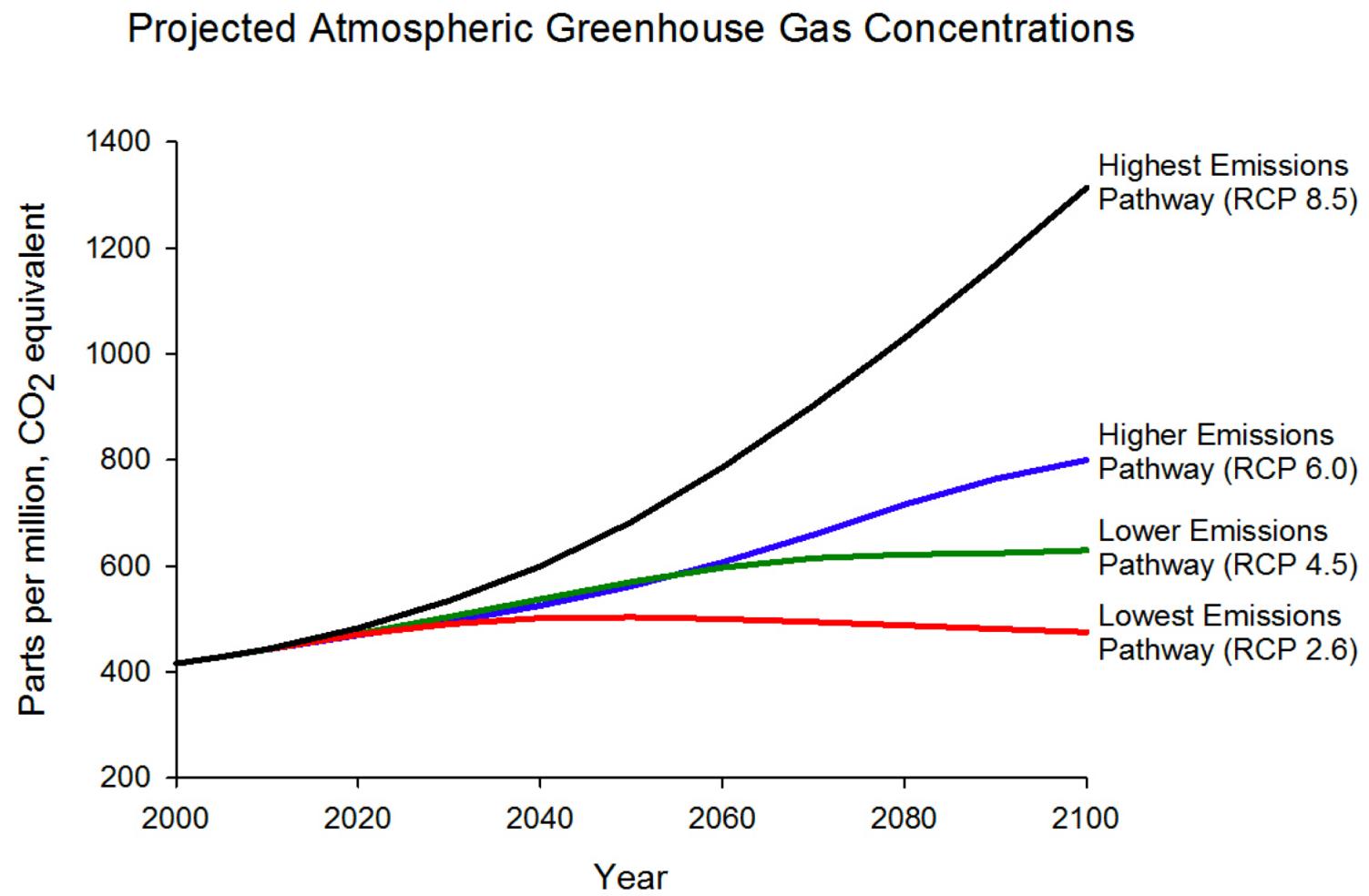






What does this mean for the  
whole plant?

What does this mean for the  
whole ecosystem?



What do you  
expect the plant  
response to be?

Draw a systems  
diagram

Bazzaz figure for discussion

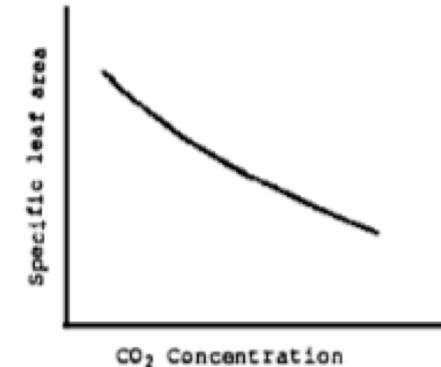
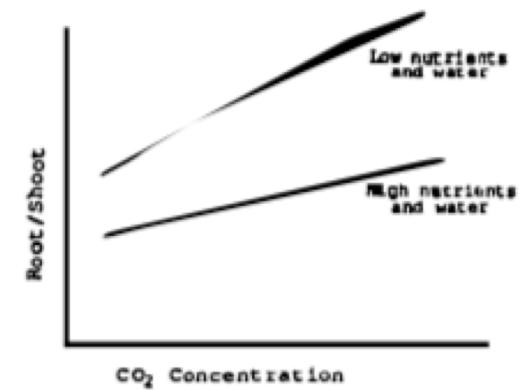
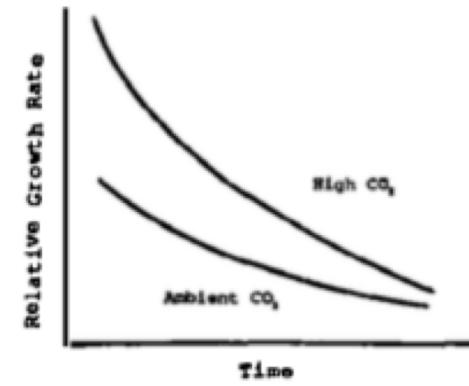
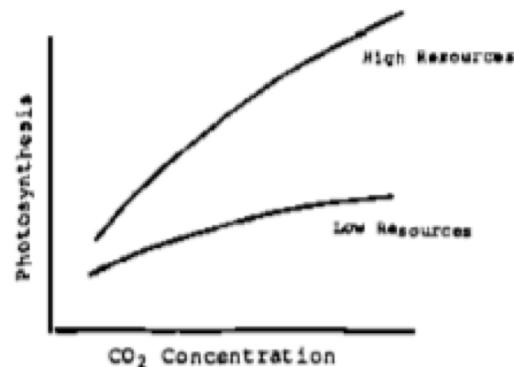
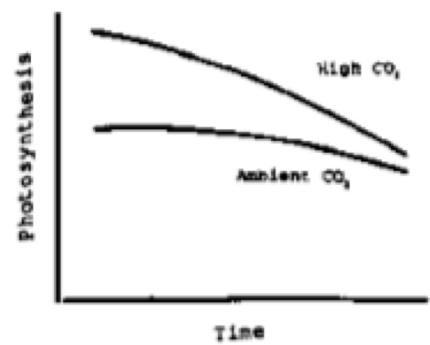
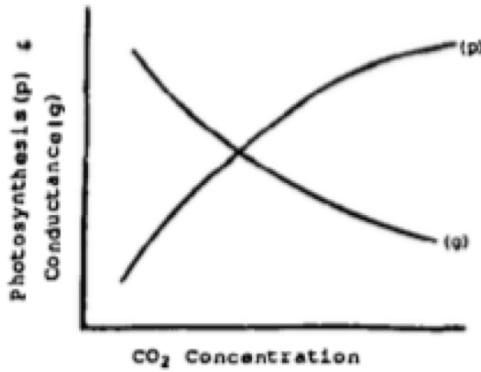


Figure 1 General trends of response of plants to CO<sub>2</sub> concentrations.