

Searching for evidence of thousand cankers disease in national forest inventory data collected in Tennessee

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FHM Evaluation Monitoring Project SO-EM-B-11-01

Background

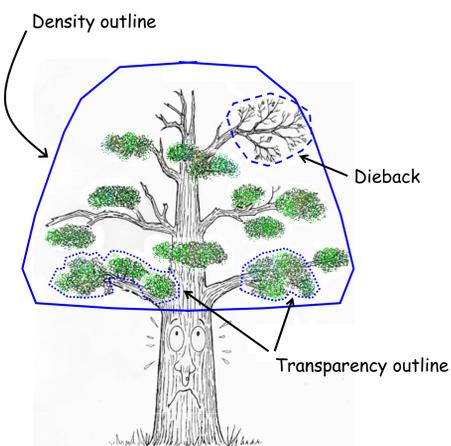
- The walnut twig beetle (WTB) (*Pityophthorus juglandis*) has been identified in six Tennessee counties.^[1]
- Thousand cankers disease (TCD) results when *Geosmithia morbida* spores on the wings of the WTB are introduced into black walnut trees.^[2] Multiple cankers around the point of infection lead to branch dieback.^[3]
- Symptoms of TCD may take many years to develop. Trees typically die within 2 to 4 years after symptoms are visible.^[3]
- TCD may have been present in Tennessee 10 to 20 years prior to its discovery in 2010.^[4] If so, evidence of its presence might exist in the data collected by the U.S. Forest Service Forest Inventory and Analysis (FIA) Program.

Objectives

- Analyze past black walnut crown conditions assessed in Tennessee to determine if symptoms of TCD were present.
- Locate areas that have black walnut trees with poor crown conditions that might suggest the presence of TCD.
- Evaluate the effectiveness of the U.S. Forest Service Forest Inventory and Analysis (FIA) Program plot network for detecting localized forest health problems.

Data and Methods

- Collected in Tennessee by the Southern FIA Program, 2005 to 2009.
- FIA level of data collection
 - Phase 2 (P2) – Basic forest inventory plot
 - P2 Urban – P2 plot in a designated urban area
 - Phase 3 (P3) – P2 plot designated for forest health monitoring
- Trees with diameter at breast height ≥ 5.0 inches
 - Tree status (live or dead)
 - Cause of death
 - Crown density, crown dieback, and foliage transparency



Crown density—percentage of light blocked by all crown biomass through the projected crown outline.

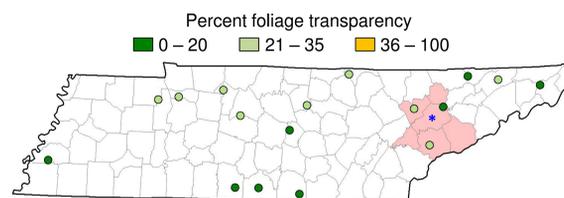
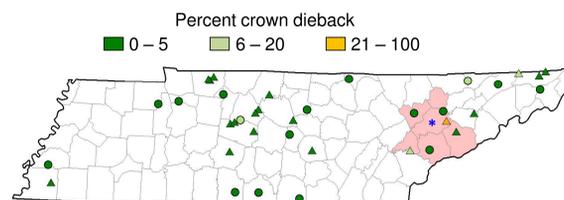
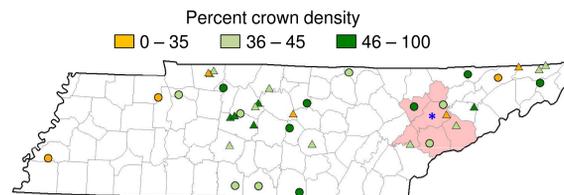
Crown dieback—recent mortality of branches with fine twigs.

Foliage transparency—percentage of light visible through the live, foliated portion of the crown.

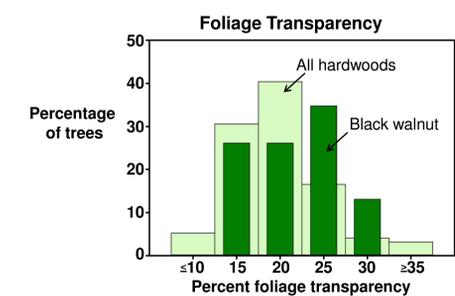
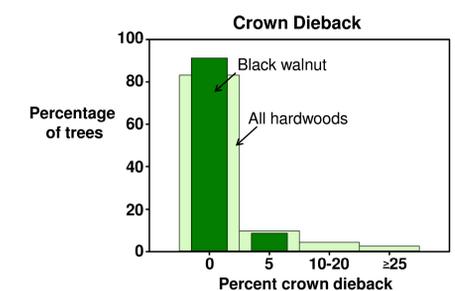
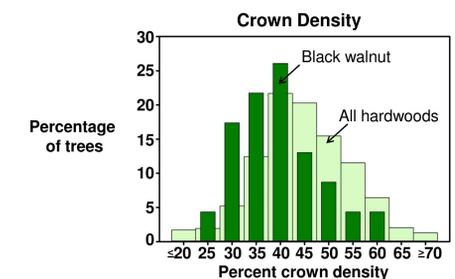
Results

Most plot averages were in the range of normal and healthy with no obvious clustering of poor crown conditions.

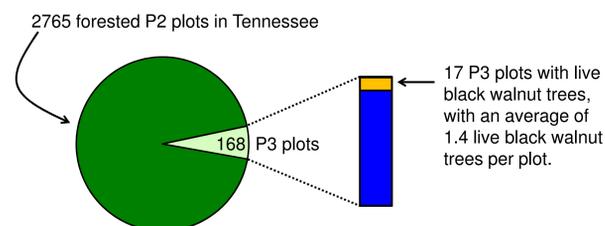
○ P3 plot △ P2 urban plot □ County boundary ■ TCD quarantine area
* Knox County, initial discovery of TCD



Black walnut crown conditions were generally within the normal range for hardwood trees.

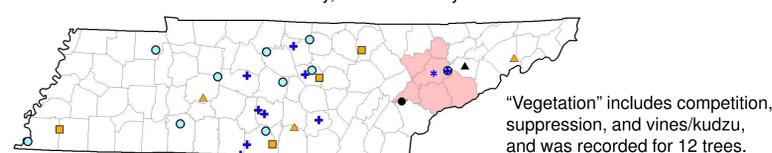


Black walnut's infrequent occurrence across the landscape along with the P3 sampling intensity limit the number of crown condition observations.



Recent black walnut mortality was concentrated in Middle Tennessee. Vegetation was the most frequently recorded cause of death, 2005 to 2009.

○ vegetation ■ disease □ weather ▲ insect ● unknown
▲ silviculture/land clearing □ County boundary ■ TCD quarantine area
* Knox County, initial discovery of TCD



Conclusions

- Across the state, black walnut crown conditions are within the range of what is typically considered normal and healthy for hardwood trees.
- Given the distribution of recent mortality, Middle Tennessee may be an area for special WTB and TCD surveys.
- The absence of TCD symptoms in the FIA crown condition data could be due to their actual absence or to an insufficient monitoring system for detecting their presence.

Literature cited

- ^[1] TN.gov Newsroom (2011). <http://news.nt.gov/node/7691>
- ^[2] L.P. Newton and others (2009). http://mda.mo.gov/plants/pdf/tc_pathwayanalysis.pdf
- ^[3] M.A. Hansen and others (2011). http://www.ppps.vt.edu/~clinic/alerts/07-22-11_TCD_alert.pdf
- ^[4] G. Haun and others (2010). http://www.tn.gov/agriculture/publications/regulatory/TN_TCD_ActionPlan.pdf

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