Apples, Roots

Tree Fruit School 2019

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Industry Trends

• Replant.
• High demand for trees.
• Fewer varieties today.
• 1980’s, Red Delicious = 1/3 of all nursery stock.
• Now, Red Delicious = < 2%
• Redder apples.
• Higher densities.
What’s being grown?

• **Fuji, Gala, Honeycrisp, and managed varieties** dominate
  – Today these varieties are around $\frac{3}{4}$ of all the nursery stock planted.

• **Cosmic Crisp (WA 38)** – 40%+ of all Washington nursery stock in 2018.
  – 12 Million Trees
Managed/Club Varieties

- State sponsored NY, Washington State
- Privately Managed
- Open Clubs Varieties
  - Midwest Apple Improvement Association
  - Others
- New Zealand's Breeding Program
HONEYCRISP

Sometimes the name of an apple says it all. Honeycrisp apples are honey sweet (with a touch of tart) and amazingly crisp. Kids love the taste, and it's easy to see why this recent variety has continued to grow in popularity since its 1991 introduction in Minnesota. More Honeycrisp trees are being planted every year in New York to increase the annual harvest.

PROFILE

Complex, sweet-tart flavor
Juicy
Super-crisp yellow flesh

BEST USES

Excellent for eating and salads
Good for sauces, baking, and pies
Red Strains of Honeycrisp

- **Firestorm Honeycrisp™**
  - Other characteristics identical to Honeycrisp

- **Cameron Select® Honeycrisp**
  - Not a new strain, improved color through budwood selection

- **Royal Red Honeycrisp® (USPP 22,244)**
  - Reddest, maybe less vigorous,
  - May store slightly better than other strains
  - Problems with Geneva® 935
Firestorm™ Honeycrisp

Royal Red Honeycrisp®
Larry Jones, Quincy, Wash
Honeycrisp Strains

• Premier™ Honeycrisp, (USPP 24,833)
  – Ripens three weeks before standard Honeycrisp.
  – Otherwise identical to standard Honeycrisp.
  – Low vigor.
  – May have less bitter pit.
Galas

• **Wildfire™ Gala** *(RKD cv. USPP AF)*
  – Three weeks ahead of standard Gala

• **Buckeye®, Buckeye Prime®, Brookfield®, Foxtrot, Gale®, Pacific®, Others**
  – Red strains still popular
BROOKFIELD® GALA

From New Zealand we bring you the ultimate strip Gala, Brookfield® (Baigent CV). Brookfield® (Baigent) has consistently shown us the strongest striped color we have seen in a Gala. The apple's early color permits proper harvest timing for best storage maturity, flavor retention, and customer satisfaction. Fruit is harvested in two picks for improved packouts. These distinctive features allow crisp, consistently colored and striped fruit to be harvested efficiently, enabling the grower to minimize costs while maintaining higher quality.

ULTIMA GALA®

Ultima Gala® is a limbless, large, thick-walled cold-hardy apple with an abundant annual production. Generally, Galas produce round fruit, but with Extra Gala, round fruit can be produced. Other fruit characteristics are similar to Imperial® Gala.

GALAVAL®
AZTEC FUJI®

DT2 VARIETY

This exciting new, high colored Fuji comes to us from the land down under. Discovered in New Zealand, Aztec Fuji® has the sweet juicy, crisp texture and harvest maturity of standard Fuji. Aztec Fuji® is a blush type and early observations show it to be one of, if not, the highest coloring Fuji sports seen to date.

Aztec Fuji® is a protected trademark of Waimea Variety Management Ltd.
Sun Fuji™, Wafler Nursery

**Sun Fuji™** ripens in late October. Skin is pink-red over yellow. Sweet, fruity, crisp flesh with sub-acid flavor. Extremely firm and outstanding keeper.

Rising Sun Fuji®, Wafler Nursery

**Rising Sun Fuji®** is an early Fuji selection that ripens five to six weeks ahead of popular Fuji and color to a beautiful 70% to 80% bright pinkish red blotch with a red blush.
Managed/Club Varieties

- State sponsored, NY – SnapDragon®, RubyFrost®

**SNAPDRAGON® (NEW!)**

A new New York apple characterized by “monster crunch.” One of its parents is the Honeycrisp, and you’ll love the spicy/sweet flavor. Along with RubyFrost®, SnapDragon is one of two exciting new apples that were 10 years in the making and developed by Cornell University's apple breeding program.

**PROFILE**
Extra sweet and juicy
Crispy texture

**BEST USES**
Excellent eating
Good for salads, recipes, and kids lunches
Managed/Club Varieties

- State sponsored, NY – SnapDragon®®, RubyFrost®

**RUBYFROST® (NEW!)**

A new apple, first planted in 2011 and marketed in 2013, RubyFrost® boasts a beautiful rich color and definitive crisp texture, blending a delicate balance of sweet and tart flavors that make it an ideal pairing with a glass of red wine or a light fresh salad. It’s also a great new baking and recipe ingredient choice. Along with SnapDragon®, RubyFrost is one of two exciting new apples that were 10 years in the making and developed by Cornell University’s apple breeding program.

**PROFILE**

Blend of sweet and tart flavors
Crisp texture

**BEST USES**

Excellent for eating, baking, salads, sauces, and use in recipes
Cosmic Crisp

- State sponsored, WA – Cosmic Crisp

COSMIC CRISP®

Cosmic Crisp is a cross between Honeycrisp. The large, juicy apple and crisp texture. Its exceptional sweetness and tartness make it an eating apple.

(WA-38 CV) USPP #24,210 (Variety reserved for Washington State)
Managed/Club Varieties

• Open Clubs
  – Midwest Apple Improvement Association (Evercrisp®),
  – Pink Lady® Brand
Midwest Apple Improvement Association
Open Club Variety

• Evercrisp®
  – Fuji x Honeycrisp cross
  – Ripens mid-October in Kentucky
  – Great flavor and superb storage
  – Has a less than ideal finish
    • (especially on young trees)
  – Low vigor
  – Has MAIA marketing behind it

• New Introductions from MAIA
New MAIA varieties

- Summerset (MAIA 12)
  - Ripens with Honeycrisp
New MAIA varieties

- **Ludacrisp ® (MAIA-L)**
New MAIA varieties

• Sweet Zinger ®
New MAIA varieties

- Rosalee® (MAIA-11)
Managed/Club Varieties

- Privately Managed
  - Envy®, Jazz®, Kanzi®, Pazazz®, SugarBee®, SweeTango®, Kiku Brand®, Smitten®
Managed/Club Varieties

- Others

- Pacific Rose™
  Pretty in pink.

- Ambrosia™
  Sweet as Honey. Pretty as.
Opal® makes a Difference

1. Crispy, Flavorful & Sweet.

2. Non-Browning

3. Non-GMO

4. [Non-GMO Project Verified logo]
Ambrosia

• Ripens ahead of Red Delicious
  – Harvest timing is critical with Ambrosia

• Patent will be off in 2019
  – Trees are difficult to come by due to budwood shortage
MN 1955
Disease Resistant Varieties

• CrimsonCrisp®
  – Popular farm market variety
  – Also achieving commercial popularity
  – Ripens after Honeycrisp, w/Cortland

• Other disease resistant varieties
  – Initial, Crimson Gold, Galarina, Querina, Winecrisp
Consumer Traits: Texture, Juicy, Flavor, Storability, Sweet and Red, Different Peel and Flesh Colors

Grower Traits: Resistance to Scab, Mildew
Apple Rootstock
DWARF APPLES NOT COMMERCIAL PROMISING.

SUMMARIZED BY
F. H. HALL
FROM BULLETIN BY
U. P. HEDRICK.

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PUBLISHED BY THE DEPARTMENT OF AGRICULTURE.
• Tall Spindle 3x12
• Fruiting Walls 2x10
• Graft union height 3 to 4”
• Raised bed.
• Straight up leaders
• V-system
• Multi-leader
Budagovsky 9 (Bud 9)

- Dwarf (Approx. 30% of Seedling)
- Hardy, Bitterpit, Low Vigor
- Field Resistant* to fire blight

*Resistant doesn’t mean immune
M9-337 | Nic 29 | Pajam 2 | EMLA 9

- Known as “9 clones”, originate from Malling 9
- **Precocious, productive, promotes large fruit size.**
- **Fire blight susceptible** (avoid combining with cultivars like Pink Lady, Crimson Topaz)
- Adaptable to a wide range of soils, **irrigation on sandy sites**
Cornell’s Geneva® Apple Rootstock Program

• Disease Resistant
  – Fire blight resistant
  – Some are replant disease resistant
  – Resistance to Phytophthora

• Productive and Precocious
  – Equivalent or better to other “9-clones”

• Many new introductions
  – Risks are associated with new rootstock (e.g. scion incompatibility and latent virus)
Geneva 11

- Field tested longest
- Similar in size to M9-337
- Moderate resistant to fire blight and Phytophthora
- Less resistant to replant disease
- High yield efficiency
Geneva 41

- Very Productive
- Similar in size to Nic-29
- Replant disease resistant
- Fire blight resistant
- **Brittle** graft union (Honeyscrisp and Pink Lady)
- Cold hardy rootstock
Bud 10

- Productive and precocious
- Similar to 935 size or stronger 9’s
- Winter hardy
- Just getting experience
Geneva 935

- Latent Viruses, grower nursery.
- More vigorous dwarf, M-26 size.
- Very Productive and Precocious

- Good for low-vigor varieties, sandy soils
  - Some incompatible
- Resistant to Fire Blight and Phtophthora
  - Not resistant to Woolly Apple Aphid.
Other Geneva Rootstock

• Geneva 202 and Geneva 222
  – Similar in size to G. 935. Geneva 222 is not be replant tolerant.

• Geneva 16 (virus sensitive) and Geneva 30
  – Both rootstocks are being phased out. Few nurseries are growing these.
  – Many releases, only a few commercially available, even fewer have a long track record in the field.
Geneva 213, New Release

- Very good productivity
- Similar in size to Nic-29
- Replant disease tolerant
- Very Fire Blight resistant
- Cold hardy?????
- Resistant to Wooly Aphid
Geneva 814, New Release

- Very good productivity
- Similar in size to 935
- Replant disease tolerant
- Fire Blight, very resistant
- Cold hardy?
- Not resistant to Wooly Aphid or latent viruses.
Geneva 969

- Excellent productivity
- Similar in size to M-7
- High resistance to Wooly Aphid and Fire Blight
- Replant disease tolerant
- Cold hardy
- **Resistant to latent viruses.**
Geneva 890

- Excellent productivity
- Similar in size to M-7 to M-106
- High resistance to Wooly Aphid and Fire Blight
- Replant disease tolerant
- Cold hardy
- Resistant to latent viruses.
Other Rootstocks

- Vineland Series,
  - V1, V2, M-26 Size
  - V3, V5, V6, 337 Size
  - Productive and some FB resistance
<table>
<thead>
<tr>
<th>Traits</th>
<th>D1148</th>
<th>D1147</th>
<th>D3610</th>
<th>D3539</th>
<th>D4950</th>
<th>D6263</th>
<th>D3609</th>
<th>D4190</th>
<th>D2737</th>
<th>D4951</th>
<th>D3785</th>
<th>D3540</th>
<th>D5107</th>
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</thead>
<tbody>
<tr>
<td>Arranged in order by size (smallest to largest)</td>
<td>M.9 T337</td>
<td>M.9 T337</td>
<td>M.9 T337</td>
<td>M.9 T337</td>
<td>M.9/M.26</td>
<td>M.26</td>
<td>M.26</td>
<td>M.26</td>
<td>M.7</td>
<td>M.7</td>
<td>M.7</td>
<td>M.7/M.M.106</td>
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<tr>
<td>Woolly Apple Aphid Resistance</td>
<td>No</td>
<td>No</td>
<td>High</td>
<td>High</td>
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<td>No</td>
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<tr>
<td>Fire Blight Resistance</td>
<td>Resistant</td>
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<td>Very Resistant</td>
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<td>Replant Disease Complex Resistance</td>
<td>Partial</td>
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<td>Tolerant</td>
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<tr>
<td>Crown and Root Rots (Phytophthora)</td>
<td>Tolerant</td>
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<tr>
<td>Cold Hardiness</td>
<td>Yes</td>
<td>Partial: Good Midwinter, Bad early cold</td>
<td>Yes</td>
<td>TBD</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes-Good, Midwinter</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
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<tr>
<td>Productivity/Yield Efficiency- as good or better than M.9</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
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<td>Yes</td>
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<td>Low suckering and burr knots</td>
<td>Yes</td>
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<td>Medium</td>
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<td>Yes</td>
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<td>Yes</td>
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<tr>
<td>Susceptibility to latent viruses</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
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<td>Yes</td>
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TBD: To Be Determined.

Remarks: G.41 has presented weak graft unions with the following scions: Cripps Pink, Scilate, and Honeycrisp. The well feathered trees are prone to breakage in strong winds in the first 2-3 years and additional care needs to be taken to prevent breakage. Breakage risk decreases with time.
Released GENEVA® Apple Rootstocks Arranged by Tree Size

M.27 Size

M.9 T337

M.9 PAJ 2

M.26

M.7-MM106

Seedling Size

G.65

G.11

G.41

G.214

G.935

G.969

G.814

G.935

G.222

G.30

G.213

G.202

G.210

G.890

The GENEVA® Apple Rootstocks perform differently in Washington State conditions in comparison to the data displayed here that was collected in New York State.

Please contact your local extension agent for growing predictions for these varieties in your region.
Released GENEVA® Apple Rootstocks Arranged by Tree Size

New Releases

V3, V5, V6
Nic 29
B9 B10
M.9 PAJ 2
M.9 T337
M.26
M.27 Size

G.65 G.11 G.41 G.214 G.935 G.969
G.16 G.213 G.814 G.222 G.30 G.210
G.202 G.890

Seedling Size

M.7-MM106

The GENEVA® Apple Rootstocks perform differently in Washington State conditions in comparison to the data displayed here that was collected in New York State.

Please contact your local extension agent for growing predictions for these varieties in your region.
Released Geneva® Apple Rootstocks
Arranged by Tree Size

Leaders

Nic 29
M.9 T337
M.9 PAJ 2
M.26 Size
M.7-MM106 Size

G.65
G.11
G.41
G.16
G.935
G.214
G.202
G.30
G.969
G.210
G.890

New Releases

Seedling Size
<table>
<thead>
<tr>
<th>Rootstock</th>
<th>Vigor (TCSA, cm²)</th>
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<tbody>
<tr>
<td>B.70-30-20</td>
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<tr>
<td>B.67-30-20</td>
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<td>B.6-3-190</td>
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<tr>
<td>B.7-3-190</td>
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<tr>
<td>B.7-3-1-11</td>
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<td>B.7-0-2-0</td>
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<td>B.7-0-2-6</td>
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<td>B.7-0-9-90</td>
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<td>C.G.4004</td>
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<td>C.G.9112</td>
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<td>M.26</td>
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<td>M.9Pajam</td>
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<td>M.337</td>
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<td>B.9</td>
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2017 tree vigor, ‘Honeycrisp’ Trial, Sparta, MI

Vigor (TCSA, cm²)
### Sparta NC-140 Honeycrisp/Rootstock Trial 2013-2017

#### Average Percent Bitterpit

**Sparta NC-140 Honeycrisp/Rootstock Trial 2013-2017**

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</table>

**Legend:**
- **2013**
- **2015**
- **2016**
- **2017**
What’s Next

• Higher Densities
• Fruit Walls, Super Spindle
• Hedging
• Mechanization
• Platforms, Harvest Machines, etc
Bi-Axe
1200 Trees/Acre
3 x 12
Thank you!

Tree Fruit School 2019

Philip Schwallier

Clarksville Research Center
Michigan State University