



APH

Advanced Plant Habitat (APH)*

*Currently Under Development

The Advanced Plant Habitat (APH) hardware will be a large growth volume plant habitat, capable of hosting multi-generational studies, in which environmental variables (e.g., temperature, relative humidity, carbon dioxide level, light intensity and spectral quality) can be tracked and controlled in support of whole plant physiological testing and Bio-regenerative Life Support System investigations.

Specifications and Environmental Conditions:

Plant experiments up to 135 days

Front and Top View Windows

Porous Tubes/Solid Media contained within Removable Science Carrier Tray

Max. Shoot Height: 45 cm

Root Zone Height: 5 cm

Growth Area: 1,708 cm²

Growth Volume: 112,500 cm³

Light Provision

- 0-1000 $\mu\text{mol m}^{-2} \text{s}^{-1}$ Photosynthetic Photon Flux (PPF) in increments of 50 (internal PPF Sensor)
- Red (630-660 nm), Blue (450 \pm 10 nm), Green (525 \pm 10 nm), Far Red (730 nm), White
- Uniformity: \pm 15% (15 cm below light bank, 5 cm in from wall)

Relative Humidity (RH)

- RH Controlled/Monitored: 50-86% (\pm 5%)
- RH Condensate Measured and Recycled

Carbon Dioxide (CO₂)

- CO₂ Controlled/Monitored: 400-5000 ppm (\pm 50 ppm)
- Internal CO₂ Sensor
- CO₂ Draw-Down Capability

Air Quality

- Air Flow: Controlled between 0.3-1.5 m/s
- Ethylene: Scrubbed to \leq 25 ppb
- Air Filtration
- Air Sampling Ports

Water Quality

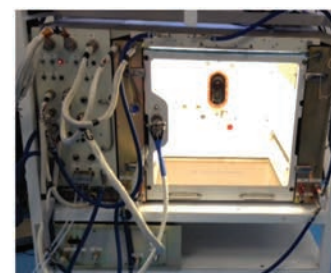
- Water and Nutrient Delivery
- Water Sampling Ports

Temperature

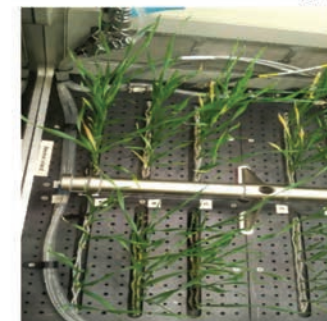
- 18-30°C (\pm 1°C)
- Leaf Temperature Sensor

Root and Shoot Zone

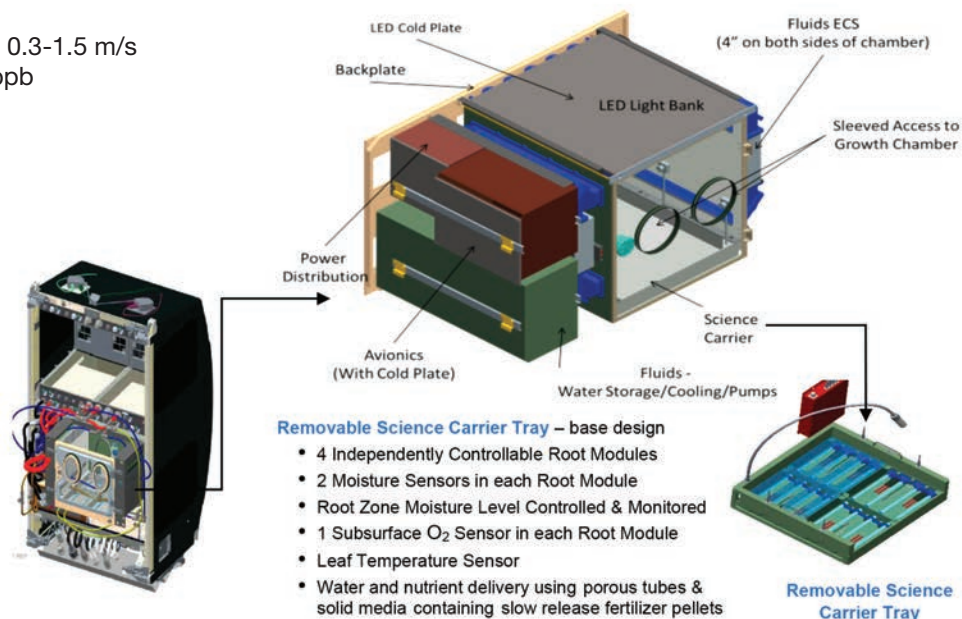
- Root Zone Moisture Level Controlled/Monitored
- O₂ Sensors in both Shoot & Root Zone



Advanced Plant Habitat Prototype



Plant Test #1 at 20 days after planting within the APH prototype



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