

The Bulletin

OF THE NATIONAL TROPICAL BOTANICAL GARDEN

Volume XXVI, No. 1

Winter-Spring 2009



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ON THE COVER: Species in McBryde's tropical world collection of *Erythrina* were damaged by invasive gall wasps. Another wasp may hold the key to their survival. See story on page 4.

Pictured: The green-flowered *Erythrina sandwicensis*, the native Hawaiian species of this genus. Photo taken in 2007 by Janet Leopold

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ISSN 1057-3968

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National Headquarters

3530 Papalina Road, Kalāheo, HI 96741 USA

(808) 332-7324 Fax: (808) 332-9765

www.ntbg.org administration@ntbg.org

Editor: Janet L. Leopold

Associate Editor: Jon Letman

Erythrina's Second Chance

Hawai'i Department of Agriculture Releases a
Natural Enemy of the Gall Wasp in McBryde

by David A. Burney, Director of Conservation

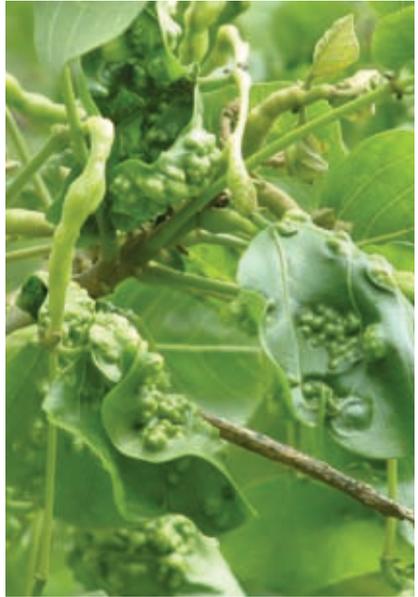
A couple of years ago McBryde Garden's beautiful and diverse collection of flowering trees in the genus *Erythrina* fell victim to a scourge that has swept the Hawaiian Islands and many Indo-Pacific areas recently — the erythrina gall¹ wasp. Since first being reported in Mauritius, Réunion, and Singapore in 2003, this menace has spread eastward all the way to Hawai'i, threatening a host of species of these beautiful flowering trees in the legume family (Fabaceae), famous for their copious flowers.

In Hawai'i, conservationists were alarmed by the swollen, blistered leaves and stems of the native wiliwili (*E. sandwicensis*), and sprung into action collecting seeds from wild populations throughout the islands in the hope of preserving the genetic diversity of this rapidly declining dry forest tree. Studying the collections at McBryde and other botanical gardens, researchers such as Russell Messing of the Kaua'i Agricultural Research Center noticed early in the infestation that whereas many species are devastated by the gall wasp, losing leaves and often eventually dying, some African species were not affected at all and other African species were only lightly blistered. Detective work by Hawai'i Department of Agriculture (HDOA) Exploratory Entomologist Mohsen Ramadan eventually traced the infestation back to eastern Africa.

This finding was crucial, as early experimentation had shown that pesticides were only temporarily effective, if at all. This left biological control agents as the last best hope for saving the native wiliwili and the large collections of its exotic cousins in botanical gardens, yards,

¹ Plant galls are abnormal outgrowths of tissue.

▲ Abnormal tissue growths called "galls" on the leaves of the erythrina feed gall wasp larvae.
Photo by Scott Sloan



and farm windbreaks. Eventually, field research turned up some candidates for testing — potential natural predators and parasitoids of the burgeoning gall wasps. In Hawai‘i, HDOA entomologists tested one of these and, after a year of laboratory studies, found this beneficial wasp to attack only the erythrina gall wasp and not any other unintended insects. The beneficial wasp was approved for release in November 2008 after extensive review by State and Federal agencies.

A research team of University of Hawai‘i (UH) and HDOA entomologists have so far chosen several locations on Hawai‘i Island, O‘ahu, Maui, and Kaua‘i’s south shore to release the biological control agent, *Eurytoma erythrinae*, a predatory wasp only slightly larger than the tiny gall wasp itself. Key sites on Kaua‘i were McBryde Garden and the Makauwahi Cave Reserve nearby. The former, in addition to its large and once spectacular collection of exotic *Erythrina* species, also contains some large mature native wiliwili in the Native Hawaiian Section. At Makauwahi, about 60 wiliwili trees have been established in dry forest restorations.

Dr. Leyla Kaufman, Junior Researcher with UH’s College of Tropical Agriculture and Horticultural Research, and her assistant Roshan Manandhar, began visiting these sites several months ago, collecting background data on tree numbers, locations, and degree of infestation. The beneficial wasp, which is being propagated by the



▲ Immediately after the first release of *Eurytoma erythrinae* (below: magnified), Assistant Director of Living Collections Mike DeMotta and Cindy Adams of the Conservation Department observed the beneficial wasp at work. Photo above by Leyla Kaufman, wasp photo by Walter Nagamine; used with permission

HDOA, was released by Dr. Kaufman and Juliana Yalemara (HDOA) on infested trees at NTBG beginning in December 2008. These tiny wasps are not harmful to humans, animals, or plants and pose no threat to native insects.



The life cycle of the biocontrol agent is only about 18 days but it is still too early to assess its effectiveness. The research team is currently monitoring establishment as well as releasing more individuals during each visit. The control species does its work by laying an egg in the gall and, upon hatching, the beneficial wasp larva will feed on one or more erythrina gall

wasp larvae to complete its development. This swollen leaf structure would otherwise have continued swelling to provide plant tissue to

feed the gall wasp larvae until they emerged as adults to breed and find another leaf on which to lay eggs.

“Biological control is the best solution for long-term control of the erythrina gall wasp,” Dr. Kaufman stated on a recent visit to NTBG to release more of the predatory wasp. “This is probably the best hope for saving the trees.” She indicates that another species is under consideration for release as well.

NTBG staff hope that someday soon, with the aid of these tiny wasp helpers, the “rescue collection” of rare erythrina cuttings they rooted (now poking against the ceiling of the greenhouse) can be set out along the erythrina alée¹ near Pump Six in McBryde Garden to once again grace the roadside with a shower of crimson blossoms.

¹ A landscape design element where a row of trees is planted immediately along each side of a road or path.



▲ Left: Years ago the erythrina alée in the McBryde Garden was a riot of intense red. Right: From a similar vantage point in early 2009. Photos from NTBG archives and by Jon Letman