

# Operational Evaluation of the Root Modules of the Advanced Plant Habitat.

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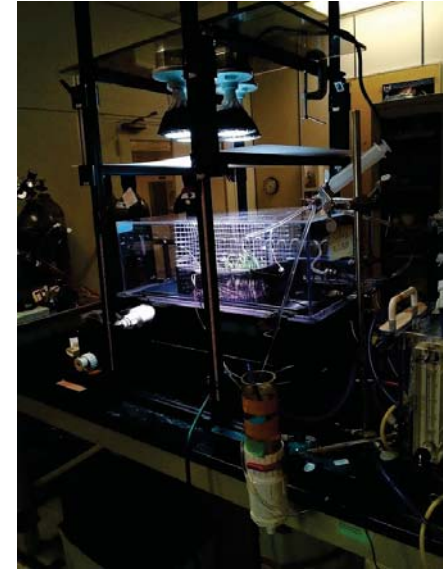
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# Operational Evaluation

- Photosynthetic and growth data were collected on APH Root Module
- Stand pipe system for active moisture control
- Tested germination in wicks
  -
- Evaluated EC-5 moisture sensors
- Demonstrated that Wheat plants can grow in the APH Root Module

# Controlled Growth Environment System

- I. Homogenous Lighting System
- II. Root Zone Moisture Control
  - I. 3D Printed Root Module/Manifold
  - II. Water Manifold with Porous Tubes
  - III. Passive Suction Control (Stand Pipe)
  - IV. EC-5 Moisture Sensor
- III. Atmospheric Monitoring and Control

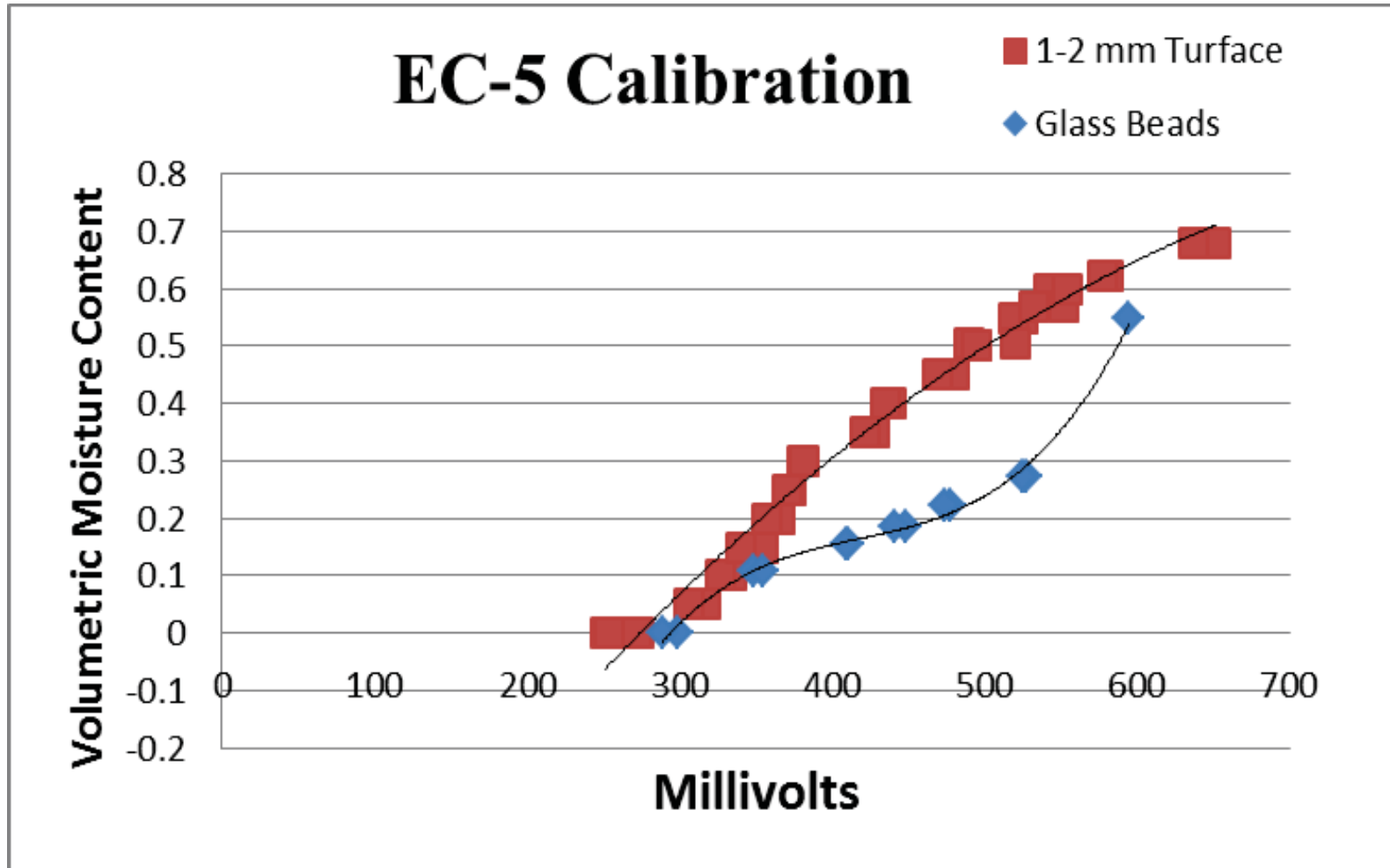


# Cultural activities

- EC-5 Moisture sensor calibration (Volumetric Moisture Content)
  - Glass beads and Turface 1-2mm
  - Mix media with water to known VMC and insert sensor, record mV
- Moisture sensor placement
  - Stand pipe system to control moisture in root module
  - Bottom of tray is flooded
  - Top of tray determines VMC for germination
- High fidelity germination studies
  - Root module with manifold
  - Used old BPS Mott porous tubes
  - Primed tubes and they remained primed for 10+ days
  - Turface with Nutricote 18-6-8 at 20 g/ml
  - High CO<sub>2</sub> and PPF
  - Wick trade studies – Nytex, Crew wipes (BPS), Cap Mat2 (Veggie)
  - Planted 10 seeds per row – 660 plants/m<sup>2</sup>

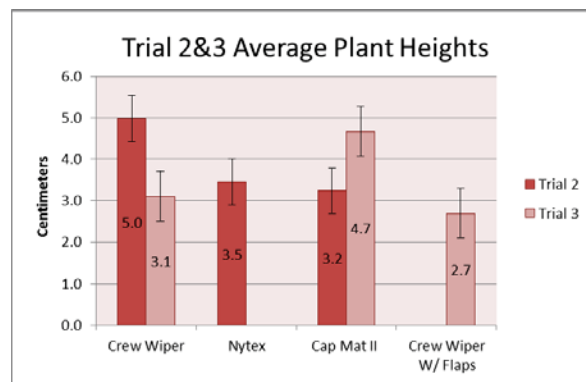
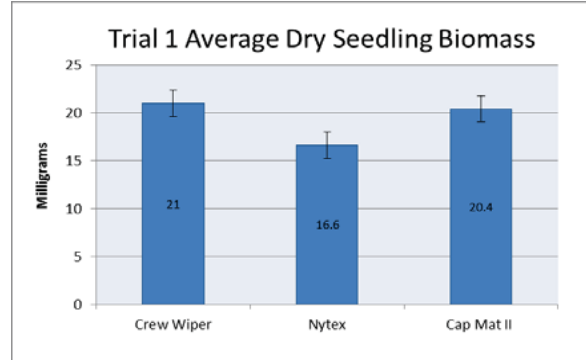


# Decagon EC-5 Calibration

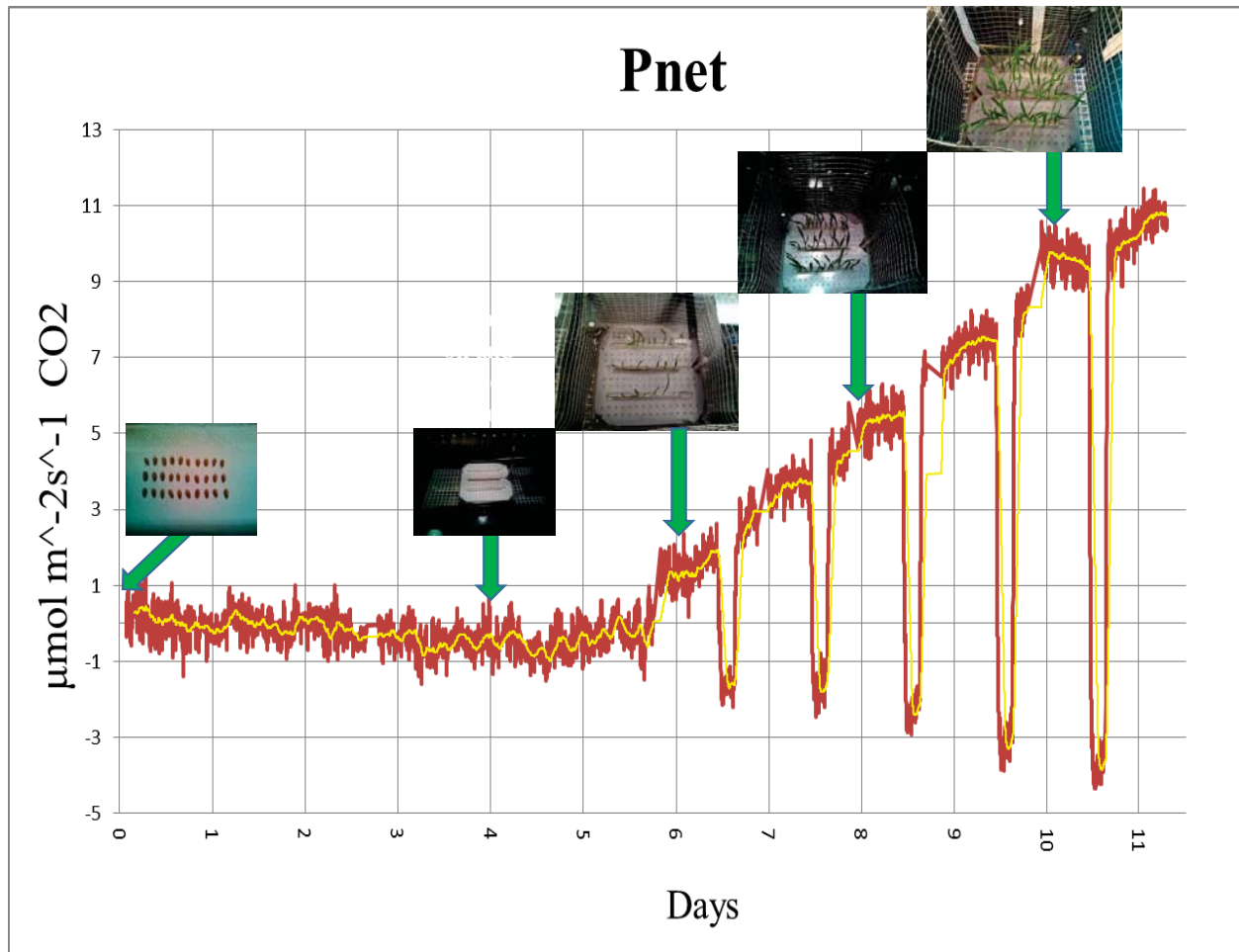


# Germination/Early Growth Studies

- I. Four separate trials of thirty *Triticum aestivum* L. cv. Apogee plants
  - I. Wicks: Nitex, Cap Mat II, Crew Wiper
  - II. Foams: Pyrell, Melamine



# Plant Stand Photosynthesis



## Conditions

Media: 1-2 mm  
Surface w/ 20 g/L  
of 18-6-8  
Nutricote

Light: 600 PAR  
20/4 photoperiod

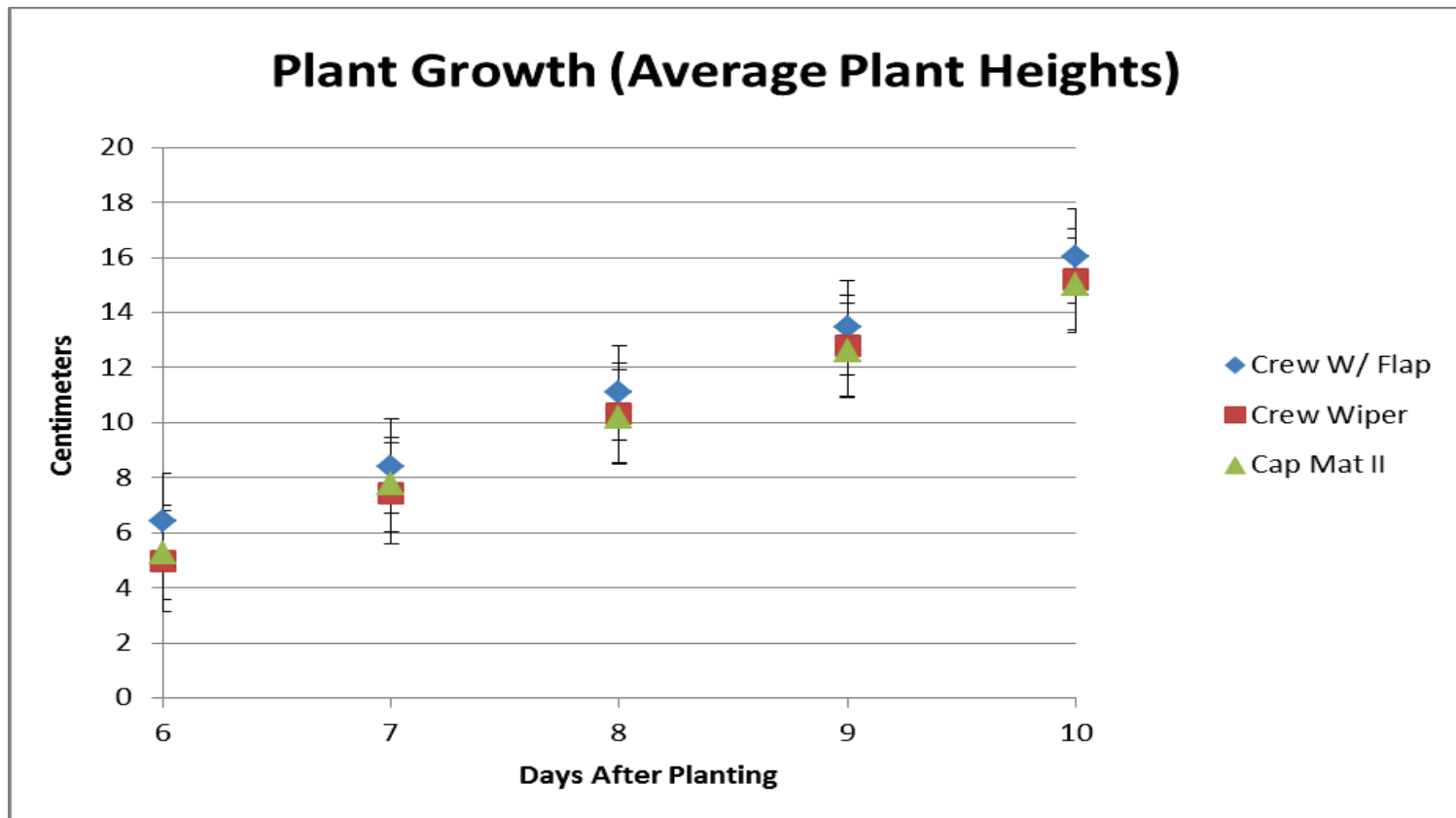
CO<sub>2</sub>: ~1500 PPM

VMC: 0.55 top /  
0.7 bottom (-2  
suction)

Relative  
Humidity:  
uncontrolled

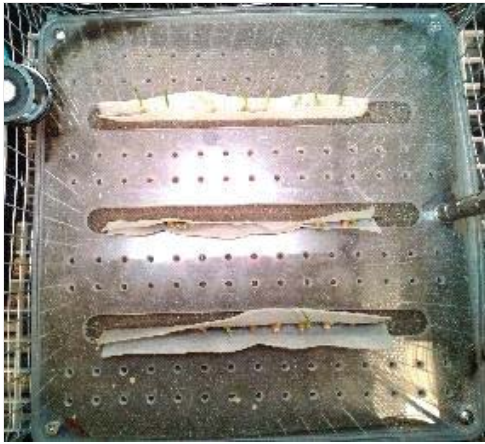
# Plant Growth

Plant heights were measured live, every day after the first day of witnessed growth. Additional growth rates are still being characterized by selectively harvesting batches of plants from each wick every 5 days to record biomasses.

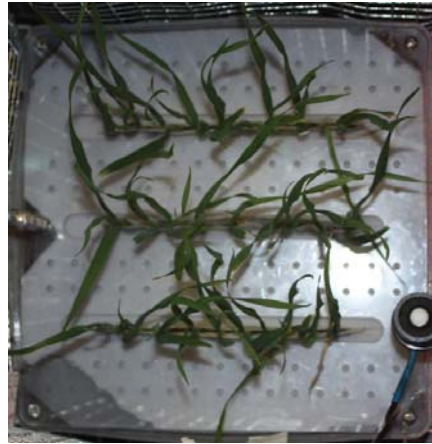




# Wheat Growth – 45 Days After Planting



Germination 4 DAP



10 DAP



Harvest 45 DAP