

# A Special Survey for a New Rust Disease (*Puccinia psidii*) on Myrtaceae in Hawaii

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## Background

*Puccinia psidii* (guava or eucalyptus rust) was first detected in Hawaii in the spring of 2005. Its range includes South and Central America, the Caribbean, and the states of Florida and California. The disease infects a large number of plants in the Myrtaceae including ohia (*Metrosideros polymorpha*), the dominant species in approximately 80% of Hawaii's remaining native forests. Damage to this species could have catastrophic effects on Hawaii's forests.

We conducted surveys to establish host range, describe disease distribution and severity, and study population genetics of the disease in Hawaii.



Figure 2: Infested Rose apple

## Survey Results

Surveys were carried out on the islands of Hawaii, Maui, Oahu and Kauai. Disease incidence occurred in areas ranging from sea level to 1200 m elevation with 750-3000 mm annual rainfall. Of the 82 species worldwide known to be hosts of *P. psidii*, 41 occur in Hawaii. Of these 41 species, only 18 have been found infected in the environment in Hawaii.

Rose apple, an introduced invasive species found throughout Hawaii, is the most severely affected host in Hawaii, and the disease is causing widespread defoliation of this species (Figure 2). More than 50 records of the rust were confirmed on ohia, but the disease was not detected in all survey areas (Figure 3). Although ohia appears to have low susceptibility overall, damage to seedlings and on localized individuals was observed.

Repeat visits to survey sites are planned to document seasonal effects and interaction with host plant phenology, as well as any increase in virulence. Approximately 300 ohia seedlings have been tagged at 3 sites and are being monitored to determine impact on regeneration.

## Population Genetics

Differences in host range in areas with *P. psidii* suggest a disease complex made up of different strains or clones. However little is known about the population structures of the disease. 15 genetic markers were successfully developed and characterized from 22 isolates at the University of Hawaii. DNA extraction methods were recently refined in order to run extensive analyses of samples taken in this survey. Preliminary results suggest the disease in Hawaii is a single genotype similar to one in Florida. Further analyses will characterize this disease throughout its range and inform quarantine policy for preventing additional introductions.

## Disease Index

A disease index was developed for both ohia and rose apple (*Syzygium jambos*) so that resource managers working in Hawaii have a common method to describe disease severity (Figure 1). This will allow us to track disease impact over ecological gradients as well over time. A monitoring sheet was developed and will be available to managers online along with the disease indices.

Figure 1: Ohia Disease Index

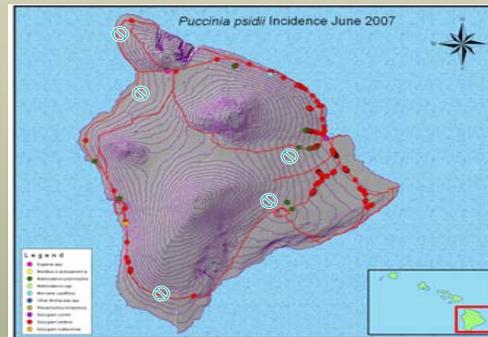


Figure 3: Map of disease incidence by host on Hawaii. (Blue crossed circles represent disease absence with host species present and are located in either dry or high elevation areas.)

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MAHALO!