

Final Report

Paul C. and Edna H. Warner Endowment Fund for Sustainable Agriculture Interdisciplinary Grant Program for On-Farm Research - 2013

Project Title:

Participatory plant breeding of crops for organic and sustainable farming in Southwest Ohio

Project participants:

The Ohio State Univ. PI - David M. Francis, Assoc. Prof. Hort. and Crop Science
Miami Univ. Oxford, Ohio PI - Alfredo J. Huerta, Assoc. Prof. Dept. of Botany
Miami Univ. Oxford, Ohio Co-PI - Nancy L. Smith-Huerta, Assoc. Prof. Dept. of Botany

Funds from this grant were used to support initial efforts during the 2013 agricultural season toward development of regionally adapted varieties of vegetable and grain crops for organic and sustainable farming in southwest Ohio. To kick off this project, a public seminar titled "On-farm plant breeding and seed-saving" was presented by A.J. Huerta in Oxford, Ohio at the LCNB National Bank on April 13. The seminar was attended by almost 30 interested farmers and community members. Based on this presentation and feedback from potential participants, it was decided that this project would work to develop locally adapted lettuce and bean varieties during the 2013 season with the potential to work on tomato varieties in the future. In addition, this project conducted initial work toward the development of a locally adapted variety of corn for organic agriculture resistant to genetic contamination by pollen from genetically modified (GMO) varieties of corn growing nearby.

The 2013 growing season in southwest Ohio was one of the coldest and wettest seasons on record. Because of that there were some difficulties in managing the field work. However, we were successful in completing the projects that were started.

Most of the work aimed at lettuce variety development focused on developing criteria for plant selection and also for developing the expertise necessary for making successful crosses. Although this work was started a little late due to the poor weather conditions, two varieties of interest were identified for cross-breeding. Plants were grown in both field plots and in pots for this purpose. The potted plants are still growing under greenhouse conditions and the intention is to make crosses as soon as these plants are in the proper stage of flowering. For this work we recruited the expertise and advice of a lettuce breeder from the University of Florida. This work is ongoing and we hope to be able to have seeds for planting and to select from segregating genotypes during the next growing season.

For work on bean variety development we also ran in to problems of weather and excessive precipitation so this work was also started late in the season. Most of the work carried out throughout the growing season was to learn to identify optimal genotypes and to rouge out poor performers. The goal for the next season is to plant plots of selected genotypes for selection and potential cross-breeding, and also to develop techniques for successful nursery propagation of

seed from selected varieties for planting for next year. The objective of the nursery propagation will enhance the ability of the farmer to save significant amounts of money because of a reduced need to purchase new seed every year.

Our initial steps toward the development of a locally adapted GMO-resistant variety of corn were successful. The highest-producing open-pollinated variety of field corn grown in south-central Ohio during the 1940's (preceding the development of commercially available hybrids) was Foster's White. Seeds of this variety were obtained from the National Plant Germplasm System (NPGS) base collection of the USDA. Seeds of this variety were grown in a corn nursery at the Miami University Ecology Research Center in Oxford, Ohio. At flowering, ears and tassels were bagged to prevent unwanted pollinations. At the same time, seeds of a variety of corn provided by Dr. Frank Kutka from the Northern Plains Sustainable Agriculture Society were also grown. Those seeds provided by Dr. Kutka were homozygous for the GAS1s allele, a gene which confers resistance to contamination by foreign pollen in corn. Crosses were made where the GA1s variety was the pollen donor and the Foster's White was the pollen recipient. At the end of the season, ears were collected and the seeds harvested. These seeds will be planted next growing season and through repeated crossing and backcrossing, a variety of Foster's White resistant to GMO contamination will be generated and made freely available to local farmers after several cycles of this variety development.

Funds acquired for this grant were expended mostly for materials. Miami University covered all of the salary for hiring an undergraduate student to work on this project. Of the \$4,500 that was granted by the Foundation for this work, \$3,723.47 was spent on supplies and materials such as pollinating bags, electric fence controllers, fencing materials, deer and squirrel repellent, mileage for the undergraduate student, miscellaneous tools, and other materials needed for performing the tasks of pollination. One of the goals of this project was to host two workshops to train farmers to do the work necessary for plant selection, breeding, and seed-saving. Based on conversations with the Chair of the Biology Department at Miami University it was decided that because the term "workshop" at Miami University is used as an official activity which involves students that pay, we should not call our gathering a workshop but should call it a symposium. Since the actual number of participating farmers was small it was decided that a single event would suffice instead of two. For that purpose, we organized a symposium titled "*Save Seeds Now! On-farm plant selection, breeding, and seed-saving*" for December 7, 2013. Advertising was carried out and 65 attendees registered for the symposium from as far away as Nebraska and Wisconsin.

Scheduled presenters for the December 7 symposium were as follows...

Dr. Alfredo J. Huerta – Miami University
Dr. Nancy-Smith-Huerta – Miami University
Dr. David Francis – The Ohio State University
Dr. Frank Kutka – Northern Plains Sustainable Agriculture Society
Dr. Richard Munson – Miami University

A symposium poster PDF and the schedule for the symposium can be found at www.SaveSeedsNow.org

Unfortunately, at the last minute the symposium had to be canceled due to a heavy snowstorm and cold temperatures. The \$500 from the grant earmarked for the symposium (workshop) was not spent and is being returned to the Foundation. Our goal is to locate funds to conduct this symposium in late March or early April of 2014.

The PI's from Miami University (Huerta and Smith-Huerta) have started a non-profit corporation called "Save Seeds Now!" (www.SaveSeedsNow.org) in Oxford, Ohio. Funds from this grant have strengthened the resolve to push more strongly to work with farmers toward the development of locally-adapted varieties of crops for organic and sustainable agriculture. In pursuit of those actions, Huerta has established strong links with the Ohio Farmers Union resulting in the endorsement of the Save Seeds Now! non-profit actions by that Union. It is the goal of Save Seeds Now! to promote on-farm plant breeding for organic and sustainable farming throughout Ohio and potentially through the US. With that in mind, the Ohio Farmers Union along with Save Seeds Now! are exploring the possibility of pushing these ideas forward to the national level through the National Farmers Union. Acquisition of funds for moving these ideas forward will be a significant part of the work performed by Save Seeds Now! in the future.

Huerta is scheduled to present a 2-hour workshop titled "*Developing Locally-Adapted Crop Plants through On-Farm Selection, Breeding, and Seed Saving*" at the upcoming 2014 OEFFA Conference in Granville, Ohio. The presentation details are as follows...Saturday, February 15: Session II: 1:45 – 3:45 P.M and will include a brief summary of this project.

Finally, Huerta and Smith-Huerta are scheduled to present a poster at the upcoming 7th Organic Seed Growers Conference organized by the Organic Seed Alliance in Corvallis, Oregon on January 30 to February 1, 2014. The title of their poster will be "*Save Seeds Now!: A new non-profit organization dedicated to Participatory Plant Breeding for increasing crop biodiversity*". In addition to presenting the ideas promoted by the Save Seeds Now! non-profit, a summary of results from this project will be presented in that poster.