



Orchard Design

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Introduction:

- ▶ Grew up on Orchard / Dairy farm in SW Wisconsin
- ▶ 180 acres of Apples ; 25 varieties, mainly McIntosh, Cortland and Honeycrisp
- ▶ Quickly moving to new varieties
- ▶ 4th generation, family has operated it for 115 years
- ▶ Graduated from UW-Madison with degrees in Dairy Science and Horticulture 1993

Introduction:

- ▶ My grandfather was one of the first to plant semi-dwarf trees
- ▶ We still have about 100 acres of semi-dwarf: mostly M7 and M26
- ▶ Mostly staked and planted 10 by 18 or 8 by 16 spacing
- ▶ Slow to convert to high density and super spindle; too comfortable with old ways, used a lot of equipment back and forth with the dairy
- ▶ Tractors would not work well in the closer rows
- ▶ Big mistake, cost us a lot of money : production and labor
- ▶ Also we didn't want to " build fence " i.e. trellis

Orchard Design

- ▶ Started in baby steps: 6 by 14 spacing, then 4 by 12
- ▶ A lot of wasted space and time (waiting for trees to fill space)
- ▶ Now everything is 3 by 12
- ▶ This is all we do now
- ▶ Probably will not move rows any closer because we are very hilly, a little room for sliding
- ▶ Have a few multi-leader trails going; hard to get even growth on all

Orchard Site: New

Things to consider:

- ▶ 1: well drained soils
- ▶ 2: good air drainage; For frost, we have had higher elevation freeze because air could not move out
- ▶ 3: no previous orchard; Replant disease
- ▶ 4: soil test preplant
- ▶ 5: look at soil health also, add organic matter if you can
- ▶ 6: ability for irrigation

Orchard Site: Replant

- ▶ 1: try to wait 2 years after tree removal; put lots of organic matter on before planting; plant cover crops
- ▶ 2: drain tile any wet spots
- ▶ 3: soil test preplant
- ▶ 4: have there been frost events; Frost fan? Remove barriers for air drainage

Orchard Site

- ▶ If much deer pressure in the area fence before planting



Layout:

- ▶ Pick the type of layout that works for what you are doing;
- ▶ Not a one size fits all
- ▶ Are you doing pick your own? Might want shorter more pedestrian orchard?
- ▶ Might want a more “ traditional” looking orchard without all the wires
- ▶ More commercial you will want to maximize production and labor (picking and pruning)

Layout

- ▶ How will you plant?
- ▶ North/South
- ▶ Plant with the terrain? Rows oriented to allow best air drainage
- ▶ In our area it is hilly enough we have to plant along hillside; can not plant up and down hill, too much erosion
- ▶ If planting a pick-your-own, do you want to layout your varieties for picking through the season
- ▶ Consider pollination
 - ▶ Are you planting a single variety; add pollinator trees
 - ▶ If planting multiple varieties, will they cross pollinate



Picking the Engine

- ▶ What rootstock will you use
- ▶ My opinion; this is where a lot of mistakes are made
- ▶ Things to consider:
 - ▶ 1: is it a new or replant site
 - ▶ 2: soil drainage and fertility
 - ▶ 3: winter temps
 - ▶ 4: fire blight
 - ▶ 5: varieties on top

Rootstocks

- ▶ Talk to other growers in the area or other regions like yours, see what works there
- ▶ Don't be afraid to try a few new ones out on a small scale
- ▶ From this you should get 2 to 3 rootstocks to use on different varieties;
No one magic combo
- ▶ Plan ahead, order 2 to 4 years out, get what you want not what is left

Varieties

- ▶ Know your customer
- ▶ Plant what they will buy
- ▶ Make sure it will grow in your area
- ▶ If pick-your-own; or retail market; you can try new varieties
- ▶ If commercial market **REALLY** know what the buyers want

Varieties

- ▶ Make sure you put the right combo together for your area
- ▶ Weaker growing varieties need more horse power
- ▶ Watch fire blight prone varieties
- ▶ More vigorous varieties need smaller rootstock to stay within your growing systems (pruning can also help, but let's not push it)

Our Favorites

- ▶ Rootstocks:
 - ▶ 1: G11: on most everything, consistent, productive, lots of branches
 - ▶ 2: Nic 29 : watch fire blight and bitter pit
 - ▶ 3: G41: Don't like dominant branching and limb angles
 - ▶ 4: G935: really grows, maybe too vigorous in our area, Had Honeycrisp to top wire in 2nd year
 - ▶ 5: Bud 9: Ok on new ground, very inconsistent on replant
 - ▶ 6: M9-337: Ok, better new ones, fire blight a problem
 - ▶ 7: trying G210, G222 and G214; we will see

Our Favorites

- ▶ Varieties
 - ▶ 1: Honeycrisp: The sports; we have most of the red sports in the ground and Premier
 - ▶ 2: Pazazz: Managed or club Variety
 - ▶ 3: Gala: new red strains
 - ▶ 4: Ruby Mac
 - ▶ 5: Pink lady
 - ▶ 6: Crimson Crisp

Firestorm Honeycrisp



Premier Honeycrisp

- ▶ Picked on Aug 15 this year
- ▶ Picked Aug 10 in 2017

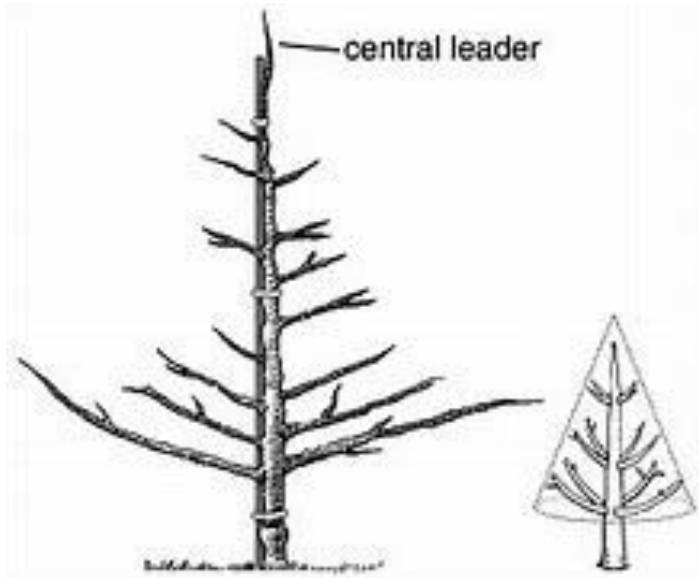


Type of growing system

- ▶ This will really determine your row spacing and tree spacing
- ▶ May be different for pick-your-own vs commercial
- ▶ Pick the right rootstock to fill in the space correctly
- ▶ May be different for varieties
 - ▶ Some easier to grow and fill in their space

Type of growing system

- ▶ Tall Spindle (renewal pruning)
 - ▶ 2D vs 3D
- ▶ Central leader and permanent branches



Multi -leader



1st year

Plant quality trees

Don't "save " money here, It usually bites you in the long run

Not too big , i.e. $\frac{3}{4}$ start slower

Big and tall not always the same



1st year

Plant them early and push them hard

Cut back all side branches to 3 to 4 inches

Helps the tree start faster and gets rid of 90 % of the bloom and fire blight risk

Do not head back the leader

Totally defruit first 2 years

Keep leader singled ALL year



Type of support

- ▶ Individual Stakes : Make sure they will support the tree with a load of apples; Can be as much as the tree for costs
 - ▶ Still have had loses from trees twisting
- ▶ Trellis
 - ▶ More upfront work but better support
 - ▶ Can use wires to train branches
 - ▶ If you put in drip irrigation , hang the drip line on bottom wire
 - ▶ Less expensive on per-tree basis when we go to high tree density

Individual tree stakes

Can cost as much as the tree
Can rub out limbs on post side

Have had failures when heavy
load and the right weather



Trellis

- ▶ Don't get cheap on your posts
- ▶ Use 6 inch on the ends and 4 to 5 inch in the rows
- ▶ Don't go over 35 ft apart in the rows
- ▶ Use the right length post: if you want the end height of your trees to be 11 feet
 - ▶ (90 % of your row width) Top wire will be about 9 ft, Should use at least a 12 ft post driven into the ground 3ft.
- ▶ Use taller posts if you want to add hail netting or shade cloth
- ▶ How many wires? 3,4,5,9? Once you have built the trellis another wire is very cheap, helps support leader as it is growing
- ▶ Do you use support for each leader? Wire, conduit, bamboo
 - ▶ Adds expense and labor?

Trellis Design

- ▶ Anchor vs “H” Brace



Trellis Design

- ▶ V type
- ▶ Very high tree density
- ▶ Lots of infrastructure
- ▶ No experience with





We use H
Brace



9 ft tall
5 wires

U hooks to
attach
trees

Trellis Design

No matter which way you go; make sure your brace, or your end anchor, is at least as long as your height

Example: If your top wire is 9 ft, your end anchor must be set back at least 9ft

Anchor type

- ▶ We are going to try this type this year
- ▶ Less labor, pre-made kits
- ▶ Don't like losing end 3 trees



Irrigation

- ▶ With high density most say it is a must, especially when getting the trees started
 - ▶ Might get away without it if very fertile soils and heavy soils
 - ▶ If varieties size well, big problem with some i.e. Gala

How we do it

- ▶ We don't have huge irrigation wells
 - ▶ Have to go 650 ft at least just to get 30 GPM
 - ▶ We use house wells, 10-15 gallon per minute flow
 - ▶ Have holding tanks that we fill then irrigate in zones

- ▶ 2500 gallon or
- ▶ 5000 gallon tanks
- ▶ Gas or electric pumps with disc filter and pressure regulator





Dripline on
bottom
wire,
about 24
inches off
ground

- ▶ Run 2 inch main line to rows
- ▶ Branch off to rows with
- ▶ 1 and ½ inch pipe



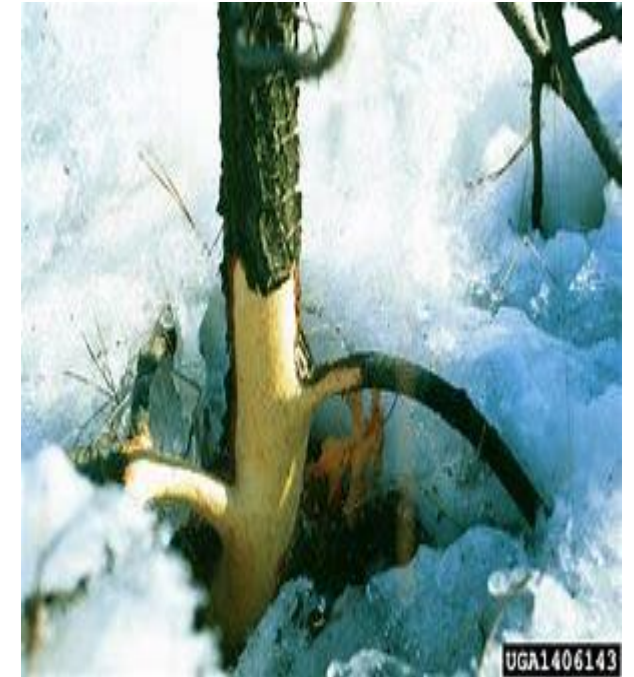
Irrigation

- ▶ The most important thing is to water slow and long
- ▶ Start before it gets really dry, takes a lot to catch up
- ▶ Also allows you to do fertigation



Protection

- ▶ Do you have a high pressure from rodents
- ▶ Most damage in winter
- ▶ Can lose hundreds of trees



Protection

Tree guards

Bait stations

Lots of mouse traps

Hawk houses; don't use with
bait for mice



If you get it wrong

- ▶ If you pick the wrong varieties, or the wrong spacing, you can always top work them over



Grafting



Grafting

- ▶ Where spacing was too far apart we have done two and brought them up to a “ V ” or two leader system



Grafting

- ▶ We went from 4 by 12 to 2 by 12
- ▶ Grew 3 ft the first year
- ▶ Filled space in and to top of wire second year
- ▶ Will be full production 3rd year
- ▶ Watch fire blight
- ▶ Pazazz on Bud9



Conclusion

- ▶ Pick growing system
- ▶ Pick rootstocks; Make sure to get this right!
 - ▶ Plan ahead and order, don't just take what is left, you will pay for your hastiness in the long run
 - ▶ Match them to varieties
 - ▶ Pick Varieties
 - ▶ Know what your customers want

Conclusion

- ▶ Keep learning and trying
- ▶ Plan ahead, plant quality trees and take good care of them
- ▶ Don't forget about them late in the season the first couple years
 - ▶ Make sure they go into winter in good condition
- ▶ Don't get stuck in same old ways
 - ▶ Try new varieties and rootstocks
 - ▶ Look at new growing systems
 - ▶ Multi-leader
 - ▶ 2D vs 3D