

Assessing Heat Tolerant Lettuces for Production in Oklahoma - \$97,308.00

Scientists at Oklahoma State University's Horticulture and Landscape Architecture Department will combine their expertise and resources in greenhouse hydroponic plant production, field vegetable plant production and harvesting, handling and objective measurement of quality to devise systems for producing high quality lettuce into Oklahoma's summer season. This project seeks to de-tangle the various heat tolerance mechanisms existing in lettuce, especially within the newer heat-resistant lettuce market types, to simplify specific variety choices for producers wishing to grow lettuce farther into the summertime heat. Hydroponic root zone cooling and plant population dynamics will also be investigated to decrease bitterness and maintain productivity for greenhouse growers. Evaporative cooling with generally available micro-sprinklers will be evaluated in combination with heat resistant market types in field plantings to further extend lettuce's harvest window into summer/early fall. Our results will de-mystify lettuce heat tolerance and allow for more straightforward variety and production system choices for summertime lettuce production by small farm producers.

Identification of Viruses Infecting Peppers in Oklahoma and Screening for Resistant Pepper - \$87,991.00

This project at The University of Tulsa focuses on pepper viruses to determine the type of viruses infecting peppers in Oklahoma and to find possible control measures to minimize their effects on pepper yield. In Oklahoma, pepper (*Capsicum annuum*, L) crops (including bell and chili peppers) grow on more than 600 acres and contribute approximately 2 million dollars per year to the state economy. For the last several years, virus diseases have severely affected the production of pepper crops (both quality and quantity), causing the reduction of cultivated acreage. Growers have limited knowledge on the type of viruses infecting their crops in order to minimize losses. The main objectives of this project are to identify the viruses infecting peppers in major growing counties in Oklahoma and determine sources of resistance to the prevalent viruses. In addition, we will continue education efforts through our collaboration with county extension educators and growers who currently have little knowledge about the nature of virus diseases and their possible control.

Development of Native & Pollinator Plants as Turfgrasses - \$69,496.53

Oklahoma State University researchers will evaluate the potential for native plant ground covers for use as low input turf of shaded landscapes. Plant materials will be tested under a variety of locations and environments to determine their general appearance and adaption. The project will also identify best methods for propagation of prospective plants for greenhouse nursery production, field nursery production, or sod production. The research will create new products for Oklahoma growers in order to diversify offerings to a broad range of consumers. .

Flowering Management: Minimizing the Harms Caused by Spring Freeze in Pecans - \$91,784.00

Scientists at Oklahoma State University will investigate mechanisms by which pecans can tolerate and maintain productivity when subjected to spring freezes. Spring freeze is one of the most severe problems threatening pecan bloom and production in Oklahoma. In 2018, the late April freezes across Oklahoma's pecan production areas damaged up to 70% of growers' crops. It is not fully clear, however, the threshold temperatures and tolerant period of pecan flowers (both male and female) to spring freeze. Uniquely, some pecans cultivars' secondary buds will develop into healthy flowers if the primary buds are impaired, which functions as a fail-safe to guarantee the yield. However, previous reports demonstrated some other cultivars failed to produce, or set abnormal flowers, from secondary buds. This trait was also correlated to rootstocks, but the mechanism behind this flowering characteristic is unknown. To resolve spring freeze tolerance, this project will focus on three objectives: 1) Evaluate the development and qualities of flowers exposed to different freeze temperature ranges and durations; 2) Investigate the correlations between the bud break and bloom of secondary buds, and the physiological determinants at carbohydrate and endogenous hormone levels; 3) Assess the influence of rootstocks on flower differentiation and development correlated to carbohydrate status and hormone balance..

Detection of Detrimental Viruses and Viroids in High Value Chrysanthemums in Oklahoma – \$68,244.00

Researchers at Oklahoma State University propose to determine the prevalence of detrimental viruses and viroids infecting chrysanthemums varieties (*Chrysanthemum* L., family Asteraceae) in relevant germplasm foundational stock in Oklahoma and to select virus and viroid free plants. A catalog of these phytopathogens is missing and is needed for selecting healthy individual plants. The output of this project will set the basis for in vitro propagation of virus-free germplasm in the future and will allow developing customized broad-spectrum detection assays for chrysanthemums in OK and the U.S. Virus detection will be done using commercially available ELISA assays (serological methods) targeting a panel of 14 viruses and two viroids. Viroids will be detected by molecular means (RT-PCR and nucleic acids hybridization) since they lack coat protein and no antiserum is available. This research will favor the implementation of virus-free propagation practices and will mitigate the spreading of these phytopathogens in foundational stocks in Oklahoma and the U.S.

Compost as a Cost-Effective Heat Source for Seed Germination & Season Extension - \$18,750.00

CommonWealth Urban Farms will host a series of two interactive workshops for both agriculture students and beginning/socially disadvantaged farmers across the state of Oklahoma on how to use compost as a heat source for seed germination (in a greenhouse) and season extension (under low tunnels). The overarching goal of this educational project is to share an effective, low cost technology that will reduce start-up costs to beginning/socially disadvantaged farmers, and to provide a cost-effective, widely accessible and environmentally-friendly alternative to propane, a commonly used heat source for starting seeds in greenhouses.

Improvement of Vegetable Production and Soil Health Using Cover Crops - \$51,559.93

Researchers from Oklahoma State University will address vegetable production issues using cover crops to improve soil health and enhance yield and quality with additions of organic matter, and to evaluate soil parameters to further understand the relationship between soil health and crop production. Spinach (aboveground production) and sweet potato (belowground production) yield and quality will be evaluated to assess the effectiveness of soil management using various cover crops during the off-season.

Controlling Algae in Hydroponics to Increase Production - \$61,823.45

Light, nutrients, and water are needed for plant growth and are rigorously controlled in hydroponic production, but is also optimum for algae growth, which is known to reduce yields, harbor insects, clog emitters, and increase labor costs. As interest in soilless production continues to increase to meet locally-grown produce markets, control of algae is a major concern. All growers are impacted by algae no matter the size of the operation or what crops are grown. Research at Oklahoma State University will evaluate different hydrogen peroxide products, which can serve as algaecides and provides extra oxygen that promotes root growth. Algaecides are known to reduce or eliminate algae, however, limited research has looked at rates and timing of applications. This research will consist of two separate experiments. First, we will evaluate which rates of the algaecides are effective at eliminating algae and if those rates affect plant growth of several common hydroponic vegetables using two different products plus a control. Secondly, we will identify the common types of algae at grower operations and test that the optimum rates determined in the first experiments also work with their algae and production system.

Harvest of the Month Educational Activity Sheets - \$24,408.87

Oklahoma Ag in the Classroom and Oklahoma Farm to School will create ten “Harvest of the Month Educational Activity Sheets” to disseminate to students through classrooms, cafeterias, student events, and farmers markets. These activity sheets will promote the consumption of specialty crops grown in Oklahoma and will educate students and families about the nutritional benefits of consuming the products. The activity sheets will include pictures of the product to help students identify the products, nutritional information and puzzles/activities to reinforce the information, challenges to taste test new specialty crops, and conversation starters with questions to ask the producer.