The Trials and Tribulations of Horticultural Design in a Butterfly House at a Public Garden

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Introduction

Everyone knows in a glass house full of butterflies, providing enough food for all individuals is a priority. But being part of a public garden where every planted space has a horticultural mission some of the priorities can be lost in translation. Is it possible to have horticultural diversity but still provide enough nectar for several hundred butterflies? Since taking over management of the horticultural aspects of the Christina Reiman Butterfly Wing at Reiman Gardens we have converted our landscape to almost exclusively nectar plants while still fulfilling the ideals of horticultural design. Along the journey we had met several challenges, some successful, some not.

Background

When I was hired in 2012 I began to assist with some of the plant maintenance in the Wing such as pest scouting, deadheading, and supplemental watering as needed. I have a degree in horticulture so I know what is required for plant care so I took it upon myself to help out. I also was more aware of the condition of the plants because I am in and out of there many times a day to take care of entomology tasks. Eventually I took over the management of the plant care completely. It is just easier and makes more sense for the entomology staff to take care of things because we are constantly in the space. We have just adjusted our daily schedule to include the plant care and maintenance as part of our regular tasks. We typically water the entire space three times a week and spot water in between as needed during the summer. On Mondays I make a list of what needs pruned and that work gets done in the afternoon or on Tuesday morning before our weekly trip to the incinerator at the Vet College at Iowa State. This allows us to keep up with pruning caught up and we don't have to find spaces to hide bags among our plants. They just get double-bagged and removed the same day. Minor pruning and deadheading is something we do when we have extra time or if we are working in the Wing and there are no visitors present.

Goals

The written goal or mission of the flight house in the document for the entire property is: 'To display tropical and native butterflies among a backdrop of tropical plants.' Nathan Brockman and I changed this goal slightly to this: 'To display tropical and native butterflies among a backdrop of tropical plants that provide nectar atleast once per year unless they are located in the no-fly zone.' In an area that is only 232.26 sq. m. and houses 400-800 butterflies year round it is

important to the health those individuals to make sure that sufficient nectar sources are available at all times.

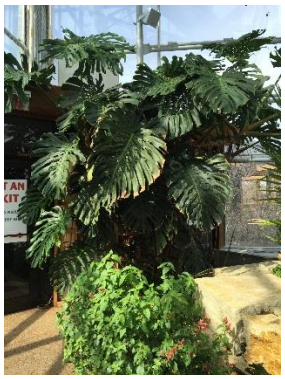
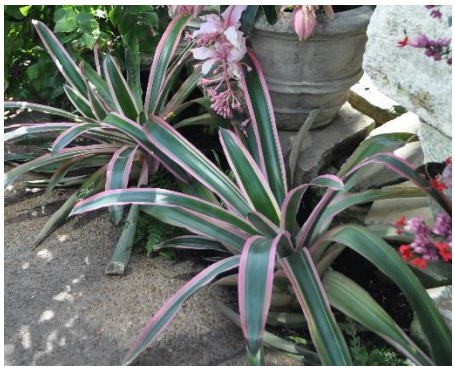
Methods

In March 2013 we did plant renovation for approximately 2/3 of the space. We took out some large overgrown trees and replaced them with shrubs, smaller ornamental trees, and tropical plants that would allow more sun into the space and increasing blooming of the plants. I worked with the indoor horticulturalist on the design and the plant list for ordering. We removed a large traveler's palm, *Ravenala madagascariensis*; pitch apple, *Clusia rosea;* and monkey puzzle tree, *Auracuria auracuria.* Some things that were added were Turk's cap, *Malvaviscus arboreus* and black bamboo, *Gigantochloa atroviolacea.* These are two examples of plants that were introduced and then later removed. The Turk's cap bloomed but was never utilized by the butterflies. The black bamboo grew quickly and filled the space as we intended but had to be removed because it was being used as a hostplant by purple mort bleu, *Euryphanis polyxena*. Other plants that have been removed because they failed to provide nectar for the butterflies are chenille, *Acalypha hispida;* glorybower, *Clerodendrum speciosissium;* and various foliage plants.

As plants were removed and replacements were chosen, I tried to make sure that I kept in mind some of the aspects of design that would help keep the landscape interesting and visually appealing to visitors while fulfilling the needs of the butterflies. Because we are permitted for over 900 species of Lepidoptera it is sometimes challenging to find new plants that can be introduced to the space. And even with careful research in determining that a species is not a hostplant it is always helpful to have a back-up plan, as we found out with the black bamboo. All flight houses have that short list of the best nectar plants, like lantana and pentas, but sometimes it is hard to avoid overuse. The great thing about the horticultural trade is that new cultivars are always being developed. Using different cultivars and forms of the same species allows one to use the same plant species throughout the landscape without the appearance of overuse. In our flight house I have several jatropha, Ixora and porterweeds. The jatropha are pink and red but are grown as small shrubs, a tall hedge and in standard (tree) forms. This allows a different visual experience and also provides accessible nectar at different heights for the butterflies. The Ixora are actually two different species; one has small leaves with yellowish orange flowers and the other has large leaves with large clusters of flame orange flowers. The porterweeds are also four different species, each with a slightly different appearance and flower color. Being able to plant different forms, colors, and cultivars also helps to avoid the 'carpet bed' look.

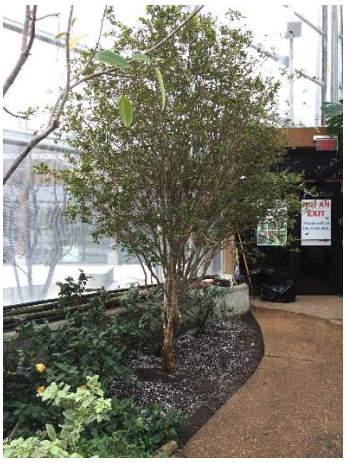
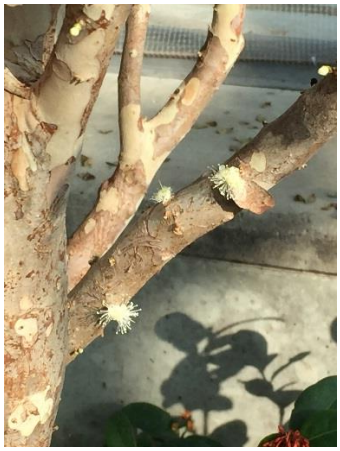
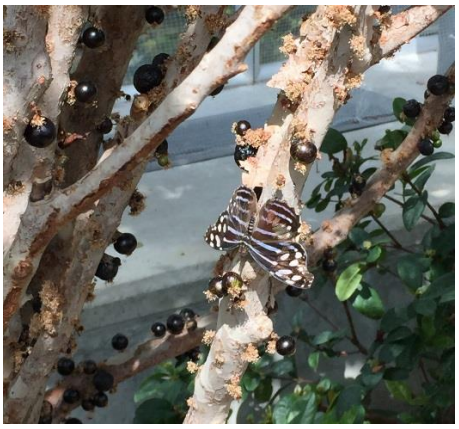
Another way I have tried to make the Butterfly Wing visually appealing to the visitors is to maintain as much diversity as possible and introducing interesting, unique specimens while still fulfilling our goal for optimum nectar. There are 44 different species of plants from 22 families and there are plants from 5 continents. [Table 1] Horticultural design talks about texture in the landscape, this refers to the visual texture (fine, bold, coarse) rather than the tactile. Among the 44 species that are planted in the Wing there is a wide range of textures represented. Some of the specimen plants, mostly trees, which have been introduced to add interest to the exhibit are

Brazilian Grapetree, *Myrciaria cauliflora;* rainbow eucalyptus, *Eucalyptus deglupta;* flamboyant tree, *Delonix regia;* and Holywood lignum-vitae, *Guaiacum sanctum.*

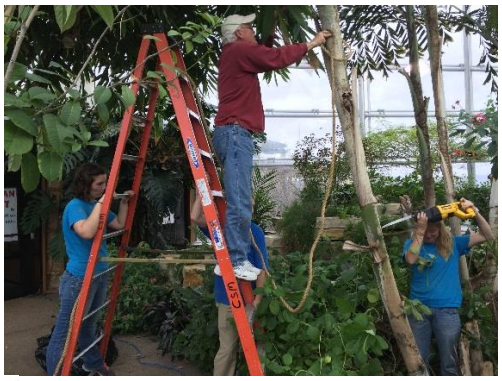
Plant Specifics

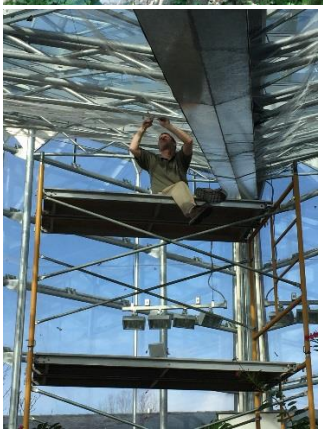
The Brazilian Grapetree, *Myrciaria cauliflora;* was planted to replace the black bamboo that had to be removed from the exhibit. It is located near the entrance just beyond the 'no-fly' zone. It is native to Brazil, Paraguay, Argentina and Bolivia. This is a small, slow-growing tree that has small leaves and smooth multicolored bark. It flowers and fruits multiple times a year with the flowers and fruits growing right from the main trunk and branches of the tree. The flowers provide a nectar source for the butterflies and the edible fruits can also be used for the butterflies as they rot. Our Grapetree has bloomed and fruited three times since being planted in late February. It is very striking and has been a great attraction for our visitors.

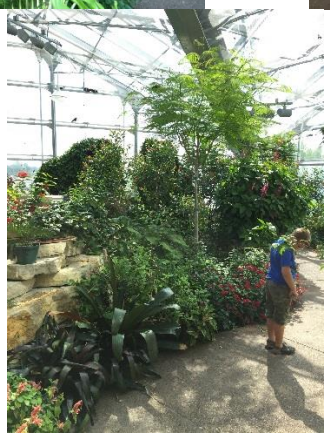




In the center bed where previously we had a fishtail palm, *Caryota mitis;* we have replaced it with a flamboyant or Poinciana tree, *Delonix regia.* The fishtail palm was something that required constant pruning to prevent the new fronds from growing up through and damaging the netting that keeps the butterflies away from the glass and the return vent of the air handler. It took us 3 days to cut down the plant, remove the root ball and put up scaffolding to repair the damage to the netting. The hope is that the flamboyant tree will not cause the same issues. Its growth habit tends to be wider than it is tall and should provide a nice canopy but still allow

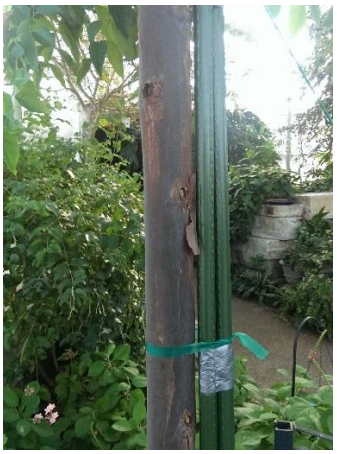
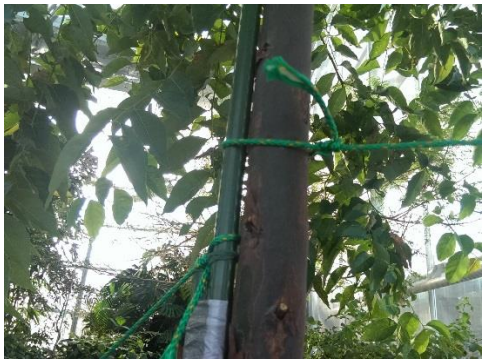
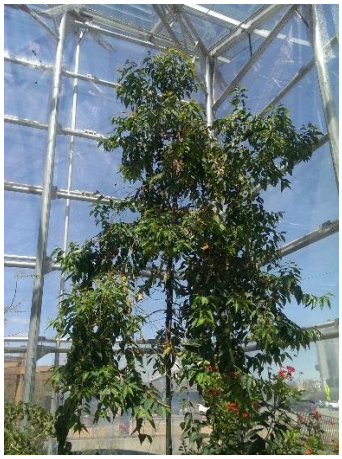
some light to the plants growing around the base of the tree. The flamboyant tree is native to Madagascar where it is considered to be endangered, but this species has been widely cultivated in tropic and sub-tropic regions worldwide. It has bipinnately compound leaves which makes it significant botanically as part of Reiman Gardens' plant collection but for the butterflies it will bloom once a year for a long period of time to provide a good source of nectar.







The rainbow eucalyptus, *Eucalyptus deglupta;* is a specimen tree that has taken some extra work but has grown to be something that has great form and function. It is native to Asia and Africa where it can reach heights of 60.96 meters. It grows very fast, up to 3 meters in one year. Our tree was about 1.5 m. tall at planting in March 2013 and is now about 6.096 m. tall in 2016. Because the tree grew so fast there was lots of staking and stabilization using ropes to help keep the tree growing vertically until the trunk grew large enough to support the weight and height of the canopy. I still use some selective pruning to insure that that canopy weight is balanced so it doesn't lean in one direction. I have removed the apical growing point because it has reached maximum height for the space but it continues to send out new grow and the trunk continues to grow in diameter. It has a bit of a weeping appearance but I believe this is because it is being grown indoors and doesn't have to contend with outside weather conditions. We did have a few issues with aphids but there is now an established colony of parasitic wasps that keep them under control.

The Holywood lignum-vitae, *Guaiacum sanctum;* is a small specimen tree and may remain that way for some time as it has a slow growth rate. It is native to Central America and the Greater Antilles. It is listed as endangered in some of its native habitats but is easily available in the horticultural trade. It has curled or almost twisted look to the trunk and main branches. The canopy has a horizontally layered look. It blooms with clusters of purple flowers intermittently throughout the year and has bright red-orange seeds. The wood from the tree is very dense and sinks in water. It has been used to make bowling balls, propeller shafts for steamships and wooden mallets. Because of the slow growth habit it was under planted with porterweed, a jatropha hedge planted behind it and golden Thyrallis to the sides.

Volunteers and Visitors

Throughout the transition of our planting we have gotten many positive comments from our volunteers and visitors. At first I dealt with the volunteers asking what they should talk about as we were removing the fishtail palm but all they needed was a little education about our new goals and new plants. As soon as they understood the 'what and why' of the changes they were all excited. In May 2016, I lead a Behind the Scenes tour of the Butterfly Wing plants, many of our regular volunteers were grateful to have the opportunity to learn and ask questions about the plants. They really appreciate being able to answer questions for the visitors and the more they

know the more they share. The visitors love all of the bright colors and the sweet smell of the flowers as well as the butterflies.

Conclusion

It has meant extra work and training for the entomology students but I think the new landscape of the Christina Reiman Butterfly Wing provides interest and visual appeal for all of our visitors but most importantly it provides substantially increased levels of nectar opportunities for our butterflies while maintaining key aspects of horticultural design.

Table 1. Plants of the Christina Reiman Butterfly Wing

Common Name	Scientific Name	Origin	Family
Adiantum peruvianum	Silver Dollar Maidenhair	South America	Pteridaceae
Aechmea 'Chocolate'	Bromeliad	hybrid	Bromeliaceae
Aechmea 'Mend'	Bromeliad	hybrid	Bromeliaceae
Aglaonema 'Emerald Holiday'	Chinese Evergreen	hybrid	Araceae
Alcantarea imperialis	Imperial Bromeliad	Brazil	Bromeliaceae
Aloysia virgata	Sweet Almond Bush	Argentina	Verbenaceae
Blechnum gibbum	Dwarf Tree Fern	South Pacific Islands	Blechnaceae
Buddleia davidii	Butterfly Bush	Asia, Africa, and the Americas	Scrophulariaceae
Caesalpinia pulcherrima	Peacock Flower	Central and South America	Fabaceae
Caryopteris sp.	Blue Mist	Asia	Lamiaceae
Centratherum intermedium	Brazilian Buttonflower	Brazil	Asteraceae
Clerodendron thomsoniae	Bleeding Heart Vine	West Africa	Lamiaceae
Codiaeum variegatum	Croton	Asia, Australia, South Pacific Islands	Euphorbiaceae
Cyrtostachys renda	Sealing Wax Palm	Malaysia	Arecaceae
Delonix regia	Flamboyant	Madagascar	Fabaceae
Echinacea paradoxa	Bush's Coneflower	USA	Asteraceae
Eranthemum pulchellum	Blue-sage	Asia	Acanthaceae
Eucalyptus deglupta	Rainbow Eucalyptus Tree	Asia and Africa	Myrtaceae
Euphorbia punicea	Jamaican Poinsettia	Jamaica	Euphorbiaceae
Galphimia glauca	Golden Thryallis	Mexico and Central America	Malpighiaceae
Guaiacum sanctum	Holywood Lignum-vitae	Central America, Greater Antilles	Zygophyllaceae
Heliotropium arborescens	Heliotrope	South America	Boraginaceae
Impatiens walleriana	Impatiens	Africa	Balsaminaceae
Ixora coccinea 'Maui Sunset'	Jungle Flame	Asia and Africa	Rubiaceae
Ixora 'Super King'	Jungle Flame	Asia	Rubiaceae
Jatropha integerrima	Spicy Jatropha	Cuba and Hispaniola	Euphorbiaceae
Justicia brandegeana	Shrimp Plant	Mexico	Acanthaceae
Lantana camara	Lantana	Central and South America	Verbenaceae
Liatris sp.	Blazing Star	North America	Asteraceae
Microsorum diversifolium	Kangaroo Fern	Australia	Polypodiaceae
Mostera deliciosa	Swiss Cheese Plant	Central and South America	Araceae
Myrciaria cauliflora	Brazilian Grapetree	Central and South America	Myrtaceae
Neoregelia 'Green Eyes"	Bromeliad	hybrid	Bromeliaceae
Neoregelia 'Patches'	Bromeliad	hybrid	Bromeliaceae
Odontonema strictum	Firespike	South America	Acanthaceae
Pentas lanceolata	Egyptian Starcluster	Africa	Rubiaceae
Philodendron erubescens	Blushing Philodendron	hybrid	Araceae

Psiguria ternata	Pink Psiguria	South America	Cucurbitaceae
Psiguria umbrosa	Pygmy Melon Vine	Central America	Cucurbitaceae
Rhaphis excelsa	Lady Palm	China and Taiwan	Arecaceae
Rondeletia leucophylla	Panama Rose	Mexico	Rubiaceae
Rudbeckia hirta	Gloriosa Daisy	North America	Asteraceae
Russellia equisetiformis	Firecracker Plant	Mexico	Plantaginaceae
Sanseveria	Snake Plant	Asia and Africa	Asparagaceae
Sansevieria cylindrica	Cylindrical Snake Plant	Angola	Asparagaceae
Stachytarpheta frantzii	Purple Porterweed	Central America	Verbenaceae
Stachytarpheta jamaicensis	Blue Porterweed	Caribbean	Verbenaceae
Stachytarpheta mutabilis	Pink Porterweed	Central and South America	Verbenaceae
Stacytarpheta mutabilis x Stachytarpheta frantzii	Emerson's Folly Porterweed	hybrid	Verbenaceae
Swietenia mahagoni	Mahogany Tree	USA, Central America, Caribbean	Meliaceae
Verbena bonariensis	Purpletop Vervain	South America	Verbenaceae
Zinnia sp.	Zinnia	North and South America	Asteraceae