

Stress, Pests & Injury In Redbay (*Persea borbonia*)

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Redbay (*Persea borbonia*) is a medium sized tree of the deep coastal plain woodlands. Redbay is a member of the Laurel family, one of the more primitive angiosperms families. It lives where water is plentiful but quickly drains away. The combination of wet but well-drained soils needed for best growth limits where redbay is found. Because redbay seed will germinate in more mucky, swampy, and poorly drained conditions, redbay can be found growing on stressful sites. Lack of water or lack of drainage conspire to generate tree stress which limits growth, constrains defenses, and results in a number of pests being more effective. This publication highlights major pests of redbay, both traditional and dangerous new arrivals.

Redbay has been traditionally thought of as having few native pests of any consequence. Redbay has several pests which cause few problems except on single trees and branches. Redbay pests include an psyllid which produces ugly disfiguring leaf galls, an exotic twig boring beetle which generates twig diebacks, several scale insects which damage twigs and branches, several fungal and algal leaf spots, a defoliating fruitworm, and topical sooty mold. New exotic pests are now severely damaging and killing redbays. Redbay and its close relatives could all be at risk to these invaders.

Simply Lousy

Redbay is the principal host for the magnolia psyllid or plant louse (*Trioza magnoliae*). All of the *Persea* species in the southern and southeastern United States are susceptible to some degree. This common pest produces large disfiguring galls along redbay leaves. The insect initiates galls which are about one inch long, light green in color with a whitish-blue colored thin surface coating. The galls are formed on redbay leaf margins causing them to roll and curl. The gall contains the growing young of the psyllid which emerges in May through a split in the gall. The adults look like a miniature cicada. Redbay tolerates this form of leaf damage well and the pest causes little damage except aesthetic problems due to the gall's appearance and associated leaf deformity.

Exotic Boring

Redbay is attacked by the black twig borer (*Xylosandrus compactus*). This borer is an exotic ambrosia beetle native to Central America. This beetle chews galleries into the wood of healthy redbays (and dogwoods) across the southern end of the redbay's range. Redbay loses growth, loses twigs, becomes disfigured and stressed. This pest has been considered only an aesthetic loss for redbay, but can lead to compounding problems resulting in significant tree damage and loss. Symptoms include wilted foliage, droopy shoots, dead twigs and damaged branches. The adult beetle is small and solid black. It chews into the wood to the pith on twigs, or into branch and stem wood about 3/4 inch. Inside this wood-surrounded gallery it lays eggs and deposits the ambrosia fungi (*Fusarium solani*). The ambrosia fungi consumes xylem and ray cell materials. The beetle larvae feed on fungal tissue and wood, expanding the gallery. Larvae growth, pupal rest, and mating all occur inside the gallery and then the beetles emerge beginning in April.



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Suckers

Redbay twigs are attacked by a number of scales and aphids. Two of the most common and damaging are: cottony maple leaf scale (*Pulvinaria acericola*) which has a white waxy secretion over its body and sucks on the main veins on redbay leaves leading to tree stress and twig death; and, tuliptree scale (*Toumeyella lirodendri*) a large, irregular oval-shaped, gray-green to black-mottled peach colored, phloem sucking insect attached along twigs and branches of redbay. Tuliptree scale is also a serious pest of magnolias, and is sometimes mistaken for magnolia scale which attacks only magnolias. Scales can cover redbay tissues so densely they can cause rapid decline. The mobile stage (crawlers) of scales do not have a protective covering and can be killed with pest control materials if carefully timed. Both of these scales can be found on a number of other plants in the areas where redbays grow. Scales suck the phloem liquids and expel excess materials, including sugars, as drops of honeydew. Honeydew can coat leaves and is a food source for ants and sooty molds.

Spots & Blotches

Redbay has fungal leaf spots and blotches caused by many fungi including *Phyllachora perseae*, *Dothidea lauri borboniae*, and *Cylindrocladium perseae*. These three organisms are usually not a serious problem. Many times lower leaves, twigs, and bark are covered with sooty mold or black mildews (*Meliola* sp.) which is a superficial, black fungal layer growing over redbay surfaces consuming honeydew.

Scurfing

Redbay can host a parasitic leaf surface algae sometimes called green scurf (*Cephaleuros virescens*). This algae appears as greenish brown spots on leaf, twig and branch surfaces. The spots look raised and reddish-brown when the algae is reproducing. The spaces between the redbay tissues immediately below the algae are invaded and die, leaving a brown or necrotic spot. On sites redbay normally grow (wet, hot, humid), this algae attacks many species of plants with evergreen, leathery-leaved species of trees the most susceptible. Algae spots in bark crevices can start lesions and shallow cankers which slowly girdle the stem or branch. The cork cambium may respond to the algae by forming tissues which appear disfigured and extended, with bark eventually looking stringy. Branches up to two inches in diameter have been girdled. This algae usually develops on leaf surfaces after warm summer rains.

Nibbler

Redbays growing with a mixture of oak trees can be attacked by the ermine moth (*Urodus pavola*). This sooty black moth is the adult of a fruitworm which eats leaf parts, and sometimes whole leaves. This pest species can occasionally have population explosions and defoliate large areas of redbay. The cocoon is a unique dangling net hanging from a leaf tip.

Chemical Defense

The locations redbay can be found growing have a lot of soil moisture, warm night temperatures, hot day temperatures, and high relative humidities. Given these site conditions, it is interesting redbay does not have more foliage and root pests. Redbay does contain a material called borbonol A (isobutylactone, a yellow oily liquid discovered in 1973), which is an antifungal compound found in redbay roots and other tissues. Borbonol A has been shown to provide strong resistance to *Phytophthora* root rot.

Abiotic Stress

Redbay requires wet conditions for seed germination and then wet, well-drained conditions for growth. Short term flooding which does not cover the foliage is usually survivable. Short-term drought

is not a problem in established trees. Redbay is moderately salt tolerant. Redbay is a poor compartmentalizer and bark breaches, storm injuries to major branches, and fire scarring of the trunk can lead to wood decay and associated structural problems. Redbay can be used in upland landscapes, but providing enough water and drainage are critical constraints. Redbay in protected areas and warmer urban microsites can be moved into hardiness zone 7 with the expectation of eventual damage from freezing and ice storms.

Fire

Redbay is intolerant of fire. Mature redbay stems can be severely damaged and scarred by fire. Redbay is a late successional species which thrives on sites with little or no disturbance, especially from fire, forest clearing, or soil compaction. Due to its crown form, evergreen leaves, foliage density, stand stocking, and the essential oils in leaves, fire can be devastating in redbay areas. On the other hand, fire does help stimulate seed germination and can help stimulate redbay browse for wildlife.

New KILLERS!

Redbay is under a growing attack from a sapwood stain / vascular wilt pathogen in the *Ophiostoma* genus (*Ceratocystis*). This genus is also home to tree killers Dutch elm disease and oak wilt organisms. This fungi is carried by a new (introduced in ~2002) exotic ambrosia beetle (*Xyleborus glabratus*) from south and southeastern Asia, now called the redbay ambrosia beetle. Other ambrosia beetles have been also associated with some dying redbays. Symptoms on redbay include signs of ambrosia beetle attack: small pin-sized holes in bark, frass sticks, or bark and tree base frass (sawdust). Pathogen symptoms on redbay are like classic wilts: wilted foliage, drooping new shoots, reddish or purple discolored leaves, discolored sapwood streaks, and fast demise (2-3 months) of the tree leaving brown foliage attached to twigs.

The redbay ambrosia beetle probably arrived from Asia in shipping materials before 2002, the year it was first trapped. The fertilized females then started to radiate out from the Port Wentworth, GA area distributed by wind and flight (about one mile distance covered each adult cycle). The redbay ambrosia beetle is a small (less than a 0.1 of an inch long), dark brownish-black colored, round shaped beetle similar to many other ambrosia beetles. The larvae are curled and white-colored with an amber head. Local spread beside insect flight or wind storms is from redbay firewooding, brush removal clearance, and log and limb transport.

Note other Laurel family species are susceptible to these pests in addition to redbay. Avocado (*Persea americana*) culture in southern Florida could be impacted. A small wetland shrub (pondberry -- *Lindera melissafolium*) on the United States federal threatened and endangered species list is at risk. The state of Georgia already lists *Litsea* as a threatened species. The state of Florida already lists *Licaria* and *Litsea* as endangered species. Sassafras (*Sassafras albidum*) has been killed in the field from these pests. Note Figure 1 -- Range map of redbay within which other native *Persea* species are found. Figure 2 ñ Range map showing potential expansion of these pests following Laurel family species distribution.

In addition, there is a significant genetic risk of these pests impacting other primitive angiosperms in the southern and eastern United States like magnolias (*Magnolia*), yellow-poplar (*Liriodendron*), pawpaw (*Asimina*), anise tree (*Illicium*), wild cinnamon (*Canella*), and sweet shrub (*Calycanthus*).

Conclusions

Redbay is a biological, ecological, and a cultural treasure of the deep woods. This treasure could be quickly lost to pests problems. Better awareness of stress problems and good pest management will be needed to sustain redbay.

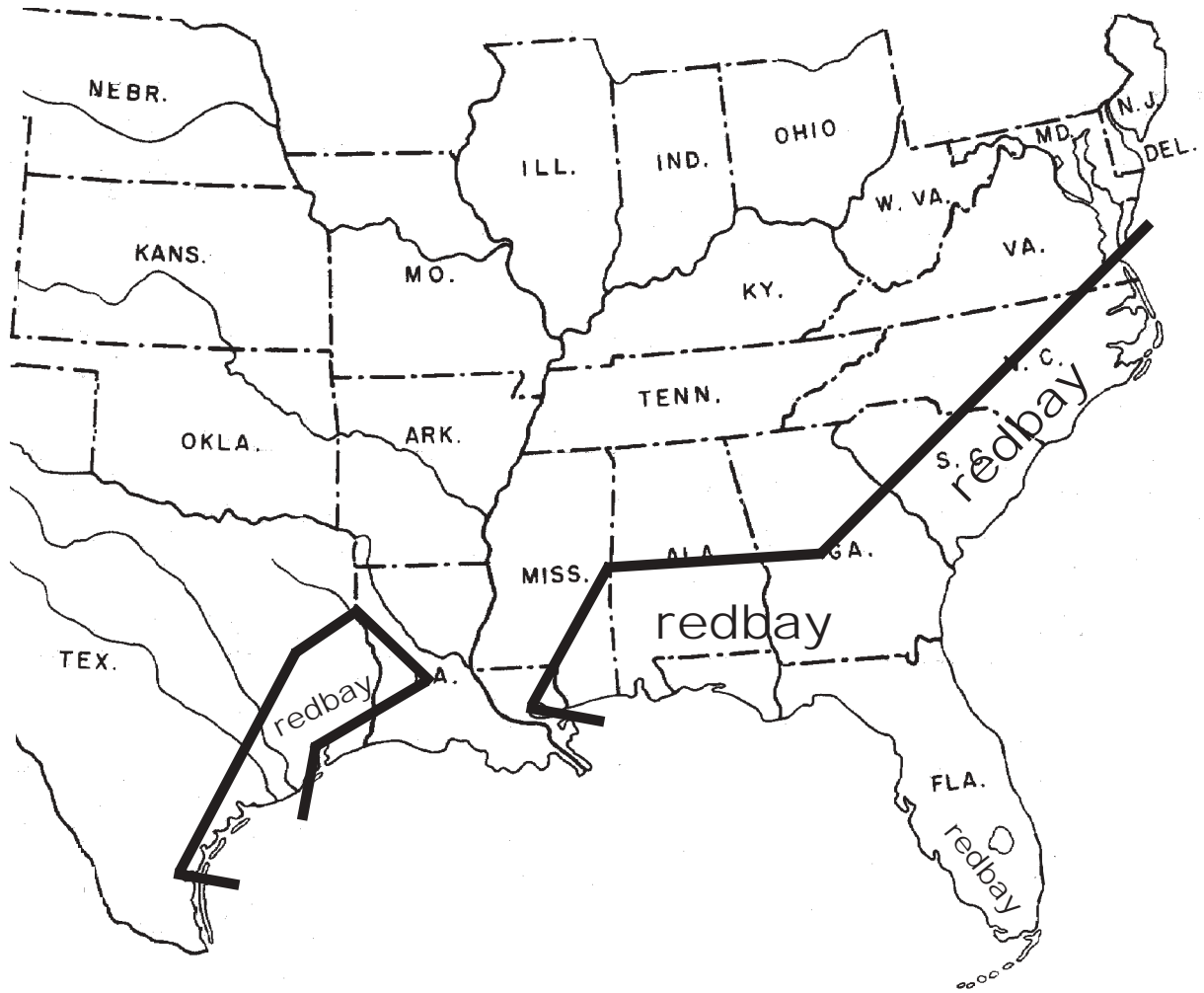


Figure 1: General geographic range map for redbay (*Persea borbonia*).

Small outlying populations are omitted. Area within, and south & east, of the lines is the redbay range, extending south to the Keys. Note that the ranges for the other native *Persea* species are found within redbay's range.

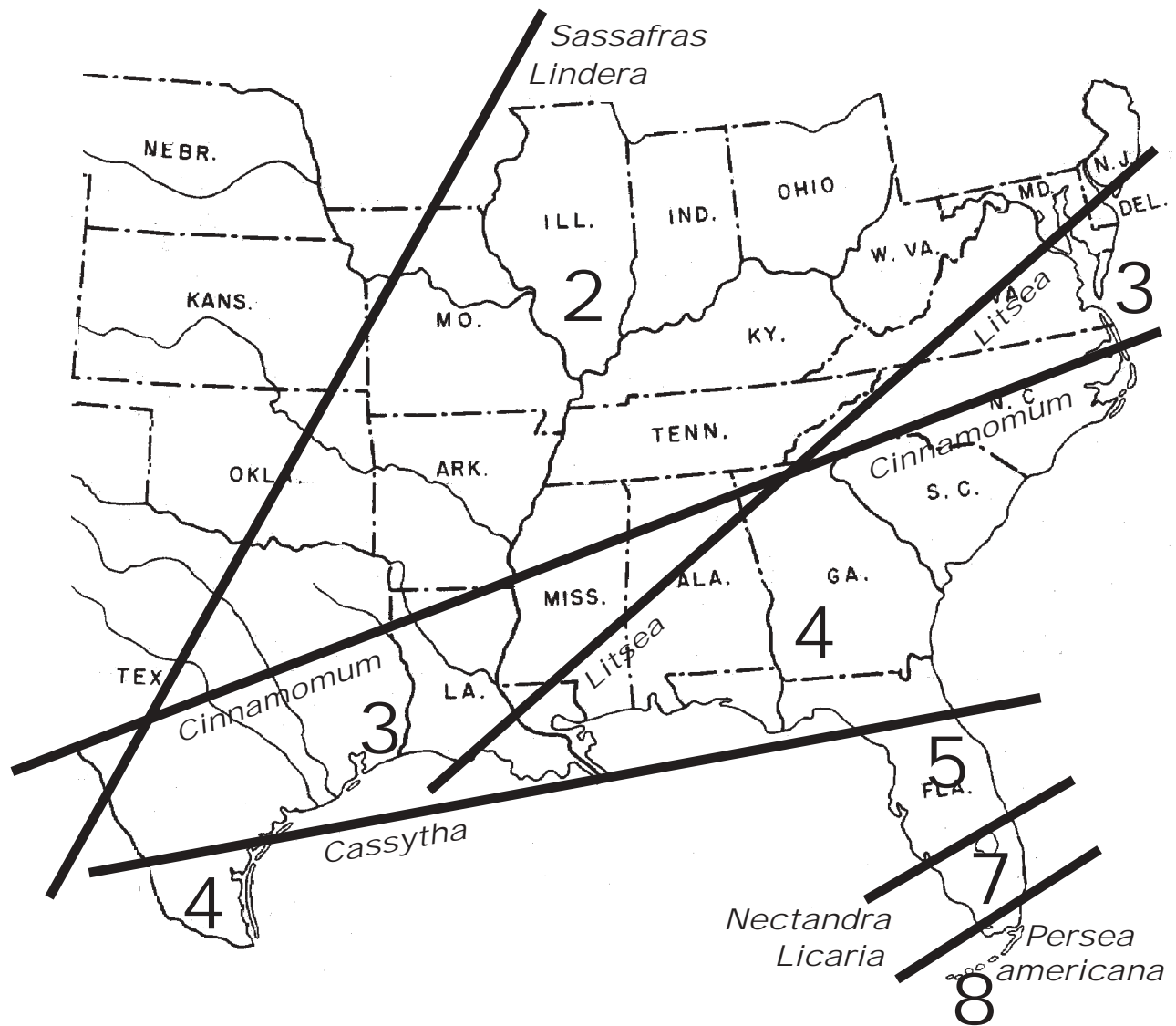


Figure 2: General geographic range map showing potential spread of *Ophiostoma / Xyleborus glabratus* following the Laurel family genera distributions. Ranges listed are always south and east of the lines. The digits represent the number of woody species in the native forest and wetland areas potentially serving as hosts for *Ophiostoma / Xyleborus glabratus*. Note the northern extent of the pests ranges will be limited by cold temperatures, but no northern delineation is currently available. Remember these values do not include the three native *Persea* species along the Coastal Plain of the Atlantic and Gulf of Mexico.