Reconsidering Tree Fruit as Candidate Crops Through the Use of Rapid Cycle Crop Breeding Technologies

Presented by:

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Overview

• Dwarfing Revisited
• Tree Crop Exclusion
  • Architecture; Juvenility; Dormancy; Harvest Index
• FasTrack™ Crop Breeding System
  • Prunus domestica (plums)
• Tree Crop Inclusion
• Current State of Development
• Q & A
Dwarfing Work at KSC
Root Restriction

Lighting

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Tree Fruit Incompatibility

- It’s not just about size
- Dormancy
  - Environment control/volume challenges
  - Punctuated production
- Juvenility
  - Fruit takes a while
- Harvest index concerns
  - CHO sequestration to support tissue
Tree Fruit Incompatibility

Architecture

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Tree Fruit Incompatibility

Dormancy

Photo by: Connie Painter

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Tree Fruit Incompatibility

Juvenility
Tree Fruit Incompatibility
Candidate crops restricted to herbaceous crops

Tree fruit crops *could* contribute significantly to health crew diet and other ALS objectives...

Tree fruits precluded based on:

- Stature/size
- Long maturation phase
- Dormancy requirements
- Harvest Index

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The challenge is...

Develop tree fruit cultivars that conform to the requirements of planetary exploration design reference mission life-support systems
FasTrack Breeding System

Developed by USDA (Kearneysville, WV)

- Breeding disease resistance
- Breeding better traits
- Stay ahead of disease

Flowering Locus T Gene – *Populus trichocarpa*

*Prunus domestica*
Incompatibilities

- Architecture
- Dormancy
- Juvenility
- Harvest index

Have been overcome???
Phenotypic characteristics of FT plums.

Potential Benefits & Outcomes

• Improved crew diet/nutrition (functional foods)
• Bone loss prevention/countermeasure
• Radiation countermeasure
• Water filtration
• ISRU
• System carbon capacitance
• Biomaterials & fibers
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Questions?

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¿QUESTIONS?

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