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The Veggie Vegetable Production System On The ISS: A Tool For Addressing Space Food Production Challenges

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The Veggie Vegetable Production System On The ISS: A Tool For Addressing Space Food Production Challenges


NASA and URS Federal Services, Kennedy Space Center, FL, USA
Veggie on ISS
Crop Selection for VEG-01

- Reliable germination
- Rapid growth
- Attractiveness
- Low native microbial levels
- Palatability / acceptability
- Antioxidants

VEG-01 consisted of two sets of ‘Outredgeous’ lettuce and one set of ‘Profusion’ zinnia pillows.
Key Points:
• Demonstrated plant growth in Veggie
• Identified watering challenges
• Samples returned and analyzed for food safety and nutrient content
• Gained approval for crew to grow and consume second crop
See metadata page for streaming video
Key Points:

- Better mitigation of water issues
- Tested produce sanitization
- Produce consumed by the crew
- Sub-samples returned and analyzed for food safety and nutrient content
VEG-01B Harvest (August 2015)

See metadata page for streaming video
Astronaut Comments

- **Scott Kelly**
  - the logistical complexity of having people live and work in space for long periods
  - the supply chain that is required
  - For Mars, need a space craft that is more self-sustainable with regards to its food supply

- **Kjell Lindgren**
  - benefit of eating the fresh food
  - contribution that plants have to the ISS ecosystem
  - psychological benefit - it’s really fun to see green growing things in the sterile environment of the ISS
VEG-01C - Third Crop – Zinnia  
(November 2015-February 2016)

Key Points:

• Flowering and seed formation tested in Veggie
• Long duration growth test
• Identified airflow challenges and issues with excess water
• Tested fungal mitigation techniques
• Demonstration of independent crew gardening
Water Issues / Consequences

Guttation and Leaf Curling

Fungal Development & Abnormal Growth
Zinnia Action Shots
And they bloomed, and bloomed...
90 DAI: Harvest on February 14, 2016

See metadata page for streaming video
Valentine’s Day Bouquet on the ISS
Key Points:

- Cut-and-come-again repetitive harvesting tested
- ‘Tokyo Bekana’ Chinese cabbage tested
- Varietal response to elevated CO$_2$ identified
VEG-03C Cut-and-Come-Again
Happy Crew
Key Points:

• Second Veggie unit installed
• Mixed crops growing simultaneously
• Additional new crops tested
• Staggered planting in two veggies for near-continuous harvest cycle
VEG-03E & F - A Tale of Two Veggies
VEG-03 G, H, I - New Crops on Orbit

- Red Russian Kale
- *Dragoon Lettuce
- Wasabi Mustard
- *Extra Dwarf Pak Choy
- Outredgeous lettuce

Three sets will be grown in different combinations

* = Student Selected Crops!
VEG-03H – Wasabi and Pak
Thank you!

- Veggie and VEG teams at KSC and SNC-ORBITEC
- Astronauts Steve Swanson, Rick Mastracchio, Scott Kelly, Kjell Lindgren, Shane Kimbrough, Peggy Whitson, Jack Fischer, Joe Acaba, Scott Tingle, Serena Auñón-Chancellor, Alex Gerst
- Payload Operations and Integration Center
- NASA’s Space Biology Program, ISS Program, Human Research Program