



## OFRF Grant Awards Summary 2020

### Crop Breeding

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#### **Sarah Hargreaves, Ecological Farmers Association of Ontario**

##### [Seeding a Culture of Innovation in Organics: Farmer-led breeding of peppers, broccoli and cucumber](#)

This project supports three breeding projects in cooperation with the Ecological Farmers Association of Ontario's Farmer-Led Research Program. All three projects focus on providing best practices to adapt to climate change by breeding varieties that are locally adapted to low-input organic systems for southern Ontario and the U.S. northeast. By supporting farmer-led breeding efforts for organic production, this project also contributes to an emerging but critically under-researched area of vegetable farming.

**Impact:** Release three varieties of early ripening, blocky, and flavorful bell peppers: a mass selected population of red peppers, and uniform populations of red and yellow peppers using progeny lines. Breed an open pollinated broccoli that is heat tolerant and adapted to organic systems. Breed an open pollinated seedless English cucumber with excellent flavor and good yield that is adapted to organic greenhouse conditions.

#### **Helen Jensen, Seed Change**

##### [Evaluation of selection methods and efficacy in on-farm breeding of organic wheat and oat varieties](#)

Participatory plant breeding (PPB) is internationally recognized as a methodology that works collaboratively with organic farmers to minimize environmental impacts and adapt to climate change. This project will document how farmer-selectors have contributed to genetic improvement for organic production for wheat and oats and share that information with existing and prospective PPB participants across the country.

**Impact:** Improve knowledge of selection practices for all of the stakeholders in the program, as well as improved methodologies and increased adoption of PPB by a broader range of organic farmers.

#### **Carol Deppe, Fertile Valley Seeds**

##### [Breeding disease-resistant heirloom-quality tomatoes](#)

The goal of this project is to breed disease-resistant heirloom-quality tomatoes, especially those resistant to late blight and a number of other diseases.

**Impact:** Wide distribution of seeds to allow organic farmers and gardeners to easily develop their own heirloom-quality tomato varieties with resistance to common diseases.

## Soil Health

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### **Pushpa Soti, University of Texas Rio Grande Valley**

#### [Cover Crops for Soil Health: demonstration of on-farm trial](#)

The sub-tropical climate prevailing in the Lower Rio Grande Valley (LRGV) region, a major agricultural region in semi-arid, subtropical Texas, poses significant agronomic challenges to farmers: year-round weed, sand, insect pest and pest pressure must be managed simultaneously while also maintaining soil health. To mitigate these issues, farmers in LRGV have started to show interest in using cover crops, which have been shown to provide multiple agroecosystem services, including protecting soil from water and wind erosion. This project is designed to address farmers' concerns about cover crops by evaluating the potential of various cover crops and their ecosystem services.

**Impact:** Information on cover crop species selection and management to improve the long-term sustainability of organic farms in semi-arid, subtropical regions.

### **Inna Popova, University of Idaho**

#### [Advancing Organic Potato Production with Mustard Seed Meal Extract: a multi-pronged tool to control weeds, promote soil health, and improve potato nutrition](#)

The overall goal of this project is to discover effective weed management strategies for organic potato production that promote healthy soils and nutritious potatoes. Utilizing innovative organic agricultural practices that improve soil health, combat weeds, and enhance nutritional quality of staple foods will enable farmers to successfully meet the challenges of feeding a rising global population.

**Impact:** Increased knowledge of the efficacy of mustard seed meal extract (MSME) as a bioherbicide and adoption of MSME by organic and non-organic farmers as a weed management strategy.

### **Martin Guerena, National Center for Appropriate Technology**

#### [Biosolarization: harnessing the sun and organic matter for weed control](#)

The primary objective of this project is to measure the efficacy of biosolarization (a new innovation in the realm of weed control that includes the use of organic matter in the form of compost, cover crops, manure or other materials such as pomace or nut hulls) on weedy species present on three organic farms in the Sacramento Valley of northern California (Solano and Yolo Counties).

**Impact:** Use biosolarization to achieve equal or better weed control in less time compared to a plot using solarization (clear plastic sheeting on moist soil to thermally terminate a variety of pest species)

### **Jed Eberly, Montana State University**

#### [Evaluating the effects of seeding rates and inoculant performance on nodulation, weed suppression, and relative yields of different lentil varieties grown in the Northern Great Plains \(year two\)](#)

Lentils are important for diversifying wheat-based cropping systems and also enhance soil health. These benefits have contributed to the exponential growth in pulse crop acreage in The Northern Great Plains (NGP). However, there are several challenges facing organic lentil production. For instance, lack of approved herbicide for use in organic pulse crop production provides a challenge to weed management. The goals of this project are to evaluate effects of seeding rates on lentil yields and weed competition. The effect of inoculation rates on nodulation and the soil community profile will also be determined.

**Impact:** Improved lentil yields, nutritional quality, and better returns on investments. Ultimately, incorporating lentils into organic cropping systems could enhance soil health and improve the economics of organic operations.

**Mary Barbercheck, The Pennsylvania State University**

[Conservation of an endophytic insect-pathogenic fungus for plant protection in organic cropping systems](#)

Farmers and agricultural professionals have great interest in exploiting beneficial soil organisms, especially in organic systems with their focus on soil health and reliance on natural cycles to manage plant health and pests. Endophytes are microorganisms that form non-pathogenic symbioses with plants and can confer benefits, including growth promotion and increased plant tolerance to environmental stresses that are predicted to increase with climate change.

**Impact:** Broader understanding of how to promote and conserve the beneficial endemic soil fungus, *Metarhizium robertsii*, as an insect pathogen and endophyte in organic cropping systems. Findings will strengthen the capacity of Extension and other agricultural professionals to serve the information needs of organic growers.

**Weed Management**

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**Donn Cooper, Georgia Organic Peanut Alliance**

[A comprehensive approach to control weeds in organic peanut systems in the Southeast](#)

This project will examine the effectiveness of an integrated weed control system in organic peanut production utilizing regular mechanical cultivation and Eugenol, a broad-spectrum herbicide derived from cloves and approved for Certified Organic production in a commercial formulation as Weed Slayer. Data for all weed control activities will be collected throughout the year, and weed populations at each farm will be measured after approximately eight weeks of control and again before harvest.

**Impact:** On-farm tested information on best agronomic practices and economic considerations of weed control methods in organic peanut systems.

**Pest Management**

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**Arash Rashed, University of Idaho**

[Efficacy evaluation of biological control agents against wireworms in organic production](#)

Managing wireworms has been a challenge due to their long-life cycle, subterranean living habitat, and ability to use a wide range of host plants. Although there are a few insecticides available for conventional farming, there is no effective alternative control measure against wireworms in organic production. Recent studies suggest that entomopathogenic nematodes (EPN) and fungi (EPF) may offer protection against wireworms, but their efficacies are influenced by soil type and wireworm species. Focusing on one of the most damaging species in the Pacific Northwest, the sugar beet wireworm *Limonius californicus*, this project will evaluate and compare efficacies of EPF, field-collected and commercial EPNs, and combined EPF/EPN treatments against wireworms in organic vegetable production.

**Impact:** Identification of the most effective entomopathogenic treatment against the sugar beet wireworm and successful establishment of the biocontrol agent in organic farm soil.

## Organic Fertilizers

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**Kate Scow, Russell Ranch Agricultural Sustainability Institute, University of California, Davis**  
[Evaluating costs and benefits of organic-approved liquid injectable fertilizers to improve nutrient uptake and yields in tomato](#)

While research on cover cropping and compost application has surged in the past decade, organic growers are still struggling to maintain sufficient levels of available nitrogen (N) in vegetable cropping systems. A number of new soluble injectable OMRI-approved fertilizer products are now available but have not been independently evaluated, leaving growers uncertain about efficacy. This project will use plots managed organically for 26 years as part of a long term cropping systems trial at the UC Davis Russell Ranch facility to compare N uptake, fruit yields, and profitability of three representative types of organic liquid fertilizers (fish emulsion, compost tea, and microbial/amino acid injectables) via fertigation in organic tomatoes.

**Impact:** Determine nutrient uptake and yield benefits of three organic-approved liquid fertilizers, and evaluate their effect on soil nutrient cycling. Provide a cost-benefit analysis of each type of fertilizer based on cost of products, yield effects, and organic premiums.

## Organic Seed Development

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**Lee-Ann Hill, Rocky Mountain Seed Alliance**  
[20 to 20, in 2020](#)

This project looks beyond the marketability of heritage grains to explore their impact on soil health, climate adaptivity, weed pressure, and insect pressure through farmer-driven, participatory research. Research data collected from this project will be published in the Heritage Grain Trials Handbook, freely distributed online, and disseminated to grain trialists and interested growers to increase and enhance knowledge about these unique varieties.

**Impact:** Increased availability of 20 unique heritage grain seed varieties to a minimum of 20 pounds each in 2020.

## Farmer Mentorship

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Sarah Brown, Oregon Tilth  
[Best Practices for Virtual Peer-to-Peer Farmer Learning](#)

Virtual peer learning programs that connect learners off-site are increasingly common in a variety of fields and disciplines. Unlike traditional distance learning such as online courses and instructional webinars, these programs are explicitly designed to use web technology for the reciprocal sharing of knowledge, ideas, and experience among practitioners. This project will explore how to adapt and develop effective virtual peer learning models in the organic and sustainable agriculture sector.

**Impact:** Increase access to peer learning to help more farmers start and succeed in organic farming.