



HISB Newsletter

SEEDS FOR OUR FUTURE

Reforestation is dependent on supplies of viable seeds from appropriate species and locations – this is one of the largest bottlenecks in scaling up restoration projects^{1,2}. If seeds are only collected year to year, environmental conditions – like drought, wind, storms, and insect and animal damage – limit what plants can be propagated each season. Disasters like wildfires and hurricanes can devastate landscapes, and many native species are outcompeted by invasive plants without restoration^{3,4}. If native seeds are not banked for emergency response, revegetation with non-native seeds can put ecosystems at further risk. Seed banking is a critical tool to preserve precious resources, both natural forests and agricultural crops, and a Global Strategy for Plant Conservation priority^{5,6}. Using proper protocols, seeds can potentially be stored for decades^{7,8}. As climate fluctuates, wild areas are deforested, and crop resiliency is reduced, it is ever more critical to save seeds!

[Terraformation](#) is a company and foundation that works to empower partners in scaling up restoration efforts through seed banking and tree planting. One way we accomplish this mission is by supporting the [Hawai'i Island Seed Bank](#) (HISB). The HISB, established in 2008 by Jill Wagner, is the only seed bank to serve partners across all of Hawai'i Island. It began by banking seeds of native species for restoration partners and has since expanded to include seeds of locally adapted agricultural species for farmers across the state. Partners pay a nominal fee to store as many seeds as they wish throughout the year. The seeds are processed, dried, and stored using international standards, enabling them to remain viable for many years.



INSIDE THIS ISSUE

Seeds for Our Future	2
‘Ōhi’a Seed Collections	3
Meet the HISB Interns	3
Seed Collections at Nāpu‘u Conservation Project	4
Violet’s Multi-Colored Butter Beans	5
Recipe for Kawanui Farm Chili	5
Recipe for Pan-Fried Butter Beans & Greens	6

Continued on page 2



SEEDS FOR OUR FUTURE (CONTINUED)

HISB stores seeds both refrigerated and frozen, as appropriate for the species and desired length of storage. The cold storage units are powered by off-grid solar PV systems with battery backups, ensuring the security and longevity of the seeds. These valuable collections also include millions of ‘ōhi‘a seeds collected by HISB staff for the [Rapid ‘Ōhi‘a Death Seed Banking Initiative](#); seeds of rare and endemic Hawaiian species collected by the Hawai‘i Island [Plant Extinction Prevention Program](#); and seeds of iconic native species (such as wiliwili, p.1, and pilo, left) from Hawai‘i Island’s dry forests – the most endangered ecosystem in the world. Indeed, these collections are so important for restoration of these rare

“As climate fluctuates, wild areas are deforested, and crop resiliency is reduced, it is ever more critical to save seeds.”

REFERENCES

¹León-Lobos et al. (2020). *Restoration Ecology*, 28(2), 277–281.

²Merritt & Dixon. (2011). *Science*, 332(6028), 424–425.

³Trauernicht et al. (2018). *Forest Ecology and Management*, 411, 1–11.

⁴Van Beusekom et al. (2018). *Remote Sensing*, 10(9), 1386.

⁵Cochrane et al. (2007). *Australian Journal of Botany*, 55(3), 356–361.

⁶Convention on Biological Diversity. (2011). www.cbd.int/gspc/strategy.shtml

⁷FAO. (2014). *Genebank Standards for Plant Genetic Resources for Food and Agriculture*.

⁸Walters, C. (2004). In: *Ex Situ Plant Conservation*. Island Press.



ecosystems that HISB is sponsored by [Ka‘ahahui ‘o Ka Nāhelehele: a Non-Profit for Hawai‘i’s Dryland Forests](#). Many of the dry forest species stored at HISB are considered “workhorse” species for their ability to thrive in harsh conditions during early stages of ecological restoration. These include ‘a‘ali‘i, ‘ilima, koaia, mamane, and others.

In exciting news, HISB’s seed lab recently moved from a temporary location at Makalei to a permanent location in Kona (while the cold storage facilities remain at another permanent location near Kona). Terraformation is supporting the creation of a new seed lab, so that HISB can expand its capacity to store our seeds for the future, as well as a restoration project on the adjacent land. Our Head of Seed Banking is overseeing the transition and supporting HISB as it expands its operations and its capacity to serve restoration partners across all of Hawai‘i’s islands. HISB is proud to serve as the pilot project site for Terraformation’s Seed Bank Modules, which will be offered worldwide in 2021.

By Dr. Marian Chau, HISB Head of Seed Banking



Seed capsules and flowers of 'ōhi'a lehua on Hawai'i Island

'ŌHI'A SEED COLLECTIONS AT HISB

Hawaiian Electric Company funded HISB with \$27,500 to focus on 'ōhi'a seed collection this year. This generous grant will allow HISB to collect seeds from wild 'ōhi'a trees throughout Hawai'i Island as a response to Rapid 'Ōhi'a Death (ROD). This is the most positive thing we can do to guarantee the future of this native keystone species. Seed saving is important, and this grant will allow us to greatly expand our collecting efforts.

In addition to collecting, HISB is also giving people a chance to go in to the wild and learn about native Hawaiian ecosystems. It is always good to collect with another person for safety and efficiency. HISB currently has 3 helpers, including one person from the Hawaiian Electric Company staff, who go into the field to collect seeds, as well as work in the lab learning how to process seeds so they can be properly packaged, databased, and stored for decades. This resource is a gift we can give to future generations.

By Jill Wagner, Hawai'i Island Seed Bank Director

MEET THE SEED BANK TECHNICIANS

We have two wonderful technicians who have been training in managing collections of native species, going into the field for seed collection, seed cleaning, and processing.



Robin Yamamoto started with the seed bank in February 2020. She works in IT at Kona Community Hospital but is a nature lover who loves to do field work. She has helped in the lab a lot with inventory and general organization.



Lehua Tadero is a geography major, with a certificate in Environmental Science. She started working for the seed bank in April 2020 to help with the huge influx of orders for the Hawai'i Public Seed Initiative's locally adapted seed offerings, and with native seed orders. Lehua loves field work and is committed to conservation of Hawaiian ecosystems.

We are very grateful to Terraformation for helping the HISB to scale up our projects and mission.

SEED COLLECTIONS AT NĀPU‘U CONSERVATION PROJECT

Collecting native Hawaiian plant seeds for the Nāpu‘u Conservation Project is one of the tasks at [Pu‘uwa‘awa‘a Forest Reserve](#). I always enjoy and look forward to. It is like a treasure hunt for conservationists because you don’t always know what you’re going to find. Trevor, my summer Kupu intern, and I recently made a successful collection. Our target species were the endangered kauila (*Colubrina oppositifolia*) and ‘iliahi (*Santalum paniculatum*, or sandalwood), both of which I had noticed green fruit on in the recent past. We went out to some ‘iliahi trees I had in mind first, which were loaded with green fruit about a month ago. We got there and although it was not covered in purple (ripe) fruits, a decent amount of the once unripe fruit was now ready to be picked. We ended up with about 2 quarts of fruit!



Trevor collecting ‘iliahi seeds at
Pu‘uwa‘awa‘a State Forest Reserve

Next we headed out towards a kauila stand; however, on the way there we were able to collect a handful of ripe ‘āla‘a (*Planchonella sandwicensis*), kulu‘i (*Nototrichium sandwicense*), halapepe (*Chrysodracon hawaiiensis*), and more ‘iliahi fruit which is surprisingly hard to find at Pu‘uwa‘awa‘a given the large number of trees here. We stumbled upon another kauila stand on the way to the first one and ended up getting a good harvest from multiple wild trees.



David collecting ‘āla‘a seeds at
Pu‘uwa‘awa‘a State Forest Reserve

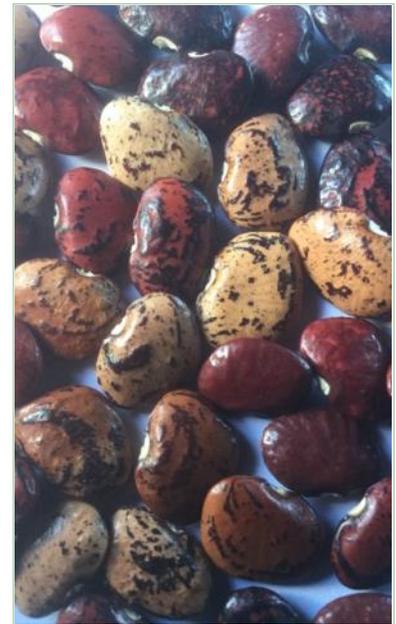
Collecting and saving the seeds of native Hawaiian plants is critically important to protecting these species; we propagate seeds for plant reintroductions to help augment struggling populations, and we store seeds in the Hawai‘i Island Seed Bank as a way to protect valuable genetic diversity in case of wildfires or other catastrophes. Given that climate change will make the area more prone to wildfire, seed collections are more important than ever. All in all it was a good day collecting seeds and we both got to discover new trees at Pu‘uwa‘awa‘a.

By David Russell, Nāpu‘u Conservation Project, Field Nursery Assistant

VIOLET'S MULTI-COLORED BUTTER BEANS

I'll admit it, I have creepy childhood memories of my mother serving canned green lima beans at dinner. When she was engaged in conversation with my father at the table, I would feed them one by one to my dog Dotty, who was somehow always lying under my chair. They were mealy and tasteless. So when I saw the amazing rainbow of colors of the Violet's Multi-colored Butter Bean, (also a Lima Bean) I was enthralled but extremely cautious! The colors were cream, beige, red-brown, and violet purple with speckles and swirls. OK so they're beautiful, but how do they taste?

So I decided to grow them.



“The colors were cream, beige, red-brown, and violet purple with speckles and swirls. OK so they're beautiful, but how do they taste?”

Violet's Butter Beans are a small pole lima bean, and need a trellis to grow on. The small seeds (inside the 3-5" pods) have a great flavor, and can be eaten fresh or dried & cooked. Besides being hardy and beautiful, beans are one of the most underrated foods on the planet. They are excellent sources of fiber, protein, B vitamins and other important vitamins and minerals, and there is good evidence of many health benefits. I have done many bean trials here in Kona, and many varieties just don't like it here! However, Violet's Butter Bean is one of the hardy naturals for our climate, offering good disease and drought resistance, and sometimes more than one crop!

Every seed has a story and thankfully the story of these beans has been passed on. The name comes from a Ms. Violet Brady Westbrook's family who saved the seeds and passed them along for 4 generations (that is a long time) in Banks County Georgia. Also, I learned that in the "South" lima beans are called "butter beans"- sounds better, don't you think? The lima bean originates from the Andes of Peru and domestication took place around 2000 BC. The small seeded "Sieve" varieties (like Violet's) can be traced back to about 800 AD, and by 1500, they had spread around the world.

KAWANUI FARM CHILI RECIPE

Ingredients:

- 2 tbsp. of olive oil
- 2-3 cloves of garlic minced
- 1 large onion chopped
- 2½ tsp. chili powder (to taste)
- ½ tsp. ground turmeric ('olena)
- 1-2 tsp. ground cumin
- 1 (15 oz.) can organic tomatoes don't drain (or chopped fresh tomato)
- ½ small can organic tomato paste (can add a little water)
- 1 pound ground Big Island Beef or equivalent (optional)
- 1-2 tbsp. organic molasses
- 2 cups dry Violet's Butter Beans cooked (makes about 6 cups cooked)
- Salt and ground pepper to taste

Directions:

1. Add the olive oil to a large soup pot or skillet and place it over medium-high heat for two minutes. Add the garlic, onion, and turmeric. Cook for 5 minutes, stirring occasionally.
2. Add the ground beef to the pot. Break it apart with a wooden spoon. Cook for 6-7 minutes, until the beef is browned, stirring occasionally.
3. Add the chili powder, cumin, tomato paste, and optional cayenne. Stir until well combined.
4. Add the diced tomatoes (with their juice), molasses and the cooked Violet's Butter Beans. Stir well. Add salt and ground black pepper to taste.
5. Bring the ingredients to a low simmer. Then, reduce the heat (low to medium-low) to gently simmer the chili, uncovered, for 20-30 minutes, stirring occasionally.
6. Remove the pot from the heat. Let the chili rest for 5-10 minutes before serving.

Continued on page 6



VIOLET'S BUTTER BEANS (CONTINUED)

Cooking Tips: If you want a fresh bean, pick when the pods are green and steam them up. If you'd like to save them as a dried bean, pick when the pods are tan colored. Don't leave them on the bush, especially if the weather is rainy. I like to pick them, shell them, and dry the beans on a plate on my kitchen table. Butter Beans cook more quickly than many other beans, but all beans should be soaked overnight to decrease the phytates and lectins that will help you digest them more easily. You can also sprout or ferment them first. See article below for all the details. I always start them the night before; 2 cups of dry beans in enough water to cover, bring to boil, turn off the stove, and wrap them up

“Violet’s Butter Bean is one of the hardy naturals for our climate, offering disease and drought resistance, and sometimes more than one crop!”

PAN-FRIED BUTTER BEANS & GREENS RECIPE

Ingredients:

2 tbsp. olive oil
2 garlic cloves, minced
1 ½ cups Violet’s Butter Beans (use fresh green beans & steam first)
1 bunch mustard greens, chopped (or any of your favorite greens)
¼ cup water or vegetable stock
salt to taste
black pepper to taste

Directions:

1. Warm 2 tablespoons of olive oil in a large skillet on medium heat.
2. Add the garlic to the oil, and fry until it begins to turn golden, about 30 seconds. Be very careful not to burn it.
3. Add the steamed green butter beans, and stir. Cook until they begin to brown.
4. Remove the beans with a slotted spoon, leaving as much of the garlic behind as possible. Set the beans on a plate.
5. Add the mustard greens and ¼ cup of water to the skillet, and stir. Cook until the greens are tender, about 10 minutes on medium heat.
6. Season to taste with salt—start with ¼ teaspoon—and pepper. Serve the greens topped with the pan-fried butter beans.

in a towel overnight. That starts the cooking process and reduces phytates and lectins. The next day, drain that water, put in fresh water and cook until tender. Lima beans should never be eaten raw.

I love these beans in soups, for hummus, and for making chili. I’m going to include two of my favorite recipes below. Violet’s Butter Bean is open-pollinated (meaning you can save seed for the next planting) and nitrogen fixing (good for your soil). Planting Instructions are on the seed packet. Seed packets are currently available on [Hawai’i Public Seed Initiative’s marketplace](#).

1. [Health benefits link](#)
2. [Soaking, sprouting, or fermenting beans \(great article\)](#)
3. Here is a dry to cooked bean ratio: 1 pound dried beans = Up to 6 cups of cooked beans. 1 cup dried beans = 3 cups of cooked beans. 1/3 cup dried beans = 1 cup cooked beans.

Mahalo Ms. Violet Brady Westbrook - Bon Appetit!

By Nancy Redfeather, Hawai’i Public Seed Initiative