Rootstock Scion Combination Observations
2018 Western Maryland Regional Fruit Meeting
February 16, 2018

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Keedysville Trials

- High Density system for Western Maryland
- Rootstock evaluation
- Comparison of propagation methods
tissue culture (TC) vs stoolbed (SB)

<table>
<thead>
<tr>
<th>Variety</th>
<th>Description</th>
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<tbody>
<tr>
<td>G.202</td>
<td>Resistant to Fire Blight and Wooly Apple Aphid</td>
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<tr>
<td>G.202TC</td>
<td>Tissue Culture</td>
</tr>
<tr>
<td>G.41</td>
<td>Dwarfing rootstock, Resistant to Fire Blight and Crown Rot</td>
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<tr>
<td>G.935</td>
<td>Dwarfing rootstock, Resistant to Fire Blight and Crown Rot</td>
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</table>
• Set in April 2010 (Latin Square)
• Trained to tall-spindle system: 6x12’
• 7 trees per panel
• Irrigated
• Trellis is 4 wire top wire 9’ 6”
Planting at Keedysville WMREC

Data
- Fruit Quality
- Tree Size
- Productivity
- Tree Survival
What have we observed
Tree Size 2012 & 13 Height & Diameter (by 3\textsuperscript{rd} leaf most of space was filled)

Gala Circumference

<table>
<thead>
<tr>
<th></th>
<th>G.202</th>
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Cripps Pink Circumference

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Gala Height

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Cripps Pink Height

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Fruit Quality

No significant differences

Between rootstocks

- Color
- Soluble solids (°Brix)
- Firmness (kg)
- Starch content
## Fruit Size

### Gala - Fruit Weight (g)


### Cripps Pink - Fruit Weight (g)


### Gala

G.202 smaller fruit

### Cripps Pink

Not significantly different by root
Gala Yield

G.202 – significantly lower yields each year 2013-2015

G.202 – Significantly lower cumulative yields
Cripps Pink Yield

Pink Lady - Yield per Tree (kg)

CP - Cumulative Yield 2012-15 (kg)

No significant differences in Yield between rootstocks

2014 2pt. Sevin
2015 2pt. Sevin + 64 oz. Maxcel
Tree Survival

Storm Damage July 2011
2015 Cripps Pink yield per tree and survival at Keedysville

<table>
<thead>
<tr>
<th>Rootstock</th>
<th>Yield (kg/tree)</th>
<th>Survival (%)</th>
</tr>
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<tbody>
<tr>
<td>G.41</td>
<td>21.4</td>
<td>54</td>
</tr>
<tr>
<td>G.935</td>
<td>14.3</td>
<td>68</td>
</tr>
<tr>
<td>G.202</td>
<td>15.4</td>
<td>100</td>
</tr>
<tr>
<td>G.202 (TC)</td>
<td>20.3</td>
<td>96</td>
</tr>
<tr>
<td>Brookfield Gala</td>
<td>Cripps Pink</td>
<td>Key</td>
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<td>202TC</td>
</tr>
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- Gala (not significant)
- G.202TC (3)
- G.935 (1)

- Cripps Pink
  - G.202 and G.202TC nearly 100% survival
  - G.41 (13)
  - G.935 (9)

**G.41 Cripps Pink**
4/25 bloom
5/4 bloom
storms/wind
30 mph
5/8
6/9 high
Wind 40 mph/hail

August 25, 2015
A few thoughts

- **TC** trees are big
- **Fruit Quality** not significantly different between rootstocks 2012-2015
- **Gala on G.202**: significantly smaller fruit and lower yields (annual and cumulative) but trees hold up
- **Cripps Pink Tree Losses**: Significantly higher tree losses for G.41 and G.935 than G.202 and G.202TC
  - All graft union breaks in severe wind
Continued

• **Graft union strength** may be variety specific

• **High Density Systems**: Management may prove to be a challenge in the Mid-Atlantic

  ❖ **Continue Regional Field Testing**: Tailor scion/rootstock selection & management to region

  ❖ **Project to dissect graft unions**: learn exactly what the default is how soon it shows up

  ❖ **Develop a “fast” diagnostic tool**: determine the likelihood of incompatibility
Mitigating fire blight in high density apple orchards

2018 Bay Area Fruit School
University of Maryland Extension
Wye Research and Education Center
Queenstown, MD

February 21, 2018
Fire blight challenges in Pennsylvania and Maryland: Diverse growing systems
Mitigating shoot blight phase of fire blight: taking into consideration diverse growing systems

- Controlling for fire blight – conditions during post bloom critical for fire blight management
  - Managing shoot blight until shoots harden off (early July)

- No one-size-fits all solution ➔
  Young dwarf trees concerns (Age 0 - ~5 yr old)
  - Close spacing of fire blight susceptible cultivars
  - **Renewal** pruning procedures = vulnerabilities

- Low rates of prohexadione calcium
Prohexadione calcium (ProCa) and apple trees

- Controls tree vigor by reducing terminal growth

- Shoots harden off = not susceptible to shoot blight caused *E. amylovora* infection

- Typically applied when 3 inches of vegetative shoot growth present
  - ~ King bloom petal fall
  - 10 – 14 days to see the effect of ProCa
Fire blight management on dwarf trees: Evaluation of low doses of ProCa in PA

• How does it affect the rate of shoot growth throughout the season?

• How does it affect the severity of fire blight (whether or not shoot growth is affected)?

Goal:
Achieving fire blight suppression without slowing the development of the bearing surface in trees still filling their space
Fire blight management on dwarf trees: Evaluation of low doses of ProCa

University of Maryland Orchards, Keedysville, MD
- In collaboration with UMD Extension and Penn State
- Funded by The State Horticultural Society of Maryland
- ProCa evaluated: Apogee

- 2016 (a bust) and 2017 (much better!) seasons

- Similar experiments were performed at PSU FREC using Kudos (ProCa) on Crimson Crisp/M.9
@ UMD Orchards, 2017: Using low rates of Apogee on dwarf trees to manage fire blight

- 2 cultivars: Brookfield Gala and Cripps Pink; each on different Geneva rootstocks trained to tall spindle training system (2010 planting; trees had moderate vigor)

- Four spray applications (@ 1, 2, and 4 oz per A):
  - Petal fall: 20 Apr
  - First Cover: 4 May
  - Third cover: 6 June
  - Sixth cover: 11 July

- Completely random block design with four multi-tree replications

- Fire blight severity determined by inoculated shoots; shoot growth measured on uninoculated shoots of same tree

- Shoots inoculated: 27 April
Current year’s growth: Apogee at a rate as low as 1 oz/A reduces severity of fire blight on ‘Gala’

Research @ PSU:
1 oz/A on Crimson Crisp did not reduce fire blight severity

Reduction of growth observed (both at PSU and UMD):
1 oz: 11%
2 and 4 oz: 30 – 40%
Current year’s growth: Apogee at high and low rates did not significantly reduce fire blight severity on ‘Cripps Pink’
Current year’s growth: All rates of Apogee reduce fire blight severity when combining all cultivars
Does Apogee prevent infection of renewal shoots...?

- Renewal cuts made during dormant season to encourage renewal shoots
  - 2 apps of Apogee had occurred
  - Inoculations: 30 May
  - Evaluation: 9 June
Renewal shoots: Fire blight severity reduction on ‘Gala’…?
Renewal shoots: Fire blight severity reduction on ‘Cripps Pink’...?
Renewal shoots: When combining cultivars, Apogee did not reduce fire blight severity.
Low dose ProCa applications: Considerations and questions

• Hope for renewal shoots/protecting central leader?
  ➢ To date, results inconsistent, especially for renewal shoots
  ➢ If dwarf trees have reached filled tree space, 2 oz/A is an option
    ➢ First app around petal fall (last strep spray – 10-14 days to kick in)

• Influence of ProCa AFTER infection?

• Influence of tree vigor/rootstock?
  ➢ Variability between rates
  ➢ Variability between varieties
  ➢ Additional research needed
Acknowledgements

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The Maryland State Horticultural Society
Observations

Daybreak Fuji on M 9 337 planted 2012
Honeycrisp on V1, G969, G202, B9, Nic29, and M7, M26 and G11
Other trees planted in spring, 2015 include Fuji budded on G935, G41, G202, G214, G11, G222, Bud 9, M9 (Nic29), M9 (Nakb337) and G42, planted at 6’x12’ and 3’x12’ spacing’s on a four wire 9’ trellis system.
969 Free Standing Planting
Thank you