Apples As A New Farm Enterprise

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Evaluating Apples as a New Enterprise

– For most small farmers, financial viability means more than one enterprise

– Opportunities and Risks in Apples as 2\textsuperscript{nd} enterprise
  
  • Specialized, more niche product
  • Enormous amount of variety
  • Perennial crops have ecological advantages
  • Highly management-intensive
  • Risk of spring frosts means uncertain harvest year to year
Evaluating Apples as a New Enterprise

• What we’ll cover
  – How we grow apples
  – Start up costs and equipment requirements
  – Labor needs
  – BRIEFLY concepts of pest control
  – Marketing apples

• This is NOT a how-to-grow-organic-apples! We’re trying to help you think through whether to add apples to your farm
Mary Dirty Face Farm overview

- We bought a hayfield in the Fall of 2008 (20 acres) and purchased a 2\textsuperscript{nd} parcel in 2012 (40 acres).
- From 2009-2014, we established a 5 ½ acre orchard
  - Apples, pears, cherries, plums, apricots
  - Several species of berry, including currants, gooseberries, raspberries, blueberries, and honeyberries.
- In 2016, we began work on a 2\textsuperscript{nd} orchard block, with about 1000 apple trees, mostly disease-resistant or heirloom
- Certified organic in summer 2016! We’d been using organic practices and keeping records from beginning.
Mary Dirty Face Farm overview

We started out with a 5-year transition plan to establish the orchard and move out to the farm, building and planting mostly during weekends during those 5 years. We moved into our new home on the farm in spring of 2014.
The Orchard today
Two Onion Farm
Farm History

• Started Fall, 2003
• Full-time farmers since 2005
• Children now aged 16, 13, 10
• Vegetable CSA since 2005
Apples

• 135 trees planted 2012
• In 2018, 850 trees (1.25 acres)
• Markets: CSA, stores
Farm Overview

• 5 tillable acres
• Up to 6-8 employees
• >500 CSA members at peak
• $225,000 peak annual sales
• 2 tractors and equipment, packing shed, irrigation well
Starting Your Orchard
Orchard set-up

- **PLANNING** -- what products fit for our lifestyle, transition plan, resources?
- Visited as many **working orchards** as possible to understand different production systems and learn from others.
- Where to plant? Making drawings, picture where plants will to go.
First Things First – Have a Good Site

What is a good site?

- **Good air drainage (i.e. no frost pockets)**
  - Best site is high in relative elevation
  - Avoid low areas where frost and cold air settle

- **Exposure/Slope**
  - North or east slope preferable
    - South exposure can encourage apples to break dormancy early in spring, or during winter warm-ups.
    - Sunlight on orchard early in the day helps dry dew, reduce moist environment for fungal disease
  - On steep slopes, use practices that avoid erosion/soil loss.

- **Micro Climates**
  -- Next to a building will create more heat: could help some types of fruit survive a cold winter, but could also result in blooming too early, or breaking dormancy in winter!
  -- Know your site: sunny? Shady? Windy? Protected?
First Things First – Have a Good Site

What is a good site?

• Soil
  – Must be well-drained, light soil. Apples trees will die quickly if root zone is too wet
  – Decent organic matter. Hard to amend soil once perennials are in place
Do you have a good site?

- Good air drainage (i.e. no frost pockets)
- Exposure/Slope
- Access to market?
Tree protection

- An additional $0.50-1.50 per tree for peace of mind
- At least 2 feet high, more if snow drifts common
- Hardware cloth – ¼ or ½ inch mesh works
  - Long lasting, somewhat more expensive
  - Weeds can be difficult to remove from inside
  - Need to keep tree from hitting it in wind (stake)

- Corrugated plastic or vinyl
  - Cheap
  - Need to be removed annually in fall and reinstalled in spring
Recommended Varieties

– Avoid Honeycrisp. Has high calcium requirement, attractive to pests, susceptible to a variety of problems – it’s just not easy to grow!
– Crimson Crisp good alternative – similar texture, not as sweet, but scab resistant and nice growing habit.
– Other disease resistant varieties: Liberty, Priscilla, Dayton, Pixie Crunch
– U of M varieties that are easier to grow: Sweet 16, Haralson (very tart), Chestnut Crab (great for snacks and for kids!)
– Early season: Pristine (sometimes ripens in July!), Williams Pride (mid-August), Enigma (early August)
– Late Season and Storage apples: Florina, Keepsake, Arkansas Black, Prairie Spy, Golden Russet
– Heirlooms: These can be so much fun, but often aren’t as reliable as modern cultivars.
Scab-Resistant Varieties

- All scab-immune varieties in our orchard
- Reduce sprays at busy time of year
- Unknown varieties
- Rare diseases (Elsinoe, Alternaria)
- Recommend: Pristine, Williams Pride, CrimsonCrisp, Liberty, Winecrisp, Goldrush
Elsinoe and Alternaria
Orchard Design

Tree size and planting density
Orchard Design: Tree Size

- Rootstock determines tree size
- **Dwarf**: 8-10+ feet tall (*M.9, G.11, G.41, Bud 9, etc.*)
- **Semi-dwarf**: 12-18 feet (*M. 26, M.7, etc.*)
- **Standard**: 20+ feet
Dwarf?

Pros
• Quicker to bear fruit
• Easier to prune / thin / harvest
• More sunlight into canopy = better fruit quality, less disease
• Easier to spray

Cons
• More trees/acre = More $
• Shallow roots:
  – Irrigation
  – Staking
  – Weed control
Two Onion Farm Orchard Layout

- Dwarf rootstock
- 6’ apart in row
- 12’ between rows
- 6.5’ wide strip of bark mulch under trees
- 10’ tree stakes from Best Angle Tree Stakes
- Drip irrigation
Training Methods

- Tall spindle, fruiting wall, super spindle, etc.
- 2’ or 3’ in-row spacing common
- Close attention needed!
- We opted for lower density (6’ apart)
Irrigation
Irrigation: Buried Header Lines
Weed control
Cultivators
Mulch
Mulch

- Reapplication every 1-2 years
- Edges
- Perennial weeds
Considerations of different sizes, densities

- Semi-Standard (M7, MM111, B118): Large trees, 7 years to full bearing; must use ladder for pruning, thinning, and harvest; challenging to get full spray coverage, require lots of space. BUT trees are hardy and long-lived, hold up in windy site, shade out weeds/competition.

- Dwarf (Bud9, G41...): Much more efficient use of space, bearing in 1-2 years (depending on quality and care), must use trellis. Very expensive to establish, trees may be shorter lived. Bud 9 shows some compatibility issues.
Considerations of different sizes, densities

Our choice:

• Semi-Dwarf (G11, G30, other new Geneva): Require permanent stakes, but not a trellis, 3-5 years to production, some ladder use
  – Moderate start-up costs, including stakes
  – Mulch heavily in early years, then allow permanent groundcover
Issues to Consider

• Interest
• Time
• Money
• Goals
• Long-term implications
What is all this going to cost?

Mary Dirty Face Farm: Wholesale tree purchases, mostly semi dwarf trees.

We use minimal irrigation (no drip installed in trees), mostly in first year after planting.

- Trees – $10 to 20 per tree:
- Tree guards - $0.50 to 1.50 per tree
- Fencing - $1 to $5 per foot
- Stakes - $1 - $10 – newer planting uses Right Angle stakes
- Trellising (posts, wire, etc) for dwarf plantings) - $100 per 200’ row

Total for 1 acre planting of 200 semi dwarf trees (no trellis, not including labor)

about $5000 +/-
## Expenses

<table>
<thead>
<tr>
<th>Item</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Trees 6’x12’ (605/acre)</td>
<td>$13 each</td>
</tr>
<tr>
<td>Stake</td>
<td>$8.29 each</td>
</tr>
<tr>
<td>Irrigation</td>
<td>$1.87 / tree</td>
</tr>
<tr>
<td>Training supplies</td>
<td>$1.25 / tree</td>
</tr>
<tr>
<td>Bark mulch</td>
<td>$4.90 first year, $2.45 subsequent years</td>
</tr>
<tr>
<td>Sprays</td>
<td>$4.00 / tree each year, first two years</td>
</tr>
<tr>
<td>Rodent guard</td>
<td>$0.78 / tree</td>
</tr>
</tbody>
</table>

**Total**: $40.54 per tree, $24,526 per acre for materials in first two years of planting
Labor

Year 1: 1 hour/tree

- **16 minutes**: plant trees and pound stakes (spring)
- **3 minutes**: setup irrigation (spring)
- **12 minutes**: mulch (spring)
- **7 minutes**: train/prune (early summer)
- **22 minutes**: weed, spray, cultivate

Year 2: 45 minutes/tree

- **6 minutes**: mulch, (spring or fall)
- **8 minutes**: train/prune (early summer)
- **30 minutes**: weed, spray, cultivate
Orchard equipment

Sprayers, Tractors, Post-Harvest
Reuse existing equipment...
Sprayer

- 50 gallon
- $5800 in 2014
- Tall enough?
- Three-point vs pull
- Agitation important for kaolin clay
Sprayers

- Started with 3.5 gallon backpack sprayer: Inefficient use of time (lots of refills if you’re spraying everything), but works well on young trees. Being “up close and personal” with trees has advantages. Also useful when something needs to go on a smaller subset of trees.
- Mid-sized sprayer: DIY sprayer. Saved a lot of time over the backpack sprayer, cheap alternative for a while
- Airblast sprayer: purchased used 2017. Necessary for getting full coverage on mature trees, and made spraying much more efficient.
# Tractor Sizing

<table>
<thead>
<tr>
<th>Distance between rows</th>
<th>Tractor Width</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>10.5 feet</td>
<td>65 inches</td>
<td>Can’t fit!</td>
</tr>
<tr>
<td>10.5 feet</td>
<td>52 inches</td>
<td>Okay?</td>
</tr>
<tr>
<td>12 feet</td>
<td>52 inches</td>
<td>Better</td>
</tr>
</tbody>
</table>
Tractors

- Established orchard with no tractor – made some spacing mistakes, especially in distance from row ends to fence. (We ended up moving our fence, for a variety of reasons).
- Yanmar 2000 – small and nimble, good for tight spaces. Underpowered for certain implements (especially Airblast sprayer), fuel efficient and easy to operate
- David Brown – mostly for bigger tasks
- Kubota – newest purchase, hope to be more “all-purpose.”
Post-Harvest

• Vegetable brush washer works well
• Cooler: don’t mix apples with veggies!
Pest Management

Insects and Diseases
Lots of Problems!
Pest Management

- Very challenging!
- Can’t tell you how to do it
- Annual improvement is possible
- High quality fruit is possible (60-80% #1 grade)
- Scouting and knowledge of pests important
- It’s a lot of work!
- Match level of pest control to market
Spraying?

- Not the first or best option...
- Some spraying essential for table-grade fruit
- 2-3 sprays per week on our farm from May thro August (including foliar nutrients)
- $5-$6 per tree per year
- Often very time/weather sensitive
- Quality of life?
Alternatives to Spraying

• Habitat management & beneficial insects
• Disease resistant varieties
• Traps (apple maggot)
• Mating disruption (codling moth)
• Livestock...
Livestock integration

Hogs in the orchard
• Started in 2017 with 2 feeders, raised 5 in 2018
• Research strongly suggests benefits for breaking up pest cycles, as well as improved soil biology
• Provide diversified income source
• Management intensive – must be moved frequently
• Lots of challenges, but overall a net positive.

https://cerestrust.org/potential-of-organic-hogs/
Livestock integration

Lambs for mowing
• New this year – raised 10 in 2018
• Additional non-fruit revenue –
  • Lambs were less clearly profitable in our 1st season, but cautiously optimistic about improvements in efficiency
  • Management intensive – require less overall than hogs, but can escape more easily, must use timely rotations
  • Probably did not actually reduce mowing needs, but have other benefits

Broiler chickens
• So far just for home meat
• 2019 goal to get the timing right for Plum Curculio control
• Benefit that they’re only around a couple of months
Labor Requirements
Management

• Apples require lots of management/skilled labor:
  – Scouting
  – Pruning/training
  – Tractor work: spraying, mowing, cultivating

• Much of this is in late spring/early summer
Thinning
Harvest
## Labor By Season

<table>
<thead>
<tr>
<th>Task</th>
<th>Minutes Per Tree Per Year</th>
<th>When?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prune</td>
<td>14</td>
<td>mostly Feb-Mar</td>
</tr>
<tr>
<td>Mulch</td>
<td>4</td>
<td>Mar/Apr or Nov-Dec</td>
</tr>
<tr>
<td>Weed</td>
<td>15</td>
<td>May-Aug</td>
</tr>
<tr>
<td>Spray</td>
<td>7</td>
<td>Apr-Aug</td>
</tr>
<tr>
<td>Mow</td>
<td>1.5</td>
<td>Apr-Sept</td>
</tr>
<tr>
<td>Cultivate</td>
<td>1</td>
<td>May-Aug</td>
</tr>
<tr>
<td>Thin</td>
<td>25</td>
<td>June</td>
</tr>
<tr>
<td>Pick up drops</td>
<td>4</td>
<td>June-Aug</td>
</tr>
<tr>
<td>Pest trapping</td>
<td>8</td>
<td>June-Aug</td>
</tr>
<tr>
<td>Harvest</td>
<td>25</td>
<td>Aug-Oct</td>
</tr>
<tr>
<td>Wash/grade</td>
<td>15</td>
<td>Aug-Oct</td>
</tr>
</tbody>
</table>

- Farm-specific!
- Data for mature trees
- Total: 2 hours per year per tree
- Most varieties produce 40-60 lbs fruit per tree
Two Onion Farm Labor

• Two owners + farm manager 2013-2017

• Orchard management, spraying, pruning – Chris

• Scouting, monitoring – daughter Panka
Coping With Orchard

• Delay start of vegetable delivery season for thinning
• More employee labor in fall
• High management burden for orchard
• Loss of farm manager difficult
Labor

- Labor through the season
  - Pruning starts in February
    - Eventually need to hire
  - Monitoring and scouting in early season
  - Thinning
  - Monitoring and spraying throughout season
  - Harvest, packing, selling
  - Hardest time on our farm June and August, when school and childcare programs are out
Labor

• Most orchard labor done by Rachel and Anton
• 1 full-time seasonal employee plus occasional volunteers or paid help
• Adding 1 PT for harvest

• Challenge: having appropriate amount work for someone season-long, when major labor needs of fruit are very concentrated.
• Challenge: need for attention to detail, and conscientious work (rather than simple manual labor)
Harvest and Yields
Two Onion Farm Yields

- **Our goals:**

<table>
<thead>
<tr>
<th>Year</th>
<th>Lbs/Tree</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>10-15</td>
</tr>
<tr>
<td>4</td>
<td>20-30</td>
</tr>
<tr>
<td>5</td>
<td>30-50</td>
</tr>
<tr>
<td>6+</td>
<td>40-60</td>
</tr>
</tbody>
</table>

- **Maximum yields not the best!**
Variation!

- Wide range among varieties, years
- CrimsonCrisp 2018: 7 lbs/tree
- Priscilla 2017: 105 lbs/tree
Example: Yields Over Time

- Priscilla
- Winecrisp
- Akane
- Goldrush
Fruit Grade

Percent #1 Grade

- 2016: 70%
- 2017: 50%
- 2018: 80%
Marketing
Two Onion Farm Markets
#1 Grade

**CSA**
- Approx $3.25/lb
- 4385 lbs
- Optional add-on
- 4, 2.5, or 1 lb per week
- Packed with veggies
- 10 weeks
- 63% of members chose apples
- All varieties

**To Retail Stores**
- $2.20/lb > $3.79/lb retail
- 5180 lbs
- Madison, Platteville
- Concentrate on a few varieties
- Same quality standards
Willy Street Co-op
#2 Grade

CSA

- 970 lbs
- $1.40/lb
- Extra orders for processing, fresh eating

To Stores

- 350 lbs
- $1.00/lb
- Food cart/catering
- Juice bar in past years
Applesauce and apple butter
Processing

- Made at licensed, certified organic processor (no more!)
- 2018: 2400 lbs apples
- ~16 qts applesauce/40 lbs apples

Prices

<table>
<thead>
<tr>
<th></th>
<th>8 oz Apple Butter</th>
<th>16 oz Applesauce</th>
</tr>
</thead>
<tbody>
<tr>
<td>CSA</td>
<td>$5.50</td>
<td>$4.75</td>
</tr>
<tr>
<td>Farm Mkt</td>
<td>$7.00</td>
<td>$5.00</td>
</tr>
<tr>
<td>To stores</td>
<td>$5.00</td>
<td>$4.19</td>
</tr>
</tbody>
</table>
Marketing at MDF

-Pros of Farmers markets
  - Flexibility – take what you have, helpful in years of uncertain yield, allows us to experiment with new offerings
  - Immediate customer feedback, valuable marketing information
  - Build community
  - Niche product sells well
  - Can sell less beautiful apples as 1sts

-Cons
  - Time intensive
  - Variable/unpredictable traffic, subject to weather
  - Not all markets are the same! Particulars of market composition and management make a lot of difference

Restaurant and bakery sales

-Pros
  - Market for 2nd quality and excess fruit
  - Outlet for larger quantities in single delivery
  - Interest in unusual fruits
  - Wholesale price that still meets our needs
  - Farm-to-Table restaurants very supportive

-Cons
  - Unpredictable demand, hard to plan for week-to-week and year-to-year
  - Staff turnover or business closings are common
CSA model Fruit Share/Apple Share

- Pros
  - Use what you have – some flexibility if timing of harvests is off
  - Payment up front, helps stabilize income if other outlets are inconsistent
  - Build community – great relationships
  - Can take advantage of existing market for other enterprises

- Cons
  - Difficult decisions in years of crop failure or challenges
  - Different marketing strategies for outreach in early years

Wholesale – local food co-op

- Pros
  - Easy/close delivery
  - Local presence, build community
  - Supportive staff!

- Cons
  - Lower price
  - Can’t purchase as much (quantity) at once
  - Harder to sell uncommon varieties – though we’ve had success with in-store demos
  - Fruit must be beautiful for good sales
5th Season - Our First Winter Market
Reflections
Finances
Soil Protection
Quality of Life
Reflections

• Apples work for us
  – Suitable use of land/resources
  – Marketing success SO FAR
  – Enjoy the management challenges

• Crop failure a real threat every year

• Seasonal labor requirements are immutable

• Decisions made in year 1 determine the life of orchard