Pest Alert

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Forest Service
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Sugarberry dieback and mortality

Introduction

Sugarberry (*Celtis laevigata*) is a common native tree up to 80 ft tall that is found throughout much of the South, ranging from southeastern Virginia to South Florida and west to central Texas. High rates of sugarberry mortality were first reported in Columbia, South Carolina in 2009. The issue has since expanded westward beyond the Savannah River and eastward to the coasts of South Carolina and Georgia (**Fig. 1**). Although mortality is most conspicuous in urban and residential areas, large numbers of sugarberry are dying in forested areas as well. This is by far the most severe and widespread episode of *Celtis* mortality known from the United States and the cause remains unknown.

Symptoms

Affected trees show progressive crown deterioration. Crown thinning often begins at branch tips but ultimately spreads throughout the crown. Foliage of affected trees is typically chlorotic and stunted **(Fig. 2A)**. The phloem, as visible beneath the bark of both the main stem and roots, is often brown in symptomatic trees **(Fig. 2B)**. While some trees can survive for many years before dying **(Fig. 2C, D)**, others appear to become symptomatic and die within a single year. Based on long-term monitoring, mortality appears to be independent of water availability, affects trees of all sizes and can severely reduce the number of trees over a short period of time. Trees that have died from the disorder fail to sprout at the base suggesting that the disease affects the root systems as well as the above ground portions of trees.

Ongoing research

As described below, current efforts to determine the cause(s) of sugarberry mortality are focused on both pathogens and insects.

Pathogens

Thinning and yellowing of the canopy, as well as phloem discoloration are symptoms that can be associated with diseases involving phytoplasmas, which are pathogenic bacteria found in the phloem that are primarily moved by phloem-feeding insects. Phytoplasma species are known to be associated with the dieback of European hackberry and the presence of phytoplasmas and their potential role in sugarberry dieback and mortality are a major focus of current investigations.

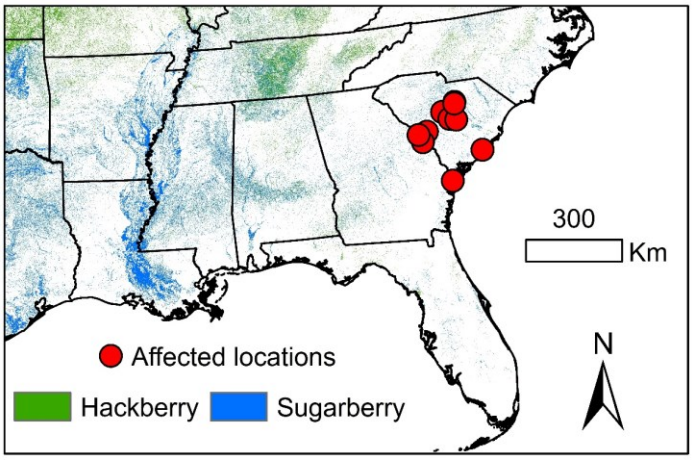

Fig. 1. Map showing known affected locations. Colors represent density of sugarberry (blue) and hackberry (green) in the southeastern U.S.

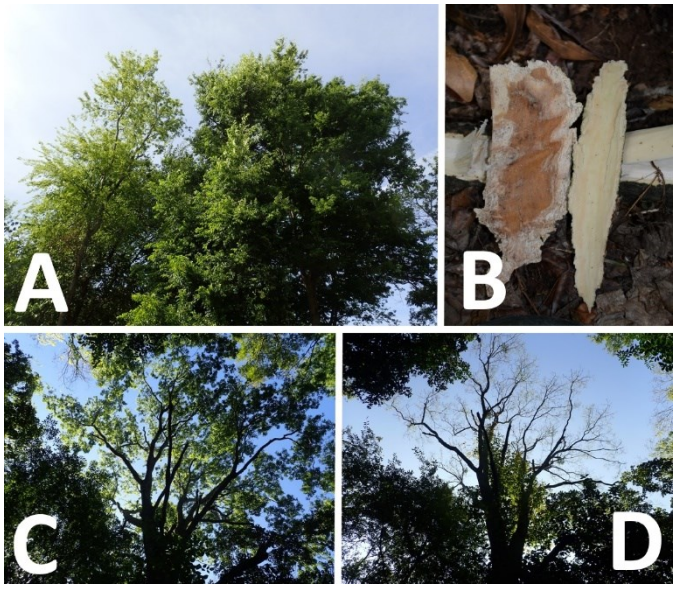

Fig. 2. A: Symptomatic sugarberry (left) next to a healthy tree (right); B: phloem (underside of bark) from symptomatic (left) and healthy (right) trees; C and D: the same tree photographed in 2016 (left) and 2019 (right) showing progressive crown deterioration

Insects

The Asian Woolly Aphid (*Shivaphis celti*) was first detected in North America in the 1990's and often attacks sugarberry in great numbers (**Fig. 3A**). The density of aphids is frequently high enough to cause obvious stress to trees, including the formation of thick layers of sooty mold and premature leaf fall (**Fig. 3B, C**). Research is underway to determine what cumulative effect repeated attacks by this species may have on sugarberry health.

Other associated organisms

A variety of opportunistic secondary insects and fungi colonize dying or dead sugarberry but are not the primary cause of the observed dieback and mortality. One of the most conspicuous insects is a native buprestid beetle (*Agrilus macer*) that lays masses of eggs on the bark (**Fig. 4A**). Black fluid sometimes weeps from the egg masses as the larvae bore through the bark and larvae create extensive tunnels between the bark and wood (**Fig. 4B**). Among fungi, elongated cankers caused by a *Biscognauxia* sp. are also frequently found on the stems and root buttresses of trees as they die. The cankers are variable in size and appear as sunken areas in the bark with a silvery grey to black color (**Fig. 4C**). *Armillaria gallica* is frequently associated with dying and dead sugarberries and dense, white mats of fungal mycelium can be observed under the bark in roots and lower stems (**Fig. 4D**).

Conclusions

Sugarberry dieback and mortality is an expanding forest health challenge facing the southern United States. Efforts to determine the cause(s) are ongoing with a focus on potential pathogens and insects.

Further reading

Bertaccini et al. 1996. Identification of phytoplasmas associated with a decline of European hackberry (*Celtis australis*). Annals of applied biology 128: 245-253.

Poole et al. 2019. Distribution and biology of *Agrilus macer* (Coleoptera: Buprestidae), a species associated with Sugarberry (*Celtis laevigata*) mortality in the southeastern United States. Annals of Forest Science 76:7

Solomon et al. 1997. Sugarberry dieback and mortality in southern Louisiana: Cause, impact, and prognosis. Res. Pap. M SRS-9. USDA Forest Service

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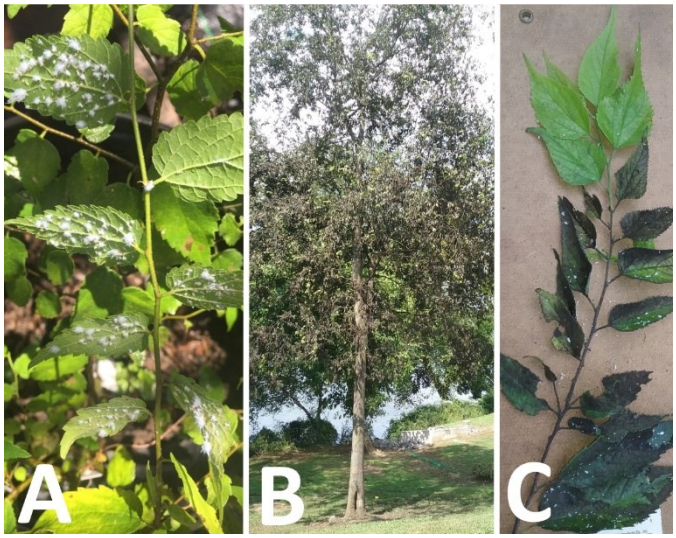

Fig. 3. A: The Asian woolly aphid on the undersides of leaves; B: a tree darkened by sooty mold resulting from aphid activity; C; fresh foliage contrasting with leaves darkened by sooty mold

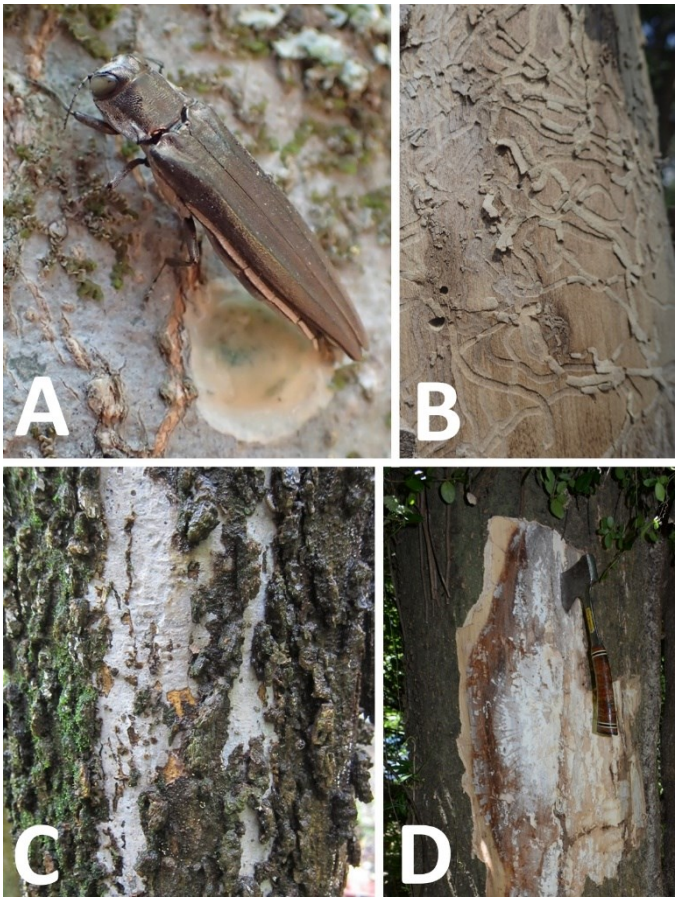

Fig. 4. A: buprestid beetle (*Agrilus macer*) laying an egg mass; B: tunnels created beneath the bark by buprestid beetle larvae; C: *Biscogniauxia* canker visible on bark surface; D: *Armillaria gallica* mycelial mat under the bark.

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