The Effects of Increased CO2, Soil Acidification, and Drought on Aperture, Density, and Potential Conductance Index of Stomata Demonstrated by Buckwheat Plants (Fagopyrum esculentum) and Pea-plants (Pisum sativum)

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The preservation of plants deteriorating over climate change is critical for organisms that depend on them for sustenance. Within the plants, the stomata — pores specialized by parenchymatic cells — regulate 95% of gas and water network between the plant and its environment by modifying its size and density. However, the climatic fluctuations are challenging plants with environmental conditions of increased CO2, drought, and soil acidification. Strikingly, less research on how stomata respond to said environmental factors warrants a study that explores the effect on stomatal density, size, and conductance in buckwheat and pea-plants. The experimental setup includes seven groups per plant: a control, two positive controls with increasing CO2, and four groups with increased CO2 combined with soil acidification and drought. It was hypothesized that density, size, and potential conductance would all decrease and that climate change will ultimately lead to a progressive decline in the efficiency of plants to maintain homeostasis. Data was collected for a four-week period and it was revealed that both plants exposed to 700ppm and 950ppm CO2 levels resulted in a substantial reduction in size and density as well as a patent degradation in plant vigor. A detailed formula was utilized to determine the potential conductance using variables like net assimilation rate. However, our presumption that climate change would lead to a progressive decline in all plants cannot be supported as our research only investigated C3-crop plants, not taking into perspective the other varieties of plants such as C4 and CAM.