

Release *Secusio*: Transitioning to a Biocontrol Management Program for Fireweed (*Senecio madagascariensis*) on Maui

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Since 2010, Maui County has sponsored the Fireweed Management Prescription (FMP) Program that has mobilized over 100 ranchers with a \$150,000 herbicide inventory to treat more than 5000 gross acres of Maui's grazing pastures. These treatments have been effective, although typically, a temporary solution to fireweed suppression. This program is coming to an end after 2012, which will make herbicide suppression too costly for a majority of our participating ranchers. Local ranchers will need new, sustainable fireweed management alternatives.

Fireweed (*Senecio madagascariensis*) is in the Asteraceae family, native to South Africa and Madagascar. It has an attractive yellow flower, and where a few plants are not very imposing, this plant can create large infestations that dominate pastures. Fireweed produces a pyrrolizidine alkaloid that is toxic to livestock, leading to chronic reductions in health and reproduction. The first reported sighting of fireweed in Hawai'i was in 1980 and now fireweed occupies up to a half-million acres of productive pasture on Maui and the Big Island. On Maui, infestations have spread across the Kula Belt from Ha'i-kū to Kaupo and even west into Kahakuloa.

This plant species is also known to be highly competitive for moisture and nutrients, particularly under drought conditions. The severity of fireweed infestations peaked on Maui during the drought of 2010, where 10 of the 12 months experienced below average rainfall. The effects of this drought are still felt today with a continued lack of rainfall in 2011-12. As a result, Hawaii's cattle industry has seen major fluctuations in the number of calves exported. According to the USDA National Agricultural Statistics Service (NASS), a 21% increase in Hawai'i calf exports occurred for 2010, as compared to 2009, although the average live weight



Figure 1. (A) Fireweed in flower, above (B) Flower developed into a seed head, with seeds ready for wind dispersal, below.



of exported cattle decreased by 9% or 39 lbs. This suggests that many ranchers were culling their herds due to the lack of available forage. The decrease in herd size became more evident in 2011 when the number of calves marketed decreased by 18% compared to 2010. An additional 9% reduction is projected for 2012, when total cattle exports are expected to be at the lowest point in 15 years. While the drought is the main culprit for this large drop, uncontrolled fireweed infestations will prevent pasture recovery and continue to keep cattle production in decline.

Once the FMP program is discontinued, a dramatic reduction in active management by participating ranchers is expected. This will likely result in further expansion of current fireweed infestations. An adaptive, integrated weed management plan is needed that establishes new goals, implements alternative techniques, and monitors outcomes (Thorne et al. 2006).

The Hawai'i Department of Agriculture (HDOA) is seeking federal approval to release the prospective defoliating biocontrol agent *Secusio extensa* in 2013. This successful biocontrol program included comprehensive exploration of the host native range, followed by intense screening of the agent under quarantine. This Lepidoptera species was originally collected in Madagascar by exploratory entomologists in 1999, where local experts identified this insect as the

Figure 2. Large *Secusio* caterpillars feeding on *Senecio* under quarantine.



most destructive to its host in its native range. The *Secusio* agent has been studied under quarantine for over a decade. Experimental feeding trials continually demonstrate substantial defoliation and death of *Senecio*. Furthermore, choice feeding trials, pairing *Senecio* to 71 other endemic and naturalized plant species determined that *Secusio* is sufficiently host-specific for release in Hawai'i (Ramadan et al. 2010).

Success of a biocontrol management program is further ensured when a well-developed, release and monitoring strategy is implemented (Fowler 2000, Paynter and Bellgard 2011). CTAHR research and extension faculty are working with HDOA and Maui County to ensure success of an anticipated *Secusio* release. Over the last two years, CTAHR entomologists have developed a robust assessment of pre-release fireweed/insect communities and will extend their monitoring regiment for comparing post-release communities to measure *Secusio* establishment and fireweed decline. This information will be critical to determining how long an active release program will need to be maintained to achieve the management goals. The CTAHR Invasive Weed Management Specialist on Maui is also starting a new project to develop prototype insect rearing facilities to supply local ranchers so they can once again become active participants in this new sustainable prescription program. One important function of the participants will be to learn how to maintain small-scale fireweed production as feedstock to build up *Secusio* populations. Ranchers should naturally become quite good with this management tool, once they see it as managing herds of mini-cows.

Please refer to the following citations to learn more about weed biocontrol strategies and the implications for developing a successful fireweed management strategy in Hawai'i:

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