Adapting to the Challenges of a Humid, Ever-Changing Environment

By Jim Koan
The Fun of Organic Apple Growing …

Managing Diseases
Managing Good/Bad Insects
Managing Soil Fertility
Managing Crop Load
Response to Rain Events
Response to Freeze Events
120 acres of organic apples presents a spraying challenge.

3 rigs @ 100 gallons/acre
2.6 – 2.9 mph = 24 man hours
Lots of agitation and high pressure

Thorough coverage is necessary or else it is wasted time and money (organic chemicals are not forgiving).

Surround® for visual spray pattern. Pressure, speed, wind effect, coverage of top, bottom and center of tree.

** Coverage changes during the growing season and with the targeted pest
Conventional Spray Program

Organic Spray Program

Sustainability?
Organic Orchard Management Is Like Warfare

Eliminating most of the “bad guys” and preserving most of the “good guys” now, and in the future.

“Bad guy”

“Good guy girl”

Consider what the cost and sacrifice will be for the season’s war …
Apple Scab Control in Fresh Fruit Production

- Silver tip to pre-pink (3-4 copper and lime sprays)
  - 2 lbs. active copper with 5 lbs. lime per acre

- 1-2 lime sulfurs @ 2.5 gallons/100 gallon water (dilute) at pre-bloom
  - Slow-drying conditions

- Lime sulfur @ 1 gallon/100 rate and 3 lbs. micro sulfur during bloom
  - Fast-drying conditions
  - Can substitute 15 lbs. micro sulfur instead if thinning with salt

- 15 lbs. micro sulfur from petal fall to end of primary

- Unscientific observation: Surround ® and sulfur don’t mix
Apple Scab Control in Processing Fruit Production

- Copper @ 2lbs. active with 5 lbs. spray lime per acre per application from silver tip every 7-10 days until end of primary
  - More “dummy-proof” than sulfur, especially under high inoculum conditions
  - Good retention properties
  - After 15-20 years, will lose soil microbes (>100 ppm copper)
Fire Blight Control

- Must not have any over-wintering cankers!!!

- Use Maryblight™ or Cougarblight™ models for spraying
  - At this time, biologicals are not effective enough; only Streptomycin® is effective

- Watch opening blossoms and weather conditions during the Fall bloom

Don’t use M26® root stock. I prefer Bud9®.
Summer Diseases
(Sooty Blotch and Fly Speck)

- Use disease model and degree days when timing sprays

- Use lower rates of copper and/or Serenade®, Bicarb®, Citrex®, summer oil, etc.
  - Most biofungicides will work with the correct timing

- These are not a problem for me except in the apple variety Gold Rush
Battle of the Bugs

After several years of organic practices, the predator/pest system balances itself out except for:

a) Plum Curculio
b) Codling Moth
c) Apple Maggot
d) Some European Red Mite flare-ups
The Dreaded Plum Curculio

The first line of defense is perimeter lures and traps.

- Watch weather forecast for temps. greater than 70°F because that is when she gets active.
- Pyganic® border sprays at night.
The second line of defense is Surround® and garlic.

- First cover of Surround® with garlic and DE at 80% petal fall.
  - 100 gallons of water/acre and 50 lbs. of surround

- Second cover at 35-50 lbs., 3-4 days later.

- Keep covered at 25 lbs./acre and freshen up every 7-10 days with garlic and DE. Recoat if temperature is predicted to be > 70°F.

- With high winds or 0.5” rain, you will lose most of your protection and you will have to recover.

- Surround® eliminates some “foreplay,” but you will get a flush of over-positioning at the end of the egg-laying cycle.

- Start sprays early and finish late.
Small orchards can be trapped out of PC by using Whalon traps and lures.

Liberty trees and Lodi trees can be used as a “trap crop” and then sprayed at night with Pyganic® (flares mites).

Future sustainable inputs will employ Hunter Nematoads and fungus to control this pest. In collaboration with Michigan State University, several successful research studies have already been conducted in my orchards.
The third line of my defense is pigs grazing on June drop apples.

**According to MSU data, PC damage is reduced from 15% to 3%.**
Battling Codling Moth

About 2-3 weeks after the PC are all done “beating you up,” codling moths’ eggs start hatching.

- You must biofix for your orchard and also have a trap for each 2-3 acres for monitoring population thresholds.

CM is controlled with mating disruption, Surround® and virus.
The first line of defense is pheromone disruption.

- I’ve used C++ at 400 ties/acre for years with excellent results.
  - 500 ties on the outside and 250 ties on the inside
  - Tie placement is critical – position correctly in top 2 feet of canopy
  - No holes allowed
  - There’s a learning curve involved here …!!!
My Technique and Tool
The second line of defense is to recover with Surround® 1-3 times at 25 lbs./acre.

- Helps only about 20%, but it’s worth it because you already have Surround® residual left from suppressing PC.

- Apples must be reduced to singles (no double-headers) for effective CM and leaf roller control.
My third line of defense is to use virus sprays.

- This is a **must** in first generation – Do not ever skip this!

- Cydx® at 2 oz./acre every 6 days when trap catch is above threshold and 250 degree days base 50 have progressed
  
  - You must know the weather for the week of that trap catch when it is above threshold
    - Moths fly only at dusk with no wind or rain and above 60°F.

  - Complete coverage is essential so larvae eat virus as they eat their way out of the egg
    - It takes 2 days before they get a bellyache and stop eating

- Cold, rainy weather will cause high larvae mortality

- You need to get first generation larvae down to < 1% survival to control 2nd generation by pheromone only

- You need to have apple fruit set down to singles for better coverage
You can put a cardboard band around the trunk and capture the pupating first generation and then pull it off the tree and burn it in late July in order to control the second generation.
Above threshold numbers in second generation (as indicated by trap catches of 4-5 moths) are addressed by summer oils at 150 degree days past threshold catch.

1% summer oil (I like Pure Spray®) at 100 gallons/acre or 3x.

Also used at this time to control European Red Mite.
Battling the Third Bad Bug – Apple Maggot

- Fly emergence usually occurs in mid to late July
  - Heavy rain brings it out of the ground and it eats for 8-10 days, then mates and starts laying eggs in the apples
  - Can pupate in the ground for 2-3 years under drought-like conditions
- First line of defense is to set traps every 15-20 ft. at head height around perimeter of the orchard
The second line of defense is to spray GF120 fly bait near the cups

- A few drops every 7-10 days in the hot spots where you are catching 2-3 flies on a single trap

The third line of defense is to apply Surround®

- Has never been necessary for me
- This year, I got caught with a late season flight in September.
Word of Caution: ERM Will Be Flaring in Late July!

- If you used too much sulfur (like I often do), you’ll have flaring and need to quickly bring it under control now or pay later.
  - Oil spray at 1% and usually 100 gallons of water/acre to control eggs and juvenile mites of ERM
  - If you don’t control now, they will get out of hand in August – you must be proactive!
  - Don’t spray when temperatures are >80°F.
  - Must have complete coverage to totally encapsulate egg with oil.
  - Only kills eggs, not adults. Therefore, you need one spray in later July, then follow-through in August with CM control.
Blossom Thinning with Salt and/or Lime Sulfur

You only need 10% of the blossoms to set fruit and you have too many apples.

You also want only singles.

(I have over-thinned using salt and lime sulfur only twice in over 12 years, and both were due to unperceived freeze damage.)
Approximately 5 sprays with salt needed at 1 ¾ lbs./100 gallons dilute (do not go under 3x).

1)30% king bloom on first varieties open … spray
2)Full king … spray
3)30% side open … spray
4)100% side open … spray
5)Lingering bloom open … spray

You need to beat the bees to the blossoms!

Lime sulfur substitution: 2-3 sprays only under fast-drying conditions at 1.5 gallons lime sulfur/100 gallons water and 3x.

-- The 1.5 gallon rate will sometimes russet the fruit finish (I like to do 1 gallon/100 and buffer with 3 lbs. micro.)

-- Full king, half side bloom and full side bloom

-- Concentration and number of sprays is dependent upon scab protection during this period
Pollination

I used only native pollinators, and usually get 3x as many apples as I need if I don’t blossom thin.

There is no good way to thin organically for large apples like in conventional production.

To wait and get a lot of seeds pollinated in order to get big apples makes too many apples.

Note: I do not use lime sulfur and oil together because it is too caustic for Michigan growing conditions. I can’t afford to damage leaves.
My Soil Fertility Input Program

Banded poultry manure at 500 lbs./acre and incorporate in Fall.

Low vigor varieties (like Gala) also get a second application in the Spring and incorporated.

Some varieties (like Spy and Gingergold) do not ever get anything.

All orchards/all prunings are flail chopped.
All high-density orchards get Swiss-sandwich treatment 3-4 times/season.
Mowing is done only 2-3 times a year (every other row) in order to maintain flowering perennials which will attract toads and cause them to move to adjacent rows that are still flowering.