

## **2021/2022 OFRF Research Projects**

June 2022

### **Organic Farming Systems Options for Control of Coffee Leaf Rust in Kona**

PI: Colehour Bondera

Lead institution: Kanalani Ohana Farm

*Project abstract:* This project seeks to identify accessible Organic Farming Systems options for controlling Coffee Leaf Rust (CLR) in Kona coffee. This project has been conceived and developed by a team of organic farmers and will test a systems-level approach to Coffee Leaf Rust management by increasing microbial biodiversity, using on-farm and island-made inputs, and sequestering more carbon through increased soil organic matter.

Research will be conducted on five certified organic Kona farms which include coffee in their agro-ecosystems. The project will explore impacts of additional fertilizer, and Indigenous Microorganisms (IMO) sprays on reducing CLR. Trial plots will be marked on each of the farms for four treatments: Extra Fertilizer, IMO, Both and Control. The CLR percentage will be monitored for both incidence and severity. Baseline and final soil and leaf samples will be taken. University of Hawaii organic system faculty will assist with analyses.

*Impact:* Coffee Leaf Rust is a potentially devastating disease for all coffee growers, but especially for organic coffee farmers as it is the most devastating disease of coffee. This farmer-led research project takes a whole-systems approach to evaluate plant health-based options for managing the disease with organic farming practices on working organic coffee farms in Kona, Hawaii.

### **Building climate change resilience with coffee smallholder producers by extending organic practices to staple crops**

PI: **Alejandra Guzman-Luna**

Lead institution: Cafe Ecológico de la Sierra Madre de Chiapas S.C. (CESMACH)

*Project abstract:* In the South of Mexico, those dependent on coffee for their well-being are vulnerable in many ways: climate change, volatile prices, and seasonal food insecurity. In this context, organic coffee-producing households have largely abandoned the traditional production of staple crops. This is primarily because most families now assume that staple crops must be produced using chemical inputs - not allowed in certified organic coffee production. And as traditional farming methods have been forgotten, they abandon staple crops entirely.

This project seeks to address the vulnerability issues by attending to the perceived lack of viable organic alternatives in staple crop production. The research has three objectives: conduct a participatory diagnosis



of the challenges of growing staple crops organically; co-design and establish four experimental and educational plots; and systematize the results and widely disseminate them. In order to reach these objectives focus groups and Farmer-to-Farmer pedagogical tools will be used.

*Impact:* There is a growing local food security problem in communities of organic smallholder coffee farmers in Mexico. This project takes a participatory research and demonstration approach to develop and integrate organic staple crop production into more sustainable organic coffee agroecosystems.

### **Organic For All**

PI: Jennifer Taylor

Lead institution: Lola's Organic Farm

*Project abstract:* Traditionally socially disadvantaged farmers, BIPOC farmers and underserved farming populations and their communities lack participation and access to opportunities, training and education provided to medium and large-scale farmers, and agribusinesses.

Organic For All is a participatory capacity building agricultural research and outreach project that will identify needs, hindrances and barriers with BIPOC farmers and work together to develop solutions and resources through relevant learning sessions that provide education, hands-on trainings, and technical assistance. The Organic For All project is designed to help farmers walk through the development of their own organic farming systems or organic agroecology farm practices and organic agriculture.

Project objectives include: (1) building relationships and engaging socially disadvantaged farmers and BIPOC farmers, to enable access and participation in organic farming systems and organic agriculture; and (2) to increase the benefits of organic for all communities.

*Impact:* BIPOC farmers have been greatly underserved in agricultural research and education. This participatory research and outreach project seeks to build capacity for access to and engagement in organic farming systems and organic agriculture for BIPOC and socially disadvantaged farmers.

### **Evaluation of seeding methods and timing of cover crops interseeded into organic corn**

PI: Axel Garcia y Garcia

Lead institution: University of Minnesota

*Project abstract:* Inclusion of cover crops continues to be a priority for organic farmers, but many in the Upper Midwest struggle with successful establishment in long-season cash crops. Typical practices of aerial seeding into standing corn and drilling after fall harvest have yielded inconsistent results leading to low adoption rates. Past research has shown that seeding cover crops between V2-V7 corn stages



produces significant biomass without affecting corn yield; however, seeding methods typically involve high-clearance equipment or modified grain drills that are expensive or difficult to obtain. Alternative and affordable methods may lie in a combination of broadcast seeding timed with routine weed control practices that mimic seed placement from drilling.

The primary goal of this project is to develop management practices that include cover crops into long-season cash crops. Researchers will evaluate how well different cover crop species establish depending on method of seeding and determine effects of cover crop species on corn yield, soil fertility and weed incidence. This information could potentially help growers select species based on their production system and available equipment. Replicated research trials on organic land will be conducted at the University of Minnesota Southwest Research and Outreach Center (SWROC) and farm of a cooperator.

*Impact:* Upper Midwestern organic grain growers struggle with integrating cover crops into the corn part of their rotations. This project will evaluate various management factors including seed selection, timing, and type of mechanical operations to optimize this key part of sustainable organic corn production.

### **Increasing the productivity and market value of pulse crops for arid organic conditions**

PI: Travis Parker

Lead institution: University of California, Davis

*Project abstract:* Nitrogen-fixing legumes feature prominently in many organic crop rotations. Some pulses, such as cowpea and tepary bean, also show exceptional resistance to heat, drought, and low soil fertility, making them particularly valuable in the context of climate change. Despite this, little is known about their yields in organically-managed arid environments. Cowpea and tepary bean, as well as heirloom common bean varieties, do not fit into the major pulse commercial classes, allowing smaller-scale organic growers to distinguish themselves in the marketplace. Heirloom pulse varieties often sell for five-fold higher prices than commodity classes.

In this research, diverse cowpeas and tepary beans will be screened to identify varieties that can outcompete standard commercial pulses. Next, an evaluation and selection of varieties of common beans specifically for organic environments will be conducted. In order to accelerate future breeding, novel sequencing and molecular biology techniques will be used to identify the genes governing the most valuable heirloom common bean seed color patterns. Finally, this data will be used to predict the genes responsible for similar patterns in cowpea and tepary bean. Together, this will lead to the adoption of resilient and dependable pulse crops for organic rotations in arid regions, and will ultimately promote the ecological and financial sustainability of organic farms.

*Impact:* Inclusion of pulse crops could enhance the ecological and financial sustainability of arid organic farming systems, particularly under climate change conditions. This project will evaluate high market

value varieties of common beans, cowpeas and tepary beans in arid organic systems and conduct advanced genetic analyses for development of new high value varieties.

### **Companion plantings for organic management of a new invasive Brassica pest**

PI: Christiana Huss

Lead institution: University of Georgia

*Project abstract:* This project leverages agricultural diversity to mitigate the recent attack of the invasive yellow-margined leaf beetle (*Microtheca ochroloma*) on leafy brassica greens across the Southeastern United States. This new pest is reviled among farmers in Alabama, Florida, Georgia and South Carolina, and is rapidly expanding its range northward as winters become milder. Unfortunately, the biology of *M. ochroloma* is not well known, and organic farmers have not found a viable tool for protecting their brassica crops.

This project focuses on identifying companion plants that reduce destruction by *M. ochroloma* in the absence of other viable tools. First, 5 potential intercrops' ability to repel *M. ochroloma* from brassica greens will be tested. Next, the most repellent intercrop with a recently identified, highly preferred border crop (mizuna) surrounding turnip greens will be combined. This system will create a naturally suppressive "push-pull" polyculture to steer *M. ochroloma* away from the high-value brassica greens that are key in farmers' income. Finally, 10 organic farmers will be recruited to test the most successful combination of companion plants for managing *M. ochroloma* on their own farms.

*Impact:* The yellow-margined leaf beetle is an invasive pest that threatens organic production of high value leafy brassica greens across the Southeast and beyond as winters become milder. This project will evaluate a very innovative landscape ecology approach that involves a combination of repellent intercrops and attractant companion plants in a "push-pull" design for bio-control of the pest.