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## **Egypt**

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### **2018 U.S.-Egypt Science and Technology Joint Fund Symposium**

**Report Categories:**

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**Report Highlights:**

FAS Cairo supported and assisted the visit of U.S. Department of Agriculture (USDA) – Agricultural Research Service (ARS) scientists Dr. Gayle Volk (Plant Germplasm Preservation Research Unit, National Laboratory for Genetic Resources Preservation, Fort Collins, Colorado) and Dr. Roger Thilmony (Crop Improvement and Genetics Research Unit, Western Regional Research Center, Albany, California). Doctors Volk and Thilmony’s participation in the 2018 U.S.-Egypt Science and Technology Joint Fund Symposium (November 5-7, 2018) highlights the USDA’s ongoing collaborative agricultural engagement with Egypt. This symposium provided an opportunity for the principal investigators of the funded projects to meet, discuss collaborations, learn about the funding program, and network.

**General Information:**

FAS Cairo (Post) supported and assisted the visit of U.S. Department of Agriculture (USDA) – Agricultural Research Service (ARS) scientists Dr. Gayle Volk (Plant Germplasm Preservation Research Unit, National Laboratory for Genetic Resources Preservation, Fort Collins, Colorado) and Dr. Roger Thilmony (Crop Improvement and Genetics Research Unit, Western Regional Research Center, Albany, California). Doctors Volk and Thilmony’s participation in the 2018 U.S.-Egypt Science and Technology Joint Fund Symposium (November 5-7, 2018) highlights the USDA’s ongoing collaborative agricultural engagement with Egypt. Funding for the program comes from the U.S. Agency for International Development (USAID and the Egypt Science and Technology Development Fund (STDF).

U.S. Department of Agriculture-ARS scientists Dr. Gayle Volk and Dr. Roger Thilmony have each received grants through the U.S.-Egypt Science and Technology Joint Fund. This symposium, sponsored by the funding agencies, provided an opportunity for the principal investigators (PIs) of the funded projects to meet, discuss collaborations, learn about the funding program, and network with other project PIs from both the United States and Egypt.

During the symposium, Dr. Volk participated in an alumni PI panel to discuss the lessons learned from previous grant awardees (she received funding in a previous cycle). A flash talk and poster session allowed all the project workshop participants to present their projects to the attendees (see Appendix I). Project topics spanned medicine, engineering, biotechnology, agronomy, and horticulture. There were also forums for the PIs to ask program managers questions about the administrative implementation of the program.



(Left-to-Right) Research Specialist Ahmed El-Homosany, Egyptian National Genebank and Dr. Gayle Volk, USDA-ARS Scientist.

Dr. Volk’s funded project is titled “Strategies for long-term conservation of vegetative and seed germplasm of *Prunus* species (apricot, cherry, plum, almond, and peach) in genebanks.” Her collaborator is Dr. Neveen Hassan, Director of the Egyptian National Genebank, located at the Agricultural Research Center in Giza, Egypt. The Egyptian part of the project includes the collection and preservation of heritage cultivars of apricot, plum, almond, and peach in Egypt, and the addition of

these genetic resources to the Egypt National Genebank.

Together, both teams will identify improved methods for the preservation of seeds, pollen, and shoot tips (1 mm vegetative propagules) in genebanks. These methods will make use of cryopreservation (liquid nitrogen storage) to increase the longevity of the stored materials in the genebank. The projects will also implement the new storage technologies to preserve *Prunus* genetic resources in the U.S. and Egyptian genebanks. Genetic analyses will be performed to compare the new Egyptian materials to those that are already available in the Egyptian and U.S. genebanks to assess their novelty and possible uses in Egypt.

Dr. Thilmony's project is entitled, "Developing abiotic stress tolerant wheat using gene editing." His collaborator is Dr. Naglaa Abdallah, Professor of Genetics, in the Faculty of Agriculture of Cairo University. The two research groups are collaborating on using genome-editing tools to generate novel drought tolerant wheat cultivars that have the potential to exhibit improved tolerance to drought and potentially other environmental stresses.

The new collaborative research relationship supported by this project will foster the open exchange of knowledge and expertise between scientists from both countries and will increase our understanding on how important traits like drought tolerance can be introduced into locally adapted wheat cultivars as well as potentially other crops.

# APPENDIX I

## Strategies for long-term conservation of vegetative and seed germplasm of *Prunus* species (apricot, cherry, plum, almond, and peach) in genebanks

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### Background

*Prunus* species (in particular, peach, plum, apricot and almond) are important to the people of both Egypt and the United States. Both countries have national genebanks in which important *Prunus* genetic resources are maintained and distributed to breeders, farmers and nurseries. The materials in these genebanks are becoming increasingly critical as breeders must develop new cultivars that are resistant to the environmental changes that have resulted from the impacts of climate change. The goal of this project is to increase the quality and security of the *Prunus* collections in Egyptian and USDA genebanks.

### Egypt Objectives

#### Prunus Collections in National Genebanks

##### Egypt



Egyptian Plant Gene Bank in Giza

Greenhouse collections

In vitro collections

The Egyptian *Prunus* genebank collection is in a greenhouse and other fruit genebank collections are maintained *in vitro*.

- The size of the Egyptian *Prunus* collection will be increased by gathering landrace cultivars from local farms and villages.
- The diversity of *Prunus* collections will be determined using genetic marker techniques.
- Egyptian *Prunus* cultivars that are maintained in other genebanks around the world will be reintroduced.
- Heritage cultivars will be distributed to local farmers.
- Abiotic stress tolerance of rootstocks will be tested.

#### Cryopreservation of *Prunus* in Genebanks (Transfer Technology)

#### Collection composition

Apricot 4 cultivars  
 Plum 7 cultivars and 5 rootstocks  
 Almond 9 cultivars and 4 rootstocks  
 Peach 17 cultivars



### USA Objectives



Most of the USDA National Plant Germplasm System (NPGS) *Prunus* collection is maintained in the field in Davis, California. The National Laboratory for Genetic Resources Preservation (NLGRP) is in Fort Collins, Colorado and serves as a back-up of all the locations of the NPGS. Seeds and plant propagules are stored either in the freezer or in liquid nitrogen.

- Methods will be developed to secure vulnerable *Prunus* collections at -18°C or in liquid nitrogen.

#### Collection composition

Apricot	370 accession
Sweet cherry	175 accession
Plum	184 accession
Almond	206 accession
Peach	536 accession

#### Long-term Preservation of *Prunus* in Genebanks

It is expensive and risky to store our national collections of *Prunus* in the field and in the greenhouse. We will develop methods to store *Prunus* shoot tips (1 mm propagules that can regenerate an entire plant), seeds, and pollen to improve the security of Egyptian and U.S. *Prunus* collections.



- Cryopreservation methods will be developed to conserve *Prunus* cultivars. Preliminary results are very promising.



- Preservation methods will be developed to preserve *Prunus* seeds at either -18°C or in LN vapor.



- Cryopreservation methods will be developed to preserve *Prunus* pollen.
- Determine viability after LN exposure using *in vitro* germination and tree pollination.
- Implement pollen preservation methods for field trees in US collection.



U.S.-Egypt Science and Technology Joint Fund  
 2018 Joint Fund Symposium (November 5-7, 2018)

