



Wanderings & Musings of a Retired Fruit Specialist

John Strang

U.K. Dept. of Horticulture

Honeycrisp Color



Washington State fruit
Pete's Market, Chicago, IL
Oct. 11, 2022



Kentucky fruit
UK Hort. Research Farm, Lexington
Aug. 23, 2022

AppleAtcha AgriTech

Debord, KY (Martin & Johnson Counties)

- 65 Acres Honeycrisp
- Planted 2021
- Booth Energy strip mine
- 4 color strains of Honeycrisp
- Super Spindle training
 - Spaced 1.5' X 10'
 - 2,904 trees/acre



July 19, 2022

Honeycrisp Color Strains

From AppleAtcha AgriTech

- Premier
 - Adams County PA
 - Ripens 2-3 weeks earlier than Honeycrisp
- Royal Red
 - Columbia Basin, WA
- Firestorm
 - Univ. MN
- Roseland Red
 - VA



Honeycrisp Color Strains



Silver Reflective Mulch Film for Enhancing Apple Fruit Color



Elizabeth Wahle, IL



- 6' wide, 5,000' roll, \$300
- Midwest Vineyard Supply
- Rolled out 2 weeks before harvest
- Held down with a shovel full of soil every 6-10'
- Honeycrisp, EverCrisp
- Increased color on Honeycrisp better than EverCrisp

Honeycrisp Color

Field stripped in cooler, Belleville, IL



No reflective mulch



With reflective mulch

EverCrisp



Michigan grown
no reflective mulch



Elizabeth Wahle
Millstadt, IL grown
with reflective mylar mulch

Honeycrisp & Evercrisp Bitter Rot



Birds & bees

Mummies



=



Sunburn



Japanese beetle

Bitter Rot Control

(Eckert's Orchards)

- Drop removal at end of previous season
- Careful chemical thinning to reduce mummy fruit
- Fungicide spray program
 - 1" rain = spray
- Insecticides for Japanese beetle and bee control
- Raynox (no visible residue) or Vapor Gard prior to 90°F temperatures for fruit sunburn control
- Rotten fruit removal to prevent additional infections during season
 - Rain



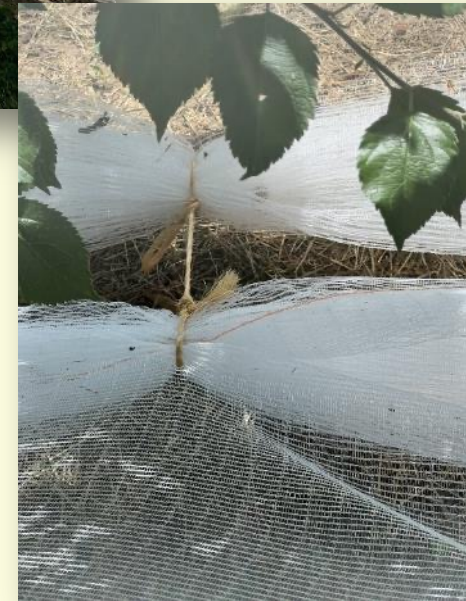
Bitter Rot Control

(Eckert's Orchards)

- Spending ~\$600-\$700/acre annually for sunburn prevention products
- Labor for hand removal



Drape Net Test Trial (Eckert's Orchards)



Initially developed for hail protection Australia/New Zealand
Excludes birds, Japanese beetles, bees
UV protection reducing sunburn
Reduced evapotranspiration
Hedge trees prior to application
Applied ~June 9, 2022
Removed ~2 weeks before harvest
Cost ~ \$5,000/acre

Drape Net Test Trial

Eckert's, Belleville, IL

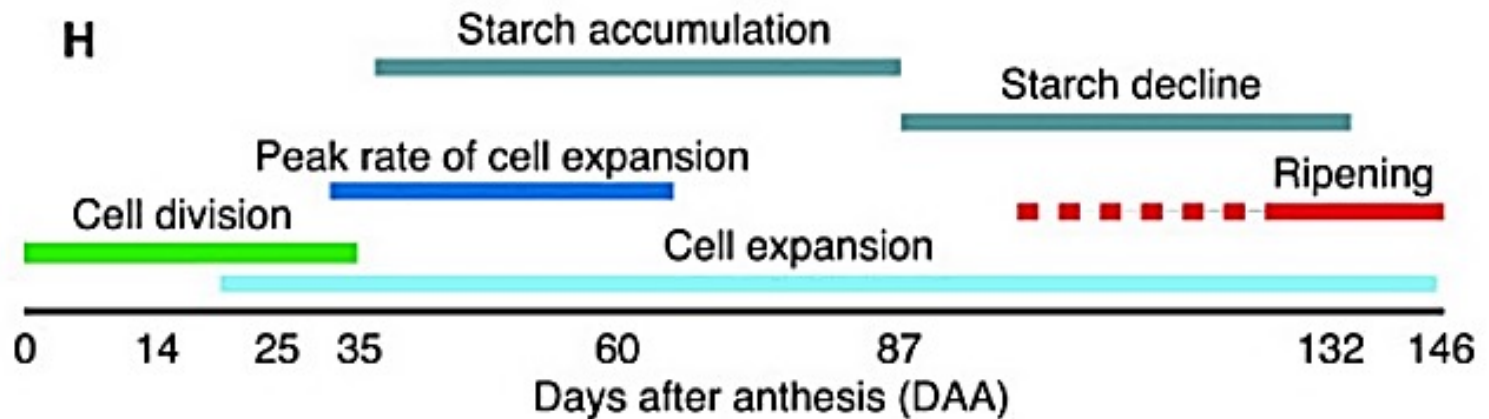
- Good Japanese beetle and bird control
- Good on Honeycrisp
 - No visible difference in bitter rot between
 - Trees sprayed with sunburn protectant
 - Netted trees
- Improved color on EverCrisp
 - Reflects light inside of netting
 - Helped with uncolored areas of fruit
- Improves spray coverage
- Will evaluate another year

Tall Spindle Shearing



Phil Brown Welding

Apple Fruit Growth



Evercrisp Calyx-end Cracking



Appears toward the end of the cell expansion period as concentric cracks around the base of the fruit

Calyx-end Cracking

- Research on Pink Lady in Northern Israel by E. Fogelan, R. Stern and I. Ginzberg
- Associated with high temperatures (90°F) during early fruit cell development
- Application of 6BA + $GA_{(4+7)}$ at 21, 35, & 50 days after full bloom decreased cracking.
- Best concentration was Superlon™ 20 mg/l (0.1%) [6BA + $GA_{(4+7)}$ + Triton X-100 nonionic surfactant at 0.025% (v/v)]
- Applications probably increased cell division at the fruit surface and peel flexibility
- Applications of 6BA or $GA_{(4+7)}$ alone did not reduce calyx-end cracking
- ProVide $GA_{(4+7)}$ Labeled to reduce fruit cracking and russetting

Calyx-end Cracking

- Equivalent products to Superlon™ are Promalin and Perlan
- Perlan is not labeled in KY
- Promalin slightly less concentrated than Superlon
- Promalin is labeled on apples but not for this use.



Labeled on apples to
Improve fruit typiness
Improve fruit size
Increase fruit set after frost
Tree branching

Promalin Treatments on EverCrisp Eckert's Millstadt Farm, IL

(Elizabeth Wahle, Rick Weinzierl, & Chris Eckert)
MAIA Grant

- 4 replications, 6 trees per treatment
- 5 appl, 0.1% Promalin v/v; 28, 45, 60, 74, 88 dafb
- 5 appl, 0.2% Promalin v/v; 28, 45, 60, 74, 88 dafb
- 4 appl, 0.1% Promalin v/v; 45, 60, 74, 88 dafb
- 4 appl, 0.2% Promalin v/v; 45, 60, 74, 88 dafb
- 5 appl, 0.2% ProVide, 5.3 oz/100 gal; 28, 45, 60, 74, 88 dafb
- Untreated check



**All of the Promalin applications exceed the maximum allowed use of Promalin on the product label. However, labels for Maxcel (6BA) and ProVide (GA 4 + 7) would allow that much use of the individual active ingredients.*

Ringing to Induce Branching

2019 NC-140 Trial - Daniel Becker, UKREC



Blind wood on Buckeye Gala/M.9
Ringed 3 times with hacksaw blade
May 24, 2022

July 5, 2022

Ringling to Induce Branching

By Daniel Becker, UKREC



August 3, 2022



August 18, 2022
Note top weakening

Ringing to Induce Branching

By Daniel Becker, UKREC



September 13, 2022



October 6, 2022

Note leaf drop and yellowing in comparison to un-ringed trees on both sides

Ringing to Induce Branching

By Daniel Becker, UKREC



Strong localized response



Less response



No response

Ringling to Induce Branching

By Daniel Becker, UKREC



Left un-ringed; center two ringed twice; right ringed once

Ringling



April 21, 2022



May 18, 2022

Tall Spindle Summer Pruning



- June is time to cut branches back to develop spurs later
- Long lateral branches flower up, but tend to develop blind wood in mid portion
- Heading discourages blind wood
- Head strong lateral branches back
- Reduces tip bearing on EverCrisp
 - Terminal fruit are smaller and greener

Bill Pitts June 8

Tall Spindle Summer Pruning

- Lateral branch heading
 - Slows tree growth down
 - Spurs are produced later
 - Moves crop to tree interior
 - Improves fruit color
- Like to leave some open space in tree to produce stronger spurs



Fire Blight Control

- Apply fixed copper the afternoon of shoot tipping on bearing trees
 - Not when trees are wet for a period
 - Less chance of fruit russetting
 - Use a dilute spray
- Magna-Bon CS 2005
 - Used by some Northeast growers
 - Copper sulfate pentahydrate
 - 19.2-64 oz/100 gal/acre
 - Use lower rate
- Cueva
 - Kentucky grower
 - Copper Octanoate (Copper Soap)
 - 0.5-2 gal/30-100 gal/acre
 - Use low rate



Results of Lateral Branch Heading



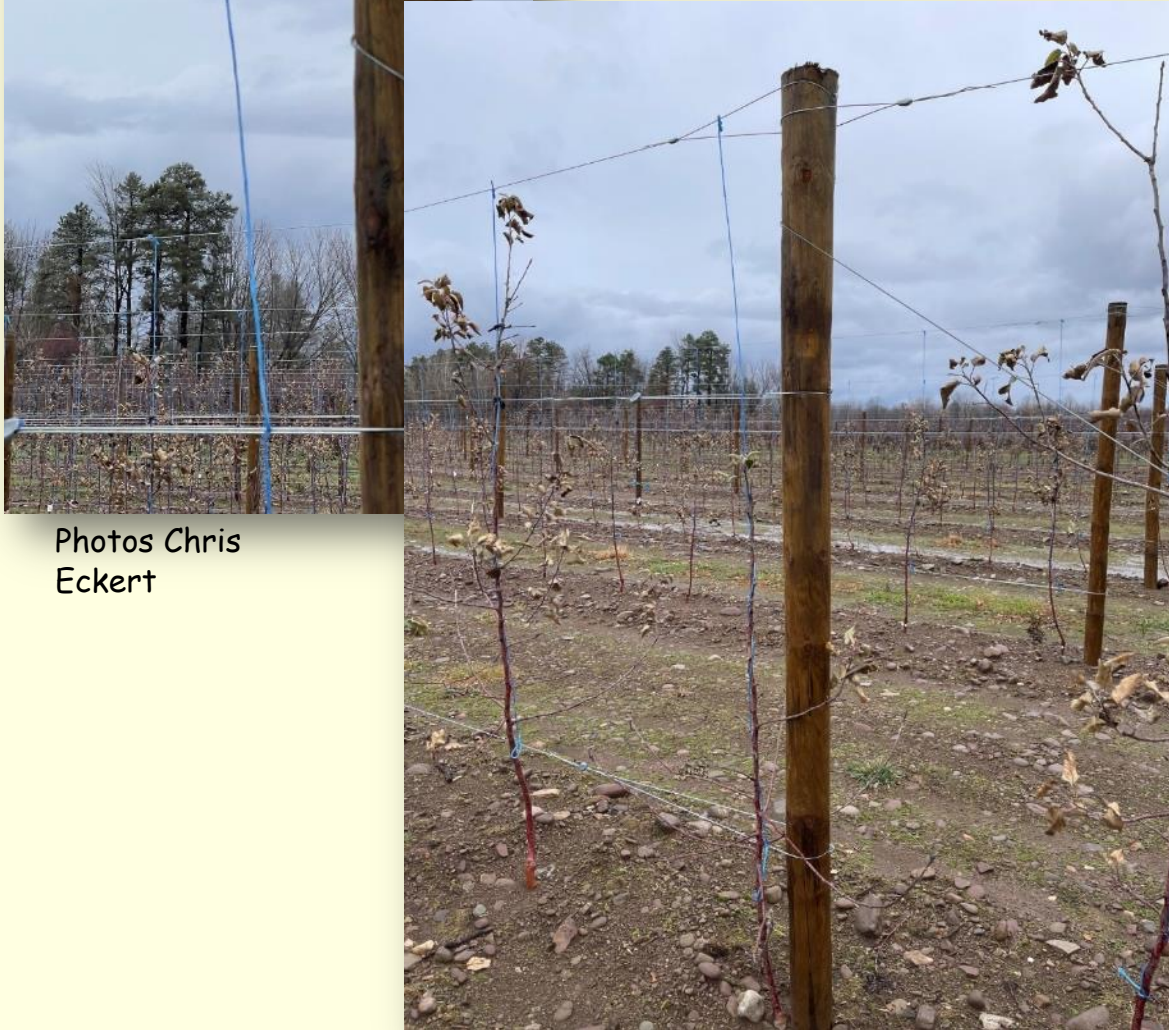
September 19

Tall Spindle Leader Tying to Increase Growth



As soon as leader begins leaning -
Wrap twine 2-3 time around tree.

Tall Spindle Leader Tying to Increase Growth



Photos Chris Eckert



Don't tie twine around leader.

Controlling Tree Height

- To control tree height and settle tree down for following season
 - Wait awhile to cut top - August
 - Head to a strong upwardly growing branch



Key to MAIA Releases

Trademark Name	Cultivar Name	Test Name	Parents/Cross	Patent Number
EverCrisp®	MAIA1	MDD5-44	Honeycrisp x Fuji	PP24,579
Rosalee®	MAIA11	MDD5-41	Honeycrisp x Fuji	PP29,146
Summerset®	MAIA12	MDD3-75	Honeycrisp x Fuji	PP29,213
Ludacrisp®	MAIA-L	Juicy Fruit	Honeycrisp, open pollinated	PP30472
Sweet Zinger®	MAIA-Z	MJE 1238	Goldrush x Sweet 16	PP30059
Sweet MAIA®	MAIA-SM	MDD 7-50	Honeycrisp x Winecrisp	Patent Pending

<http://maiaapples.com/wp-content/uploads/2020/11/MAIA-News-Autumn-2020.pdf>

Don't overcrop trees to obtain optimum flavor!!!
Flavor is bland on trees that are overcropped.

MAIA Trademarked Cultivars - Bill Pitts Observations

- Evercrisp®
 - Tends not to grow tall, bushier tree
 - Sets on terminals
 - Tip terminal buds off at green tip



2-year old tall spindle

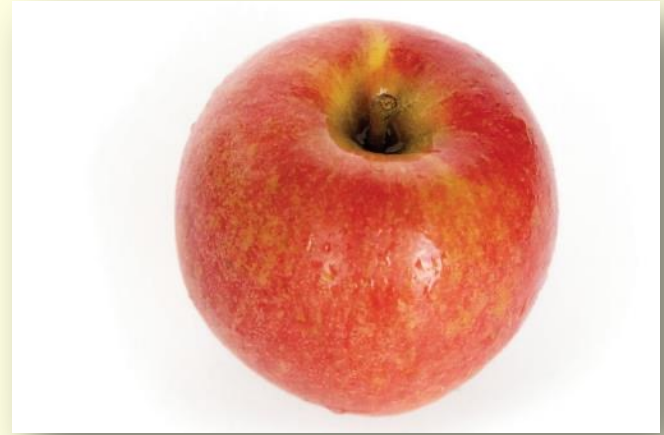
MAIA Trademarked Cultivars - Observations

- Rosalee®
 - Has more Honeycrisp in it
 - A little more susceptible to fire blight
 - Light airy fruit
 - Thin skin
 - Can't run on packing line
 - Does not get bitter pit like Honeycrisp
 - Lighter pink color
 - Very good right off the tree



MAIA Trademarked Cultivars - Observations

- Ludacrisp®
 - Very tart off the tree
 - Thus not good for U-Pick
 - Harvest ~ Oct 5th
 - Leave on tree an extra week to develop more sugar and 3 flavor esters
 - Store for 3 weeks for optimum flavor



MAIA photo

MAIA Trademarked Cultivars - Observations

- Sweet MAIA®
 - Ripens with Ginger Gold and Zestar! (~Aug. 10 Lex.)
 - Good flavor and crunchiness
 - Not as firm as Evercrisp
 - Medium vigor tall tree
 - Gets fire blight
 - Haven't seen bitter pit on this variety
 - Doesn't drop
 - Will get an off flavor 2 weeks after it is ripe on tree if not sprayed with Retain
 - Retain can hold this variety off 10 days until Honeycrisp season



MAIA photo

Three new cultivars begin
patented
No new releases this spring

MAIA board planning to
meet at Eckert's in
Versailles in April

Apple Replant Disease

(On Sites previously planted to apples)

- Symptoms visible soon after new trees are planted
- Above ground
 - Uneven growth across orchard
 - Stunting
 - Shortened internodes
- Below ground
 - Discolored roots
 - Necrosis on root tips
 - Fewer roots
- Newly planted trees often die the first year
- Survivors have lower fruit production and fruit quality



With replant disease



Healthy trees

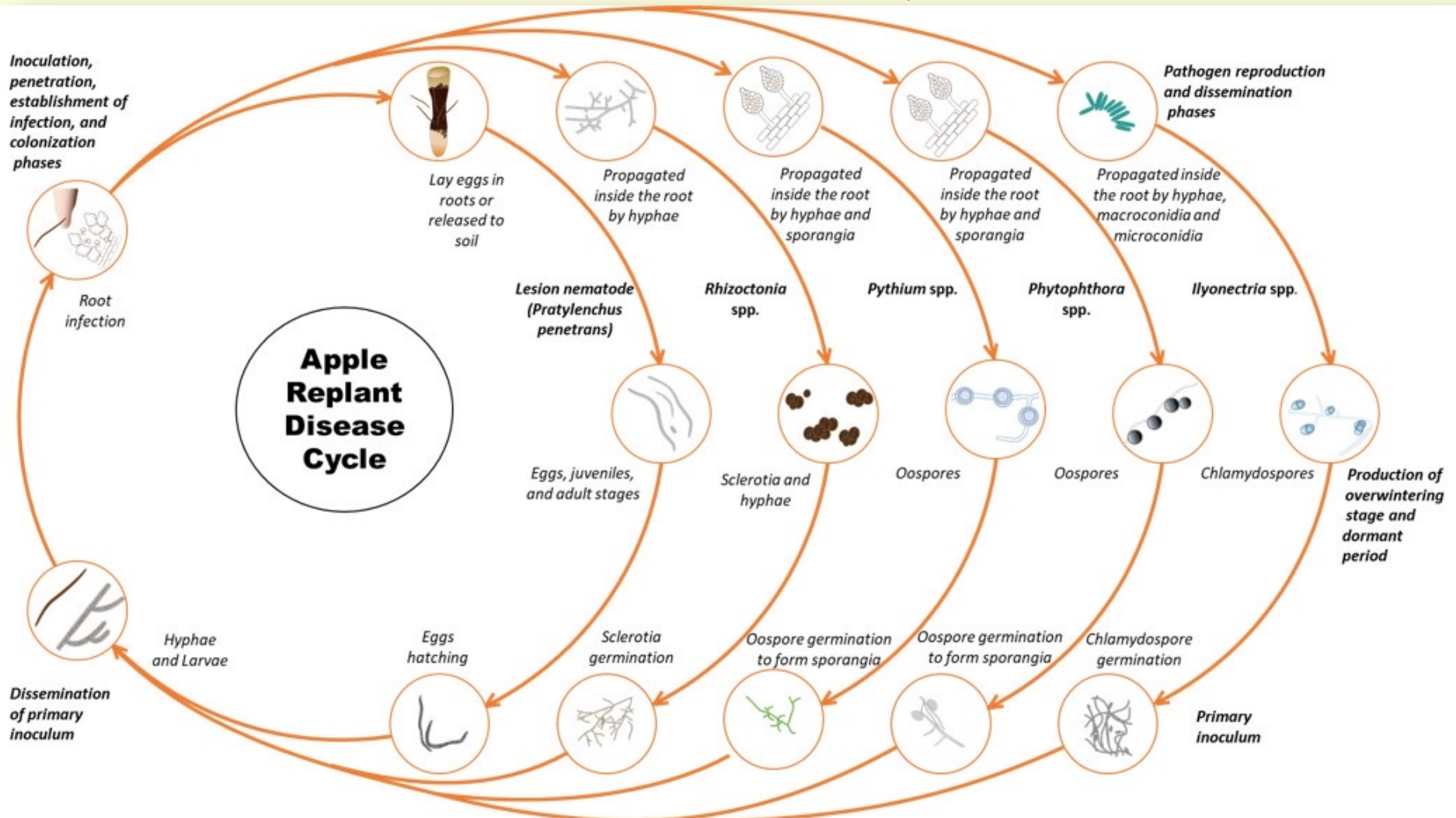
Courtesy: Mark Mazzola, USDA ARS

Apple Replant Disease Pathogen Complex

Nematodes

Fungi

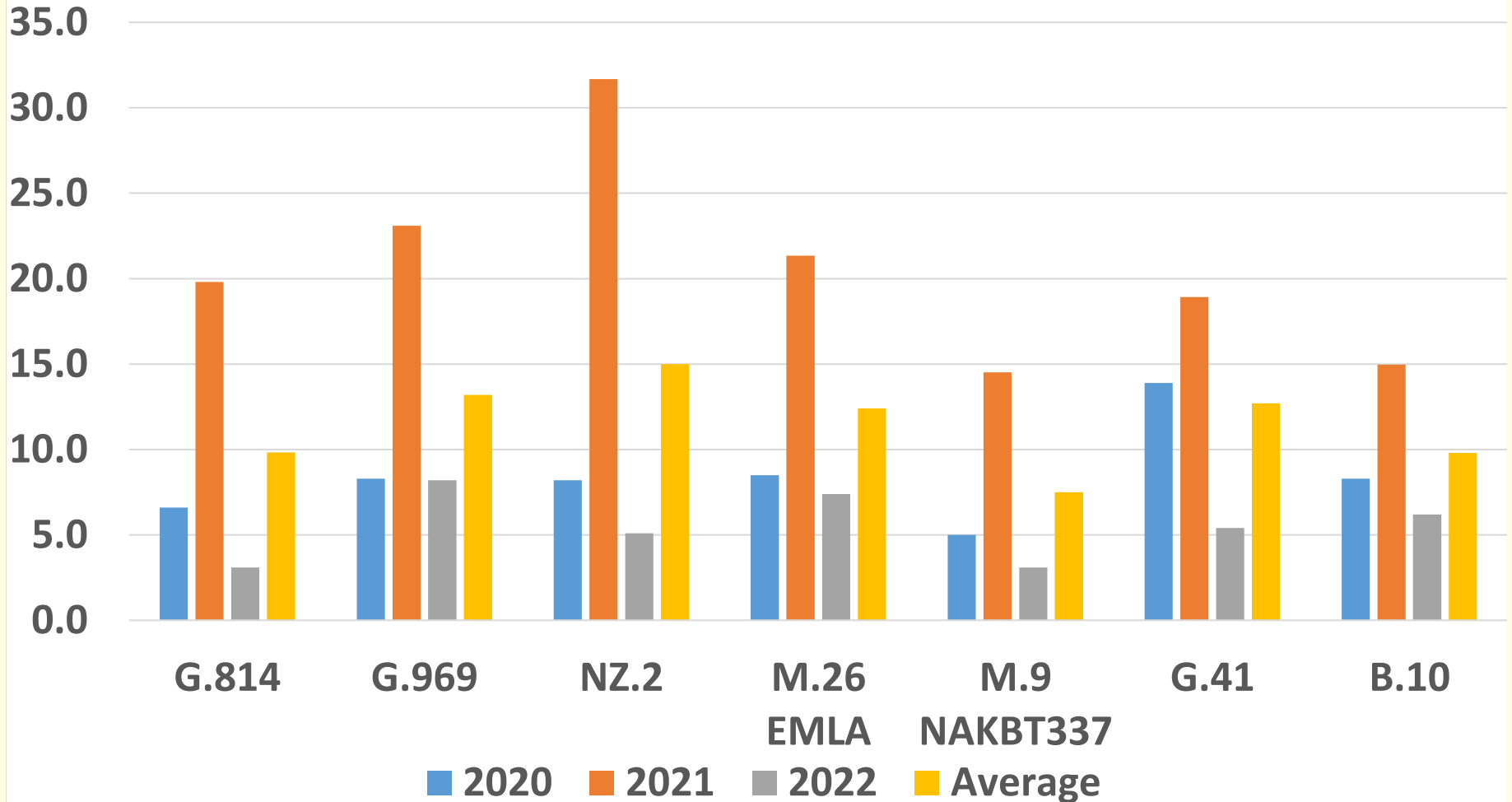
Oomycetes



Courtesy: Indika Ratnayake, WSU

<http://treefruit.wsu.edu/crop-protection/disease-management/apple-replant-disease>

2020 - 2022 Yields (lbs. per tree) NC-140 apple rootstock trial - UKREC, Princeton, KY



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-Good, Mid-winter	Yes	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.

Recommendation: Use plant materials that have been tested and are "clean" of viruses.

Licensing for all varieties is available as exclusive or non-exclusive in selected Domestic and International Territories.

Chart data valid as of September 20, 2018, and supplied by Cornell University apple rootstock breeding team members, Gennaro Fazio, PhD., USDA Breeder, Terence Robinson, PhD, Cornell Breeder, and Herb Aldwinckle, PhD., Professor Emeritus.

Not in trial
 G.213, G.814
 G.969, G.210
 G.890

Apple Rootstock Comparison Chart

Tree % Size of Standard	35	35	35	35	45	65	70	80
Rootstock	B.9	M.9	B.10	NZ.2	M.26	M.7	MM.106	MM.111
WAA Resistance	No	No	No	Tolerant	No	No	M High	M High
Fire Blight Res.	Resistant	No	Very Res	Very Res	No	No	Moderate	Resistant
Replant Disease Res.	No	No	?	Tolerant	No	Tolerant	No	No
Phytophthora Res	V. Tolerant	Susceptible- V. Resistant ¹	Tolerant	?	M. Susceptible	Susceptible- M Tolerant ²	Highly Susceptible	Tolerant
Cold Hardiness	Yes	Partial	Yes	?	Yes	Yes	Yes	Yes
Yield Efficiency	Yes	Yes	Yes	Yes	Yes	No	Moderate	Low
Low Suckering & Burr Knots	Yes	Yes	Yes	Yes	Yes/No	No/Yes	Some	Low/No
Susceptibility to latent viruses	No	No	?	?	No	No	No	No

¹M.9 NAKBT 337 (S); M.9 EMLA (VR); M.9 (VR); M.9 Nic 29 & Burg 7565 (Unknown)

²M. 7 & M.7A (S); M.7 EMLA (M .Tolerant)

Marssonina Blotch



Sept. 21



Oct. 29



Leaf spots coalesce into scald like symptoms and leaves drop.
Problem in wet springs and falls
Defoliates trees rapidly
Use fruit rot fungicides

How to Tell the Difference on Peaches Between

- Bacterial Spot
- Copper Injury
- Cherry Leaf Spot
- Nitrogen deficiency



Cherry Leaf Spot on Peaches



- Fungus disease
- Occasionally shows up later in season
- Cherry trees often near by
- Reddish spot color
- Randomly located on leaf
- Spot centers may drop out
- Leaves turn yellow and drop
- Fungicide sprays
 - 0 day PHI
 - Fontelis, Indar, Luna Experience, Mervion, Pristine, S
 - 1 day PHI
 - Flint Extra, Luna Sensation

Photos courtesy
Daniel Becker

Bacterial Spot

- Bacterial disease
- Appears first as water soaked, grayish spots on leaves
- Spots become angular (delineated by veins) turning brown, purple or black
- Usually concentrated at leaf tips and along midribs
- Water soaking around lesions
- Spots expand and centers drop out
- Leaves turn yellow and drop
- Control
 - Resistant cultivars
 - Copper at dormant
 - During season
 - Fixed copper
 - Antibiotics - FireLine, Mycoshield (oxytetracycline)
 - Fertilize to maintain vigorous growth



Universita di Bologna, U. Mazzuchi, Bugwood.org



<https://extension.psu.edu/peach-disease-bacterial-spot-differentiation-from-copper-injury>

Copper Spray Injury



- Lesions are round
- Located randomly on leaf
- Peach leaves more sensitive than apple leaves.
- Varietal differences
- Fixed copper v.s. bluestone copper
- Phytotoxicity increased in acidic spray solutions
 - Adjuvants, phosphorus acid fungicides, mancozeb lower pH
- Don't tank mix with foliar fertilizers
- Worse under slow drying conditions
- Copper sprays are a protectant treatment
- If you don't have foliar copper phytotoxicity your copper rate is not high enough!

Leaves sometimes turn yellow and drop off.

Nitrogen Deficiency



University of California

- Leaves are lighter in color and smaller in size
- May get red spots on the leaves

No Spray Peaches!



Brown Marmorated Stink Bug



W. Hershberger, StopBMSB.org

One adult may lay up to 486 eggs



Julie Beale, UK

Asian pear

BMSB Traps



Pyramid Trap



Sticky-Panel BMSB Trap



~4' height



- Trece -pherocon stinkbug-dual-lure
 - Aggregation pheromone +
 - Synergist
 - 12 wks control
- Trap Aug. & Sept.
- Replace sticky panel if 50% covered with debris
- Threshold
 - 5-10 stink bugs/wk
- Alpha Scents lure

<https://www.greatlakesipm.com/monitoring/lures/stinkbugs/gltr371805-trece-pherocon-stinkbug-dual-lures-5pk>

BMSB (PHI's)

RUP Insecticides

- Baythroid XL
 - Pome & Stone fruit 7 days
- Danitol
 - Pome fruit 14 days
 - Stone fruit 3 days
- Mustang Maxx
 - Pome & Stone fruit 14 days
- Warrior II
 - Pome fruit 21 days
 - Stone fruit 14 days



European Hornets



M. J. Raupp

<https://bugoftheweek.com/blog/2017/10/14/what-is-that-giant-hornet-and-why-is-it-eating-my-tree-european-hornet-ivespa-crabroi-1>

EUROPEAN HORNET TRAP

DRILL OR CUT A $\frac{7}{8}$ " - 1" DIAMETER HOLE AS SHOWN IN A TWO LITER POP BOTTLE.

PLACE THE FOLLOWING INGREDIENTS INSIDE THE BOTTLE.

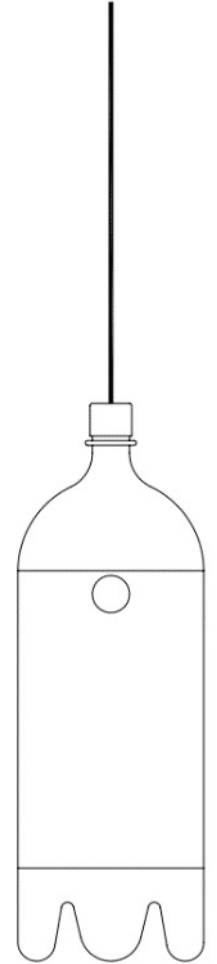
2 CUPS OF SUGAR
2 CUPS OF WATER
 $\frac{1}{2}$ CUP OF WHITE VINEGAR
 $\frac{1}{4}$ OF A BANANA PEEL

TIE A CORD OR STRING AROUND THE NECK OF THE BOTTLE BELOW THE NECK RING, OR DRILL A SMALL HOLE THROUGH THE CENTER OF THE CAP, PASS THE STRING THROUGH THE HOLE AND TIE A KNOT ON THE INNER SIDE OF THE CAP.

HANG THE BOTTLE FROM A BRANCH OR OTHER FIXTURE NEAR YOUR HIVES. A MINIMUM OF ONE PER APIARY. THIS TRAP WILL TRAP AND KILL EUROPEAN HORNETS, WASP, PAPER HORNETS, YELLOW JACKETS, WAX MOTHS AND MANY OTHER ENEMIES OF THE HONEY BEE. BUT DUE TO THE VINEGAR AND BANANA PEEL HONEY BEES WILL NOT ENTER THE TRAP.

THE TRAP MAY BE USED AROUND THE HOME AND OUT BUILDINGS AS WELL TO REDUCE UNWANTED INSECTS.

WHEN FULL OR AT THE END OF THE SEASON JUST DISPOSE OF THE BOTTLES IN A PROPER METHOD.



<https://jacksoncountybeekeepers.com/wp-content/uploads/2020/02/European-Hornet-Trap-for-yellow-jackets-etc.pdf>

European Hornet Trap



AppleAtcha AgriTech

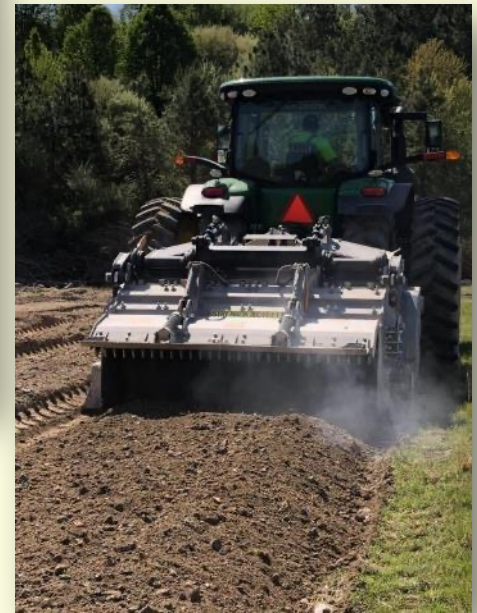
Orchard Site Preparation



Strip mine filled valley;
brown sandstone, grey sandstone, &
shale

MTH 225 Milling Machine

Italian Mfg FAE



AppleAtcha AgriTech



Fixing A Leaky Pond



Karst topography



Fixing A Leaky Pond

- Till leaky portion up 6-8" deep
- **Critical** - Add water to the ball stage
 - 2% above std. Proctor)
- Use sheeps foot soil compactor and pack multiple times
 - Work from the bottom of pond up slope
- Add a 6" layer of Maury silt loam or clay soil, wet to ball stage, and repeat packing
- Add a second 6" layer of soil, wet to ball stage, and repeat packing

Sheepsfoot or Padfoot Rollers

Recommended

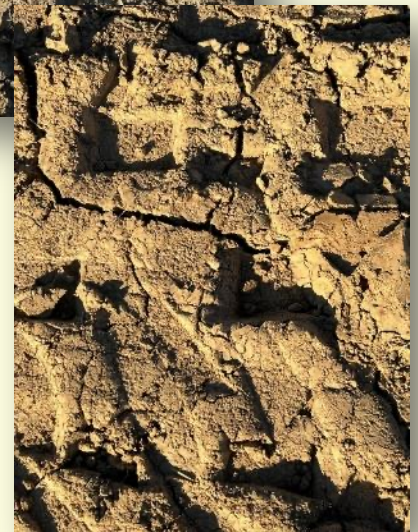


Foot has -
Slope (2"), flat (4"), slope (2")
Width 3"

Doesn't work



Ellipse shaped
foot on a rod



Oct. 28, 2022



Feb. 11, 2023



QUESTIONS?



Pixie Crunch, second growing season



Encore