What caused that apple leaf spot?



Leaf spot symptoms

- Leaf spot?
- Caused by ???
- Approach to diagnosis
- Goal: avoid those that cost money



Leaf spot symptoms

- Numerous possible causes
- Pathogenic
- Spray injury
- Physiological
- Other insect, fertilizer
- Any or all of the above



Source: APS,

Pathogenic causes of leaf spot symptoms

- Frogeye- Botryosphaeria obtusa (also black rot);
 more common following cicada outbreak in '04
- Alternaria leaf spot
- Glomerella leaf spot



Some causes of leaf spot symptoms

Spray injury

- Captan or sulfur in association with any type of oil; oil dissipated by warm temps; fungicide residue by rainfall
- Copper purple spots; worse on older leaves with more apps.
- On tree from previous app.- allow time between apps.
- In tank residue from previous load
- Dilute app.; settling out in bottom of pump-up sprayer
- Too many materials in one tank?

Some causes of leaf spot symptoms

Diagnosing spray injury

- More injury where concentration is highest
 - closest to nozzles
 - end of row; sprayer running as turn was made
 - added residue as drift from adjacent row
- Youngest leaves; older leaves?
- Consider possibilities, based on schedule
- Compare different blocks / alternate middle schedules
- Not necessarily the newest material added to the tank; interaction of several products (14 in one tank?!?)



Phytotoxicity due to sulfur left from previous tank on a different crop, followed by oil / thinner in later app.

Azoxystrobin injury on Gala (L) and Mac (R)





Abound (Quadris) etc. can cause injury on Gala that could be confused with Glomerella. Can occur with drift or small amount of residue (4 ppm) left in tank.

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Chlorosis-Ziram

- Blotchy yellowing
- Caused by ziram application in hot weather (90's)



Source: KSY

Some causes of leaf spot symptoms

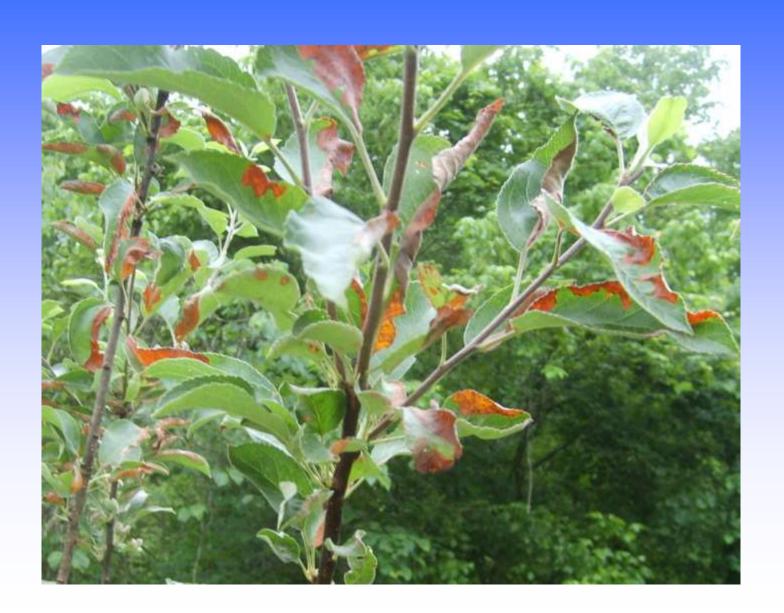
Other:

Insect related- leafminers stopped early by insecticide app.

Physiological

Golden Delicious leaf blotch

Leafminer injury



Pathogenic causes of leaf spot symptoms

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Frogeye leaf spot





- Foliar stage of black rot
- Can infect petals at the pink stage (as early as scab)
- Looks like Captan/oil injury

Source: KSY

Frogeye leaf spot

- Mostly circular spots
- Often close to a dead twig or fruit mummy inoculum source nearby
- More common on weak trees (like vole damage).





Fig. 22. Frogeye leafspot, caused by the black rot fungus, on 'Delicious' leaves. (Courtesy T. B. Sutton)

"Thinning mummy" - a source of rot inoculum for Black rot, white rot and bitter rot



Provides inoculum first and second years

Small black dots fruiting structures of rot fungus



Frogeye leaf spot





 Could be some distance from large inoculum source -brush pile

Alternaria leaf blotch

- Can cause severe defoliation of Red Delicious
- Aggravated by mites
- Improved control by strobilurins- start in late May
- Potential for resistance?
 No more than 4 apps./yr
- Break up schedule with other fungicides (Captan + ProPhyt)
- PHI's: Sovran 30 days;
 Luna S/Flint- 14 days
 Merivon/Pristine- 0 days





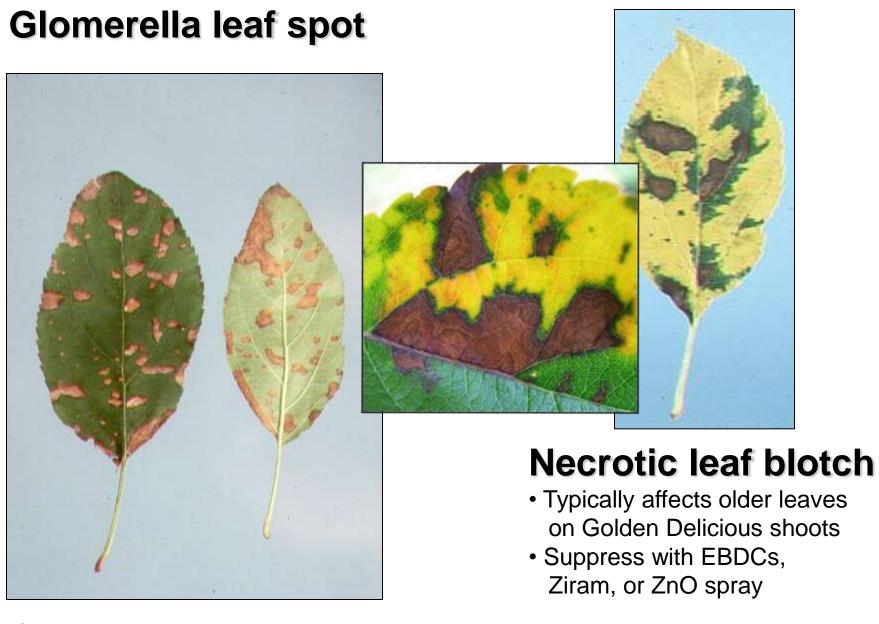
Cedar-apple rust



Control with EBDC / Ziram or SI fungicides

Glomerella leaf spot





Can occur on the same leaf on Golden Delicious

Glomerella leaf spot





Glomerella fruit spot symptoms



GLS biology, symptoms and spread

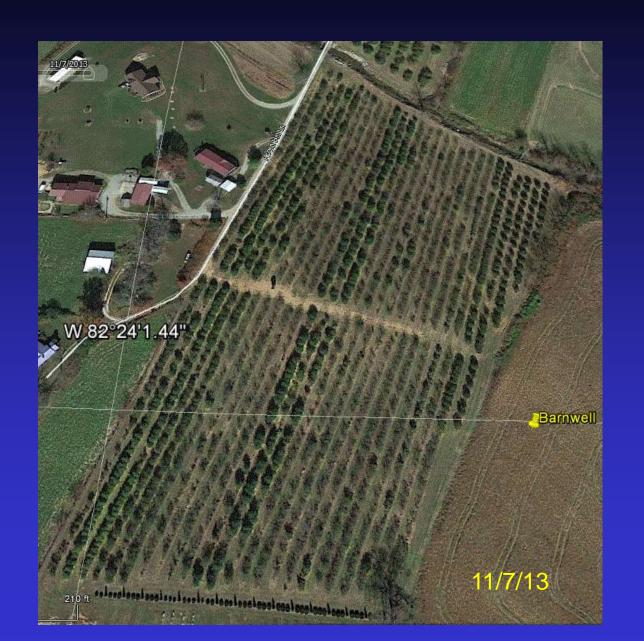
- Glomerella leaf spot (GLS) produces ascospores that blow around. More distant spread than rain-splashed conidia from typical bitter rot on fruit.
- Most susceptible: Gala, Pink Lady, Golden Delicious, Fuji, and Granny Smith. Also on Goldrush and Pristine.
- Serious defoliation affects fruit quality
- GLS strain can also cause fruit spots 1-2 mm in diameter, as well as typical bitter rot symptoms.
- Control: Think of Glomerella like a really bad case of bitter rot that also affects leaves!





M. Saunders

NC Glomerella test site



Glomerella leaf spot- examples from Nelson County, VA





Pink Lady



Summary

- There are numerous possible causes of leaf-spotting.
- Orchard assessment of cultivars affected and proximity to sprayer outflow and inoculum sources can offer clues to diagnosis.
- Some small amounts of leaf-spotting may not matter
- More severe cases could lead to serious rot problems, or if spray injury, could indicate potential russet problems.
- When possible, diagnosis could help avoid potentially more serious problems later.
- Laboratory isolation can also assist with diagnosis but field factors and spray schedules are important information.

Questions/comments?

