How scary is this? Two emerging pests: emerald ash borer and crapemyrtle bark scale©

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INTRODUCTION

I am fully aware that an entomologist in a plant propagation meeting is likely to be only seen as a bearer of bad news. At the risk of being *that* entomologist, I was asked to update you on two emerging insect pests—one that threatens the future of ash trees (*Fraxinus* spp.) in the USA, and one that has the potential to damage the economic viability of crapemyrtle (*Lagerstroemia* spp.). Besides the obvious bad news, however, I want to inject some hope. The good news is that we are discovering more effective tools that should help manage the negative impacts of both pests.

EMERALD ASH BORER

The emerald ash borer (*Agrilus planipennis* Fairmaire (*Insecta*: *Coleoptera*: *Buprestidae*) (EAB) was probably introduced into the US in the early 1990s, but was first found attacking trees in Michigan in 2002 (Herms and McCullough, 2014). Little was known about this insect prior to its discovery in the USA, as it was considered only a minor pest in its native China at the time (Wei et al., 2004). In North America, however, the impact of this species on native ash populations has been unprecedented, with five of the six most prominent ash tree species recently being listed as critically endangered as a direct result of borer attack (IUCN, 2017). Since 2002, the EAB has spread to 31 states and killed hundreds of millions of ash trees in the USA and Canada. Last year, in the spring of 2016, EAB was first detected in Texas (USDA/MSU, 2017).

Emerald ash borer attacks trees in both forested and urban sites, including otherwise healthy and vigorous trees. Larval feeding in phloem girdles and kills trees as small as 2.5 cm diameter breast height, leading to death within 5 years of initial infestation. The EAB causes virtually 100% mortality of most of the major ash species in areas where it invades (IUCN, 2017). In addition to ash, EAB has been found infesting white fringetree and cultivated olive (Cipollini, 2015; Cipollini et al., 2017), though with lower survival rates than in susceptible native *Fraxinus*.

Three factors hold some promise that EAB impacts may be somewhat mitigated in Texas and the South. First, density of urban and forest *Fraxinus* is lower in Texas (and presumably other southern states) than in the Midwest states where EAB impact has been severe. Whether patchy distribution of *Fraxinus* populations in our area will allow isolated populations of *Fraxinus* to escape EAB mortality, however, is yet to be determined.

Second, releases of classical biological control agents have shown promise for long-term suppression of EAB. Classical biological control efforts against EAB began in 2007 after release of three species of exotic parasitoid wasps by USDA/APHIS. Since that time at least one other exotic agent has been released and other native species with impact on the borer have been identified. It will take years to assess the long-term success of these releases, and of the ability of native predators to respond to EAB, but initial results have been encouraging (Bauer et al., 2015; Duan et al., 2017). Ultimately, researchers believe that biological control offers the greatest promise for economically sustainable control, and survival of native ash.

Third, effective insecticide control strategies have been developed over the past 15 years, preparing the way for practical management of EAB as it reaches Texas and the other southern states. Emamectin benzoate is a highly effective treatment and can provide ash protection for up to 3 years under high EAB pressure. This product is usually injected into the tree trunk. Other systemic insecticides, including imidacloprid, dinotefuran, and azadirachtin—are in widespread use and providing effective control for 1 to 2 years

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(McCullough et al., 2011). Prophylactic treatment of trees is generally not recommended until EAB is detected within 15 miles of a location.

CRAPEMYRTLE BARK SCALE

Crapemyrtle, (*Lagerstroemia indica* and hybrids; *Myrtales*: *Lythraceae*) is an important flowering tree widely used in horticultural plantings throughout the southern USA, and in temperate coastal areas. In 2004 an unidentified scale was discovered feeding on crapemyrtle trees in a commercial landscape in Richardson, Texas. Heavy infestations of the scale insects at this site had coated upper tree branches turning them white, while lower parts of the plants were black with honeydew and sooty mold.

Initially identified as azalea bark scale (*Acanthococcus azalea*), DNA sequence analysis of mitochondrial and nuclear regions, completed in 2015, confirmed this scale as (*Acanthococcus* (*=Eriococcus*) *lagerstroemiae* Kuwana) (*Sternorrhynca*: *Eriococcidae*), a species native to Asia and previously unknown from the USA. Subsequently, morphological features have been identified that allow systematists to physically identify the two species. Last year the Entomological Society of America approved the official common name of this insect as crapemyrtle bark scale (CMBS).

While CMBS infestations are not normally fatal to the plant, we have consistently observed that the scale significantly reduces the quality of crapemyrtle appearance via sooty mold and reductions in bloom size and abundance.

We have been conducting research on insecticide control of this scale since 2008. Soil applied neonicotinoid insecticides have been the most consistently effective in our trials. Imidacloprid applied to the root zone of the tree is a standard treatment and provides 1-2 years of control. Foliar and trunk sprays with neonicotinoids provide some suppression, but are not as effective as root treatments. Horticultural oil sprays alone have not provided effective or long-lasting scale control.

Lady beetles are frequently noted on infested crapemyrtles in our study plots. After multiple years of insecticide trials, we suspected that high numbers of lady beetles on untreated control trees contributed to difficulty maintaining high scale numbers in our untreated (control) plots. So in 2006 we attempted to exclude beneficial insects from our research plots by spraying the canopies early in the season with low and high rates of either carbaryl or cypermethrin. Significantly lower numbers of lady beetles, and higher scale numbers, were observed in plots treated with carbaryl and cypermethrin, suggesting that these insecticides kill predator insects with little or no impact on scale abundance. This research suggests that lady beetles do play a significant role in CMBS suppression, and has given us a tool to ensure consistently high scale numbers in our field trials.

The geographical range of CMBS continues to expand. While larger metropolitan areas in Texas, Arkansas, Louisiana and Tennessee are most heavily infested, CMBS is now verified from Virginia Beach, Virginia, to Seattle, Washington. A website has been developed by the Southern Region IPM Center that allows us to record scale sightings from anywhere in the country (http://www.eddmaps.org/cmbs/). Anyone who observes this scale for the first time is asked to take photos of the scale and submit it to the EDDmaps site for confirmation. This will allow us to track the spread of this scale to new areas.

Texas, Arkansas and Louisiana all have publications on CMBS describing the insect and outlining best control recommendations:

- Texas http://www.agrilifebookstore.org/Crape-Myrtle-Bark-Scale-p/eht-049.htm
- Arkansas https://www.uaex.edu/publications/pdf/fsa-7086.pdf
- Louisiana http://www.lsuagcenter.com/NR/rdonlyres/0C57CFE2-CAA2-444B-A1AB -DED45AFC5009/103115/Pub3440BugBizCrapeMyrtleBarkScale_FINAL.pdf

In my last bit of good news, this year Texas A&M AgriLife Extension and additional cooperating states received a $3.3 million grant to from the US Department of Agriculture's National Institute of Food and Agriculture for the specialty crop industry (SCRI). This grant will fund ongoing CMBS research and outreach for the next 3 years. Among the areas to be addressed in the project are study of chemical and non-chemical control methods, host plant resistance, consumer preferences and impacts of insecticide control methods on pollinators.

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