

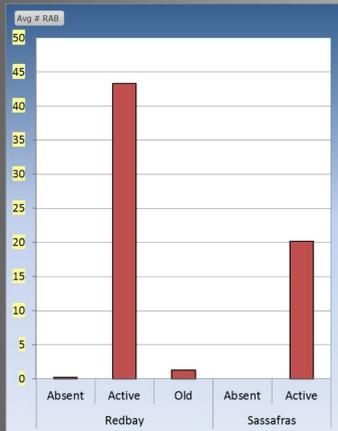
Laurel wilt in redbay: A) Total mortality and collapse in a dense stand of large redbay, B) regeneration after breakup, C) sprouts around stump, D) stump sprouts killed by laurel wilt after first wave.



Leaf symptoms: Healthy to faded chocolate brown



Redbay ambrosia beetle (RAB), Xyleborus glabratus



Mean # RAB trapped by disease stage & host, Aug 2009 & 2010



Spread of Laurel Wilt Across Georgia 2009-2010

Scott Cameron, Chip Bates, and James Johnson



Background

Laurel wilt disease (LWD), caused by the fungus *Raffaelea lauricola* and vectored by the redbay ambrosia beetle (RAB), *Xyleborus glabratus*, has spread rapidly throughout the coastal maritime forests in Georgia, killing nearly all large redbay (*Persea borbonia*) trees in its path. As this disease spreads inland, it is moving into more diverse habitats, often with scattered and smaller redbay and sassafras. Past surveys and research have revealed much about LWD, but a lot remains to be learned about the disease process in redbay and especially sassafras, extent of spread, and impacts on host plants.

Objectives

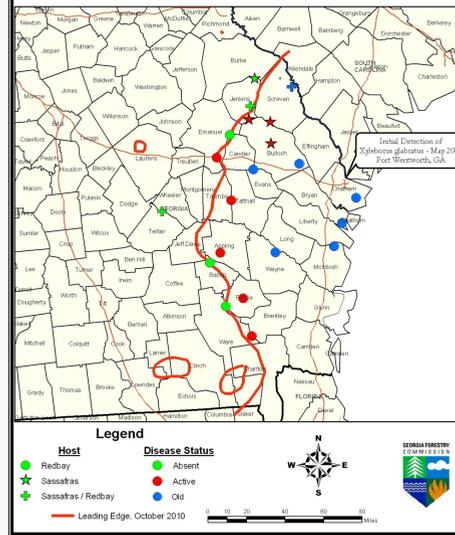
The goals of the 2009-2010 GA laurel wilt disease evaluation project were to:

- Document the advancing front of LWD in GA,
- Establish a methodology to document the disease process and long term effects on hosts and other vegetation,
- Document the rate of local spread in redbay and sassafras on diverse sites,
- Learn the fate of redbay after the initial epidemic, and
- Monitor abundance of RAB in varying disease stages.

Methods

- The LWD advancing front and host species affected were documented through forester observations, landowner contacts, and directed road surveys.
- Standardized permanent plots were installed in redbay and sassafras habitats to document the disease process, vegetation changes, and host regeneration status.
- Seventeen redbay plots with four 10 m x 10 m modules and seven smaller sassafras plots were established in the spring of 2009 and revisited three times through fall 2010.
- Redbay plots were established in three disease status categories: LWD "absent," "active," and "old" at initiation. Sassafras modules were established on absent and active sites.
- Lindgren funnel traps baited with Manuka oil were deployed during August 2009 & 2010 to monitor relative abundance of RAB adjacent to redbay and sassafras plots with varying stages of disease.

Georgia Laurel Wilt Monitoring Plots and Disease Front October 2010



Plot ID#	Etab.			Traps			Initial Stage	Rb	Sas	Ps	Pb	Ca	County	
	Win/Spr 2009	Summer 2009	Spring 2010	Summer Fall 2010	Aug 2009	Aug 2010								
111	1/30/09	8/11/09	2/6/10	9/21/10	X	X	1	1					Emmanuel	
112	2/10/09	8/11/09	4/14/10	9/21/10	X	X	1	1	1				Jenkins	
113	2/12/09	8/9/09	3/14/10	9/19/10	X	X	1	1	1				Bacon	
114	4/6/09	8/12/09	2/6/10	9/21/10	X	X	1	1	1				Emmanuel	
115	6/23/09	8/8/10	2/4/10	9/18/10	X	X	1	1	1				Ware	
121	2/2/09	8/11/09	4/14/10	9/23/10	X	X	1	2	1				Screven	
122	2/4/09	8/13/09	3/16/10	9/19/10	X	X	1	2	1				Bulloch	
123	2/4/09	8/9/09	3/16/10	9/21/10	X	X	1	2	1				Tattnall	
124	2/12/09	8/12/09	3/14/10	9/19/10	X	X	1	2	1				Appling	
125	5/24/09	8/8/09	2/4/10	9/18/10	NA	X	1	2	1				Brantley	
126	3/25/09	8/8/09	2/4/10	9/18/10	X	X	1	2	1				Pierce	
131	2/7/09	8/14/09	2/3/10	9/16/10	X	X	1	3	1				Wayne	
132	2/8/09	8/9/09	2/3/10	9/16/10	X	X	1	3	1				Chatham	
133	2/22/09	8/14/09	2/3/10	9/16/10	X	X	1	3	1				McIntosh	
134	2/13/09	8/9/09	2/6/10	9/16/10	X	X	1	3	1				Bulloch	
136	2/10/09	8/8/09	3/14/10	9/18/10	X	X	1	3	1				Wayne	
211a	5/14/09	8/11/09	4/14/10	9/21/10	NA	NA	2	1	1	1			Jenkins	
211b	5/14/09	8/11/09	4/14/10	9/21/10	NA	NA	2	1	1	1			Jenkins	
212a	5/1/09	8/10/09	4/15/10	9/23/10	X	X	2	1	1	1			Jenkins	
212b	5/1/09	8/10/09	4/15/10	9/23/10	NA	NA	2	1	1	1			Jenkins	
213	5/14/09	8/11/09	4/19/10	9/23/10	X	X	2	1	1	1			Jenkins	
221	8/13/09	8/10/09	4/13/10	9/23/10	X	X	2	2	1				Bulloch	
222	8/13/09	8/10/09	4/17/10	9/23/10	NA	NA	2	2					Screven	
223	5/13/09	8/11/09	4/14/10	9/23/10	NA	NA	2	2	1	1			Screven	
224	5/2/09	8/6/09	9/24/10		X	X	2	3	1				Bulloch	
311a	5/27/09	8/12/09	5/10/10	NA	NA	NA	3	1	1	1	1		Wheeler	
311b	5/27/09	8/12/09	5/10/10	NA	NA	NA	3	1	1	1	1		Wheeler	
117	NA	NA	NA	NA	X	X	1	3					Evans	
116	NA	NA	NA	NA	X	X	1	1					Emmanuel	
117	NA	NA	NA	NA	X	X	1	1					Wheeler	
TOTALS					22	23			20	10	1	1	1	

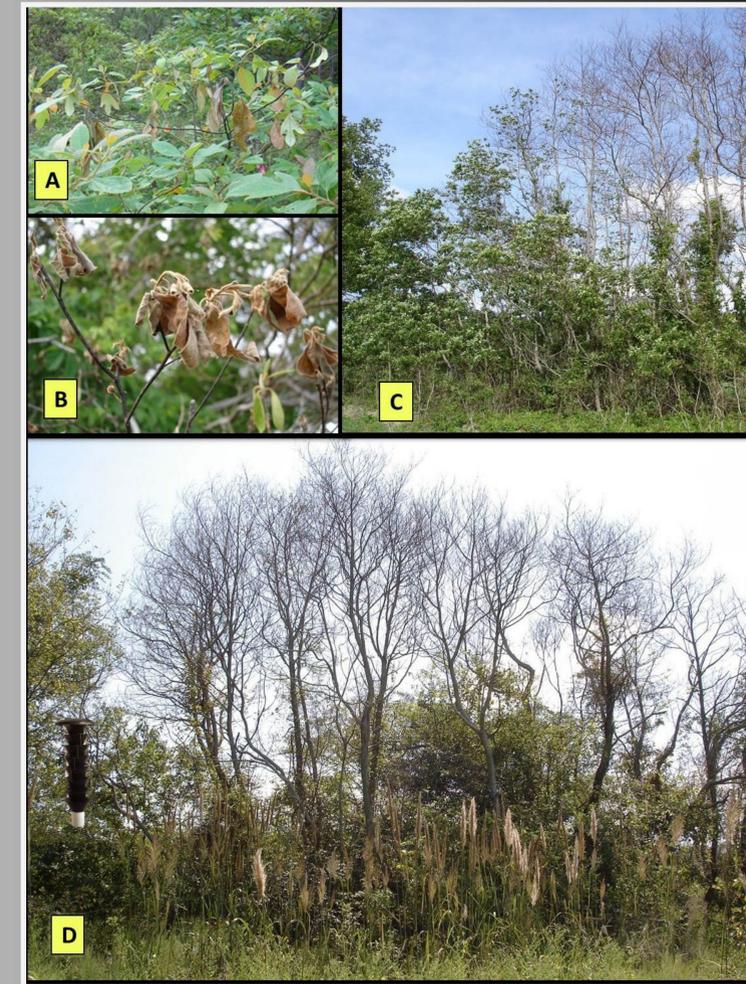
* Absent=no known LW near, Adjacent=disease near, but not in plot, 1st sympt=first LW symptomatic trees observed in plot, Active=multiple trees with LW symptoms, ambrosia beetles active, Old=disease moved through area, RAB emerged, host trees fallen apart, Multi-spp.=more than 1 host species in plot, Sass adj.=added module to include more sass - color indicates original plot association.

Results

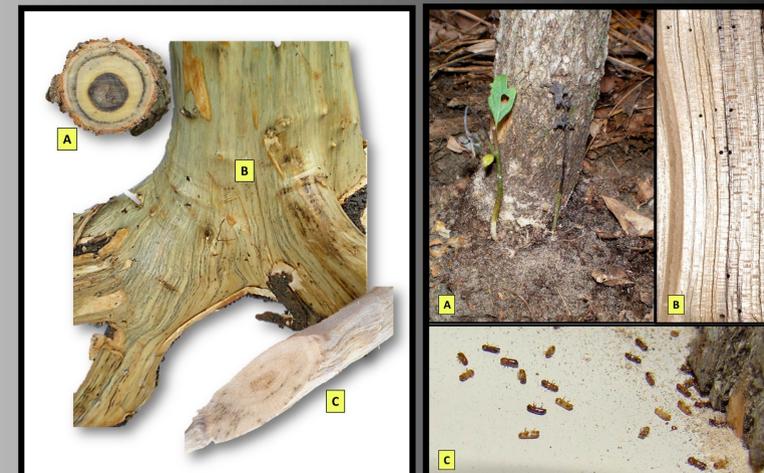
- LWD moved more slowly westward in 2009-10, but killed large numbers of redbay trees behind the front.
- Numerous thickets and scattered sassafras have been killed by LWD, in areas with and without redbay.
- LWD was discovered in three isolated areas, each about 40 miles ahead of the disease front.
- Vegetation change is greatest on sites with dense, mature redbay in the canopy.
- When redbay trees fell apart, opening the canopy, abundant regeneration often resulted.
- LWD tends to start in largest sassafras trees and moves rapidly in dense thickets, apparently through lateral roots.
- Epicormic shoots are common in LWD killed sassafras.
- Ambrosia beetle frass is most abundant at base of sassafras trees killed by LWD.
- Few RAB were caught in absence of active LWD; greatest numbers were caught on sites with dead trees prior to breakup, but a few linger in the area for years later.
- In 2010, the largest number of RAB was caught beside a thicket of large sassafras in the absence of redbay.

Conclusions

- LWD has slowed in areas of sparse host and is transitioning into sassafras along the northern front.
- The disease process is rapid on sites with large, dense host and much slower on sites with small, sparse host.
- Additional heavy redbay mortality is likely in south GA.
- RAB can infect and produce brood in sassafras.
- LWD and RAB are present at low levels in redbay regeneration many years after the initial epidemic.
- LWD is initiated in scattered trees in new areas and explodes after about 2 years, if redbay is abundant.
- Much information is yet to be derived from continued plot assessments and in-depth evaluation of data sets.
- Long distance spread of LWD continues to occur, emphasizing a need for more effective education aimed at limiting the movement of host material harboring RAB.



Laurel wilt in sassafras: A) Initial leaf symptoms, B) short-lived dead leaves, C) rapid spread through thicket, D) one year following rapid mortality and RAB trap position.



Black staining in sassafras: A) Stem, B) root flare C) lateral root.

RAB in sassafras: A) Frass at base, B) galleries, C) emergence.