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4th Grade 'Ike Hawai'i: How to Harvest and Replant Kalo (Taro)

Aloha e nā haumāna! Aloha to all my students! Hope you are keeping up with your school work, helping your 'ohana with all the many kuleana (or responsibilities) that you have at home and taking time to try to breathe. That's right... when life seems challenging, scary or you feel nervous the best thing we can do is to focus on our 'Hā' or our breath. Right now as we continue to deal with the school and work closures caused by the Coronavirus pandemic, please remember the best thing you can do when you feel nervous is to **just breathe**.

Now, with that said, let's play a game! "He nane?!?!?" or "A riddle?!?!?"



Riddle 1-

Who is the little man with the swaying chin, swaying? Who am I?

Riddle 2-

Ku'u wahi i'a, moku ke po'o, moku ka hi'u, ho'ihoi i ka wai, a ola hou!
"My little fish, cut off its head, cut off its tail, return to the water, it lives again!"

Who am I?

Answer:

The kalo plant!

Today's lesson is one which I really hoped you could all participate in. It was the end of the school activity that we have been working for in the māla all year long. You probably remember that back in September we planted kalo (or taro in English) in the māla. We worked all year on our Hawaiian value 'Mālama' or 'to care for' our kalo plant as we watered, pulled weeds, added compost and mulch and practiced the "pu'epu'e" style of mounding up the soil in our rocky home here in Pāhoa.

We also learned about kalo and its importance to Hawai'i. For the Kanaka Maoli or Native Hawaiian people, we learned about how kalo is a food "staple". A staple is a traditional food crop that is essential to a people's survival in their place because it grows well and is their main source of food. We studied the mo'olelo or story of Hāloanakalaukapalili. "Hāloa" (for short) is the older brother of our Hawaiian people and the first kalo plant in Hawai'i. We learned how Hāloa represents our connection to our 'āina (or land and surrounding environment) here in Hawai'i. We analyzed this mo'olelo to learn about the phrase, "Mālama Hāloa." Which is a reminder that if we take care of our 'āina and Hāloa (the kalo plant) that it will always care for us by providing 'ai or food. Hāloa will continually ensure that our people will continue on and on, forever and ever. MĀLAMA HĀLOA!

We kept up our end of the promise, as we practiced "Mālama Hāloa" all year long. Sadly, due to the health issues worrying the world at this time we were not able to "huki kalo" or "pull out or harvest" our kalo together. We also could not "ku'i kalo" or pound and mash our kalo into poi.

This last lesson will be so that you will be able to remember what you learned from our time together in our "māla 'ai" or dry land taro patch. ***My hope is that you will use these instructions to grow more 'ai or***

food at home for your 'ohana. My hope is that you will "kalo kanu" or plant kalo at home. Below are instructions for how to "huki" or harvest, make "huli" or kalo slips for replanting, and how to "kalo kanu" or plant kalo.

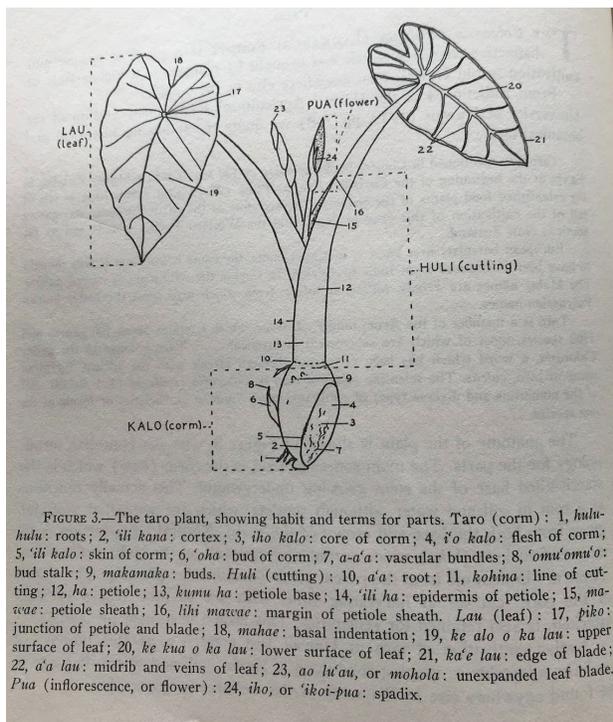
But first, here are some other facts you should know about kalo before we move on!

General Information:

"Colocasia esculenta" is the scientific species name for the taro plant. Taro is considered one of the oldest cultivated food crops in the world. As you know, in Hawai'i, "kalo" is the 'Ōlelo Hawai'i or Hawaiian language word for our main food staple, the taro plant. Surprisingly, not many people realize that the kalo plant is grown all around the world in at least 65 different countries! It is grown in many tropical parts of Asia, throughout many of the Pacific Islands, even in Egypt, and all over Africa as well as throughout the Carribean, just to name a few areas across our Earth.

Throughout the world, the kalo plant is grown for its starchy vegetable **corm**, leaves and stem, all of which can be eaten after they are thoroughly cooked. Here in Hawai'i, kalo was primarily grown for its **corm** or as most people call it, its 'root'. The underground root* is called the "kalo" or "i'o kalo." In Hawai'i, we eat the i'o kalo **after it is cooked** both in chunks called "kalo pa'a" and also after we "ku'i kalo" or pound and mash it into a paste we call "poi".

(*But...actually it's not the root of the kalo plant that we eat! The yummy i'o kalo that grows under the ground that we eat is really called a **corm** or an "**underground starch filled stem base**" ... but now we're getting technical. :)



"Kalo pa'a" or "poi" is not the only thing that we eat from our beloved kalo plant here in Hawai'i. We also use the "lau" or leaves and sometimes even the "hā" or stems as a type of delicious cooked "greens" in dishes such as "laulau" or in soups and stews called "lū'au". If you have never had laulau or lū'au before... you have to try them! Onolicious!!!

Kalo is not just tasty and delicious it is also considered a "superfood" by many nutritionists because it is a "complex carbohydrate". This means that kalo is packed with lots of energy, fiber, vitamins and minerals that will give you the healthy energy you need to keep working all day long.

The image above is from the Handy & Pukui, pg. 72. The drawing shows the parts and names of the kalo plant both in 'Ōlelo Hawai'i and in English.

Nā Kalo Maoli - Native Hawaiian Kalo Varieties and ‘Āina-based Adaptations:

In a great book called Native Planters In Old Hawai‘i: Their Life, Lore, & Environment the authors explain how kalo was planted all around the world, but it was never, ever grown so well as it was here in Hawai‘i. Here’s what they said...

“But nowhere was it <kalo> cultivated as intensively or as skillfully as it was in the Hawaiian Islands, where there were hundreds of varieties adapted to planting in every type of soil and on every type of terrain, and wild varieties that flourished in and along mountain streams.” (Handy, Handy & Pukui, Rev. Ed. 1991. pg. 79)

In Hawai‘i, the kalo plant has been adapted (or changed over time to better survive in a place) and grown by our kūpuna into many different varieties (or different types or forms). A great way to think about the different varieties of kalo is to think about your family and your cousins. You have cousins that look kind of similar to you, but kind of not. That’s the same with the different varieties of the kalo plant too! They are kind of the same... but kind of different... but all still ‘ohana!

The pictures below show two different ‘cousins’ or varieties of Hāloa. The left picture is of a variety called “ ‘Apuwai ” the right is a variety called “ ‘Elepaio Hā Uliuli ”. How are they the same? How are they different? What do you notice?



Our kūpuna developed many different varieties based on what grew best in the many different environments and climates found throughout our islands. The Hawaiian kalo varieties that are still grown today have been selected and re-grown for countless generations because they have been adapted to the specific places where they grew best.



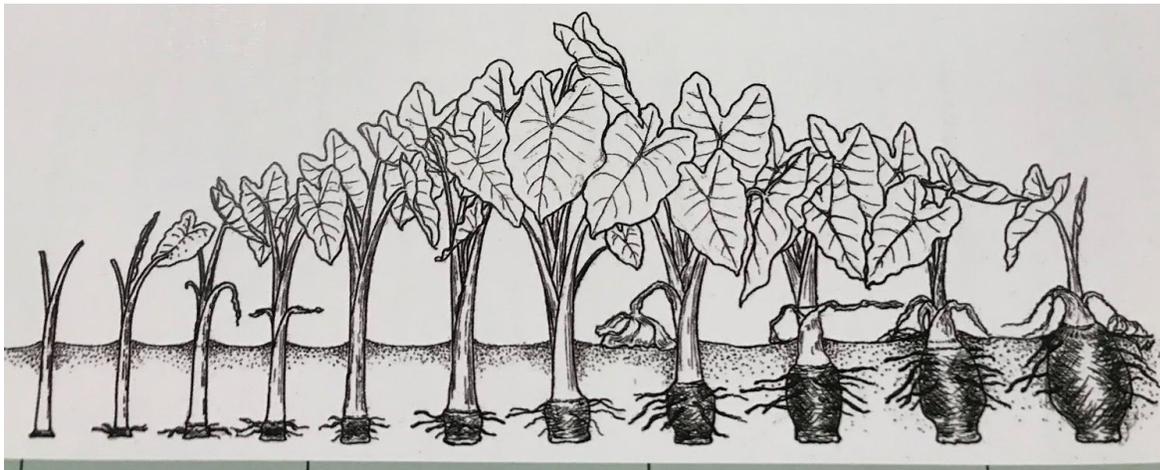
Some kalo varieties have been grown and adapted to live best in flooded or “water-filled” taro patches called “lo‘i”. While others have been grown and selected for very arid or dry areas in the māla ‘ai or “dryland taro patches”. Some kalo varieties are even drought resistant. “Drought resistant” means that it is able to live in very dry and hot areas with very little water compared to other varieties. For example, in the dry, windy areas in the deserts of Ka‘ū there was a very famous kalo variety called “Paua” that could grow there. The Paua kalo was famous because it made amazing poi that our kūpuna knew how to grow in the dry desert.

According to Handy and Pukui, prior to 1940, there were over 300 names (342 names to be exact) of ancient Hawaiian kalo varieties grown around the Hawaiian islands. Some of those names might have been different names for the same kalo. Sometimes in Hawai‘i we have different names or ways of saying things. For example, in Hilo many people refer to our long-time favorite sweet frozen treat as “Ice Shave” while many others from different areas in Hawai‘i refer to it as “Shave Ice”. These different names for the same thing are called “synonyms”. Of the 342 names it is thought that there were probably many synonym names. Researchers from the past estimate that without the synonym names there were anywhere from 150 to 175 distinctly different varieties that were grown around Hawai‘i. That’s amazing when you think of it! That’s a lot of cousins!

The Life Cycle of Hāloa

Hāloa is truly a special plant and a great big brother. Just like a “kanaka” or a human, Hāloa goes through a life cycle that is similar to one that we do. When a human is born we are small born as a small baby. We continue to eat and grow, we become taller and stronger as a young child, then more so as a teenager and we become stronger and taller still as adults. For most, as adults we begin to have a family of our own. We build our own ‘ohana or family unit all connected and cared for by the adult. Next, we begin to get older, we slowly begin to get a little smaller, we shrink as we become kūpuna or grandparents (or older ancestors). As we age, we begin to become a little weaker and lose some of the energy that we once had as teenagers and adults. While we are kūpuna, our keiki or children continue to grow and develop from the guidance, protection and energy that we provide. In time, our keiki become much larger and stronger than we are as kūpuna. As a kūpuna ages and passes on, it’s keiki are left behind to continue on the teachings, traditions and values of ‘ohana that they have learned from their elder parent. This process for humans can take 60 to 80 or more years to go through.

The picture below shows the kalo plants “**LIFE CYCLE**” and is from a book called Taro Mauka to Makai (version 2- pg 58).



This **LIFE CYCLE** picture illustrates how the kalo plant goes through a similar life cycle to us kanaka or as humans. Hāloa on average (depending on the variety) takes about 9 months to develop from kanu (planting) to huki (harvest). Some varieties (cousins) grow faster and some slower. Surprisingly, kalo takes about the same amount of time to develop as it does for a keiki or child to develop and grow inside of its mother's belly. What a cool similarity!

The picture begins at the far left with what Mary Kawena Pukui describes as “kalo kanu” or taro planting (Native Planters, pg. 20). The kalo planting slip is called a “HULI”. After the huli is planted, the kalo plant focuses on developing “huluhulu” or underground roots that it uses to suck up water and nutrients from the soil. It also begins to grow new “lau” or leaves from its “hā” (or petiole / stem stalk). Kalo, like all plants, uses its leaves to take in sunlight and carbon dioxide (a gas in the air) and with the water and nutrients from the soil is able to create its own food through a process called PHOTOSYNTHESIS. (For more information about photosynthesis see the resource at the bottom of this document.)

Next, the kalo plant begins to grow taller and develop more leaves. As it continues, it grows taller and taller with even larger and larger leaves. This beginning to middle phase of the life cycle of Hāloa is similar to our human life cycle when we are baby’s, teenagers and young adults. We, just like Hāloa, go through a great growth spurt developing our height and strength. In the picture this would be the tallest and largest plant drawn right in the middle. If you grow kalo at home, (or begin to after this lesson), you

will be tempted to huki or harvest your kalo plant when it is large and tall, like the middle drawing of the picture. If you do harvest your kalo at this middle point in its life cycle you will be very **DISAPPOINTED!!!** (This is very important to remember!!) Look closely at the center of the **LIFE CYCLE** drawing, the plant itself is huge but the underground corm or kalo is still very small.



Then, about halfway through its life cycle, Hāloa begins to change into a “makua” or parent. As a makua it is not purely focused on growing its hā and lau. Now it begins working on developing its corm or kalo. As this change happens the plant begins to slowly shrink down. This shrinking process will take several months to complete. As it begins to shrink down, more and more of its energy is focused on developing its kalo and its keiki or its babies. These kalo plant keiki are called **‘ohā** or “corm buds / offshoots / suckers”. ‘Ohā begin as sprouts called **makamaka** or “bud eyes” (pictured to the left). The makamaka grow up from around the “makua” or parent kalo corm underground.



As the makamaka develop they become larger and begin to rise out of the soil, they are called ‘ohā. The picture to the left shows the ‘ohā which have developed on this Lehua Pala‘i variety of kalo, if you look real close you can see some makamaka too!

As Hāloa continues to grow in its makua or parent stage its hā and lau continue to get smaller and smaller. Just like how all kūpuna shrink as they get much older in life. All the while, as the kalo plant shrinks above the ground, it is actually growing larger and larger under the ground. If you look back to the **LIFE CYCLE** picture above you will notice these changes on the right side. While all the energy of Hāloa is going to its corm, it is also growing larger and larger ‘ohā (The **LIFE CYCLE** picture does not show any ‘ohā developing.)

Finally, as our makua or parent kalo plant reaches the end of its life cycle (as seen at the far right side of the **LIFE CYCLE** picture above) it tells us it is ready to huki or harvest. As **mahi ‘ai** or food cultivators/farmers, we need to constantly be practicing the art of **kilo** or close environmental observation. As we kilo our kalo closely we notice 2 main things that let us know that our kalo corms are ready to huki. We notice that:

- the hā and lau have become short and much smaller (like an old kūpuna, who has shrunk in old age)
- the makua or original parent kalo plants corm is physically rising up out of the ground

At this point, as the mahi ‘ai huki’s the kalo plants that are ready and the ‘ohā are broken off from the makua. ‘Ohā can be left in the soil to keep on growing or can be removed and made into huli to replant again in another area. The terrific thing about Hāloa is that with each huli planted, by the end of its life cycle it will have created anywhere between 4 to 8 or more ‘ohā which can all be replanted.

Māla ‘ai Math... “From one, many more will sprout!”

So let's do some math... if we plant 1 huli this year we might get 8 huli next year, and if we plant our 8 huli we will then at the end of 2 years possibly have 64 huli (8 multiplied by 8 = 64) WOW!!! How many huli could you possibly have at the end of year 3 if all 64 huli were replanted? Try and figure it out. 64 multiplied by 8... You do the math... what's the answer? _____ (fill in the blank) That's a lot yeah?!?!

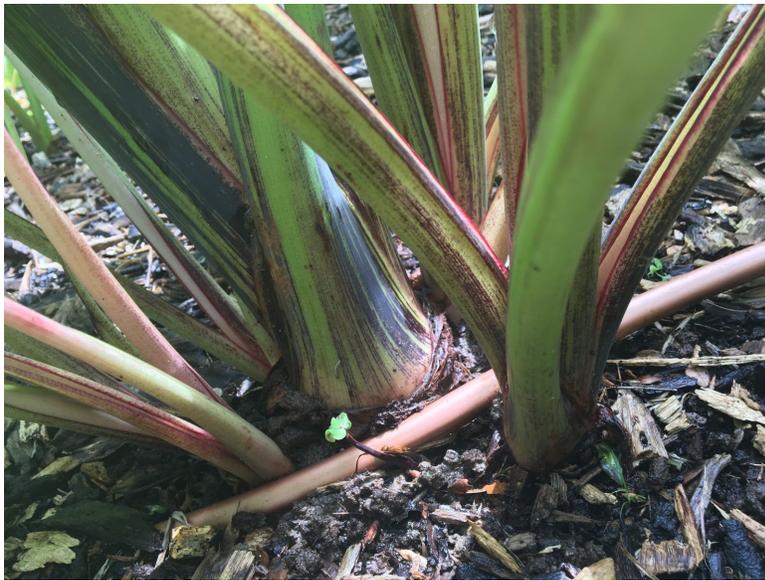
In math you have or will learn about something called “exponential growth”. It is a big term for something that continually increases faster and faster the more that time goes by. *You may have heard of this kind of rapid growth recently ever since the Coronavirus pandemic has begun. For example: In the United States, the confirmed cases of Coronavirus were showing signs of exponential growth until people began following the social distancing and mask guidelines from health care experts.*

It's just jaw-dropping to think that Hāloa will continue to grow and provide food exponentially if he is properly cared for! It's no wonder many people say Mālama Hāloa! If you mālama this magic plant by just planting and caring for 1 huli, he will provide many more keiki or 'ohā forever and ever. Continually multiplying and continually giving food. The potential to create so much food was one of the reasons kalo was so significant to our people here in Hawai'i.

Kalo as a Symbol of ‘Ohana

A symbol is something that stands for or represents something else. With that said, another reason why our beloved kalo plant is so special is because to many Kanaka Maoli, Hāloa, our kalo plant, is a symbol of **‘ohana** or of our complete family unit. When I say the word ‘ohana I don't just mean your family that takes care of you now. Not even the “ *‘ohana means family and family mean nobody gets left behind...or forgotten...*” definition from that Lilo and Stitch movie. No! No! ‘Ohana is so much more than that!

My basic understanding of our concept of ‘ohana is that it means all of our relations and relatives now, all of our ancestors who have come before us, and all of your keiki who will come in the future (all future generations). For many, we believe that our kūpuna who have passed away long ago are still here with us now. These kūpuna who have passed on guide us, protect us and give us strength to grow through life's challenges. When I think about it, ‘ohana represents who we are now, how we have become who we are now and what we will be in the future.



With this perspective, the kalo plant is clearly a symbol of this concept of ‘ohana. When we plant one huli it becomes a makua or a parent unit. Then it develops a whole bunch of ‘ohā or keiki around it. (When we have many of something in ‘Ōlelo Hawai‘i, we use the word ‘nā’.) So if you think about the word ‘ohana and break it down. One interpretation is that it could mean: ‘ohana = ‘ohā + nā or “the many, many, many keiki or descendants”. When you stop to think about it, the huli that we hold in our hand today, is the keiki, of a keiki, of a keiki, etc. that our great

ancestors themselves held and planted which were the ‘ohā of ‘ohā of ‘ohā, etc. from the first kalo plants ever grown in Hawai‘i. These ‘ohā have, continue to and will always support our ‘ohana (past, present and future) with ‘ai or food all around Hawai‘i nei.

Notes on Mahi 'ai (Hawaiian Food Cultivation) Cultural Practices

*'Ōlelo No'eau # 203 - Collected by Mary Kawena Pukui

'A'oha pau ka 'ike i ka hālau ho'okahi.-

All knowledge is not taught in the same school.

One can learn from many sources.

* Please note that the instructions below are just one way to “huki” (harvest), make “huli” (kalo planting slips) and “kalo kanu” (plant kalo) in the māla 'ai (dry land kalo patch). Just as there are many ways to dance a hula to any mele or song, there are always different ways to do things, depending on who you learn from. This also applies to planting kalo! Here are some of the ways that I have learned and that worked for me.

KALO “MANE'O” WARNING

While raw and uncooked, the kalo plant and all of its cousins carry inside them tiny crystals called “**calcium oxalate**”. This calcium oxalate is in all parts of the kalo plant. The leaves, stem, corm, small roots, sap, everything. They cause something in 'Ōlelo Hawai'i, our Hawaiian language called “**mane'o**” or the “ITCH”! If you touch any part of the kalo plant you will become itchy. VERY, VERY, ITCHY! So... just like in our māla 'ai, please wear gloves, AND don't touch your eyes, nose or mouth. Also, when pau working with Hāloa, wash your hands. If you huki and are cleaning kalo, or about to cook it please wear a long sleeve shirt if you have. It will save you from the mane'o. If no more, please be careful! You were warned!

REPEAT! YOU MUST COOK THE KALO BEFORE YOU EAT IT! Eating kalo raw will cause you great, great pain and likely land you in the EMERGENCY ROOM.

After thorough cooking, the mane'o is gone. Completely safe to eat. Our kūpuna have dealt with this for years. You will be fine. Over time you will become less sensitive to the mane'o. For now just be careful. Show respect.

*****Please make sure you cook all leaves, stems and kalo corms thoroughly before eating.*****

How to Huki or “Harvest” in the Māla ‘ai (Dryland Kalo Patch)

To be clear, we are starting with our “huki” or the pulling up and harvesting of our kalo plants because this is what you would have done with me during this last month of school.

Here’s how to huki:

1. **Kilo (closely observe) Your Māla ‘ai.** Remember to watch for when the kalo hā (stalks) and lau (leaves) begin to shrink down. Also watch closely for the corm to begin rising out of the ground. *Some kalo plants will be ready to harvest before others! You must kilo!
 - We planted a maoli (native) variety called Mana ‘Ulu which grows very quickly.
 - This variety is famous for its delicious sweetness, which is good... but if you leave the corm in the ground too long it will “loliloli” or become watery and then quickly rot at the bottom.
 - In my experience harvesting Mana ‘Ulu (the variety of kalo that we grew at school and that you will be given from me) should be done between 7 - 8 months after planting. To be on the safe side harvest a few that look ready and check. Sometimes if you wait too long it will be rotten! What a shame!



The picture above is our māla ‘ai before our kalo was pulled at about 8 months of growth!

2. **Gather Your Tools.** You can use any of the following to huki your kalo that are pictured below left to right:

- ‘ō‘ō - metal or wood planting stick (made from waiwi, broomstick, or anything)
- Shovel
- Garden Spading Fork



3. **Huki.** Using the tool of your choice, place it 6 inches away from the base of plants and use it as a lever to dig down below the kalo plant corms. Use your tool to pry them free (see examples below) and then use your hands to lift them out of the soil. Shake off as much lepo or soil as you can back into your māla ‘ai.



● 'ō'ō stick



● shovel



● garden spading fork

4. **Holo-Clean.** Wash off extra soil with water. Pull as many “huluhulu” or roots off as possible.



5. **Cut Kalo.** **With the help of an ADULT**, use a sharp knife to cut the “kalo” off of the stem stalk. The line where the hā or stem stalk meets the corm is called the “kōhina”. Place the knife about ¼ of an inch below the kōhina line down onto the kalo corm. Cut straight through the corm.

In the picture below (left) notice the knife ¼” below the kōhina ready to make the cut. In the picture below (right) notice the kalo corm cut from the hā. Also notice the beautiful yellow colored i’o kalo (flesh). Similar to the yellow color of the ‘Ulu fruit.



6. **Save For Cooking.** Place your kalo corm into a bag, bucket or pakini.



7. **Harvest 'Ohā.** You can also harvest the corms of your larger 'ohā (corm offshoots / sucker). These can all be cooked and eaten, as well as, be made into huli! Below is few 'ohā which were also made into the huli which I will be giving to you!

- Huli made from 'ohā are much healthier, stronger and more desirable to replant with. Huli from the makua or parent corm can be used to grow but will in time be more susceptible to disease. In the old days, huli were not used from makua (unless there was an emergency).



*******REMINDER*****:**

NEVER EAT RAW KALO! NEVER! SEE KALO MANE'O WARNING ABOVE!!!!!!

How to Make Huli (Kalo Planting Slips)

1. **Cut Off Lau.** After cutting the kalo corm off of the hā or stem stalk (as instructed above), cut the **lau** or leaf off of the hā. See pictures below.



2. **Collect Lau.** Collect leaves in a bag, bucket or pakini. (Mana 'Ulu has very nice lau for cooking! Save them for cooking with later. Laulau or lū'au... yum!)



3. **Cut Top Of Hā.** Then cut the hā above the “māwae” (petiole or stem sheath/groove) with a sharp knife.
 - The picture below (left) shows the “U” shaped opening of the māwae where the new leaves emerged from when they were young.
 - In the picture below (right) you can see my thumb holding open the māwae. Notice the “U” shape it makes inside the hā. Follow the māwae up to it's tip. Cut the hā above the top tip of the māwae as shown in the picture.



4. **Collect Huli.** Place finished huli or kalo planting slips in to bag, bucket or pakini. Save for replanting.



5. **Let Heal.** Let the wound where we cut the kalo dry and heal. Simply leave your huli out in an area with good airflow in the shade to dry. After them dry and form a nice dry scab, collect them and stand them up in the shade. Keep them standing up while you wait to plant. Or as Puna's own, Uncle Jerry Konanui would say, "Keep them standing, bumbai they get lazy..." and not grow tall, straight and strong.

Wait at least 24 hours so that a thick scab can form over the wound to prevent infections from entering and spreading disease in your huli.

I left mine on a table on the lānai to dry overnight. Then after a callus or "scab" formed over the cut side, I stood mine up in a pakini. I try not to wait more than a week before I replant. I have found that waiting longer than that often causes my huli to dry out and they become weaker when I plant them. See pictures below:



Some mahi 'ai let their kalo scab over, then they soak the bottom of the huli in a bucket of water. When you do this, roots will begin to form around the kōhina. Some planters do this so the huli has a jump start on root development and when they are finally planted are ready to grow! This is great... but if you do this, please change the water in the bucket every single day! If you don't, the water will get stinky and disease will come and sicken your huli.

Remember, there are many ways to do all things. These are just some. All are maika'i or good if there is good intentions and the way works!

Cooking Kalo:

When cooking whole kalo corms. They can be either boiled or steamed in a pot with fresh water. Some people now days use pressure cookers or the “Insta-pots” to cook them quickly.

Traditionally, kalo was cooked in our underground ovens called “imu” and it took many hours. There is no guarantee formula for the exact cooking of kalo because the amount of mane‘o or calcium oxalate crystals vary from variety to variety.

Two things to remember about cooking kalo are: temperature and time.

Kalo is not a fast cooking food. The mane‘o need to be melted down inside the kalo. So just remember, heat and time. No rush. If you boil or steam your kalo keep checking the water level so it doesn’t burn. No burn ‘um! You will regret it!

Some indicators I use to know when my kalo corms are cooked:

- ‘Ili kalo (kalo skin) begins to crack open and apart
- When a butter knife easily pieces through the corm, and then when lifted into the air, the kalo easily slips off the knife on its own- just with the force of gravity.
- **MUST DO!!!!** Take a small piece of kalo from the big kalo corm and taste test just a sliver (very small chunk). If it’s not itchy it’s COOKED. If it’s itch... cook some more.

After cooking your kalo, they must be cleaned by removing the “ ‘ili ” (skin) and “ ‘ili kana” (inner skin or cortex) first. You can use an ‘opihi shell, spoon, butter knife, or potato peeler. Be careful that when you “‘ihi”, peel or remove the ‘ili you don’t take too much kalo with you. Clean the entire kalo, making sure it is spotless and free of all specks or spots. As you clean make sure you rinse your kalo and your scraping tool off in freshwater.

Once cooked and cleaned you can eat your kalo as ‘kalo pa‘a’ (taro chunks) or pound it into poi.

Below is a picture of poi after it pounded on a board (left). Also, Mana Ulu poi in a bag (right).



Kalo Kanu - How to Plant Kalo

For instructions on how to create a māla 'ai of your own check out the distance learning link at the top of this document and look for the lesson entitled: '**Āina Engineering-Pu'epu'e Raised Garden Beds.**

- 1. Gather Soil & Make a Mound.** Use a garden tool or hands to gather lepo (soil) up into a pu'e or a mound. In Puna, since we have 'plenty pōhaku' and very little lepo, we use the pu'epu'e style of planting. In pu'epu'e planting we gather the little lepo we can and make a mound to plant inside.



- 2. Make a Lua.** Use an 'ō'ō (metal or wooden stick of your choosing) to make a "lua" or a small hole in the mound.



3. Kalo Kanu. Plant your huli by placing it in the puka.

- Place huli into hole so that about $\frac{1}{3}$ of the huli bottom is covered with soil. The other $\frac{2}{3}$ parts of the huli will be above the ground.



4. Ho'opa'a. Make the soil firm around the huli stalk and pu'e (hill) by patting it down firmly with your hands.



- Repeat the process so that you plant at least 2 or more huli around your pu'e. Keep your huli spaced at least one pī'ā (one hand distance) away at minimum or up to one "ha'ilima" (one- elbow to outstretched fingertips - distance). The farther apart you put your huli the larger they will get.
- The reason I like to plant at least 2 huli is because a wise friend of mine from Puna told me to that's what he did. We can all learn from the knowledge and practices of our elders! Uncle Jerry Konanui would say that many of our kūpuna always planted their huli with a partner so that "they would not get lonely". This mana'o makes sense because of what we know about Hāloa and our understanding of the root words of " 'ohana".

5. Mālama Hāloa. Water every evening if the soil is dry and pull weeds as often as possible. After the kalo plant begins to develop taller stalks and many healthy leaves, usually within the next 2-3 months, apply a thick layer of “pulu” or mulch that spreads and covers all the exposed soil.

- Use kukui nut leaves, ti leaves, hau leaves, mango leaves, avocado leaves, crushed banana stumps and leaves as a “hali‘i” or covering. Remember “Use what get!”
- The pulu that you add will help to keep the water in the soil from evaporating and will help to feed the decomposers in the lepo. Making your soil healthier.



6. Only Aloha. Remember what we learned in class about working in the māla ‘ai especially around Hāloa... “Only Aloha!” Only love filled thoughts, words and actions. If you are thinking bad, speaking bad and behaving with bad intentions, that negative “mana” or energy and life force will be absorbed by the plants and make them weak and small. We all do better when people say nice things to us and around us. The same thing applies to our older brother. Simple. Only Aloha.



Mahalo:

I'd like to take time to mahalo the many people who have shared their mo'olelo (stories), 'ike (knowledge, understand and experiences), digital resources (websites, videos and pictures) and their own living practices with me related to the various topics shared in this lesson (both now and throughout the years). Mahalo for your help in making this lesson/project possible:

- Uncle Jerry & Aunty Gladys Konanui, Uncle Howard Konanui, Uncle Larry Kuamo'o, Uncle Stanley & Aunty Cheryl Ka'awaloa, Uncle Henry Leong, Uncle Earl Kawa'a, Aunty Pua Niau-Puhipau, Jason Scott Lee, Pi'ilani Ka'awaloa, Keani Kaleimamahu, Ka'iana Runnels, Keahi Thomas and Ka'apuni Aiwohi.

Questions:

If you have questions please don't hesitate to email me and ask @ nifraci@ksbe.edu

Additional Kalo Resources:

Kuokoa Home Rule Newspaper Article from 1911- Warning the people of Honolulu not to neglect their kalo patches. (A lesson for us all to learn!)

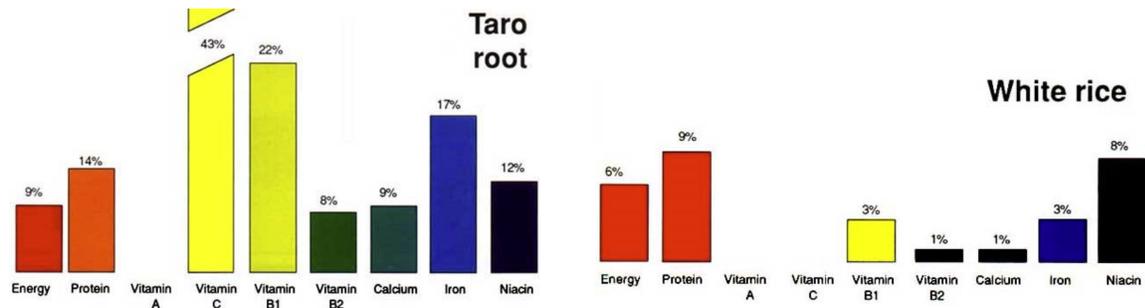
<https://docs.google.com/document/d/1lnlGns-wjErzSN-m-ph5sBtj1LAsqKMx6czMrJSomcA/edit>

Health Benefits of Taro

<https://www.healthline.com/nutrition/taro-root-benefits>

<https://www.organicauthority.com/eco-chic-table/mystery-superfood-highligh-taro-root>

Nutritional Comparison: Kalo Root v.s. White Rice (from “Taro Mauka to Makai”)



More General Information

<http://www.canooplants.com/kalo.html>

Cooking with Kalo- Taro Recipes:

<https://www.hookuaaina.org/about-kalo/recipes/>

<https://www.staradvertiser.com/2016/05/24/food/taro-can-be-prepared-in-an-enormous-variety-of-ways/>

[https://www.hawaiianelectric.com/recipes/find-a-recipe/kalo-and-uala-in-coconut-milk-\(taro-and-sweet-potato-in-coconut-milk\)](https://www.hawaiianelectric.com/recipes/find-a-recipe/kalo-and-uala-in-coconut-milk-(taro-and-sweet-potato-in-coconut-milk))

Photosynthesis for Kids:

<https://www.ducksters.com/science/photosynthesis.php>

<https://kids.britannica.com/kids/article/photosynthesis/353624>

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Bowers, F. A. I., Takahashi, M., & Whitney, L. D. (1939). *Taro Varieties in Hawaii*. Honolulu, Hawaii: University of Hawaii Press.

Evans, D. (2014). *Taro mauka to makai: a taro production and business guide for hawaii growers*. Honolulu, Hawai'i: University of Hawaii Press.

Handy, E. S. C., Handy, E. G., & Pukui, M. K. (1991). *Native planters in old Hawai'i: their life, lore, and environment. Rev. ed.* Honolulu, Hawai'i: Bishop Museum Press.

Lucas, L. (1982). *Plants of old Hawai'i*. Honolulu, Hawai'i: Bess Press.

Pukui, M. K., & Varez, D. (2018). *'Ōlelo No 'eau: Hawaiian proverbs & poetical sayings*. Honolulu, Hawaii: Bishop Museum Press.

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