Researching Colocasia esculenta (aka Taro) in the Southeast as a Sustainable and Alternate Crop

On-Farm Research by Utopian Seed Project

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Introduction

The purpose of this research project was to explore taro as a climate-resilient crop with high agronomic potential in the North Carolina food and farming system. Climate change is already a threat to growing food, with the severity of weather systems wreaking more regular farm and crop devastation in the South. This can occur in many forms but includes periods of drought, flooding due to intense rain events, and hail. In addition, a warming climate will leave 'traditional' crops less viable and fuel greater disease and pest pressure. These climate-related challenges will leave our current food systems less resilient to sudden shocks, resulting in potential supply chain disruptions for producers, distributors, and consumers, and will require adaptations to new growing conditions. The Union of Concerned Scientists wrote, "Farmers choose crop varieties and animal breeds that are well suited to local conditions. As those conditions shift rapidly over the coming decades, many farmers will be forced to rethink some of their choices."[1]

The challenge of growing food in a new and volatile climate reality is a problem that is likely to get worse before it gets better. While it is important to seek climate mitigation solutions and carbon reduction strategies, if we fail to consider climate-adaptive solutions, then growing food will become increasingly challenging. We believe focused research to identify additional and alternative suitable food crops is critical for future food security, and learning to grow and consume them in our current conditions before they become a true necessity is a prudent course of action.

Utopian Seed Project (USP) grows and researches a wide range of crops that could have strong food system viability in North Carolina. Taro emerged as a crop that is easy to grow, has good yields, and can provide a low-input, climate-resilient alternative to other storage root crops. In addition, both the underground corms and the leaves are marketable harvests. This report provides an overview of our on-farm research project over the last three years, which includes our on-farm trials, broad collaboration with farmers who have grown taro, and chefs and culinarians who are helping to showcase taro within our regional food systems.

Our specific goal is to increase both the farmer and consumer awareness of taro as a viable, climate-resilient, and versatile crop in North Carolina. However, we also wish to recognize that

[1] Climate change and agriculture. (2019, March 20). Union of Concerned Scientists. https://www.ucs.org/resources/climate-change-and-agriculture

taro has a long and diverse history as a domesticated food crop across many tropical regions of the world. Our work to grow taro in North Carolina aims to learn from a diverse network of farmers and chefs with authenticity and respect for the taro's rich history, while also acknowledging that crops grown and consumed in new regions will adapt and meld in new and exciting ways.

What is Taro?

Colacasia esculenta is the species designation for a group of plants in the Araceae (aka Arum) family. Within this family, there are some edible root crops, one of which is commonly called taro. *Colocasia esculenta* also represents a wide range of landscaping plants often called Elephant Ears. In addition, the common name taro is sometimes ascribed to *Xanthosoma sagittifolium.* The two species are somewhat similar in growth, and their starchy corms are used similarly, so the confusion is easily understood. The broad botanical distinction is that *Colocasia esculenta* is native to Southeast Asia, while *Xanthosoma sagittifolium* is native to tropical America, leading to a Eurocentric description of Old World Taro vs New World Taro. An extremely important difference for Utopian Seed Project's work, and this report, is that *Colocasia esculenta* has proven easy to cultivate and produce, while *Xanthosoma sagittifolium* grows vegetatively, but produces little in the way of harvestable yield. For the rest of this report, we will refer to taro with the understanding that we are talking about *Colocasia esculenta.*

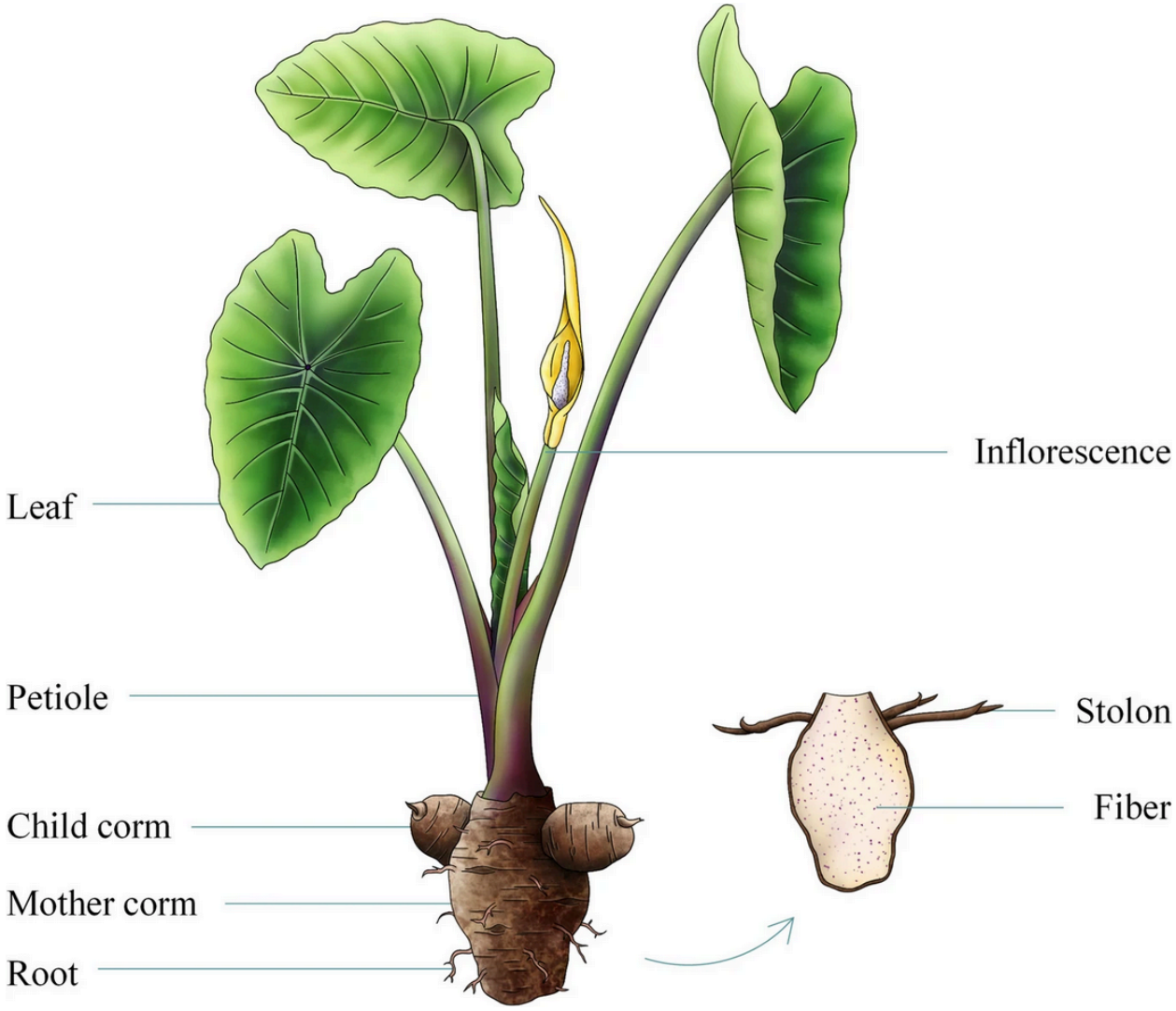
Taro is grown across many tropical and subtropical parts of the world. The FAO reported that 18 million tonnes of taro were produced worldwide in 2022. As a culinary crop, the primary yield is usually the underground corms and cormels, but the leaves and petioles are also eaten. All parts of taro must be cooked before eating because of the presence of calcium oxalate raphide crystals, which can cause intense irritation when consumed raw or undercooked. As a crop that was domesticated as much as 5,000 years ago, taro has a wide range of culinary applications. A 2023 paper titled, *Taro Roots: An Underexploited Root Crop*, with lead researchers from North Carolina A&T, noted, "Considering the sustainability and high nutritional value of taro roots, it is worth exploring their potential to thrive in warmer regions of the USA."[2] This report focuses on taro as a diversified crop for small-scale market farmers, but there is broader potential still to be explored.

Taro is described as a single polymorphic species, with most horticulturists further breaking the species into two botanical varieties - *C. esculenta var. esculenta* and *C. esculenta var. antiquorum.* A report by the Taro Network for Southeast Asia and Oceania (TANSAO) found the described taxonomic differences unhelpful in distinguishing varieties and preferred a system of named cultivars and cultivar groups. While Utopian Seed Project claims no taxonomic expertise

[2] Ferdaus, M. J., Chukwu-Munsen, E., Foguel, A., & Da Silva, R. C. (2023). Taro roots: an underexploited root crop. Nutrients, 15(15), 3337. https://doi.org/10.3390/nu15153337

about taro, we have internally broken our taro into two groups that we have described as Tropical Taro (a large corm and a smaller number of cormels, aka Dasheen Taro) and Temperate Taro (a high number of small cormels, aka Eddoe Taro). The descriptions in Table 1 closely align with our experience of two distinct taro types, but we have not done further work to identify them with confidence.

Annotated parts of a taro plant



Source: Fang, Q., Matthews, P. J., Grimaldi, I. M., De Jong, H., Van De Belt, J., Schranz, M. E., & Van Andel, T. (2024). The invisible tropical tuber crop: edible aroids (Araceae) sold as “Tajer” in the Netherlands. *Economic Botany*. https://doi.org/10.1007/s12231-024-09624-y

Table 1. Characteristics differences between Colocasia esculenta var. esculenta and var. antiquorum.

	Colocasia esculenta var. esculenta	*Colocasia esculenta var. antiquorum*
Geographic origin	SE Asia (including India)	Developed and selected in China and Japan after introduction from Southeast Asia
Geographic distribution	Polynesia, Southern China, Eastern Mediterranean, Egypt, Africa, West Indies, Trinidad	East Asia, Japan, Northern China, West Indies, Puerto Rico, Trinidad, Hawaii, Southern USA
	Mainly, large corm and petioles are used for food.	Mainly, small cormels are used for food. In some varieties, the main corm is acrid and inedible. Some cormels are practically free of acridity.
Corm size and number of cormels	Large main corm, cylindrical, edible, and 4–8 sucker cormels.	Small to medium-sized main corm and a large number of edible cormels (15–20 or more)
Uses	Main corm, leaves, and petioles used for food	Small cormels used for food

Source: Farm and Forestry Production and Marketing Profile for Taro by Harley I. Manner and Mary Taylor

Growing Taro in North Carolina

We have found that growing taro in Western North Carolina is fairly easy and productive. The following section is designed to give an overview of our growing procedures that we have refined over the last 5+ years of growing taro, and is specifically informed by our recent trials under the on-farm research grant.

Taro Propagation

Taro is clonally propagated by taking the mother corm or smaller cormels of the underground growth and planting them. The propagation material will sprout and produce a new taro plant, which will produce more underground corms and cormels.

In Hawaii, it is the practice to harvest taro and then slice off the top section of the corm (with the growing point) to immediately replant. Our temperate season, with freezing winter temperatures, does not allow for this style of propagation, so we store corms over the winter and replant in the spring.

We often replant the whole corm or cormel to grow a new plant, below we have results from our On-Farm Trials suggesting that planting larger pieces will give higher yields. We assume this advantage will level off at some point, but further research is necessary.

We have also sliced the top off larger pieces, as they do in Hawaii, but for us, after winter storage. This allows us to plant the top section and still eat the lower section. This has worked for bigger corms and, anecdotally, led to faster and more vigorous rooting.

In summary, we have a propagation system that works. Taro is easily propagated from the mother material, much like many other clonally propagated plants, but there is still work to refine and improve the technique for our region.

Growing Taro

Taro is a frost-sensitive plant, but the underground growth is cold-tolerant. We have observed taro overwintering in the ground. We have yet to establish the extremes that taro can tolerate,

but one ‘perennial’ patch has survived minus 1°F (Korean Taro). We assume that different varieties have different cold tolerances. This allows for a few different planting tactics:

One: Plant your taro as soon as you harvest it with the aim of overwintering. **This is not a tactic we have tried**, but it is possible to have a planting bed ready and replanted on the same day as harvest. We would suggest a deep planting to protect from ground freeze, perhaps 6-8”. The corms/cormels should overwinter and sprout the following season as the weather warms. A future research project would be to fall-plant the taro (October) and overseed with an overwintering cover crop mix. The cover crop could be terminated in late April or early May, with the possibility that the taro will emerge through the mulch end of May or the beginning of June.

Two: Plant your taro early in spring once the ground is workable. If we have beds ready and prepared, then we prefer this tactic. It’s useful to get an early planting on crops that we can, it’s quicker and easier to plant a dormant piece of plant material than transplant a live plant. On the same note, you don’t have to dedicate a heated growing space to transplants and all the time and energy it takes to nurture them. We planted taro on April 1 with great success, with a planting depth of about 6”. The taro emerges as the soil warms. Occasionally, we’ll cover with landscaping fabric ahead of emergence to warm the soil and control weeds.

Three: Taro can be treated like starting tomatoes. Corms or cormels can be bedded into pots (min 3” pots) or flats to pre-sprout in warm conditions (heat mats) about 4-6 weeks ahead of the average last frost date. Once they’ve broken dormancy and started sprouting, they can grow quite quickly and develop dense roots. Following standard transplant procedures, the plants can be hardened off ahead of transplanting into the field.

Typically, we see 3-4ft plants, but 6ft + is also possible. We have traditionally planted taro at 12” spacing, but results from the On-Farm Trial have persuaded us to increase to 18-24” (see below). The plants are erect and self-supporting. Taro can tolerate light to medium shade, and perhaps even heavier shade in some circumstances. Taro can also tolerate ‘wet feet’ and could be suitable for otherwise marginal growing areas with periodic flooding or standing water.

We have found taro to be tolerant of a range of conditions. We have grown taro in unirrigated rows (yield is likely to be lower if taro experiences long drought periods); in irrigated rows; in areas that could be described as soggy; and one of our growers grew taro in a submerged

system with periodic draining (he noted that while it worked, the yield wasn't much different to normal row culture). We imagine taro would do ok in medium-large containers, but haven't tried this ourselves. We have not investigated fertility requirements, but at our experimental farm, we don't fertilize beyond occasional compost applications and cover crops, and taro has grown well for us. Our farmers' interviews (see below) reveal a wide range of growing conditions, with varying yields. Our On-farm Trial also revealed that corm plant size and plant spacing have a strong impact on yield. More research will reveal ideal practices for maximizing yield.

We have not noticed much pest or disease pressure. The calcium oxalates seem to discourage deer, groundhogs, and voles, however we have had reports of foliar damage from some growers, and overwintered corms in the ground are susceptible to voles. We've seen a small amount of Japanese Beetle damage, but not significant. The classic viral diseases that plague some tropical taro growers don't yet seem present in our region. We'd still recommend good crop rotation.

Taro Harvesting

Taro can cause skin irritation for some people, usually presenting as itchiness but sometimes hives. Gloves are recommended when harvesting larger quantities.

Taro Leaf Harvest

The leaves and stems of taro are edible as long as they are cooked for a sufficient time (one chef has said 40 minutes for the Korean Taro variety). If growing for leaves, the plants can be spaced more closely (perhaps 6"). Harvesting the outer leaves allows new growth to come through.

The impact of leaf harvest on yield requires some further research. Our On-farm trial suggested that there was not a strong impact on yield, however, a report from Hawaii suggested that leaves can be harvested at any time during the growth of taro, but corm yields will be reduced if more than 3 leaves are picked per plant.[3] The same report noted that only young taro leaves are used for cooking, and you can harvest the tender unfurled leaves (within the stem) at the same time as the main corm harvest.

[3] *Taro Production guidelines for Kauai*. (n.d.). http://www.extento.hawaii.edu/Kbase/reports/taro_prod.htm

Taro Corm Harvest

The corms and cormels of taro are usually harvested after a long growing season (6-12 months in the tropics). In Western North Carolina, our season is shorter than taro's natural growth cycle, and so we like to leave taro in the ground for as long as possible (often allowing the first frost to knock back the leaves). The new cormels can sometimes push above the soil surface during growth. Unlike potatoes, there is no risk from sun exposure, but heavier freezes will damage the exposed eddoes. Taro plants can be dug much like potatoes, using a spade or fork to dig down about 1ft back from the center of the plant and lifting the plant. In loose soil, sometimes the entire plant can be lifted from the soil without digging. We have also used a potato plow to lift larger row plantings with success. Soil can be shaken loose from the root structure, corms and cormels tend to clump strongly together, but some cormels will break off during harvest. Spraying with a hose in the field can also release a lot of soil trapped between the cormels. We chop off the main stem a few inches above the corm and stack it into crates to be removed from the field.

Taro Storage

Taro can be eaten straight away (as long as it's cooked), but it also serves as a good winter storage crop. In addition, the propagation material needs to survive the winter to be replantable the following spring/summer. In our experience, taro can be cleaned by removing the stem and hosing or brushing off any clumps of dried soil. Taro benefits from being cured ahead of storage. This allows any harvest wounds to heal and the outer skin to dry. Under traditional post-harvest systems, curing is accomplished by placing corms in the sun until any harvest-damaged surfaces dry out. Corms can also be cured in naturally ventilated barns or other storage structures. Curing is less effective if damage to corms is extensive. We lay the corms and cormels on drying racks in a well-ventilated greenhouse for a week or two before moving to longer-term storage.

Taro stores well in potato-like storage conditions, which are cool and slightly humid. Some winter spoilage occurs, so periodic monitoring is advised. Too much airflow or dry conditions can lead to the taro corms drying out. Too much humidity can lead to rot. We stack them in crates and cover them with a cloth. This keeps them dark and allows for air exchange, but prevents them from drying out. The recommended temperature for prolonged storage is 45-50°F with a relative humidity of 85.

Variety Trials - Utopian Seed Project

Introduction

There are hundreds, if not thousands, of taro varieties. The University of Hawaii alone has a list of 84 well-documented and described varieties.[4] Given that we are growing taro outside of its ideal tropical environment, with a shorter season than it expects, some of our work is simple variety exploration to find which varieties grow well in our region. We are growing in standard row cropping systems, with no flooding, and are primarily looking at yield and average corm size.

Note: Yanna Fishman, from a purely observational perspective, has noticed that the varieties of taro (and other clonally propagated tropical root crops) that she has worked with over consecutive years generally tend to increase in productivity and plant vigor. Many factors could be at play, including a trend toward warmer temperatures and increased competency and knowledge in growing. However, we are also open to the possibility of inheritable epigenetic adaptation.

2023 trial planting at the Southern Appalachian Highland Conservancy Community Farm, Alexander, North Carolina.

2023 Trial

At our farm site on the Southern Appalachian Highland Conservancy Community Farm, Alexander, North Carolina, we set up a block design with 2 replications of 6 taro varieties. We aimed to plant out 18 plants in each block, but were slightly light on planting material for several varieties. The ground was newly opened, without irrigation, and not of the best quality. We planted an edge row using additional taro varieties that we had in lower quantities. The layout of the field is represented below, along with the number of plants in parentheses.

Edge Row	Row 1	Row 2	Row 3	Edge Row
Big Taro (6)	Puerto Rico (18)	Filipino (15)	Korean (18)	
Pa'akala (5)	Kai Kea (16)	Bun Long (18)	Lee (18)	
Lehau Maoli (9)	Filipino (15)	Korean (18)	Puerto Rico (18)	
Thai (8)	Bun Long (18)	Lee (18)	Kai Kea (16)	
Pilaloha (5)				
Manini Owali (5)				Sorghum

We transplanted sprouted cormels into the field on May 25, 2023. Spacing was 12” between plants, with Zinnias used as a break between varieties within the row. We planted through landscaping fabric for weed control.

2023 was a dry growing year, and the taro plants stayed smaller than usual. We allowed a frost to kill the top growth before harvesting the plants in mid-November. The total yield per variety should not be seen as representative of taro’s yield potential (see farmer interviews below), but rather a comparative assessment between varieties.

Total yield is calculated post-harvest, after the corms and cormels have been washed and dried with the stem removed.

Yield per plant is calculated by taking the total yield per variety and dividing by the total number of plants harvested.

Harvested corms/cormels are calculated by counting all separate pieces of corm or cormels, regardless of size.

Yield per corm/cormel is calculated by taking the counted total number of corms/cormels per variety and dividing by the total yield per variety.

Variety Names	Surviving Plants	Harvested Corms / Cormels	Total Yield (g)	Yield per Plant (g)	Average Weight Per Corm / Cormel (g)
Big Taro	6	39	2,478.00	413	64
Puerto Rico	33	177	13,312.00	403	75
Lee	30	471	8,827.00	294	19
Korean	34	594	9,772.00	287	16
Filipino	17	100	4,110.00	242	41
Kai Kea (HI)	26	125	6,248.00	240	50
Pilialoha	5	52	1,187.00	237	23
Thai	8	44	1,454.00	182	33
Bun Long	29	148	4,696.00	162	32
Lehua Maoli	9	38	1,150.00	128	30
Manini Owali	5	7	607	121	87
Paakala	5	7	304	61	43

Image: Taro growing through landscaping fabric. Other tropical perennials growing alongside (arrowroot to the left, and yacon to the right).

2024 Trial

In 2024, we planted another round of varieties at the same farm location. This time, we did not replicate any of the plantings, but planted into uniform rows with drip irrigation. We followed 12” spacing between plants and broke varieties with a zinnia planting. Our transplant date was May 15, 2024.

Row 1	Row 2
Filipino (8)	Lehua Maoli (21)
Kai Kea (6)	Miyako (18)
Paakala (1)	Akado (12)
Thai (26)	Araimo (4)
Korean (36)	Bun Long (3)
	PR (5)
	Big Taro (12)

A taro cormel that has been pre-sprouted in a flat ahead of transplanting into the field. The roots are growing from the corm.

Our harvest protocol was the same as in 2023, waiting for a frost to kill the greens before digging and weighing the yield. In 2024, we counted the total corms and cormels separately.

Below you can see the data for the 2024 harvest; overall yields were better across the board, almost certainly because of better soil quality and irrigation.

Variety Names	Surviving Plants	Harvested Corms	Harvested Cormels	Total Yield (g)	Yield per Plant (g)	Average Weight Per Corm / Cormel (g)
Korean	32	32	1,012.00	24,411.00	763	24
Kai Kea (HI)	5	5	44	3,531.00	706	80
Big Taro	9	9	86	6,074.00	675	71
Paakala	1	1	12	512	512	43
Filipino	8	8	65	3,967.00	496	61
Lehua Maoli	19	19	119	8,098.00	426	68
Araimo	3	3	32	1,128.00	376	35
Thai	20	20	137	6,158.00	308	45
Akado	12	12	92	3,464.00	289	38
Miyako	18	18	104	3,919.00	218	38
Puerto Rico	3	3	11	590	197	54
Bun Long	2	2	9	290	145	32

Results & Discussion

The two years of variety trials have shown us that yield and corm count are highly variable across varieties, and have helped provide guidance in selected varieties most suitable for taro growing in our region.

Total yield is important, but as noted in the farmer interviews (below), there is a market preference for large cormels and corms, so the average weight per corm is also important in terms of marketability.

A challenge of the variety trial is that it is hard to standardize the propagation material size. As was noted in the on-farm trials (see below), propagation material size can have a serious impact on yield. Producing enough nursery stock of consistent size to do a large variety trial was

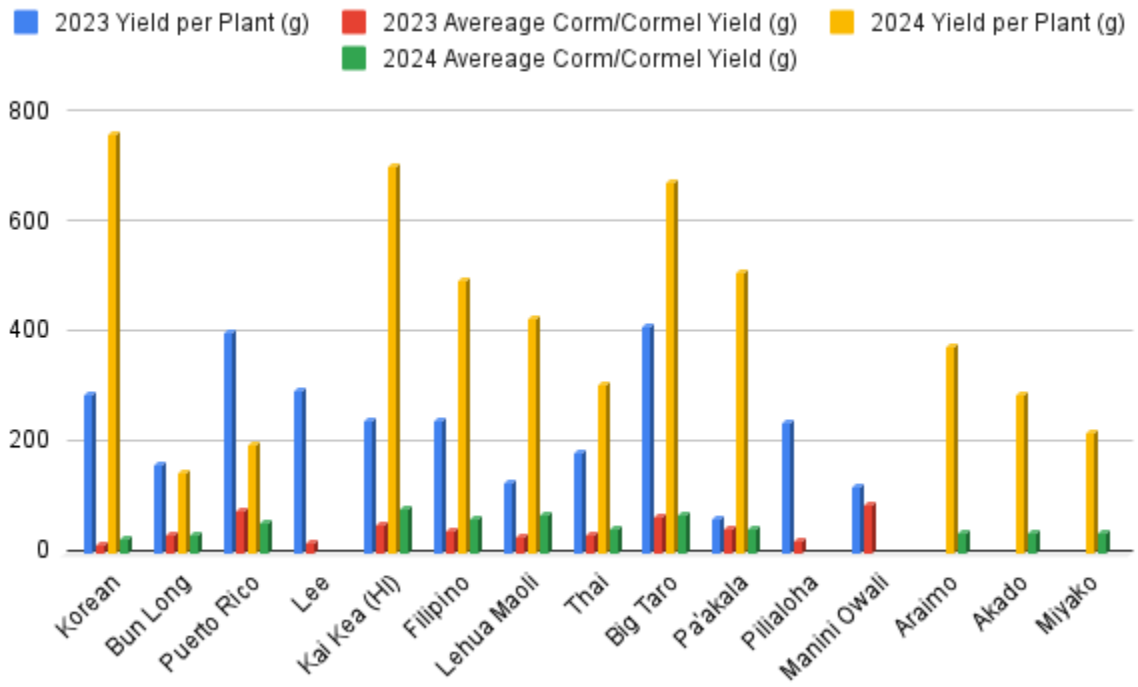
challenging. Further work to assess yield based on more standardized planting material size would be beneficial.

Given that limitation, results over the two years help paint a picture of suitable higher-yielding varieties. **Korean** and **Lee** varieties of taro (very similar, possibly the same) produce high quantities of smaller eddoes.

Big Taro and **Kai Kea** produced consistently high yields and a much larger average corm size, making them good contenders for the market demand for larger corm size.

Puerto Rico was extremely promising in 2023, but less so in 2024. We are doing further grow outs with this variety to get a better sense of its performance.

A final note is that culinary qualities and winter storage qualities are also very important. For example, **Lehua Maoli** has lower yields but stores incredibly well, and **Bun Long** has purple fibers throughout its corm flesh, which is sought after by some chefs.



Graphical representation of the yield per plant and average corm/cormel weight over the 2023 and 2024 variety trials.

Variety List

Below is a list of the taro varieties that we have grown. We have done our best to put together a description of where they came from, but many of them do not have clear cultivar links, and our name is not an 'official' name. The country name associated with many of the taros does not mean that the taro came from that country.

Korean: Yanna Fishman received circa 2012 from The Pang family (Korean), who had been growing it in Georgia for over 50 years. They've shared it with Korean farmers in TN, NC, and GA. Korean produces a large number of smaller eddoes and is the taro we've been working with the longest.

Lees: Chue and Tou Lee shared one of the taro varieties that they cultivate, which we've been calling the Lees. We have grown it for just two seasons, and it is extremely similar in look, growth, and production to Korean.

Thai: Received from Mark Homesteader (Homestead, FL). Doesn't have great storage, especially compared to a phenotypically similar taro we call Filipino. Pinkish stem

Filipino: Yanna Fishman received this variety from David Laws in Davie, Florida. Has been growing in WNC since 2012. We traced the source back to an Asian grocery store in Florida and think that the taro was likely sourced from an international clearing house in Atlantic (although it is possible it was grown locally).

Big Taro: Yanna received from Karen Sherwood in Hawthorne, FL, circa 2022. This taro has been amongst our highest yielding taro two years running and it stores incredibly well.

Puerto Rico: A favorite of Josh Jamison, who grows many varieties in Northern Florida.

Bun Long aka. Chinese Taro: In 2022, we received Bun Long as first-year meristem culture grown transplants from Santiago Arroyo, Tree Amigos, Florida. They grew extremely rooty plants with a fairly low yield. In the second year there were less roots from cormel planted plants, but fairly low yield. We know this is a popular commercial variety, and it develops purple

corm fibers. Notable: “The young leaves are considered desirable for luau because of their large size, tenderness, and comparative nonacridity.”

Kai Kea: Yanna Fishman received from Oliver Moore (FL) circa 2020. Oliver Moore received his original material from Michael Porter, who commented, “This [Kai Kea] is my largest planting of taro, because I liked it better than Bun Long (mostly because it is so moist) and I have had it for many years. It is very prolific in a wide variety of growing conditions. Kai Kea is a Poi type Taro, but is great as a table variety also. Kai Kea is moist, tender (not rubbery like some Poi Type), rich in flavor, and easy to prepare, low in calcium crystals, and the corms can be eaten with minimal cooking. A stiff vegetable brush will easily remove enough of the skin for cooking and eating without any itch. I have found some taro that I like as much, but it is unsurpassed (in my estimation) for flavor and ease of preparation. The leaves need about 25-30 minutes boiling time (just a little longer than Bun Long) and are of good flavor, they are tender and get very soft in cooking.” At Utopian Seed Project, we called this variety Hawaii for a long time before learning its actual cultivar name. It produces larger corms and larger (but fewer) cormels. Good storage.

Lehua Maoli: Yanna Fishman received a small amount of starter cormels of this variety. It was very slow to sprout, and Yanna stopped growing, but Utopian Seed carried on for the storage qualities and shared them back to Yanna. Each year, it sprouts a little easier. This taro is listed as a native of Hawaii; *maoli* means common or ordinary. The corm has some lilac color to its flesh and red/pink to its stem. One thing that has stood out about this variety is its long storage life. A large number of corms/cormels survive winter storage.

Akado aka Ekaeka: We received corms of this variety from Jay Bost because he was struggling to get production in Boone, North Carolina (Zone 6b). A Japanese taro that is known to be highly resistant to disease. Also noted to have poor keeping quality and high acrid mothers.

Miyako: Probably a native of Japan with similar characteristics to Akado.

Araimo aka. Tsurunoko: Roxanne Masters (Georgia) received this taro from ***, and shared it with Utopian Seed Project after she'd built up stock for a year or two. The cormels have stayed

relatively small for the two years we've grown them. Parent corms are reported to be highly acrid, and if cormels develop top growth, they develop acridity. Notable: "The popularity of this variety is due primarily to the excellent keeping quality."

The following varieties are not currently maintained by USP

In 2023, we received three cultivars from a friend in Hawaii, which are documented here for completeness. The cultivars performed reasonably well, but all shared the same challenge of low storability. Only Paakala made it through to a 2024 planting, and none of that harvest made it through to a 2025 planting.

Pilaloha: Unknown.

Manini Owali: Described as a native variety of Hawaii, it had beautiful purple stems.

Paakala: A patented variety USP PP12,772), the progeny of a cross between commercial cultivars `Ngeruuch` and `Maui Lehua`. Shows resistance to taro leaf blight (TLB) and a high tolerance to root rot. Vigorous growth, extra-large mother corm size, and pinkish corm of very good flour quality and good poi and eating qualities.

Note: Chris Smith, our Executive Director, dug up some corms of a well-known landscaping taro called **Jack's Giant**. After cooking in a pressure cooker for 30 minutes, the culinary experience was watery and mushy, a far cry from the creamy textures of a good culinary taro.

On-Farm Trial - Warren Wilson College

In 2023, Dr. Joshua Arnold (Assistant Professor of Sustainable Agriculture), along with his students, produced the following research report.

Introduction

In the Spring/Summer of 2023, Warren Wilson College participated in a taro field experiment using Utopian Seed Project taro planting material. The variety was Korean.

Research Questions:

1. Are final plant corm yields or plant growth affected by initial seed corm/cormel size?
2. Does selective pruning of leaf growth reduce overall yields?

Image: a collection of Korean taro planting pieces.

Methods

Taro was planted on May 15th and harvested on Nov 20th.

Individual taro seed corms obtained through Utopian Seed Project and planted in the WWC agroecology test plot, located at Warren Wilson College, Swannanoa, NC (35° 36 '32.2"N 82° 26' 33.2"W).

The planting material was grouped into three classes based on the weight of the corm/cormel.

- Small, 75 total pieces: <22g
- Medium, 80 total pieces: 22-34g
- Large, 57 total pieces: >34g

The soil is a sandy, acidic loam (pH 5-6). Each corm was planted with approximately 0.5 quarts of compost and was not irrigated throughout the duration of the experiment. The taro was grown in a replicated block experimental design (Table 1).

Small-cut 1	Small-cut 1	Small 1	Small 1
Large-cut 1	Large-cut 1	Large 1	Large 1
Med-cut 1	Med-cut 1	Med 1	Med 1
Small-cut 2	Small-cut 2	Small 2	Small 2
Large-cut 2	Large-cut 2	Large 2	Large 2
Med-cut 2	Med-cut 2	Med 2	Med 2

Table 1. Block experimental design and spacing.

During the summer and fall, the taro was kept weed free and measured monthly for height (of tallest leaf) & number of total leaves. Taro was selectively pruned in sub-treatments every two weeks during the months of September and October. Three leaves between the size of 10-14”

were removed during each pruning. Taro was monitored for pest infestations, and none were recorded.

In November of 2023, after the first hard frost, the taro was harvested. Each plant was gently removed from the soil, and all corms were detached from the plant at the junction of the “mother” corm. All corms were washed and weighed in total g/kg per plant.

A statistical analysis was completed using two response variables: Corm yield (weight in g/kg) and plant size (leaf number and height in cm), and two explanatory variables: corm size (g) and pruned/unpruned. All quantitative variables were tested for normality using a Shapiro-Wilk test. Homogeneity of variances was tested using the Bartlett test of homogeneity of variances. No non-normal data were identified.

An analysis of variance test (ANOVA) with a post-hoc TUKEY Highly Significant Difference test (TukeyHSD) was utilized to investigate whether the response variables were influenced by the explanatory variables.

Results

Corm Size

Yields were highest in the treatments with medium corm size. A two-way ANOVA revealed that there was a statistically significant difference in taro plant corm yields (p = [4.99e-06]). Tukey’s HSD Test for multiple comparisons found that the mean value of corm yield was significantly different between small & medium corms (p = 0.0000028], 95% C.I. = [-718.47324, -278.05210]) as well as the medium & large (p = 0.0036004], 95% C.I. = [87.54733, 519.47860]). There was no difference in yields between the pruned and non-pruned treatments.

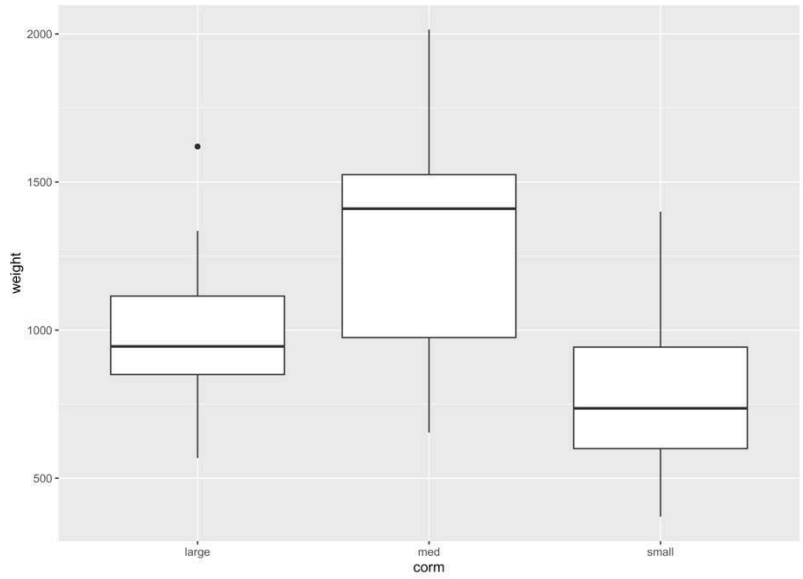


Figure: Corm size and overall yields

Plant Growth

Height of plants was affected by corm size 0.01 A two-way ANOVA revealed that there was a statistically significant difference in taro plant height when compared to corm size (p = [0.01]). Tukey's HSD Test for multiple comparisons found that the mean value of plant height was significantly different between small & large corms (p = [0.009]), 95% C.I. = [-13.709651, -1.6082931]). There was no difference in plant height between the pruned and non-pruned treatments.

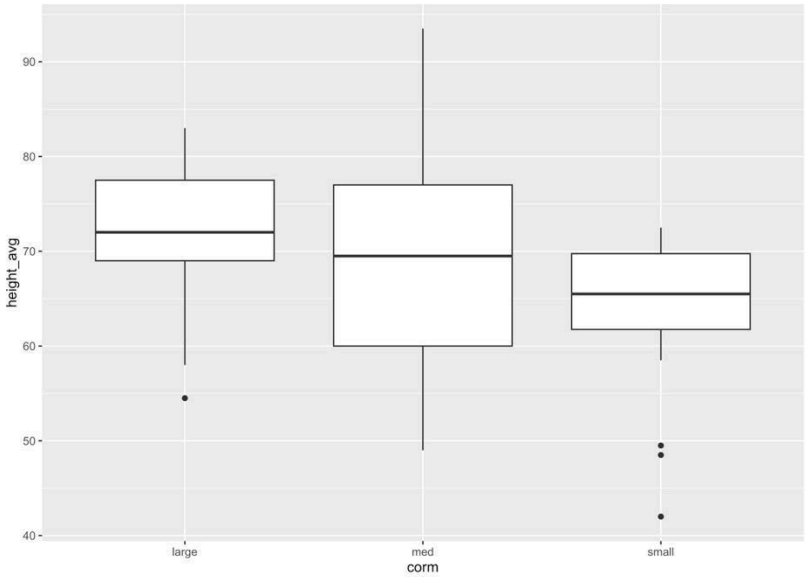


Figure: Corm size and average plant height in cm

Discussion

The results of this experiment show that small seed corms may be less vigorous in both overall corm yields as well as plant biomass/height. The strong yield results in the medium seed corm replicates are notable. It is unclear why these plants performed better than the large seed corm treatments, and this experiment should be replicated to confirm these results. One important thought is that this trial only weighed harvested cormels, not corms. Given the omission of the additional weight of the central corm, this could have significantly impacted the overall yield of the larger planting material vs. the medium.

The results are positive for dual-cropping potential, where light leaf harvests don't significantly affect final corm yield.

NOTE: We planned to replicate this trial in 2024 and include an additional variety to verify the results. Warren Wilson College experienced total crop loss early in the season due to pest pressure. It is the first and only time we have heard reports of deer/groundhog eating taro. A similar trial was conducted at Elon University that showed different results, more in line with expectations i.e. large planting material translates to larger yields.

On-Farm Trial - Elon University

In 2023, Jacob Rutz (Lecturer in Environmental Studies), along with his students, conducted a taro trial and produced the following results.

Introduction

In the Spring/Summer of 2023, Elon University participated in a taro field experiment using Utopian Seed Project taro planting material. The variety was Korean.

Research Questions:

1. Are final plant corm yields or plant growth affected by initial seed corm/cormel size?
2. How does plant spacing affect yield?

Students at Elon University helped to plant, monitor, and harvest the on-farm trial at Loy Farm.

Students are pictured here at harvest time!

Methods

The planting material was grouped into three classes based on the weight of the corm/cormel.

- Small: 17–29g
- Medium: 30–49g
- Large: 50-95g

The three spacing treatments were 6", 12", and 24".

Korean taro was planted into bulb trays with seedling mix on 4-12-23. Sprouted taro plants were planted in the field by starting corm weight, 8 plants per spacing treatment in 48" beds on 5-23-23. No supplemental fertility was added, but drip tape was used. The field layout is represented in the diagram below.

	Row 1 Small Corm	**Row 2 Med Corm**	**Row 3 Large Corm**
	Plant 1	Plant 1	Plant 1
	Plant 2	Plant 2	Plant 2
	Plant 3	Plant 3	Plant 3
	Plant 4	Plant 4	Plant 4
	Plant 5	Plant 5	Plant 5
	Plant 6	Plant 6	Plant 6
	Plant 7	Plant 7	Plant 7
6" Spacing	Plant 8	Plant 8	Plant 8
	Plant 1	Plant 1	Plant 1
	Plant 2	Plant 2	Plant 2
	Plant 3	Plant 3	Plant 3
	Plant 4	Plant 4	Plant 4
	Plant 5	Plant 5	Plant 5
	Plant 6	Plant 6	Plant 6
	Plant 7	Plant 7	Plant 7
12" Spacing	Plant 8	Plant 8	Plant 8
	Plant 1	Plant 1	Plant 1
	Plant 2	Plant 2	Plant 2
24" Spacing	Plant 3	Plant 3	Plant 3
	Plant 4	Plant 4	Plant 4
	Plant 5	Plant 5	Plant 5
	Plant 6	Plant 6	Plant 6
	Plant 7	Plant 7	Plant 7
	Plant 8	Plant 8	Plant 8

All plants were harvested on 11-7-23. Stems and leaves were cut off at the base, and a digging fork was used to unearth all taro. Corms were hosed off to clean as much as possible and then weighed after drip drying.

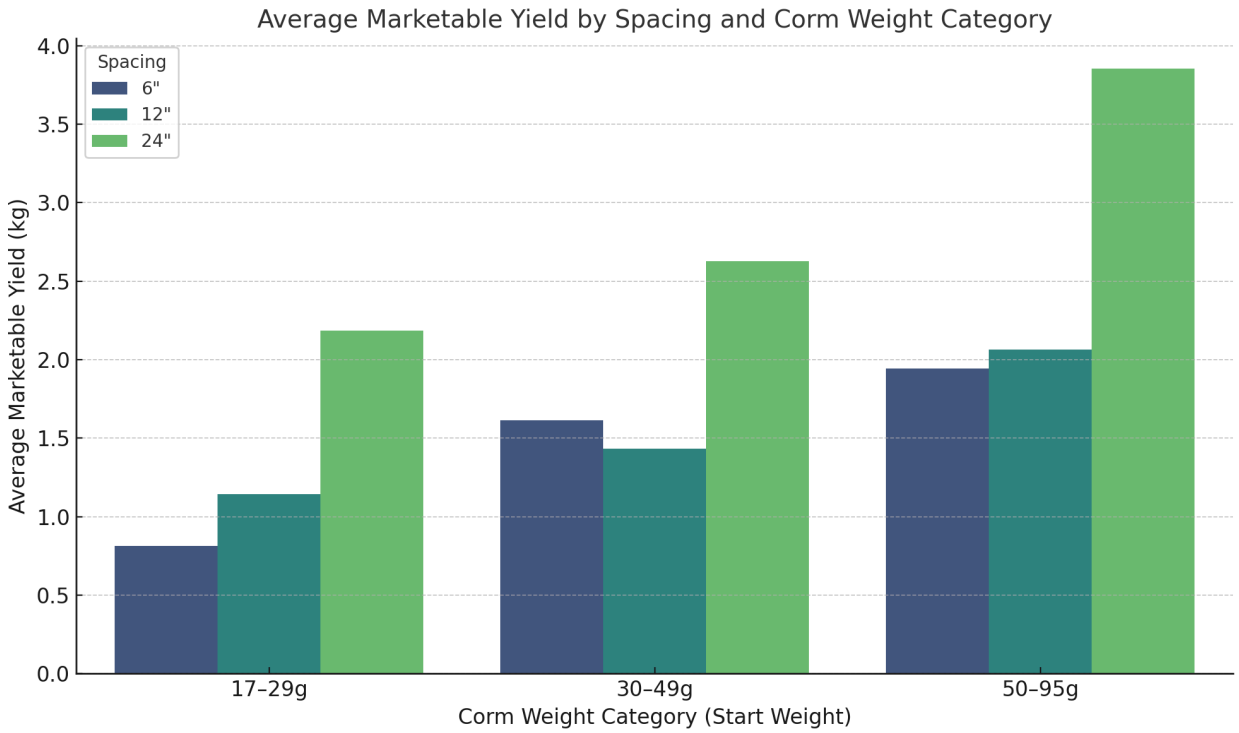
The following data was collected:

- Mother corm weight (kg).
- Total number of marketable tubers (assessed visually - smallest cormels <17g not counted).
- Average cormel weight (average of smallest and largest, in kg).
- Total marketable yield (kg).

Results

Marketable Yield

The data shows that wider spacing (24") and larger corm starting weights (50–95g) consistently produce the highest yields. Conversely, the 6" spacing with smaller corms (17–29g) shows the lowest yield across the board. The average marketable yield per plant was 4.75 times higher when comparing small planting size at 6” versus large planting size at 24”.



Tuber Size Trends

Average tuber weight increases with both spacing and planting corm size, with corms/cormels in the 30–49g and 50–95g categories at 24" spacing giving the largest average tubers.

Discussion

The data suggests that we should be recommending wider plant spacing and holding back larger pieces for planting material to increase yield. It is assumed that the effect of wider spacing and larger planting material would level off at some point. It would be useful to assess where that point is. Spacing trials for 18” and 36” treatments across different varieties could be extremely useful.

Farmer Interviews

Interviews and summaries by Dr. Sandi Ozterkatz. Based on phone conversations with taro growers from January to March 2025, except for Sherri Greene, who sent her notes by email.

During the cold first months of 2025, we interviewed 17 growers about their experience planting, cultivating, harvesting, selling, and cooking with taro. Taro is a staple food crop throughout the temperate world, a central part of many foodways around the globe, and well adapted to a warming climate in large parts of the United States. The goal of this project was to gather experience and recommendations from a diverse group of taro growers and make it available to facilitate potential increased adoption of taro as a subsistence and commercially marketed crop on farms in the Southeast.

Our growers ranged from Georgia and South Carolina to Pennsylvania, from Piedmont regions to Appalachia. All our growers are within USDA hardiness zones 6, 7, and 8, though taro is certainly viable as a commercial crop both farther South and in somewhat colder climates. Taro was almost universally pest and disease-free, grown in sand as well as clay, often without fencing or irrigation. It fits easily into existing diversified crop systems, with traditional row cropping systems using the same equipment for planting as for Irish potatoes. Human-scale farms grew, cultivated, harvested, and cleaned taro as they would other tropicals like turmeric, planting by hand and harvesting with a digging fork. Small farmers using crop rotation successfully grew blocks of tropicals together, with taro fitting easily into a permanent bed system that included other warm, long-season crops.

Yields ranged significantly from 2 to 15 lbs per plant, based on cultivation, irrigation, spacing, soil type, and climate. Taro required little care, shading out weeds and tolerating companion planting with a diverse array of crops. The most common high yields of 8-10 lbs per plant resulted from well-drained soil with adequate organic matter and fertility, full sun, consistent irrigation, spacing of about 18 inches between plants, and at least 6-7 months in the field. Yet many of our growers experimented with less than ideal growing conditions and found taro tremendously resilient, tolerating drought and excess moisture, even when other field crops were struggling. Korean taro overwinters in the ground for all growers who tried it, and all taro varieties can be stored indoors over winter in a climate-controlled space. Hawaiian taro may be

better suited for warmer climates, while Korean taro tolerates cold winters better, both at higher elevations and farther north.

Commercially, taro was of interest to chefs and home cooks alike, as well as in landscaping and homesteading endeavors. Communities and chefs with connections to regions where taro is part of traditional foodways were eager for access to both roots and leaves. Customers learning to use taro for the first time needed more education to understand how to process and prepare it. Taro was universally enjoyed by those growers who were cooking with it and by their customers. For community kitchens and restaurants, access to a starch that was tolerated by folks with blood glucose disorders, as well as nightshade intolerances, was a plus. Prices varied considerably, with some growers selling to grocery stores at wholesale prices of $2.50/lb, at the low end, and others selling to chefs and markets for $6-8/lb, at the higher end.

The biggest challenge for marketing taro for our growers lies in educating customers and finding markets. It was easier for growers to sell larger corms, as most customers preferred these both in terms of what they were familiar with seeing at markets, and for ease of processing. The greatest success was tapping into African and Asian customer communities and markets, where buyers were already familiar with taro and there was significant unmet demand, as it is still a less-commonly grown crop in the USA. Access to adequate supplies of seed stock was the primary logistical challenge for commercial growers.

Given the lack of pests or disease, ease of growing and lack of maintenance required during the growing season and in over-winter storage, taro has tremendous potential as both a wholesale food crop to bulk buyers like grocery stores, restaurants, schools, and institutions, as well as direct to households through farmer’s markets and CSAs, and in nursery settings as a dual purpose landscaping plant and back-up food supply. Amongst all our growers, interest was high in partnerships that would allow chefs and cooks with experience to help educate customers about how to process and prepare taro. Customer education and awareness were the only barriers to selling taro, and growers with access to African and Asian markets had significant demand and opportunities for expanded production.

LINDY ABRAMS

At Ruff’ton Roots Farm in Rutherfordton, NC (7b), Lindy has been growing Korean taro for 10 years, working with Yanna Fishman on cultivation and culinary education. Ruff’ton Roots grows

for a municipal public garden program, with both a learning garden for visitors and food production destined for non-profit food pantries in town, and prepared meals at a community food kitchen. All farm work is done collectively, and taro is planted and harvested on the same day as the rest of the tropicals–turmeric, ginger, and yacon. About 1 in 10 of Lindy's Korean taro plants bloom every year, offering a special treat for visitors to the learning garden. Ruff'ton's team also pots up about 20% of their taro to distribute to home growers, with an informational leaflet.

While growing more taro and more varieties of taro would be of interest, before expanding, Lindy wants to have a system in place to ensure that the knowledge is there for both the community kitchens and the broader community, to make sure people can enjoy the crop. Feedback from folks in the community kitchen has been welcoming on flavor, similar to potatoes, but kitchen staff found it more labor-intensive to prepare. Finding varieties with larger corms, bringing in folks with regional foodways experience to help educate staff and home cooks, and learning labor-saving techniques for preparation would allow for expanded growing. The ability to offer a starch food that isn't a nightshade and also fits with specialized diets for those needing to moderate glucose levels is a real strength, and Lindy hopes for concrete informational resources about this that can be offered to customers.

LEON BIRSTEIN

At Full Circle Family Farm in Black Mountain, NC (7a), Leon grows turmeric, corn, and sweet potatoes and sells directly to customers and local grocers. He's been growing Korean taro for several years, primarily for home consumption. Leon's farm is fully off-grid and irrigates with a gravity-fed system. The taro has been allowed to overwinter each year and come back. While he has sold to the local co-op, customer education and corm size limited how much the co-op was able to sell. With limited labor, comparing the price per pound for a crop like turmeric, which has similar growing and harvesting needs, has made taro seem like a more challenging crop from a financial perspective. Having larger varieties, more similar to what customers are familiar with, could be a plus. Leon grows taro in 3 rows down a 100-foot-long bed alongside his sweet potatoes. After the sweet potato harvest, their foliage is pulled over as mulch on top of the taro bed.

MICHAEL CARTER

At Carter Farms in Orange County, Virginia (7b), Michael does both non-profit agricultural education work and grows traditional African, Caribbean, and Asian crops for specialty markets. Carter Farms grows taro for leaf production, rather than roots. While living in West Africa, Michael observed how cocoyam leaves were bundled and sold, and harvested them at the same size for his markets. As one of the primary cooking greens in Nigeria and Ghana, small and medium-sized leaves (less than a foot long) were bundled together for sale. Michael's no-till farm grows without pesticides or herbicides, relying on landscape fabric for weed control and soil warming. Taro is planted to fit the 6-8 inch holes, spacing that works well for leaf production. Michael dedicates approximately a tenth of an acre to taro greens production, distributed between the tunnel and field, and sells half-pound bundles of leaves. Among his markets, there's demand for taro root as well as leaves, but Carter Farms fills a specialty niche as the only grower of taro greens and has chosen not to sell the roots at this time. While about 70% of Michael's customers are already familiar with taro greens, he does customer education for those who need it.

ROXANNE MASTERS

At Roots and Earth Farm in Fairburn, GA (8b), Roxanne grows taro as a primary food crop for her own family and sells plants as part of her nursery business centered on culturally significant annuals, edible perennials, and herbs. She has tried taro in different microclimates and landscape locations and finds that it tolerates partial shade, but does not thrive without access to irrigation during hot and dry conditions. It has overwintered outdoors at lows of -5°F. Roxanne grows several varieties, including Korean, Hawaiian, Japanese Araimo, Puerto Rican, a grocery store variety (H Mart), and experimental varieties from the Utopian Seed Project. Japanese Araimo is the variety that blooms in her gardens. Roxanne finds tremendous community interest both in landscaping plants that are edible (particularly in neighborhoods with restrictive covenants related to using yards to grow food crops) and in connecting community members to the foodways of Black communities in the Caribbean.

Roxanne's family is originally from Jamaica, where she grew up eating cocoyam. While taro leaves were not commonly eaten, they were in Trinidad, and she learned to use them from Trinidadian friends, and now shares recipes for taro leaves with family and friends. Roxanne explained that in Jamaica, taro root is used in soups and stews with other root crops, as well as steamed and mashed like fufu. When she shares her experience with customers and

community, she explains how taro can substitute for starches like rice. For her, the market for taro as a nursery plant fits well in her business model, where she can show visitors the plants in the garden, teach them how to use it in the landscape and the kitchen, and then make plants available with information they can take home. In her own home, Roxanne appreciates connecting her children to her Jamaican foodways by growing and eating taro as a family.

ZACK ELFERS

At Future Forest Plants in Airville, PA (7a/7b), Zach has grown taro for sale to local chefs and home use, and is considering expanding to grow it as a market crop. The main constraint on this endeavor is access to enough seed stock and the need for irrigation. While Zach's dry-farmed taro produced well during seasons with adequate rainfall, it did not thrive during periods of drought. Interplanting with sweet potatoes has allowed Zach to double crop in the same space, with just slightly wider spacing. Sweet potato size is somewhat constrained, but they were still marketable–he recommends planting at the same time so the sweet potatoes aren't out-competed. Zach generally grows taro in staggered rows with approximately 16 inches between plants and rows.

At home, Zach's family loves taro. They boil the corms with the skin on, then squeeze out the flesh, mash, and add salt and maple syrup. They've also eaten it fried. When cooking the greens, Zach first blanches them and tosses out the cooking water, then fries or sautés them as with other cooking greens. Marketing to chefs was straightforward if their menus were Asian-inspired or if they already knew the crop. New chefs were curious, but less likely to buy larger quantities if the taro was destined for one specific dish on the menu.

YANNA FISHMAN

In Union Mills, NC (7b), Yanna grows on about half an acre for home use, teaching, and maintaining seed stock of several crops to support the mission of the Utopian Seed Project, of which she is a founding board member. Tropicals are an important part of Yanna's seed work, and she maintains a dozen varieties of taro, including several varieties for distribution to growers around the Southeast, like the Korean and Hawaiian taro grown by most of the farmers we interviewed. Yanna finds that taro responds best to rich soil with adequate water during the growing season. She grows in beds about 3 feet wide with plants in two staggered rows. At harvest time, Yanna cuts the leaves before digging, hoses the roots before bringing them in, and

cures them as one would with garlic, before storing. In her naturally cool, earth-bermed storage space, Yanna keeps taro in ventilated plastic bins at about 55°F and 50% relative humidity.

In her own home, Yanna steams taro, rinses and peels it, then boils or pressure cooks it for 10-15 minutes, drains, and stores it in the refrigerator, where it can easily be accessed to roast, fry, or add to other dishes. She shares that there are different opinions about whether cooking in the skin can change the flavor, but steaming makes the skin fast and easy to remove. If skins are removed immediately after cooling, there may be less impact on flavor. Like other growers, Yanna has found that chefs and cooks who are familiar with taro are eager to use it and do not need support and guidance, but those who are not appreciate information about handling and preparation. Yanna has been growing and learning about taro for many years and continues to experiment, explore, and support growers and eaters.

BEN GEIGER

At Garden Windows Farm in Denton, NC (8a), Ben grows year-round on about an acre for chefs, markets, food hubs, and a small CSA. Every year, he dedicates space in the farm's low-till, permanent bed system for a few experimental crops. In 2024, he tried Korean taro without supplemental irrigation, growing in a single row, 50-foot bed, with 24 inches between plants. Ben found the main challenge from a growing perspective was fitting taro's long season into the farm's orientation toward crops with a quicker turnover. The taro was low maintenance and low labor, but took up field space for three seasons.

Ben sold the full crop between a brewery (making a taro beer for a farm-to-table event) and a chef who made a taro gnocchi that received rave reviews. Education was an important element of the sales process, and gave Ben some pause in considering expanded growth for farmer's market or CSA customers. Both of his buyers had expected larger-sized taro, and Ben feels that a variety with bigger corms would be easier to market for chefs and home cooks. For the brewery, the surprise of smaller taro was beneficial, as it made the corms easier to process for the brewer's intended use.

SHERRI GREENE

In Shelby, NC (8a), Sherri of Greene Family Farm grows turmeric and ginger for the Foothills Farmers Market. Sherri's trial-taro thrives and overwinters mulched on the north side of a

structure, serving dual purpose as a beautiful landscape plant. Primary constraints on expanded field growing include labor and culinary education.

DONGPING HAN

Author and retired Warren Wilson professor Dongping Han grows taro in the large garden at his home on the Warren Wilson campus in Swannanoa, NC (7a). Dongping grew up in Shandong, China, and shared his memories of growing and harvesting taro in his rural community. The late-autumn harvest window for taro aligns with the Mid-Autumn Moon Festival, and fresh taro is a staple part of the celebration, bringing luck. Dongping says that in China, taro is not distinguished by variety but by region of origin. Certain regions are known for growing the best taro, because of their soils, and could command higher prices at market. In China, many rural families grew taro for home use, and Dongping has been growing taro in his large garden for decades, since coming to the United States. He shares prepared taro dishes with students and colleagues on campus.

TAYLOR HOLENBECK

Taylor works as the Grower Services Coordinator for Happy Dirt Farms and grows taro in his home garden in Durham, NC (8a), in well-amended raised beds with partial sun. Last year, Taylor pre-sprouted the taro in April in a cold frame and planted it out after about 4 weeks, successfully intercropping it with tomatoes and peppers. The experiment was due to space constraints, but both taro and nightshades were happy with the arrangement. Taylor's been experimenting in the kitchen, peeling the taro and cooking it like a potato. A recent lentil soup with taro was delicious, and Taylor noted the stewed taro had a satisfying texture similar to a roux. He hopes that more farmers and customers will grow and use taro, and that more products like taro flour can be made and marketed in the Southeast.

CHUE AND TOU LEE

At Lee's One Fortune Farm in Marion, NC (7a/b), Chue and Tou grow for the Hmong refugee community that settled in Western North Carolina after leaving Laos in the years following the Vietnam War. The Lees grow many traditional food crops and sell them to the Hmong community. Families grow 50 to 60 lbs of taro a year for their households, with a few farmers growing several hundred pounds to serve community members who don't have access to their own garden spaces. The Lees build organic matter with wood chips, chicken litter, and mulch. Tou tells us that taro loves warm, moist, rich soil, so they choose the warmest spots, even if they

have some shade, and can use areas that might be too wet for other crops. The Lees have successfully intercropped taro with chayote and bitter melon, reporting that it helps break up the soil and doesn't mind being shaded by the vines. Normally, the eddoes are eaten, and the mother is saved for replanting. In addition to a white taro, the Lees also grow a rare purple taro, only used for special holidays, as it produces less, as well as a green taro that is grown for the leaves. The green taro must be planted separately from the white because the plants are hard to tell apart, even for experienced growers. Chue identifies the green by rubbing the stem with her fingers, which has a white powdery residue.

Selling taro to the broader community is a challenge, as it takes a lot of customer education and even with warnings, people will sometimes forget and eat it raw–a difficulty reported by several growers. Chue and Tou started bringing it to the farmer's market as prepared samples two years ago and are working to introduce it to the Asheville community.

Tou told us, "As a young child, I can remember…we'd harvest it, the older family members would steam it, and when you peel it, it's got a wonderful sweet, nutty, honey aroma to it, almost like a sweet potato. As a kid, that was a snack or dessert that you longed for because it's only a couple of times of year that you have an abundance, so it's something we always look forward to. Another dish we long for is a bubble tea with taro, steamed chunks of taro inside that take the place of tapioca pearls. It's really good. It gives you a nice chew and a nutty, sweet flavor."

MILLARD LOCKLEAR

At New Ground Farm in Pembroke, NC (8b), Millard has been farming for nearly a decade on land that has been in his family for almost a century. The farm grows wholesale fresh produce for natural grocers and distributors, and tried taro for the first time in 2024. Millard used the same equipment and systems as for Irish potatoes, trenching about 8 inches deep and then hilling. He planted about 7 lbs of seed and harvested 86 lbs of taro, which are being saved for replanting. In the first trial year, Millard did no soil amendments and grew the taro without irrigation, including through two months in early summer with no rain. In 2025, he plans to irrigate and fertilize on the same schedule as Irish potatoes, planting in mid-March. Because wholesalers require larger quantities, the full crop was saved for seed, echoing the challenge for growers looking to scale up.

PHILLIP NOGUERAS

In Burnsville, NC (7a), Phillip has been growing taro for home consumption experimentally for the past two years. The trial taro was dry-farmed in a 25-foot bed with plants spaced 8-12 inches apart, in two rows. The plants were resilient and grew well without irrigation, despite a prolonged drought, but the yield was relatively low. Phillip cooks both taro root and leaves, stir-frying the leaves like spinach or collard greens, and making roast fries or mashed taro with the root. The similarities to white potatoes in terms of cooking methods are appealing, and the fact that folks who can't eat white potatoes or nightshades can enjoy taro is a great feature.

SANDI OSTERKATZ

At Footnote Farm in Carrboro, NC (8a), Sandi has been growing Korean and Hawaiian taro from USP for two seasons. She is growing almost exclusively for CSA customers, but has also sold taro directly to her broader non-CSA customer community and a local bar focusing on "ground to glass" cocktails. She sells taro greens as well as roots. With a permanent raised bed system and plots that rotate each season, taro fits well in her tropical plot with turmeric, ginger, yacon, arrowroot, okra, and hibiscus, where everything is planted and harvested more or less on the same schedule. Like most of the growers we spoke to, Sandi harvests taro by cutting off the foliage and using a digging fork. In 2023, she experimented with overwintering by mounding excess seed stock of both Hawaiian and Korean taro side by side in the ground, finding the latter to be hardier, which has also been the experience of several other growers. She stores cured taro in ventilated plastic crates stacked in a conditioned interior space over winter, as well as unprotected in the ground, without losses.

Customer education has been less of a problem with CSA members, as her members are used to looking up new crop profiles in her CSA guide, but individual customers and restaurants require more careful explanation. At home, Sandi steams or boils whole taro, then peels and flash freezes it in chunks to use later in soups, baking, or roasted veggie dishes. The muffins she made using cooked taro as the main starch were a hit with her kids. In 2025, Sandi doubled her taro planting and is excited to try making taro flour.

JASON AND AMI ROLAND

On their small family farm in Lexington, SC (8b), Jason and Ami Roland grow almost exclusively for CSA. Their soil is extremely sandy, and the Korean and Hawaiian taro Jason has grown for

the past two years would have preferred slightly heavier soil and more irrigation. Jason grew about 100 plants in a block at the end of a primary growing field. The Korean taro struggled significantly more than the Hawaiian taro on days over 90°F, regardless of watering. This heat intolerance seemed to weaken the plants and make them susceptible to pressure from mice and voles. The Hawaiian taro did not suffer from the heat or the pests, despite being planted in the same location. This experience with rodent damage was a rare report of pest damage in all our taro conversations.

Jason sold a few lbs of taro to a local chef interested in exploring the crop, and like other market growers, faces the need to either plan to save a significant amount for seed or find a supplier for larger amounts. They have recently moved to a new farm in the Piedmont of North Carolina, and plan to continue growing taro on their new land.

JACOB RUTZ

At Elon University's Loy Farm in Burlington, NC (8a), Jacob has grown Korean taro as an experimental crop since 2023. Loy Farm is a one-acre student farm growing diversified fruits and vegetables for teaching, the dining hall, and local food banks. Taro fit well in the crop rotation–it helped break pest and disease cycles and was ideal for the farm's schedule of student labor availability in spring and fall, but not over summer. It was grown in a 30-inch-wide, 100-foot-long bed, with 18-inch spacing between plants and fertilized minimally with Harmony and feather meal. In Jacob's second year growing taro, he suspects a poorly drained planting location made for a less productive season.

In the student test kitchen on community garden days, Jacob's students have made boba tea and vegan crab cakes with their taro, which were both a big hit. The dining hall used some of the mothers, but as a less familiar crop, there was a significant learning curve. They tried cooking with the greens but struggled to find a method that eliminated mouth irritation. Jacob is looking forward to growing taro again and hopes for resources on optimizing conditions for a more productive growing season, as well as learning new culinary techniques.

JAMIE SWOFFORD

At Old North Farm in Shelby, NC (8a), Jamie has been growing Korean and Hawaiian taro for several years as a market crop destined for the kitchens of area chefs. In a permanent raised bed system using minimal tillage and following organic practices, taro is grown in the same

30-inch beds as other crops, in a rotating block dedicated to root crops. With the same 18-inch spacing used by most of our growers on permanent 30” bed systems, Jamie got about 400 lbs of taro root from a 100’ bed and sells it in 5lb bags.

Chefs are excited for access to fresh taro and universally impressed with the depth of flavor, particularly compared to the potato. Some customer education is needed, and familiarity has been a primary limit to demand. Coming from a restaurant background himself, Jamie does demonstrations to show customers how to poach, peel, and then prepare taro root. Restaurant customers used taro for chips as well as roasting like potatoes, after poaching. Jamie’s favorite home preparation is to dice the taro after poaching and cook it in a cast-iron skillet. It was also delicious in a Ghanaian Groundnut Stew (Nkatsenkwan) recipe from Zoe Adjonyoh.

GWEN CASEBEER AND JAY ENGLEBACH

Black Trumpet Farm is a gourmet mushroom farm in Leicester, NC (6b), where Gwen and Jay have grown taro for several years as an experimental food crop, primarily for home use. While they have worked hard to improve their dense clay bottom land, one benefit is that once established, long-season crops need very little irrigation. Gwen and Jay find taro durable and low maintenance, as well as beneficial in their crop rotation (since it’s not a brassica or nightshade), with low pest and disease pressure. Sheet pan fries and mashed taro have both been tasty dishes in the home kitchen.

Eating Taro

Utopian Seed Project focuses on a multi-stakeholder approach to introducing crops that are new to our region. The supply-side, agronomic questions are very important, but there is little use in growing something if a farmer can't sell it. Taro has high levels of popularity within communities that have cultural and culinary ties to the crop. We saw this in our interview with Chue and Tou Lee (Lee's Fortune Family Farm) and their Hmong community, however, they also struggled to sell taro to a broader audience at farmers markets.

Taro is easily sourced in most Asian Markets, and on occasion sold at larger grocery chains like Earth Fare and Ingles. Part of our work has been to introduce taro to the public in an accessible way. This work is important and ongoing and involves a mixture of exposure and education.

General Culinary Notes

The entire taro plant contains calcium oxalate raphide crystals, which are often described as acrid in culinary descriptions. If eaten raw, it will cause intense itching and irritation to the mouth and throat. Taro must be cooked to be edible. This can create some intimidation in the consumer, but it is worth remembering that eating raw potatoes can cause nausea, vomiting, diarrhea, and other gastrointestinal distress. We hoped to analyze the different varieties we are growing for calcium oxalate levels, however, we were unable to secure a laboratory that could carry out this analysis for us. In addition, other factors can affect the levels of acidity. Cormels that have sprouted have been noted to have increased acridity, and some varieties have acrid mothers and edible eddoes. Chef Cleophus Hethington noted that his Grandmother's 'island remedy' for eating undercooked taro was a spoonful of mustard seed oil. We also came across a reference to lemon juice in a little water as a solution.[5] A final note on calcium oxalates is that there seem to be varying levels of sensitivity amongst individuals.

Not all taro is created equal, and one of the things that makes the edible taro edible is the lower concentrations of calcium oxalate raphide crystals. There are a few basic cooking methods that make taro very accessible. If peeling before cooking, the calcium oxalates can irritate the skin, so gloves are recommended if you find yourself sensitive.

[5] George Washington Carver|The Dasheen: A Southern Root Crop for Home Use and Market|NAL|USDA. (n.d.). https://www.nal.usda.gov/exhibits/ipd/carver/exhibits/show/crop-development/item/161

Pressure Cooking

A pressure cooker or Instant Pot is one of the easiest ways to cook taro. The taro can be cooked submerged in water or in a steam basket. Beyond scrubbing any dirt off the skin, there is very little prep work ahead of cooking. Cook times will vary depending on the size of the taro pieces and the variety. I have cooked small Korean taro eddoes for just 12 minutes on high pressure at events before sharing them with attendees, but I will cook larger pieces for up to 40 minutes. We spoke with a cook from Hawaii who pressure-cooked larger mothers (4-5 lb pieces) for many hours. Once pressure-cooked, it is easy to peel/remove the skin, and the creamy inside almost pops out. The taro can be enjoyed like this, with a little salt and butter. It can be mashed into a creamy mashed taro. I have frozen taro at this stage for later use.

Boiling/Steaming

Similar to pressure cooking, but the cook time will need to be at least twice as long. Note: Sometimes I will peel the taro and cut into cubes to include in a soup (see Yunanda Wilson's Burmese Taro and Chicken Stew). The smaller pieces need much less cooking time than whole eddos/mothers.

Frying

Taro can be peeled, grated, and fried like a hash. Sometimes I'll parboil the eddoes to pop the skin off, then cut into slabs and fry until the outsides are golden brown (also works in the oven like potato wedges). .

Roasting

Roasting taro, much like any other roasted root vegetables, brings out some of the sweetness of the root. Taro can be peeled and sliced into cubes or wedges and roasted with a little oil and salt.

Taro Pop-up, Whaley Brewery

As part of this research grant, we organized a Taro Pop-up at Whaley Brewery, Old Fort, North Carolina in March of 2023. We invited 3 chefs to each prepare two taro dishes for members of the public to come and sample. We also used the event as an educational opportunity where we distributed taro planting material and talked to participants about taro!

Chef Yunanda Wilson

Taro Thargu: Steamed taro, tapioca pearls, sweetened coconut milk

Taro Hinn: Chicken & taro curry, coconut rice, spicy pickled achira

Chef Jeremy Salig

Taro with tapioca, coconut, candied turmeric, and hibiscus marinated yacon

Scalloped taro with bacon, pimento cheese, and wild onions

Chef Beth Kellarhalls

Taro Hand Pie with Peanut Anglaise

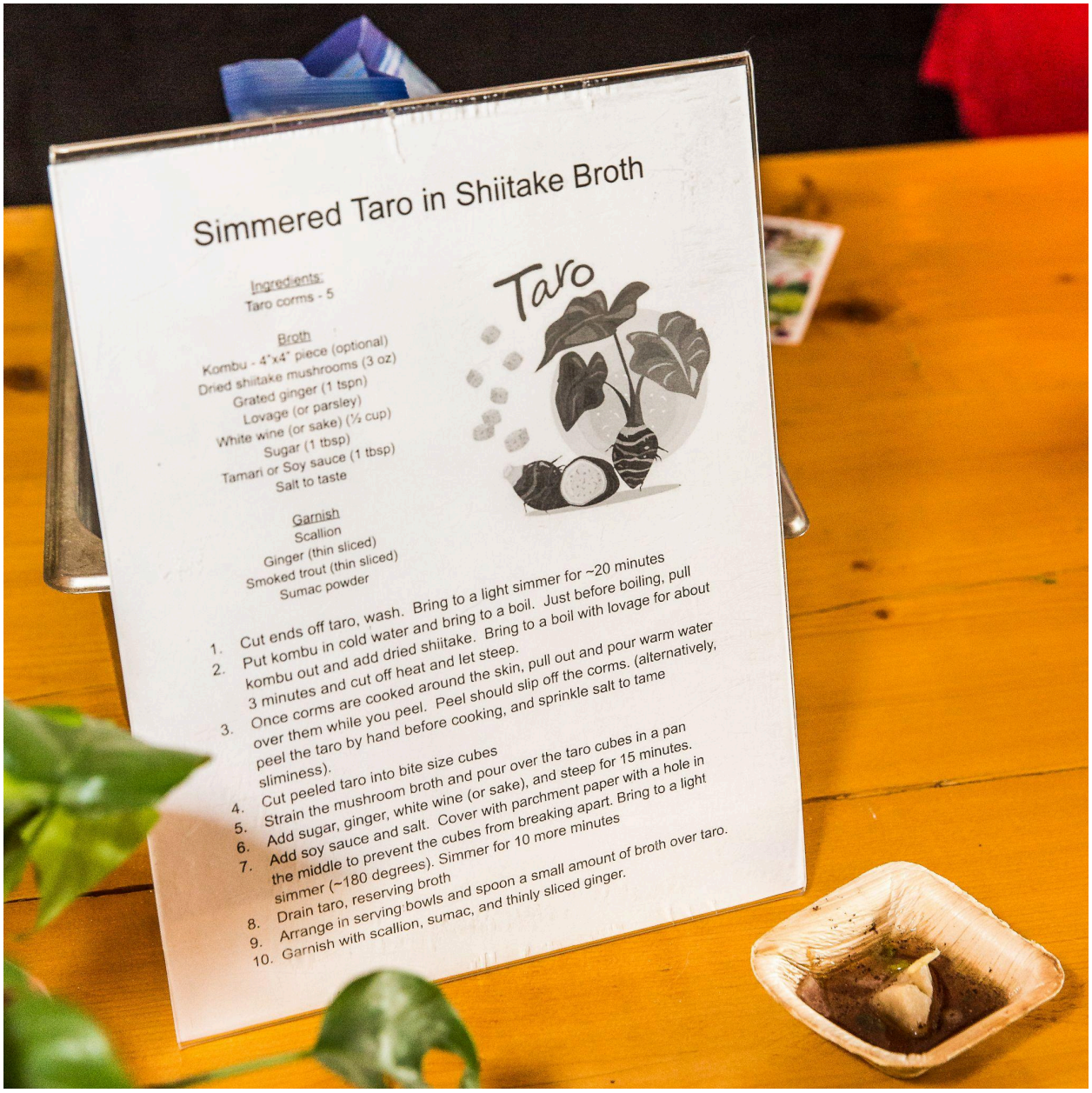
Taro Brandade Crostini (Salt Cod, Caramelized Scallions, Taro, Local Sourdough)



Over 75 attendees came out on a cold, but beautiful, March day to experience and learn more about taro.

Taro Demo Table with Sunil Patel

We host events called Trial to Table, where we bring around 150 people together to experience crops from our trials through the talented hands of local chefs. At these events, we also organize a Demonstration Table. The demonstration table aims to have a local chef or cook make an ingredient accessible. They prepare a very simple dish, share the recipe, and then give two live demonstrations during the event to introduce people to the ingredient and how to cook with it. In 2024, we invited Chef Sunil Patel to showcase taro at our demonstration table. He chose a simple dish that he'd learned to cook from his time living in Japan. We encourage participants to be open to buying and trying new types of vegetables!



Trial to Table

In addition to the very specific Demonstration Table explained above, we often have taro and taro leaves on our pantry list that we offer to chefs for all of our Trial to Table events. Throughout 2022, 2023, and 2023, many chefs have selected and cooked with taro. Below is a summary of some of the dishes.

Chef Jamie Swofford

Taro Pani Puri w/ Roselle Chutney & Coriander Water.
Sweet Potato & Taro Hash.

Chef Ophus

Creamy Broken Rice & Taro Grits: Green garlic, pickled collards, toasted okra, and benne.

Chef Erica “Shorty” Glaubitz

Slad phak rak (root vegetable salad): kale, arugula, bok choy tossed with yacon and roasted Taro root and Murasaki seasoned with my spice mix, drizzled with a kaffir lime leaf vinaigrette and topped with candied ginger.

Chef Sunil Patel

Taro, parsnip, carrot, sochan & yardlong bean with pork belly in a miso broth.

Chef Awo Amenumey

Gari Fortor Croquettes – Gari (Cassava granules), Corned Beef & Egg Tomato stew, Mixed greens (including taro greens).
Koliko: Taro & Sweet Potato Fritters, Taro leaves & Tomato Sauce with Agushi.

Chef Jeremy Salig

Sancocho -Caribbean Stew: Squash, sweet potato, taro, plantain, braised beef, chicken skin.

Chef J Chong

Sorghum three ways: sorghum congee, 5-spice sorghum pork, taro, pickled cucumbers, sorghum popcorn. J included taro chips with this dish, which she later recreated for a PBS State of Things: Rethinking Our Food System.

Chef Chuck Cutler-Gutiérrez

Mushroom and squash stew, taro and potato knödel.

Chef Mallory Foster

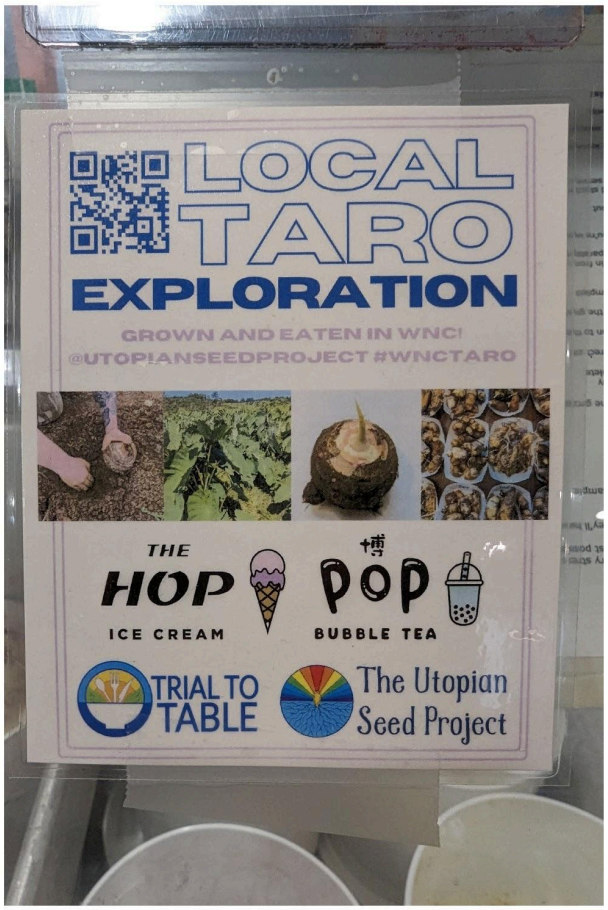
Taro filling, chocolate cremeux, benne seed, toasted mallow, marigold.

Chef Michelle Bailey

Turmeric Taro Crudo, Yam Tots, Achira Crema, Collard Stem Kraut, Okra Seed Dukkah, Winter Squash Jus.

Taro Ice Cream with The Hop

In some cultures, taro has an extra dimension - the dessert dimension! Taro mochi, taro donuts, taro puddings, and taro ice cream. In 2024, we partnered with The Hop, Asheville, North Carolina, to make a Taro Ice Cream, which they sold as a seasonal special. They are repeating in 2025.



The Hop also co-owns a bubble tea company called The Pop. They used extra taro in their bubble tea, which offers another outlet for local taro growers.

Taro's Future

Taro has the potential to have a significant impact on the food and farming systems in North Carolina. It is an easy-to-grow, productive, nutritious, and marketable crop. While it is considered emerging in North Carolina, it is well established in other parts of the world. In 2022, worldwide production of taro was 18 million tons. Taro is the fifth-largest producer of root crops in the world, and generally commands a higher market price compared to other root crops. In 2023, North America imported 64,309 metric tons of taro, which represents 44.8% of the world's total taro imports.[6] Currently, the United States imports approximately $69 million worth of taro products each year from countries including Costa Rica and Mexico. The same report concluded, "The demand for cocoyam (taro) in the United States is driven by its nutritional benefits, culinary versatility, and the increasing popularity of ethnic foods. Cocoyam is rich in dietary fiber, vitamins, and minerals, making it a healthy alternative to other starchy foods. It is used in various dishes, including soups, stews, and chips, and as a flour substitute in baking. Additionally, the trend towards plant-based diets has further increased its popularity as a nutritious and versatile ingredient."[7]

Introducing taro as an alternative sustainable crop in North Carolina specifically addresses food security concerns in a warming climate, but it also confers additional sustainable benefits through improving crop rotations, minimizing pesticide and herbicide usage, potential for unique intercropping usages, and meeting the demand for a crop that is largely imported into the United States i.e. even without climate change, growing and consuming taro in North Carolina makes a lot of sense. A 2023 paper titled, *Taro Roots: An Underexploited Root Crop,* with lead researchers from NC A&T, noted, "Considering the sustainability and high nutritional value of taro roots, it is worth exploring their potential to thrive in warmer regions of the USA."[8]

Below you can see a chart that summarizes the market opportunities for taro, showing that the food system impact could be large and also reach into other industries. Our focus for this grant will be growing and marketing as a food crop, both as a vegetable and value-added.

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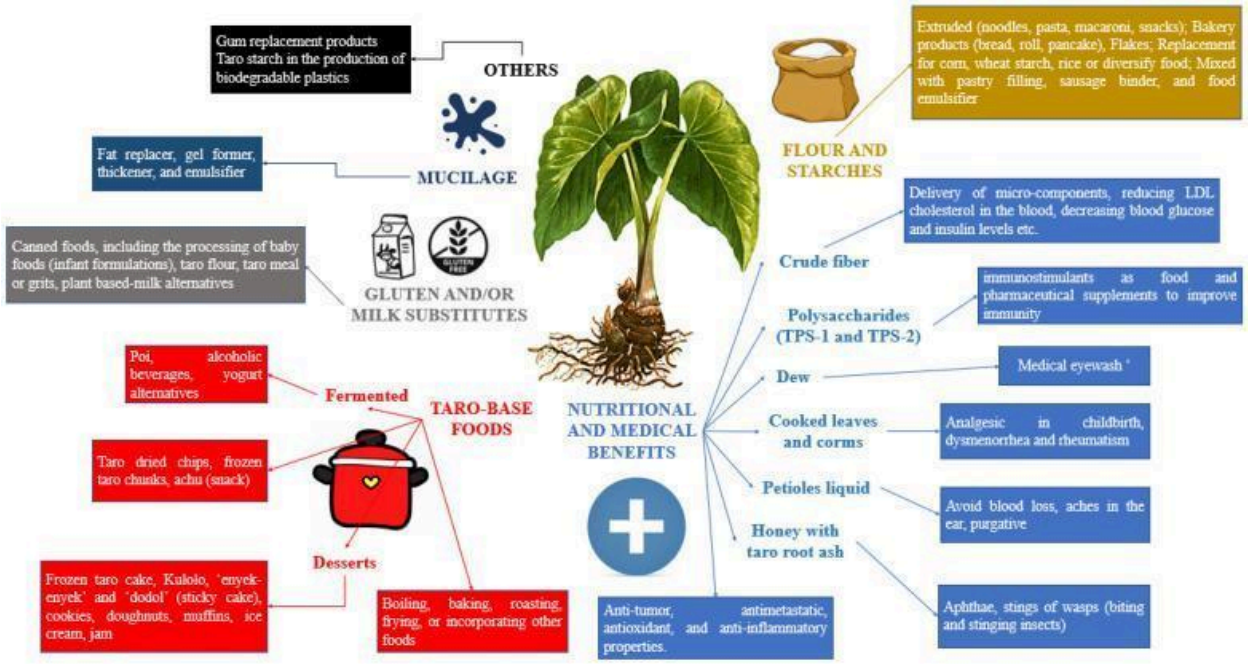
[6] Taro Market size | Mordor Intelligence. (n.d.). https://www.mordorintelligence.com/industry-reports/taro-market

[7] ibid

[8] Ferdaus, M. J., Chukwu-Munsen, E., Foguel, A., & Da Silva, R. C. (2023). Taro roots: an underexploited root crop. Nutrients, 15(15), 3337. https://doi.org/10.3390/nu15153337



Taro is a tropically originating crop and is therefore highly adapted to hot and humid conditions. These growing conditions can be a challenge for growing food in North Carolina, but also an opportunity. The success of the sweet potato (another tropical origin crop) in North Carolina is a great model as we seek to diversify our crop options. Taro also has limited pest and disease issues present in North Carolina, making it a unique and beneficial crop for rotation in vegetable production. As a member of the Araceae family, none of the predominant pests (including Taro beetle) nor diseases (including Taro leaf blight) are present in North Carolina, and few if any crop rotations include this plant family, potentially breaking pathogen disease cycles[9]. This means that taro can be grown without the need for fungicides and pesticides, making it a desirable alternative in organic systems. Increasing species diversity across the landscape and at a field level through unique crop rotations also decreases crop failure risk and increases soil microbiological and pollinator diversity.

Taro's unique growth pattern also contributes to the dynamic nature of this crop in North Carolina. Taro's large, broad leaves form a dense canopy over a wide area, improving weed suppression and reducing moisture loss for a large portion of the season, minimizing the need for mechanical cultivation under organic agroecosystems. Taro's natural distribution is in tropical polycultures as an understory crop; with a tolerance for some amount of shading, taro could

[9] Rojas-Sandoval, J., & Acevedo-Rodríguez, P. (2022). Colocasia esculenta (taro) [Dataset]. In CABI Compendium. https://doi.org/10.1079/cabicompendium.17221

potentially be intercropped with a variety of different perennial or annual crop species. Taro can thrive in full sun as well as partial shade, making it adaptable to a broad spectrum of agronomic conditions. Taro is very adaptable in terms of a range of growing conditions. The University of Hawaii Extension reports that, “Taro can be cultivated under both wetland (paddy-taro) and dryland (upland) conditions. Some varieties do well under both types of culture.”[10] This wetland tolerance could offer an opportunity for growing in areas prone to flooding or heavy rainfall, demonstrating another benefit of taro in terms of climate change.

Taro’s post-harvest handling is no more onerous than other root crops grown in North Carolina. It doesn’t require the energy-intensive curing of sweet potatoes and has similar storage requirements to ‘Irish’ potatoes. Taro can easily be stored over the winter for sale at Winter Farmers Markets, restaurants, and wholesale, creating a longer market season with economic opportunities even in the slower winter season for NC farmers. Taro leaves and roots indeed need to be cooked before eating, but the same is true of potatoes, and we don’t see this as a large barrier to introduction.

With the growth of a domestic taro market, foreign importation may be reduced, ultimately saving significant carbon emissions through regional production over international shipping. Currently, the United States imports approximately $69 million worth of taro products each year from countries including Costa Rica and Mexico.[11] If only a fraction of this imported product could be diverted to regional production, large amounts of fossil fuels would be saved in distribution emissions alone.

In summary, there are farmer benefits to growing taro, both economic and environmental, plus the bigger picture goal of crop diversification and resulting climate resilience will have a high impact on all stakeholders in a climate-uncertain future. We have also noted that minority farmers who have a cultural connection to taro, and younger farmers who are more willing to diversify their fields and try new things, are most likely to benefit from growing and marketing taro, with the ability to capture early market share as a niche product. In time, we expect food aggregators, wholesalers, and bulk purchasing will broaden the market for larger-scale producers.

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[10] Taro Production guidelines for Kauai. (n.d.). http://www.extento.hawaii.edu/kbase/reports/taro_prod.htm

[11] https://www.businesswire.com/news/home/20200819005251/en/Global-Taro-Market-2020-2025-North-America-Dominates-Global-Imports---ResearchAndMarkets.com