

# Growing Cider Apples



Beginning Farmer Webinar Series

Bob Tritten

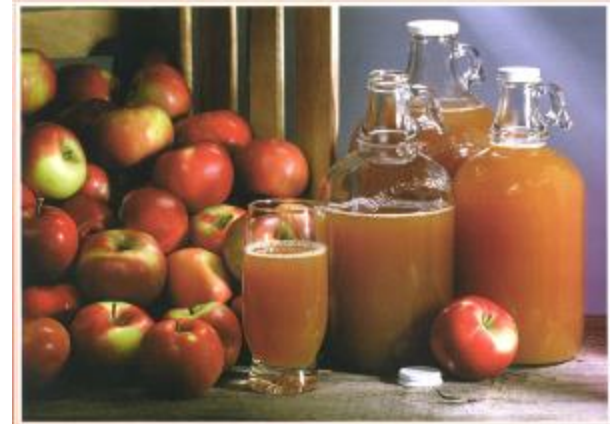
District Fruit Educator

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# Growing Cider Apples

- This session will focus on growing apples for cider making. Cultural practices, variety selection, storage, and other considerations unique to cider apples will be discussed.



# Growing Cider Apples - roadmap for webinar

- General considerations
- Site selection
- Variety selection
- Bloom time considerations
- Pollination
- Rootstock & tree characteristics
- Planting tips
- ~~Pruning systems~~
- Pest considerations
- Sweet cider production
- Hard cider varieties
- Hard cider production
- Questions - all along the way



# Growing Cider Apples

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# Why raise apples as part of a farming operation?

Because-

- greater offerings to consumers
- you can grow unusual varieties
- can add value with cider
- good demand for 'locally' grown

However-

- the knowledge level may need to be ramped up
- investment in specialized equipment
- greater risks and rewards
- apples take time to ramp up production



# Tree fruit versus Small fruit

- Tree fruit – once established may be less work and longer lived than small fruit
- Small fruit – more compact and comes into production more quickly than tree fruit



# Michigan is a great place to grow fruit



Michigan's national ranking in fruit crops

- #1 Blueberries, tart cherries, Niagara grapes
- #3 Apples, Sweet Cherries, Plums
- #6 Peaches
- Other important fruit crops include concord grapes, wine grapes, brambles, pears, strawberries





# Our Michigan climate is friendly to fruit growing

Lake water helps to:

- prevent air temperatures from getting too cold in the midwinter
- prevent warm air temperatures in early spring, thereby delaying bloom

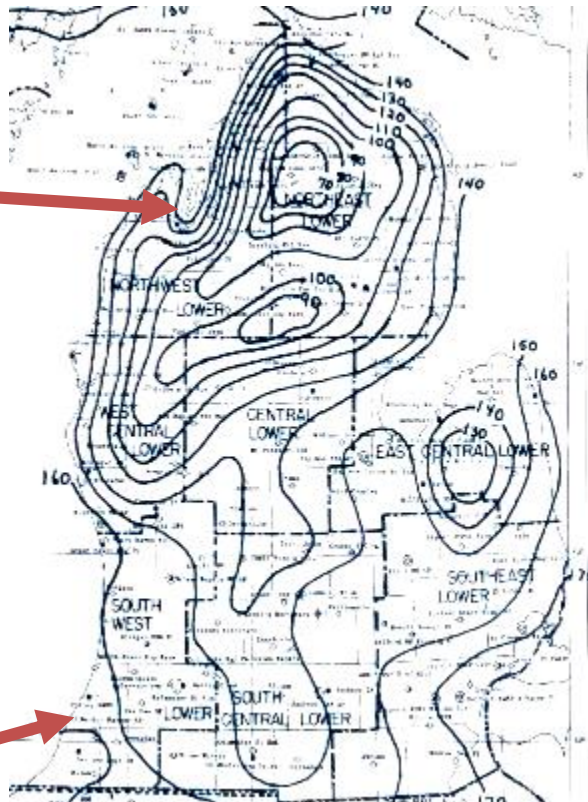




# Average number of frost-free days depends on where you are in Michigan

Traverse City area averages 150 frost-free days

Benton Harbor area averages 170 frost-free days

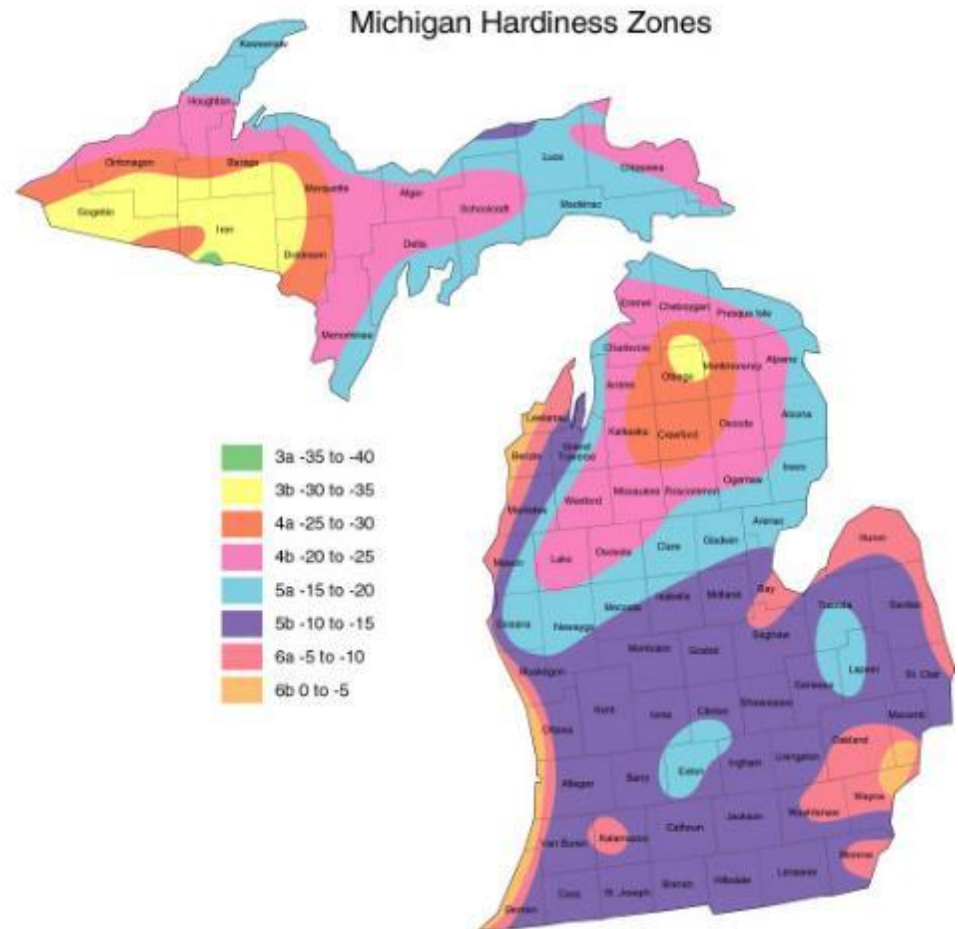


Variety	Typical SW MI Harvest	Days from bud opening to harvest
Macs	Sept. 8	146
Gala	Sept. 10	148
Red Delicious	Oct. 1	169
Golden Delicious	Oct. 3	171
Fuji	Oct. 15	183

So—the day length in northern regions of Michigan is insufficient for late-ripening varieties in many years

# Michigan hardiness zones

- Typical winter low temperatures are used to determine hardiness zones
- These zones are used in choosing plants that can survive Michigan's winters



source: CropMap – Purdue University

## HOWEVER - We also need to be concerned about flower bud hardiness for all of our tree fruit crops and most of our small fruit crops

- The flowering and fruiting is a two year process
- Extreme cold events in fall, winter and spring can injure buds, twigs and tree trunks
- Strawberries and fall red raspberries are the exceptions to this



# Cold hardiness, what is it?

- Enables plants to withstand winter cold
- Related to dormancy or winter rest
- Plants gain hardiness in subfreezing conditions
- Plants lose hardiness in warm weather
- Lose cold hardiness much faster than they can regain it



# Winter injury - what is it all about?

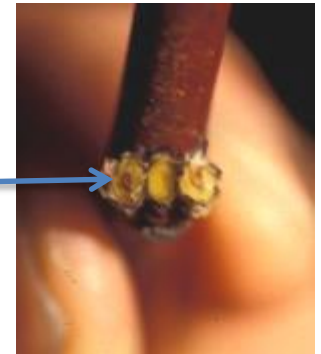
## - several types

- Extreme winter cold
- Cold snap following warm weather
  - **Fall** - early hard cold
    - Before plants are acclimated
  - **Winter** - warm up during winter
    - Loss of cold hardiness
  - **Spring** - cold snap after spring warm up
    - Loss of dormancy and cold hardiness



# Three levels of cold damage to fruit crops

1<sup>st</sup> **Flower buds** - Bud cross section shows brown tissue of dead fruit buds with healthy leaf bud in middle positions



2<sup>nd</sup> **Twig damage** - Blueberry shoot tip dieback



3<sup>rd</sup> **Trunk damage** - Brown cambial layer under bark





# Flower bud damage

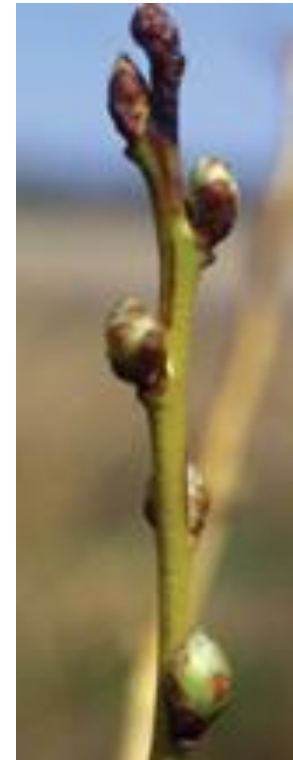
- Apparent after thaws
- Slice bud crosswise, cutting deeper with each slice to assess damage to all flowers
- May kill all or some flower buds
- Some buds do not grow in spring, others only partly damaged





# Mid-winter hardiness levels of flower buds

<b>Fruit type</b>	<b>Critical temp. (F) for flower injury</b>
Apple	-30
Apricot, Pear, Concorde	-25
Tart Cherry, E. Plum	-20
Raspberry (summer)	-17
Blueberries	-15
Blackberry	-15
Sweet Cherry, J. Plum	-15
Peach and Nectarine	-13
European Grapes	-8 to -15



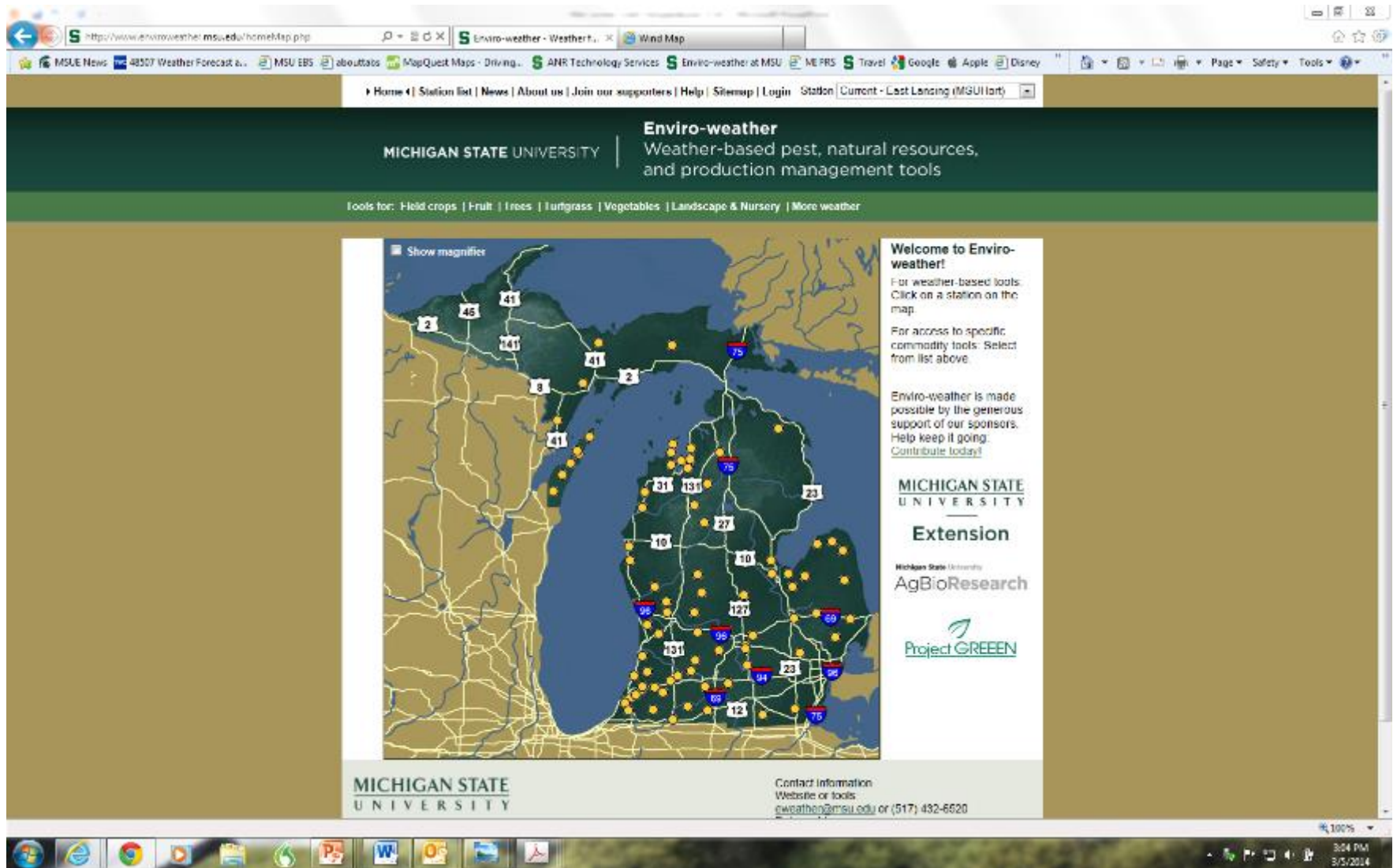
# Peach trunk splitting due to $-19^{\circ}\text{F}$ temperatures in 1994

We did not have much research or data on the impact of extreme cold to tree trunk and scaffold branches; however....



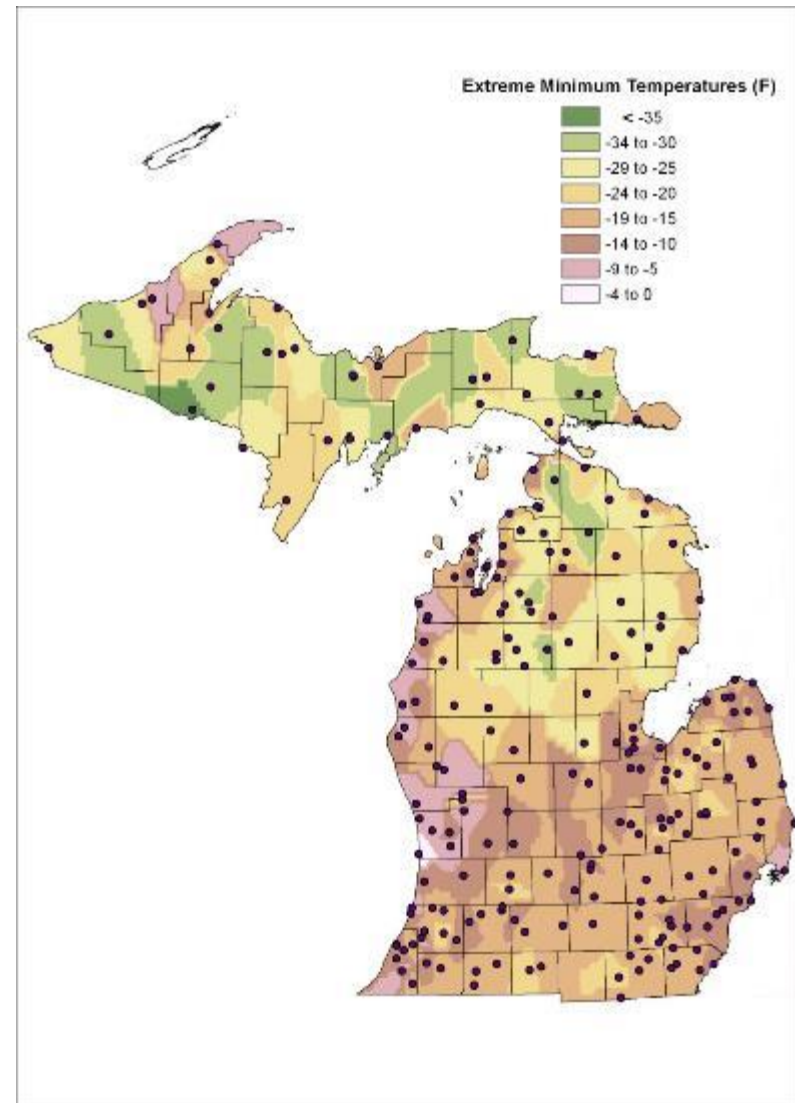
The Winters of  
2014 and 2015  
-two tough winters  
back to back!





# Extreme minimum temperatures for the winter of 2014

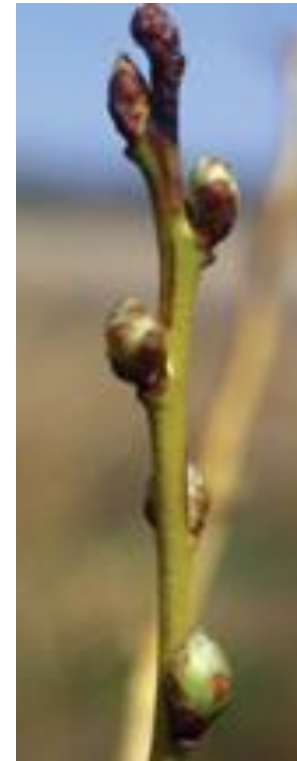
Dr. Jeff Andresen  
MSU





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# Tree anatomy and growth characteristics

Some fruit varieties such as Northern Spy and Rome have vigorous growth each year. Spur type varieties such as Red Delicious tend to be smaller trees.

## Non-spur type



## Spur type



Spur types require less pruning but may “runt out”





## Closer view of spur type growth habit

Red Delicious apple



Bartlett pear



Spurs may grow less than an inch per year



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# Site selection for apples

## Sunlight requirements

- fruit needs approximately 90% full sun-
- all day is best

## Soil requirements

- sandy loam to clay loam
- good water drainage
- soil pH

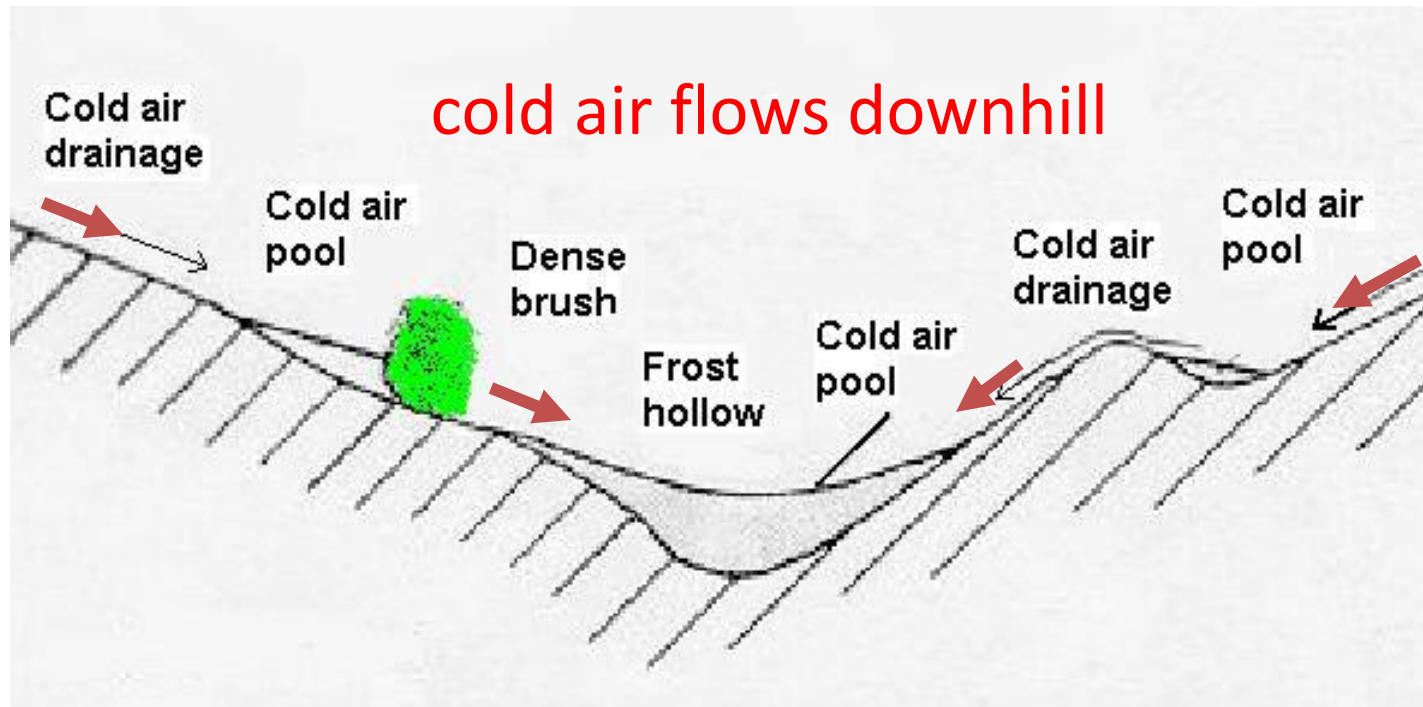


- for most fruit: soil pH best is 6.2 to 6.8, okay is 5.5 to 7.5.
- blueberries and cranberries require pH below 5.5 and perform best at pH between 4.5 and 5.



# Frost pockets

-avoid planting fruit in “frost pockets” that collect cold air under still conditions



Adapted from graphic by Andrew Bootsma, Specialist, Land Resource Research Institute, Agriculture Canada

# Tolerance to poorly drained soil

Worst

Peach/Nectarine/Apricot

Strawberry

Cherry, Brambles

Concord grape

Apple/Pear

Blueberry

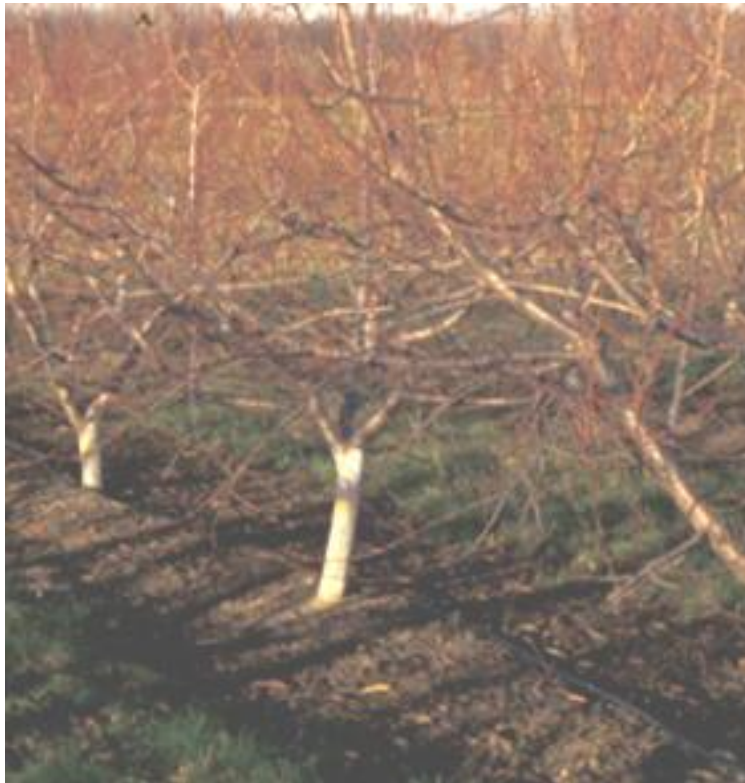
Best





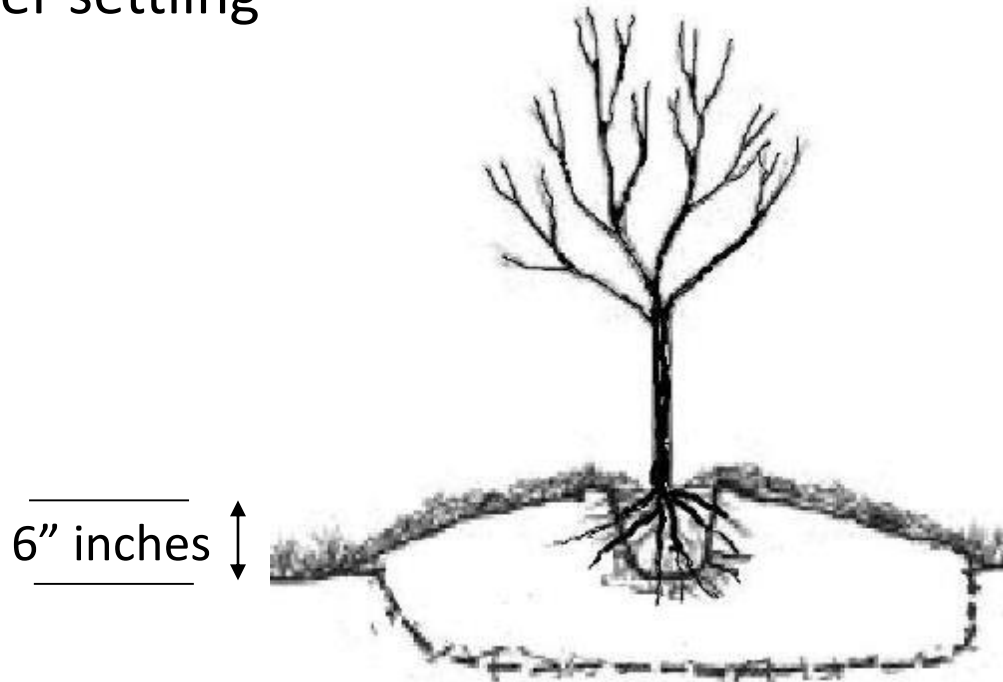
# Overcoming wet soils

- build a mound or berm where wet soil is a problem
- also consider tiling to improve water drainage



# Mounding fruit trees

-mound or berm should be about 6" above normal ground level after settling





# Adding organic matter

-will help if soil is sandy or heavy clay



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# Choosing apple varieties

- Chose fruit types, varieties & rootstocks that are adapted to the region.
- Chose varieties to spread the harvest season.
- End the season with varieties known to have longer storage life.
- Disease resistance will reduce pest control.
- Don't just choose from a catalog



## Sweet cider varieties – Bob's list

- Gala
- McIntosh
- Jonathan
- Jonagold
- Golden Russet
- Empire
- Golden Delicious
- Northern Spy
- Goldrush



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Mid-winter hardiness levels of flower bud is much different than cold temperatures in bloom



# Time of flowering

-fruit types with early bloom are at greatest risk for spring frost damage

**Bloom  
early**



Apricot

Japanese Plum

European Plum

Peach/Nectarine

Sweet Cherry

Tart Cherry

Pear

Apple

Blueberry, Strawberry



















Summer Raspberry

Concord Grape

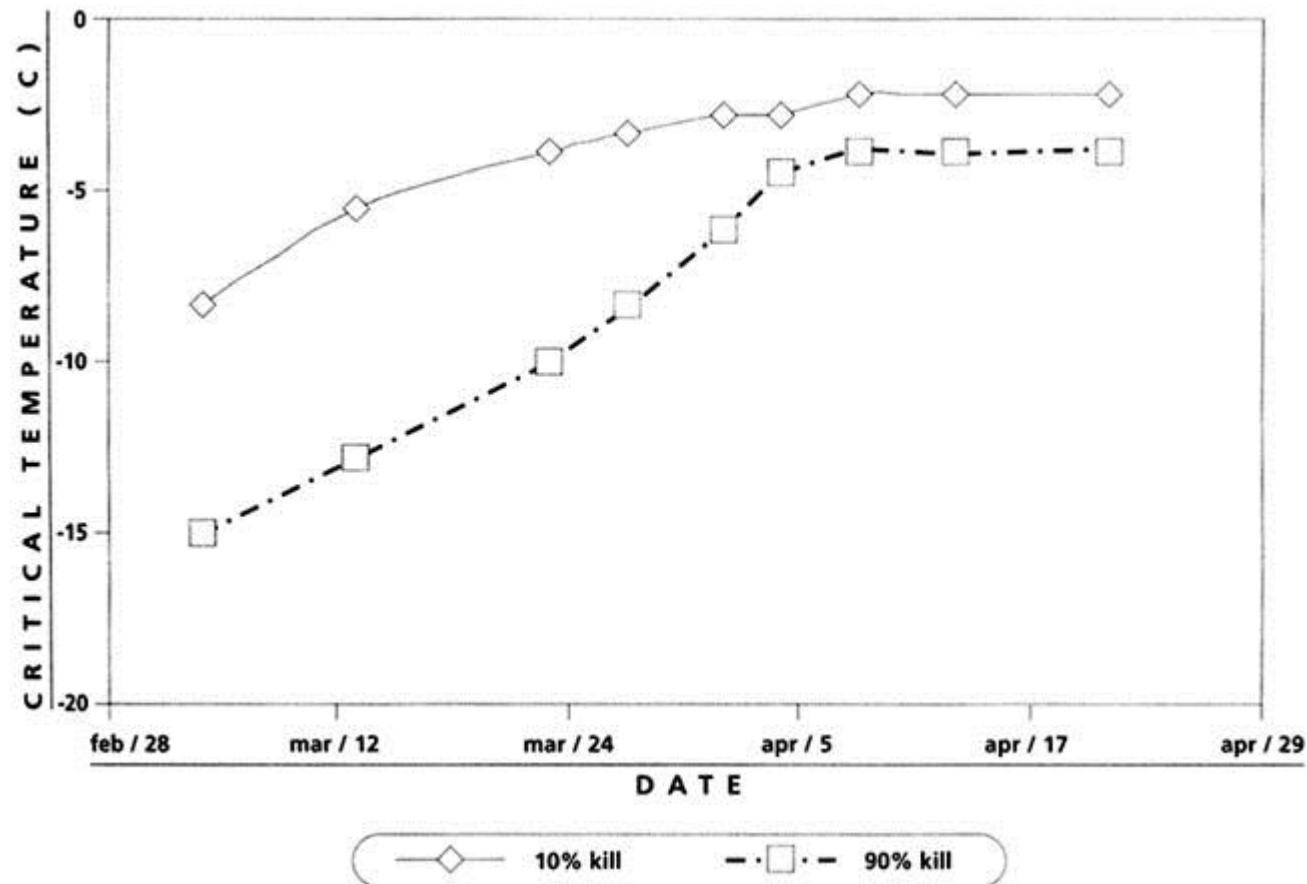
**Bloom late**



# Critical spring temperatures for tree fruit bud development stages

Pome Fruit (Apples and Pears)									
<b>Apples</b>									
<b>Apples</b>	<b>Silver tip</b>	<b>Green Tip</b>	<b>Half inch green</b>	<b>Tight Cluster</b>	<b>First Pink</b>	<b>Full Pink</b>	<b>First Bloom</b>	<b>Full Bloom</b>	<b>Post Bloom</b>
<b>Old temp</b>	<b>16</b>	<b>16</b>	<b>22</b>	<b>27</b>	<b>27</b>	<b>28</b>	<b>28</b>	<b>29</b>	<b>29</b>
<b>10% kill</b>	<b>15</b>	<b>18</b>	<b>23</b>	<b>27</b>	<b>28</b>	<b>28</b>	<b>28</b>	<b>28</b>	<b>28</b>
<b>90% kill</b>	<b>2</b>	<b>10</b>	<b>15</b>	<b>21</b>	<b>24</b>	<b>25</b>	<b>25</b>	<b>25</b>	<b>25</b>
<b>Pears</b>									
<b>Pears</b>	<b>Bud scales separating</b>	<b>Blossom buds exposed</b>	<b>No name</b>	<b>Tight cluster</b>	<b>First White</b>	<b>Full White</b>	<b>First Bloom</b>	<b>Full Bloom</b>	<b>Post Bloom</b>
<b>Old temp</b>	<b>18</b>	<b>23</b>	<b>No data</b>	<b>24</b>	<b>28</b>	<b>29</b>	<b>29</b>	<b>29</b>	<b>30</b>
<b>10% kill</b>	<b>15</b>	<b>20</b>	<b>No data</b>	<b>24</b>	<b>25</b>	<b>26</b>	<b>27</b>	<b>28</b>	<b>28</b>
<b>90% kill</b>	<b>0</b>	<b>6</b>	<b>No data</b>	<b>15</b>	<b>19</b>	<b>22</b>	<b>23</b>	<b>24</b>	<b>24</b>

Typical 10 percent and 90 percent bud kill temperatures for cherry trees corresponding to average dates observed at the Washington State University, Prosser Research and Extension Centre (Proebsting and Mills, 1978)



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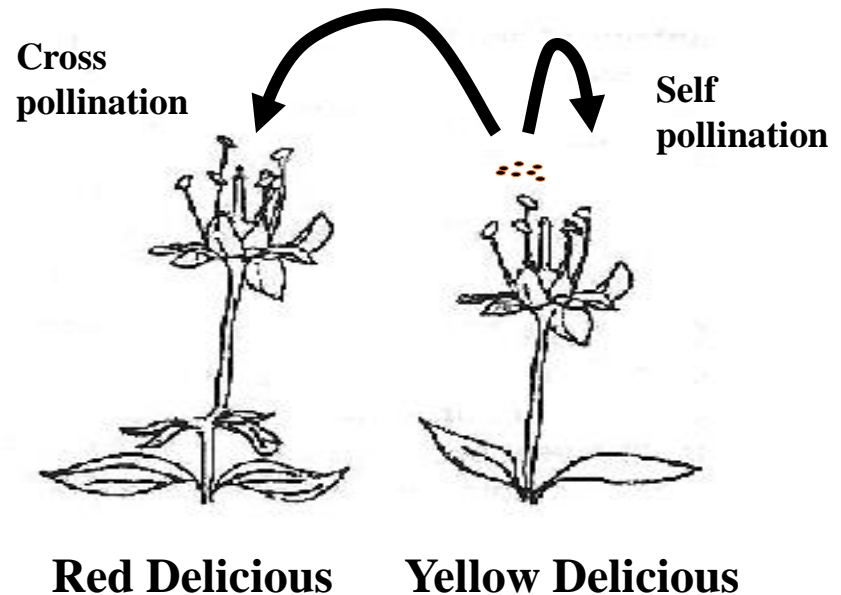
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# Some apples may require a pollinizer partner

Self-fruitful varieties:  
pollen from another variety is not needed

Self-unfruitful varieties:  
pollen from another variety is needed for fruit production



Yellow Delicious is self-fruitful. Red Delicious is self-unfruitful and requires pollen from a compatible partner such as Yellow Delicious

# Pollination requirements

- Self fruitful or pollinizing (with some exceptions)
  - Examples: peach, nectarine, apricot, tart cherry, grape, raspberry, strawberry, blueberry
- Self unfruitful or not self pollinizing (generally)
  - Examples: **apples**, pear, sweet cherry, Japanese plum, nut crops

Both types generally need pollinators (bees or insects) or wind (nuts) to move pollen.





# Choosing compatible pollination combinations

Choose pollinizing partners that are:

1. Genetically compatible
2. Produces enough pollen
3. Bloom at the same time



# Finding compatible varieties – example for plums

☐ Can be relied upon to pollinate this variety.  
 ★ Suggested good pollinizer for this variety.  
 ♦ Partially self-fruitful, but we not be recommend solid planting.  
 ● Should not be to pollinate this variety.

**EUROPEAN PLUM**

**Variety Pollinated**

	Earliblue	Mount Royal	Castleton	NY66.609.6	Stanley	Polly	NY 58.900.9	Twilight	Italian	Demaris	Shropshire Damson	Victory	Green Gage	Vision	Empress	President
Earliblue	●															
Mount Royal		●														
Castleton			●	★	★				★	★						
NY66.609.6			★	●	★				★	★						
Stanley				★	♦				★					★	★	
Polly	★	★	★	★	★	●	★	★	★	★	★	★	★	★	★	★
NY 58.900.9				★			●									
Twilight								●								
Italian			★	★	★				●	●				★	★	★
Demaris			★	★					●	●						
Shropshire Damson											●					
Victory												●				
Green Gage													●			
Vision					★				★					●	★	★
Empress					★				★					★	●	★
President									★					★	★	●

Source: Hilltop Trees Nursery Catalog

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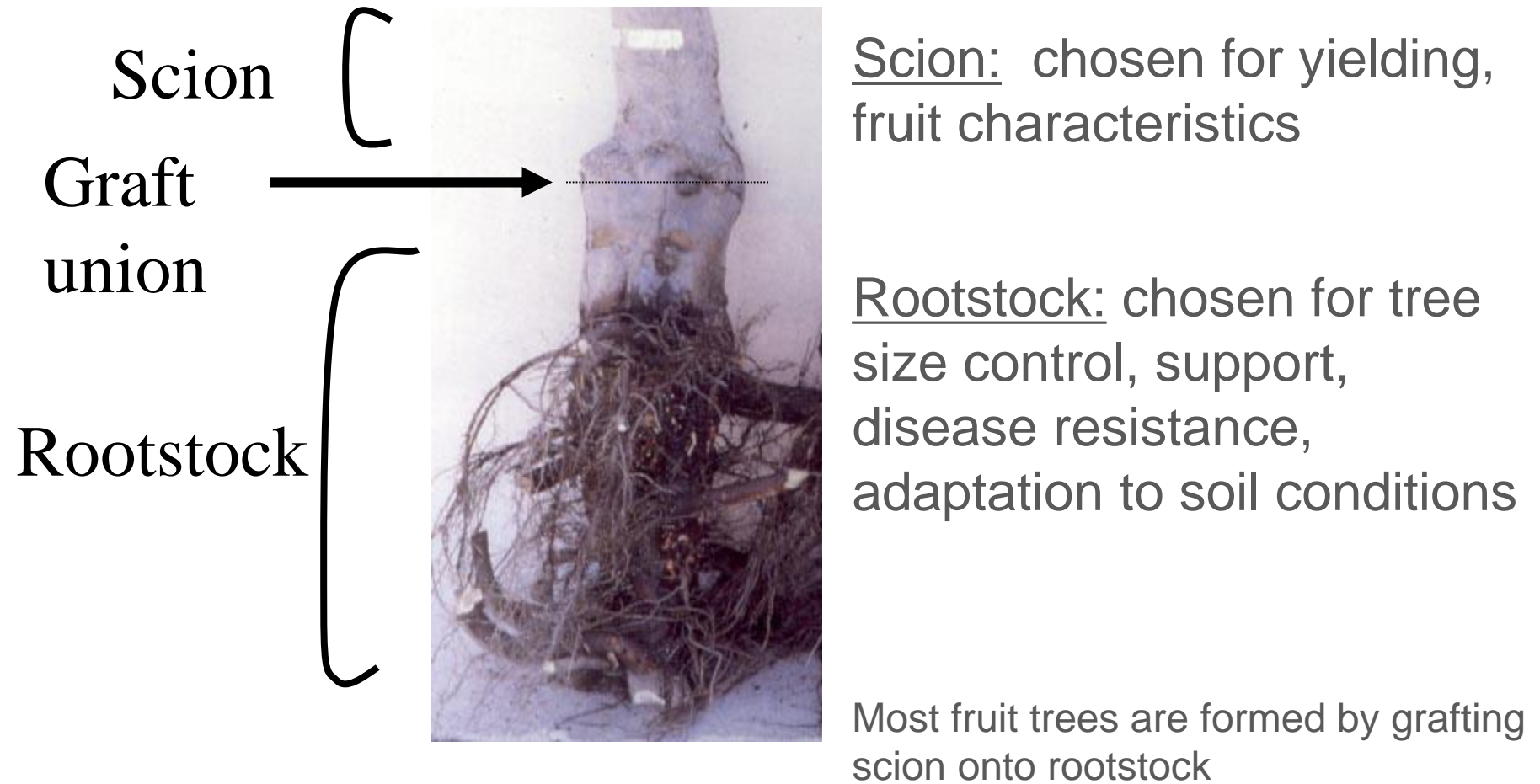


# All apple trees are grafted

- Grafting is an ancient art
- The shoot or top of the tree is referred to as the scion (sign)
- The root system is referred to as the rootstock
- The graft union is the junction of the rootstock and the scion

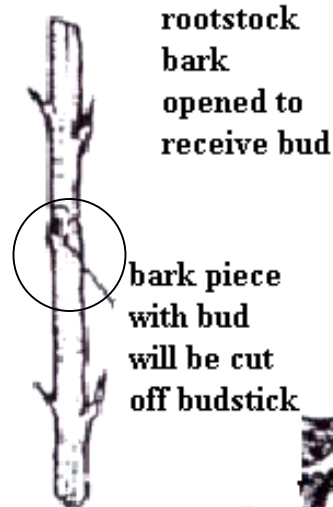
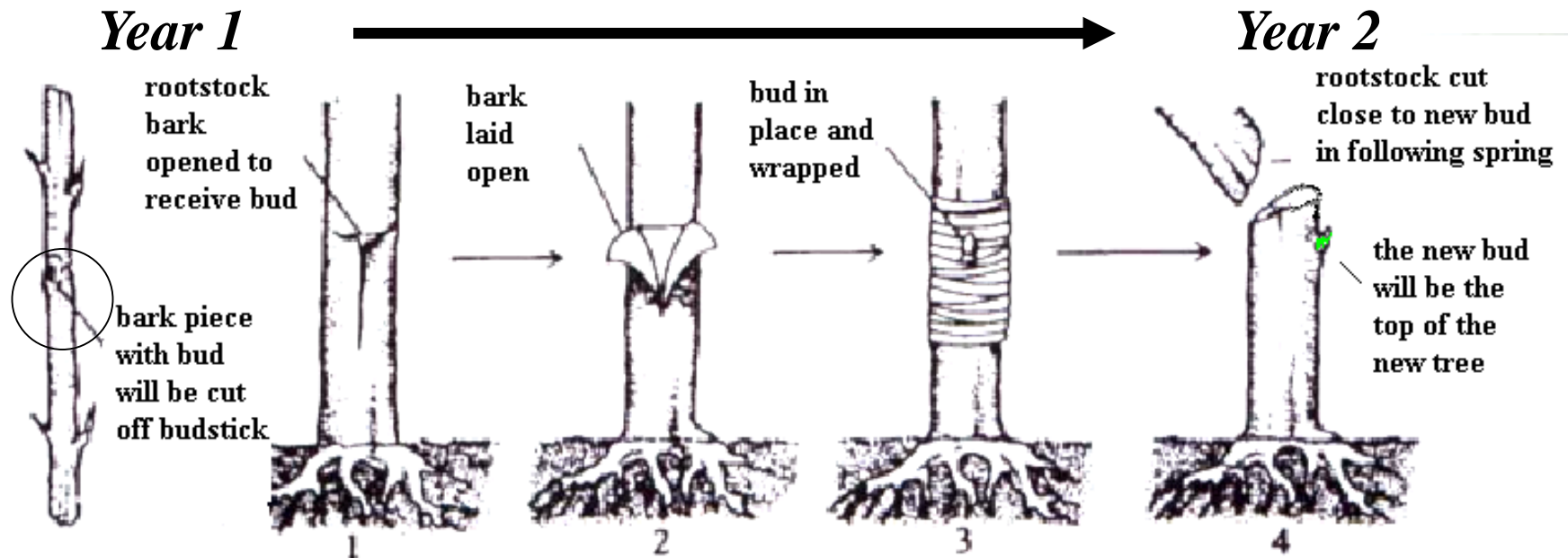


# Characteristics of scion and rootstock





# Tree propagation by T-budding



budstick

Inserted bud before growth in spring



Inserted bud starts to grow in spring



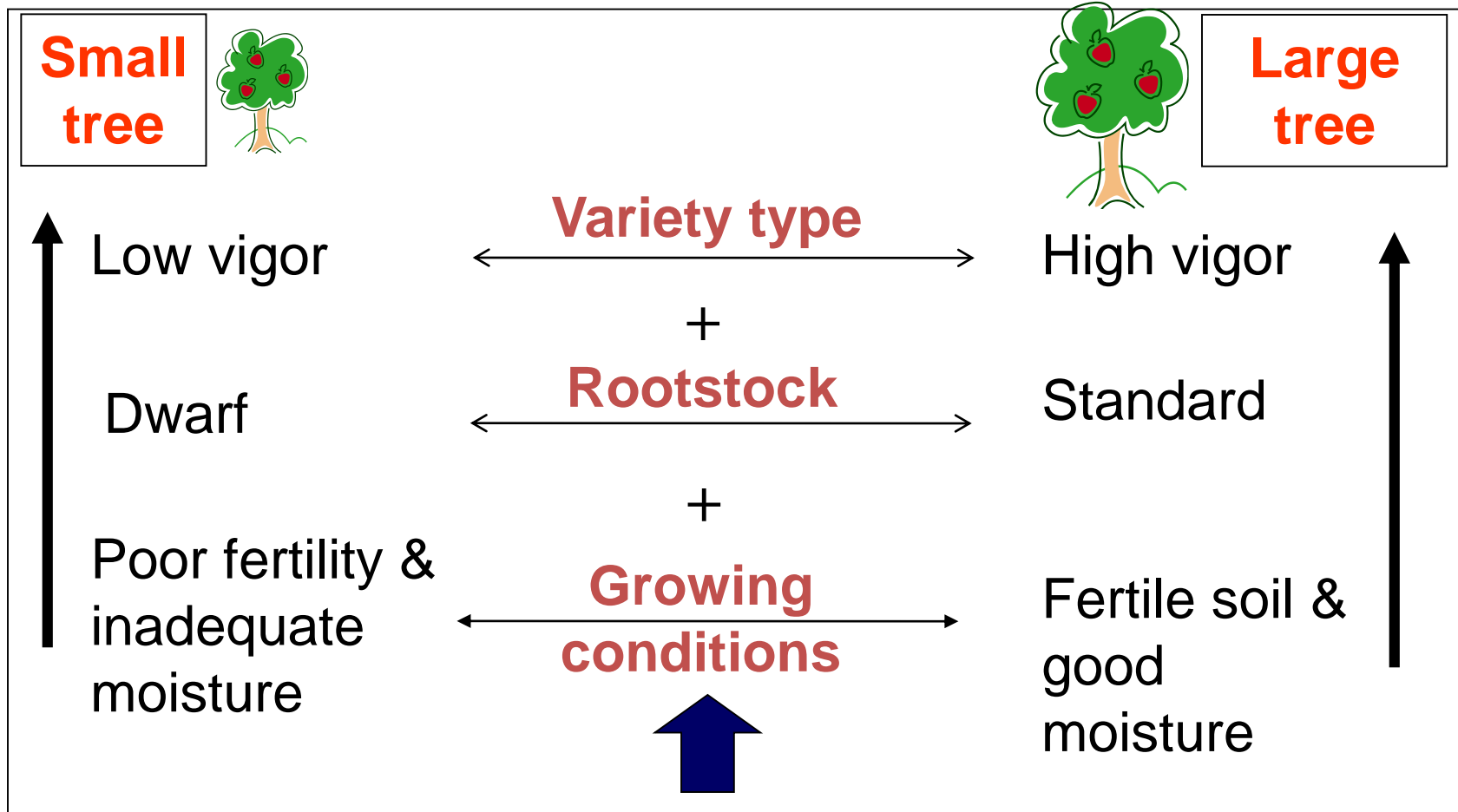
# Examples of apple rootstocks and their effect on tree height

Root-stock	Mature tree height (ft)	Requires staking
MM 111	30	No
MM 106*	25	No
M7 G30	20	No
M26*^ G11	16	Yes
M9^ Bud 9	12	Yes

\* = susceptible to Phytophthora collar rot

^ = very susceptible to fire blight

# Factors influencing fruit tree size



Tree size is influenced by these three factors

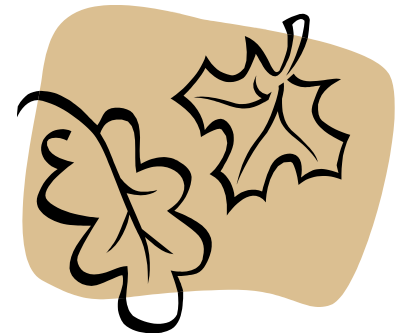
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# When to plant apple trees

- Bare root trees - spring planting is best, fall is 2nd best choice
- Container grown trees - spring or fall is best, but can be planted anytime during the growing season



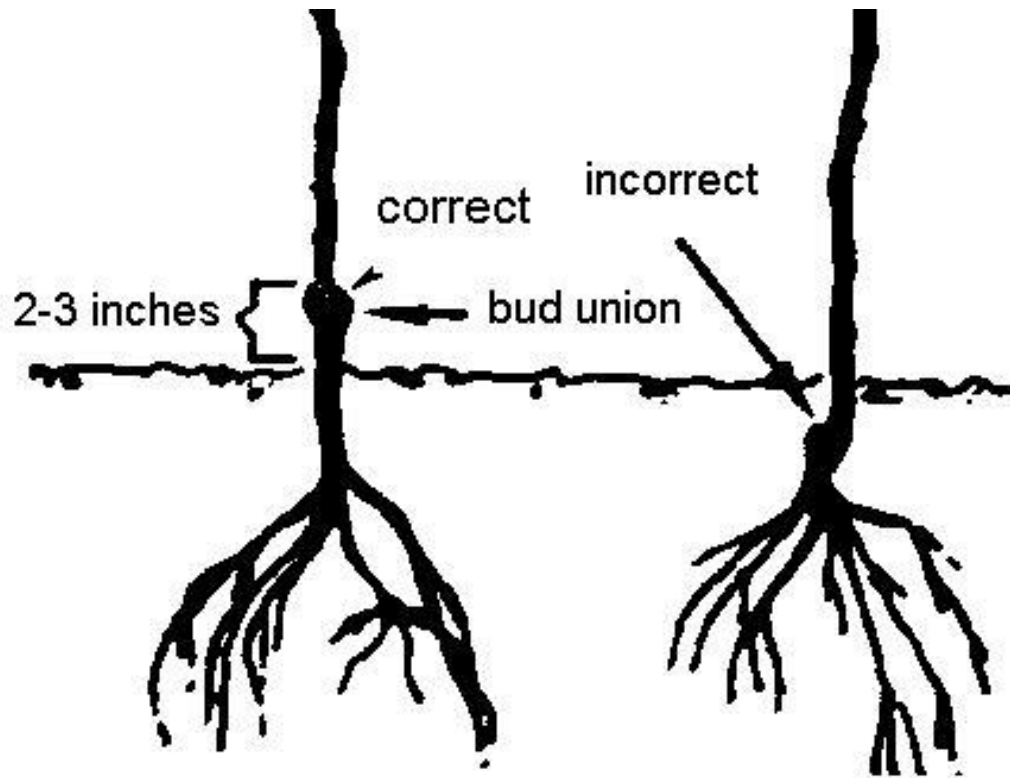
## Tips on planting apple trees

- Don't let roots dry out.
- Cut off damaged root tips.
- Don't wrap roots around in planting hole, shorten if necessary.
- Tamp the soil down gently around the roots gently while filling the hole. Water to settle the soil.
- Check over the next few days, especially following rain, to make sure that the graft union is above the soil line for apples and pears.



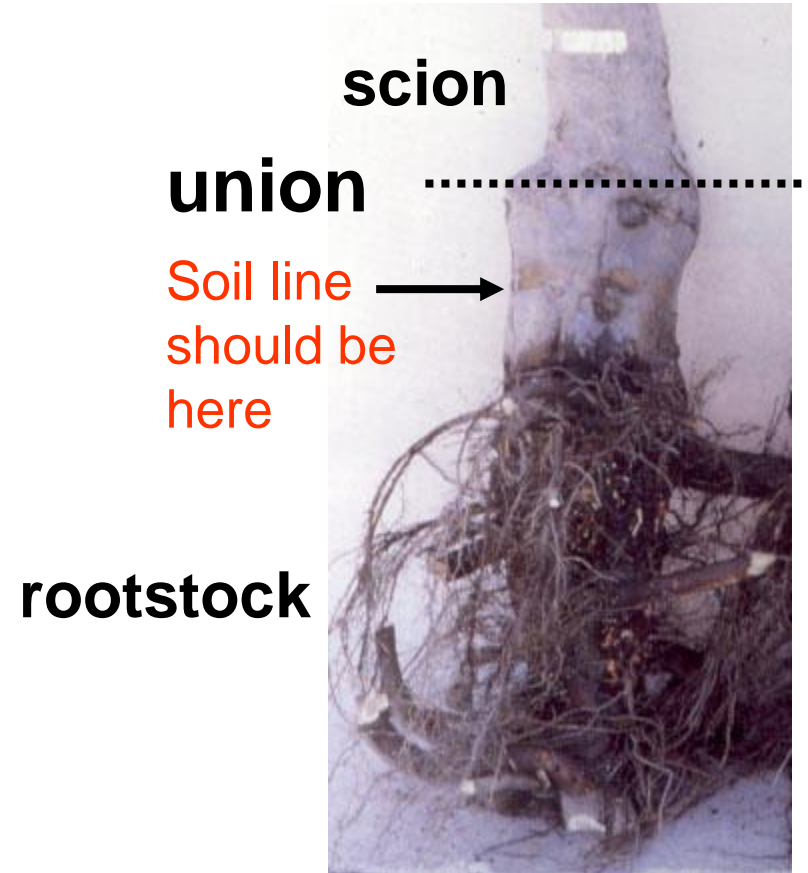


# Planting depth for apples and pears



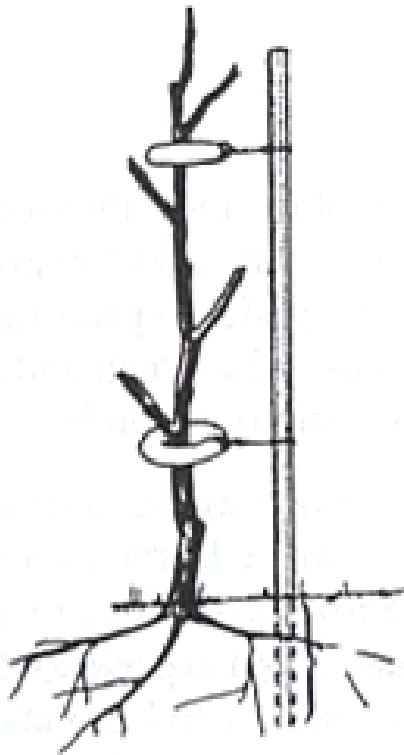
- Note: with cherry, peach, and plum, plant so that the bud union is close to the soil line.

# Scion rooting if planted too deep



The tree on the left was planted too deep and the scion sent down roots, resulting in vigorous tree growth

# Stake apple trees growing on dwarfing rootstocks



Fruit load tipped tree

# Tree wraps, tree cages, & tree paint



tree wraps



cage + white latex paint

- both plastic tree wraps and cages help prevent rodent feeding.
- white latex paint and wraps reflect light and thus reduce trunk damage due to rapid temperature fluctuations due to sunlight in mid winter.
- remove tree wraps in summer to avoid disease & insect problems, cages can stay on year-round.



# Latex paint does not protect against extreme low temperatures



Peach trunk splitting due to -19 F temperatures in 1994

# Protect from deer browsing





# Where to buy fruit trees

## Locally

- better nurseries
- big box stores
- mostly container grown



## Mail order

- mostly bare root
- better variety selection
- old varieties



## Mail order catalogs

- Fedco Trees [www.fedcoseeds.com/trees.htm](http://www.fedcoseeds.com/trees.htm)
- Cummins Nursery [www.cumminsnursery.com](http://www.cumminsnursery.com)
- Raintree Nursery [www.raintreenursery.com](http://www.raintreenursery.com)



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# Pruning – a science and art in itself



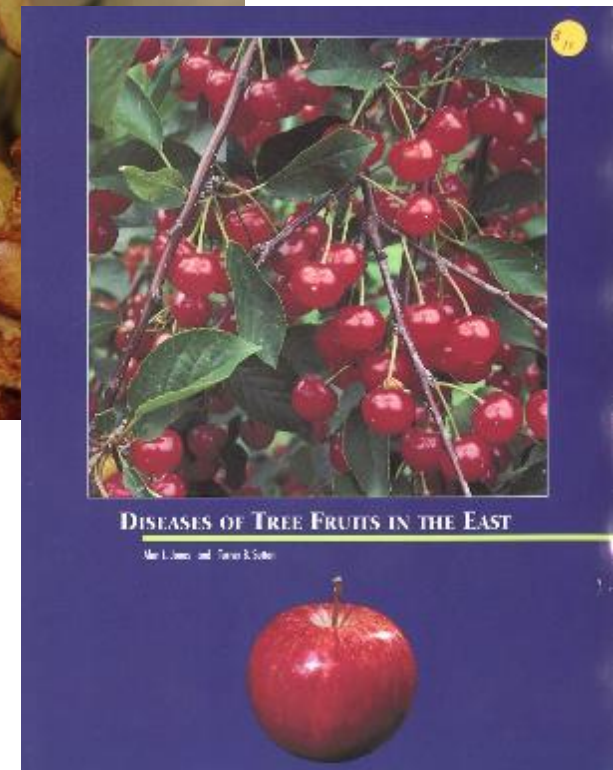
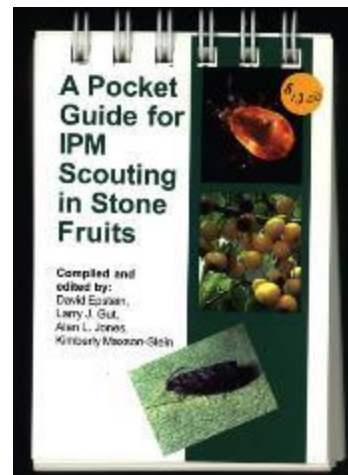
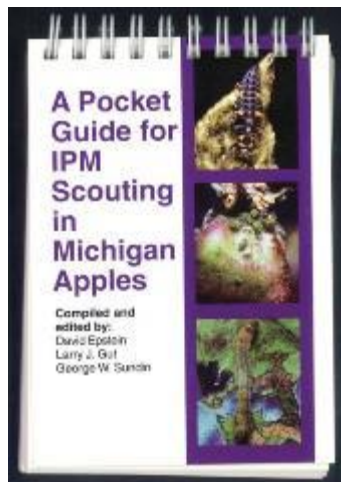
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# Identifying pests

There are several good references to quickly identify insect pests and other problems in fruit trees





## Direct fruit pests

- Fruit feeding insect pests direct damage to fruit
- May not be a problem until fruit have developed
- Hard to ignore damage
- Need ID to control

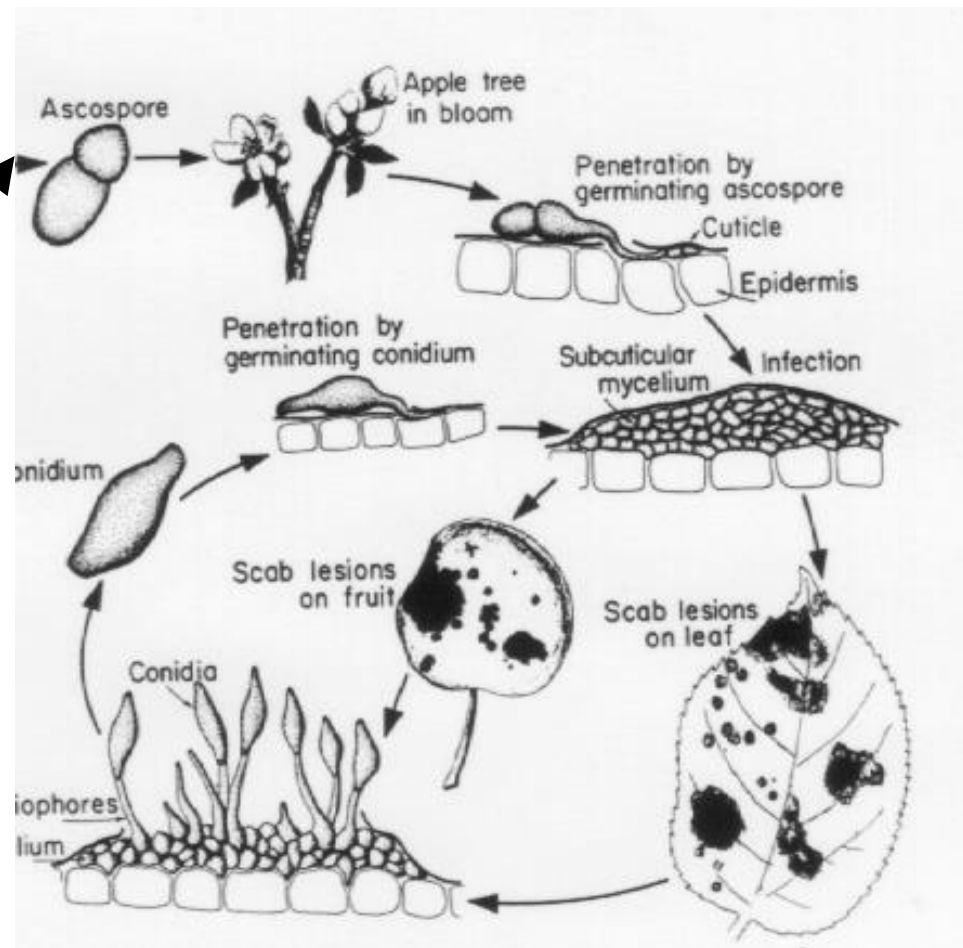
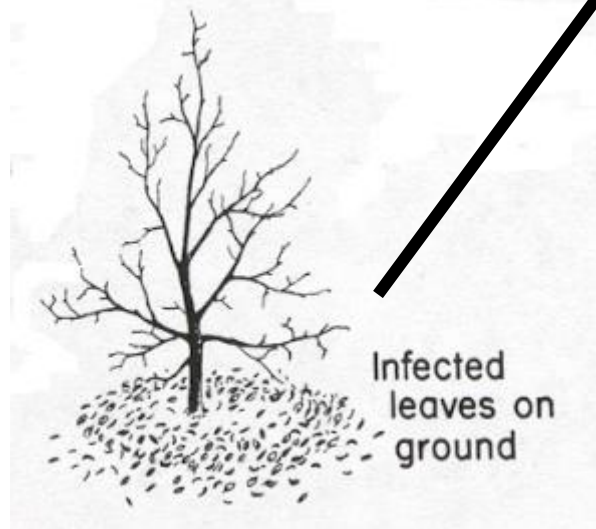


# Apple maggot

- Affected apples look lumpy
- Apple maggot damage appears as winding brown trails under the apple skin
- Adults emerge after a rain in July and August
- Fly about for 7-10 days
- Lay eggs under skin of apple
- Control the adult!



# Apple scab - life cycle





# Apple scab resistant varieties



Pristine	Yellow type, early, better quality than Lodi or Transparent, somewhat fire blight susceptible
Redfree	Somewhat Jonathan-like, susceptible to fireblight
Williams Pride	Somewhat like Red Delicious, decent quality, early, mid-August, productive.
Liberty	Somewhat mac-like with better shelf life, moderately resistant to fire blight, productive.
Jonafree	Late September, somewhat Jonathan like, productive, susceptible to fire blight
Enterprise	Large, dark red, productive, looks like Rome,
Goldrush	Late (early Nov), excellent storage, rough finish,

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Cider making is a blend of science, history, and art





# Blending of varieties is the key to good tasting cider

- Sweets
- Tarts
- Flavor



## Quality control in sweet cider

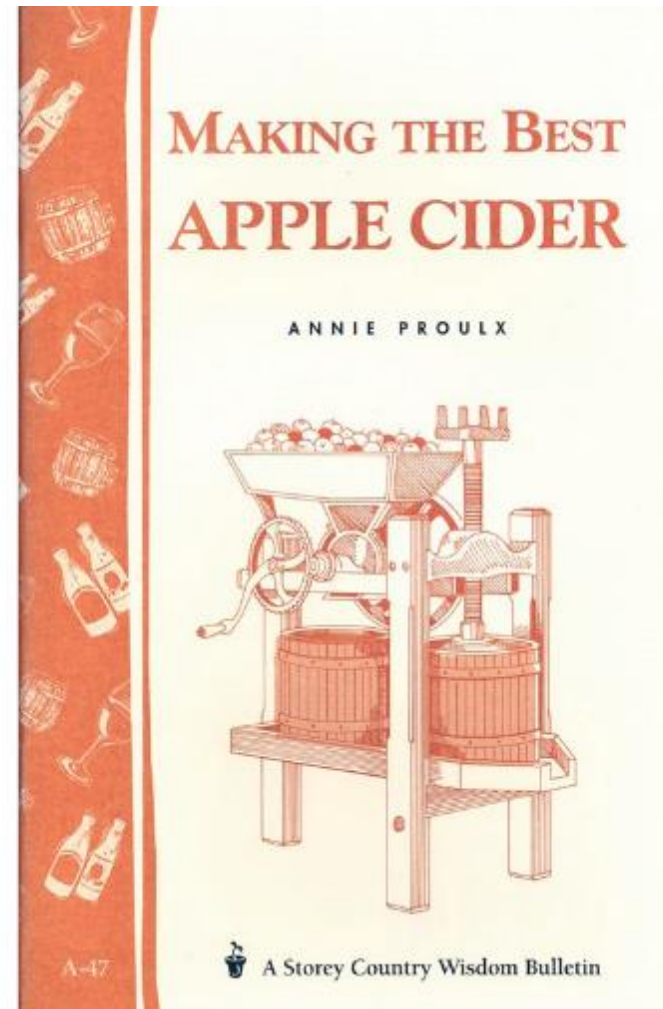
- Only mature, tree-ripe, picked, sound apples should be used in cider
- Windfall apples often contain soil and unwanted bacteria that could cause danger in the finished cider



Cleanliness through the entire process is the key



A nice reference  
guide on cider making



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Hard cider apples are generally not considered fit for eating fresh; they may be small, bittersweet, or downright ugly. Often a mixture of apples is used to provide the right balance of tannins and acids, sweetness and aromatics.





## Cider varieties are grouped into

1. bittersweets (with tannins greater than 0.2% and malic acid less than 0.45%),
2. bittersharps (with tannins greater than 0.2% and malic acid greater than 0.45%),
3. sharps (with tannins less than 0.2% and malic acid greater than 0.45%), and
4. sweet or dessert apples (with tannins less than 0.2% and malic acid less than 0.45%).



**Sweet apples** make up 30-60% of the blend. These apples are high in sugar, low in acid and will blend well with the juice of other more zesty and aromatic varieties. Examples of apples in this category are Baldwin, Red Delicious, Cortland, and Rome.



**Tart or sharp** varieties will make up 10-40% of the juice: Jonathan, McIntosh, Granny Smith, Rhode Island Greenings, and Winesaps are good examples.



**Bitter apples** comprise 5-20% of the juice and varieties in this category include Golden Russets, Red Gravenstein, and Northern Spy.



**Aromatic apples** round out the cider by furnishing the cider with its bouquet and “nose”; these apples make up 10 - 20% of the juice.



# Hard cider varieties

## 17 hard cider apple varieties to consider

From Ian Merwin  
Horticulture Professor Emeritus  
Cornell University





- **Gold Rush-** “of the modern scab-resistant varieties that are inexpensive to produce and the ones I encourage growers to consider for hard cider, this would be at the top of my list” Merwin says.
- **Stayman’s Winesap**
- **Winesap**
- **Crimson Crisp**
- **Liberty** –a scab free variety



- **Black Twig**
- **Arkansas Black**
- **Roxbury Russet**
- **Golden Russet** - “It’s a heavily-russetted variety, quite brown and like sandpaper on the outside and has a very high sugar content and lots of acidity. It’s a very potent apple in a cider blend. It tends to give you aromas of citrus, grapefruit, and wine. As part of a cider blend, you get some really nice aromatic traits”



- **Harrison**
- **Newtown Pippin** - also known as Albemarle Pippin, “A really popular variety for blending in hard cider”
- **Cox Orange Pippin** “One that does well in New England and upstate New York. It is an excellent apple for blending in a hard cider”
- **Ashmeads Kernel** –the most commonly known hard cider variety



- **Wickson**
- **Ribston Pippin**
- **Northern Spy** - “Makes a really excellent cider”
- **Baldwin** - “Has high sugar and it is high acid. So it really makes a good base cider”

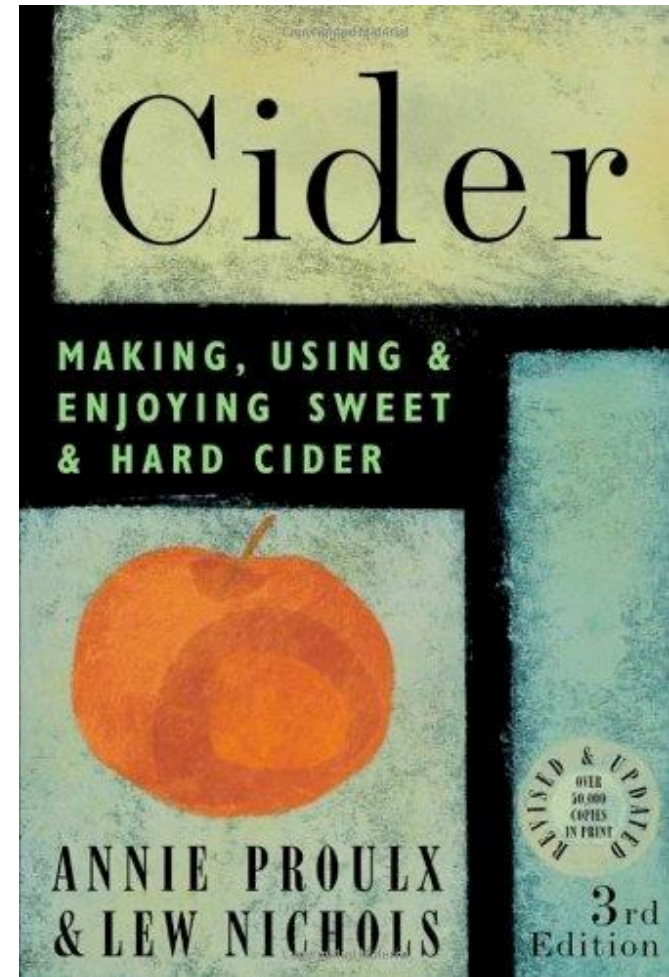


# Growing Cider Apples

- General considerations
- Site selection
- Variety selection
- Bloom time considerations
- Pollination
- Rootstock & tree characteristics
- Planting tips
- ~~Pruning systems~~
- Pest considerations
- Sweet cider production
- Hard cider varieties
- **Hard cider production**
- Questions



# Good hard cider reference





**Organize Your Blocks** —blocks of European hard cider varieties should be organized according to bloom time, because about half of the European varieties are late blooming.



**Be Choosy When Picking Rootstock** — select rootstocks that are a little more tolerant to viruses because a lot of the European and antique apple budwood has viruses in it. Good rootstocks are B.9, G.41, and G.935.



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# Questions?



# Thank You!

Bob Tritten

