

Structural Roots and HLB: Implications for young tree management



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HLB and Structural Roots

- Review of HLB effects on fibrous roots
- How does HLB affect structural roots?
- Considerations for new plantings

Fibrous root symptoms of Huanglongbing

- 30-50% root loss before symptoms develop
- >70% root loss as visible canopy decline begins

Ridge root system



30-50% root loss

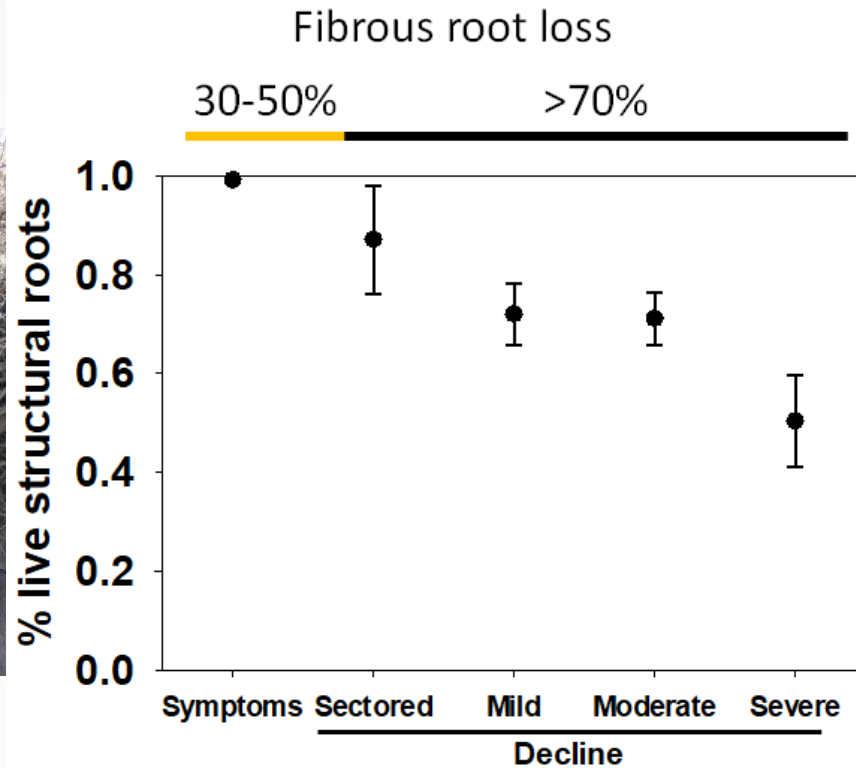
>70% root loss

HLB and Structural roots

HLB Structural root loss



30-50% root loss



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Structural roots stay intact long after death

*Visible line of dieback in root bark

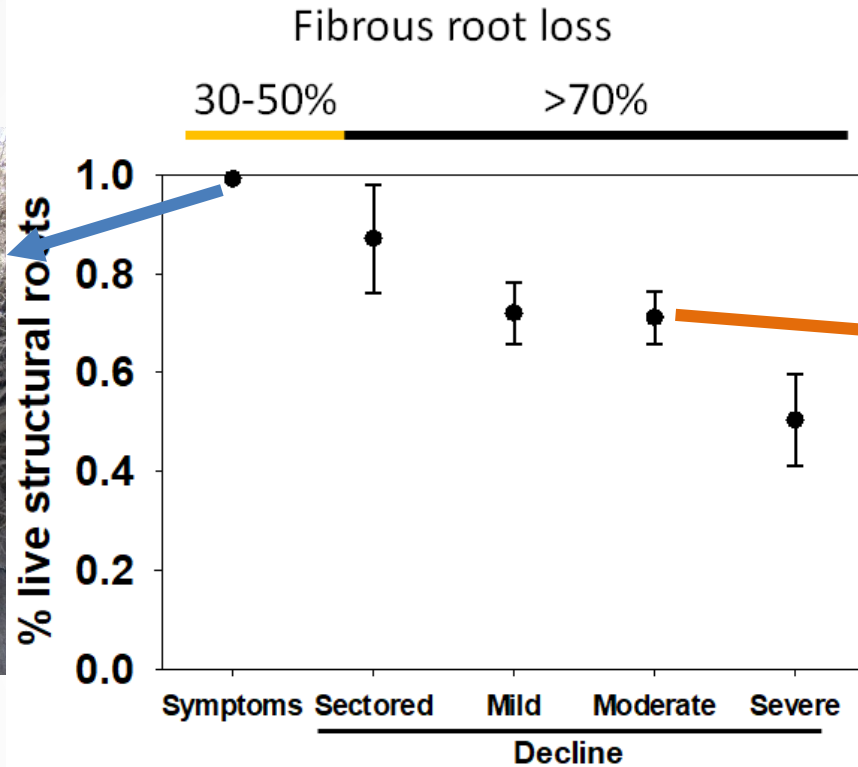


- Root dieback only measured from edge of wetted zone
- Begins from tips and moves toward trunk

HLB Structural root loss



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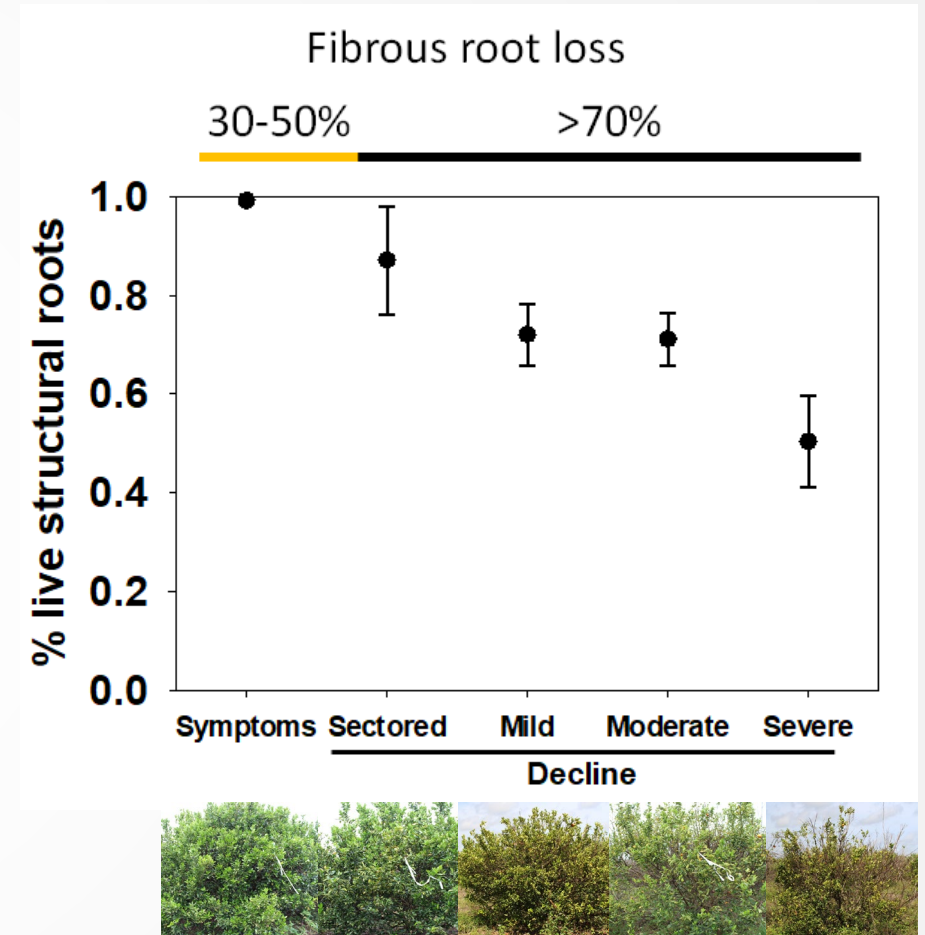
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What does structural root loss mean for new plantings

- Structural root system is the largest it will ever be when trees become infected
 - Timing in young trees not fully investigated
 - Structural root dieback will counteract any new growth
 - Could be cause of HLB dwarfing
- Trees need a robust established structural root system before infection
- Need optimal root health and growth from day of planting to establish structural roots



New Plantings and Root Health

Rootstocks: Can they help?

- All rootstocks tested can be infected with Las in the roots (>17 rootstocks)
- Most have root loss similar to Swingle
 - Cleo, Sour orange, Carrizo, Volkamer lemon, 12 more
 - US series appears similar, only thoroughly tested in greenhouse
- One tested rootstock increases root mass during early phase HLB
 - Cause still unknown, genetics needs to be put into multiple good rootstocks

Rootstocks for new plantings?

- HLB data is still preliminary
 - Long term performance is unknown
 - Soil pest/pathogen resistance tolerance is not clear
 - General productivity seems most important– fruit production, fruit quality
- Select the rootstock based on the grove site
 - Pest/pathogen pressure, soil type, pH, salinity, irrigation water quality
 - Rootstock guide:
- http://www.crec.ifas.ufl.edu/extension/citrus_rootstock/templates/guide/
- **Test soil** at the grove site **before** selecting rootstock
- A great rootstock in the wrong soil is a horrible rootstock!

What to look for in a nursery tree

- Order from a reputable nursery
- Check for signs of root health problems
 - Root sloughing
 - Patchy watersoaked soil
 - Can be caused by overwatering, fertilizer burn, or Phytophthora
- Check for signs of rootbound trees
 - If rootbound, some remediation can be done at planting



Rootbound trees develop circular structural roots



Rootbound -> Self girdling structural root ball



Planting and rootbound trees

- Some growers desire larger trees at planting
 - Only helps if the root system is allowed to get larger
 - Waiting for too large a tree may cause root health problems in a few years
- Need to break up root balls at planting
 - 1 inch deep vertical cuts through root ball
 - Helps establishment and water penetration even in non-rootbound trees
 - Water does not like to move between sand and organic potting medium
- Don't jam trees into planting hole
 - Can lead to J-rooting if lower structural roots are bent upward
- May need to trim off spiraling roots at bottom of root ball.

Root health before HLB

- New plantings need strong root establishment prior to HLB
- Optimize soil conditions for roots
 - Water management – bedding, drainage, etc.
 - Choose the rootstock to match the site
 - Optimal fertilization
- Aggressively sample and treat Phytophthora and other root pests
 - Phytophthora in soil or brought in on planting material will reduce root growth and establishment leading to stunted trees
 - Chemical management of HLB trees is less effective

Root health and HLB

- Consider the whole tree when managing HLB
 - Canopy and roots interact throughout year
- Target root function and longevity in management of HLB trees
 - Adjust for limited uptake capacity – timing and duration
 - Reduce other stresses on the root system
- Management needs to be site specific
 - Soil, drainage, rootstock
 - Pest and pathogen management uncertain - Efficacy? Economic return?
- New plantings need strong root establishment prior to HLB

Questions?



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