



**CALIFORNIA STATE SCIENCE FAIR  
2002 PROJECT SUMMARY**

<b>Name(s)</b> <b>Fei Gu</b>	<b>Project Number</b> <b>S1610</b>
<b>Project Title</b> <b>Geotropism: A Study of the Effects of Simulated Micro and Fractional Gravity on the Growth of Maize</b>	
<b>Objectives/Goals</b> My objective was to determine if growing maize in a simulated micro and fractional gravity environment would have any effect on the growth of maize in terms of height and leaf area.	
<b>Abstract</b> <b>Methods/Materials</b> Four identical clinostat devices were constructed using stepper motors and wood. Plastic plates were attached to the motor shafts and four cans were glued to the plates into which potting soil and a single corn seed was placed. The clinostat array was then put into an environmental chamber suited to grow corn and the plates were rotated at a rate of 2.5 RPM. After one week of growth, one half of the test subjects were removed from the chamber for analysis. Stalk height was measured with a ruler. Leaf area was measured by stripping the leaves off of the stalk and scanning the leaves in to a flatbed scanner. A computer program was then used to count the number of pixels of green registered by the scanner. This number was then converted in to dots per inch and then into area in centimeters cubed. Cross-sections of the stalk were analyzed for any abnormalities in stalk structure. After two weeks of growth the other half of the subjects were removed for the same tests. After this was completed, the soil was changed, new seeds were inserted, and the clinostat array was rotated 7.5 degrees for a new set of tests. By rotating the clinostat in this manner, it was possible to study the effects of not only simulated micro gravity on the growth of maize, but the effects of fractional gravity as well as the percentage of gravitational force experienced by the test subjects in a clinostat is proportional to the sine function of degree of tilt of the clinostat. This procedure was repeated until the range of 0 to 90 degrees was covered in 7.5 degree increments.	
<b>Results</b> It was found that the plants exposed to lowered gravity levels consistently grew taller and had more leaf area than those that experienced more gravity. However, it was also found that the plants exposed to lowered gravity grew to be weaker structurally than those that were exposed to higher gravity.	
<b>Conclusions/Discussion</b> In conclusion, maize responds to lowered gravity levels by growing to be taller and growing more leaf area in exchange for structural integrity. Also, the effects of simulated altered gravity are more profound during the early stages of maize development and while they exist, are not as extreme in later development.	
<b>Summary Statement</b> My project is a study of the effects that simulated altered gravity levels have on the growth of maize.	
<b>Help Received</b> My mother helped pay for the science fair board.	