

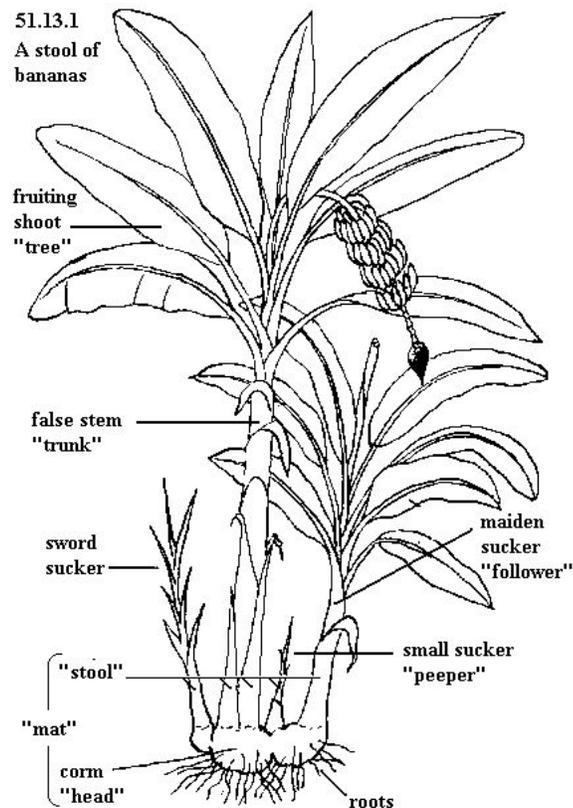
## How to a Complete Diet with Permaculture Principles: Tropical Subsistence Gardening. 24 part class series

### Part 10 of 24 **Staple Tree Crops (carbs): Bananas & Plantains/Mai'a:**

Learn to grow and use this super productive food plant from yard to table, including mulching, thinning, disease prevention, and more. Find out how to cook green bananas!

**Acknowledgements:** A special thanks to Hawaiian Sanctuary, County of Hawaii Research and Development and all others involved to make these classes a reality! We are still looking for support to complete and enhance this amazing FREE program. <http://hawaiiansanctuary.com/donate>

**Introduction:** Staple crops are eaten frequently and make up the base of our diet supplying a large percentage of our energy and nutrient needs. In temperate climates these are often grains while in the tropics they are often tree crops and/or root crops. Bananas are the 5th most grown staple crop worldwide. Cooked and eaten while still green they are like a potato and can be used in a myriad of recipes. Bananas or “mai'a” were one of the crops the polynesians brought with them to Hawaii also known as a “canoe crop”. Many rare Hawaiian varieties of bananas, found nowhere else, are still available today. Growing them = preservation.



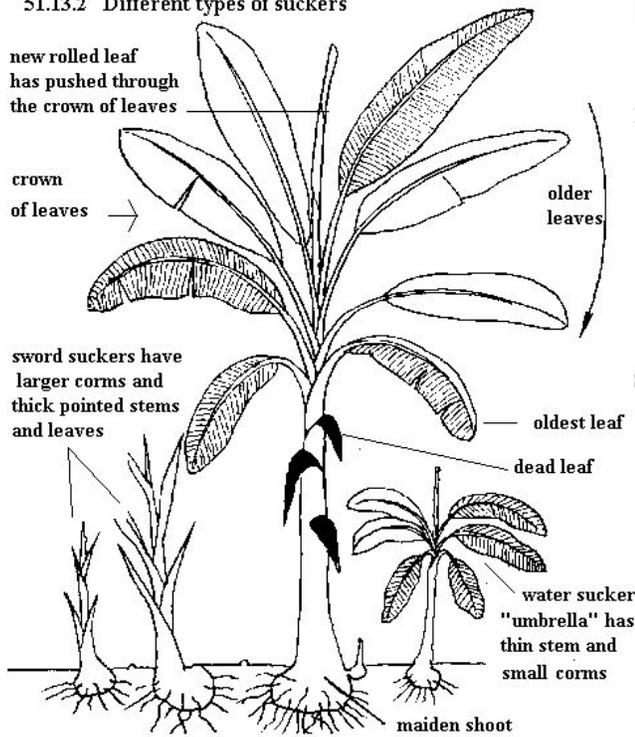
**Anatomy of a banana plant:** Bananas are not technically a tree but are in the grass family. The trunk or “pseudostem” is actually made up of succulent (not woody) leaf sheaths nested around each other. Once a particular trunk has fruited it will die back to the ground, the underground part, also termed the “corm” remains alive and sends up new shoots that may become new fruiting trunks.

**Types of Bananas:** There are **tall**, **semi-dwarf**, and **dwarf** banana varieties ranging from 8ft to 30ft tall. Because of this wide range of sizes, different types of bananas can fill different niches in our food forests. There are around 1000 varieties world wide, of which 100 or so are found in Hawaii. Of all the varieties “**dwarf apple**” aka “dwarf Brazilian” is by far the most widely grown here due to its productivity (can bear fruit within a year of planting) and disease resistance. Other popular varieties are “dwarf blue ice cream”, “silk fig”, “lady finger”, “dwarf Chinese” aka “Cavendish”, and “Dwarf Namwah”. Dwarf varieties are much easier to harvest and less prone to wind damage. Some varieties may take 1.5 to 2 years to produce. There are also “**cooking**” types which tend to be less sweet and more starchy and “**dessert**” types which tend to be sweeter. Plantains are a member of the banana family and are less sweet and generally cooked.

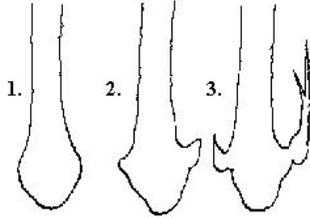
**Niche in a Food Forest:** depending on size, bananas can be overstory or understory, can take partial shade and are fast growing, are often planted between establishing fruit trees to get a quick extra yield of bananas and provide protection to the young sensitive trees, and can be grown in the partial shade near large fruit trees. They can also handle climbing vines growing on them like chayote or

cultivated air potato. Edible hibiscus is a good companion as they also like heavy mulch and the shade from the bananas.

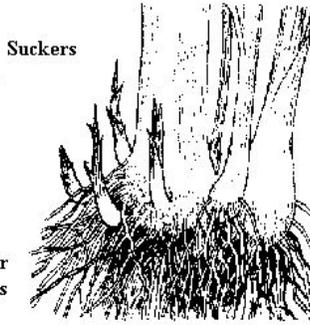
51.13.2 Different types of suckers



Suckers



Vertical section showing a sucker growing from a mother corm



banana stool with many suckers growing from a mother corm

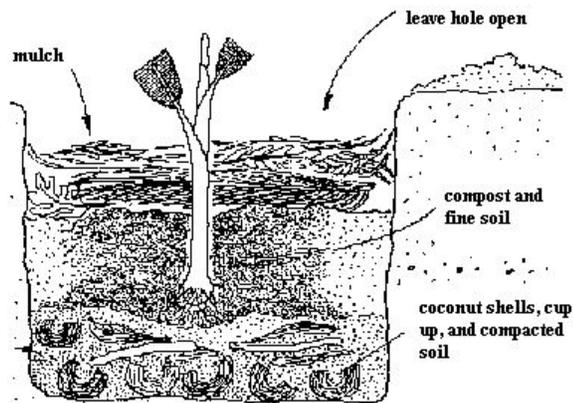
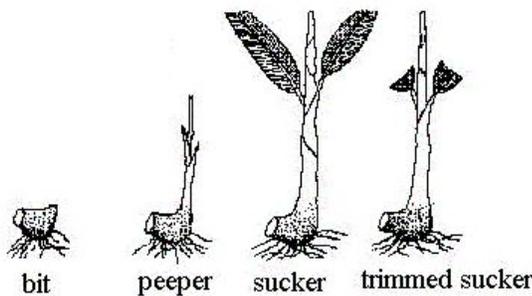
**Propagation:** Most bananas are seedless. They are propagated through division of the suckers or pieces of corm (root). It is very important to start with strong disease free propagation material so that the new plant will be healthy and fast growing. The ideal start, or "**keiki**" ("child" in Hawaiian) is called a "**sword sucker**" they have a wide base and narrow leaves and are ideally around 2 to 4ft tall. "**Water suckers**" are poor starts and may take twice as long to produce. Maiden suckers which have been cut back are the second best. A large metal digging bar or "**o'o bar**" or a very strong sharp shovel is used to separate the

sucker from the mother plant. The roots and corm are inspected for signs of pests and disease. Healthy roots are white and the corm is often pink and clean without black spots. Plantations sometimes trim all the roots and outer surface of the corm back to make sure there are no pests and dip for 5 minutes in a 10% bleach solution to sterilize.

**Planting:** Keiki should be planted at least 8-10 ft apart, in holes 1-2 feet deep and wide amended with 2-4 cups of aged chicken manure or comparable fertilizer. Put half the fertilizer in the hole and mix with soil, sprinkle the other half around the plant after planting. They should be planted at about the same depth as they came from. Halved coconuts may be buried at the bottom of the planting hole to retain moisture, especially in dry areas.

51.9 Planting banana

51.10 Planting Material



**Cultivation:** Bananas are "heavy feeders" meaning they want lots of mulch and or fertilizer. Mulch can be piled up around the stems as it will not rot them like it would an actual tree's trunk. They also like lots of water, which

mulch helps to conserve. Low spots may be beneficial due to increased water but standing water may drown or rot plants. **Thinning:** bananas are often thinned to 1 mother plant, 1 daughter (maiden sucker) shoot and 1 keiki, per clump. Additional stems are removed, cut at ground level (they will often try and grow back) or dug out (more effective) and can be replanted elsewhere. Thinning generally increases production, rack size, and limits the size of the clump.

**Banana Diseases / Pest Control:** **Corm weevil** beetles larva burrow into corms and weaken the plants. Black burrows in the corm are obvious when the new keiki corm is dug up, cleaned, and inspected. Carve out any black spots from the keiki. Moving disease free keiki to a new location is beneficial. Weevil traps can be made from a halved banana stem section laid face down, beetles congregate there and are collected and destroyed. There are several leaf diseases, such as **black sigatoka**, dead and diseased leaves (50% brown or more) should be cut from the plant and often recommended to be mulched away from the plant or burned. Though often locally these leaves are just mulched back around the plant with acceptable results. “**Bunchy top**” is a serious viral disease to which no cure is known. It is spread by aphids, so if it shows up in your bananas you must first kill all the aphids on the plant using water with dish-soap in a sprayer. Pay special attention to crevices. Then the whole clump or mat must be destroyed. This can be done by digging out entire plant and chopping and drying the corm to kill it. Roundup injection is another way recommended by the Hawaii Department of Agriculture. Bananas which have been recently infected may not show signs of disease. Be very careful of where you are getting keiki. Act aggressively at first signs to contain the virus from spreading.

**Harvest:** Racks are generally harvested when one banana starts turning yellow. Cutting a small wedge out of the front side of the stem and slowly making it deeper allows the rack to be lowered slowly. If allowed to come crashing down the bananas may be damaged. On dwarf bananas single hands may be harvested from racks within reach to spread out the harvest.

**Usage:** Green bananas can be cooked and used like a potato, boiled, baked, mashed, fried, etc. Green bananas may be hard to peel so the simplest way to cook them is to wash, cut off both ends, slit peel down one side and boil with the peel still on. Adding a splash of oil will keep the cooking pot from getting sticky from the banana sap.

**Storage and preservation:** Green bananas can be stored in the refrigerator for up to two weeks so that they do not ripen and can continue to be cooked green. Ripe bananas can be peeled and frozen, or dried.

#### **Further Reading:**

Banana Project [http://www.uq.edu.au/School\\_Science\\_Lessons/BaProj.html#BaProjHEADING](http://www.uq.edu.au/School_Science_Lessons/BaProj.html#BaProjHEADING)

Banana bunchy top brochures and video <https://www.ctahr.hawaii.edu/bbtd/>

<https://www.ctahr.hawaii.edu/bbtd/downloads/BBTV1.pdf>

Banana Species Profile for Pacific Island Agroforestry

<http://agroforestry.net/images/pdfs/Musa-banana-plantain.pdf>

**Homework:** Cook green bananas. Mulch, harvest, thin, or propagate, bananas. Try green bananas in a new recipe if you have already cooked them before, they are great as potato salad, or sliced thin in a lasagna.

#### **Next Week March 23 Part 11. Staple Tree Crops (carbs): Ulu/Breadfruit**

Find out how to propagate, harvest, prune, and cook this amazingly productive Pacific island staple. Ulu is the new potato!

#### **Contact: Malama Aina Permaculture: Edible Landscape Design, Education & Nursery**

We provide consultation, design, install, maintenance, edible plants & work-exchange.

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(Past class notes, registration and links to further educational materials available below)

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