Invasive Ambrosia Beetle Conference
The Situation in California
August 12 – 14, 2012

Meeting sponsored by:

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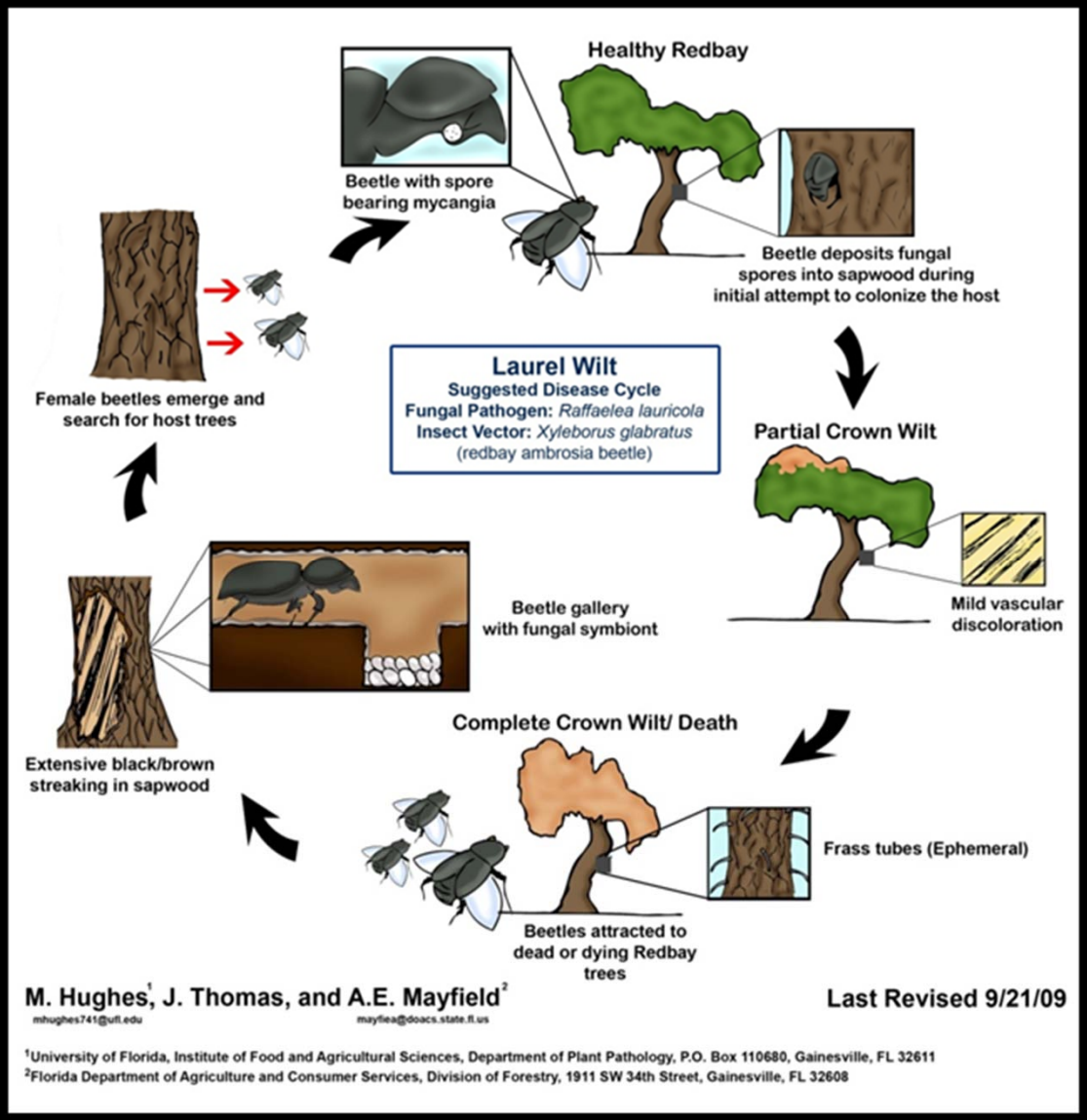
Session 4

Biology of the Fungal Symbiont

Where do we go from here? Interdiction, management and prediction

What can we learn from similar situations?

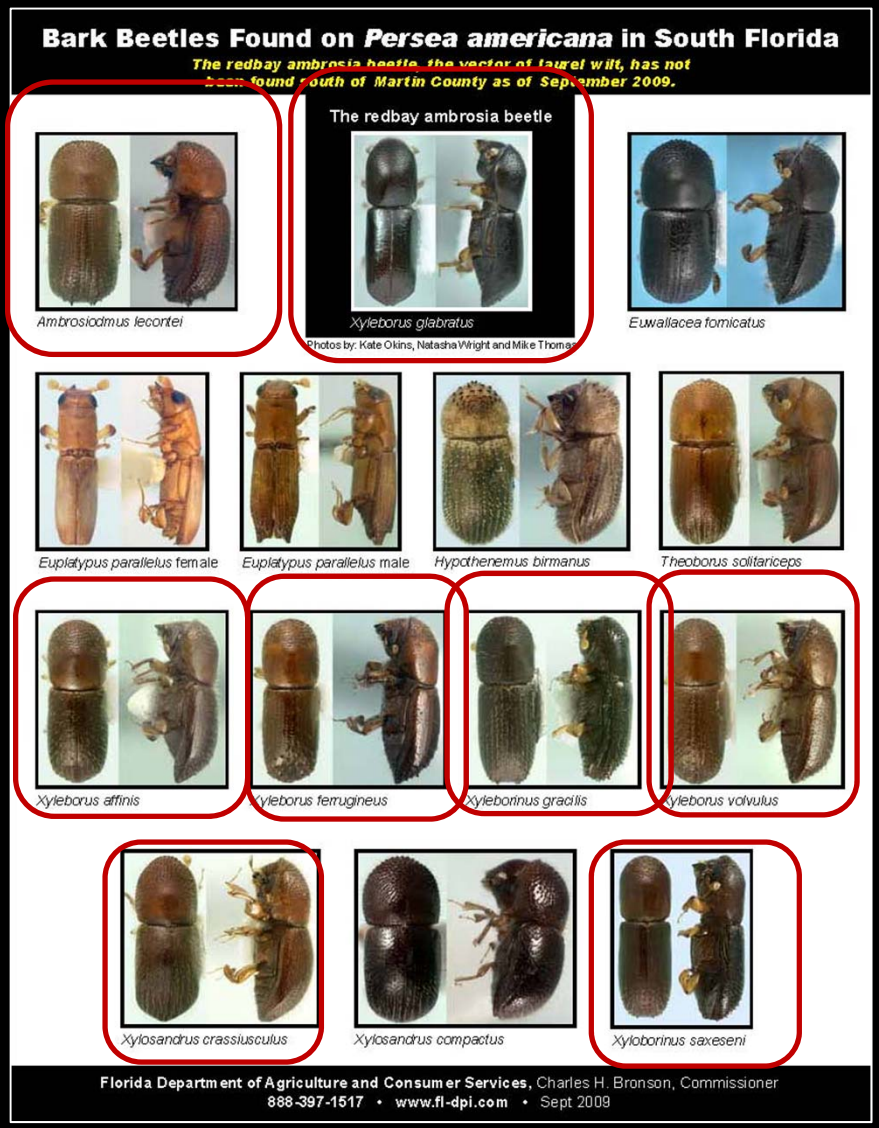
Epidemiology. Pathogen dissemination



Epidemiology. Pathogen dissemination

Lateral transfer of symbiont/pathogen?

Ex. *Raffaelea lauricola* has been recovered from eight additional species, some of which are vectors



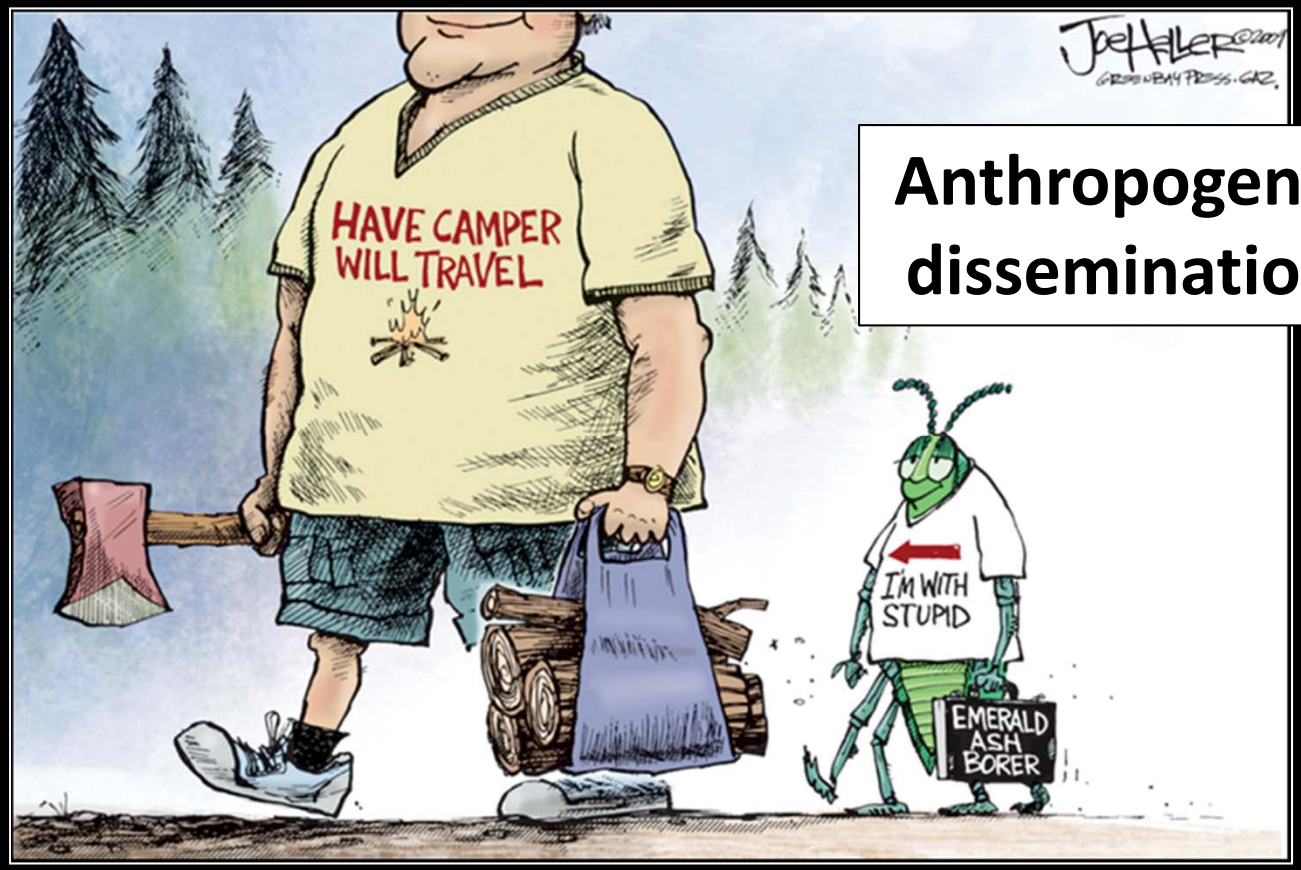
Epidemiology. Pathogen dissemination

Root graft transmission
(for vascular pathogens)

In some situations, the insect vector is <u>not</u> required

Mechanical transmission

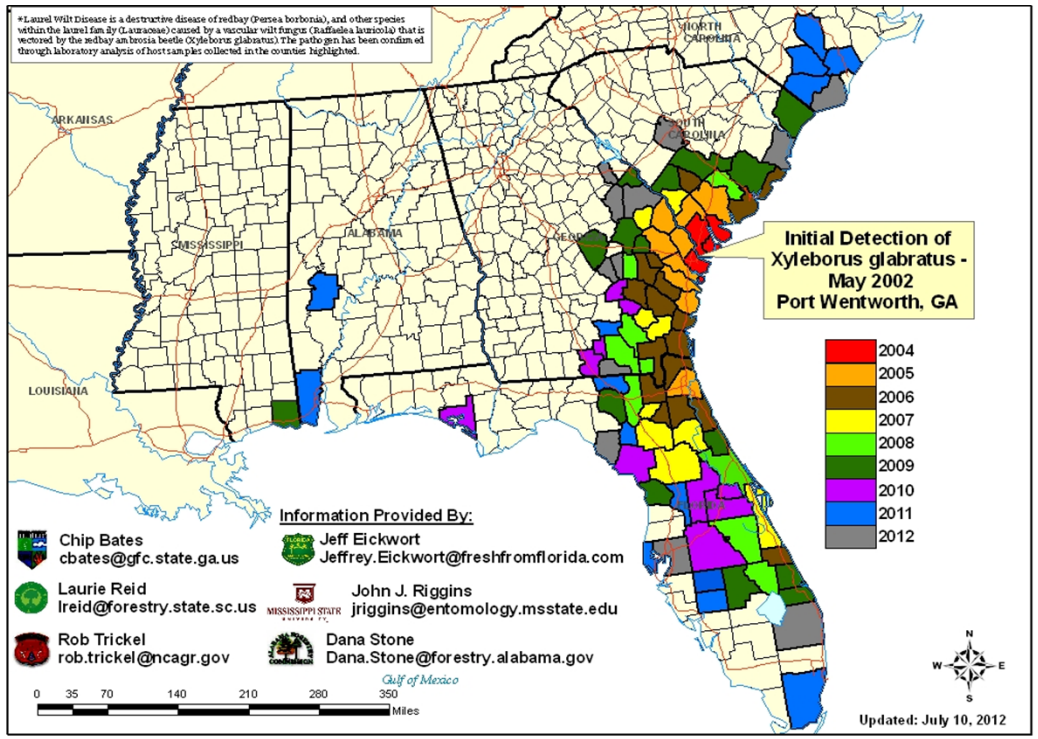
In all ambrosia beetle-associated diseases, movement of infested wood is especially dangerous



Anthropogenic dissemination

In all ambrosia beetle-associated diseases, movement of infested wood is especially dangerous

Annual, county-by-county changes in the distribution of laurel wilt



Cultural (sanitation

Cultural (sanitation, exclusion)

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Quarantine!

Chemical management?

- Fungicides
- Insecticides
- Repellants
- Attractants

Often cost-prohibitive or ineffective

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Host resistance? – a best option, but often poor (new encounters)

Prediction of risk?

Establishment of damaging, exotic Scolytinae likely to increase in the future

Based on climatic conditions, forest attributes and import values, regions of high risk were predicted

Symbiont risks (Smith and Hulcr)?

Biol Invasions (2011) 13:2275–2288
DOI 10.1007/s10530-011-0039-2

ORIGINAL PAPER

Exploring associations between international trade and environmental factors with establishment patterns of exotic Scolytinae

Lorenzo Marini · Robert A. Haack · Robert J. Rabaglia · Edoardo Petrucco Toffolo · Andrea Battisti · Massimo Faccoli

Received: 16 December 2010 / Accepted: 5 June 2011 / Published online: 15 June 2011

Abstract Although invasion of exotic ambrosia beetles (fungus feeders) and bark beetles (phloem feeders) (Coleoptera: Curculionidae: Scolytinae) is considered a major threat to forest health worldwide, no studies have quantitatively investigated the anthropogenic and environmental factors shaping the biogeographical patterns of invasion by these insects across large spatial scales. The primary aim of this study was to assess the relative importance of international trade and several environmental variables of the recipient region on species richness of established exotic Scolytinae. As a reference, we also evaluated the relationships between the same environmental variables and species richness of native Scolytinae. Using an *information-theoretic framework* for model selection and hierarchical partitioning, we evaluated the relative importance of the potential drivers of species richness of native and exotic Scolytinae in 20 European countries and the 48 contiguous continental US states. Analyses were conducted separately for ambrosia and bark beetle species. Value of imports was a strong predictor of the number of exotic Scolytinae species in both regions. In addition, in the USA, warmer and wetter climate was positively linked to increased numbers of both native and exotic ambrosia beetles. Forest heterogeneity and climatic heterogeneity and secondarily forest area were key drivers in explaining patterns of species richness for native bark beetles but not for exotic species in both regions. Our findings suggest that if current infestation levels continue on imported plants and wood packaging material, increasing international trade will likely lead to more establishments of exotic Scolytinae with concomitant negative effects on forest health in both Europe and the USA. Compared to Europe the risk of invasion appears higher in the USA, especially for ambrosia beetles in the southeastern USA where the climate appears highly suitable for exotic establishment.

Keywords Alien insect · Ambrosia beetle · Bark beetle · Forest pest · Import · Scolytidae

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Introduction

Invasive exotic forest insects are considered a major threat to forest health (Gandhi and Herms 2010). In