Mālama Learning Center

Lesson: How to Propagate Native Hawaiian Plants

This lesson was created by Mālama Learning Center in collaboration with Ulu A'e Learning Center with funding from the NOAA BWET Hawai'i Program.

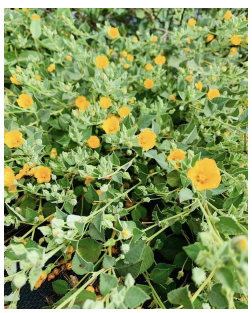
Overview: Native plants are important to Hawai'i's ecosystems arriving to the islands naturally by one of the three W's: Wind, Wings (birds), and Waves or the three M's: Makani (wind), Manu (birds), and Moana (ocean). Native Hawaiian plants are either indigenous (occurring naturally in Hawai'i and other locations) or endemic (found only in the Hawaiian Islands). Native plant ecosystems provide numerous services such as creating habitat for other native species, recharging groundwater aquifers, climate change mitigation and adaptation, and providing important natural and cultural resources for people. Many native plants can be used for multiple purposes such as medicine, food, tools, weapons, lei, dye, canoe and hale building, and much more making their existence a vital part of perpetuating the Hawaiian culture and way of life in the islands. Today, native species are being threatened by invasive species, development, wildfires, climate change, and other human causes. Therefore, it is important to grow more native plants and outplant them in natural areas or in backyards or school grounds to keep them from becoming endangered or even extinct.

The three native plants featured in this lesson are commonly found in drier areas of our islands and are good plants to grow where water is scarce.

Objectives:
Students will learn about three native Hawaiian plants and how to propagate them using various techniques.

Essential Question: Why is it important to learn about the names, mo'olelo, and uses of native Hawaiian plants and how to grow them?

Minutes	Procedures:
5 min	1. **Introduction:** Introduce lesson and activity focusing on native Hawaiian plants. ● Show a live native plant in a pot or a picture of the three native plants on the screen to generate interest/questions before starting the lesson. ● Connect this lesson to your overall unit/subjects.
15 min	2. Instructor will REVIEW and ask questions to assess student understanding before going into the propagation lesson. ● What is a native species/plant? What makes it native? ● How do you think native plants and animals got to Hawai'i? ● Why are native Hawaiian plants important? How do they benefit the environment and people? ● What are some threats to native Hawaiian plants and ecosystems?

15 min	3. Overview the three native Hawaiian plants (show photos of each plant). ● Maʻo (*Gossypium tomentosum*): Maʻo also known as Hawaiian Cotton is a small shrub or tree growing 2-4 feet tall with attractive bright yellow flowers. The maʻo plant is endemic to Hawaiʻi, meaning that it can only be found here and nowhere else in the world. Maʻo does not need a lot of water and was once common in dry, rocky, coastal sites. However, they have significantly declined. The leaves have three-to-five lobes (sections). Maʻo have seed capsules that contain two to four seeds that are covered with short, brown, cotton fibers. The fibers are too short to make cotton fabric, but maʻo was used to breed with the American cotton because of its resistance to certain pests. This resulted in a stronger hybrid plant that saved the cotton industry. The bright yellow maʻo flowers can be used to make lei and a green dye. **Plant Information Source: *Growing Hawai'i's Native Plants* by Kerin E. Lilleeng-Rosenberger  Photo credit: Mālama Learning Center ● ʻIlima (*Sida fallax*): Although very small, the yellow-golden flowers of the ʻIlima are very useful. ʻIlima's tender flowers can be used to make an incredible lei, have medicinal properties, and make great plants to beautify a garden. ʻIlima, the flower of Oʻahu, is a native Hawaiian plant that grows into either a small shrub or a beautiful ground cover (ʻilima papa). ʻIlima can be found growing from the coast to the dry mesic forests on all of the main Hawaiian Islands. It is a member of the hibiscus family (Malvaceae) and is indigenous (naturally occurring here and other locations) to Hawaiʻi .The flowers of the ʻilima were strung into a beautiful lei that was given to aliʻi (chiefs). As it takes about 1,000 of these flowers to make just one lei, if you receive an ʻilima lei, you should feel very honored. Not only can the flowers be turned into a lei of royalty, they can also be used in lāʻau lapaʻau (traditional Hawaiian medicine). The ʻ*Ilima* flowers and sap can act as a natural laxative; the flowers were given to new babies and the sap was given to adults. Also, the pounded flowers were made into a drink and given to women when they were in labor, it was believed to help ease childbirth. Never underestimate what a small pua (flower) can do! **Plant Information Source: https://www.mauimagazine.net/hawaiian-plants/5/  Photo credit: Mālama Learning Center

- Lonomea (*Sapindus oahuensis)*: Lonomea (the Hawaiian soapberry tree) is endemic to our dryland and mesic forests on Kauaʻi and Oʻahu- that means it can only be found in those two places and nowhere else in the world! Lonomea have a white trunk, dark green leaves, and small little white flowers that grow in tiny clusters. Lonomea is one of the larger trees in the Hawaiian forest; it can grow up all the way up to 50 feet tall! Lonomea being a soapberry tree, you can actually take the fruits of the tree and mix them with water to create a soap that you can wash your body and clothes with. While the fruit can be used to make soap, the seedlings inside the fruit can be dried and stung into beautiful lei. The trunk of the tree was used to make spears. Germinating lonomea is almost like a little science experiment; you must "extract the embryo" to get the viable seedlings. Prepping the seeds for lonomea germination can be a process; scarify, soak, remove outer layer, then carefully plant embryo in media. Before going through the entire process, make sure to test and see if your seeds are still good; helpful hints for any kind of seed: good seeds sink & bad seeds will float.
  ** Plant Information Source: https://www.nativehawaiiangarden.org/flowering-plants/lonomea


Photo credit: Mālama Learning Center

20-25 min

4. Show propagation videos.
- Maʻo Video: https://vimeo.com/762797271 (6:29)
- ʻIlima Video: https://vimeo.com/762799820 (8:01)
- Lonomea Video:https://vimeo.com/762795394 (4:32)

5 min

5. Split the class into three groups (one for each plant).

30 min

6. Each group runs through the steps of propagating their native plant following the videos and Native Plant Propagation Videos Script.

30 min

7. **Closing:** Reflection and summary of the lesson. Answer any questions students may have.
- Each group shares their propagation method with the class.
- What are the differences/similarities between these methods?
- Discuss how plants should be cared for after propagating them.
  - Water (don't let media dry out)
  - Kilo (observe) everyday checking for germination (seeds), root growth (cuttings), and for pests (aphids, ants, mealy bugs, etc…) on the leaves, roots, and stems
  - If you find pests, treat using neem oil, soapy water, or another natural insecticide
  - Up-pot and outplant when they are ready (refer to the videos on how to do this)
- After learning about these three native Hawaiian plants, why is it important to learn about the names, moʻolelo, and uses of native Hawaiian plants and how to grow them?

TOTAL: ~120 min (2 hours)	*Make modifications/extensions to this lesson to meet the needs of your class and students. This lesson can be done in one period or over the course of a few days depending on how you want to structure it, adjust the time and pace of this lesson as you see fit.

Materials:
-Native Hawaiian Plant Videos made by Mālama Learning Center
-Native Plant Propagation Videos Script
-Plant propagation materials

- Maʻo seeds
- Sand paper
- ʻIlima seeds & cuttings
- Lonomea seeds
- Pruner/scissors
- Perlite
- Peat moss
- Mixing bin
- Water
- Planting trays
- Plant pots

Additional Resources/Helpful Websites:
-Native Hawaiian Garden: http://www.nativehawaiiangarden.org/
-Native Plants Hawaiʻi: http://nativeplants.hawaii.edu/index/
-Hui Kū Maoli Ola: https://hawaiiannativeplants.com/
-University of Hawaiʻi Mānoa College of Tropical Agriculture and Human Resources Hawaiian Native Plant Propagation Database: https://www.ctahr.hawaii.edu/hawnprop/

Assessment/Performance Indicators:
Informal assessment: observation, participation
Formal assessment: HĀ Self-Assessment

Rubric:

ʻAno Maikaʻi (Somewhat good)	**Maikaʻi (Good)**	**Maikaʻi loa (Very Good)**	**Maikaʻi Nui Loa (Super Good)**
Needs help explaining significance of the 3 native Hawaiian plants	Can partially explain significance of the 3 native Hawaiian plants	Able to explain significance of the 3 native Hawaiian plants	Able to teach others the significance of the 3 native Hawaiian plants
Needs to be reminded of Hawaiian terms/words associated with the plant names and moʻolelo/uses of the native Hawaiian plants	Can partially recite Hawaiian terms/words associated with the plant names and moʻolelo/uses of the native Hawaiian plants	Can recite Hawaiian terms/words associated with the plant names and moʻolelo/uses of the native Hawaiian plants	Able to connect Hawaiian terms/words associated with the plant names and moʻolelo/uses of the native Hawaiian plants

Instructor does most of work	Completes task but needs constant help	Fully completing task with little or no help	Fully completes tasks with no help, can teach others

Hawaiian Values:

Ahonui (patience)	Hōʻihi (respect)	Kuleana (responsibility)
Mālama (caring)	Laulima (helpful)	Pono (right behaving)

Learning Styles:

Left Brain Right Brain Auditory **Visual** **Kinesthetic/Tactile** Spacial

Keywords: Native, endemic, indigenous, propagate, scarification, media, cotyledon, embryo

Extensions: Moʻolelo of native Hawaiian plants in different wao (elevations); Explore traditional and modern uses of native Hawaiian plants; Native leaf printing; Native plant identification; Plant anatomy

Nā Hopena Aʻo (HĀ) Learner Outcomes

*Source: Department of Education

-Strengthened Sense of Belonging

I stand firm in my space with a strong foundation of relationships. A sense of Belonging is demonstrated through an understanding of lineage and place and a connection to past, present, and future. I am able to interact respectfully for the betterment of self and others.

-Strengthened Sense of Responsibility

I willingly carry my responsibility for self, family, community and the larger society. A sense of Responsibility is demonstrated by a commitment and concern for others. I am mindful of the values, needs and welfare of others.

-Strengthened Sense of Excellence

I believe I can succeed in school and life and am inspired to care about the quality of my work. A sense of Excellence is demonstrated by a love of learning and the pursuit of skills, knowledge and behaviors to reach my potential. I am able to take intellectual risks and strive beyond what is expected.

-Strengthened Sense of Aloha

I show care and respect for myself, families, and communities. A sense of Aloha is demonstrated through empathy and appreciation for the symbiotic relationship between all. I am able to build trust and lead for the good of the whole.

-Strengthened Sense of Total Well-Being

I learn about and practice a healthy lifestyle. A sense of Total Well-being is demonstrated by making choices that improve the mind, body, heart and spirit. I am able to meet the demands of school and life while contributing to the wellbeing of family, ʻāina, community and world.

-Strengthened Sense of Hawaiʻi

I am enriched by the uniqueness of this prized place. A sense of Hawaiʻi is demonstrated through an appreciation for its rich history, diversity and indigenous language and culture. I am able to navigate effectively across cultures and communities and be a steward of the homeland.