



Hawai'i Agrivoltaic Research and Demonstration Center Phase 2 Summary



Our mission is to advance farmer success through innovative agrivoltaic systems that enhance crop production, soil health, and renewable energy integration, while fostering collaboration to strengthen Hawaii's agriculture and sustainability

PHASE 2 OUTCOMES



Agriculture and Economic Priorities

Our agrivoltaic project focuses on four core priorities: driving farmer success through profitable crop production, enhancing soil health on rehabilitated lands, advancing research to optimize agrivoltaic systems, and fostering community engagement to promote sustainable agricultural solutions. By balancing practical implementation, scientific innovation, and collaboration, we aim to create resilient, productive agricultural systems that integrate renewable energy and food production.



Priority 1: Prioritize farmer success and crop productivity

Achieving farmer success in agrivoltaic (APV) systems requires identifying crops best suited to APV conditions and refining their growing strategies. Through comprehensive trials, we compare crop performance in APV and control plots, gathering data on yield, growth, flowering, and marketability. This research guides the selection of high-value crops like basil, strawberries, and leafy greens that thrive in shaded, low-UV environments, while also exploring the most productive locations within APV systems, such as center rows, and optimizing underperforming areas for alternative uses.

- **Comprehensive Trials:** Evaluating diverse crops, such as tomatoes, broccoli, cauliflower, chard, and peppers, to identify trends like delayed flowering and larger leaf growth under APV conditions.
- **High-Value Crops:** Testing market-relevant crops like basil and strawberries for productivity and adaptability to shaded environments.
- **Optimized Planting Strategies:** Focusing on high-performing center rows while utilizing outer rows for leafy greens or herbs.
- **Real-World Testing:** Building a robust knowledge base to guide farmers toward sustainable and profitable agrivoltaic practices.

Priority 2: Increase soil health and land rehabilitation

Healthy soil is the foundation of successful agrivoltaic (APV) farming. Our objective is to rehabilitate and enhance soil health on lands previously used for photovoltaic (PV) energy production by addressing compaction, nutrient deficiencies, and organic matter loss. Through mechanical soil preparation, targeted nutrient amendments, and a focus on long-term sustainability, we aim to create optimal growing conditions that support high-yield and sustainable crop production, ensuring the coexistence of renewable energy and agriculture.

- **Mechanical Soil Preparation:** Techniques like deep ripping and tilling improve water infiltration, root penetration, and aeration.
- **Targeted Nutrient Amendments:** Addressing deficiencies in nitrogen, phosphorus, potassium, and mitigating issues like manganese toxicity.
- **Restoring Degraded Soils:** Focused interventions to rebuild fertility on depleted lands, particularly in areas like Central Oahu.
- **Sustainable Practices:** Creating a long-term model where renewable energy and agriculture coexist without compromising land productivity.

Priority 3: Research and innovation in agrivoltaic systems

Research and innovation are central to optimizing crop production in agrivoltaic (APV) systems, leveraging Hawaii's year-round growing conditions to test a wide range of crops. From integrating culturally significant crops like maile and mamaki to exploring high-value tropical opportunities like vanilla and ornamentals, our trials showcase the adaptability of APV farming. By analyzing how shading, UV reduction, and microclimatic conditions impact growth and yield, we are equipping farmers with data-driven strategies to maximize land productivity while preserving cultural heritage and boosting sustainability.

- **Culturally Significant Crops:** Integrating Native Hawaiian crops like taro, maile and mamaki were planted in the project to test suitability with all three producing promising results.
- **Tropical Opportunities:** Testing high-value crops like vanilla, strawberries, and ornamentals for their adaptability and profitability in APV systems.
- **Year-Round Trials:** Utilizing Hawaii's climate to evaluate diverse crops, from staple vegetables to specialized and perennial varieties.
- **Critical Data:** Investigating shading and UV impacts on flowering, growth, and yield to refine crop selection and system management.

Priority 4: Community engagement and knowledge sharing

Community engagement and knowledge sharing are vital to the success and growth of agrivoltaic (APV) systems. Over the past two years, our outreach efforts have included weekly tours, hands-on workdays, and educational collaborations with local schools, universities, and programs like Seeds for Tomorrow and the CSP Army internship. These initiatives have provided participants with direct exposure to agrivoltaic farming, sparking enthusiasm and building a network of advocates across community, educational, and policymaking spheres. Looking forward, we aim to deepen our impact by partnering with academic institutions to host graduate students and researchers, further strengthening the role of agrivoltaic systems in addressing agricultural and renewable energy challenges.

- **Educational Outreach:** We hosted a variety of different activities ranging from weekly tours and hands-on workdays, engaging groups participants from high schools, universities, and community programs.
- **Youth and Intern Programs:** Partnered with Seeds for Tomorrow and CSP Army internships to provide students and transitioning professionals with practical APV farming experience.
- **Policymaker Engagement:** Collaborated with federal and state agencies, state senators and committee members, as well as international delegates, to build a better understanding of the potential agrivoltaic initiatives in local and international communities.
- **Future Collaborations:** Expanding partnerships with academic institutions to host graduate students and researchers, advancing innovation and knowledge sharing.

With Gratitude to Our Funders

