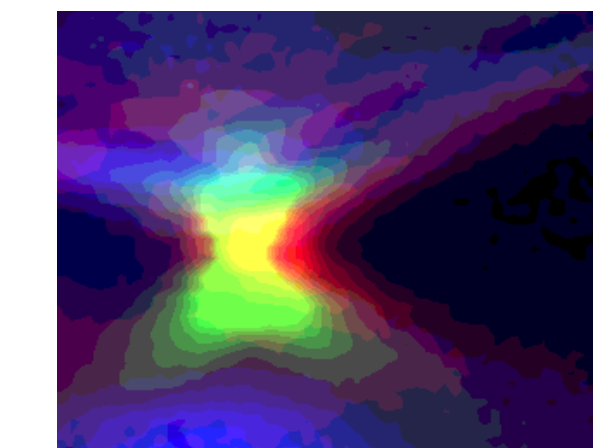


EFFECTS OF CO₂ ON PLANTS

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INTRODUCTION AND OBJECTIVE

Our purpose is to examine how elevated carbon dioxide levels affect the respiration [mitochondria] and photosynthesis [chloroplast] of plant cells.

MATERIALS AND METHODS

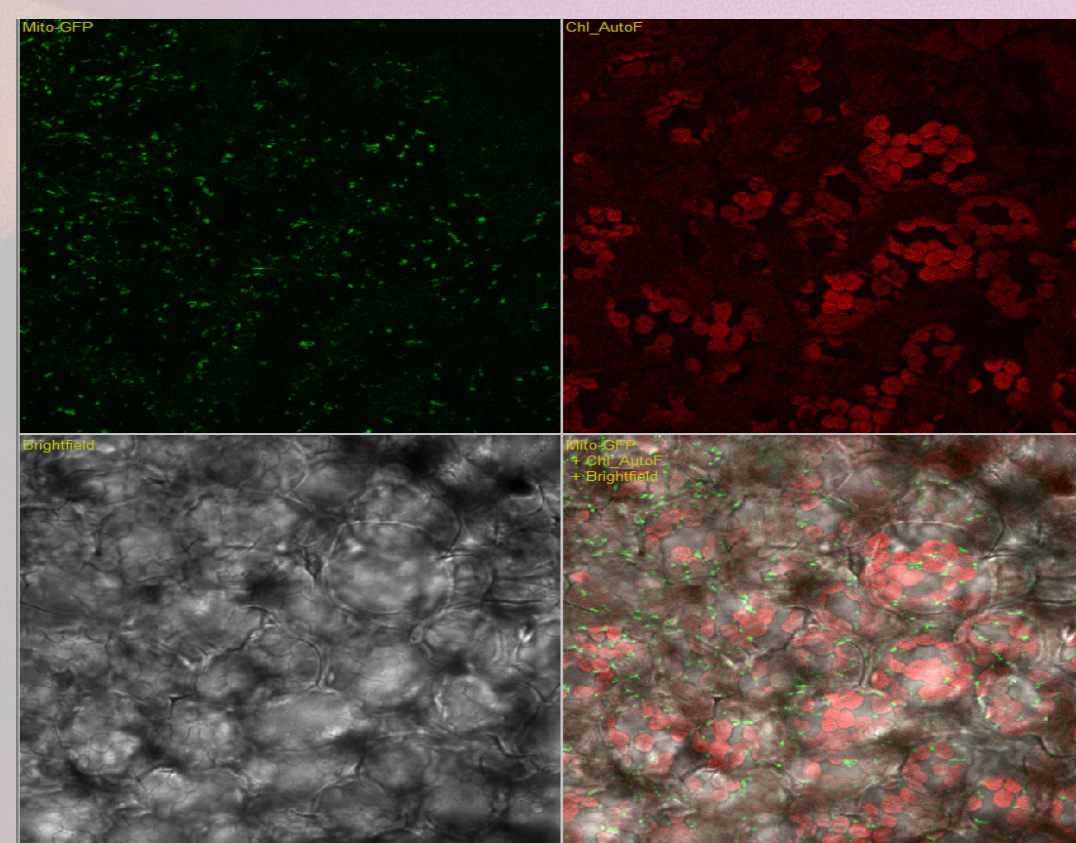
2D Imaging: Zeiss Axiovert- M200, Germany, Arabidopsis Thaliana- the leaves were dissected by putting the leaf sample under two cover slips with a drop of water on the leaf.

3D Imaging: Andor Spinning Disk Confocal, Excitation Laser at 488nm. The emission for the mitochondria is 520 nm and it showed green. The emission for the chloroplast is 650nm and it showed red. We used 100nm images and the stepsize between the optical planes was 500nm.

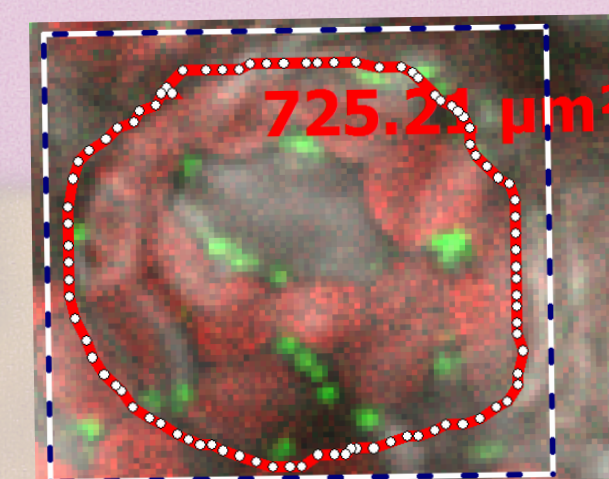


These are the Arabidopsis plants that were grown in ambient and elevated CO₂ levels.

RESULTS



This is a 2D image of the mitochondria (shown in green) and chloroplast (shown in red) in individual channels. The Axiovision Image Analysis program analyzed the cell data.



This is how we measured the cell area using the program Axiovision.

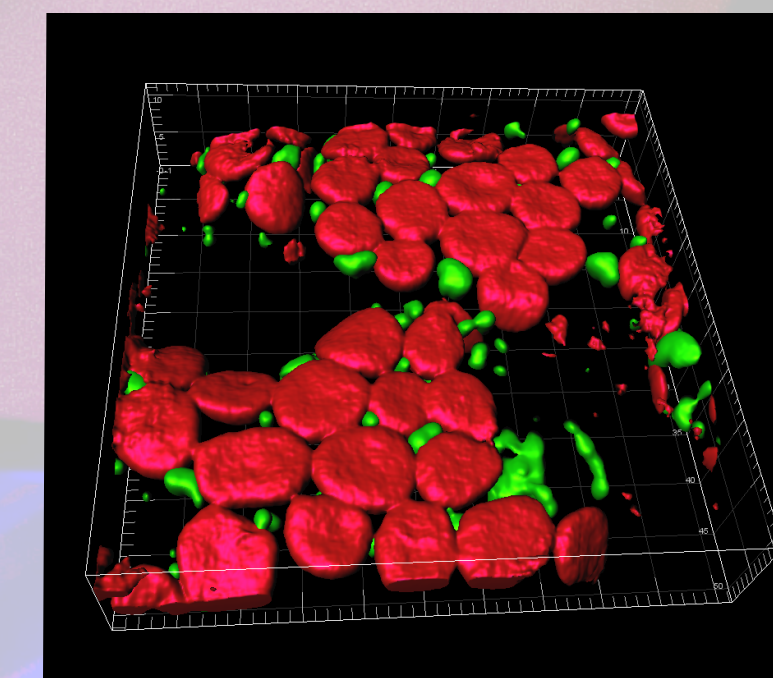
Analysis of differences in mitochondria and chloroplast areas in plants grown in the ambient and elevated CO₂ levels.

Positions/Sample	Mito Area	Chloroplast Area	Cell Area	Mito/Cdl %	Chloroplast/Cdl %
Ambient CO ₂					
Pos-1	188.13	144.3	725.21	25.94	19.9
Pos-2	65.91	192.55	1341.07	4.91	14.36
Pos-3	143.99	1097.6	1854.91	7.76	59.17
Mean	132.68	478.15		12.87	31.14
Elevated CO ₂					
Pos-1	79.51	345.51	2343.15	3.39	14.75
Pos2	30.72	212.18	2258.8	1.36	9.39
Pos-3	54.54	512.28	1272.21	4.29	40.27
Mean	54.92	356.66		3.01	21.47

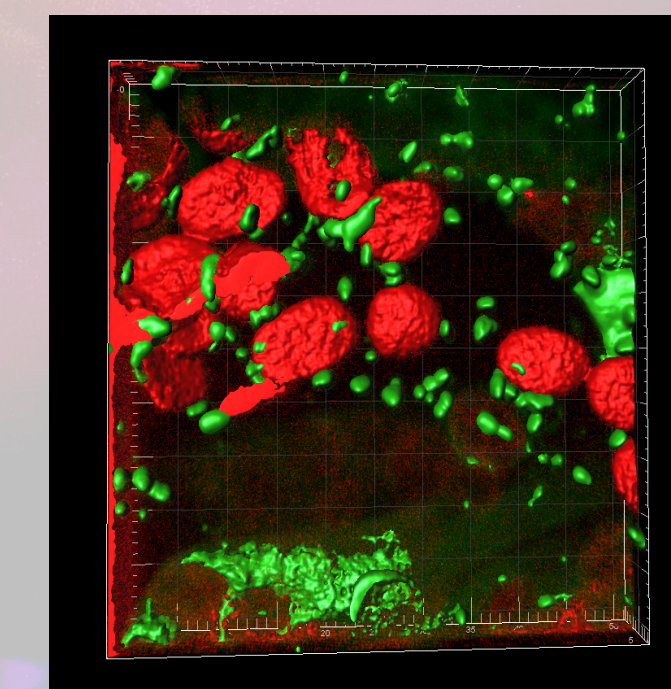
DISCUSSION AND CONCLUSION

Mitochondria and chloroplasts are important in a plant's survival, as they provide the plant with energy. This experiment showed that plants in an elevated CO₂ environment produce less mitochondria and chloroplasts than those that were grown in an ambient CO₂ environment.

3D PICTURES TAKEN FROM IMARIS



Ambient conditions



Elevated CO₂ conditions



ANDOR Spinning Disk Confocal Microscope used for 3D Imaging

ACKNOWLEDGEMENTS

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