

## Progress Report on Goichman Family Endowment Research 2011

**Title:** Screening of a specific pheromone isomer for management of longhorn Prionus borers in NY apple trees

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### Background

The Prionus borer is the grub or larval stage of a large longhorned beetle called the broadnecked root borer (Coleoptera: Cerambycidae, *Prionus laticollis*), which has become an increasing problem in certain apple growing regions of New York. The borer is among the largest of the North American beetles, and can reach 3.5 inches. During the past few years, these borers have been found infesting apple trees in both Long Island and the Hudson Valley, as well as in parts of Rhode Island and New Hampshire. Researchers in the western US identified the sex pheromone of a closely related species, *P. californicus*, as a first step in the possible development of non-insecticidal methods of monitoring and managing this important class of pests (Cervantes et al. 2006). They showed that female *P. californicus* produce a powerful sex pheromone that specifically attracts males of this and related Prionus species, including broadnecked Prionus. In 2010, we set out field-trapping trials to assess the effectiveness of this pheromone in detecting the distribution and seasonal activity of this species in NY apple systems, which occurs generally through the month of June and into August. The pheromone traps proved to be effective in attracting adult Prionus males from the general area in each of the locations surveyed. The synthetic pheromone used was a blend of several different isomers, but further research has determined that the true pheromone produced by *P. californicus* consists of just one single isomer of the compound (3R,5S-dimethyldodeca-noic acid). We were interested in determining whether the broadnecked Prionus uses the same specific pheromone isomer as the western species, in order to increase the attractiveness to adults of the pheromone traps, and thereby obtain more detailed information about this species' activity and distribution for management purposes.

### Methods

We set out field-trapping trials to assess the effectiveness of both the general pheromone mixture and also one specific isomer found in the general blend, in detecting the distribution and seasonal activity of this species in NY settings. In one site, a mixed pine and hardwood forest south of Geneva, a single pitfall trap was placed and baited with the mixed pheromone blend ("PA", prionic acid), and another, placed 25 meters away, was baited with the natural single isomer. The traps were placed on June 27, and checked daily through July. All beetles captured were collected for identification, and the lures were rotated to eliminate any location effects.

At a second site approximately 1/2-mile away, two more pitfall traps were placed at the edge of a wooded area adjacent to a cornfield, and baited with a commercial lure containing the PA blend (Contech Enterprises, Delta, BC, Canada). These traps were also positioned approximately 25 meters apart, and were checked daily through July.

To obtain more information about this species' distribution in other NY locations, single pitfall traps baited with the Contech PA lure were also set out in early July in apple orchards located in Modena (Hudson Valley), Riverhead, and Northport (Long Island). These traps were checked intermittently until early August.

In all cases, beetles captured were collected and preserved for identification.

## Results

The pheromone traps once again proved to be very effective in attracting adult *Prionus* males from the general area in each of the locations surveyed. In the Geneva traps baited with the commercial PA blend, the first capture occurred on July 4, at 1069 DD (base 50°F), similar to the timing seen in 2010 (Fig. 1). Peak capture in these traps was recorded on July 18.

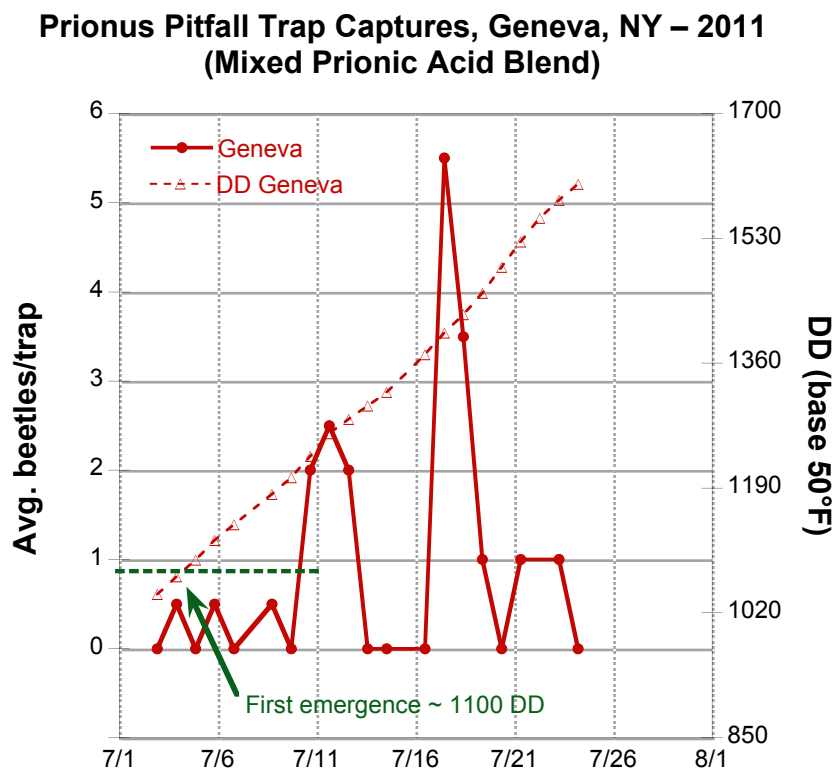


Fig. 1. Average captures of *Prionus laticollis* adults in pheromone-baited pitfall traps placed in a mixed woods, Geneva, 2011.

In the Geneva lure comparison trial, the single isomer-baited trap captured a total of 6X the number of *Prionus laticollis* males as were taken in the PA lure-baited trap, with captures 3-5X higher in the single isomer trap on a daily basis (Fig. 2). In the non-Geneva sites, the commercial PA lures were similarly effective in attracting *Prionus* males, with peak captures recorded also between July 18-19 (Fig. 3). Two related species, *P. imbricornis* and *P. pocularis*, have also been reported taken in traps baited with this pheromone, but these appear not to occur in our region.

### Prionus Pitfall Trap Captures Lure Trial, Geneva - 2011

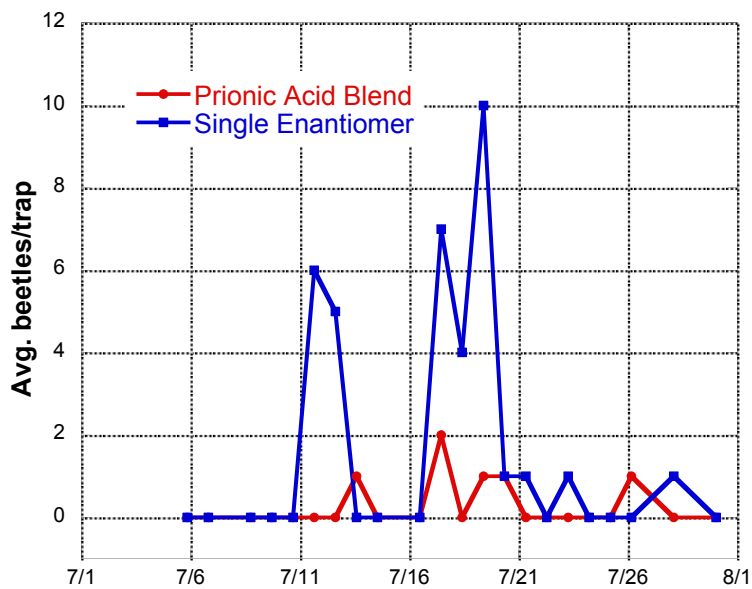


Fig. 2. Captures of *Prionus laticollis* adults captured in pitfall traps baited with either mixed Prionic acid blend or a natural single isomer.

### Prionus Pitfall Trap Captures, Eastern NY – 2011 (Mixed Prionic Acid Blend)

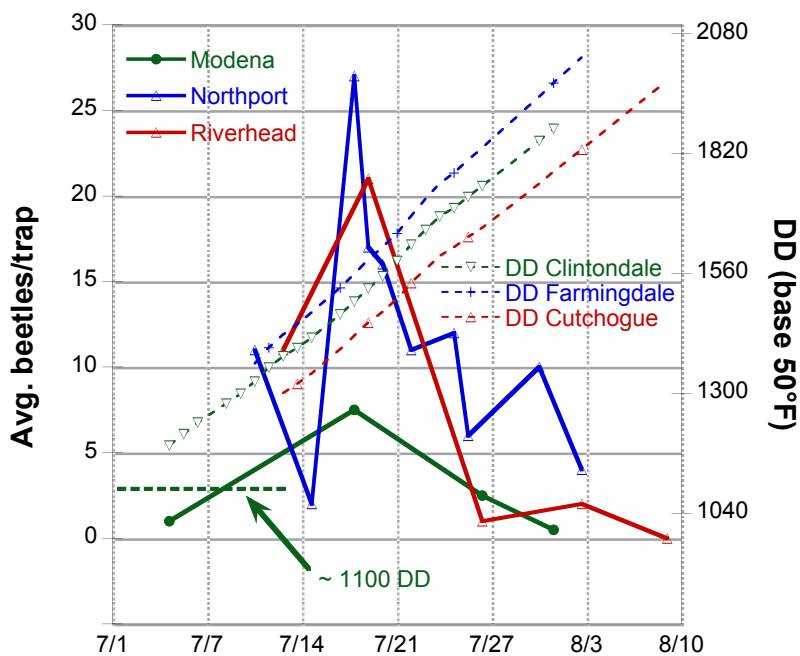


Fig. 3. Captures of *Prionus laticollis* adults in PA pheromone-baited pitfall traps placed in apple plantings in eastern NY sites, 2011.

### **Projected Impacts:**

We anticipate that this pheromone could find useful application in monitoring the distribution and abundance of broadnecked Prionus, improving the efficiency of preventive insecticide treatments, and it ultimately might also be exploited for control of the insect via pheromone-based mating disruption, mass trapping, or attract-and-kill strategies. Researchers in the western states have already made progress in assessing this single-isomer pheromone for use against *P. californicus* as a mass-trapping or mating disruption tactic (Maki et al. 2011). We hope to parallel their efforts against *P. laticollis* in NY settings, to eliminate the threat they pose to established apple plantings.

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Maki, E. C., J. G. Millar, J. Rodstein, L. M. Hanks, and J. D. Barbour. 2011. Evaluation of mass trapping and mating disruption for managing *Prionus californicus* (Coleoptera: Cerambycidae) in hop production yards. *J. Econ. Entomol.* 104: 933–938.