The Effects of Gravitropism on Seed Germination

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Gravitropism is a natural phenomenon occurring within plants that allows for the direction of roots and stems to be oriented to the strongest gravitational field for optimized growth and germination. It was hypothesized that if a plant could not use gravitropism in its germination process, root length would be stunted, and the direction of root growth would not be uniform. In three petri dishes, nine seeds were placed in a 3x3 grid formation with nutrient growth agar. The petri dishes were then placed in different gravity environments, including constant gravity, minorly distorted gravity, and microgravity. Data was analyzed with two unpaired, two-tailed t-tests. After six to seven days in simulated gravity environments, seeds that were germinated in constant gravity produced an average root length of 25mm, seeds germinated in minorly-distorted gravity produced lengths of 20mm, and seeds in microgravity produced root lengths of 10mm. Seeds in constant gravity also grew in a more uniform direction than seeds in microgravity, which grew in various directions. The p-value for the t-test between constant and microgravity was 0.000105. This study showed that seeds germinated in microgravity would take longer times to grow into full maturity in environments such as Space, but it is possible to produce fresh, edible food. Astronauts could use natural food sources such as plants to produce fresh, healthy foods on Space expeditions where prepackaged food is not feasible to transport.

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