The Impact of Wildfire on Invasive Bark and Woodboring Beetles in Periurban Forests of Southern California (Project #: WC-F-08-01)

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The primary invasive: RPBB

Redhaired Pine Bark Beetle (RPBB) Hylurgus ligniperda (F.) (Coleoptera: Scolytidae) and fires

The redhaired pine bark beetle (RPBB) was first found overwintering in North America in New York in 2000. In July 2003, it was detected in Los Angeles Co., California. RPBB has since been collected in flight traps in urban forest lands in Orange, Riverside, San Bernardino, San Diego, and Ventura Cos. The impact of frequent wildfires in the surrounding national forests on RPBB invasion is not known.

RPBB is generally a secondary pest attacking the lower stem and roots of dead or stressed pines, but has also been reported to kill healthy trees and seedlings. A major concern in the U.S. is that RPBB could vector black-stain root disease, Leptographium wageneri, a virulent native pathogen that currently threatens western pines though a native bark beetle vector system.

Native and introduced ranges of RPBB

<table>
<thead>
<tr>
<th>Native range</th>
<th>Europe, Mediterranean, and Asia</th>
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<tr>
<td>Australia</td>
<td>Brazil, Chile, Japan, New Zealand, St. Helena Island, South Africa, Swaziland, Uruguay, U.S.</td>
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<td>How RPBB entered the U.S.</td>
<td>is unknown, but it likely arrived with solid wood packing material associated with imported goods.</td>
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Other invasives in southern CA

• The native range of Arhopalus syriacus (Reitter) (Coleoptera: Cerambycidae) includes the Mediterranean region, Canary Islands, and Middle East. It has invaded Australia, New Zealand, and the U.S. It develops in pines (Pinus pinaster, Pinus salzmanni, Pinus laricio, and Pinus halepensis).

• The Asian ambrosia beetle, Xyleborinus saxeseni (Ratzeburg) (Coleoptera: Scolytidae), appears to have invaded the U.S. over a century ago. It attacks recently cut, injured, and dying conifers and hardwoods.

Methods

Baits: Both α-pinene and ethanol were used in every trap, because ethanol and α-pinene worked synergistically to attract RPBB. A previous year-long flight study in southern California showed that α-pinene was attractive to RPBB, and ethanol was not. There were no differences in the responses of males and females. Similar responses to ethanol and α-pinene were found for A. syriacus, whereas ethanol was found to be very attractive to X. saxeseni.

95% (~98% chemical purity) α-pinene purchased from Sigma-Aldrich Co. LLC; five bottles used in each trap.

Ethanol (~98% chemical purity) purchased from Phirteen International Inc.; five bottles used in each trap.

Data Collection and Analyses: Traps were emptied bi-weekly from April to September in 2008. Approximately 1,800 samples were collected. We have processed about 60% of our samples. Thousands of bark beetles (Scolytidae) were studied. The numerical comparisons were made by using paired t-tests (α=0.05).

Summary

RPBB has expanded its range in both the ANF and SBNF. RPBB has moved upslope to a remotely located ponderosa pine forest (approx. 1,826 m elevation) in the SBNF. RPBB has also moved into a native pine forests (1,915 m elevation) in the northern edge of the ANF. RPBB was not detected on the CNF in 2008. Arhopalus syriacus was detected in burn-unburned sites of ANF and Williams and Pines Fires in ANF, as well as in the native knobcone pine stand and unburned site of Old Fire in SBNF. Xyleborinus saxeseni was found in all sites surveyed.

Preliminary Results

1. Invasion of RPBB into national forests in southern California

Our data in 2008 showed that RPBB moved upslope from the Los Angeles Basin through a remote knobcone pine stand located at intermediate elevation (1,082 m,) to a more remotely located ponderosa pine forest (approx. 1,826 m elevation, X) in the SBNF. RPBB has also moved into a native pine forests (1,915 m), located on the northern edge of the ANF. RPBB was not detected on the CNF in 2008. Arhopalus syriacus was detected in burned-unburned sites of ANF and Williams and Pines Fires in ANF, as well as in the native knobcone pine stand and unburned site of Old Fire in SBNF. Xyleborinus saxeseni was found in all sites surveyed.

2. Comparisons between funnel and pitfall traps on catches (mean ±SE /trap/wk) of three invasive bark and wood-boring beetles (different letters in each comparison indicate significant differences found by using paired t-tests, α=0.05).

Total number of cerambycid beetles: 3.3 ± 0.7; 3.7 ± 0.9. Total number of scolytid beetles: 0.36 ± 0.1; 0.41 ± 0.1.

3. Comparisons between burned and unburned sites on catches (mean ±SE /trap/wk) of bark and wood-boring beetles and ants in 3 national forests surveyed (no significant differences found by using paired t-tests, α=0.05).

Total number of cerambycid beetles: 0.41 ± 0.6; 0.36 ± 0.1. Total number of scolytid beetles: 3.7 ± 0.9; 5.3 ± 0.7.

Numerically more invasive beetles, as well as slightly more bark and woodboring beetles, were caught in burned sites.