

Plant stomatal response to carbon dioxide (CO₂) concentrations in the urban environment of Seattle, WA

- CO₂ levels are typically higher in urban environments due to the concentrated burning of fossil fuels and high population levels; Elevated levels of CO₂ can cause some plants to respond by decreasing the amount of **stomatal** pores their leaves have (Figure 2);
- Stomata** are pores located on the top and bottom of leaves that act as gateways for taking in CO₂, releasing oxygen, and water vapor exchange between the plant and the atmosphere (Figure 3).
- CO₂ levels were monitored at the Center for Urban Horticulture (CUH) in Seattle and the town of Forks, WA to evaluate differences (Figure 1);
- Arabidopsis thaliana* plants were grown at both sites in the summer of 2008. Leaf impressions of plants were made in order to calculate the average stomatal density (# of stomata per unit area) per plant.

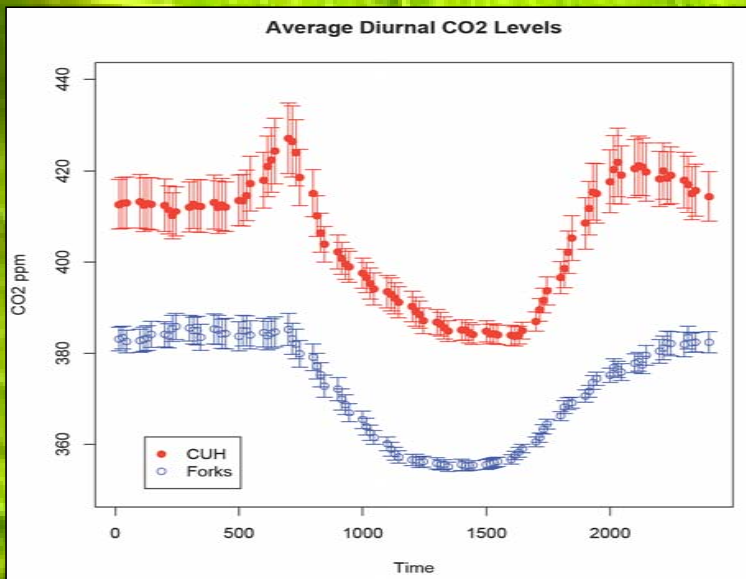


Figure 1: CO₂ concentrations averaged over a 24 hour period at the CUH are significantly higher on average than at Forks;

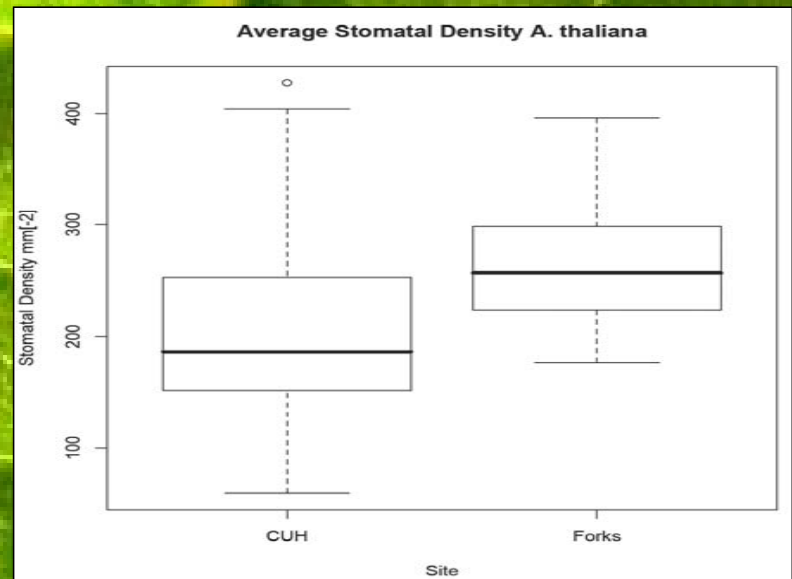


Figure 2: Average stomatal density of *A. thaliana* plants grown at the CUH are significantly lower than those grown in Forks;

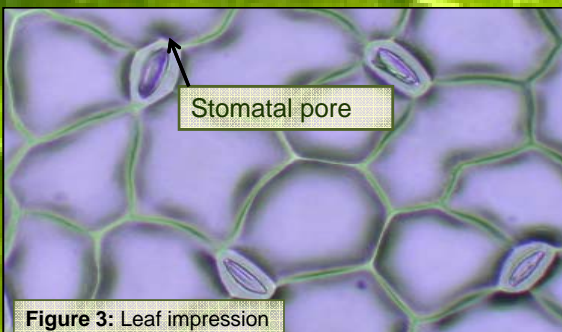


Figure 3: Leaf impression

Some Implications:

- With fewer stomata overall, the plant loses less water through their pores, therefore they need less water from the soil and this can lead to an increase in water runoff from the soil.
- Fewer stomata can also lead to a decrease in water vapor exchange with the atmosphere- this can influence the heat and water balance of leaves causing the air around the plant to be warmer. On a global scale the effects of runoff and warming are of greater concern.

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