Gravitropism of Radish Seeds in Microgravity

Concord, North Carolina

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Introduction

- In the 2016-2017 school year, our school participated in the Student Spaceflight Experiments Program (SSEP).
- Our proposal, *Gravitropism in Microgravity*, was selected to be sent aboard the International Space Station with many other experiments.
- The experiment was sent in August and came back in late September.
Our Experiment

• The purpose of our experiment: To find the differences between germinated radish seeds in gravity and microgravity

• The Question: How does gravitropism vary in these different environments?
The Purpose

• To find out if plants can develop properly outside of Earth's gravity
• Germination is the first stage of a plant's growth, so it is important it happens properly.
• Agriculture in space could benefit astronauts in many ways.
Gravitropism

- Gravitropism is a plant's response to the stimuli of gravity.
- It occurs when starch granules in amyloplasts settle to the bottom of the organelle due to gravity.
- This causes a set of reactions to occur, which leads to the release of IAA.
Gravitropism (Continued)

- Gravitropism allows the shoot of the plant to grow upwards, against gravity.
- IAA slows growth in the roots, while stimulating it in the shoot.
Our Hypothesis

• Our hypothesis: In space, the germinated seeds will have longer shoots and shorter roots.
• We also believe the shoots and roots will grow in random directions.
• These will be the results of a lack of gravitropism.
Our Experiment Aboard the ISS

- The FME Mini-Lab contains three compartments.
- The first contains 3.4 ml of water, the second having 2.5 ml of soil with three *Raphanus* sativus seeds, and the third containing 2.5 ml of Formalin.
# Requested Interactions

<table>
<thead>
<tr>
<th>Time</th>
<th>Requested Interaction</th>
<th>Occurring Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>A = 0</td>
<td>Remove Clamp A, shake vigorously</td>
<td>Water is released into the soil, activating germination</td>
</tr>
<tr>
<td>U - 14</td>
<td>Remove Clamp B, shake vigorously for 20 seconds</td>
<td>Formalin is released, ending the experiment and preserving the specimens</td>
</tr>
</tbody>
</table>

![Type 3 FME Mini-Lab Diagram](image-url)
Results

• After our harvest and analysis on September 26, 2017, we observed that the lengths and visible characteristics of all germinated seeds were very similar.
Conclusion

• We have concluded that germination is not hindered by microgravity or varied gravitropism, and that our hypothesis was incorrect.

• Germination is too early in a plant’s development to be greatly affected by gravitropism’s importance.
Partners

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References


