

# Annual Report of Hawaiian T&E Plants, at Palomar Community College



March 10

# 2015

Volume 2

*This report indicates the current status of the seeds and any subsequent seedlings from the collections made of cultivated T&E seeds from the Honolulu Botanic Gardens, National Tropical Botanic Garden, and the Waimea Valley Arboretum in the spring of 2013.*

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## Introduction

In the summer of 2012, I made a formal request to collect and bring back to the mainland, seeds from cultivated stock of some Threatened and Endangered plant species. Charmian Dang, who is the Rare Plant Permit Coordinator from the Division of Forestry and Wild Life of the Hawaii Department of Land and Natural Resources, was the person contacted. She instructed me on the process and in early 2013 permission was granted from both the Hawaii Division of Forestry and from the US. Fish and Wild Life Service.

The intent was to grow the species in the nursery at the college, and when large enough for out planting, to plant them in specific garden areas for public display. All seeds were inspected by the Hawaii Department of Agriculture and the US Department of Agriculture prior to leaving the islands. They were then inspected and cleared by the California Department of Agriculture on April 10th, 2013.

Those collected were as follows:

- *Sesbania tomentosa*
- *Abutilon mensiesii*
- *Abutilon sandwicensis*
- *Hibiscadelphus distans*
- *Polycias racemosum*
- *Caesalpinia kaviaensis*

Due to pest problems in the greenhouse and concerns of committing all the available seeds to first trial failures, some of the seed was held for planting until late winter (February 2014). In the fall of 2013 the new Teaching & Learning Center was completed at the San Marcos Campus and officially opened to students in January of 2014. The gardens that surround the center were designed to exhibit plants native to Hawaii and greater Polynesia. In addition, plants that are native to South East Asia, but were vital to the Polynesian migration across the Pacific Ocean have also been planted in this location. The only exceptions are the low growing grasses and

sedges, which are California natives. In addition to grasses we planted Pineapples which were brought to Polynesia with the Europeans. These plants were at one point a vital part of the islands economy. An interesting, but sad part of Hawaiian natural history is that the Europeans cleared much of the lowland forests to make way for the planting of Pineapples and Sugar Cane. There is also a slightly older test garden planted by the Boehm Gallery that contains similar plants.

By the spring of 2013, only one species grew rapidly enough to plant out in the garden. The nursery contains many more species of unique plants native the Hawaiian Islands, as well as greater Polynesia. When they become big enough to plant out, we will add them to the garden in the hopes that they might act as ambassadors for conservation. If nothing else, just being in the garden they provide every visitor a chance to see how beautiful and diverse our world is and hopefully entice at least a few to take some active role in the efforts to protect it.

**The Following Botanical institutions provided seeds for nearly all of the Hawaiian Native plants in these gardens.**

[The National Tropical Botanical Garden](#)

[NTBG The Honolulu Botanical Gardens](#)

[The Waimea Valley Botanical Garden](#)

## Soil Type for Planting

The soils at the San Marcos Campus are primarily clay and garden beds must have soil amendments added to improve drainage and nutritional composition. In an attempt to lessen "Out-planting" shock, we try to mix soils that are similar to our native soils after amendments have been tilled in. This does create some issues with drainage in

nursery containers, but has helped a bit with minimizing “Out-planting” shock.

For the T&E seeds planted in the spring of 2014, Sunshine Mix #3 was used. It was chosen as a substitute because this mix has proven to be slightly more favorable than the Loamex in a few trials with similar species. The overall structure of Sunshine Mix 3# provides a superior balance of moisture retentive, aeration and drainage properties. Sadly only a few *Abutilon* seedlings germinated and all died approximately 6-8 weeks after germination. The *Hibiscadelphus distans* and the *Polycias racemosum* also were upsized into one gallon containers with the same Sunshine mix #3; which resulted in rapid growth. After approximately 6 weeks, growth had slowed and nutritional deficiencies began to appear in the leaves. At this point a well balanced fertilizer with 9% iron was used and applied continually at approximately 6-8 week intervals which relieved the nutritional problems.

The *Sesbania* plants due to their fast growth were ready for 15 gallon containers by the spring and were planted into fine compost; which resulted in fantastic growth. The single *Hibiscadelphus distans* was planted into a Sunshine Mix #3 blended with ¼ to ½ inch pumice at a rate of 70/20% in the fall of 2014.

## Campus Nursery

The nursery on campus contains four primary structures and a temporary hoop house that is skinned with plastic in the winter, on an as needed basis. The nursery is approximately one half acre in size and is completely fenced in. This facility has been crucial to our conservation and education efforts for years. The nursery is slated to be relocated in the next few years to accommodate campus construction and development efforts. We expect that the new nursery will be a more state of the art facility to continue our environmental outreach efforts.



(From Left to Right Top to Bottom)

Shade House, Hot House, Sun Yard, Green House

## Seed and Seedling Status, As Of Spring 2015

As with last year the chart below shows that only 3 species are still represented in the seed bank at the college. Unlike last year; there are more seed in the seed bank, as a few our *Sesbania tomentosa* have begun producing seed. The three species held in the bank collectively yield a total of 694 seed, with the best represented species being *Sesbania tomentosa*.

Genus Species	Remaing in Seed Bank	Alive At Present
<i>Caesalpinia kaviaensis</i>	2	0
<i>Sesbania tomentosa</i> (Original Collection of 25)	18	4
<i>Sesbania tomentosa</i> (plant #1)	494	1
<i>Sesbania tomentosa</i> (plant #2)	84	1
<i>Sesbania tomentosa</i> (plants #2&3)	30	1
<i>Sesbania tomentosa</i> (plant #3)	64	1
<i>Sesbania tomentosa</i> (plant #4)	0	1
<i>Hibiscadelphus distans</i>	2	1
<i>Polycias racemosum</i>	0	1

*Abutilon sandwicensis* were planted in the spring of 2014, despite our high hopes for this species only 4 germinated and all were lost. The total number of seedling T&E species from the original collection dropped from last year’s total of 9 to 6.

*Polycias racemosum*, and *Caesalpinia kaviaensis* are still worth trying in Southern California and thankfully we do still have two seeds and one seedling respectively to experiment with.



*Polycias racemosum* in the nursery March 2015.



*Hibiscadelphus distans* in the nursery March 2015.

As discussed last year the greatest success was with the *Sesbania tomentosa* seeds. These plants have been very vigorous and initially showed great promise for outdoor cultivation in Southern

California. Their fast growth and apparent cold hardiness seemed promising. However they are not fond of prolonged drought and seem slightly temperamental to prolonged root temperatures in the low 40's high 30'sF.

## Pest Problems

As is often the case, plant pests tend to be problematic in closed environments like greenhouses and hothouses.

The plant pests listed below have shown an affinity for the plant species currently being grown in the greenhouse.

- *Tetranychus* sp. - **Red Spider Mite**
- *Trialeurodes vaporariorum* - **Greenhouse White Fly**
- *Pseudococcus* sp. - **Mealy Bug**

Historically Red spider mite has been voracious on the foliage of the *Sesbania tomentosa* in the green house, but occasional hosing down with water has been sufficient to keep the pest controlled. The sole specimen of *Sesbania* in the garden suffered approximately 30-60% defoliation in the early summer from an infestation of *Graphocephalla atropunctata* (**Blue-green Sharp Shooter**), a leaf hopper insect. It also showed a very mild infestation of brown scale. The concern with the sharp shooter is that it is a vector of *Xylella fastuosa* (**Pierce's disease**).[1] The plant was treated with **Merit** (imidacloprid) as soon as the insect was identified and within one week began new pest free growth; doubling in size by October. If the insect did carry the bacteria the plant appears to be unaffected and possibly immune.

The only plants to be attacked by Greenhouse white Fly this year was the *Hibiscadelphus*. This pest was minimal and removed after the one event.



## Response to Cold

The temperatures in late December of 2014 dropped to the mid 40's f, high 50's f during the day and plummeted to as low as 27 f with an average of around 33 f at night. This occurred over a 7 to 10 day period with two of those nights near the 27 degree Fahrenheit range. I expect that soil temperatures in the nursery containers may have approached the 30's if not colder?

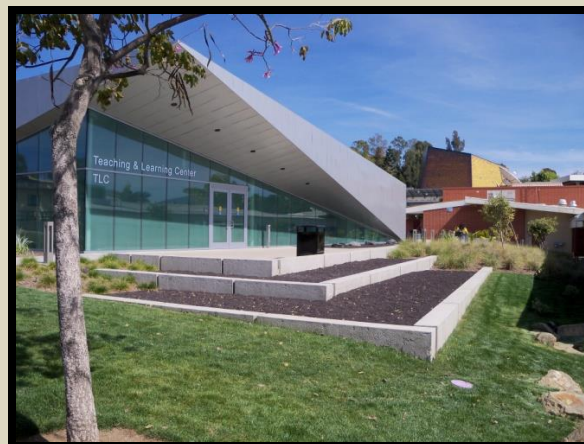
*Sesbania tomentosa* despite some setbacks still seems promising for outdoor cultivation in So Cal. The one specimen in the ground, was mulched in the fall and has done well with added irrigation, but is apparently going to be winter deciduous. One other is doing fine in our green house and the other two remaining are in 15 gallons containers and apparently did not like being outdoors during the winter and suffered what appeared to be significant root damage from a cold snap in late December.

Within one week the leaves began to die and within two weeks much of the smaller branches on these two plants began to die back. After one month a close inspection of some of the fine roots seemed to confirm that a significant percentage of fine roots had died. The plants were in a shaded cold spot in the nursery and may have fared better if they were in the ground. Amazingly the plants still appeared to have life in them; after a scratch test on the trunk confirmed a beautiful green color below the bark. By February 18 2015 many of the branches had begun to die back. We still have hope that these two plants will make a full recovery, though time will tell. The specimen in the ground showed only a slight aversion to the cold conditions and exhibited some slight bronzing on the leaves, and has halted all growth, but otherwise looks fine. In fact it began to flower again the last week of February 2015.

All of the other plants on the list below that are currently in the greenhouse, have fared well and showed no signs of cold damage to date.

- *Sesbania tomentosa*
- *Hibiscadelphus distans*
- *Polycias racemosum*

## Garden Areas As Of Spring 2015



**A view of the South Plaza of the new Teaching & Learning Center**



**(From Left to Right Top to Bottom)**

**North East, South East, North West, Taro in West Lawn**

The images above and below show some areas of the Polynesian and Hawaii test Gardens as well as some of the specimens as contained in as of March 6<sup>th</sup>, 2015.



**Hawaiian Native Plant Test Garden**

There are so many species to see in the garden that to include them all would be impossible here. I have included a few images below of some other species growing in the garden.



***Acacia koaia*; a native to the Hawaiian Islands, although not yet listed by the USFW this plant is listed by the IUCN as Vulnerable. [2]**

Frequent drought conditions are common place events in California. In San Marcos at the main campus it is rare to receive more than 18 inches of precipitation per year. As a result water management strategies are a significant concern and played a major role in the garden design. Many of the plants have bubblers that irrigate only them on an as needed basis. This minimizes wasted water in the large expanses where lava rock was used as ground cover/mulch.



***Sesbania tomentosa* in the Greenhouse, summer 2014**

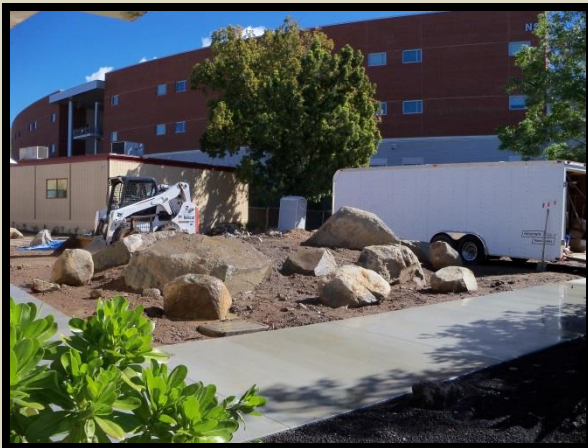


***Sesbania tomentosa* in Polynesian Garden, early December 2014**



Oddly, one that was planted in the late fall of 2013 died in March of 2014. Although this may have been from a lack of irrigation issue after the plant was fertilized. Two more were planted in the spring of 2014. At first these both showed promise. Thankfully, one is still alive and currently has seed pods on it, while the other died a few months after planting. Possibly due to the issue that killed the first.

Currently there is a plan to expand the Polynesian garden this year with many more spectacular plants that are currently in the nursery. We also hope to harvest rain water off the building in the background and store it in an in-ground cistern and use it to fill a water feature as well as water some of the plant material. [3]



Site of Polynesian Expansion Garden

## **Educational Outreach**

Growing T&E plants is a great undertaking and it comes with a responsibility to share your knowledge and findings with others, as well as take advantage of educational opportunities when they arise. Ex-situ and In-situ conservation efforts are important, but so is educating the public why we botanical institutions do the work we do. The intent of growing these species on campus first and foremost

was to create a unique garden that would showcase plants that are in peril from Hawaii and Greater Polynesia.



An example of the garden plant labels

Each species when they are planted in the garden are given a plaque or label. These labels provide some basic information concerning the plant. The scientific name of the plant is given, as is the plants common name (often in Hawaiian or another Polynesian language), the place of origin, botanical family and the IUCN Red List status or USFWS listing status. By giving visitors insight as to what they are looking at, these labels help to educate the public and have the effect of engaging them in thought and further discussion.



## Conclusion

The opportunity to grow unique and rare plants such as the Hawaiian T&E species listed above has provided us new insight to their cultural requirements and tolerances. Although we have had success with some species, we have also had failures with others. Our last minute decision to hold back seeds of some species for later plantings seems to have been a wise decision, as we might have otherwise lost more seeds and seedlings to some of the problems listed above. Now that we have the much needed firsthand knowledge of each species needs, genetic restrictions and tolerances, we have a better chance at successfully cultivating the remaining seeds.

As we move forward in our efforts to grow many of these rare and unique species we will no doubt continue to learn more about their adaptability and survivability in new habitats. This information may help in conservation efforts, but will at least provide us with an opportunity to share our discoveries with others. And no doubt for some species who can adapt to California's climate, they will have the chance to serve as ambassadors for conservation to the students, staff, faculty and the community.

## Bibliography

- [1]  
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- [2]  
The IUCN Red List of Threatened Species. Version 2014.3. <[www.iucnredlist.org](http://www.iucnredlist.org)>. Downloaded on **03 March 2015**.
- [3]  
<http://ag.arizona.edu/pubs/water/az1052/harvest.html>



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**WE-8721A -Antonio Rangel**

A handwritten signature in blue ink, appearing to read 'Antonio Rangel', is written over a white rectangular background.

**Date: March 10, 2015**