Potential Disease Issues in Young Apple Nurseries





Sara M. Villani February 24, 2016





Department of Plant Pathology North Carolina State University



General Thoughts on Nursery Disease

- Generally going to face same onslaught of diseases as in established blocks
 - Fruit rots won't be an issue
- In general-more susceptible to foliar diseasesnew flush green tissue emerging
- Different application schedule and different fungicide/bactericide choices
 - Fruit finish not a concern, don't want to promote resistance
- Cultural practices and diligent scouting

Fire Blight concerns in Nurseries

- Increase acreage in susceptible cultivars
 - Bud wood & nursery trees
- Availability of resistant rootstocks
- Different management paradigms
- Asymptomatic fire blight infections in bud wood
 - "Invisible cankers" and proximity to strike





- Tim Smith, Washington State University
 - Western US,1999: Severe fire blight outbreak ~3 weeks after budding with "clean" bud wood
 - Greatest losses on specific cultivar
 - Budded prior:
 Symptomless; Budded after: Mild/moderate FB symptoms
 - Trees lost= 47,100!



- Newly Established Honeycrisp Planting, Hudson Valley, 2014
- Trees have no flowers, but FB symptoms in trunk or shoots-what is infection source?
- Presence of strep-resistant FB







The Problem

- *Erwinia amylovora* is systemic and "hides" in wood without causing symptoms
- Pruning of fire blight strikes in summer —> disguises fire blight
 - What about small "invisible" cankers?

The Question

- What is the "safe" distance from fire blight strike for cutting bud wood?
 - Same Tree? Adjacent Tree? Different Block?





% Fire blight incidence/sample: 5 buds/ sample, 30 samples



Quantification of *E. amylovora* (cfu) per sample (5 buds)

Fire Blight Management in Nurseries

10

Cultural Considerations

- DO NOT plant next to infected orchard or old orchard with FB history
- Keep tools clean
- If pruning fire blight strikes next to bud wood source trees, mark where strikes were pruned
 - Be cautious about taking bud wood from trees <20 m away (>20 m in some cultivars)
- Do not allow any bloom
- If infections become established, rogue any symptomatic trees and monitor planting weekly
- Keep deer away

Fire Blight Management in Nurseries

11

Bactericide Considerations



 Copper efficacy on shoot blight variable under high disease pressure: Real-life situation?

Fire Blight Management in Nurseries

Antibiotic Considerations

- Apply low-MCE coppers (Badge, MasterCop, Cueva) at low-label rates
- Apply strep or other antibiotics if high risk of infection predicted, after hail and high winds accompanied with rain
- Actigard: Induces Systemic Acquired Resistance
 \$\$\$: 32-64/A

Phytophthora Concerns in Nurseries ¹³

- Collar Rot (scion), Crown Rot (rootstock), Root Rot: Phytophthora spp.
- Symptoms: Typical of dysfunctional root system







Phytophthora Concerns in Nurseries¹⁴

- Aboveground symptoms often indistinguishable from other root diseases or winter injury
 - Stunting, sparse, chlorotic foliage, wiliting, reduced terminal growth, premature fruit coloring





Phytophthora Concerns in Nurseries

- "Below-ground" and Crown Rot Symptoms:
 - Reddish brown coloration of cambium/inner bark underneath outer bark
 - Crown Rot: Dark delineated margin between healthy and diseased tissue



Phytophthora Risk Factors

- Saturated/free standing water: zoospore movement (chemotaxis)
- Low lying planting or poorly drained soils
 - *Phytophthora* ubiquitous in soils
- May show up even in elevated areas in young plantings if heavy rain and susceptible scions/rootstock
- Susceptible rootstocks: MM.106, MM.111, M.26, M.7





Phytophthora Management in Nurseries7

- Plant on well drained soils and hillsides to promote drainage
 - Slightly raised berms?
- Select resistant rootstocks: Geneva series, B.9 (M.9?)
- Avoid susceptible cultivars to minimize collar rot (Topaz)
- Avoid puddling with irrigation-monitor closely
- If necessary: Phosphite fungicide, Mefenoxam (Ridomil Gold)

Black Stem Borer and Associated Fungi[®]



- Tree decline and death, esp. in young trees
- Black Stem Borer (BSB): Xylosandrus germanus : Ambrosia beetle
- Most common in ornamentals, not apples

Black Stem Borer and Associated Fungi[®]



- Attracted to ethylene produced by stressed tree
 - High density plantings, drought, flooding, winter damage, FB injury, nutrient deficiencies

Black Stem Borer and Associated Fungi[®]

- BSB are farmers too!
 - Adult carries food (on outside and in gut) into tunnel galleries and fungi colonize vascular tissue → wilting symptoms



- Management
 - Addressing stressors more effective than insecticides or fungicides

- Common viruses transmitted through grafting, budding, top-working:
 - Apple Stem Pitting Virus (ASPV)
 - Apple Chlorotic Leaf Spot Virus (ACLSV)
 - Apple Stem Grooving Virus (ASGV)
 - Apple Mosaic Virus (ApMV)
 - Tomato Ring Spot Virus
- Disclaimer: I'm not a virologist, nor do I have diagnostic tools/equipment in the lab





Asymmetric leaf distortion Inner bark necrosis Stunting Terminal Dieback





ASPV: SweeTango/B.9

Latent infection

Decreased yield, heightened sensitivity to cankers & nutrient deficiency

More prone to russeting

- G.16 rootstock: Very susceptible to common viruses transmitted through infected but asymptomatic bud wood
 - Jonagold, Gala, Fortune carry latent viruses: May not show up until orchard is established
- G.65 rootstock: Tomato ring spot, apple stem grooving virus

What to Look For:

- Foliar discoloration/deformity
- Slow maturation
- Union necrosis
- Lack of vigor/tree decline
- Inability to handle other stresses

Other Concerns









- Inspect rootstock liners and grafted trees prior to planting
- Plant on a well drained site
- Conduct soil analysis-Keep Out BSB
- Be aware of weather conditions promoting disease
- Consider disease pressure in adjacent "mature" blocks
- Practice good horticultural practices

Acknowledgements/Questions?





