California Department of Food and Agriculture
2023 Specialty Crop Multi-State Program
Project Abstracts

Understanding and Breeding for Yield Under Water and Heat Stress in Sweet Pepper *$998,941.00*

- The University of California, Davis
- Ohio State University

The project team proposes to mine pepper landraces collected from semi-arid regions in the center of genetic diversity, Mexico, to identify, characterize, and breed sweet peppers tolerant to water-stress (WD) and heat stress (HS) for United States (U.S.) markets. Outcomes are a survey of current varieties and tools to measure tolerance to WD and HS for farmers to make decisions on variety selection; tools and germplasm for efficient breeding of these traits into pepper; and evaluation of breeding strategies for complex traits in vegetables. Success will be monitored by assessing the use of information and tools by growers and extension personnel, adoption of DNA markers, and germplasm as varieties or licenses to the industry to produce hybrid peppers. Long-term outcomes include the reduction of economic losses, yield, and quality due to WD and HS in pepper. The strategies tested will serve as a model to breed these traits in other vegetable species. This project focuses on conducting research in plant breeding, genetics, and genomics to improve crop characteristics, but also addresses Improving production, processing, storage, and distribution efficiencies for conventionally or organically grown specialty crops; and reducing environmental impacts on pepper production in the U.S. The project complementarily represents research in a midwestern, Ohio, and a major pepper producing western state, California.

Climate-Ready Crops: Coupling Dry-Farm Tomato Eco-Physiology with Farmer Adoption in California and Oregon $414,801.49

- The University of California, Santa Cruz
- Oregon State University

The project team proposes to evaluate the physiological traits and environmental conditions associated with successful dry-farmed tomato production. Dry-farmed tomatoes are grown by small-scale organic farmers in coastal California and the Willamette Valley of Oregon. However, drought stress can exacerbate physiological disorders like blossom-end rot (BER), which can result in crop failure. Understanding the physiological traits that underpin dry-farmed tomato success will allow breeders and farmers to develop tomato varieties that can tolerate drought and produce high-quality fruit. This is especially important as climate change will result in hotter and drier summers in the western U.S. The project team will: 1) conduct and compare physiological measurements along with yield and fruit quality measurements using dry-farmed and irrigated tomatoes to determine how they differ; 2) evaluate relationships between physiological traits and yield and BER for dry-farmed tomatoes grown under different conditions; 3) conduct on-farm trials for high-performing varieties, allowing farmers to assess their quality and; 4) share project findings with dry-farmed vegetable growers in California and Oregon. The team expects that some physiological traits will be associated with increased marketable yields and reduced losses to physiological disorders, allowing farmers and breeders to better understand which traits to target when breeding tomatoes for dry farming. Access to irrigation remains a major concern for agriculture in the western U.S. By better understanding the physiology of dry-farmed crops, both dry-farmed tomato growers and the California processed tomato industry will be better equipped to breed varieties that resist drought stress.