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The Effects of Environmental Stress on *Arabidopsis thaliana* Establishment and Development

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INTRODUCTION

- *Arabidopsis thaliana* is a model organism that can be applied to agricultural species.
- Drought and high temperature effects were applied to the seedlings to mimic climate change.
- Question: How is the adult plant affected by delayed seedling establishment due to the effects of climate change?

METHODS

- Seeds were sterilized and cold treated at 4 C for 4 days.
- Seeds were plated on MS media and germinated vertically at 20 C, 24 C, or 30 C for 4 days.
- Seedlings were then imaged at 20 C, 24 C, or 30 C and imaged every 4 hours over 8 hours.
- Seedlings were transferred into soil and received either 125 mL, 250 mL, or 500 mL of water.

DISCUSSION

- The plants were old enough to measure leaf area but flowering time and seed number were not measured.
- Optimal growth for the seedling were at 24 C when receiving 500 mL of water.
- The adult plants survived but there was no measurement on whether their offspring would be viable.

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RESULTS

Figure 1. Average Leaf Area of Seedlings at 24 C

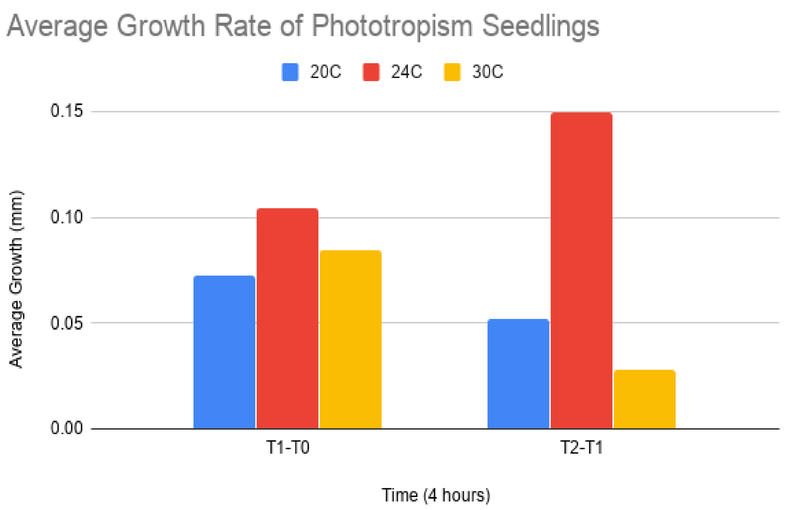

Figure 1. Average Leaf Area of Seedlings at 24 C: The figure shows the average leaf area of the *Arabidopsis thaliana* plants over 3 weeks. The seedlings were germinated at 24 C. Six seedlings were planted into three separate pots that were watered either 125 mL, 250 mL, or 500 mL. The leaf area of each pot was measured using ImageJ and was then averaged.

Figure 2. Average Leaf Area of Seedlings 24 C vs. 30 C

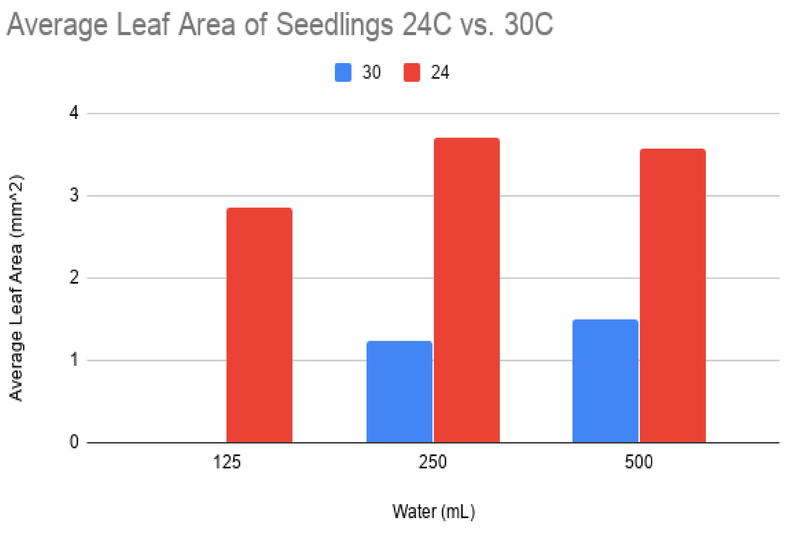

Figure 2. Average Leaf Area of Seedlings 24 C vs. 30 C: The figure shows the average leaf area of the *Arabidopsis thaliana* plants over one time period. The seedlings were germinated at 24 C or 30 C before being planted. Six seedlings were planted into three separate pots that were watered either 125 mL, 250 mL, or 500 mL. The leaf area of each pot was measured using ImageJ and was then averaged.

Figure 3. Average Growth Rate of Phototropism Seedlings

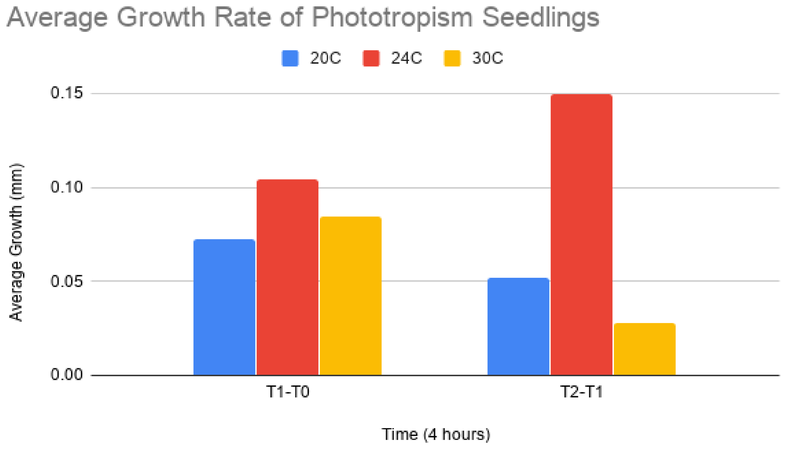

Figure 3. Average Growth Rate of Phototropism Seedlings: The seedlings were sterilized and then cold treat at 4 ºC for three days. The seedlings were then pipetted onto an MS plate and stored vertically for germinated at 20 ºC, 24ºC, and 30 ºC. The seedlings were imaged at time 0 (T0) and then continued to grow in the dark for 4 hours (T1) and then imaged again. The seedlings then continued to grow under a blue light for 4 more hours and were imaged again. The seedlings hypocotyl length in mm was then measured using ImageJ. The average growth rate was found by subtracting T_1 by T_0 or T_2 by T_1 and then dividing the growth in by 4 hours.