Notes from the
Thousand Cankers of Black Walnut National Conference
November 3-4, 2009 - St. Louis, Missouri
Doubletree Hotel—St. Louis at Westport

This is based on notes taken by Julia Thompson and David Johnson (both of the Missouri Department of Agriculture) and typed by J. Thompson ***(CAUTION: This is not a transcript, but notes. Remarks are often paraphrased and may have been accidentally omitted or misunderstood by the note-takers. It has not been compared with the event recording to check for accuracy.)***

Wednesday, November 4, 2009

Key to some abbreviations used:

WTB = walnut twig beetle = *Pityophthorus juglandis*
TCD = thousand cankers disease
Gm = *Geosmithia 'morbida'* ('*morbida*' is proposed species name of this newly discovered species)
BW = black walnut = *Juglans nigra*

Jason Oliver (Tennessee State University) and Chris Ranger (USDA-ARS) - Advances In Understanding Ambrosia Beetle Chemical Ecology and Utilizing the Findings to Improve Insecticide Management Studies.

Jason Oliver's part was first

- General biology of ambrosia beetles
  - Bark beetles and engravers
  - Many attracted to volatiles like ethanol (stress chemical) and dark silhouettes (trunk imitators)
  - 24 species found at nursery research center in 1998-1999 alone
    - Tiniest beetles may escape trap because of drainage screen
    - Many foreign introductions
      - Granulated ambrosia beetle introduced in 1994 from Asia
        - 5-10 attacks can kill a small tree
      - Black stem borer introduced in 1932
      - Lesser shot hole borer (also a problem on walnut)
      - Thysanoes fimbricornis
    - Biology similar for these pests
      - Wide host range
      - Prefer hardwoods
      - Most introduced
      - Overwinter as adults in hosts
      - Females mate in galleries; fly to new host
      - Make branching galleries in sapwood
      - Feed on symbiotic fungus that they introduce to galleries from mycangia
      - Attack (Feb) March through May; some attack before bud break
      - Natural enemies around
      - Stressed plants and plants near water more badly attacked
    - Beetles can reproduce in dead wood if moisture content of wood is sufficient for symbiotic fungus to grow
  - Monitor

        - Overwinter as adults so more difficult to predict time of emergence
        - Peak flight can be very different year to year but will be similar site to site
            - Traps will collect many scolydid beetles
            - Granulated ambrosia beetle usually more orange-reddish, dull patch on abdomen tip, widely spaced procoxae
            - *X. germanus* usually flies at same time as ambrosia beetle
        - Flights occur in flushes (4 -7 events over 55 days)
        - More galleries on SW side of tree
        - Galleries may intermingle and mixed species emerge from same gallery
        - Soda bottle trap works very well for granulated ambrosia beetles and black stem borer
            - Best lure pill bottle with wick for ethanol
            - Best height 2 – 5 ft especially on low end
        - If Ethanol is injected in plant beetles attack quickly
        - Tree bolt as a lure catches more beetles than ethanol attractant
    - Chemical control
        - (We did not get accurate notes on the pesticides. Please consult power point slides for this information.)
    - Tree stress tests tested: too deeply planted, drowning, delayed dormancy, defoliation, drought
        - No significant difference between treatments but controls turned out to have more hits than the treatments in this experiment.

    - Management
        - Use traps early to detect
        - Use pesticides throughout flight periods
        - Discontinue fertilizers midsummer
    - Need more work to understand more fully

Chris Ranger spoke second

- Works with *Xylosandrus crassiusculus* and *X. germanus*
    - Both exotics have been here a while
    - What is causing them to be pests now when they were less important in earlier years
        - Climate? Insecticides? Symbiotic fungus associated with beetle?
- Infestation may not be easily observable
    - Small entrance hole
    - Later frass “toothpicks” and may have sap leakage near tunnel entrance
    - Most attacks on main trunk rather low to the ground
- X. germanus—90% of attacks on trunks of dogwood
- Mycangia—organ in beetle that carries inoculum of symbiotic fungus
    - Beetles feed on fungus not their host
    - Ambrosiella assoc. with *X germanus*
    - Pathogenicity of fungus
        - Often see terminal dieback in affected trees in nurseries
        - Mechanical damage does not cause dieback
        - Ambrosiella not highly pathogenic—collecting isolates to see if geographic populations differ in pathogenicity
        - Issue seems to be Fusarium sp.
- Hosts
    - Huge list—primarily dying and stressed trees
    - May attack “apparently healthy” trees
    - “inaparently stressed” may possibly be more accurate
    - May be short stress that triggers attack

    - Weber and McPherson (1984) black walnut attacked by *X. germanus* were growing more slowly the year before the attack than other trees
    - Flood stressed dogwoods in nursery more attractive, but only 2 trees in experiment were attacked
    - Ott (2007) found *Quercus alba* were significantly more attractive if flood stressed
    - Ohio observations—winter damage or flooding preceded attacks
- Improving the lure
    - Stressed trees emit ethanol—draws these insects
    - Ethanol also a byproduct of microbial growth
    - Ethanol plus alpha pinene—not promising
    - High ethanol better than low release ethanol
    - Attempts to identify volatiles from infested tree
    - Attacks by *X. alni* subsequently made trees more attractive to *X. germanus*
    - Appears at this time that host derived volatiles are most important
- Repellants and trap trees another experiment to go
    - Maybe use injected ethanol to make trap trees
    - Hanging ethanol on trees –some but not many attacks
    - Irrigate with ethanol
    - Botanical formulations—repellants
    - Veggie Pharm. and Armorex look promising

- Management
    - Maintain tree vigor
    - Avoid stress
    - Sanitation

Question: Is injected ethanol damaging to the tree itself? Answer: Yes, but is done to make sure the trap tree is attractive

Question: relationship between injection site and proximity of beetle attacks? Answer: Attacks distributed throughout the tree

Question: Where the control trees were attacked worse than the experimental trees could this be because of the injection? Answer: In that experiment the controls were not injected. …..trees injected with water were not attacked more frequently, drilling and plugging did not induce attacks either

Question: do all three of the major *Xylosandrus* species produce toothpicks when they attack? Answer: certainly you see this with both *germanus* and *crassiusculus*.

Question: with germanus Weber showed that walnuts dieback to the collar and then resprout. Do we see that with the other two major types of ambrosia beetles? Answer: so few attacks in the experiment by_____ that can't really say. Attacks by germanus and crassiusculus both will kill trees entirely. Secondary pathogens of most concern.

Question: Adults overwintering in woodlot. Also in nursery? Yes if sanitation not occurring and you let infested trees remain in the nursery.

Question: Systemic insecticides? Answer: insect can survive boring into systemic treated tree because they are not feeding on the tree, but on the fungus and may not get enough chemical.