

Apples, Roots

Tree Fruit School 2019

Philip Schwallier

Clarksville Research Center
Michigan State University



SUMMIT TREE SALES

REPRESENTING THE COUNTRY'S FINEST NURSERIES

MICHIGAN STATE
UNIVERSITY
EXTENSION

MICHIGAN STATE UNIVERSITY
AgBioResearch

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 Zealands 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



Foxtrot Gala



Gale Gala



Buckeye®
Prime Gala



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.



Pacific Gala



ULTIMA GALA®

USPP #13,753
Ultima Gala® is a limb r discovered in Wenatch a very high color factor an abundant annual pr Generally, Galas produ round fruit, but with e size well. Other fruit ct similar to Imperial® Gal



GALAVAL®

USPP #19
'Galaval interest by its in with no than ty



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.



September Wonder® Fuji

U.S. PLANT PATENT (PP 11193)

A C&O Exclusive Variety.



Sun Fuji™, Wafler Nursery

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



TopExport® Fuji
U.S. PLANT PATENT (PP 12098)

A C&O Exclusive Variety.



Rising Sun Fuji®, Wafler Nursery

Rising Sun Fuji® is an early Fuji selection that ripens five to six weeks ahead of regular Fuji and colors to a beautiful 70% to 90% bright pinkish red blush with a

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™

(WA-38 CV) USPP #24,210

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

(VARIETY RESERVED FOR WASHINGTON STATE)

CosmicCrisp®

Managed/Club Varieties

- Open Clubs
 - Midwest Apple Improvement Association (Evercrisp®),
 - Pink Lady® Brand

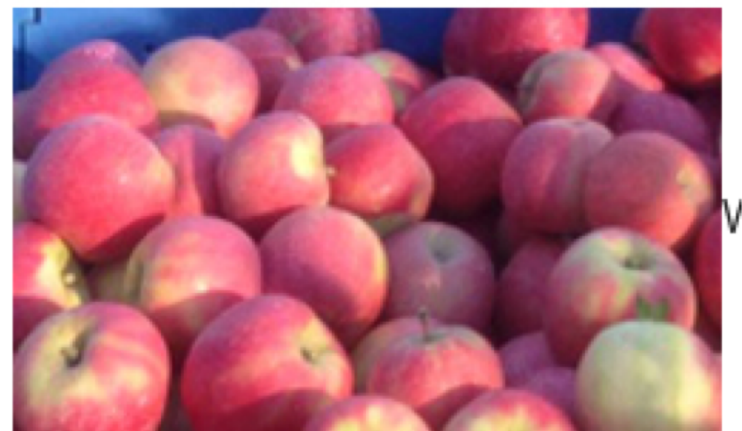


Maslin®



LADY IN RED

(A SPORT OF CRIPPS PINK) USPP #18,787
This high colored Cripps Pink sport was first discovered in 1996 as a chance limb mutation in Hawkes Bay, New Zealand. Color formation begins well over a month before harvest and finishes off with a beautiful, nice, reddish-pink hue. Beyond the high color factor of the cultivar, Lady in Red was shown to mature approximately one week earlier than the Cripps Pink cultivar grown in the same location in New Zealand. As with standard Cripps Pink, Lady in Red may not be suitable for all growing areas due to its late harvest timing.



Barnsby®

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
 - Ludacrisp, Summerset, Rosalee, Sweet Zinger, Baker's Delight, Crunch-a-Bunch.



 EverCrisp®



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[®]



Jazz[®]



Kanzi[®]



smitten.



Envy[®]

WHEN YOU'RE
THIS GOOD
THEY CALL YOU
ENVY.



KIKU[®]



SweeTango

Managed/Club Varieties

- Others



Ambrosia™

Sweet as Honey. Pretty as



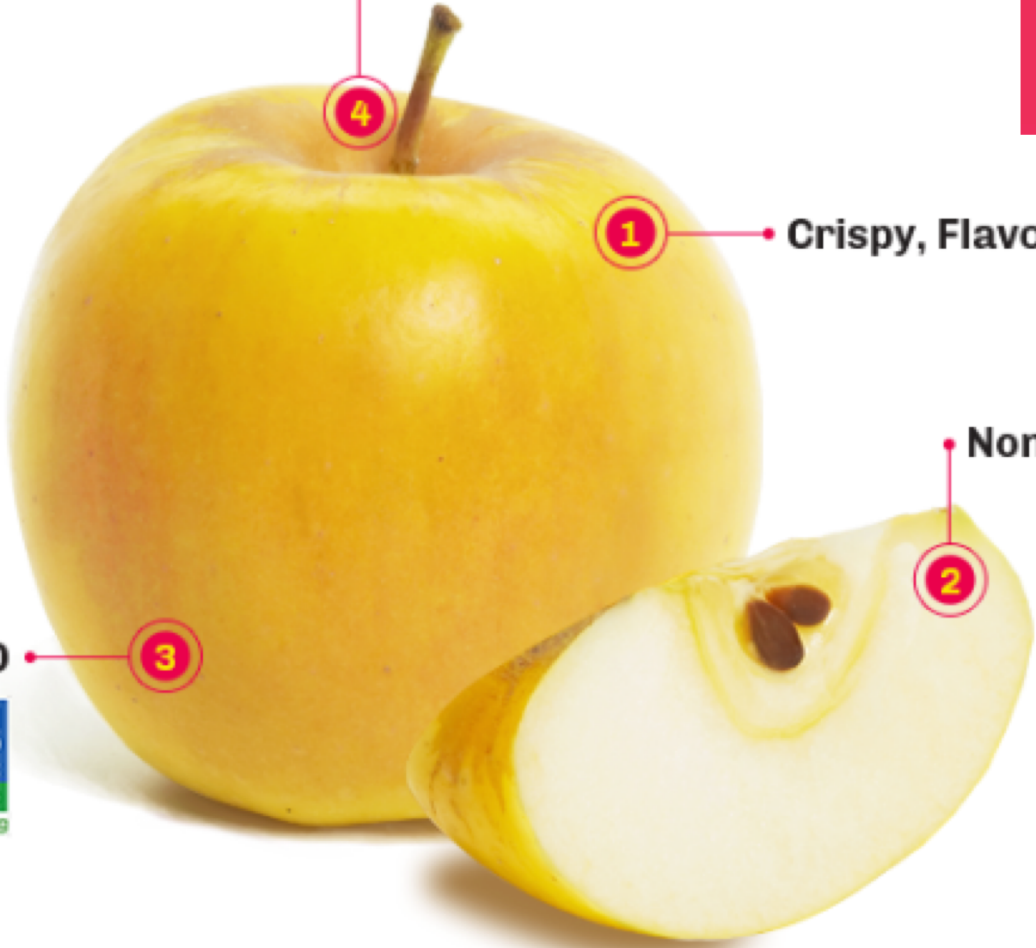
Pacific Rose™

Pretty in pink.





Opal® makes a Difference



1 • **Crispy, Flavorful & Sweet.**

2 • **Non-Browning**

3 • **Non-GMO**



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



Plant & Food **RESEARCH**

RANGAHAU AHUMĀRA KAI



↑ Reception

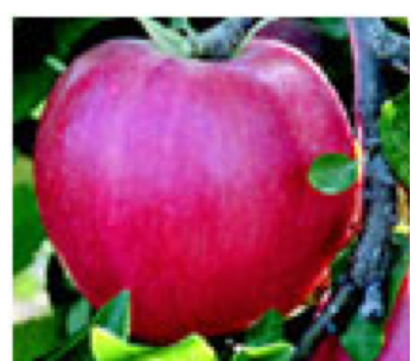
Visitors carpark →



Breeder Richard Volz, Prevar™ CEO Brett Ennis and grower Leon Stallard

Consumer Traits: Texture, Juicy, Flavor, Storability,
Sweet and Red, Different Peel and Flesh Colors

Grower Traits: Resistance to Scab, Mildew





SUMMIT TREE SALES
REPRESENTING THE COUNTRY'S FINEST NURSERIES

Apple Rootstock





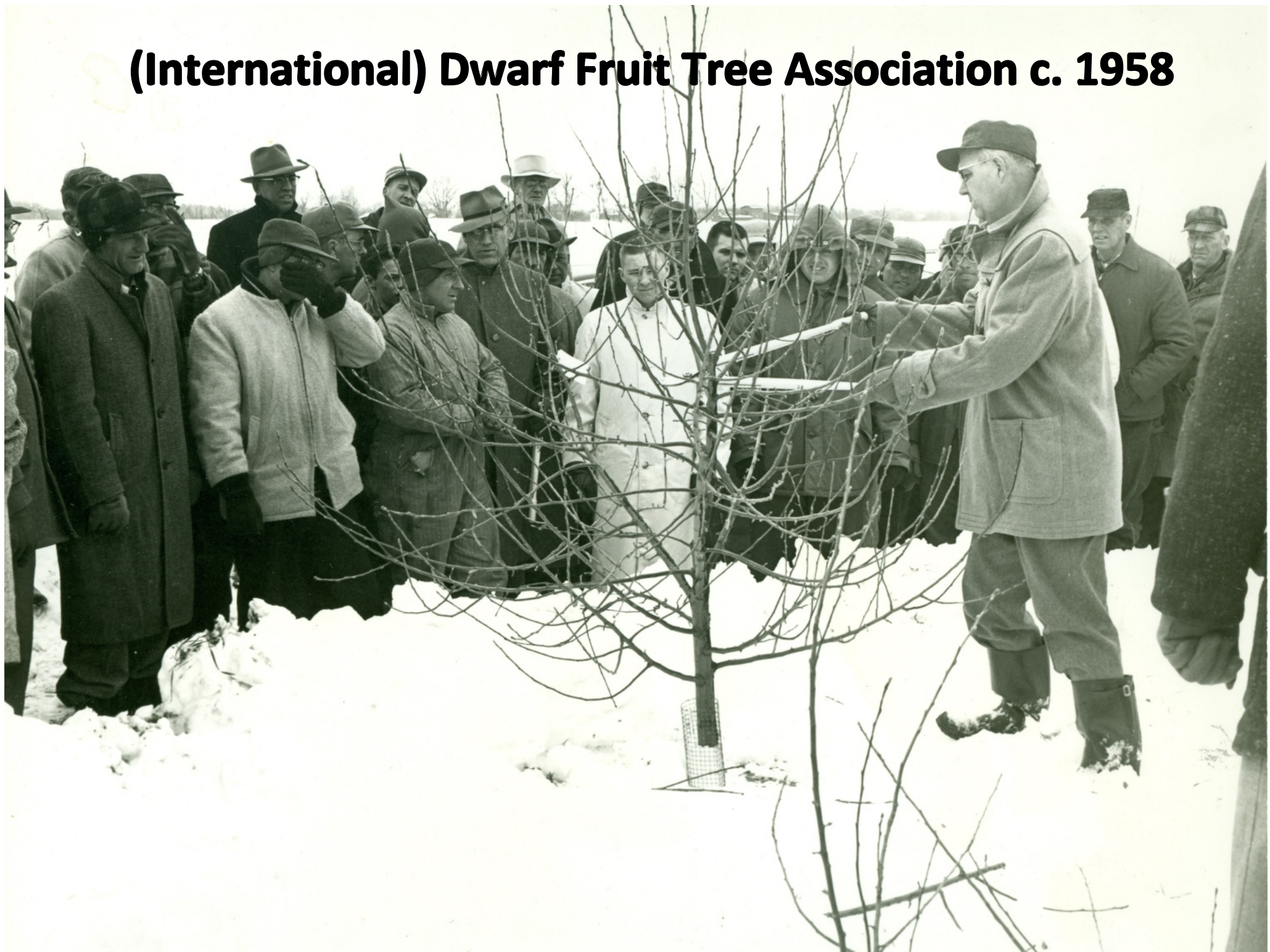


DWARF APPLES NOT COMMERCIALY PROMISING.

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

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

(International) Dwarf Fruit Tree Association c. 1958





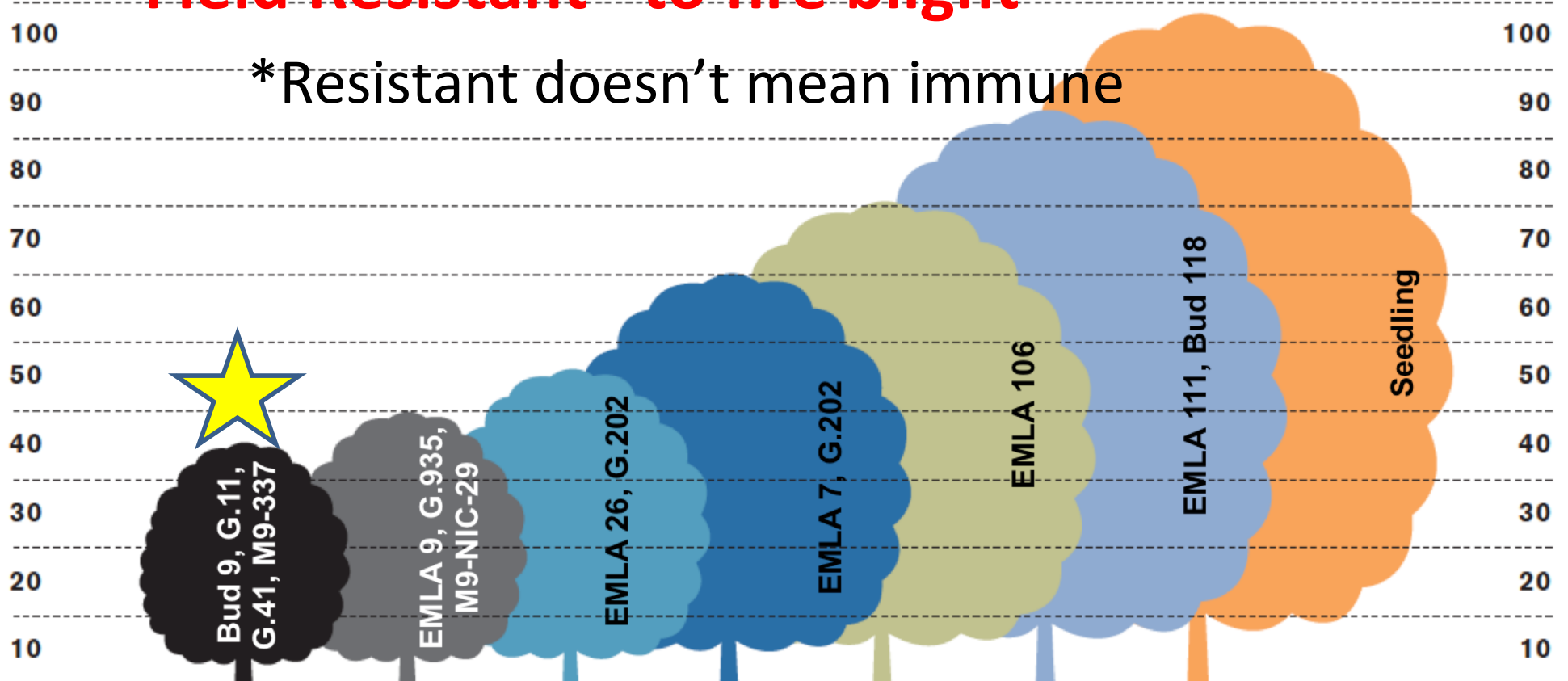
System

- 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**

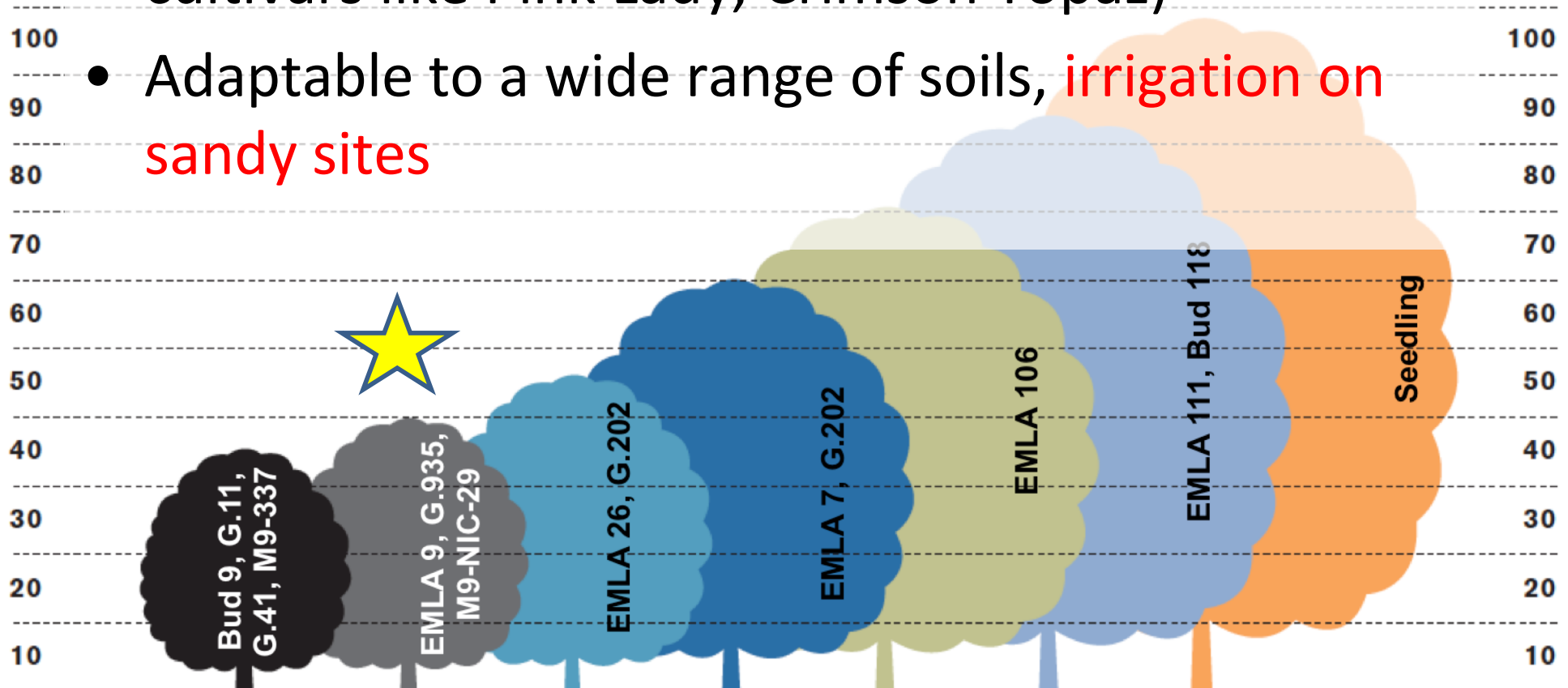
*Resistant doesn't mean immune



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)

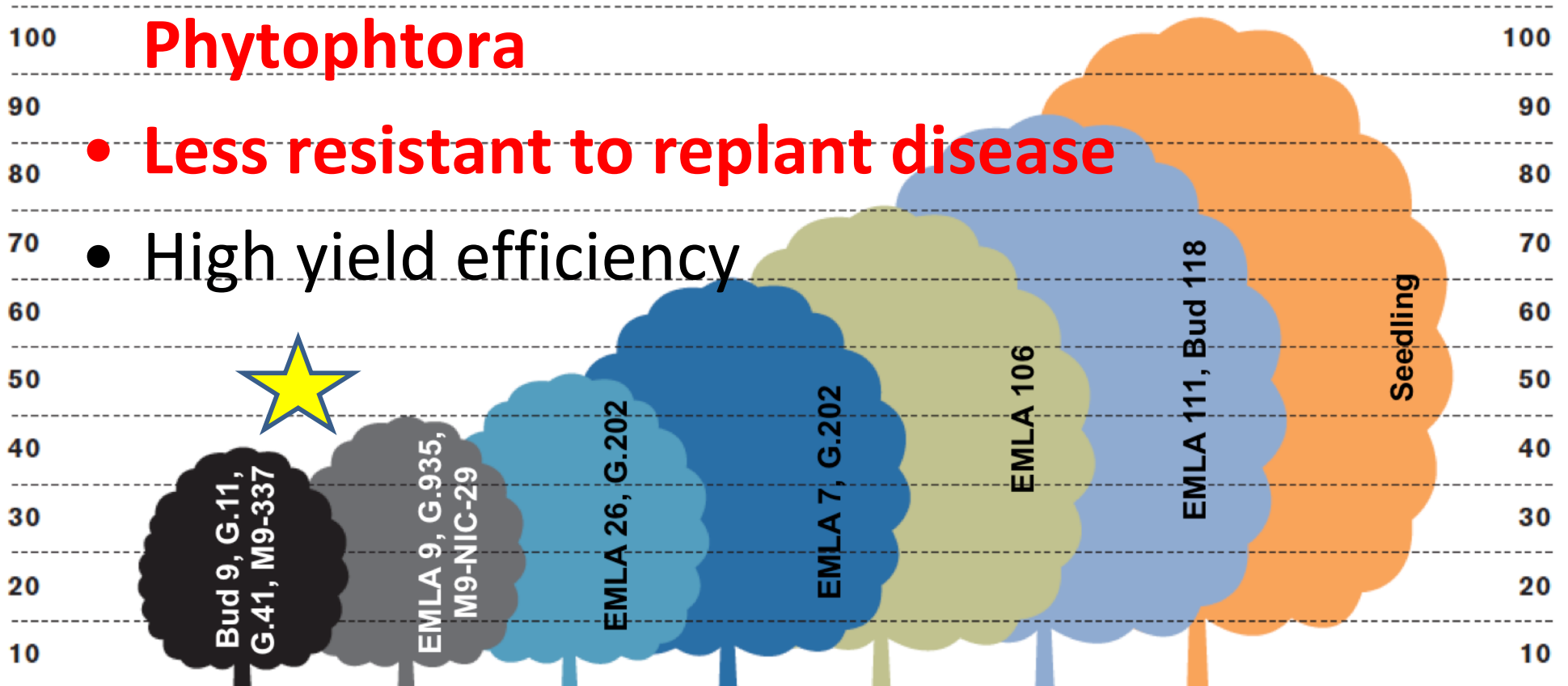
Geneva 11

- Field tested longest
- Similar in size to M9-337
- Moderate resistant to **fire blight and**

Phytophthora

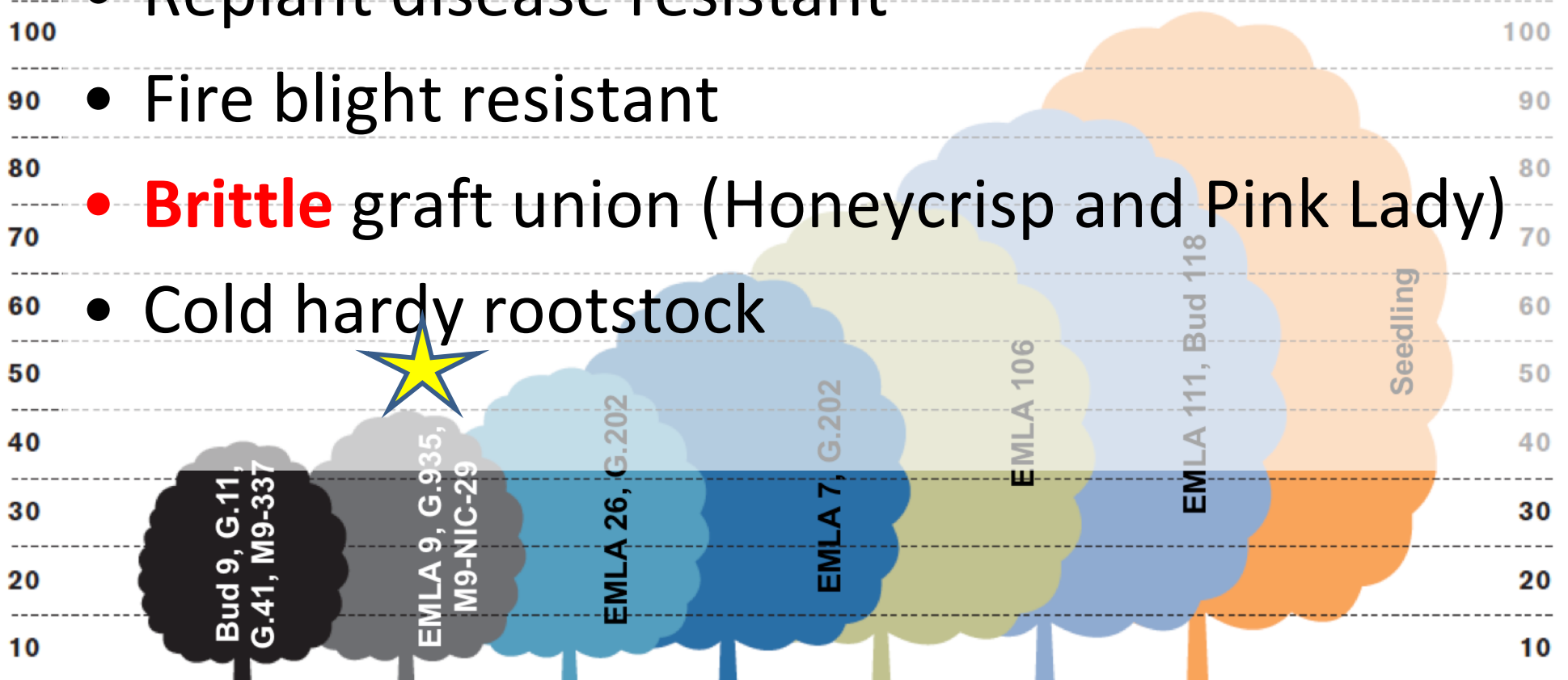
- **Less resistant to replant disease**

- High yield efficiency



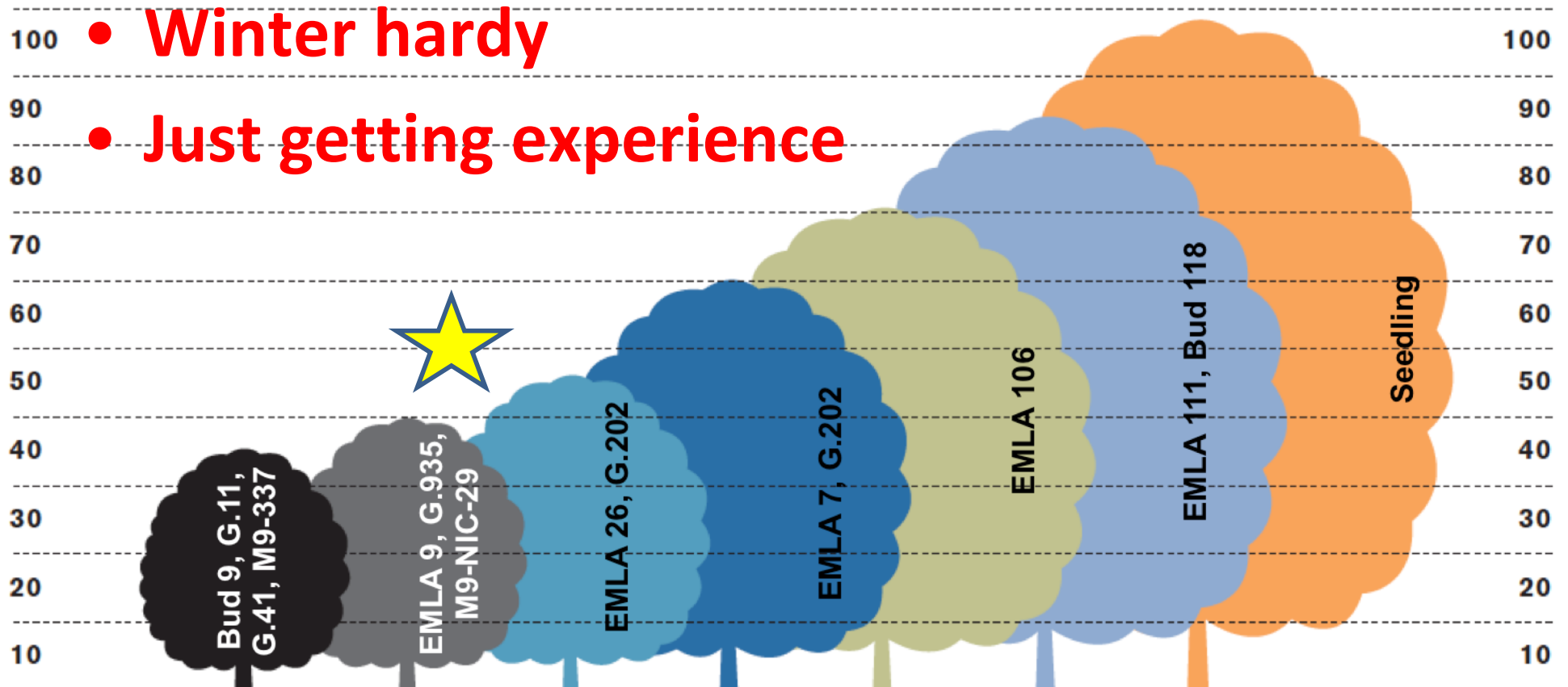
Geneva 41

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



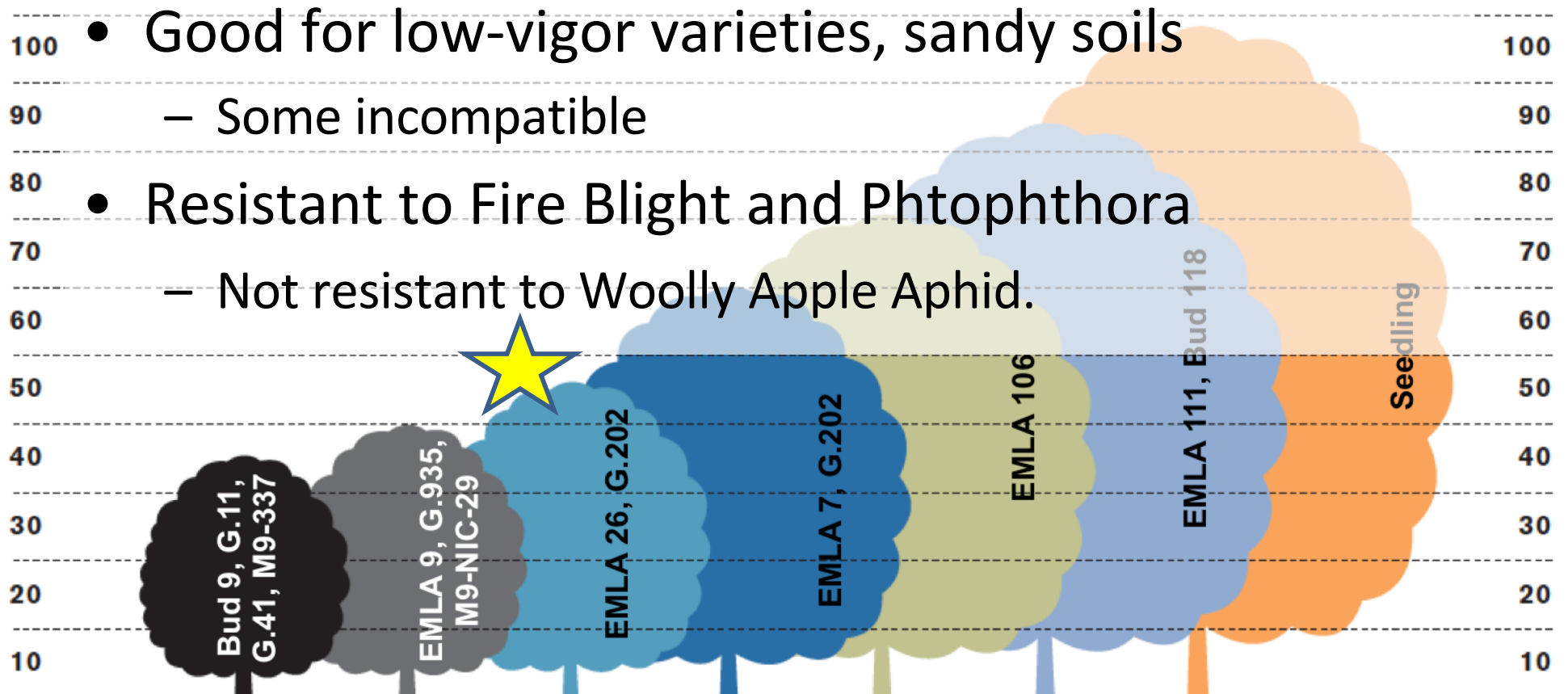
Bud 10

- Productive and precocious
- Similar to 935 size or stronger 9's



Geneva 935

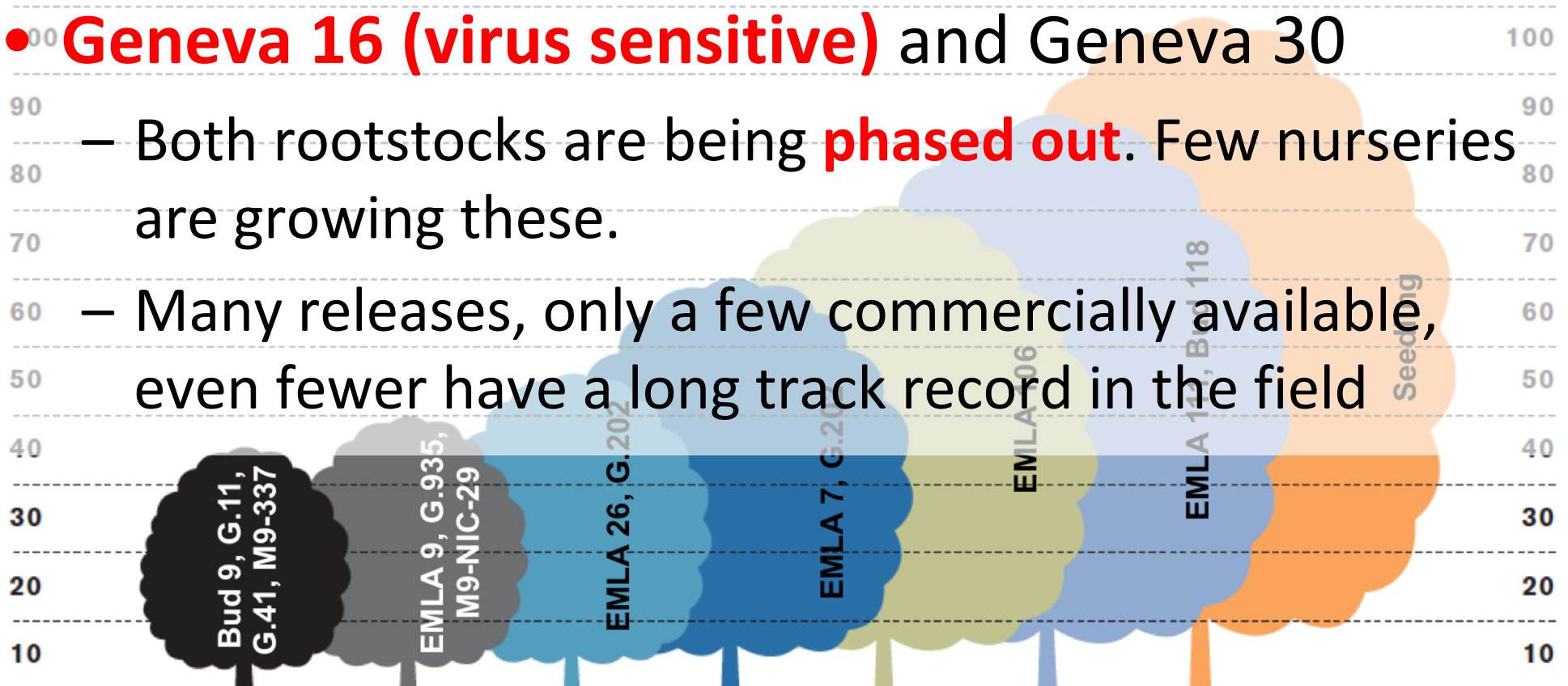
- **Latent Viruses, grower nursery.**
- More vigorous dwarf, M-26 size.
- **Very Productive and Precocious**



Other Geneva Rootstock

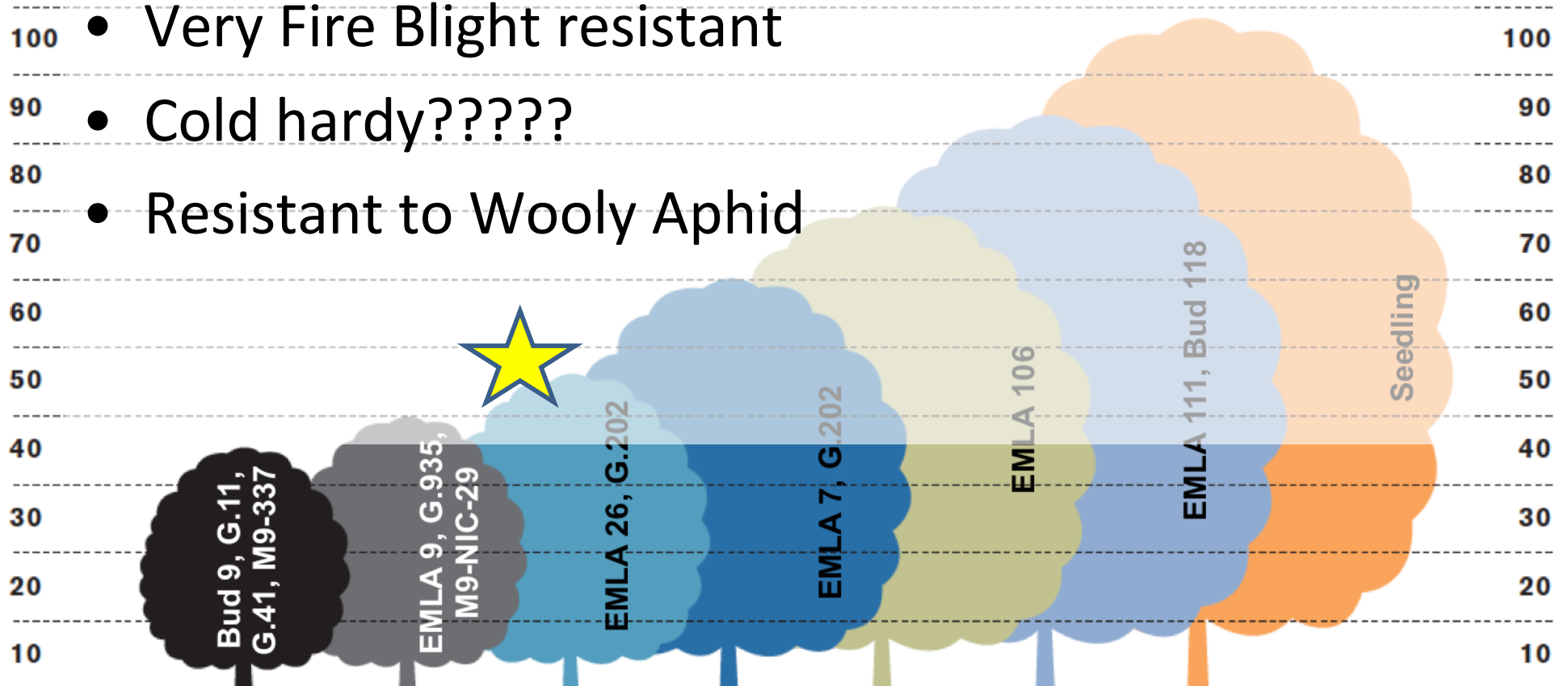
- Geneva 202 and Geneva 222
 - Similar in size to G. **935**. Geneva 222 is **not be replant tolerant**.

- **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

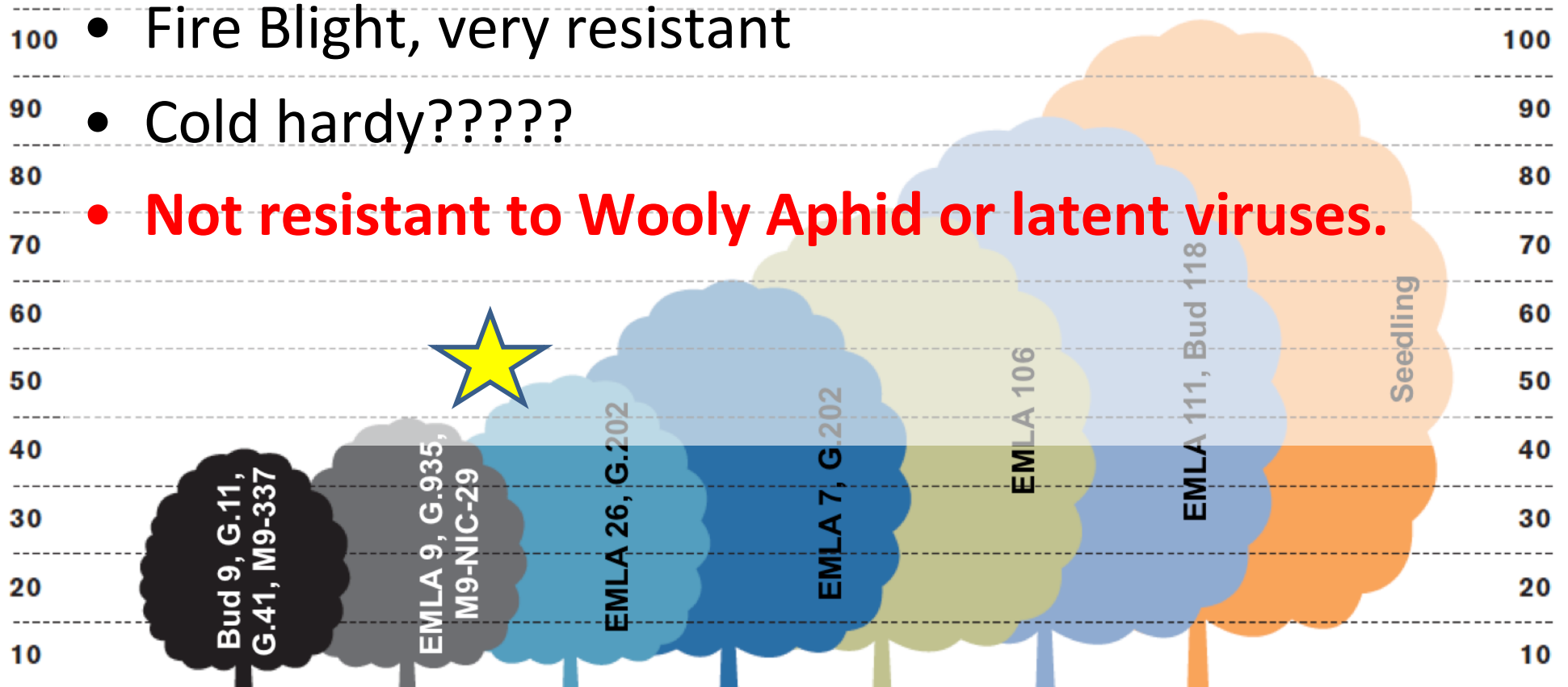
- Very good productivity
- Similar in size to **Nic-29**
- Replant disease tolerant
- Very Fire Blight resistant
- Cold hardy?????
- Resistant to Woolly Aphid



Geneva 814, New Release

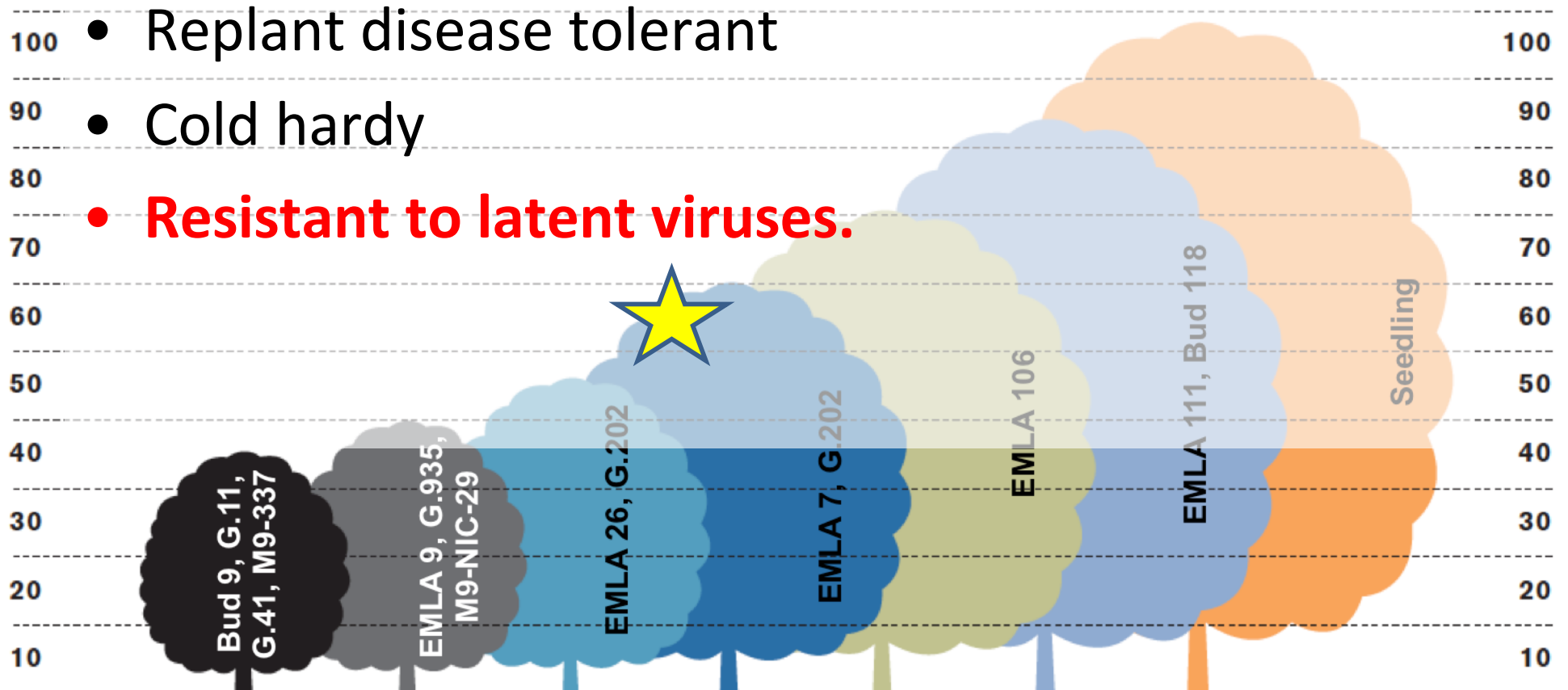
- Very good productivity
- Similar in size to **935**
- Replant disease tolerant
- Fire Blight, very resistant
- Cold hardy?????

• **Not resistant to Woolly Aphid or latent viruses.**



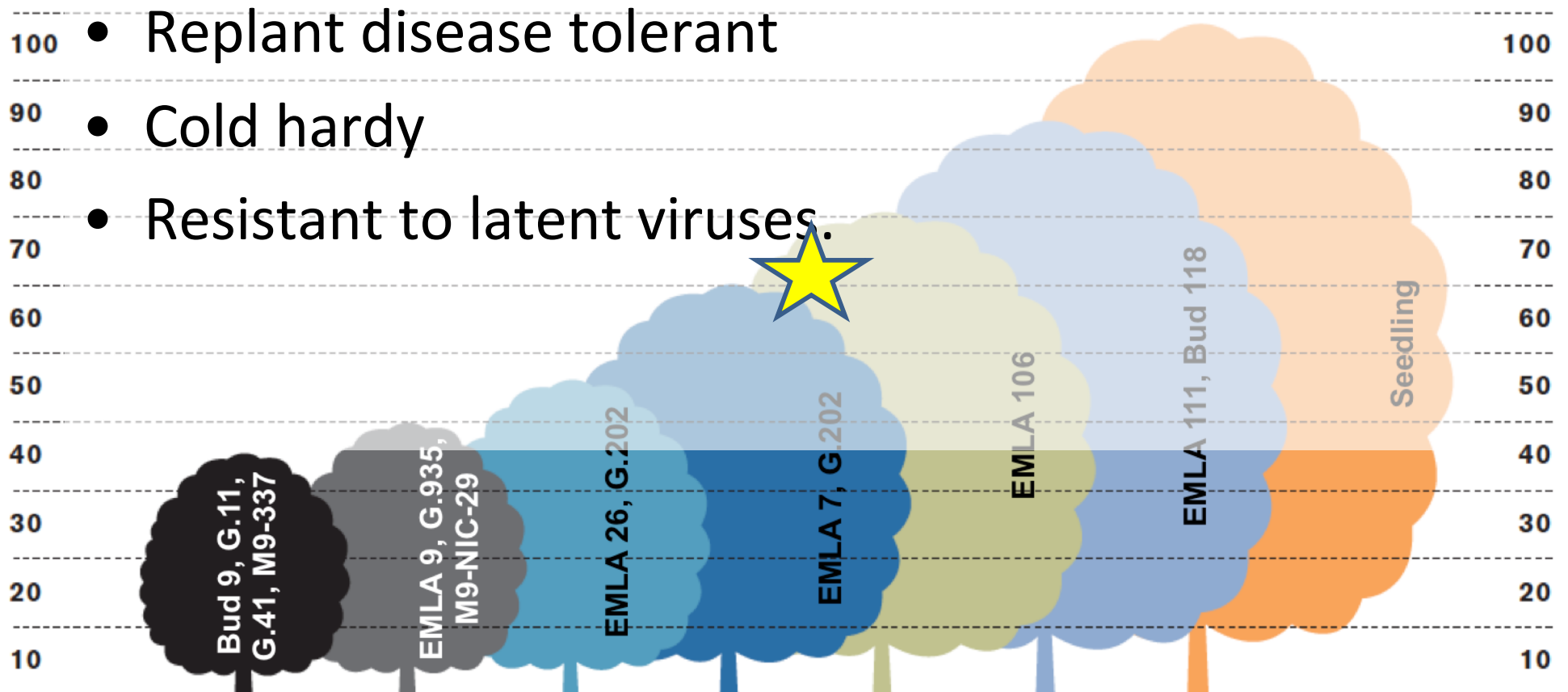
Geneva 969

- Excellent productivity
- Similar in size to **M-7**
- High resistance to Woolly Aphid and Fire Blight



Geneva 890

- Excellent productivity
- Similar in size to **M-7 to M-106**
- High resistance to Woolly Aphid and Fire Blight



NWHRS Trial

G969

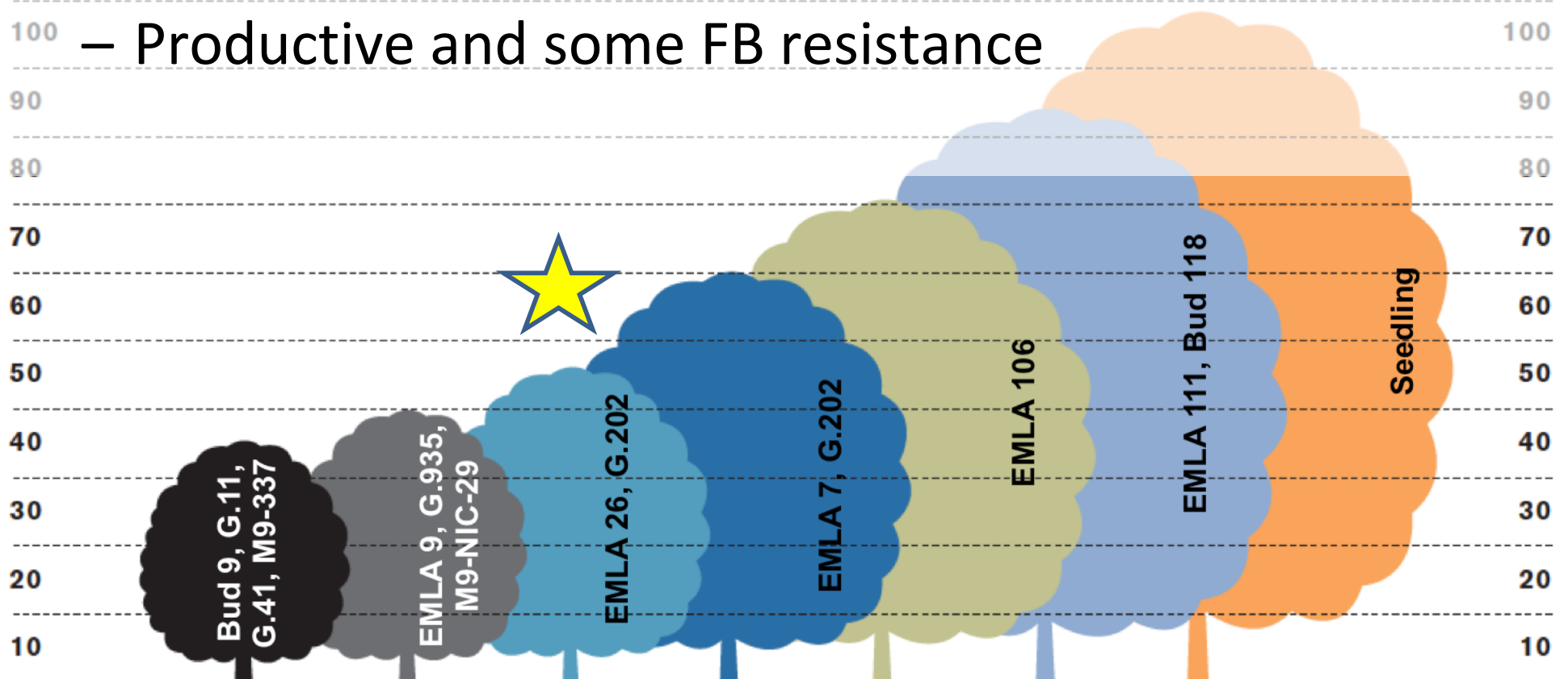
M.337



Other Rootstocks

- Vineland Series,
 - V1, V2, M-26 Size
 - V3, V5, V6, 337 Size

– Productive and some FB resistance



https://ctl.cornell.edu

GENEVA® APPLE ROOTSTOCKS COMPARISON CHART v.4

GENEVA® Apple Rootstocks													
Traits	D1148	D1147	D3610	D3539	D4950	D6263	D3609	D4190	D2737	D4951	D3785	D3540	D5107
	G.11	G.16	G.41 ^(a)	New! G.213	G.214	New! G.814	G.935	G.222	G.202	G.969	G.30	G.210	G.890
Arranged in order by size (smallest to largest)	M.9 T337	M.9 T337	M.9 T337	M.9 T337	M.9/M.26	M.9/M.26	M.26	M.26	M.26	M.7	M.7	M.7	M.7/ MM.106
Woolly Apple Aphid Resistance	No	No	High	High	High	No	No	High	High	High	No	High	High
Fire Blight Resistance	Resistant	Resistant	Very Resistant	Very Resistant	Very Resistant	Very Resistant	Very Resistant	Very Resistant	Very Resistant	Very Resistant	Very Resistant	Very Resistant	Very Resistant
Replant Disease Complex Resistance	Partial	Partial	Tolerant	Tolerant	Tolerant	Tolerant	Tolerant	No	Tolerant	Tolerant	Tolerant	Tolerant	Tolerant
Crown and Root Rots (Phytophthora)	Tolerant	Tolerant	Tolerant	Tolerant	Tolerant	Tolerant	Tolerant	Tolerant	Tolerant	Tolerant	Tolerant	Tolerant	Tolerant
Cold Hardiness	Yes	Partial: Good Mid-winter, Bad early-cold	Yes	TBD	Yes	Yes	Yes	Yes	Yes	Yes-Good, Mid-winter	Yes	Yes	Yes
Productivity/Yield Efficiency- as good or better than M.9	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Low suckering and burr knots	Yes	Yes	Yes	Yes	Yes	Medium	Yes	Medium	Yes	Yes	Yes	Yes	Yes
Susceptibility to latent viruses	No	Yes	No	No	No	Yes	Yes	No	No	No	No	No	No

TBD: To Be Determined.

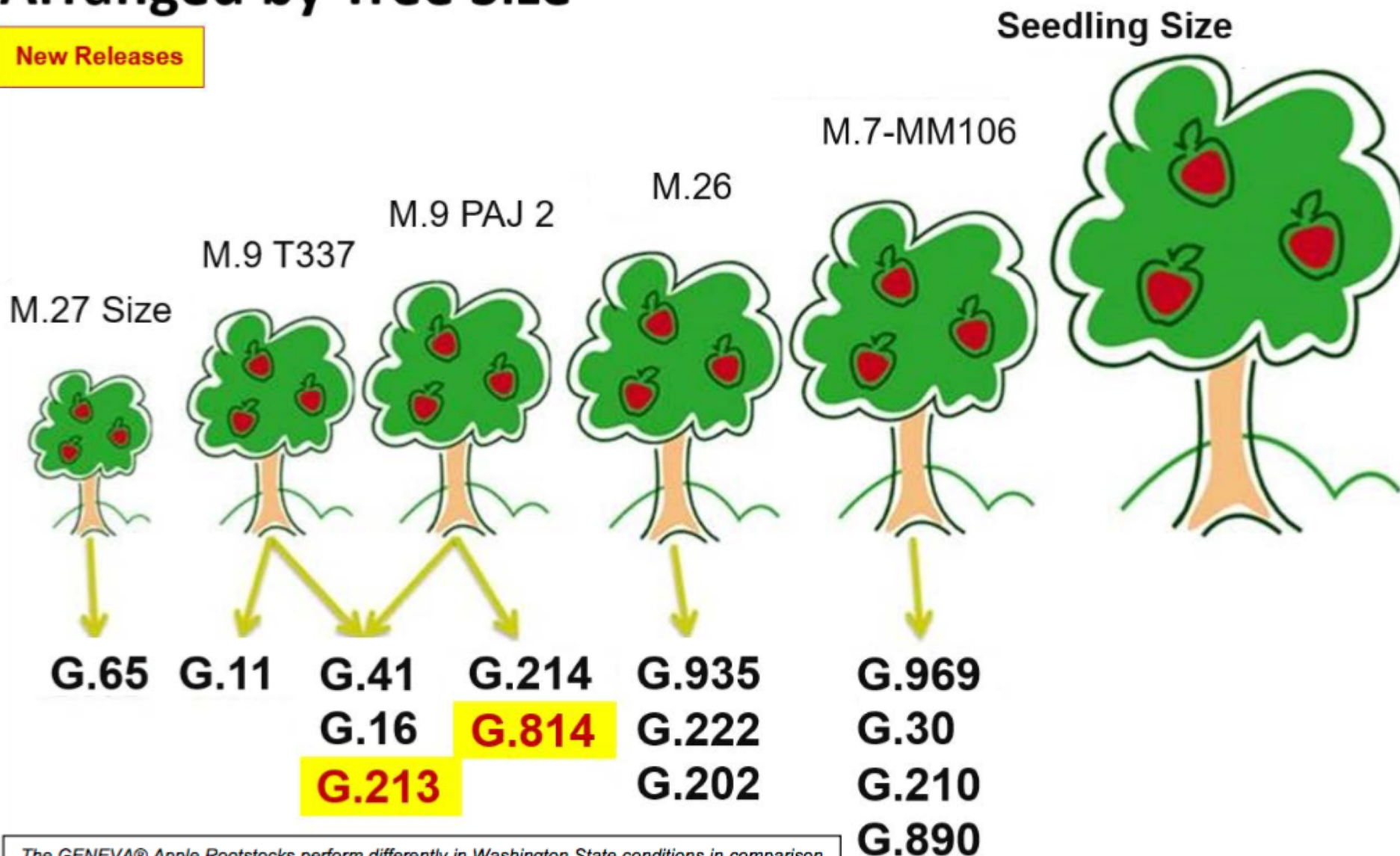
(a) Remarks: G.41 has presented weak graft unions with the following scions: Cripps Pink, Scilate, and Honeycrisp. The well feathered trees are prone to breakage in strong winds in the first 2-3 years and additional care needs to be taken to prevent breakage. Breakage risk decreases with time.



Released GENEVA® Apple Rootstocks Arranged by Tree Size



New Releases



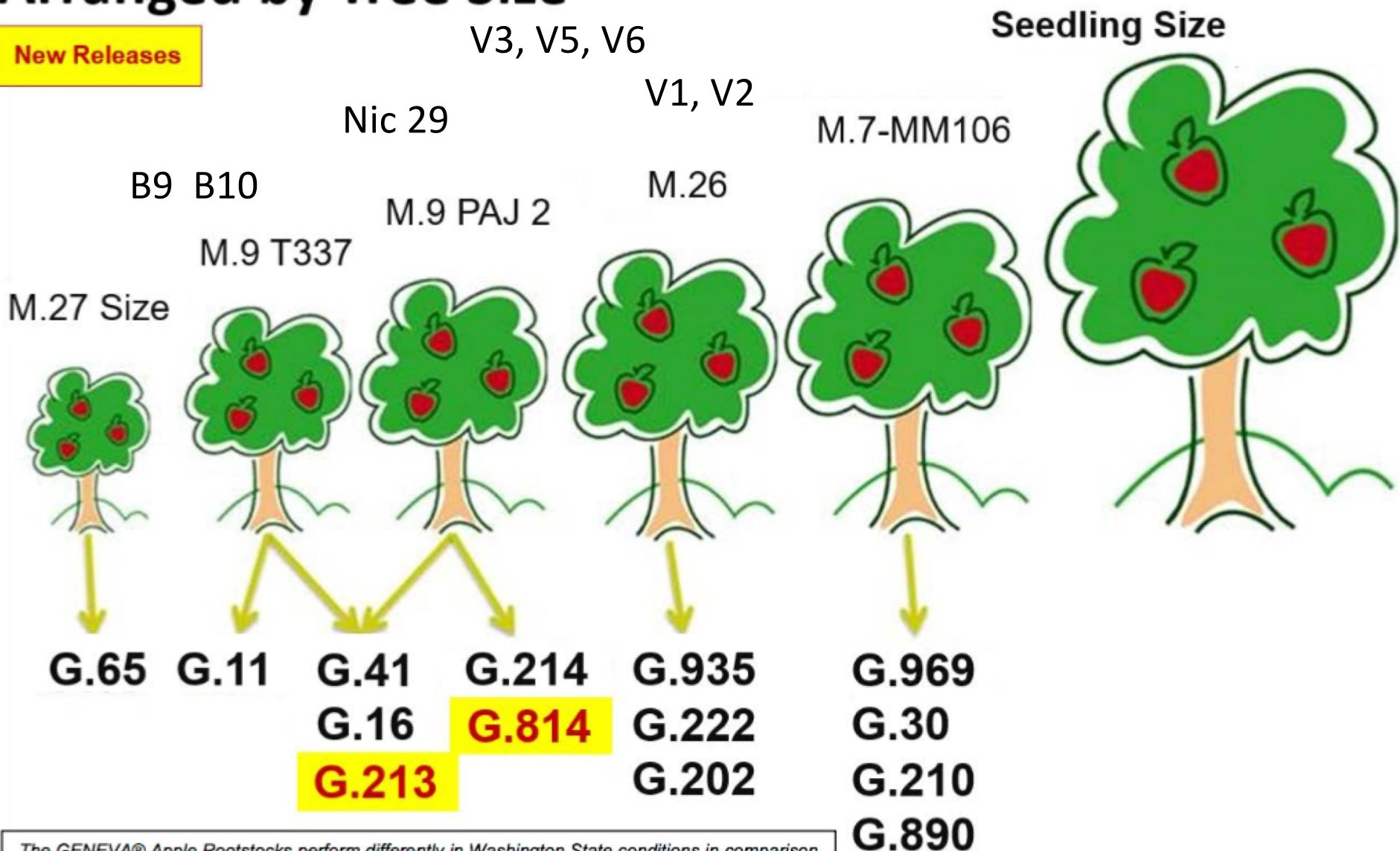
The GENEVA® Apple Rootstocks perform differently in Washington State conditions in comparison to the data displayed here that was collected in New York State.

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

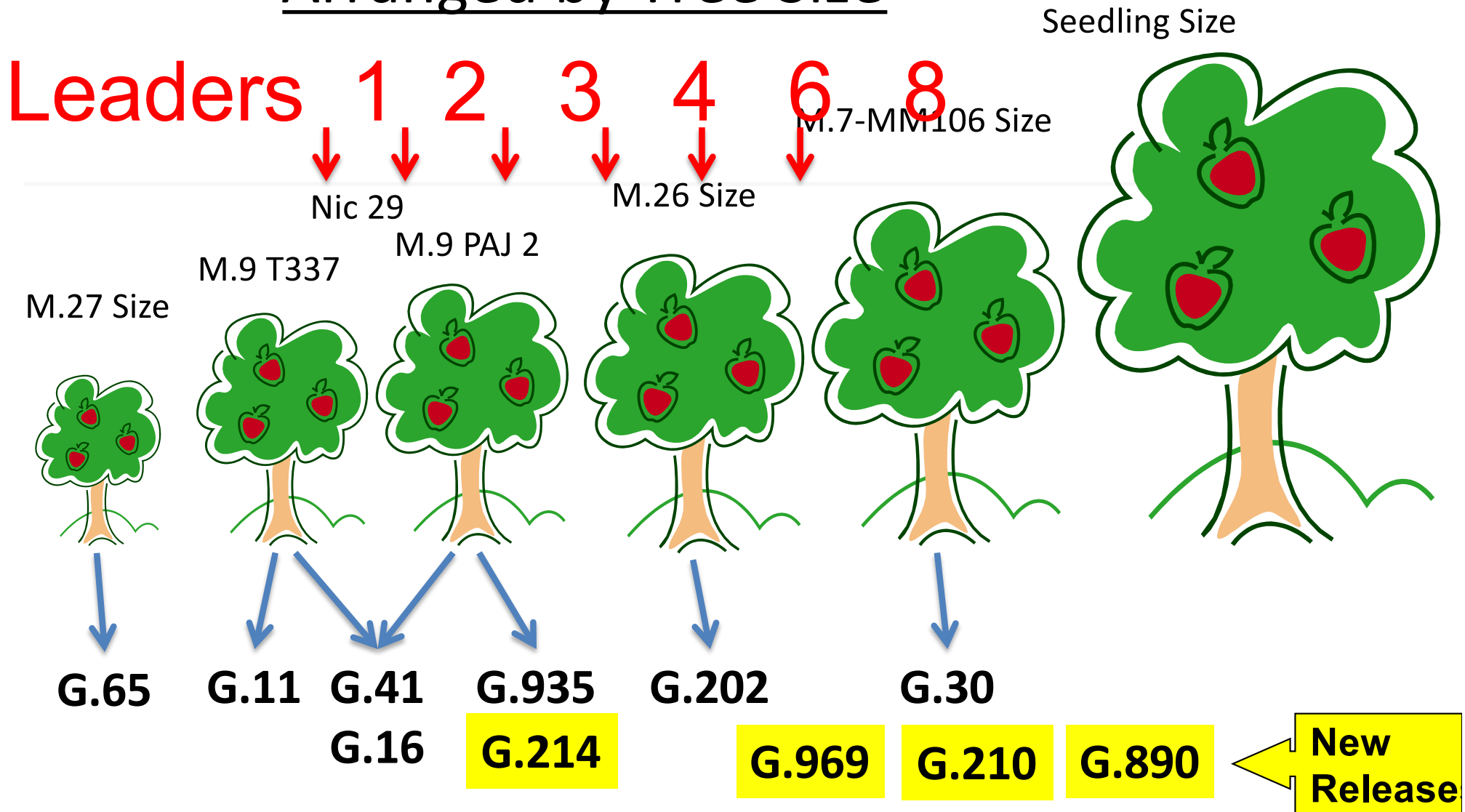


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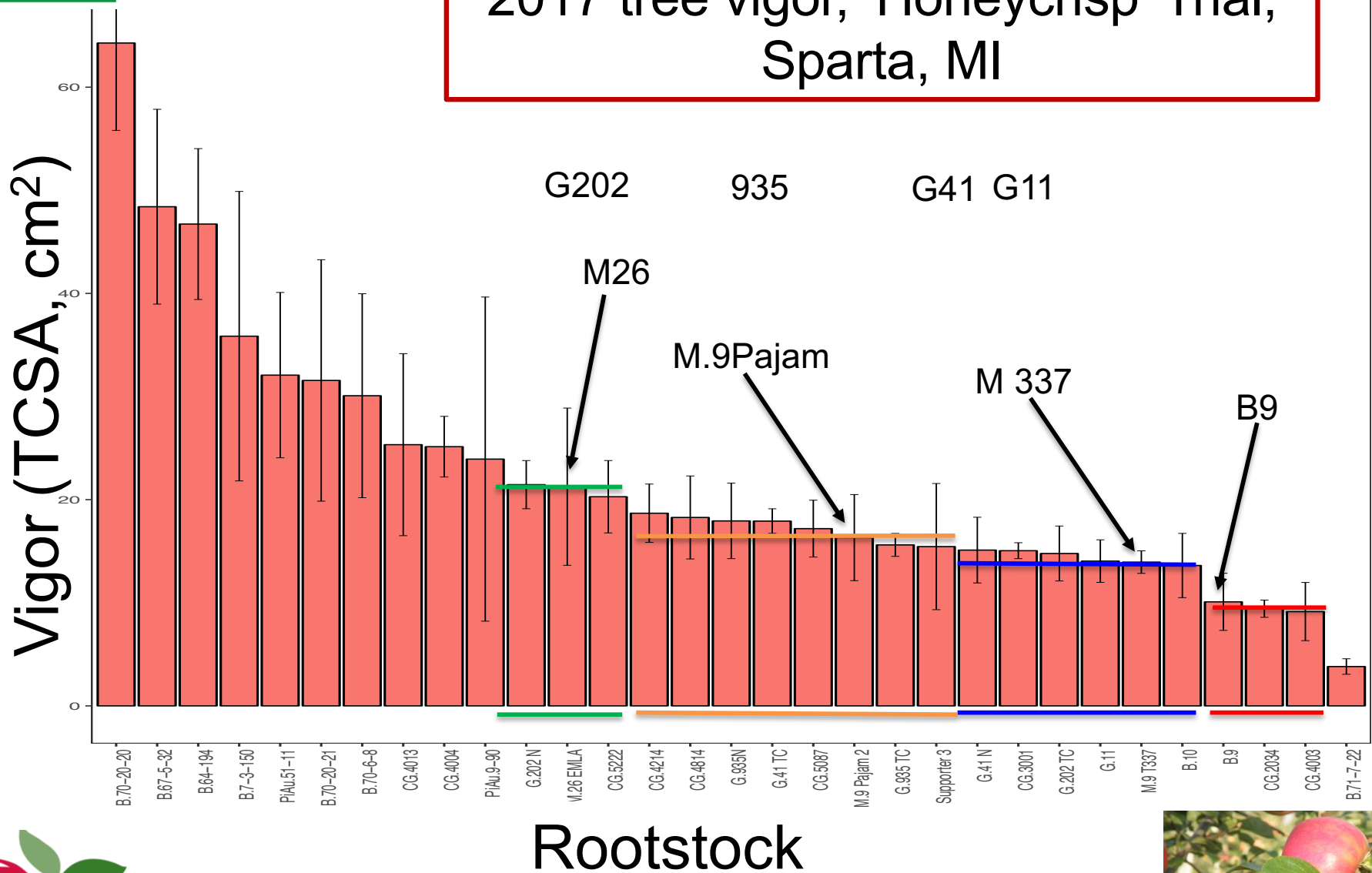
Released Geneva® Apple Rootstocks

Arranged by Tree Size

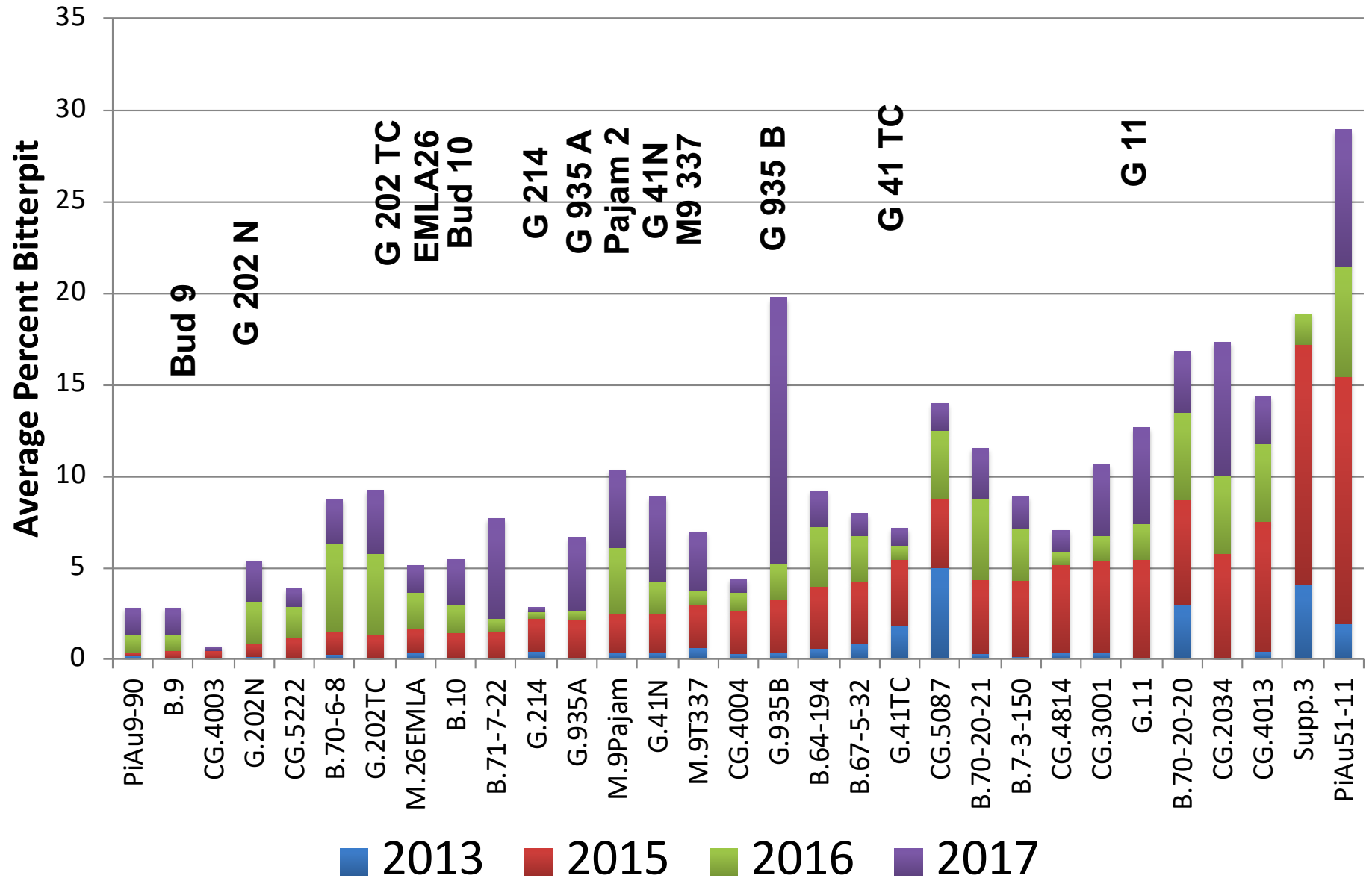




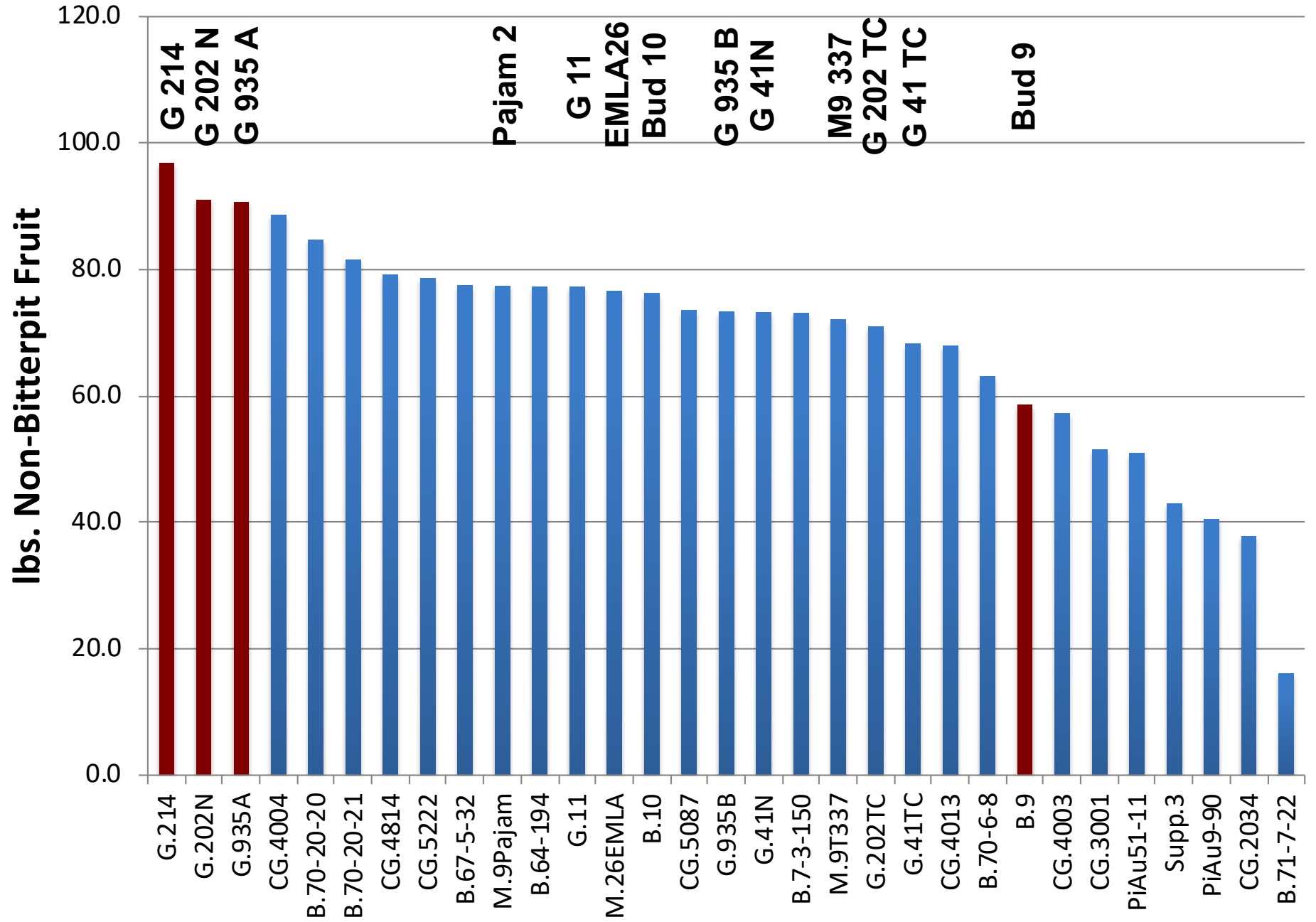
2017 tree vigor, 'Honeycrisp' Trial, Sparta, MI



Sparta NC-140 Honeycrisp/Rootstock Trial 2013-2017



Sparta NC140 Honeycrisp/Rootstock 2013-2017 No Bitterpit



What's Next

- Higher Densities
- Fruit Walls, Super Spindle
- Hedging
- Mechanization
- Platforms, Harvest Machines, etc



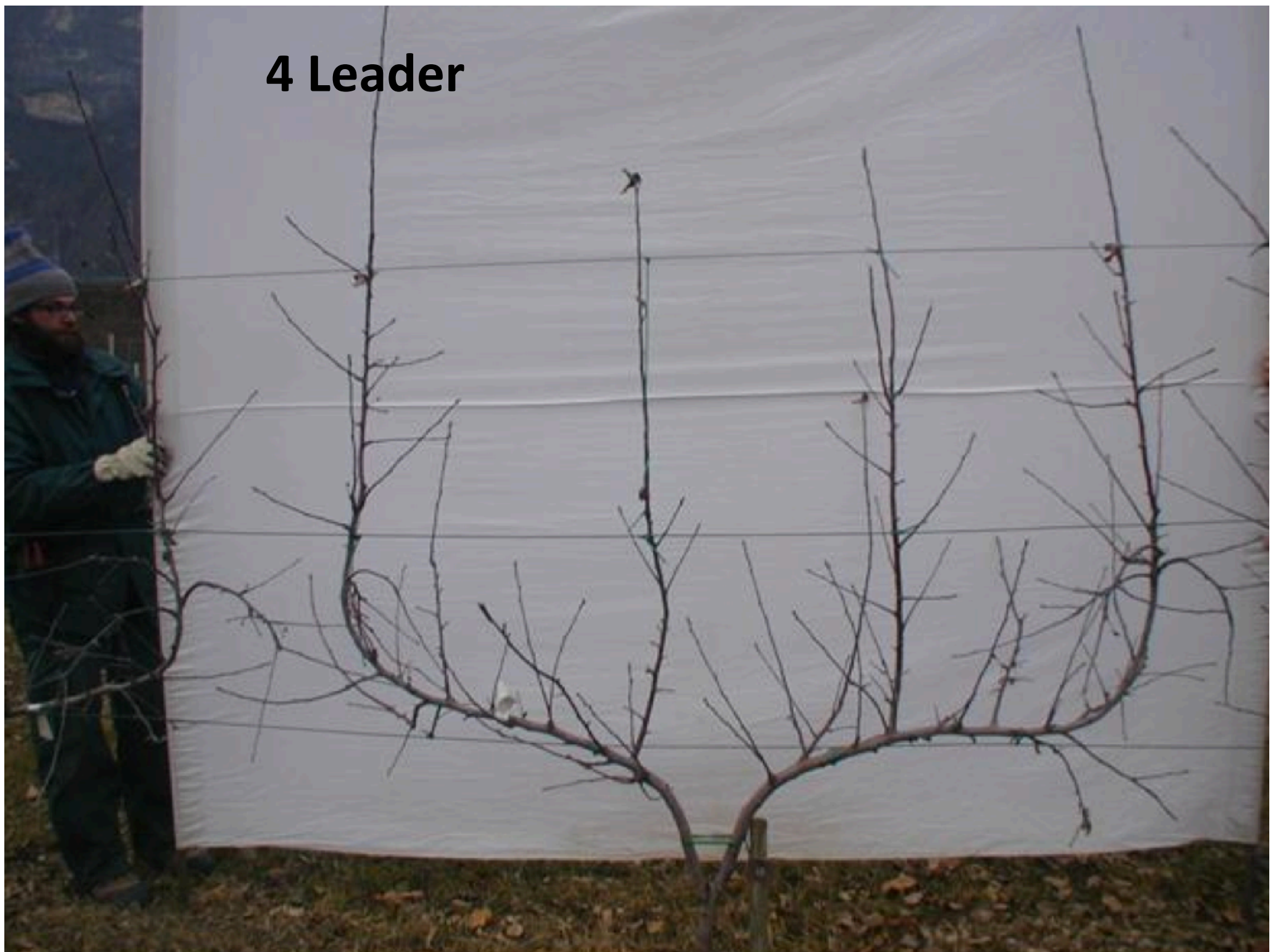




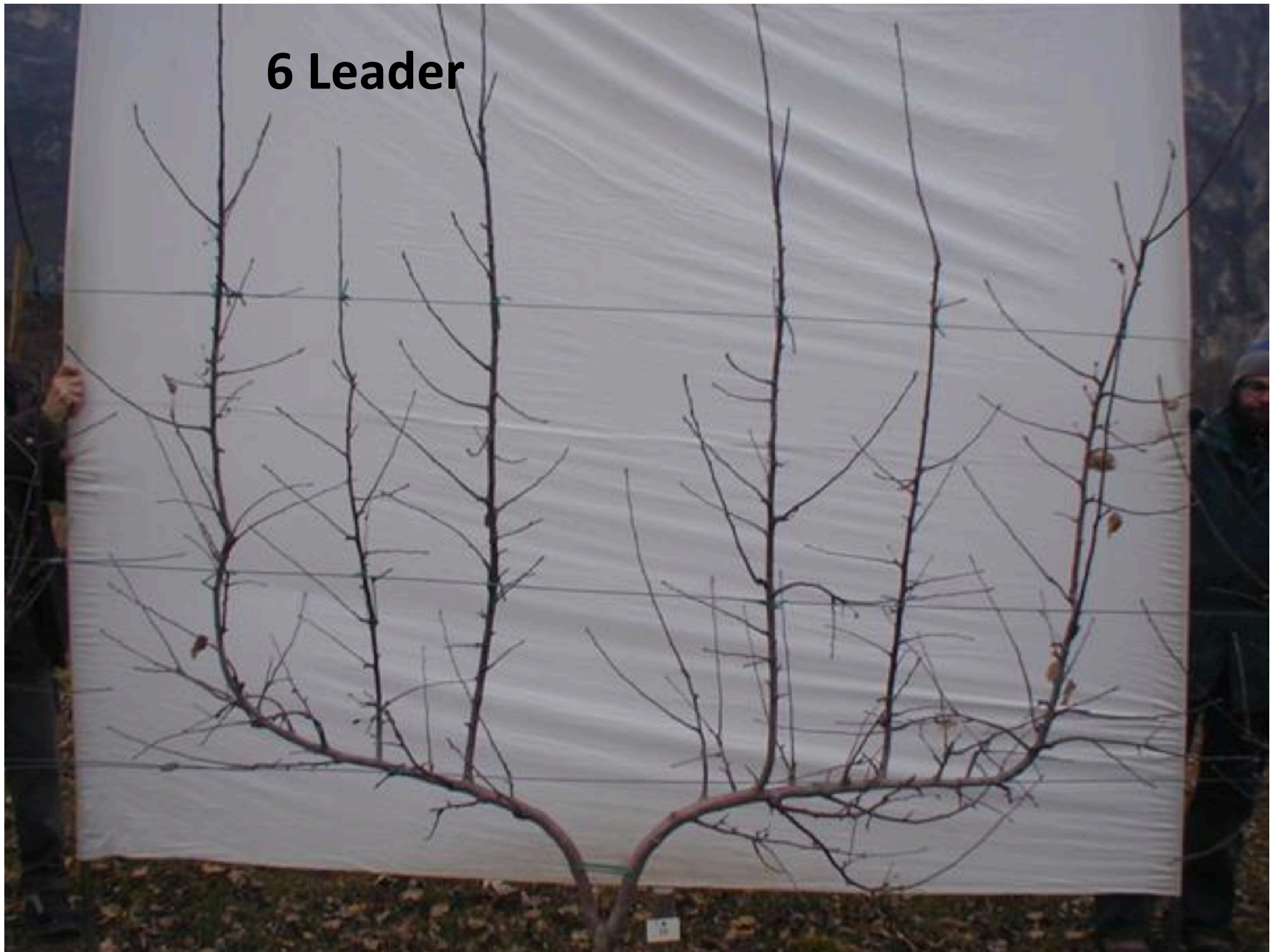
Bi-Axe
1200 Trees/Acre
3 x 12



4 Leader



6 Leader



8 Leader



Thank you!

Tree Fruit School 2019

Philip Schwallier

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