

In the Arboretum Sustainability Garden (Fall 2019 & Spring 2020)

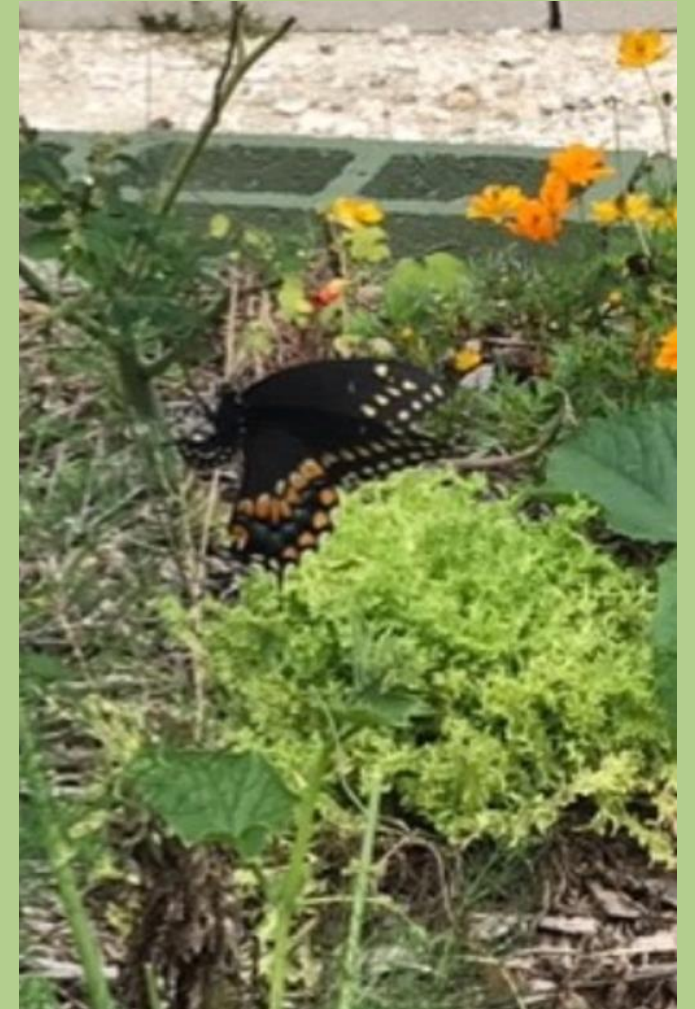
Soil-building



Edibles



Wildlife



Soil-Building in the Sustainability Garden

We are VERY enthusiastic about building healthy soils from materials that would otherwise go to waste. The philosophy is to support diverse and strong soil communities that feed the plants naturally, keep pests in check without chemical intervention, and keep soil moisture levels in optimum range without constant watering.



Hugelkultur using ramial wood:

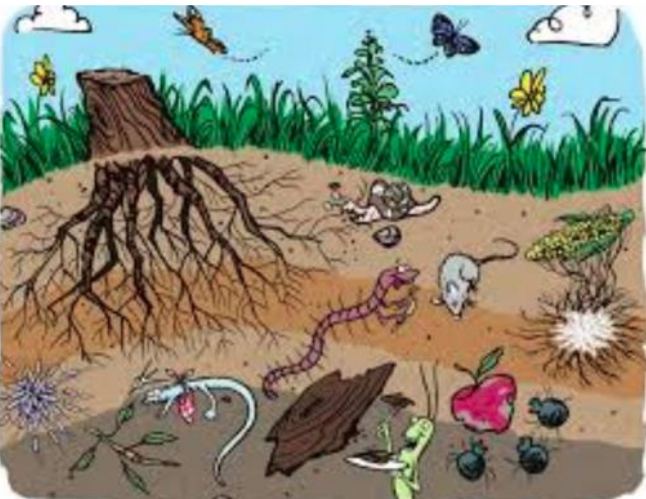
"Hugelkultur" (literally "mound culture" in German) is the practice of burying decaying wood in the soil, which acts as a moisture-retaining sponge, soaking up water from a rain then releasing it slowly over time. "Ramial" wood is small to medium size branch-wood of trees and shrubs. In addition to their hugelkultur function, breakdown of ramial wood pieces feeds the soil. Because they are the most exposed part of the tree to light and the most actively growing, ramial wood branches contain 75% of the minerals, amino acids, proteins, phytohormones and biological catalysts found in the tree. We collect already-decomposing ramial wood that falls from upper branches of the trees in the Arboretum

In Situ composting using Recycled materials

Soil amendments

are materials that, when added to the soil, increase its fertility and functionality. Instead of buying commercial soil amendments, we creatively find sources for useful materials that would otherwise go to waste.

Members of the soil community (insects, earthworms, bacteria & fungi) break down organic matter and release nutrients to the plants.



Newspapers from the UM library provide a moisture-retaining bottom layer that also smothers weed roots & seeds.

Coffee grounds from Starbucks & Einstein Bagels on campus provide slow-release nitrogen as well as improve soil structure.

Banana peels from the Wednesday Farmer's Market are a great source of potassium.

Ashes from a backyard barbecue are also rich in potassium.

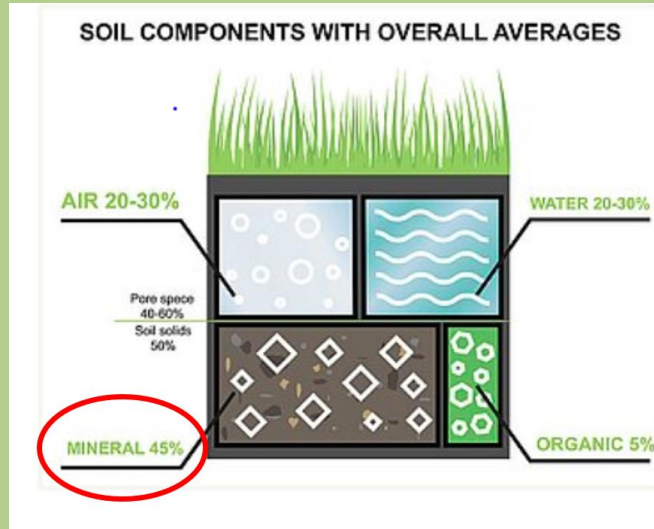
Phosphorus in babyback rib bones (charred to weaken structure) is "mined" by fungi and traded to plants for sugar.

Seaweed washed up onshore provides many micronutrients.

Rabbit manure from HARE (Houserabbit Adoption Rescue & Education) is an overall natural fertilizer.



*We're soil-building from scratch ... soils need a **mineral component** in addition to organics ~*



What if we simulated a river flood plain using sands collected from around the world?



Minerals in Soil : the UM Sustainability Garden Global Watershed project

ECS 301 Fall 2019

Phosphorus P
Potassium K

Plant Secondary macronutrients

Calcium Ca
Magnesium Mg
Sulfur S
Iron Fe

Plant Micronutrients

Copper Cu
Manganese Mn
Zinc Zn
Boron B
Molybdenum Mo
Chlorine Cl

Additional Human Micronutrients

Cobalt Co
Chromium Cr
Iodine I
Selenium Se

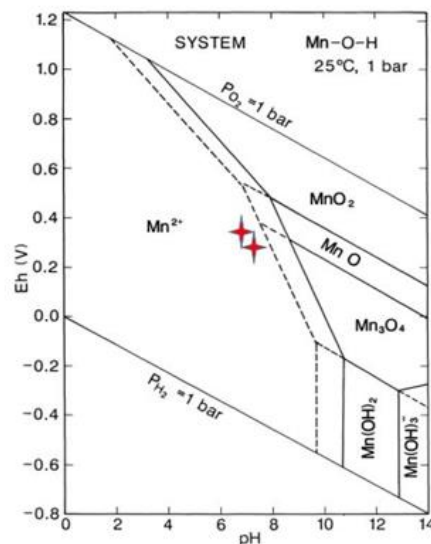


Fig. 49. Eh-pH diagram for part of the system Mn-O-H. Assumed activity for Mn = 10^{-5} . See text for discussion



Sem/EDS



HCl/
Magnet Test



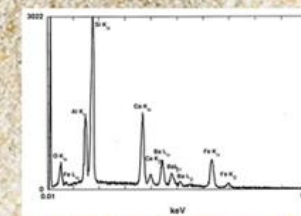
Binocular
Microscope



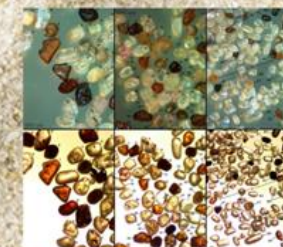
Geological
Context



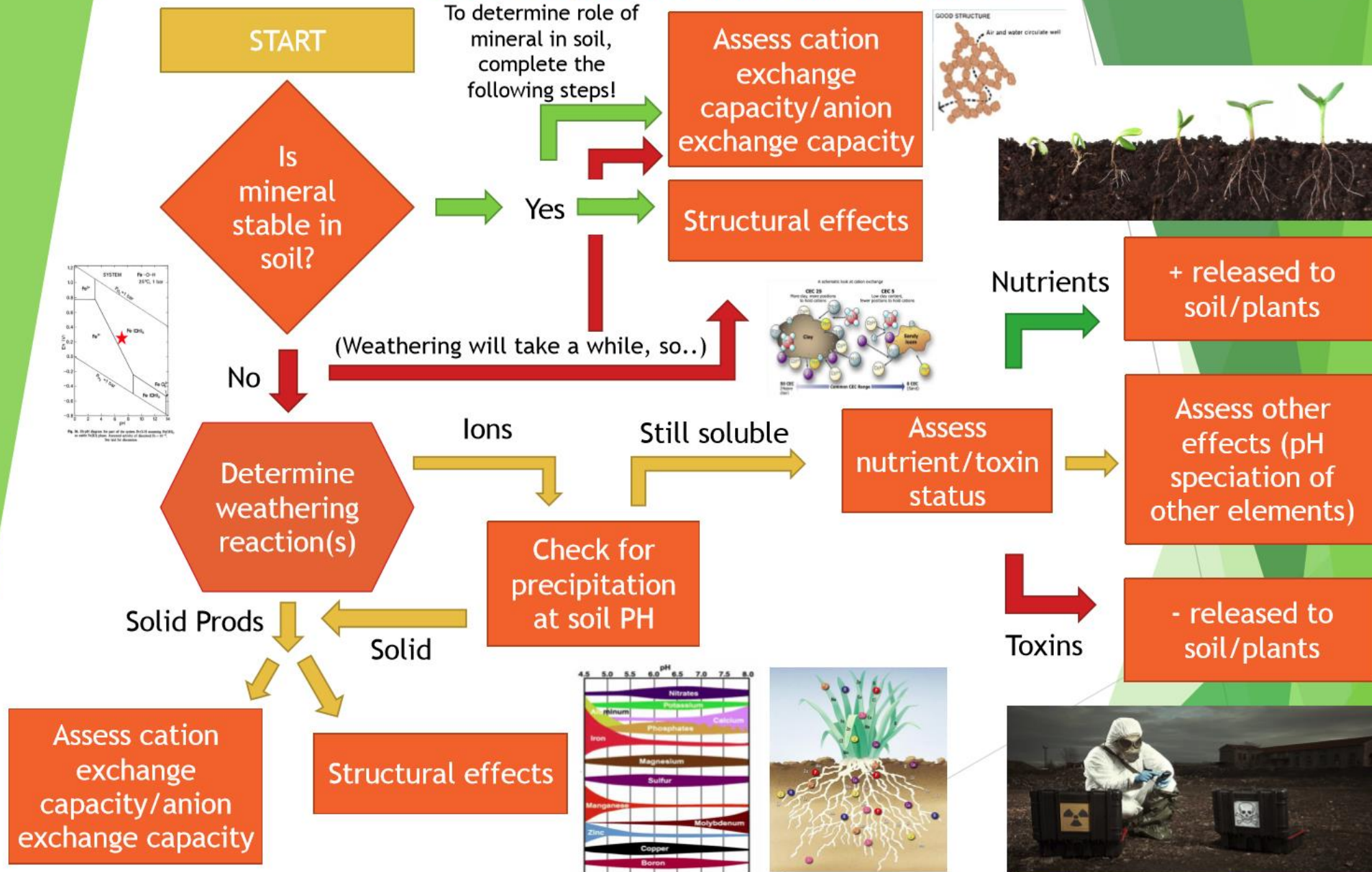
Mineral
Identification
Chart



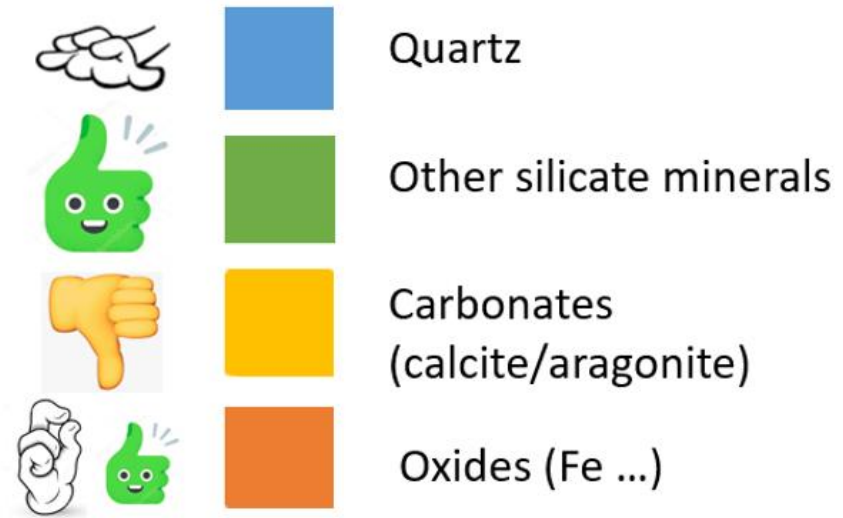
Refractive
Index



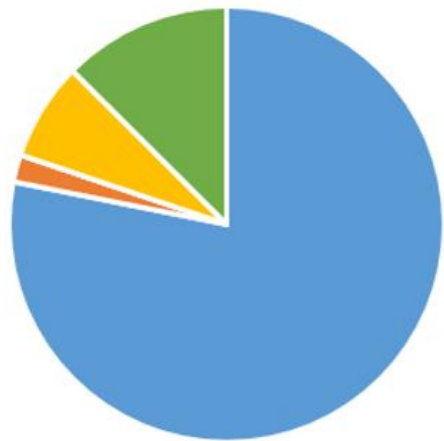
Kyndall Beal



How do these break down according to locations?



Sum All Locations



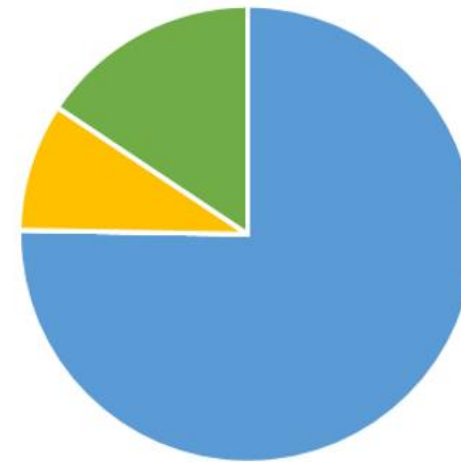
Florida Beaches



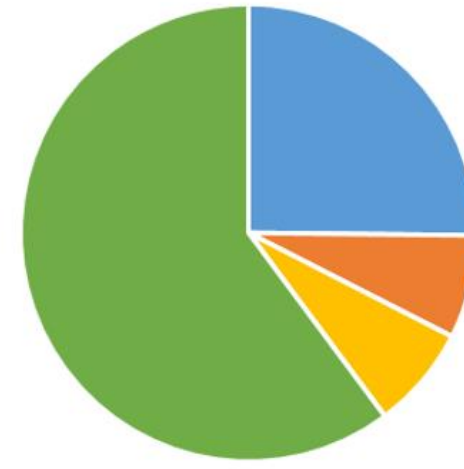
Beaches Not Florida



Rivers



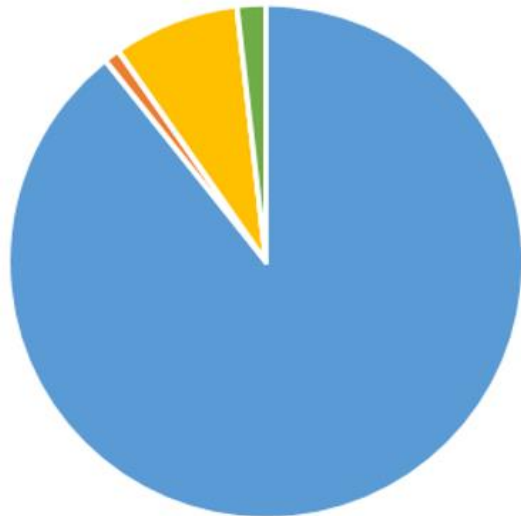
American Deserts



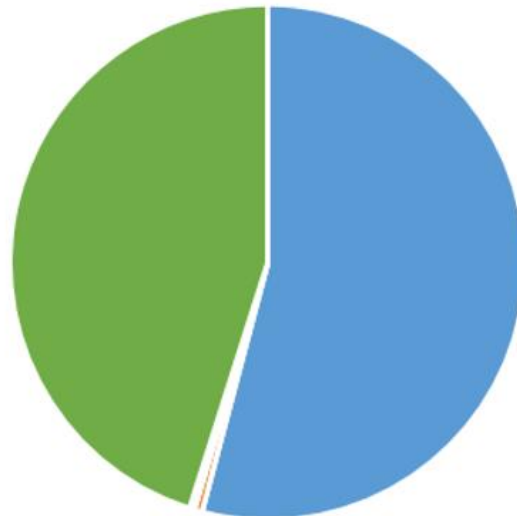
How do these break down according to sand color?



White + Beige sands



Pink sands



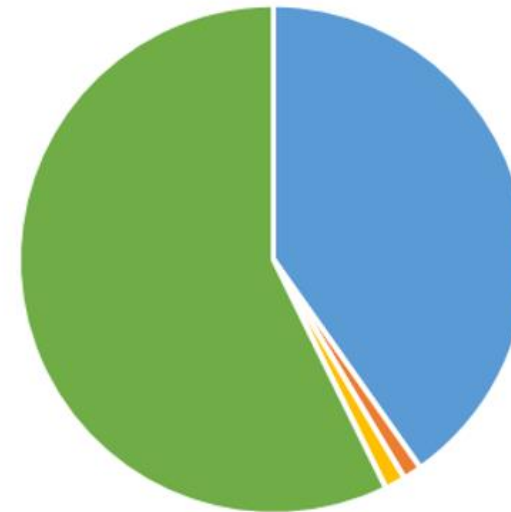
Quartz

Other silicate minerals

Carbonates
(calcite/aragonite)

Oxides (Fe ...)

Black & Dark Grey sands



Vine Planters



Edibles ~



Trial Beds



Square Foot Garden



2. Euphorbiaceae & Other Malpighiales
3. Gymnosperms
4. Moraceae & Other Rosales
5. Sapotaceae & Other Ericales
6. Fabaceae
7. Bignoniaceae
8. Myrtales
9. Basal Angiosperms
10. Sapindales
11. Malvales
12. South Florida Natives
13. What is a Tree?
14. Maya Cocoa Garden



John C. Gifford Arboretum Trail of Edible Plants

University of Miami,

2019 - 2020

Fall 2019: Team of students collate list of all edible plants in Arboretum; fact-find re. uses and reported fruiting time of year in S Florida. Also construct "Edible Trail".

Spring 2020: Students emplace stickers on plant labels ... Also begin biweekly phenology observations ...

Small stickers present on the tree/shrub labels indicate what part is eaten/used:



fruits and/or seeds



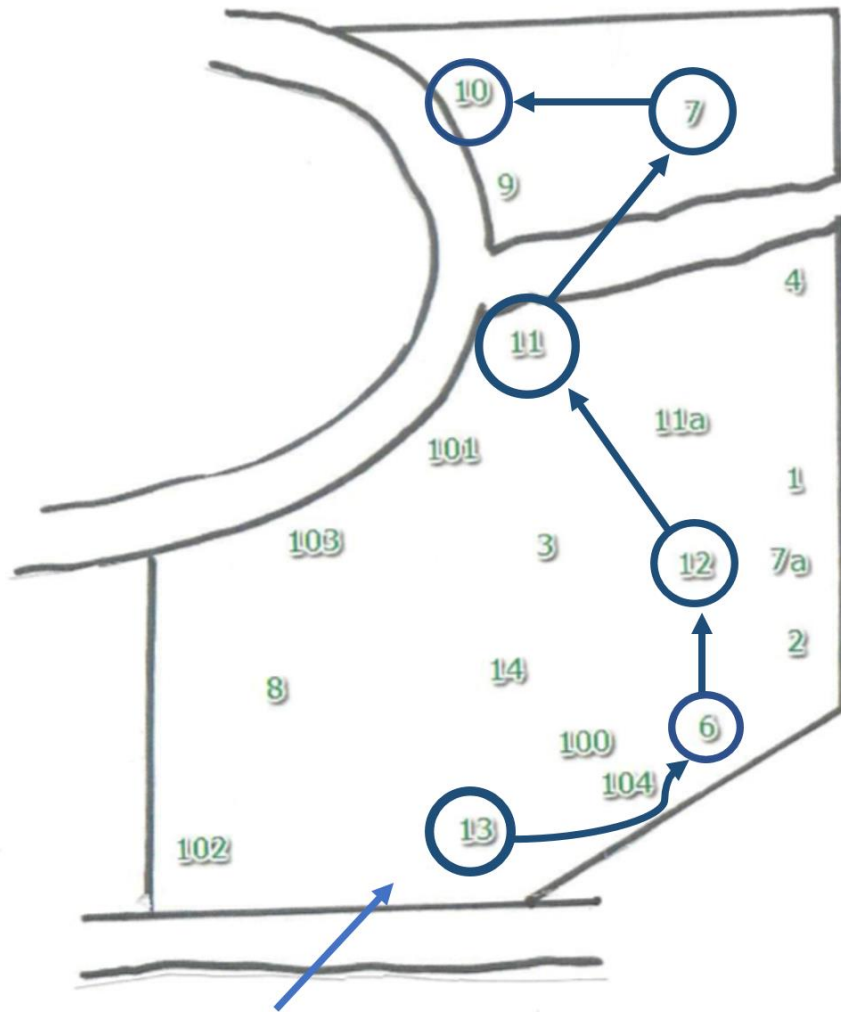
leaves



roots, stems, or bark

There are many plants in the Arboretum with fruit that should NOT be eaten; look for the apple sign!

Exhibit 8 – Myrtales



Where to
head next ...

Num ber	Genus and Species	Common Name	Edible Descriptions	Flowering	Fruiting
13	<u><i>Syzygium malaccense</i></u>	Malay Apple/Jambolan	Fruit is oblong-shaped and dark red in color. The flesh is white with bland but refreshing. Jam is prepared by stewing the flesh with brown sugar and ginger.		April
6	<u><i>Eugenia brasiliensis</i></u>	Grumichama	Small fruit have pleasant taste that is a cross between guava and grape. Dark purple skin is high in antioxidants.		Spring
12	<u><i>Punica granatum</i></u>	Pomegranate	Cultivated for centuries, fruit is a round berry that contains 200 or more seeds that are surrounded by a flavorful pulp that forms a juicy, seed coat.		Year - round
11a	<u><i>Pimenta racemosa</i></u>	Lemon Bay Rum	Leaves used as aromatic flavoring		
11	<u><i>Pimenta dioica</i></u>	Allspice	Leaves and seeds used as an aromatic flavoring		
7	<u><i>Eugenia uniflora</i></u>	Surinam Cherry	Small, red, pumpkin-shaped fruit is high in antioxidants and Vitamin C; clove-like flavor when bright red and fully ripe.		Fall through Spring
10	<u><i>Myraciaria cauliflora</i></u>	Jaboticaba	Fruit is a thick-skinned, purple berry with an astringent skin that encases a sweet, white flesh and relatively large seeds.		Year - round

Biweekly Edible Trail walks (notes + photos ...)

Flushes Flower buds Flowering Immature Fruit Mature Fruit



Goal: Arboretum
Phenological chart

Population	J	F	M	A	M	J	J	A	S	O	N	D
Tangulbei	♠●	●	○	●♣	●♣♣♠	●♣♣♠	●♠	○	●	●♣	●♣♣♠	●♣♣♠
Kampi Ya Samaki	♠●	●	○	●♣	●♣♣♠	●♣♣♠	●♠	○	●	●♣	●♣♣♠	●♣♣♠
Kimalel	♠●	●	○	●♣	●♣♣♠	●♣♣♠	●♠	○	●	●♣	●♣♣♠	●♣♣♠
Lake Bogoria	♠●	●	○	●♣	●♣♣♠	●♣♣♠	●♠	○	●	●♣	●♣♣♠	●♣♣♠

- Leafing
- Complete leaf fall
- ♣

Flowering
- ♣♣

Peak flowering
- ♠

Fruiting
- ♠♠

Peak fruiting

(a) Monthly phenological events

Planting for Wildlife ~ Butterflies

(26 different plants for larval and nectar needs)



Planting for Wildlife ~ Butterflies

(Showy Rattlebox ... trying to attract Ornate Bella Moth)

*(some already
observed ...)*



