

Preparation for the proof of concept flight of the Veggie plant growth chamber

Gioia Massa¹, Robert Morrow², Mary Hummerick³, Gerard Newsham³ and Raymond Wheeler¹

1. Surface Systems Division, Mail Code NE-S-1, Kennedy Space Center, FL 32899
2. Orbital Technologies Corporation, 1212 Fourier Drive, Madison, WI 53717
3. ESC Team QNA, Mail Code ESC-24, Kennedy Space Center, FL 32899

Email addresses: gioia.massa@nasa.gov, morrowr@orbitec.com, mary.e.hummerick@nasa.gov, gerard.newsham-1@nasa.gov, raymond.m.wheeler@nasa.gov

Key Words: Food Production, Spaceflight, Habitation, International Space Station

Veggie is a small plant growth chamber designed and built by ORBITEC that will fly to the International Space Station on SpaceX-3, scheduled for the summer of 2013. Ultimately Veggie will be used for research, education and outreach, and crew recreation. We want to demonstrate the functionality of this hardware by testing a scenario that could allow the crew to grow and consume fresh vegetables. Veggie will be collapsed and transported flat in a cargo transfer bag, and deployed on orbit, where it will be installed in an EXPRESS rack. The chamber consists of three subsystems: an LED light cap, a transparent bellows, and a root mat reservoir assembly. The bellows and flexible support arms allow the distance between plants and light cap to be adjusted for different ages and types of plants. Researchers at Kennedy Space Center and ORBITEC have been working to develop the plant growth interfaces for the proof of concept flight. We have developed a rooting pillow, consisting of a small bag containing media, time release fertilizer, seeds, and a wicking surface to conduct water from the root mat reservoir. Prototype pillows have been tested and results have influenced the design of flight pillows, which will be modified for microgravity from flight-approved materials. Several studies have been conducted selecting species and comparing media types in analog systems. Water content seems to be the most important factor differentiating media types in these small growth volumes (100 mL). Media type also influenced microbial levels on plants. Since produce sanitizing agents are not currently approved for growing food crops on orbit, plants and media types having very low microbial levels are being selected. Lettuce, mizuna, and other salad greens typically have microbial counts less than 10^4 colony forming units and thus are good candidates for spaceflight. As we approach flight verification testing, we will finalize species, media selection, harvesting, and microbial sampling procedures. Next steps include testing of Veggie flight and ground hardware and associated equipment. This research was funded by NASA.