An Analysis of Mizuna (Brassica rapa var. Nipposinica) Grown to Maturity in a Microgravity Environment

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Before plants can be used as a food source for interplanetary missions, research must be conducted to determine the effects of microgravity on the growth of plants. This experiment was conducted to analyze overall growth, chlorophyll levels, auxin levels, and nutritional value of plants grown to maturity in microgravity. A microgravity environment was simulated using a 2-dimensional clinostat to displace the center of gravity. Mizuna plants were grown for 30 days in controlled and microgravity environments, then harvested. Leaves and roots were weighed, the number of leaves over 5 cm was counted, chlorophyll levels were measured, a colorimetric analysis was performed to detect auxin, and an elemental analysis was completed. This experiment demonstrated that when plants are grown in a microgravity environment, they have decreased leaf and root mass, lower chlorophyll levels, and higher auxin levels when compared to plants grown in a control environment. Statistical significance was determined using a two-tailed heteroscedastic t-test at a=0.05. Nutritional value of the plants varied depending on the micronutrient. The difference in the number of leaves over 5 cm was not statistically significant between the data sets. Further research will be needed to determine ways to increase plant growth in microgravity, decrease auxin levels, and further analyze nutritional value if we are to use plants as a reliable food source for extended extraplanetary missions.

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