RISING CO₂: HOW IT AFFECTS OUR PLANTS

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Introduction and Objective

Over the course of this past week, we explored the effects of elevated CO₂ on the Arabidopsis plant. By observing the area of mitochondria and chloroplasts per plant cell under both elevated and ambient CO₂ levels, we hoped to discover if there was a notable difference in the amounts of mitochondria and chloroplasts. Mitochondria and chloroplasts are critical to respiration and photosynthesis, which affects plant growth. With CO₂ levels rising, it is important to know what effect this could have on plant growth.

Materials and Methods

2D Imaging: 40x Microscope Zeiss Axiovert M200
For the mitochondria we used 488 nm excitation and 520 nm emission
For the chloroplasts we used 488 nm excitation and 630 nm to 616 nm emission
The bright field image used blue halogen light with no excitation.
We used Axiovision to find the mitochondria, chloroplast, and cell area.

3D Imaging: Andor Spinning Disc Confocal
The light source was a laser with a 488nm wavelength.
We used the program IMARIS to create our 3D models.

Results

Based on our results, we found that the area of mitochondria and chloroplasts per cell in elevated CO₂ conditions was lower than in ambient CO₂ conditions. The percentage of mitochondria area and chloroplast area per cell area was lower in elevated CO₂ than in ambient CO₂. However, we cannot conclude anything from these results. We did not have many samples, and if one sample was in some way defective, our results could be greatly skewed. More experiments need to be done to come to a conclusion and predict the possible struggles farmers might experience in the future.

Discussion and Conclusion

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