

Scientists put citrus in "deep freeze" to preserve it

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U.S. Department of Agriculture (USDA) scientists are creating a backup storage site or "genebank" for citrus germplasm in the form of small buds, called shoot tips, which have been cryopreserved—that is, plunged into liquid nitrogen for long-term cold storage.

Plant physiologist Gayle Volk of the Agricultural Research Service (ARS) is applying the procedure to create a long-term [genebank](#) for important citrus varieties, breeding lines and wild citrus species. She and her colleagues' efforts coincide with concern over the spread of citrus greening, an insect-borne disease first detected in Florida in August 2005 and which now threatens the nation's citrus crop, valued at \$3.4 billion in 2011-12.

ARS is USDA's chief intramural scientific research agency, and the research supports the USDA priority of promoting international food security.

Some genebanks maintain living [citrus trees](#) in dedicated groves and screenhouses. But in cryopreservation, Volk saw a way to safeguard valuable germplasm without fear of losing it to insect or disease outbreaks, as well as natural disasters such as freezes, droughts and hurricanes. Instead of safeguarding whole plants or trees, her approach involves cutting tiny shoot tips from new growth, called "flush," and cryopreserving the material for storage inside state-of-the-art vaults at the ARS National Center for Genetic Resources Preservation (NCGRP) in Fort Collins, Colo.

The center is something of a "Fort Knox" for plant and animal germplasm. In addition to the value of its collections, which are crucial to conducting research and ensuring the food security of future generations, the NCGRP's storage vaults can withstand tornado-strength winds, floods, and the impact from a 2,500-pound object traveling at 125 miles an hour.

To date, Volk, together with ARS colleagues Richard Lee, Robert Krueger and others, have cryopreserved the shoot tips of 30 cultivars acquired from citrus germplasm collections managed at Riverside, Calif., by ARS in collaboration with the University of California-Riverside.

In preliminary experiments, an average of 53 percent of shoot tips survived being cryopreserved and thawed for use in rootstock grafting procedures, which enable generation of whole [citrus](#) plants. A manuscript detailing the methods has been published in the journal *Cryoletters*.

More information: www.cryoletters.org/

Provided by Agricultural Research Service

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