

NASA's

real world problems of growing food in space inspired teachers Meghan White, Connor Tait, and Kara Quinlan to create a project that would combine plant biology concepts and scientific methods with the motivation of an actual challenge—growing food with no natural light, no gravity, and hardly any space. They wanted each of their 11th grade scientists to have the opportunity to solve NASA's challenge regarding improving botanical methods for astronauts on the International Space Station. Students created a plant scientific research proposal and poster for NASA's Growing Beyond Earth Maker Challenge. By participating in professional experiments, students had the opportunity to increase their scientific literacy and practices.

To start, students uncovered their own previous understandings about photosynthesis and botany and created research questions that they wanted to pursue. Each scientist designed their own plant experiment and took independent, control, and plant growth data daily. Each week, teachers modeled and scaffolded the research and scientific writing process step by step for their research proposals and scientific posters. Multiple peer, group, teacher, and professional critiques with rubrics spurred students to revise and improve before they turned in their final product to NASA for exhibition.



GROWING BEYOND EARTH

ELEVENTH GRADE • BIOLOGY • ENVIRONMENTAL SCIENCE

HIGH TECH HIGH CHULA VISTA

MEGHAN WHITE • CONNOR TAIT • KARA QUINLAN



LEARNING GOALS

- To understand photosynthesis and the constraints of growing in space
- To understand and practice experimental methods
- To learn to record, monitor, and analyze data using spreadsheets
- To develop scientific writing, critique, and editing skills

Next, the team participated in NASA and Fairchild Botanical Garden's Growing Beyond Earth (GBE) experiment, where NASA sent them lettuce seed species to test. Students set up the GBE experiment, planted space lettuce, and monitored growth, biomass, temperature, and humidity daily, learning how to monitor and analyze data using Google Sheets.

Finally, students harvested the lettuce and determined which species had the most edible biomass. Students created a scientific poster with methods, data, results, conclusion, and recommendations to NASA about which lettuce species to grow on the International Space Station.





After completing this experiment, each scientist created and wrote their own research proposal and submitted it to NASA for Trial 2 of the Growing Beyond Earth challenge. When accepted, the whole team will present its research in Florida at the John F. Kennedy Space Center.

SCAFFOLDING

Teachers created models of final products. They supported the scientific writing process by breaking down each section with feedback and critique from peers and teachers with a rubric, vocabulary word walls, annotation strategies for scientific articles with new material, and used visuals for directions.

EXHIBITION

Students presented their experiments and posters during a school-wide Winter Exhibition. They also submitted their research posters and proposals to NASA and the Fairchild Botanical Garden's Growing Beyond Earth research contest. The team was accepted and the students have the honor of participating in NASA's second phase of the challenge.

