

Advanced Plant Habitat

The Advanced Plant Habitat (APH) is a fully automated plant growth facility that will be used to conduct plant bioscience research on the International Space Station. The system requires minimal crew involvement to install the science, add water, and for other maintenance activities.

The system was developed by NASA and ORBITEC of Madison, Wisconsin. The system's components are managed by and processed for flight at the agency's Kennedy Space Center in Florida.

The APH is a fully enclosed, closed-loop system with an environmentally controlled growth chamber. The plant habitat uses red, blue and green LED lights, and broad spectrum white LED lights. The system contains more than 180 sensors, relaying real-time information, including temperature, oxygen content and moisture levels (in the air and soil, near the plant roots, and at the stem and leaf level), back to the team at Kennedy.

The APH will be launched to the space station on a Commercial Resupply Services mission and installed in a standard EXPedite the PProcessing of Experiments to Space Station (EXPRESS) rack in the Japanese Experiment Module Kibo. Arabidopsis seeds, small flowering plants related to cabbage and mustard, will

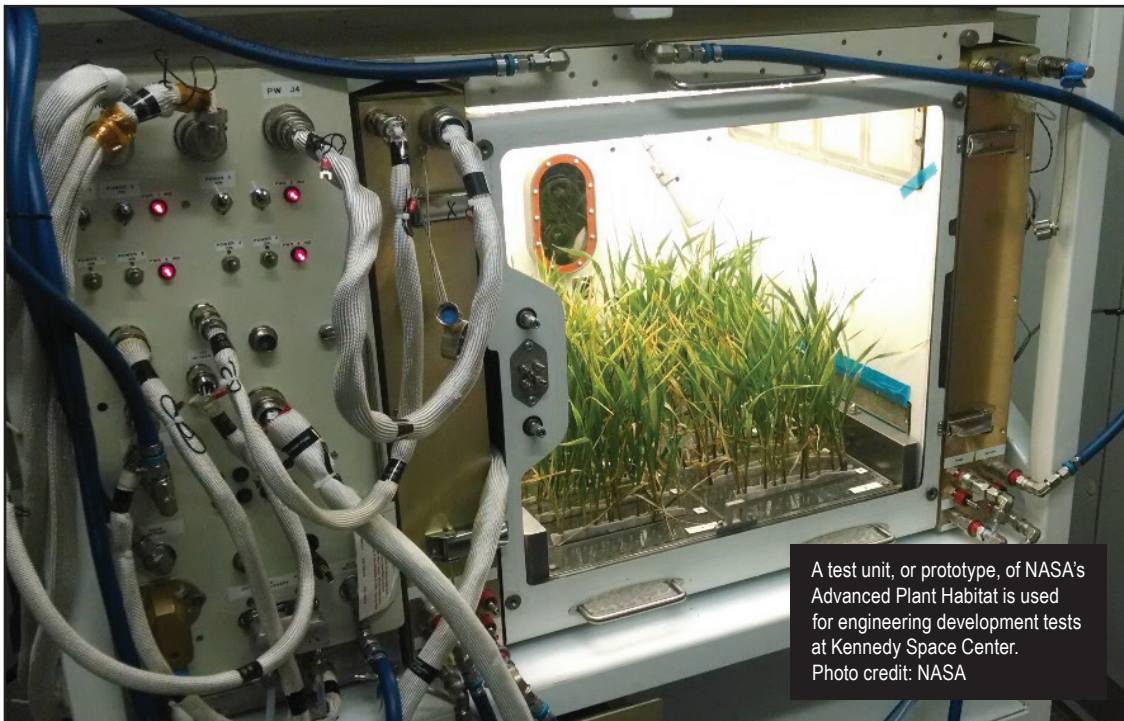
be the first plant experiment grown in the chamber. The experiment is called Plant Habitat 1, or PH-01. Before PH-01 is initiated, there will be a short grow out of Dwarf Wheat and Arabidopsis as part of the post-installation checkout on the space station.

The large, enclosed chamber is designed to support commercial and fundamental plant research or other bioscience research aboard the space station for up to a 135-day science investigation, and designed for at least one year of continuous operation without maintenance. The design of the plant habitat is based on an open architecture concept to allow critical subsystems to be removed and replaced aboard the space station.

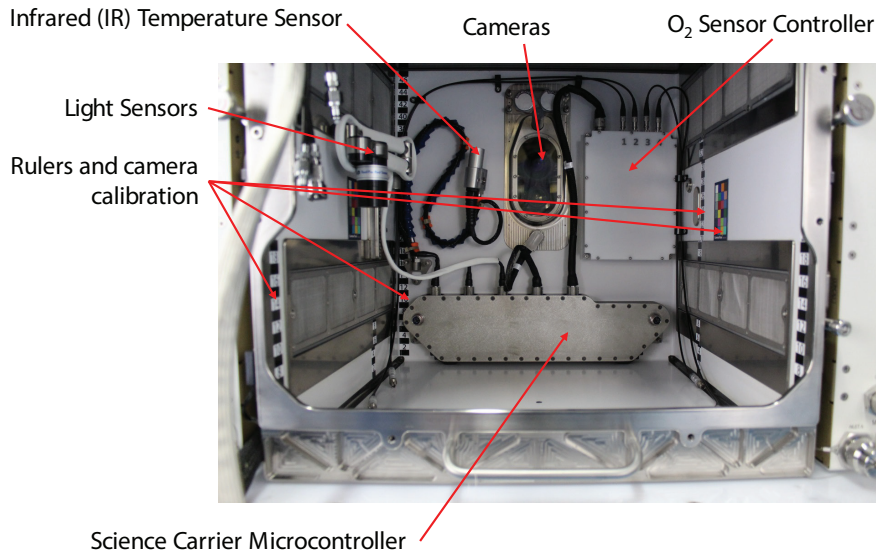
The APH will be activated by astronauts aboard the space station but will be controlled by the team at Kennedy, minimizing the amount of crew time needed to grow the plants.

The system's Plant Habitat Avionics Real-Time Manager in EXPRESS Rack, or PHARMER, will provide real-time data telemetry, remote commanding and photo downlink to the team at Kennedy. The APH has an active watering system with sensors that will detect when the plants need water and keep water flowing as needed.

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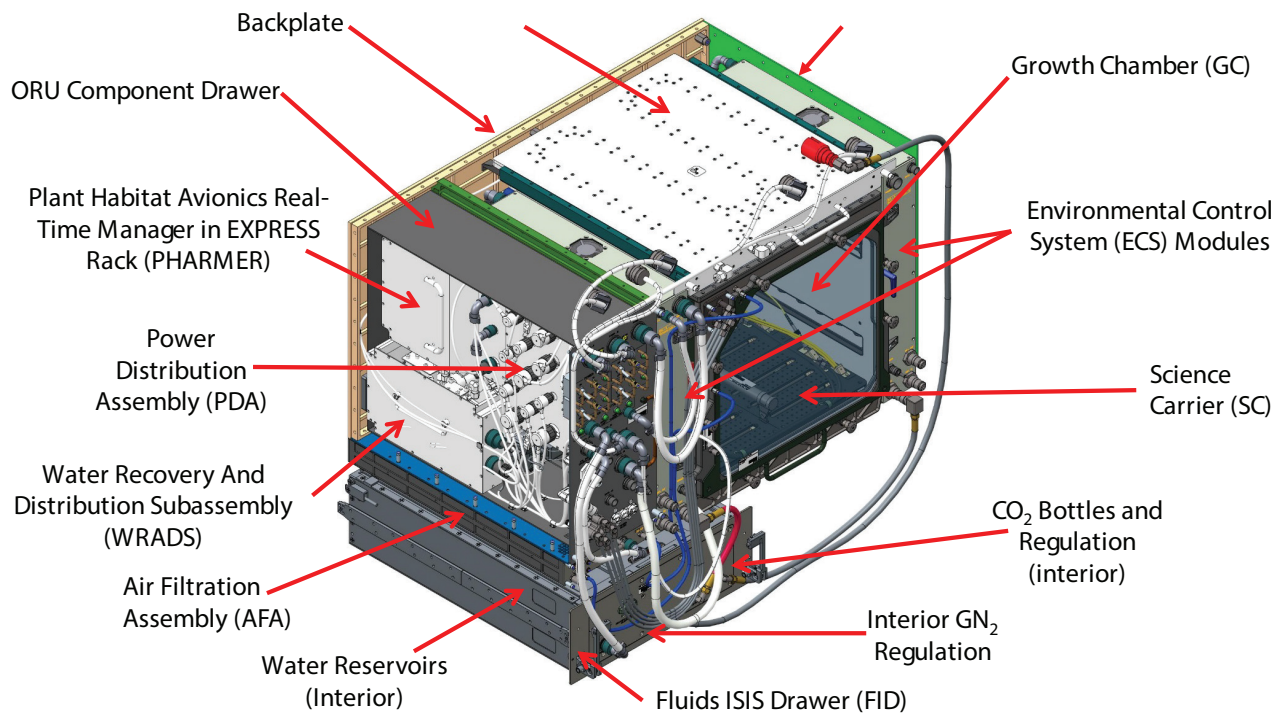


A test unit, or prototype, of NASA's Advanced Plant Habitat is used for engineering development tests at Kennedy Space Center. Photo credit: NASA



Advanced Plant Habitat Components

- Structural Mounting Assembly
- Air Filtration Assembly (provides filtered air to the system)
- Plant Habitat Facility Kits (includes hoses, water bags, syringes)
- Science Carrier (the tray that the plants will grow in)
- Growth Chamber (enclosed volume that the plants will grow in)
- Environmental Control System (ECS) (Growth Chamber temperature, humidity and air flow control)
- Fluid International Subrack Interface Standard Drawer (contains the carbon dioxide bottles, water reservoirs and gaseous nitrogen regulation)
- Orbital Replacement Unit Component Drawer (water distribution system, power system and main computer, or PHARMER)
- Growth Light Assembly (lighting system)



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National Aeronautics and Space Administration

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