



Growing the Honeycrisp Tree and Best Management Practices to Mitigate Bitter Pit

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Simple rules for establishing/growing 'Honeycrisp'

- Graft union should be 6" above the ground level once the soil has settled
- Leave at least **3-4" of rootstock** exposed for a **weaker tree**
- Remove all feathers below 24 inches
- **Do not head the leader!** when planning to grow a Tall Spindle tree
- Remove any feathers larger than 2/3 diameter of the leader
- If there are less than three feathers remove them and treat the tree as a whip and use **Maxcel 15-20 days after budbreak** to promote branching
- A young TS tree mainly needs to grow **quickly and vertically** to the top trellis wire – without much need to fill lateral spacing. It will happen magically!
- Early, early **good support is critical**
- Early, early **good irrigation is critical**
- Trickle irrigation has its **largest impact** in the first few years. It should be installed early in the first year
- In **drought years**, the application of water should **begin in mid-May**. In other years, the application of water can be delayed **until late May**

Plan, Prepare, and Establish a Successful Honeycrisp High-Density Orchard

- The **decisions** made now and **methods** to be used in 2023 for establishing that future high-density orchard will have **consequences** for the next 15-20 years

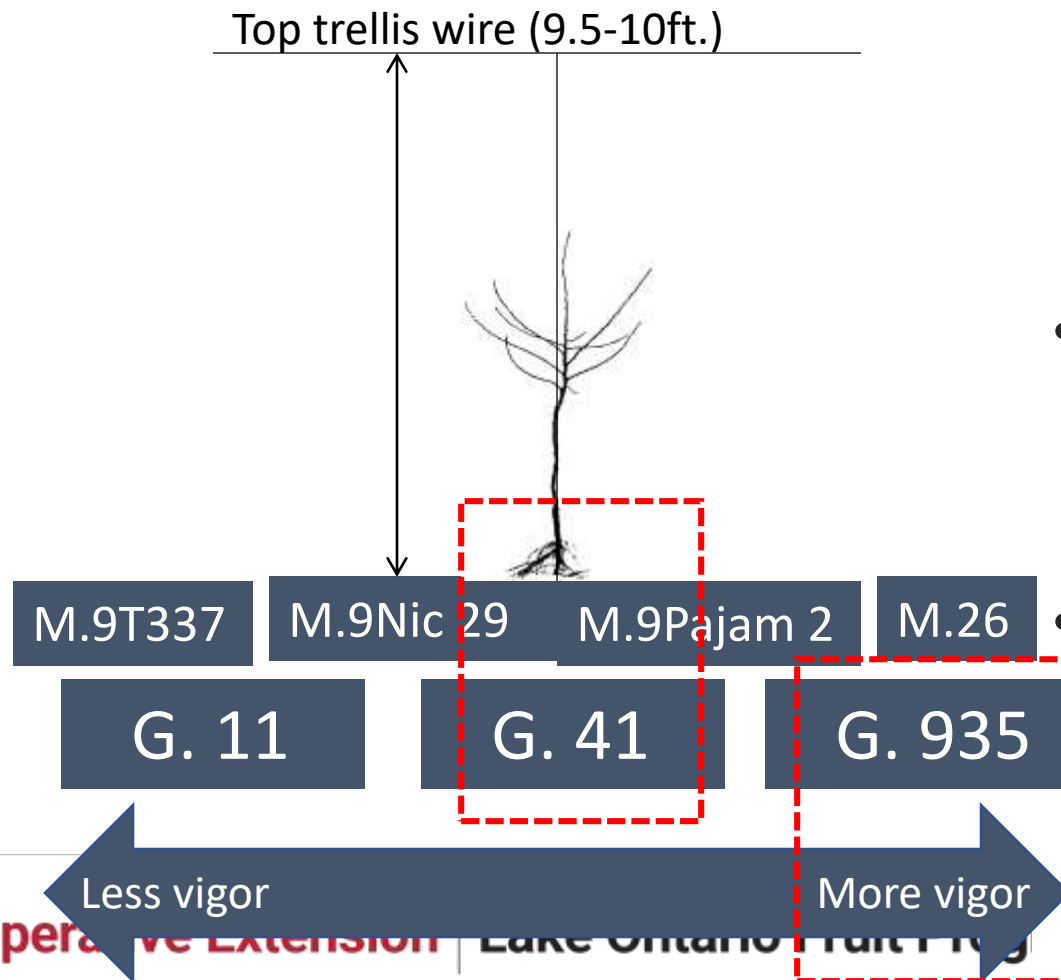
Critical steps.....

- Advanced planning for a minimum of **two years** to get the proper tree with the right price and to prepare the soil
- The use of nursery trees of excellent quality whether they are bought or produced on the farm
- Early spring or fall planting to allow **early root establishment** and **maximum tree growth** in the first year
- Quick installation of a **trellis support and irrigation lines** soon after planting
- Optimal leader growth for the first 2-3 years as a result of a balanced nutritional program, irrigation, excellent weed control and overall good orchard management.

Maximum leader growth is critical for the money maker Honeycrisp

- With a **weak growing cultivar** such as Honeycrisp the **lack** of sufficient leader growth to reach the top of the trellis (10ft) by the end of the 3rd year is a serious problem that **limits** yield in future years
- With more vigorous cultivars such as Gala, Fuji or McIntosh reaching the top of the trellis by the end of the 3rd season is **usually not a problem**
- However, with weak growing cultivars growers need to **intensively manage the trees** in the first **3 years** to achieve the **desired growth**
- **Push the trees as hard as you can as fast as you can!**

Plan ahead and push a weak leader to grow fast and vertically



- A **weak cultivar** must be planted at a close spacing (3ft or less) using the more **vigorous M.9 clones** (Pajam 2, Nic 29), or **G.41** (comparable to the large M.9 clones, fire blight resistant)
- **G.41** will be especially useful when orchards are **replanted on old orchard sites** since it has some tolerance to replant disease
- A good option is **G.935** for establishing high-density plantings for a weak growing cultivar like Honeycrisp

You don't head the leader, instead you Select the leader

- You **quickly install** the new trellis and irrigation lines after planting
- The goal is to **keep the leader growing** until the end of July through intensive water and nitrogen management and achieve 18-24" of shoot growth
- You **select** the leader when 2" long and remove buds #2-4 when 1" long, (if this is not done you should **cut competing shoots** back with clippers to 2" long) to prevent competition with the leader
- The new trees should grow **healthy**, without weed competition, mildew, and fire blight





Feed the tree to promote optimum growth

- **Apply ¼ lb. of Ca nitrate per tree** after the soil settles carefully applied in a doughnut shaped band around each tree
- At about 3-4 weeks after the first fertilization the trees receive a **second small dose of nitrogen (1/4 lb. of calcium nitrate)** carefully applied in a doughnut shaped band around each tree
- Flowers can sometimes be manually removed (first year)



Support the Tree to Grow Quickly and Vertically to the Top Trellis Wire

- The trellis should have **3 wires** if there is a vertical supporting element such as a conduit pipe, a bamboo, or a wire stabilizer
- It should have **4-5 wires** if no vertical supporting element is used
- The leader should be attached to the trellis with a **rubber band** or a **wire loop** as soon as it reaches each **successive wire**





4 wires



5 wires

1 wire w/Conduit Stake



3 wires plus Stabilizer

Trellis clip





- With young weak trees that have crop the unsupported terminal portion of the leader above the last wire should be defruited for maximum shoot growth and good lignification during years 1, 2, 3 and 4





Honeycrisp is less forgiving!

- Honeycrisp is a lot **less forgiving** than other apple cultivars
- To grow a **weak Honeycrisp tree** you have to **support, prune, and single the leader** early in June
- **Remove extra shoots** at the terminal and **divert the growing effort on the central leader**
- **Remove large lower limbs**
- **Renewal pruning** needs to be **accelerated** on Honeycrisp
- Removing the **largest bottom branch** from this **slow-growing tree** will **divert energy to the growing terminal**

Prune and use the 3Ts..

The 3 'Ts':

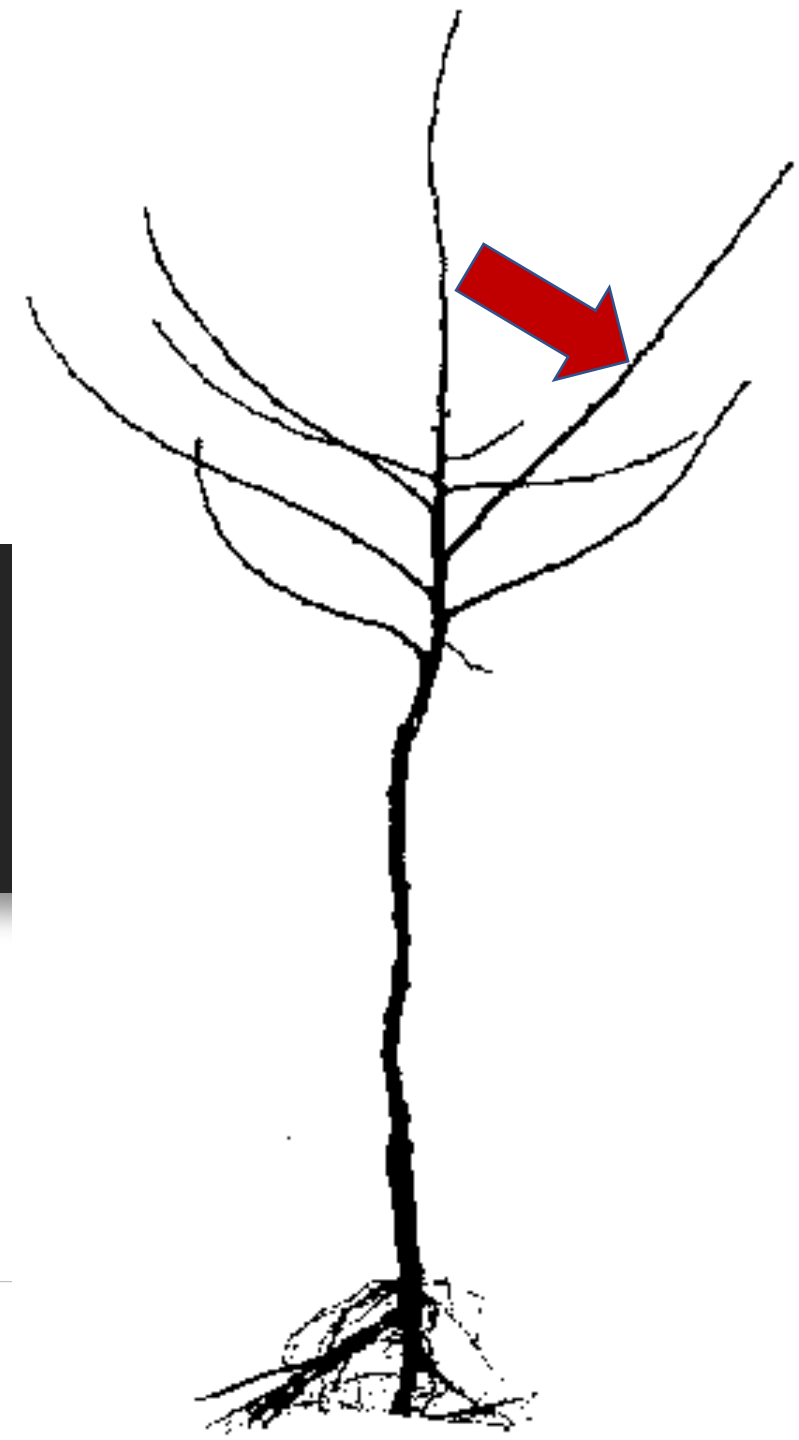
Too narrow, or Too long, or Too thick,

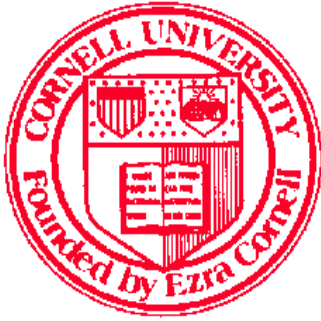
Always leave a stub ! (longer for a weak cultivar like Honeycrisp)

A Visual Guide for Pruning of Young and Semi-Young High Density Apple Plantings



Mario Miranda Sazo - Lake Ontario Fruit Program
Cornell Cooperative Extension

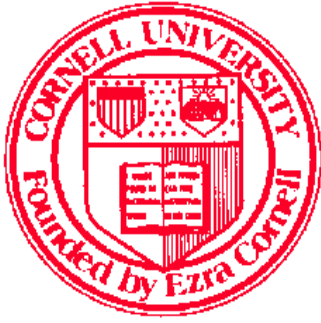




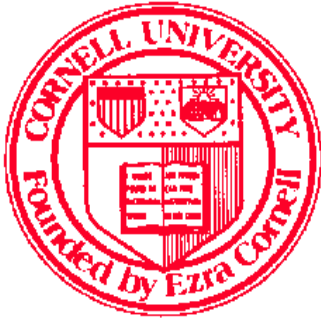
As you plant closer and closer in the in-row spacing, always leave/favor horizontal (planar) one-year old laterals of medium length and with a terminal floral bud

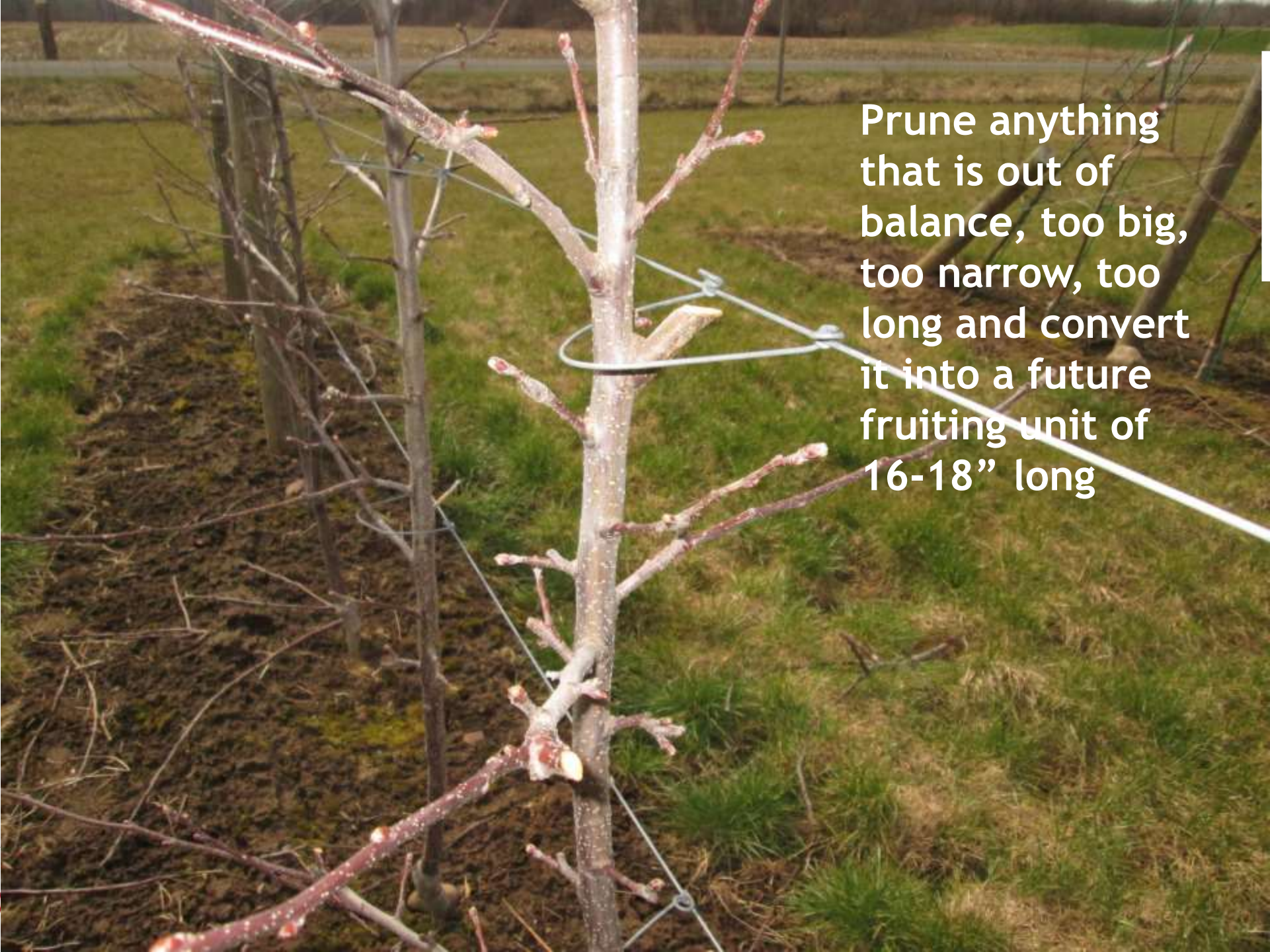
Prune anything that is too vertical, vigorous, too long

Pruning of an under-performing apple tree for maximum annual growth



Pruning detail





Prune anything that is out of balance, too big, too narrow, too long and convert it into a future fruiting unit of 16-18" long

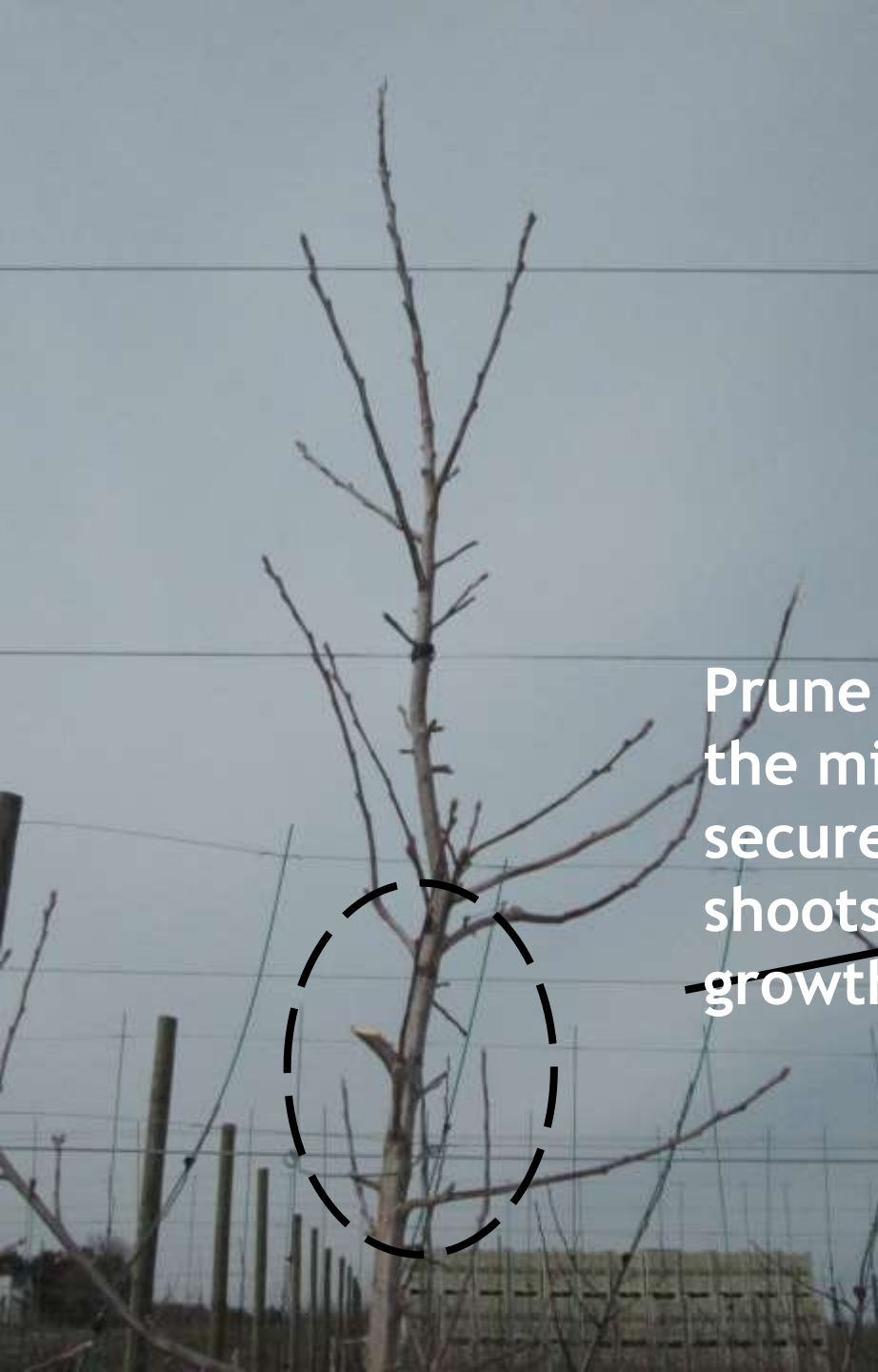


Help the tree to grow and produce well balanced lateral shoots via pruning



Two branches that were close together and were 'chocking' the upper part of the tree

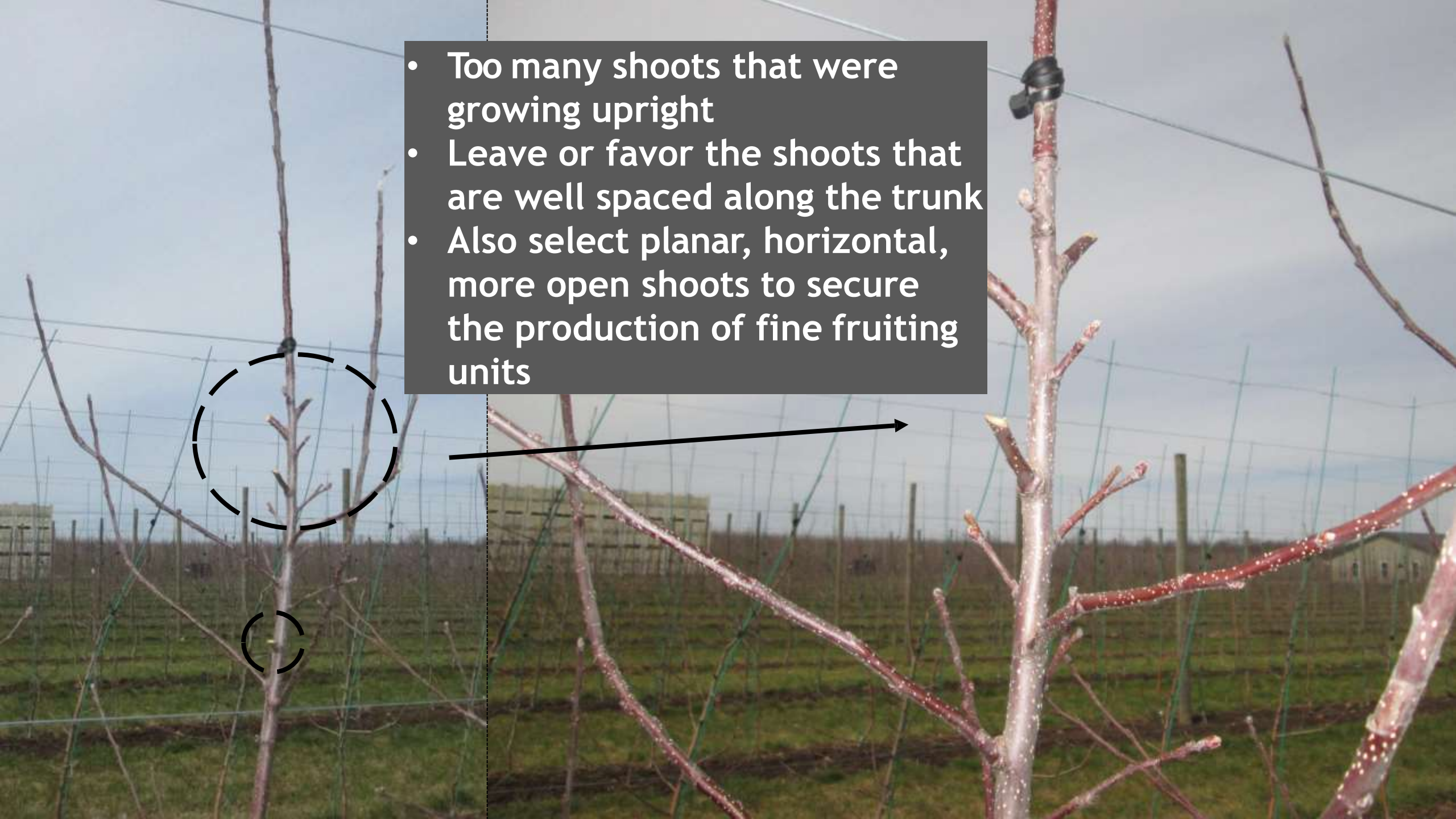


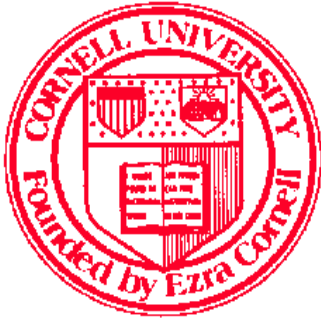


Prune any vigorous branch on the middle part of the tree to secure further development of shoots and maximum vertical growth

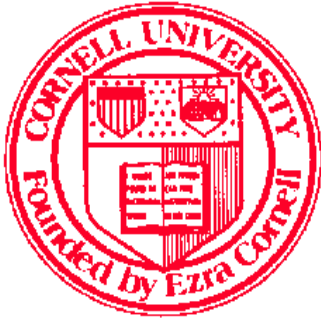


- Too many shoots that were growing upright
- Leave or favor the shoots that are well spaced along the trunk
- Also select planar, horizontal, more open shoots to secure the production of fine fruiting units





Pruning detail
next slide



Prune, select, and
leave more horizontal
fruiting units

“Open” the tree!





Don't choke the tree
with too many branches and
prune some of them in the
middle portion

Use the "4 fingers" separation
rule along the trunk and
envision that at maturity you
just need 15 to 20 semi-long
fruiting units per tree (planted
at 3x12ft)





Don't choke the young tree
with too many branches and
prune some of them by using
the four-fingers separation
rule along the trunk



'4-fingers' branch separation rule
as you grow the tree the first years



Gala tops tend to produce too many shoots



Single the leader

Prune 2-3 shoots below the 'ring' and always leave a stub

Ring

Before Pruning

After Pruning

1

2

3



Before Pruning

After Pruning

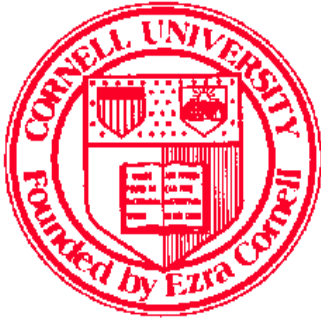
1

2

3



Leave single, fine, narrow Gala tops after pruning



After Pruning

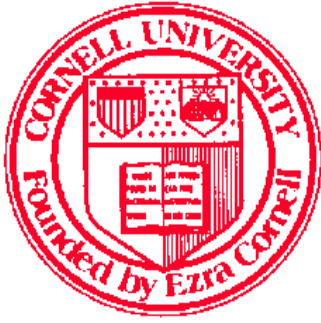
Pruning of young Honeycrisp

- Honeycrisp is less forgiving than Gala
- To grow a weak Honeycrisp tree you have to support, prune, leave horizontal shoots, and single the leader
- Remove extra shoots at the terminal and divert the growing effort on the central leader
- Remove large lower limbs
- Always leave longer stubs to secure renewal
- Renewal pruning needs to be “accelerated” on Honeycrisp
- Removing the largest bottom branch from this slow-growing tree will divert energy to the growing terminal
- First grow the tree then crop it!

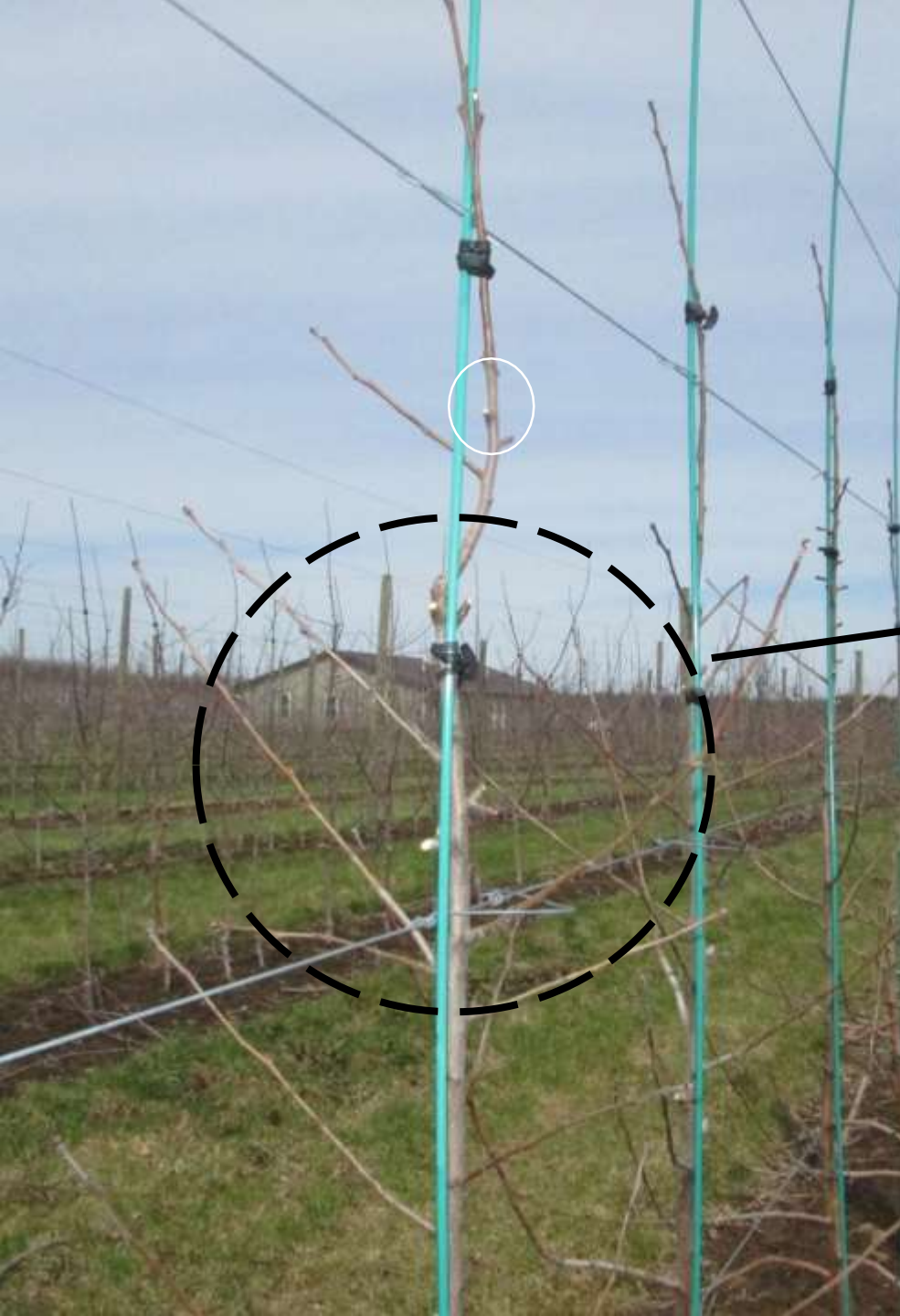




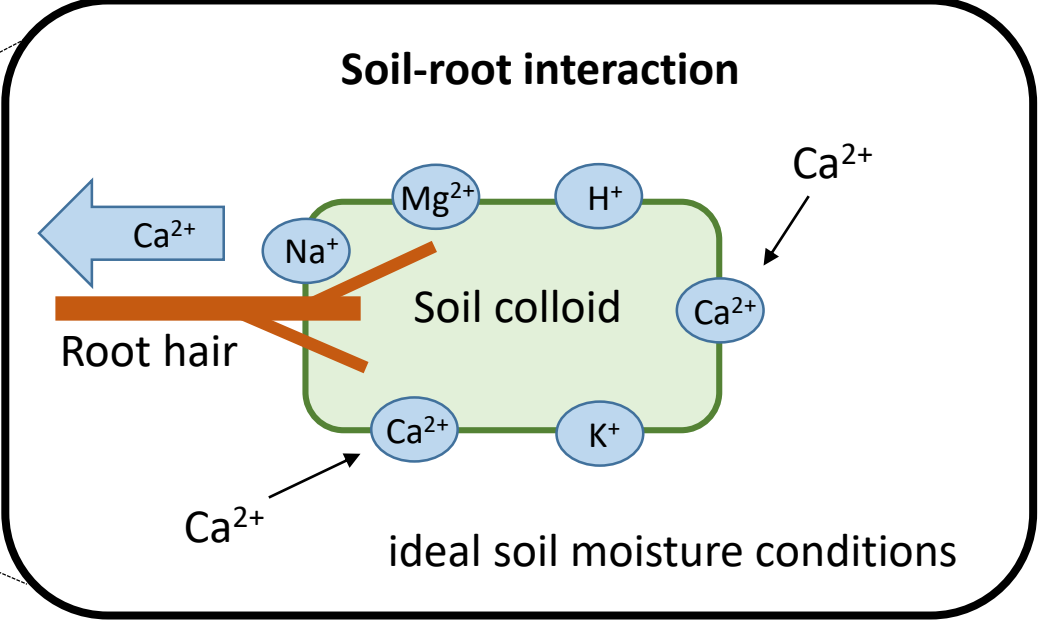
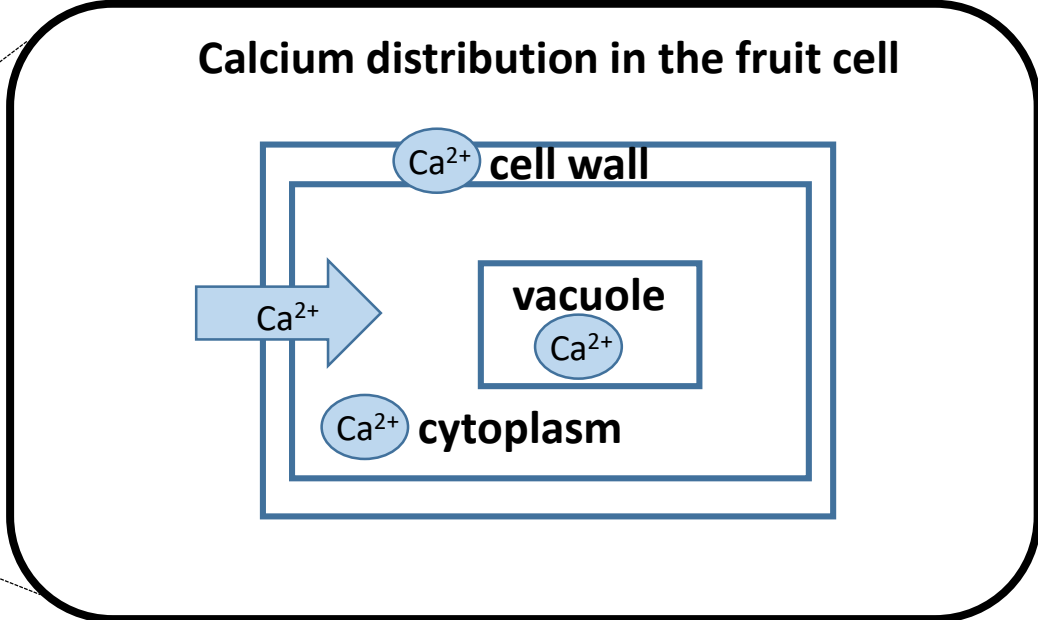
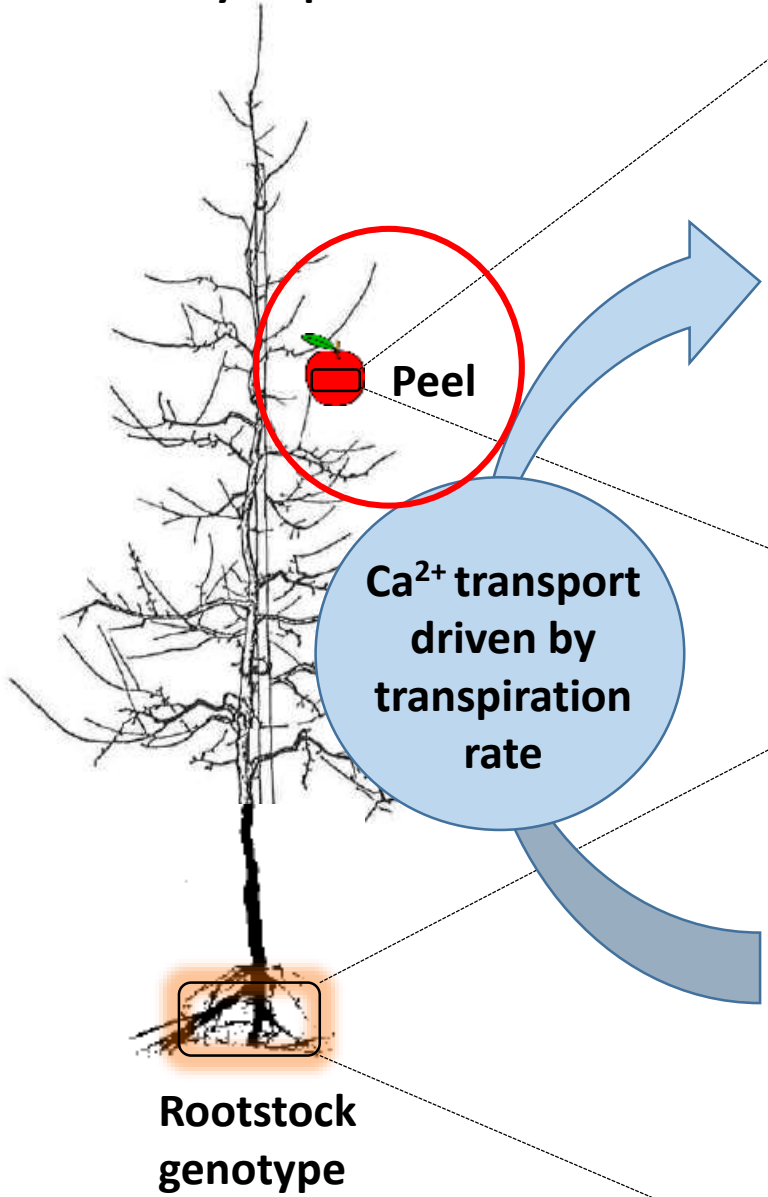




Pruning
detail next
slide



'Honeycrisp' tree



An **imbalance of calcium with potassium** in the **peel** predisposes 'Honeycrisp' to bitter pit

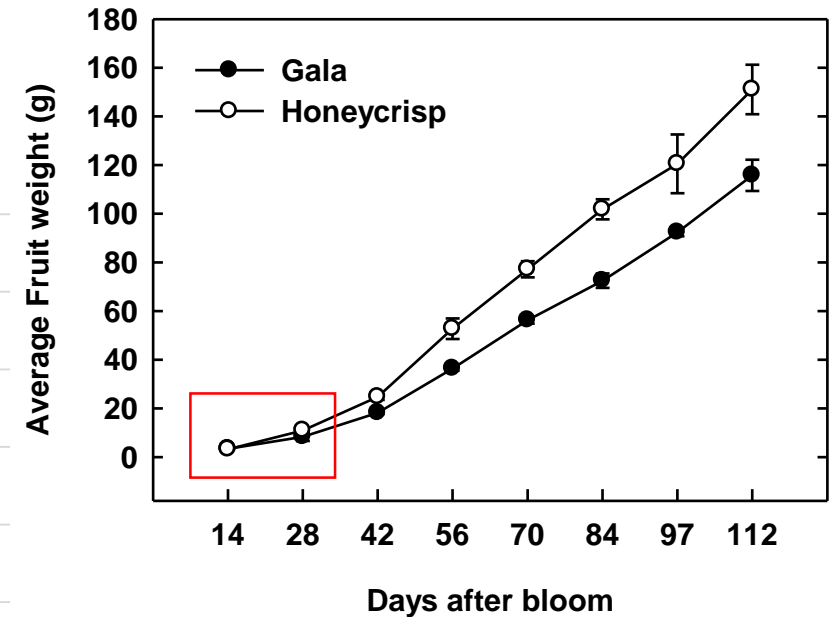
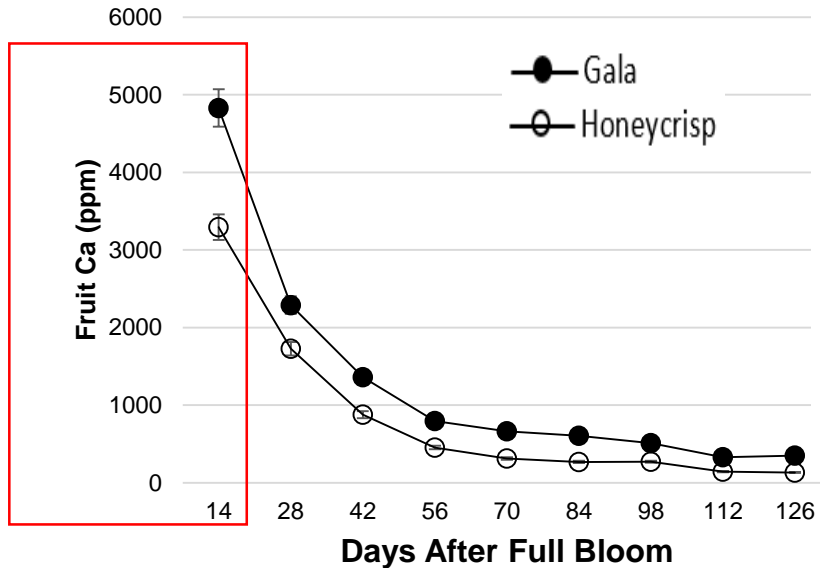
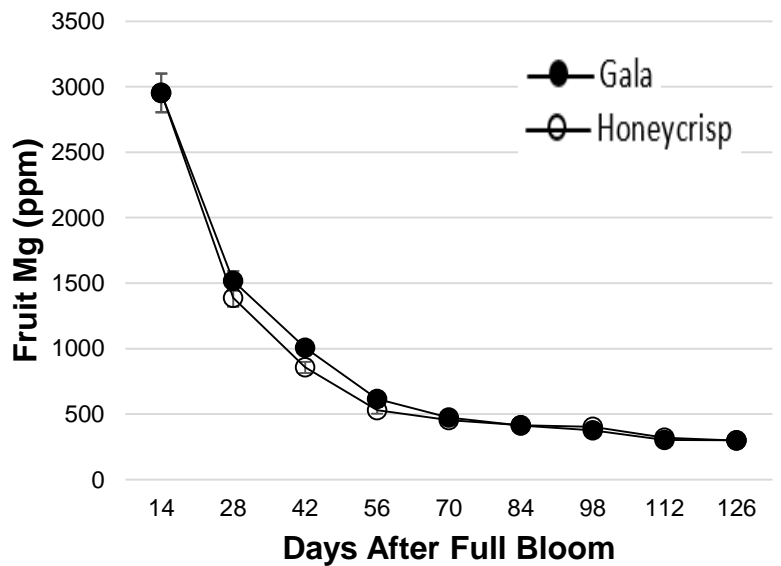
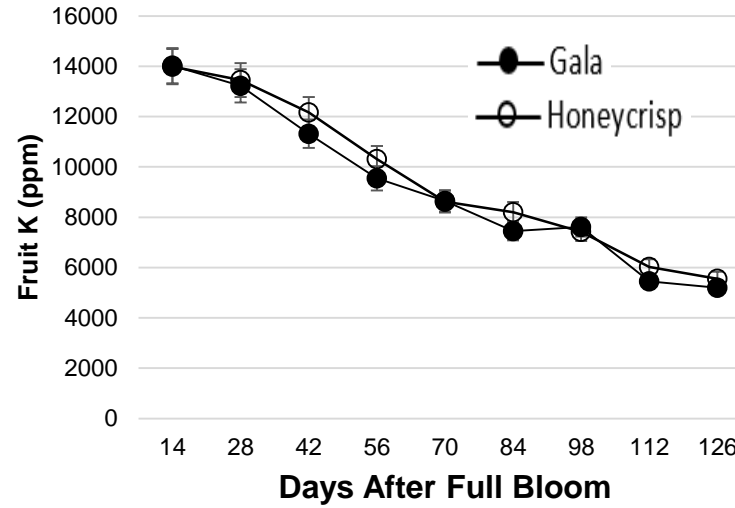
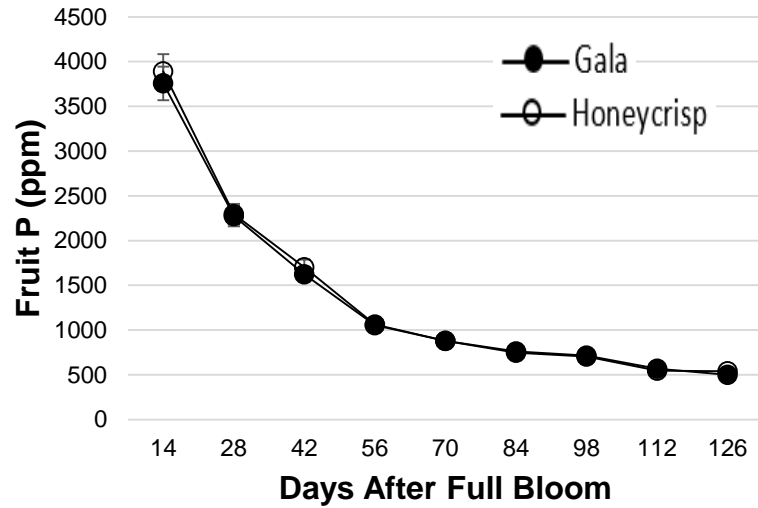


In our study, **'Honeycrisp' fruit had only half the calcium, but nearly 50% more potassium in the peel than 'Gala'**

2015

Developmental changes of fruit nutrients in Honeycrisp & Gala

Developmental patterns of fruit growth in Honeycrisp & Gala during the 2017 growing season, NY



Bulk Fruit

Cornell Cooperative Extension
Lake Ontario Fruit Program

Fruit Peel Method (traditional)

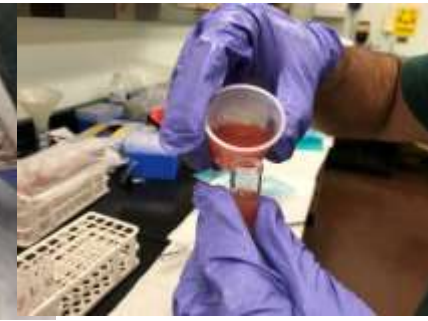


Peels dried and ready to be ground

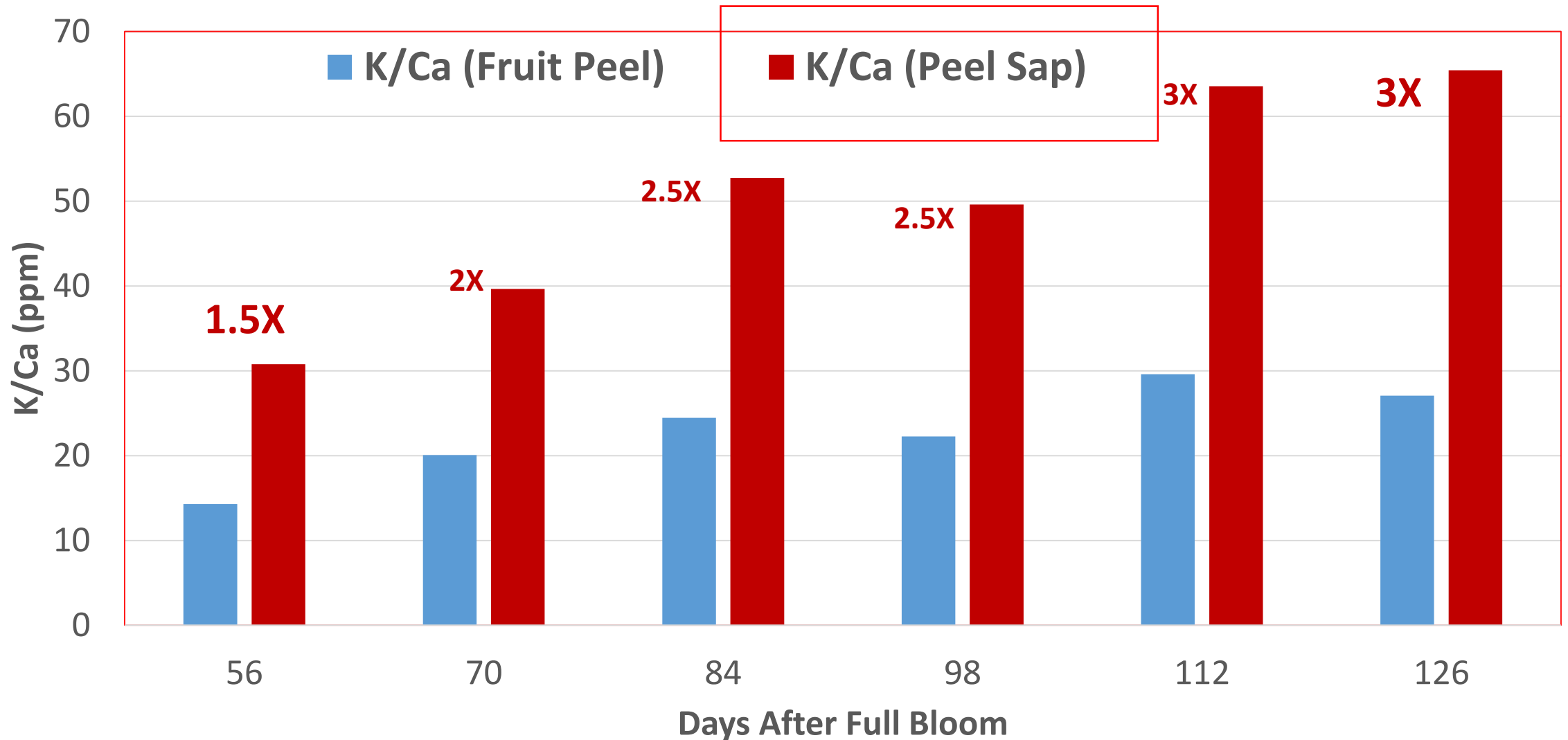


Peel SAP Method (Cornell)

Frozen peels, then thawed, and ready to be squeezed



K/Ca ratios of Fruit Peel versus **Peel SAP** in Honeycrisp



Grafting to Honeycrisp?



Block	RootStock	Grafted	Year	Density	K/Ca Jul-19	Block	K/Ca Jul-18	Block	K/Ca Jul-17
4	M26	GRAFTED	2007	10X18	15.86	SC7	17.99	LS10	17.34
241	B9		2006	2x11	16.09	239	19.6	229	19.92
Y163	B9		2006	2X11	16.43	241	19.87	24	21.15
33	M9/111	GRAFTED	2004	10X18	17.09	LS10	19.87	101	21.64
6	M9		2007	3.5X14	17.24	Z15	20.52	6	22.62
58	M9 NIC29		2000	4X13	18.03	22	20.64	Z9	23.4
59	M9		1999	6X13	18.09	33	20.73	34	25.16
101	M9 NIC29		2005	4X14	18.32	6	22.04	SC7	25.9
34	B9		2015	2x11	18.59	5	22.27	Y163	26.39
5	M9		2004	3.5X14	18.77	24	22.3	22	26.9
Z15	M9 EMLA		2008	5X13	18.93	SC8	22.58	SC8	27.22
Z9	M9		2009	5X12	19.05	58	22.59	239	27.24
SC7	M26		2000	6X16	19.1	229	22.69	33	27.66
105	M9 NIC29		2005	4X14	19.36	101	23.32	105	27.86
24	M9 NIC29		2003	4X13	20.6	Z9	23.62	Y157	29.78
22	B9		2013	3X12	22.84	Y163	24.95	58	31.46
51	M9/111	GRAFTED	2007	12X20	23.28	59	25.12	59	31.46
230	M9	GRAFTED	2005	8X14	23.63	105	25.36	Z15	33.97
54	M9/106	GRAFTED	2007	10X20	23.67	R335	26.69	54	33.98
SC8	M26		2000	6x14	23.68	23	26.85	241	34.31
23	B9		2014	2.5X11	24.35	34	26.95	4	34.31
LS10	M26		2010	3X13	25.1	54	27.39	5	35.41
239	M9		2002	2X11	25.88	51	28.09	230	35.77
Y157	M9	GRAFTED	1998	5X14	26.27	4	29.35	22	36.07
229	B9		2005	2X11	30.09	230	29.5	Y161	36.5
Y161	M26	GRAFTED	2005	10X16	30.79	Y157	29.79	R335	37.06
R335	M7	GRAFTED	2010	10x16	30.98	NICE	30.98	NICE	39.02
NICE	M26	GRAFTED	1998	6X16	31.1	Y161	34.95	51	40.6

New cultivar	Grafting technique	Training of new scion wood	Rootstock	Notes ¹
Ambrosia	Top working Side grafting Beaver grafting ¹	2-4 leaders/tree (18-20" in-row) 2-4 leaders/tree (18-20" in-row) 3-4 leaders/tree (18-20" in-row)	All dwarfing stocks, M.26	If the existing orchard grafted over had a less than ideal support and training system, if any, it will need to be re-engineered by installing a more robust trellis with taller (12-foot or higher posts) in-line posts and more horizontal wires spaced not more than 25 inches apart (use at least five to six wires).
Fuji	Top working Side grafting	2-3 leaders/tree (22-24" in-row) 2-3 leaders/tree (22-24" in-row)	All dwarfing stocks	
EverCrisp	Top working Side grafting	2 leaders/tree (24-30" in-row) 2 leaders/tree (24-30" in-row)	All dwarfing stocks	
Gala	Top working Side grafting	1 leader/tree (30-36" in-row) 1 leader/tree (30-36" in-row)	All dwarfing stocks	
NY-1 / NY-2	Top working Side grafting	1 leader/tree (30-36" in-row) 1 leader/tree (30-36" in-row)	All dwarfing stocks, B.9 with high soil fertility	

Honeycrisp Prefer planting a new orchard instead of grafting to avoid fruit quality issues and incidence of BP

 **Do not Graft to Honeycrisp**

Key findings in the last years

- **Peel SAP K/Ca ratios above 23-25 in July are associated with **higher risk of bitter pit incidence****
- **Peel sap K/Ca ratio in early July provides a **sensitive indication** of bitter pit risk at harvest and after storage**



Statewide Averages of Honeycrisp Fruit Mineral Concentrations

Table 1. Average values of various nutrients from 358 Honeycrisp blocks across NY state in 2021

NY Statewide data	Ca	K	Mg	N	K/Ca	(K+Mg)/Ca	N/Ca
Mean	58.8	1657.2	107.2	83.3	30.4	33.6	4.4
Minimum	16.4	450.3	27.2	33.8	6.8	8.7	1.5
Maximum	118.4	2563.0	171.4	167.5	51.2	56.6	12.6

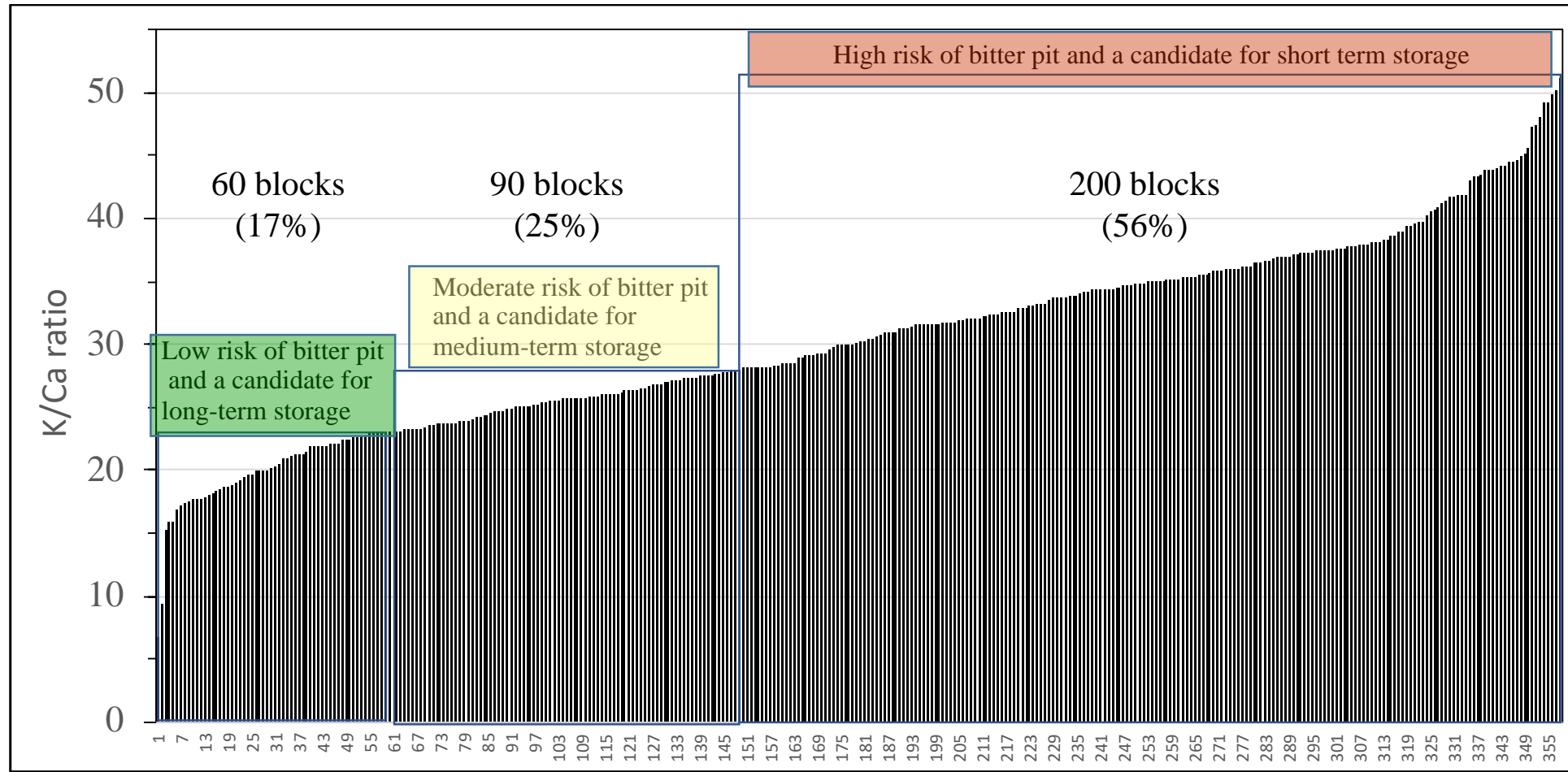
Table 2. Average values of various nutrients from 285 Honeycrisp blocks across WNY state in 2020.

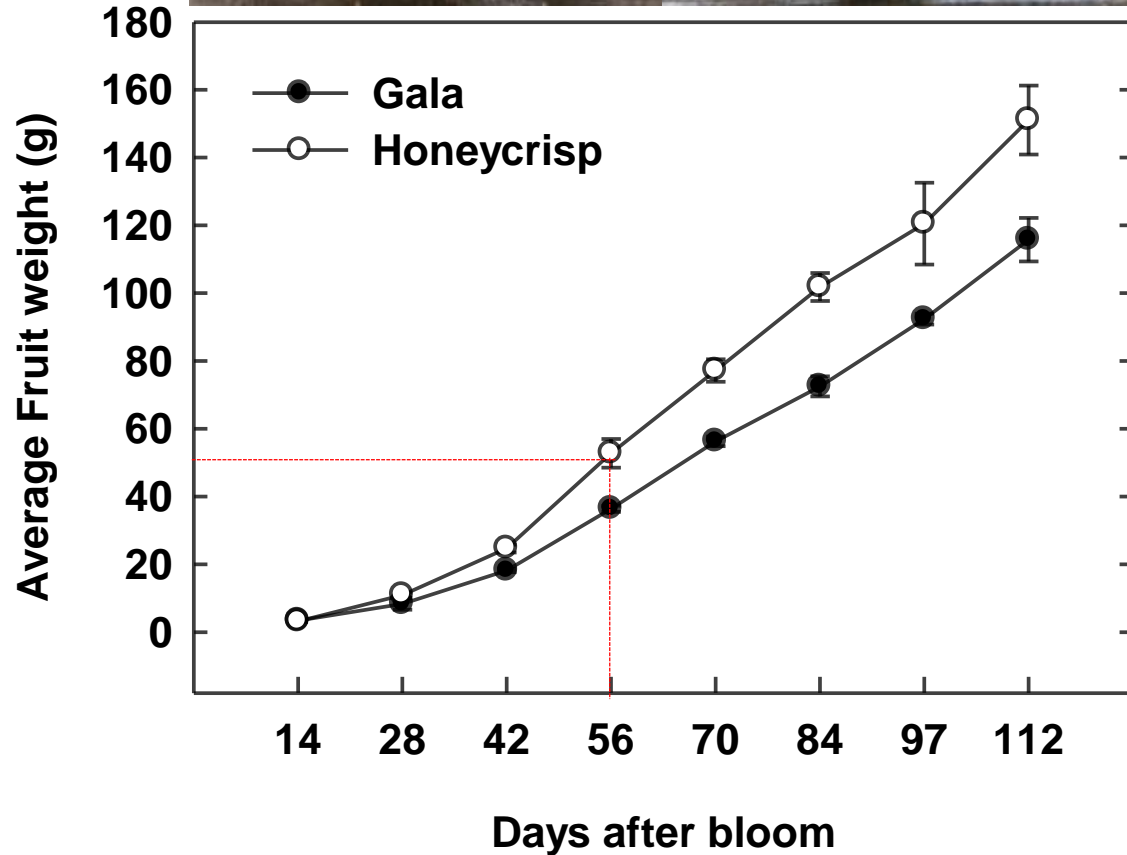
WNY	Ca	K	Mg	N	K/Ca	K+Mg/Ca	N/Ca
Mean	89.7	2224	159.7	.	25.4	28.6	.
Minimum	36.7	892.3	73.2	.	13.6	16.5	.
Maximum	143.2	3127	229.2	.	45.7	50.7	.

Assessing Bitter Pit Risk of Honeycrisp

In 2021 we surveyed 358 orchards of Honeycrisp and categorized each orchard based on K/Ca ratio of nutrients in sap of fruit peel

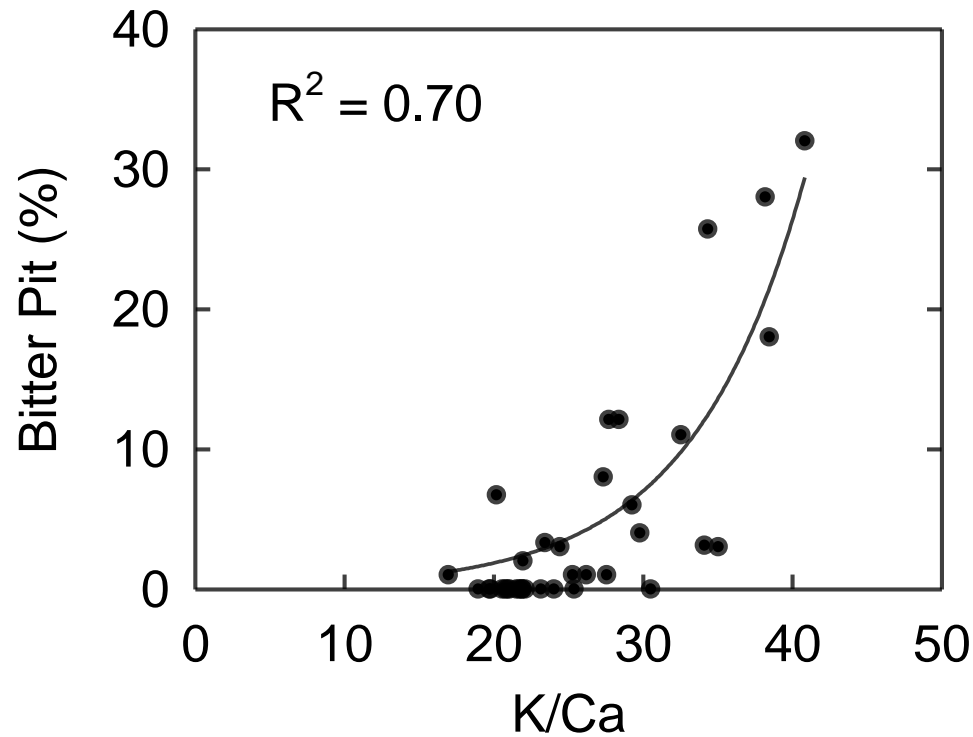
- Red=K/Ca ratio greater than 27
- Yellow= K/Ca ratio between 23 and 27
- Green= K/Ca ratio less than 23



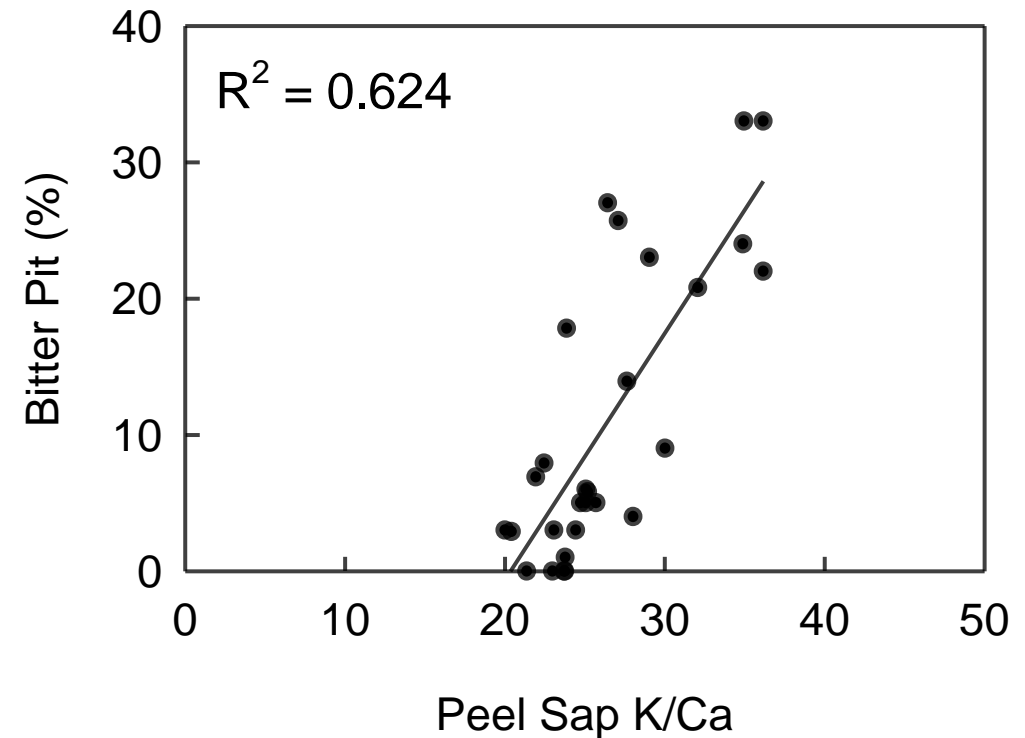


- **Honeycrisp sampling for peel sap** should be conducted at the average fruit weight of **50-55 grs/fruit (golf ball size)**
- Most Honeycrisp blocks in the Lake Ontario Fruit region reaches this size **early July**
- Honeycrisp fruits (above with golf balls) were collected on **June 25, 2020**
- The fruits averaged **22 grs/fruit** and **36.54mm** in fruit diameter
- **Golf balls** used for this comparison measured **42.6mm**

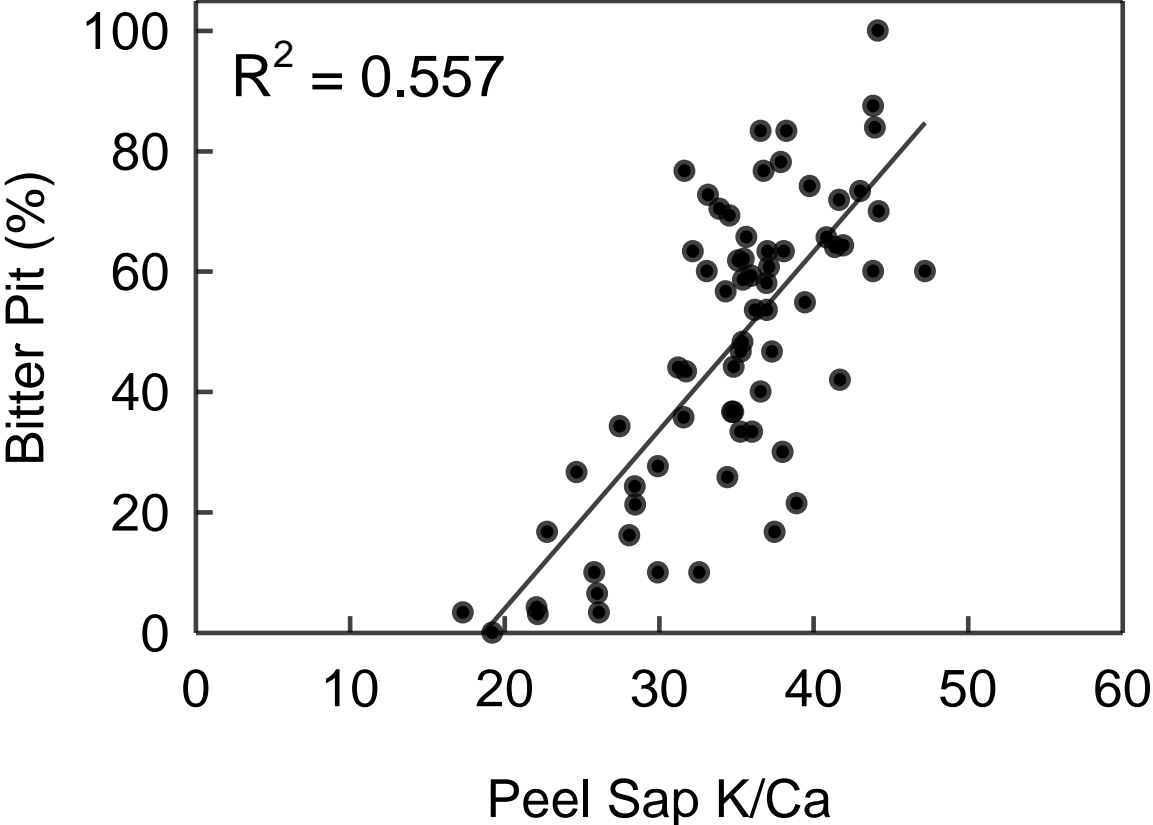
'Honeycrisp' Peel Sap Analysis to Predict Bitter Pit Risk (2020)



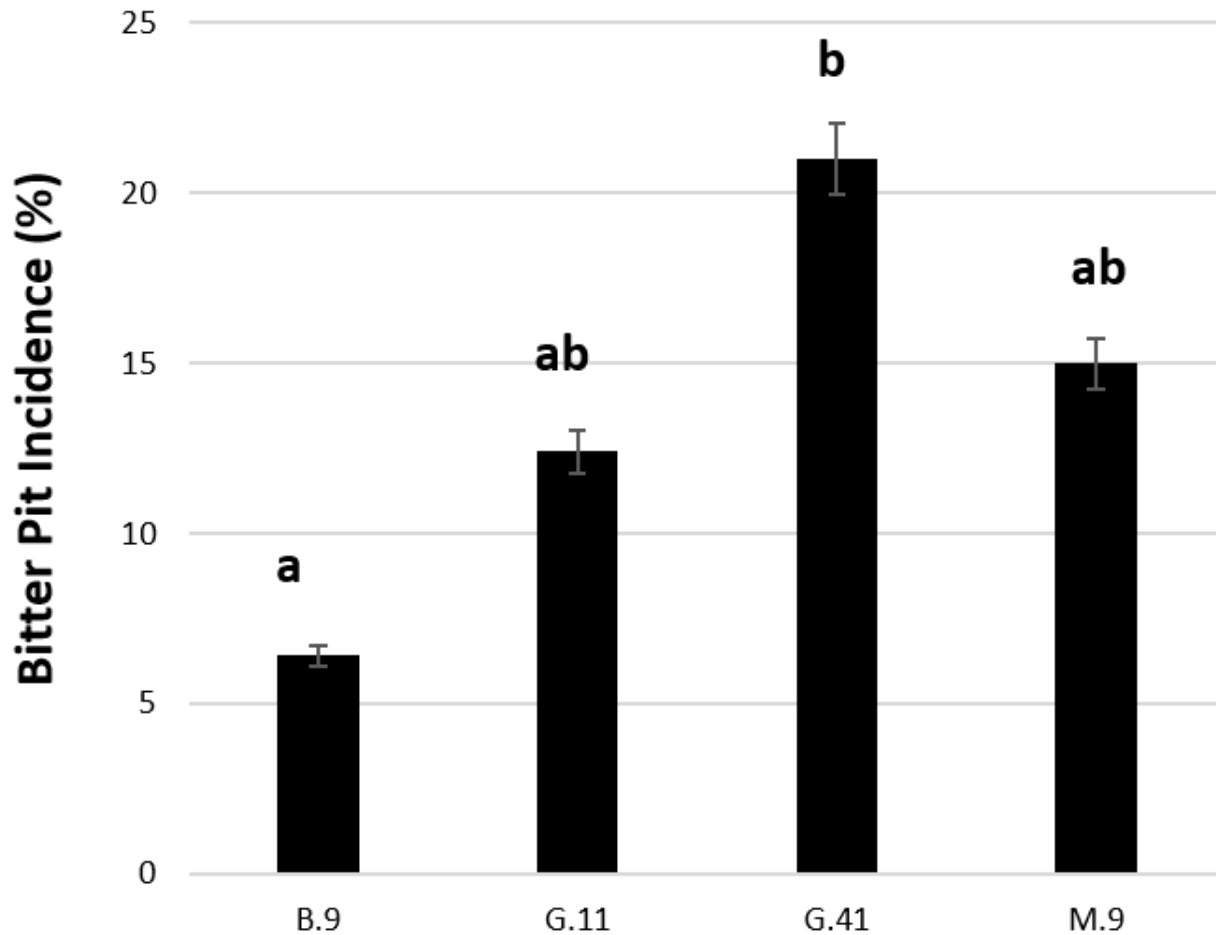
Passive Bitter Pit in relation to Nutrient Ratios (Champlain, 2021)



Passive Bitter Pit in Relation to Nutrient Ratios (North Rose, 2021)



What about the **rootstock effect** on bitter pit incidence on 'Honeycrisp'?



Bitter pit incidence of Honeycrisp at harvest as affected by rootstocks. Different letters indicate significant difference at $P < 0.05$.

Rootstocks that have consistently shown to reduce or increase the 'observed' incidence of bitter pit at harvest (Lake Ontario fruit region, NY, USA)

Rootstock	Bitter pit incidence (%)		
	Low	Medium	High
B.9	X		
M.9		X	
G.41		X	
G.11			X

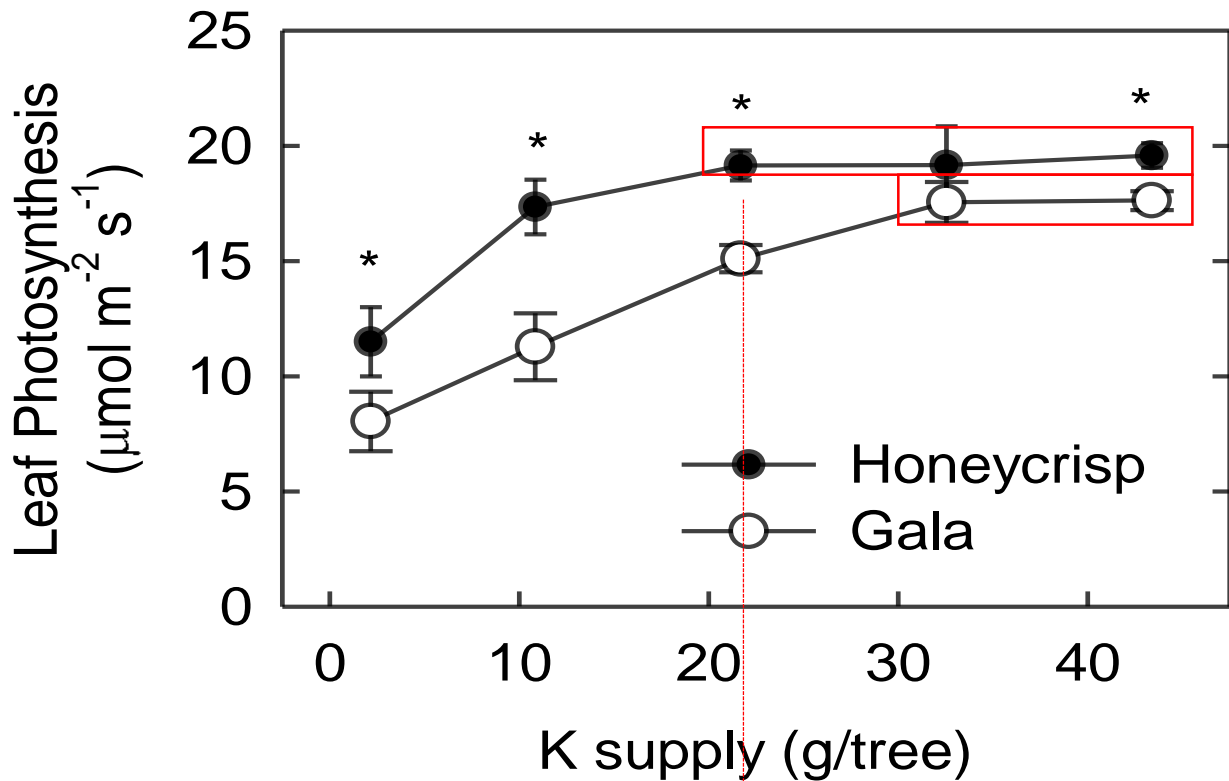
You can't starve an apple tree of **potassium K**, why?

- Cornell research in the 1990's found that **K** was **essential for large fruit size and high yield** of 'Empire'
- Cornell research in **2008-2009** on 'Gala' (also a small-fruited cultivar) showed that **high K** levels in **leaves (1.6%)** and **fruit (0.8%)** are needed for **fruit size and high yield**
- Therefore, for many years we recommended growers **annual applications** of **K** fertilizers to 'Gala', and other cultivars, **including Honeycrisp**
- But it was until **very recently** that we began to **manage 'Honeycrisp'** with consideration of **rootstock** and other **key factors** to **manage bitter pit**

Predicted removal rates of macro-nutrients by fruit harvest in relation to fruit yield in commercial 'Gala' orchards in New York

Yield (bu/Acre)	Macronutrients (lbs/Acre)					
	N	P	K	Ca	Mg	S
500	10.3	2.6	30.6	3.7	1.8	1.0
1000	20.3	5.0	57.9	7.6	3.5	2.1
1500	30.3	7.4	85.1	11.5	5.3	3.1
2000	40.3	9.7	112.4	15.4	7.1	4.2

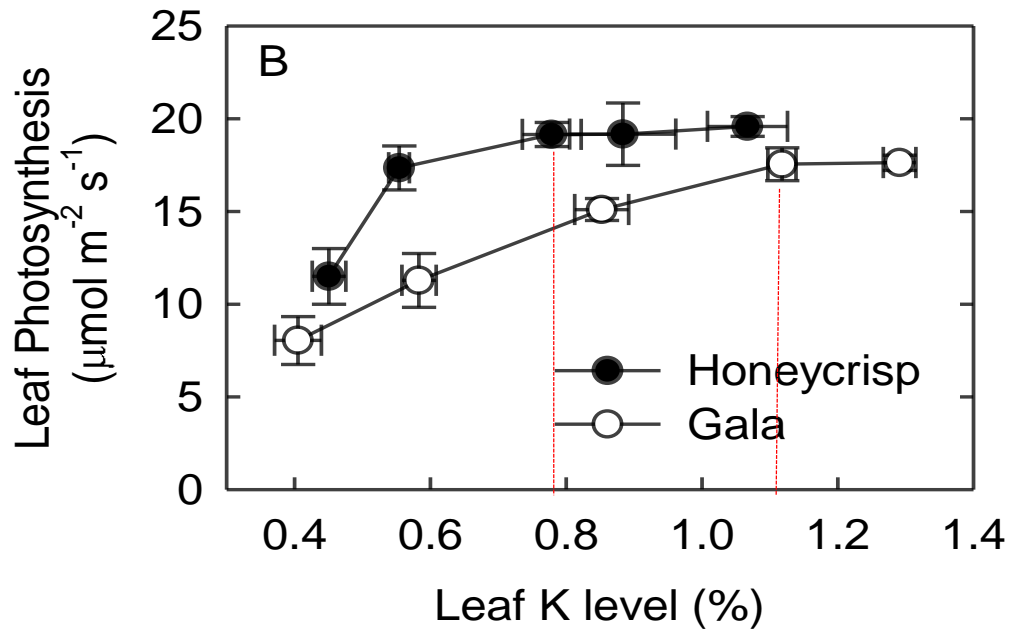
Maintenance K_2O application rate is the K removal rate in the table at a given yield multiplied by 1.2. For example, at a fruit yield of 1500 bushels per acre, the maintenance K_2O rate is: $85.1 \times 1.2 = 102 \text{ lbs/acre}$



g K/tree	2.2	10.9	21.7	32.5	43.4
lbs K/acre	5.9	29.0	57.8	86.6	115.7

- In this study, **leaf photosynthesis** (shown here), **fruit size**, and **color** increased with increasing K supply initially and then **leveled off**

Honeycrisp requires a lower K level than Gala



g K/tree	2.2	10.9	21.7	32.5	43.4
lbs K/acre	5.9	29.0	57.8	86.6	115.7

Key findings

Optimal leaf K level for HC

0.8%

Optimal leaf K level for Gala

1.1%

Implications for plant function

HC requires lower leaf K level than Gala for normal fruit growth and photosynthesis

Optimal leaf K levels with a 0.2% buffer zone

1.0% for HC
1.3% for Gala

Optimal leaf K range for HC

1.0-1.3%

Optimal leaf K range for Gala and other cultivars

1.3 – 1.8%

What can you do to keep a **low leaf K value of 1.0-1.3%** (years 1-2) in a young Honeycrisp tree

Honeycrisp orchard	K Fertilization Program for Honeycrisp
New planting	<p><u>Pre-site preparation:</u></p> <ul style="list-style-type: none">• Reduce the input of K during pre-plant soil preparations to maintain a ratio of K to Ca at 6~7.5% instead of 9.5 to 10% for most varieties

What else can you do to keep a low leaf K value of 1.0-1.3% for a **mature planting**

Honeycrisp orchard	K Fertilization Program for Honeycrisp	K/Ca levels in Leaves and Fruit Peel Tissues
Mature planting	<p><u>Maintenance application:</u></p> <ul style="list-style-type: none"> • Reduce the K rate by 20~30% that was recommended for ‘Gala’, ‘Empire’ and ‘McIntosh’ at the same yield level. • If your soil analysis indicates that there is over 350 lbs of K in the top 6” of soil per acre, we suggest skipping K fertilization for one to two years to draw down the soil K reserves and then make a decision based on leaf analysis. 	<p><u>Leaf K level:</u></p> <ul style="list-style-type: none"> • Keep a low value of 1.0-1.3% <p><u>Peel sap K/Ca ratio (July timing):</u></p> <ul style="list-style-type: none"> • Keep a ratio below 25

What about the timing for leaf sample collection of ‘Honeycrisp’

New timing for leaf sample collection for Honeycrisp	End of June/early July (about one month earlier than traditionally suggested in the past)
Traditional leaf sample collection for the rest of the cultivars	Early to mid-August
Reasons for this new recommendation for HC	1) Honeycrisp trees typically stop their shoot growth by the third week in June, earlier than many other apple varieties
	2) Development of zonal leaf chlorosis (below) affects leaf nutrient concentrations, particularly leaf nitrogen status

- Honeycrisp leaves on the outer part of the canopy can show **zonal leaf chlorosis** in the Lake Ontario fruit region in the early or middle part of July. The discoloration starts on the edges of the leaves and spreads to the rest of the leaves



'Honeycrisp' on B.9, M.9, G.11, and G.41 (2017-2021)



Planting - May 2017



Spring 2017



1ST crop - 2018



2019



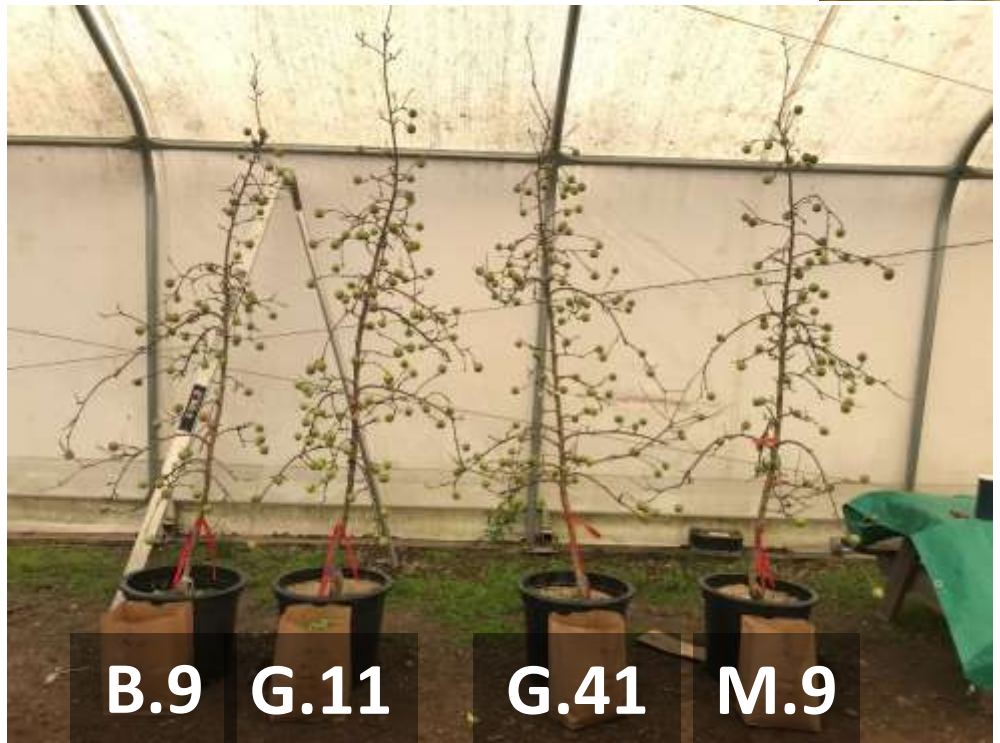
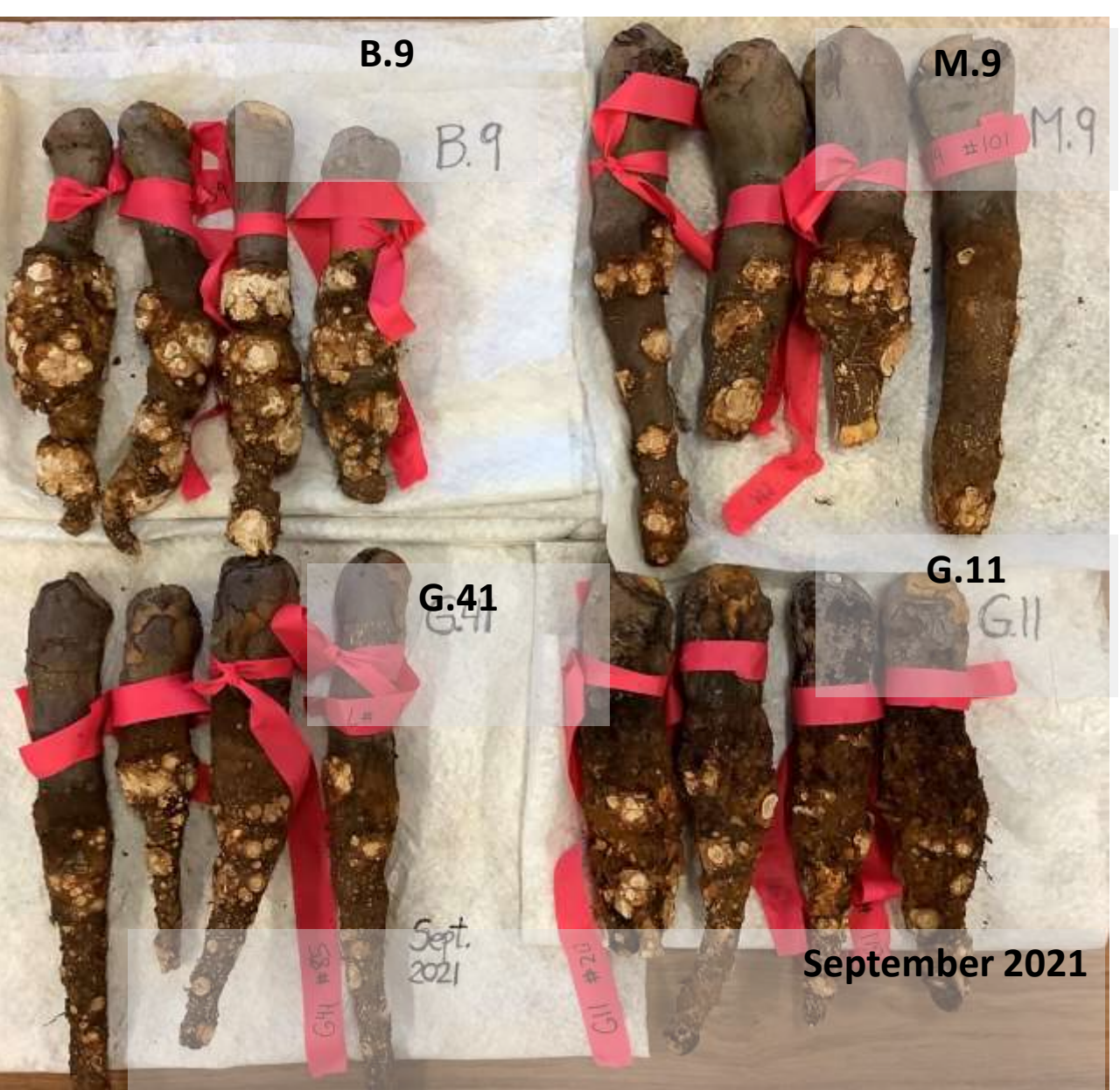
2020



2021



May 2017

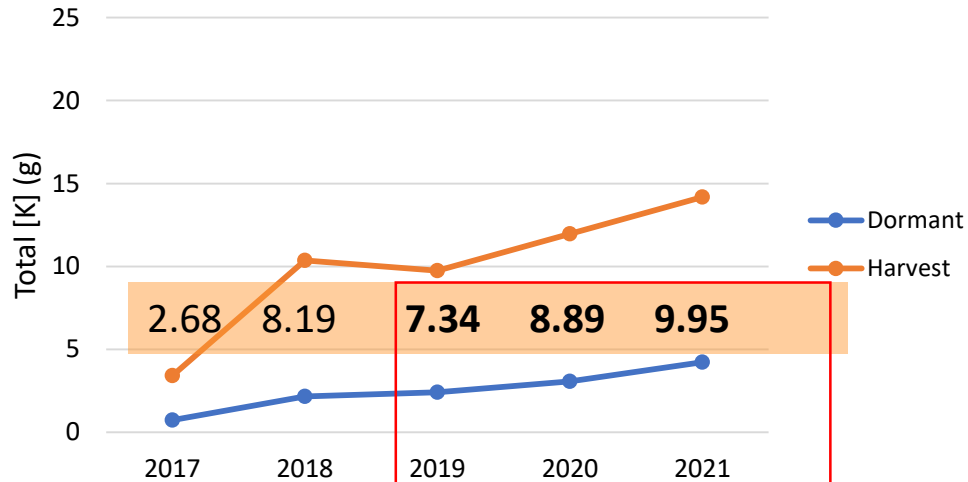


B.9 G.11 G.41 M.9

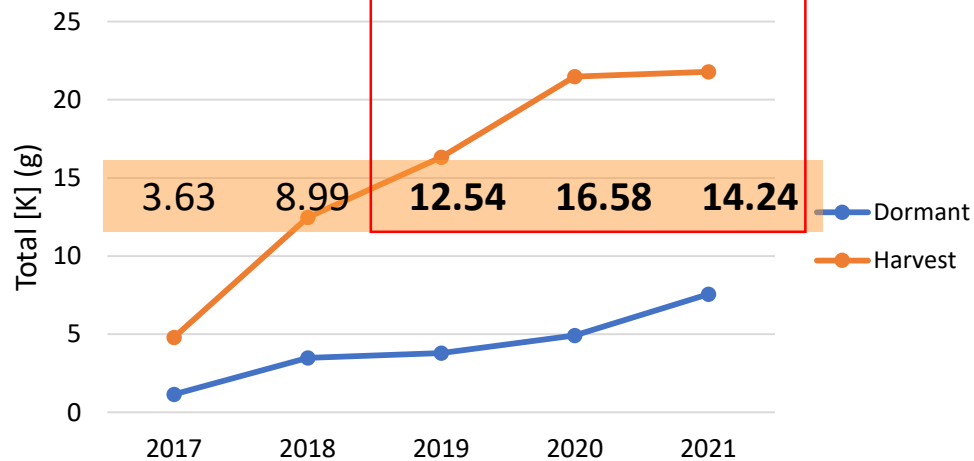
September 2021

Total Tree Potassium Accumulation

B.9



G.11



Key finding

- ‘Honeycrisp’ tree nutrient requirement is largely driven by **tree vigor conferred by rootstock**, with **G.11** trees taking up **50 ~ 100%** more nutrients than **B.9** trees.

Harvest

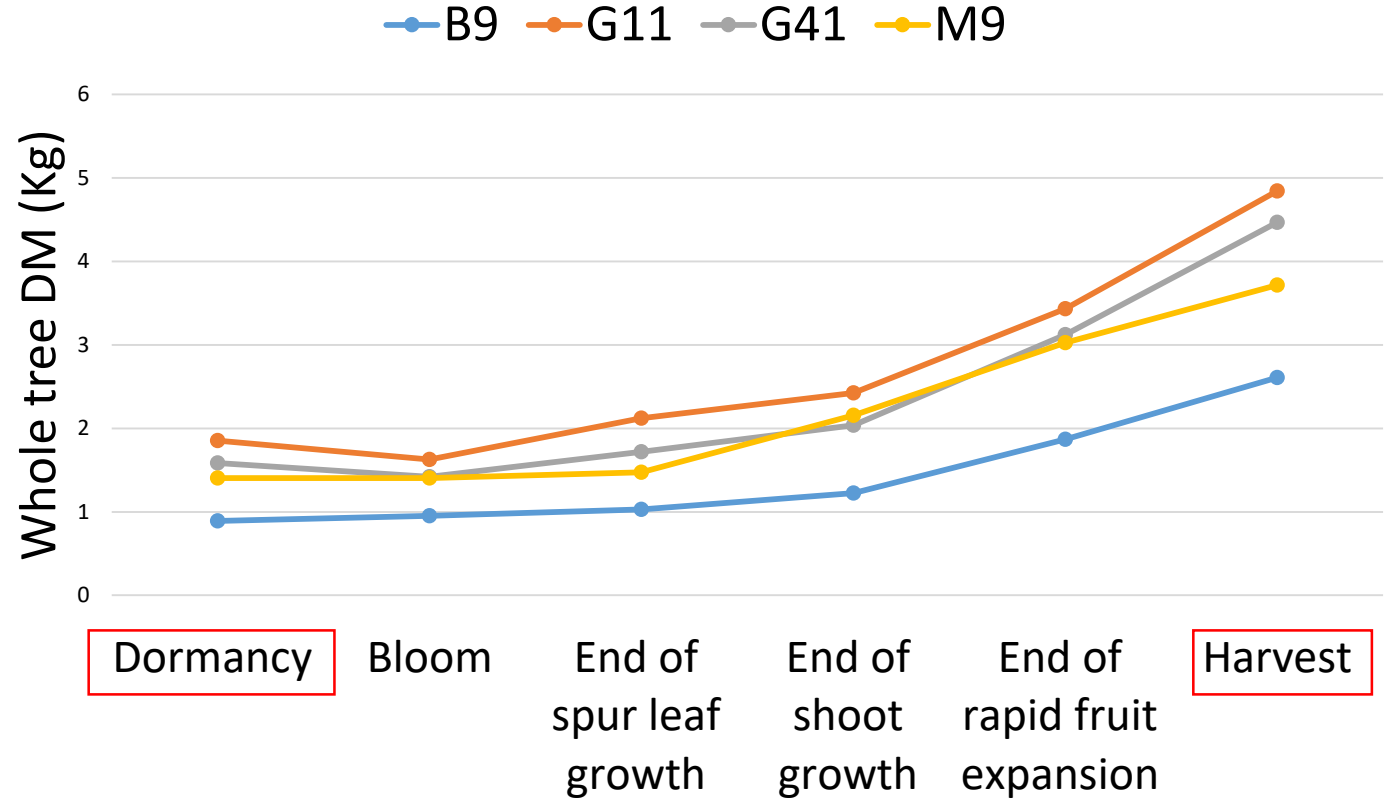
**Nutrient Accumulation
from years 1 to 5**

Dormancy

2017, 2018, 2019, 2019, 2020, 2021

Experiment 1

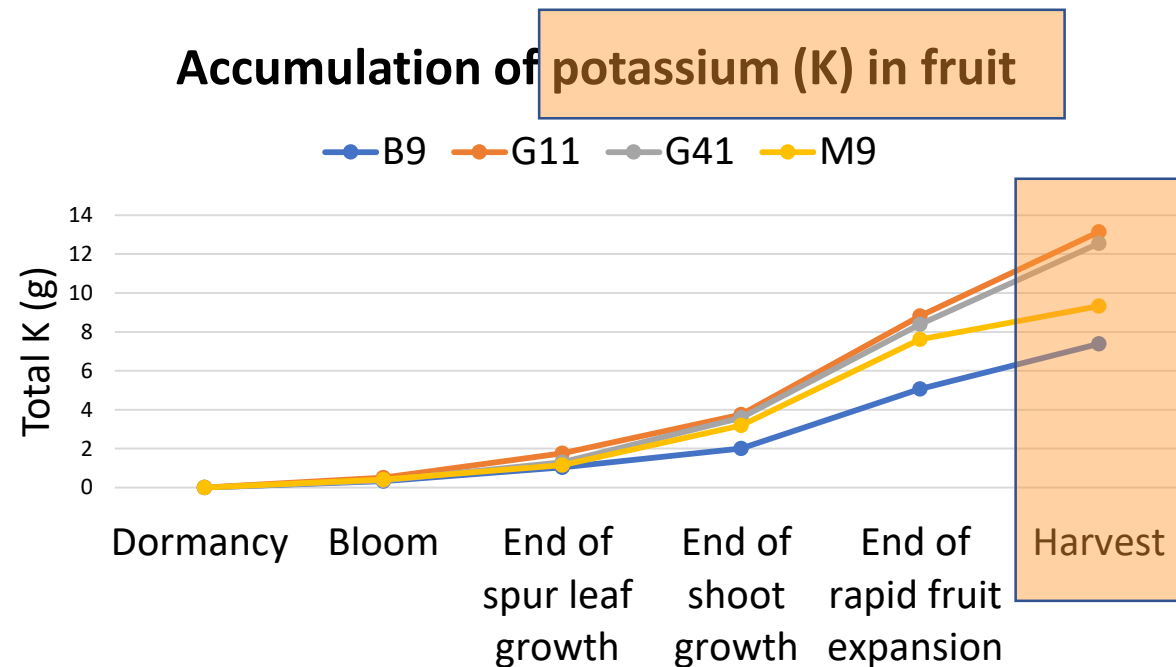
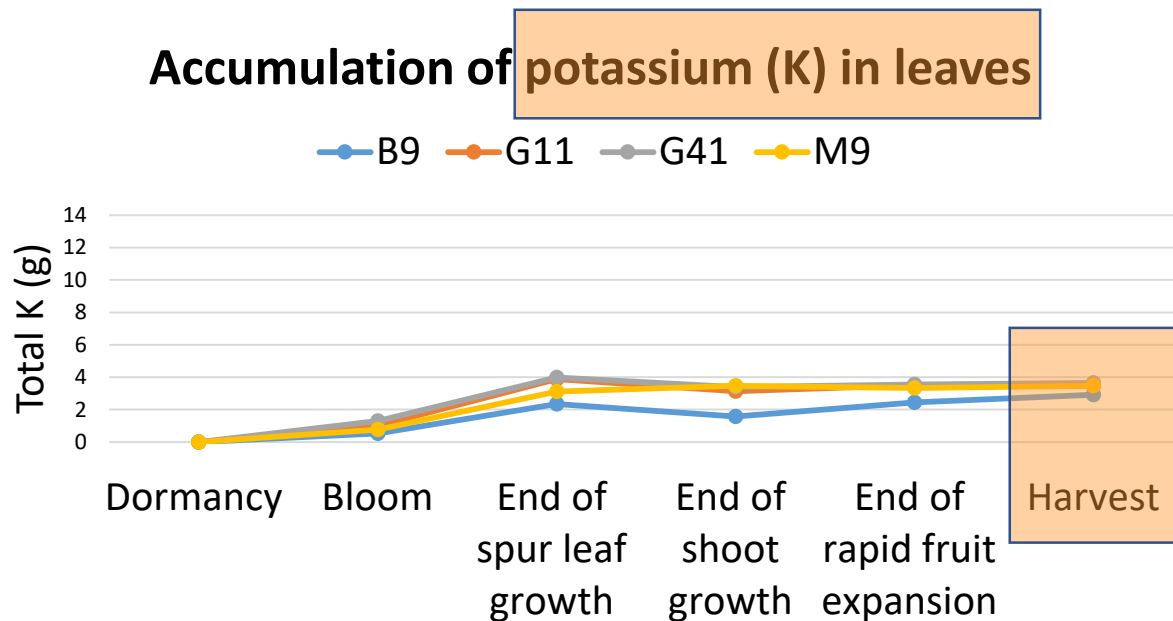
Dry matter (DM) accumulation in the whole tree



Seasonal pattern of DM accumulation in 2021

Experiment 2

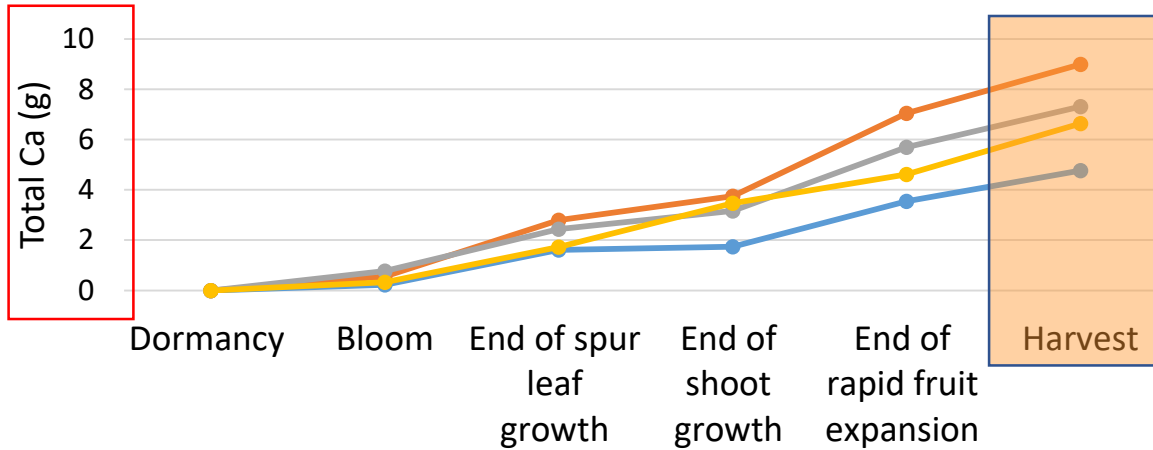
Accumulation of potassium (K) in the leaves versus the fruit in 2021



Accumulation of calcium (Ca) in the leaves versus the fruit in 2021

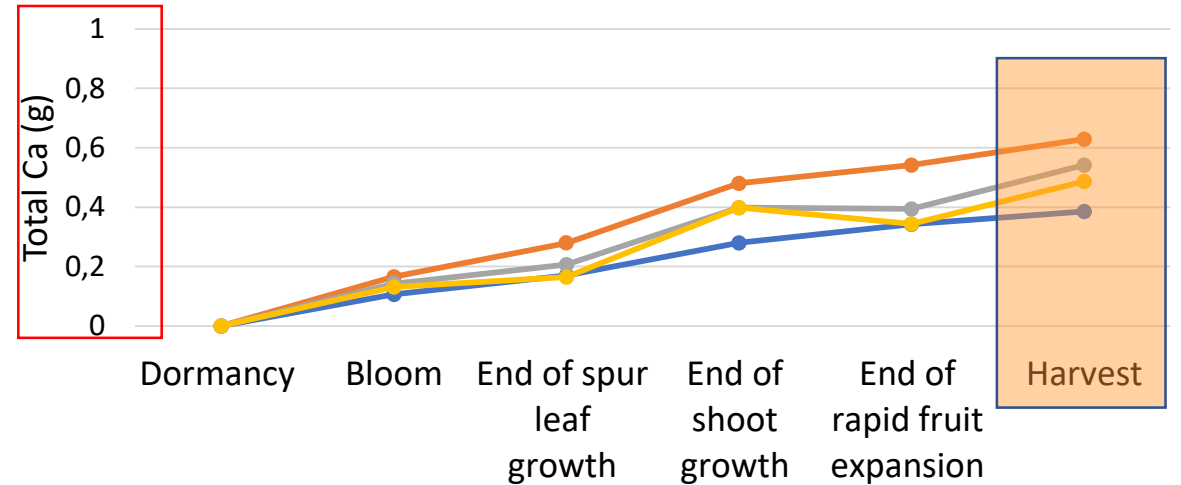
Accumulation of calcium (Ca) in leaves

—●— B9 —●— G11 —●— G41 —●— M9



Accumulation of calcium (Ca) in fruit

—●— B9 —●— G11 —●— G41 —●— M9



	Fuji	Gala	Honeycrisp
Characteristics that could use improvement	Too much vigor Biennial Color	Fruit size Productivity Color/maturity Fire blight	Weak vigor Biennial Fruit disorders
Rootstocks that have shown to improve Biennial Bearing	G.935, G.214, CG.5257, G.41, CG.4004, CG.4011	THINK Rootstock Designers	G.935, B.10, G.814, G.41TC, G.202, CG.4003
Rootstocks that have shown to lower (better) Potassium/Calcium ratio in fruit	CG.5257, G.222, G.935, G.814, G.214		CG.4003, G.214, G.16, G.814, G.969, CG.6001, CG.6976
Rootstocks that have shown to increase Fruit Size	G.11, G.41, CG.5257, G.222, G.935, CG.4004, CG.3001		G.11, G.41, G.814
Rootstocks with improved Productivity	G.11, G.41, G.214, G.935, CG.4011, G.814		G.41, G.214, G.814, G.935, G.11, CG.4004

What is the best rootstock for Honeycrisp?

It depends! analyze how much fruit you can produce with bitter pit or not , year after year !

- **B.9** has earned a strong reputation for the lowest percent of bitter pit
- Several trials have shown that **B.9, G.30, G.65, and G.214** had the lowest observed bitter pit incidence
- And the **highest** in **B.118, G.41, G.814, G.6210, and M.7**
- **Intermediate levels of bitter pit** have been observed in **G.11, G.16, G.935, M.26, M.9 Pajam2, and M.9-337**

However, it is more important you look at the **Highest Cumulative Yield of Bitter Pit-FREE fruit** over time at your farm

- Rootstocks that produced the **highest bitter pit-free fruit** have been **G.11, G.30, G.214, and G.935**, which translates to a higher crop value
- Data on **bitter pit-free yield** that included additional rootstocks also have highlighted **B.10, G.11, G.214 and M9-337** as better performers compared to **B.9**

- Mineral imbalance on the apple peel/flesh, associated with low Ca levels
- It can be increased at the orchard level by: (1) low Ca soil levels, (2) high Mg, K soil levels, (3) too much precipitation and consequent dilution of soil cations, (4) severe drought (and without irrigation) can reduce uptake of Ca, (5) excessive vegetative growth (shoot growth) as a result of high N levels, (6) low crop load due to low blossom return, excessive bienniality, etc.

Pre-site preparation and soil pH levels:

- Reduce the amount of potash to maintain a ratio of K to Ca at 6~7.5% instead of 9.5 to 10% for most varieties
- Target a higher soil pH in the range of close to 7
- Check soil pH every 2-3 years and lime when soil pH is too low or acidic (below 5-5.5)
- If soil pH is adequate, use pelleted gypsum in the fall or early spring

Maintenance application of potash:

- Reduce the K rate by 25~30% that was recommended for 'Gala', 'Empire', and 'McIntosh' at the same yield level
- If your soil analysis indicates that there is over 350 lbs of K in the top 6" of soil per acre, skip K fertilization for one to two years to draw down the soil K reserves and then make a decision based on leaf analysis.

K/Ca levels in leaves and fruit peel tissues

- Leaf K level (new planting): Keep a low value of 1.0-1.3% (years 1-2)
- Leaf K level (mature planting): Keep a low value of 1.0-1.3%
- Peel sap K/Ca ratio for a mature planting (July timing): Keep a ratio below 20

N management

- Monitor N tissue levels and grow the tree with medium/high nitrogen levels in the first years and then reduce it to improve fruit quality and storability at maturity
- Recent Cornell research developed by Dr. Cheng found that the optimal range of peel sap N concentrations is 50 to 80ppm and N/Ca <4 for peel sap samples taken at 9 weeks after bloom (corresponding to about 55 to 60 gram fruit size).

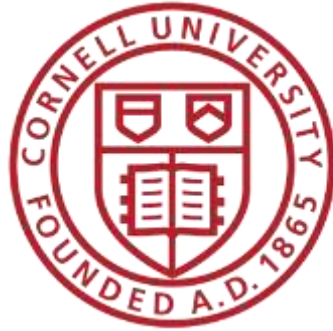
Use early/strict crop load strategies:

- Don't crop one year old trees (de-blossom or defruit manually and/or chemically before 8mm)
- For 2-3 year-old use 4 TCA
- For 4- or older mature trees use 5-7 TCA
- Start return bloom sprays early in the season (not later than 30-45 DAFB) to avoid biennial bearing

What to do with a K/Ca peel sap ratio higher than 20

- Growers should implement mitigation strategies to improve BP control by: (1) increasing Ca sprays, (2) avoiding application of ReTain or Harvista, (3) avoiding application of SmartFresh, (4) reducing annual N applications, (5) reducing annual K applications, and (6) increasing lime applications and raising soil pH to at least 7.0

Right rootstock choice



Thank you!

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