Annotated Bibliography: CO2 Concentrations

Becklin, Walker, Way, Ward (2016)

**Keywords: atmospheric carbon dioxide, climate change, eco-evolutionary feedbacks, flowering time, leaf gas exchange, plant hydraulics, plant-microbe interactions**

*Title:* CO2 studies remain key to understanding a future world

*Introduction (Becklin, 2016):* CO2 levels are rising rapidly, resulting in the need for plants to evolve. Even though there have been studies on plant responses to increased CO2 levels, little is known on this topic. CO2 concentrations could affect plant development transitions, plant and water dynamics, and plant and microbe interactions. These topics are important issues in regard to global carbon cycling, food security, and ecosystem services.

*Plant Development and Phenology (Becklin, 2016):* CO2 levels can impact the flowering time of plants which has significant ecological effects. These ecological effects include how species evolve, the competition between species especially in regards to the pollination of plants, and crop production. Late flowering can be caused by a flower repressor tha increases with high levels of a micro RNA. Since RNA is a sugar, this increases with CO2 levels. CO2 levels can also cause early flowering. There is little information on sugar-sensing mechanisms.

*Plant-Water Dynamics (Becklin, 2016):* CO2 levels are supposed to make plants mor drought tolerant by increasing photosynthesis, use water more efficiently by decreasing transcription and stomatal conductance. However high CO2 increases surface area causing a higher loss of water. Little is known about plant hydraulics associated with CO2. Cavitation (gas formation in water column) may decrease with CO2 concentration. Even though CO2 increase could be positive in defense to higher temperature, there isn’t enough offset to make a difference. The CO2 can’t offset the lake of water.

*Plant-Microbe Interaction (Becklin, 2016):* The interaction between fungi and plants is one of the mose well known interaction. CO2 may increase nutrients produced by fungi since fungi do best in conditions that limit plant growth. However, there is still a competition for nutrients. This evolution that is necessary with CO2 could affect ecosystems severely.

*The Way Forward (Becklin, 2016):* Interdisciplinary studies are needed to gain a broader understanding of the situation and ways to move forward with the inevitable CO2 rising.