**Projects Awarded for FY2024 Specialty Crop Block Grant Program**

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| **Project #** | **Awardees** | **Funded Amount** |
| 1 | "Improving Propagation of Coffee Leaf Rust Resistant Varieties in Hawai‘i" **Hawai‘i Agriculture Research Center - Coffee** | 67,658.00 |
| 2 | "Seeding the Future: A Complete Course for Hawai‘i's Specialty Crop Growers" **Hawai‘i Seed Growers Network** | 50,306.76 |
| 3 | "2025 HFNA Accessibility, Education and Promotion Program" **HFNA** | 41,318.00 |
| 4 | "Educating Coffee Farmers on Best Practices for Farm Management" **Kona Coffee Farmers Association** | 23,500.00 |
| 5 | "Improving Sustainable ʻAwa Production in Hawai‘i through Tissue Culture Propagation and Education" **Malama Sanctuary** | 69,915.77 |
| 6 | "Expanding Markets for Hawai‘i's Specialty Coffee Growers" **SHAC Foundation - Coffee** | 62,245.00 |
| 7 | "Educational Outreach for Small hold Growers on Macadamia Orchard Health" **SHAC Foundation - Mac Nuts** | 52,804.00 |
| 8 | "Improving Sweet Corn and Other Specialty Crops Production Through Variety Trials and Sustainable Practices" **University of Hawai‘i – Amjad Ahmad** | 60,466.00 |
| 9 | Expanding Markets of Specialty Crops for Import Substitution in Hawai‘i **University of Hawai‘i - Keith Kardish** | 36,000.00 |
|  | **TOTAL** | 464,213.53\* |

\*The total USDA total funds for this program is $524,773. The remainder of the project funds are allotted for administrative fees.

**Project #1 - "Improving Propagation of Coffee Leaf Rust Resistant Varieties in Hawai‘i"** **Hawai‘i Agriculture Research Center**

The proposed project is to develop a novel method to drastically increase the local propagation of Coffee Leaf Rust (CLR) resistant varieties. The Hawai‘i Coffee Association has requested “support for the importation, propagation and distribution of CLR resistant varieties” and “support for farmers to replace their fields with rust-resistant varieties.”

There are currently no local sources of CLR-resistant varieties. The lack of CLR-resistant varieties is further compounded due to restrictions on importing coffee seed and/or plants to Hawai‘i. Efforts are underway to import limited quantities of CLR-resistant varieties and to breed CLR-resistant varieties locally. These projects will have limited impact if they cannot be efficiently scaled to replace the millions of existing coffee trees.

Growers are currently forced to rely on cultural practices, such as increased pruning/weed control and applications of fungicide to manage CLR in their fields. These control methods only help to minimize the losses and they are not 100% effective. Some of the most effective chemical controls require additional farmer training and are not organic certified.

There are no existing US sources of coffee plants, and USDA-APHIS severely limits imports from international sellers. The USDA-ARS-PBARC in Hilo imported a limited number of CLR-resistant plantlets in 2020, and the Synergistic Hawaiʻi Agriculture Council (SHAC) has a project to further propagate the varieties. The Hawai‘i Agriculture Research Center has an ongoing, USDA-funded project to develop CLR-resistant varieties locally. Within 2-5 years, the projects should have limited field tests of CLR-resistant varieties in Hawai‘i.

To plant from seed, coffee must be self-pollinated for 6-7 generations, requiring 20+ years to create. The various methods of clonal coffee propagation of coffee include tissue culture, grafting and rooted cuttings. Tissue culture requires a highly specialized laboratory with trained staff, and has never been done in Hawai‘i at the scale required. Rooted cuttings production is often associated with poor root development, as the plants do not produce a tap root. Both methods require complete removal of trees and replanting new trees.

Kenya (KALRO), has decades of experience in managing CLR. Kenya has developed a grafting program to enable farmers to field graft CLR-resistant varieties onto existing coffee trees. The basic process is to stump the existing variety and then graft the new variety (scion) onto the stump. The area below the graft (rootstock) retains the old genetics and the area above the graft contains the genetics of the plant that produced the scion. Field grafting could save thousands of dollars per acre compared to tissue culture/cuttings/seedlings as no land clearing is required and production resumes more rapidly.

Large-scale replacement through field grafting will require millions of scion. The project seeks to investigate several options for large scale coffee scion production in Hawai‘i. The project will serve to increase the production of specialty crop to replace the amount of coffee imported to the U.S., by lowering coffee production costs and increasing yields in Hawai‘i and improve the sustainability in Hawai‘i by reducing the need for chemical control of CLR.

The project’s objective is to analyze three different coffee production systems for efficient production of CLR-resistant scion.

High Density Beds:

Coffee plants (will be planted at high density and grown for nine months after planting and then cut back. Once cut, new buds will grow from the remaining stem, and 2-3 vertically growing shoots will be selected and allowed to grow until they reach to appropriate size for field grafting (estimated at 4 months). The plant will then be stumped again. This method has the potential to produce 80,000+ scion per acre/year.

Low Density plantings:

An existing coffee orchard will be stumped and new shoots will be managed to produce scion. The new shoots will be managed similarly to high density planting.

Vertical Clonal Beds:

A new method for producing vertical shoots of improved varieties of coffee has proven effective (Espindula et. al., 2022). The method involves allowing the new plants to grow for nine months and then removing 70% of the lower horizontal growing branches.

HARC will plant a minimum of 200 coffee trees in the high-density and vertical clonal systems and will stump 200 existing trees. The number of scion produced will form the basis for comparison.

Timeline for Primary Objective: Months 1-3, prepare site for each system; Month 3, plant high density and vertical systems and stump low density trees; Month 9, first harvest/prune; Month 12, second harvest, Month 18, third harvest; Month 23, fourth harvest; Month 24, data analysis and final report.

HARC will present preliminary results at the 2025 Hawai‘i Coffee Association (HCA) annual meeting and will submit HCA a final report at project completion. A new method for producing vertical shoots of improved varieties of coffee has proven effective (Espindula et. al., 2022). The method involves allowing the new plants to grow for nine months and then removing 70% of the lower horizontal growing branches.

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HARC will present preliminary results at the 2025 Hawai‘i Coffee Association (HCA) annual meeting and will submit HCA a final report at project completion.

**Project #2 - "Seeding the Future: A Complete Course for Hawai‘i's Specialty Crop Growers"   
Hawai‘i Seed Growers Network**

Hawai‘i’s diverse and varied microclimates create unique requirements for farmers and gardeners. Growers in subtropical and tropical regions face many barriers to production, including high levels of pest and disease pressure, high temperatures and humidity, aggressive weed pressure and extreme weather events. With the intensification of climate change and invasive pests, there is increasing urgency to provide local farmers and home producers with a diverse and resilient specialty crop seed supply adapted to the conditions of Hawai‘i’s microclimates. Seeds sourced from temperate areas are adapted to and selected for their temperate environmental conditions which are very different than those growers experience in subtropical regions. When home gardeners plant seeds grown and developed in temperate climates it often leads to disappointing results, discouraging further attempts to grow a home garden.

While this need for adaptive seed accelerates, the local seed industry has not kept up with the demand. The UH Seed Lab no longer has an active traditional breeding program, has suffered heavy attrition of personnel and is unable to produce seeds how they used to in years past to support Hawai‘i’s growers. Many UH Seed Lab varieties are out of stock and are unavailable to local producers interested in seed produced specifically for Hawai‘i’s climate. Seed varieties around the world are being lost at an alarming rate and the varieties UH developed specifically for Hawai‘i’s ecosystems are no longer being produced by the UH Seed Lab.

Hawai‘i Seed Growers Network (HSGN) has been offering specialty crop seed to Hawai‘i’s home producers and small farmers at its Online Marketplace since 2018. The Network consists of five LLC members, one advisor, and six small farmers who grow and contribute seed of specialty crop cultivars to the selection of offerings at the Online Marketplace. HSGN works to identify resilient specialty crop varieties, grow and adapt them to Hawai‘i’s environments with agroecological low-input sustainable farming techniques that can easily be replicated by home producers. The network of seed growers has brought 126 specialty crop varieties to the Online Marketplace since 2018. We have successfully grown and marketed five varieties developed by UH including Brewbaker #9 sweet corn, UH Manoa Lettuce, Poamoho Pole bean, Koba green onions, and Tolentino eggplant. Currently, our capacity to maintain and enhance seed collections, while bringing new specialty crop varieties to the Marketplace, is limited by the number of seed growers capable of producing quality viable seed. The LLC team of seed growers has offered one-on-one mentoring relationships to budding seed producers, resulting in five additional seed growers of specialty crops. While one-on-one mentoring is very beneficial, HSGN seed growers are limited in how much time they can spend with each individual seed grower and we see the need to offer education on a larger scale. This project will work to build future seed growers for the continued and increased development of local, regional seed for Hawai‘i specialty crop market. Well-adapted, disease- and pest-resistant seeds are necessary to re-establish a viable and biodiverse specialty crop seed industry with sufficient capacity to meet the changing needs of Hawai‘i’s farmers and small home producers.

**Project #3 - "2025 HFNA Accessibility, Education and Promotion Program"**

**Hawai‘i Floriculture and Nursery Association**

According to the National Agricultural Statistic Service (NASS), in 2022 the Hawaiʻi floriculture industry was valued at $47.1 million, still less than half the industry's peak of $109 million in 2007. The industry has faced numerous past obstacles such as the recession, tropical storm Iselle, the 2018 Kapoho lava flow resulting in catastrophic losses for orchid growers, and the Covid-19 pandemic that spanned from 2020-2022. Lingering effects of the pandemic are still felt in 2023 and 2024. Reports show that the majority of weddings and special events planned for 2020, 2021 and 2022 were canceled or postponed to mitigate the spread of the Covid-19 virus. In 2023 attendance at in-person events was substantially lower than in pre-pandemic years at similar events. This must be addressed to achieve our goals of educating the floral industry on the benefits of using Hawai‘i tropical florals and how to obtain them. Now that the economy is beginning to recover, it is prudent to promote Hawai‘i tropical flowers for use in weddings, corporate events, hotel and resort décor, special events and family celebrations, such as anniversaries, graduations, etc. One segment of the floral industry that hasn't been addressed has been large installations of floral décor for weddings, galas, and other outdoor events needing flowers to enhance the atmosphere of the events.

HFNA will provide classes on topics germane to large garden installations, such as structure building, mechanics, water hydration systems and creating dimension in large floral designs. Professional educators of floral design who have experience in substantial garden installations will teach the classes. They will also provide technical input to the participants while they experience creating their own designs and installations. To attract more attendees from North America, HFNA will hold a garden installation competition. It has been noted that in past years, more attendees have been enticed to participate in competitions with prizes for winning designs.

Visits to farms of growers of Hawai‘i tropical flowers will give attendees firsthand knowledge of how the products are grown, the superior quality, beauty and freshness of the florals, and the immense variety of flowers available. The guests will have an opportunity to speak one-on-one with growers who have a display booth at the expo strategically located near the classroom. Time will be built into the schedule for visits to the displays to facilitate discussions between participants and growers on the variety of products available and how to order them, perhaps with some placing orders. All events will be filmed for inclusion in the 2025 Educational Webinar and a full-length video to be produced.

One roadblock to an increase in floriculture sales in Hawai‘i is the extremely expensive cost of shipping to the U.S. mainland and Canada. HFNA has created the Hawai‘i Starter Box Program, with three options of floral products offered for sale. Each option will include four boxes of products that ship inside a master box affording savings on shipping costs for the customers. This program was introduced in 2023 at our island workshops; however, with low attendance at those events further promotion is demanded for the program to succeed. HFNA will hold a Starter Box Challenge. Entrants will receive the same starter box of products and are required to create table arrangements of their choosing; they may use only the items in the box or may enhance their designs with temperate flowers (i.e., roses, dahlias, etc.). Their challenge submission will include photos of their designs. The entries will be judged by a panel of professional floral designers; the winning designs will be announced live at the Celebrations Educational Webinar. This challenge will allow HFNA to increase the number of floral industry participants that will have hands-on experience with Hawai‘i floral products, enabling them to experience the freshness and superior quality of Hawai‘i floriculture and an avenue of obtaining them through the Starter Box Program.

Another aspect of addressing low attendance at events in previous years will be increased promotion of the events. HFNA will work with agricultural professors at the local community college and/or university to ascertain which students are proficient in social media work and may be contracted to assist HFNA with promotion. The social media intern will create content for the bi-weekly posts, consisting of photographs of Hawai‘i flowers as well as accompanying prose that will attract the attention of many on popular social media platforms. The posts will promote Hawai‘i floriculture products, HFNA events, and the Hawai‘i Starter Box Program & Challenge.

HFNA anticipates these efforts will enable the Hawai‘i growers to experience an increase in demand for their products, orders for the Hawai‘i Starter Boxes, and a large number of floral industry members will learn how to access and order Hawai‘i floriculture.

**Project #4 – "Educating Coffee Farmers on Best Practices for Farm Management"**   
**Kona Coffee Farmers Association**

Coffee is a significant crop for Hawai’i Island. The USDA National Agricultural Statistics Service (NASS 2021) reports more than 1,400 coffee farmers statewide, most of whom are on Hawai‘i Island and qualify as socially disadvantaged due to their size, income, or race under the USDA classifications.

The Kona Coffee Farmers Association (KCFA) is a Hawai‘i non-profit with a primary mission of education (Strategic KCFA Board Goals January 17, 2024) to all interested growers. Based on recent surveys done by KCFA, a significant percentage of coffee farmers wish to sell more coffee with value-added processing and vertical integration, thereby increasing their direct farm income. They are concerned about diseases such as coffee leaf rust, soil health and feel they are not receiving enough direct education on how to implement control strategies. They also note a need for more farmer-to-farmer education and outreach specific to their specialty crop.

To resolve the educational gap, the KCFA has previously hosted two symposia, (2023 and 2024) open to all statewide growers. The events included a wide array of speakers in a one-day format that has been free to members, and only $75 (to cover venue and lunch costs) for non-members. There is not currently another coffee conference regularly held on the Big Island. There is a rotating statewide conference that comes to Kona every four years, but it is cost-prohibitive for small growers to attend and does not address on-farm activities. Under this SCBGP, KCFA is requesting funding to host two more symposia and would waive costs to all participating growers.

The primary objective of this grant will be the education of farmers to further the development of agricultural acumen and skills. This will build broader community capacities to farm responsibly and sustainably. The conference will assist growers in developing state of the art and broader skills through education and mentorship. A new farmer, or even a longtime farmer transitioning to value-added selling, can be overwhelmed with the practical aspects of operational excellence in farming, marketing, disease control, post-harvest processing and other important competencies.

The conference is a chance for farmers, both new and seasoned, to obtain additional information and confirm approaches to fighting coffee leaf rust, diversifying ag products on their farm, and adding economic value to their crop. Knowledge growth and skill refinement can be followed up in later workshops. For example, a farmer-hosted roasting demonstration and education class has been included at no cost on the day following the conference.

Educational speakers will assist growers in identifying ways to improve their crops in the coming season. These speakers will include ARS scientists conveying the latest research, industry professionals relaying market expertise, as well as a vendor area, where growers can meet with trade specialists and governmental agencies.

Program success will be measured in two ways. The first is attendance, with a conservative goal of 100 farmers in attendance, based on previous events. The second will be measured by participant evaluation. Vendors and attendees will be asked to complete an evaluation questionnaire either on paper the day of the event, or by email afterwards.

The second objective goal is the organization and dissemination of educational information. The KCFA website (konacoffeefarmers.org) will be updated with speaker presentations and videos of the speakers, as well as reorganized to properly showcase the extensive farmer-to-farmer materials currently available on site. Success will be measured by tracking views of videos, downloads of education white papers and other online metrics. The conference is a chance for farmers, both new and seasoned, to obtain additional information and confirm approaches to fighting coffee leaf rust, diversifying ag products on their farms and adding economic value to their crop. Knowledge growth and skill refinement can be followed up in later workshops. For example, a farmer-hosted roasting demonstration and education class has been included at no cost on the day following the conference.

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**Project #5 - "Improving Sustainable ʻAwa Production in Hawai‘i through Tissue Culture Propagation and Education"**

**Malama Sanctuary**

ʻAwa, also known as kava, is a canoe crop with significant cultural value and geographic relevance to Hawai‘i. Hawai‘i provides an optimal growing environment for ʻawa. This proposal enhances the competitiveness of an underutilized specialty crop.

ʻAwa is primarily marketed in three forms: frozen, dried, and as extract. The global ʻawa extract market was valued at $1.4 billion in 2023 and is projected to reach $4.9 billion by 2032, which is a growth rate of 14.85%. With Hawai‘i being the most significant producer of ʻawa in the U.S., several advantages are apparent; safer growing and processing practices, faster shipping and the ability to create a larger and more sustainable market.

The Hawai‘i Department of Health has recently listed ʻawa as “generally recognized as safe” (GRAS) and the U.S. FDA has classified kava as a food, as outlined in the Codex alimentarius Kava Standards. This has made ʻawa more accessible and marketable. A recent review article published in Nutrients documented the evidence supporting the medicinal potential of ʻawa for treating inflammatory and neurological conditions, as well as cancer. By further disseminating evidence regarding the health benefits of ʻawa the consumption of this specialty crop could be increased.

The Pacific Islands are the main producers of ʻawa. Vanuatu and Fiji are the largest producers with an estimated 14,000 and 8,000 acres under cultivation. Hawai‘i does not produce enough ʻawa to supply its own demand and it is estimated that less than 100 acres are under cultivation. Hawai‘i imports ʻawa from islands such as Fiji and Tonga. This project seeks to eliminate the need for Hawai‘i to import ʻawa.

The ʻawa industry in Hawai‘i faces two major barriers, both of which this proposal seeks to mitigate. First, there is an alarming lack of planting materials. This project aims to rapidly increase planting materials and make them available at-cost. ʻAwa growers from underserved backgrounds will be provided plants at lesser cost in order to support ʻawa growing in this population group. Secondly, growers are not adequately informed of the potential benefits and viability of ʻawa production. Through this project, we will create social media that promotes the cultural relevance and economic viability of ʻawa growing in Hawai‘i. We will also promote sustainable agricultural practices such as intercropping and organic methods to protect the environment, public health and communities. Furthermore, we will educate about the current research regarding the nutritional benefits of ʻawa.

The are 13 Hawaiian varieties of ʻawa. Four are recommended by Association for Hawaiian ʻAwa (AHA) for commercial production: Papa Ele'ele, Papa Ele'ele Pu'upu'u, Papa Kea, and Pana'ewa. We will tissue culture these four in order to provide planting materials to grow Hawai‘i’s ʻawa industry. These varieties are short and stout which decreases the impact of wind, a significant problem for ʻawa growing. They are also resistant to the three main diseases impacting ʻawa: cucumber mosaic cucumovirus, Pythium root rot, and Phoma shot hole.

The conventional method to propagate ʻawa is by cuttings. However, the propagation of ʻawa using cutting has not been adequate to meet demand. Propagating ʻawa through tissue culture offers a method to rapidly increase planting materials of recommended varieties. The plants will be grown in soil-less media and be suitable for inter-island transport. Other methods of scaling up the availability of planting materials are not viable due to the limited amount of plants in Hawai‘i and the fact that ʻawa produces no seeds. The authors of this proposal found no commercial source of ʻawa planting materials in Hawai‘i. The AHA has committed to providing Malama Sanctuary with the needed plant materials for tissue culture propagation. In fact, the AHA has already provided cuttings of the four recommended varieties to Malama Sanctuary in order to establish mother plants for future propagation.

The project will be led by Dr. Kara Tsuzaki, a biological engineer with extensive experience in tissue culture, and Dr. Alex Smolak, an infectious disease epidemiologist with over two decades of experience in research and project management. Dr. Tsuzaki and Dr. Smolak collectively have over a decade of experience in commercial agriculture in Hawai‘i.

This proposal outlines the critical next steps to promote a thriving ʻawa industry in Hawai‘i. ʻAwa is a culturally relevant crop for Hawai‘i, but it is underutilized. Given the current listing as GRAS by the Hawai‘i Department of Health, the anticancer and other health research, and the recreational popularity, we are in a time and place to see rapid growth for Hawai‘i’s ʻawa industry. More planting materials and education efforts are essential to make the most of this opportunity for agriculture in Hawai‘i. Furthermore, Dr. Tsuzaki and Dr. Smolak collectively have over a decade of experience in commercial agriculture in Hawai‘i.

This proposal outlines the critical next steps to promote a thriving ʻawa industry in Hawai‘i. ʻAwa is a culturally relevant crop for Hawai‘i, but it is underutilized. Given the current listing as GRAS by the Hawai‘i Department of Health, anticancer and other health research, and the recreational popularity, we are in a time and place to see rapid growth for Hawai‘i’s ʻawa industry. More planting materials and education efforts are essential to make the most of this opportunity for agriculture in Hawai‘i.

**Project #6 – "Expanding Markets for Hawai‘i's Specialty Coffee Growers"   
SHAC Foundation – Coffee**

Hawai‘i’s coffees are diverse in regions and flavor but share a trait of primarily being grown on small farms by almost 1,500 family-owned businesses. Though ranked as a top commodity in Hawai‘i, with a farmgate value of $59 million, individual farms are small, socially disadvantaged and have a mean NASS income of under $40,000. Growers must compete on quality, as cost of production far exceeds coffee regions in South America and Africa. Exports of Hawai‘i coffee allow the growers to maintain their unique market niche as a specialty coffee and support regional downstream benefits of value-added roasting, farm jobs, ecotourism, and ancillary industries calculated at over $250 million annually.

The Kona coffee brand is an industry strength and drives specialty sales for the state. However, other regions are still relatively unknown, despite winning awards for cup quality. SHAC seeks to address this weakness, and increase knowledge and consumption of all Hawai‘i coffee, by highlighting Hawai‘i’s eight major growing regions: Kona, Ka‘ū, Puna and Hāmākua on Hawai‘i Island; Maui, O‘ahu, Moloka‘i, and Kaua‘i.

SHAC will sponsor a Hawai‘i Coffee Association booth at the 2025 SCA Expo, the world’s leading specialty-coffee trade show. More than 12,000 B2B visitors attend the event every year. The booth will present opportunities to “cup,” or taste, all growing regions, and highlight the quality and unique varieties from the state. The expo is a key hub for sales, but also for networking with scientists and other producers battling Coffee Leaf Rust and Coffee Berry Borer, the two major pests damaging Hawai‘i coffee. Attendance at the expo also allows SHAC and HCA to maintain strong ties with the Specialty Coffee Association, the top international organization representing the full industry, from producers to baristas, globally. This activity introduces the quality and variety of Hawaiian coffee to importers and roasters around the world.

Before the event, SHAC will reach out to all coffee associations to develop a Seller List of growers who wish to be contacted for coffee sales. Buyers have repeatedly expressed challenges in identifying farm-direct producers due to the size and nature of Hawai‘i smallholder coffee businesses. While Hawai‘i’s producers are experienced in creating high-quality beans, ensuring the coffees’ authenticity through HDOA certification and packaging them in small volumes for buyers, they struggle to connect to the larger market. This list will serve to bridge that gap and will be made available to buyers at the show.

As a continuation of the promotional SCA work, SHAC will support the Hawai‘i Coffee Championships. This public event invites baristas and coffee professionals to show their skill in preparing Hawaiʻi’s specialty coffees and generates media buzz on the diversity of bean origin and processing methods available on the market. The two-day event attracts up to 400 attendees. Each year, one or more Hawai‘i-based coffee professionals have moved on to the qualifying round in their chosen competition and twice have Hawai‘i-based coffee professionals moved on to compete on the National Competition stage - one in 2019 and another in 2023. Each year, these competitions have provided a platform to promote the excellence of high-quality coffee grown in Hawai‘i to a national and global audience, while also showcasing the quality of coffee professionals who are trained across the islands. With each competitor moving on to the qualifying and national competitions, Hawai‘i-grown coffee reaches wider audiences through print and digital press releases, podcast features, and more. Our goal is to continuously send Hawai‘i-based coffee professionals to compete on the national competition stage and, eventually, on to the World Coffee Championships, where Hawai‘i coffee can be showcased for its excellence as one of the highest-quality coffee growing regions of the world. This process starts here, in Hawaiʻi, where local coffee professionals gain affordable access to this competition circuit.

**Project #7 – "Educational Outreach for Small hold Growers on Macadamia Orchard Health" SHAC Foundation - Mac Nuts**

Macadamia nuts are one of Hawai‘i’s key specialty crops, consistently ranking in the top five of Hawai‘i Department of Agriculture’s Market Analysis commodity list. However, growers have faced challenges at the farmgate recently. USDA NASS assessed the 2022 crop at $33.176 million, considerably less than 2021’s $65.07 million valuation. Growers are notably concerned by this slide, which is due to a number of factors throughout the value chain. This grant will focus on educational activities at the farm level to address management of mature and aging orchards, pest pressure and field practices to improve yields and kernel quality.

According to the most recent agricultural census, there are 835 farms. The majority of commercial growers are smallhold, with 612 farms operating on less than five acres of land and considered socially disadvantaged by the USDA (Source: USDA NASS Ag Census, 2022). Small growers in particular struggle to obtain the resources and skills necessary to combat new pests and maintain healthy orchards. Economic slowdowns, such as COVID, as well as a recent excess of macadamia nuts from foreign markets, left small growers with few options to sell their nuts. Some lost their crops outright while others laid off employees, delayed equipment purchases and didn’t fully care for their farms. The resulting lack of fertilizer and limited pest control left orchards susceptible to diseases such as macadamia felted coccid (MFC), macadamia quick death (MQD) and macadamia nut borer. Some farmers lost trees to disease and incurred extra costs to remove them.

As the industry seeks to rebound from these challenges and is targeting market growth for Hawaiian nuts, recovery of yields and quality will take a concerted educational effort. Objective one will be to improve local knowledge on orchard health, tree canopy and floor (soil) management through two workshops from experienced consultants. Workshops will be offered to growers in two separate locations on the Island of Hawai‘i. Many of the orchards here are old and suffer from overgrowth, minimal sunlight penetration, lack of orchard floor and erosion, making them difficult to manage. Addressing these unique challenges would equip growers to improve the health and productivity of our aging orchards.

The second objective is training on improvement of nut kernel quality to grow market demand. This would include post-harvest methodology and food safety practices. Two workshops will also be offered under this category. All field workshops will be recorded and posted online.

In addition as a third objective, the industry will digitize important historical research papers not yet available online and post them to https://www.hawaiimacnut.org, creating a comprehensive research and best practices record for growers.

In order to keep up with Australia, South Africa and other competing countries that show improved technology, methods and production over Hawai‘i, this project is a necessary step toward equipping state growers with the tools they need to address present and future challenges.

As the primary organization for macadamias in Hawai‘i, the Hawai‘i Macadamia Nut Association (HMNA) is well-positioned to coordinate and oversee training events related to insect pest management. The HMNA was founded in 1960 with the goal of promoting and growing the macadamia nut industry in Hawai‘i. The organization has sponsored and coordinated other training events and regional meetings on topics ranging from grafting, soil and tissue sampling and global macadamia research. The HMNA also holds an annual meeting for growers with seminars, a trade show and group discussions on key industry issues. SHAC Foundation, a Hawai‘i 501(c)3 based in Hilo, will support HMNA through grant management, financial controls and reporting. Macadamia nuts are one of Hawai‘i’s key specialty crops, consistently ranking in the top five of Hawai‘i Department of Agriculture’s Market Analysis commodity list. However, growers have faced challenges at the farmgate recently. USDA NASS assessed the 2022 crop at $33.176 million, considerably less than 2021’s $65.07 million valuation. Growers are notably concerned by this slide, which is due to a number of factors throughout the value chain. This grant will focus on educational activities at the farm level to address management of mature and aging orchards, pest pressure and field practices to improve yields and kernel quality.

**Project #8 - "Improving Sweet Corn and Other Specialty Crops Production Through Variety Trials and Sustainable Practices"**

**University of Hawai‘i – Amjad Ahmad**

Sweet corn (*Zea Mays* L. sub sp. *mays*) has become one of the most popular and economically important crops in the world. Its production in Hawai‘i is expected to increase as much as 57% in harvested acreage in the coming years. Sweet corn requires high amount of nutrients and fertile soil for high yield and can be grown in a wide variety of soils if they are naturally fertile or are made fertile with appropriate fertilizer and/or organic manure. Different groups of people in Hawai‘i and around the world, use various kinds of corn as a vegetable. Most of these types of corn can be grown in Hawai‘i. Many Asians love a corn called “glutinous,” which has a consistency like mochi rice. Many Africans and Latin Americans relish immature “field corn” as a vegetable when boiled or roasted. Hawai‘i locally grown corn sold for cooking for the dinner table is called “sweet corn,” although it is really a type called “supersweet corn.” One of the main nutritional benefits of sweet corn is its high fiber content. Dietary fiber is important for our health: it aids digestion, it can decrease the risk of heart disease, strokes, type-2 diabetes and bowel cancer. On top of that, fiber helps us stay fuller for longer, which reduces our intake of food.

Sweet corn pest issues in recent years have been increasing and local growers have been looking for solutions, including new chemicals to apply and/or new varieties to adopt in their farms. Sweet corn infection with the Maize Chlorotic Mottle Virus (MCMV) in Hawai‘i have been increasing over the years. The virus can be transmitted through various insects (Aphids, Thrips, Leaf Hoppers, and White Fly). The virus also can be transmitted through infected soil. Controlling soilborne diseases are among the hardest. The virus causes sweet corn growth decline and can lead to total yield failure. Using resistant varieties are the best practices. No locally developed sweet corn varieties has MCMV resistance. There's a need to test new varieties in Hawai‘i. Additionally, the University of Hawai‘i Seed-Lab has been facing issues in producing enough seeds to accommodate the local need and to make profit to stay functional under budget cuts and slow replacement of retired technicians.

Beets are known for their deep red color and sweet, earthy flavor. They are high in nutrients such as folate, potassium, and vitamin C, making them a healthy addition to any diet. Beets are often roasted, boiled, or pickled, and can be used in salads, soups and side dishes. Radishes are known for their crisp texture and spicy flavor. They are high in vitamin C and other antioxidants, making them a healthy snack or ingredient in various dishes. Radishes can be sliced thinly and added to salads, sandwiches, or tacos, or pickled. Incorporating beets and radishes into the diet can support a healthy digestive system, improve bowel regularity, and provide essential nutrients for optimal gut health. Bolting in beet and radish is an issue that can lead to a total crop loss. Avoiding growing these crops in spring/summer season is best strategy. However, providing shade can help with the bolting issue. Growing beet/radish between sweet corn lines can provide the needed shade. Additionally, since the sweet corn and beet/radish have different growth habits (ears/roots), no competition between these crops is expected on water/nutrients in the field.

Intercropping means simultaneously growing two or more crops in the same field. Intercropping can be used by smallholder farmers to increase the diversity of their products and for the stability of their annual output through a more effective use of land and other resources. Growing lines of different crops next each other will help in farm product diversity, maximize the total yield and expand the use of same land. Small farm seeds-planters can be adjusted to utilize it for different crops (some planters available can plant different seeds at once). This project aims to evaluate 15 new varieties of sweet corn statewide for their yield, pest resistance and suitability to Hawai‘i's micro-climates. Additionally, the project will evaluate intercropping sweet corn with 5 beet/radish varieties to maximize the small farms’ productivity, reduce bolting issues in beet/radish, and increase farms’ crop diversity and net profitability using same land/area. This project is expected to increase local food production, especially in spring/summer seasons. The project team will disseminate the project findings statewide with workshops/field days and extension articles with recommendations.

**Project #9 - Expanding Markets of Specialty Crops for Import Substitution in Hawai‘i**   
**University of Hawai‘i - Keith Kardish**

Hawai‘i is located more than 2,500 miles from the continental United States. About 85-90% of Hawai‘i’s food is imported which makes it particularly vulnerable to natural disasters and global events that might disrupt shipping and the food supply. According to the Office of Planning, Department of Business, Economic Development and Tourism “Increased Food Security and Food Self-Sufficiency Strategy” report, the economic impact of food import replacement is significant. Replacing just 10% of the food Hawai‘i currently imports would amount to approximately $313 million, which would remain in the state. This project strives to increase demand for crops that are known to grow well in Hawai‘i and would decrease dependence on imported food. This project will focus promotion on six targeted Hawai‘i specialty crops (breadfruit, mango, avocado, sweet potato, kabocha squash, sweet corn) which are well-adapted for statewide growing conditions and are strong candidates for import substitution.

To achieve this University of Hawai‘i will partner with the Culinary Breeding Network (CBN) to lead the project marketing objectives. The CBN mission is to build communities of farmers, plant breeders, culinary professionals, consumers, and other stakeholders to improve quality in fruits, vegetables and grains. CBN activities have included developing marketing campaigns, organizing large public outreach events and marketing through social media. CBN marketing campaigns reach a large culinary and farming audience through Instagram (>28k followers), newsletters (>2.5k subscribers) and in-person events. In 2018 and 2019, University of Hawai‘i worked with CBN to execute two Variety Showcase events in Honolulu, both of which attracted 325-350 attendees and participants found these events to be meaningful, educational and stimulating to local markets for specialty crops.

The specific project objectives are to 1) expand markets for Hawaiian well-adapted vegetable crops for import substitution, 2) engage a diverse group of farmers, retailers, distributors and consumers to expand these vegetable markets and 3) evaluate project impacts.

To achieve these goals, this project will 1) convene an initial virtual planning meeting to identify market needs and add 2-3 additional target crops if need is determined; 2) develop marketing materials (i.e. written content, recipes, posters, attractive photos and illustrations) to be used by growers, wholesalers, retailers and others at point of sale, in CSA newsletters, at markets and on social media; 3) create and distribute a ‘zine (i.e. small book) featuring crop histories, origins, domestication, nutrition, cultural significance, recipes; 4) execute social media campaign to promote project crops; and 5) execute a large public outreach event (Variety Showcase) to educate consumers and promote the project crops.

To extend project results to more farmers, we will present at grower meetings, annual conferences, and publish information to the University of Hawai‘i and Culinary Breeding Network websites which will also reach to consumers and chefs.

Objective 1: Expand markets for Hawaiian well-adapted vegetable crops for import substitution

The CBN approach to marketing has a track record of success for increasing sales for growers. In this project, CBN will create marketing materials, including a ‘zine for print and accessible online, that farmers and retailers can use on social media, at markets, in newsletters, and more.

Objective 2: Engage a broad group of farmers, retailers, and wholesale distributors with the project. We will engage supply chain stakeholders and consumers at a large Variety Showcase public event in May 2025 on the Big Island (in conjunction with the National Association of Plant Breeders annual meeting) as well as through a social media campaign (>28k followers) to broaden reach across all of Hawai‘i and beyond.

Objective 3: Evaluate project impact. The project will evaluate both specialty crops marketers and consumers.

1) Sales Survey: Wholesalers, retailers, farmers and seed companies (marketers) will provide sales and market trend information at the end of the project to measure project impact.

2) Variety Showcase Survey: Attendees (consumers) will be surveyed to gauge if they learned about and plan to buy project crops as a result of the event and if they better understand how to access each targeted project vegetable.