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An Atlas for Guatemala, a Tool for Conserving World Crops

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With exotic names like *ayote de caballo* (a wild squash), *friajolito* (a wild bean), and *teocinte* (a wild relative of corn), Guatemala's native plants seem very different from the agricultural bounty produced by farmers in the United States and other countries. But many of these native plants carry genes that may be vital to global food security. A new tool, developed by a team that includes Agricultural Research Service scientists, will make it easier to find and preserve these important plants. The tool is an interactive atlas designed to provide Guatemalan scientists and land managers with information on where these crop wild relatives grow, where they are relatively safe from habitat destruction, and which ones are rare and most at risk.

The genes these wild plants contain may prove useful in addressing threats posed by emerging diseases, insect pests, and temperature and rainfall extremes arising from a changing climate, says Karen Williams, a botanist with the ARS National Germplasm Resources Laboratory in Beltsville.

"Guatemala has many genetically diverse native plants closely related to some of our most important crops, including corn, beans, peppers, and potatoes. Some of these crop wild relatives are found only in Guatemala, and they have genes that equip them with survival mechanisms that may be useful to protect crops," Williams says.

Williams worked on the atlas for almost 10 years with César Azurdia Pérez from the Agronomy Faculty at the University of San Carlos in Guatemala, David E. Williams and Veerle van Damme from Bioversity International, and Andrew Jarvis and Silvia Elena Castaño from the International Center for Tropical Agriculture.

Developing the database underlying the atlas required researchers to track down and compile some 2,600 records of scientific specimens, which included when and where the plants were found and descriptions of their appearance and native habitats. They consulted records from numerous germplasm collections, including the Agronomy Faculty at the University of San Carlos and the Institute of Agricultural Science and Technology in Guatemala, the ARS-managed National Plant Germplasm System, and the genebanks of the Consultative Group on International Agricultural Research. They also consulted collections of dried plant specimens preserved in the United States, Guatemala, Honduras, and Mexico.

Species of plants in the atlas are related to 29 crops, which were selected based on their importance to both world and Guatemalan agriculture. Of the 105 species included in the atlas, eight occur only in Guatemala.

The atlas, accessible to researchers and the public via a Google Earth interface, gives access to decades of data about a region that is rich in biodiversity. Users can zoom in on a satellite map of Guatemala and see icons showing exactly where the plants were found. When icons are clicked, pop-up boxes appear that give detailed descriptions of the plants.

The atlas also provides maps showing the projected range of each species based on its known climatic preference, the overlap of species' ranges with parks where they may be protected from habitat destruction, and the geographic regions with a high diversity of crop wild relatives. Scientists can consult the information to help determine which species are threatened and warrant conservation measures, plan future collection efforts, and identify areas where natural environments need to be preserved.

The atlas is currently available in Spanish only. Williams and her collaborators are translating it into English, and that translation is expected to be available this year.

The atlas and supporting data are available at www.ars.usda.gov/ba/atlascwrguatemala. A similar atlas is under construction for crop wild relatives in Paraguay.—By **Dennis O'Brien,** ARS.

This research is part of Plant Genetic Resources, Genomics, and Genetic Improvement, an ARS national program (#301) described at www.nps.ars.usda.gov.

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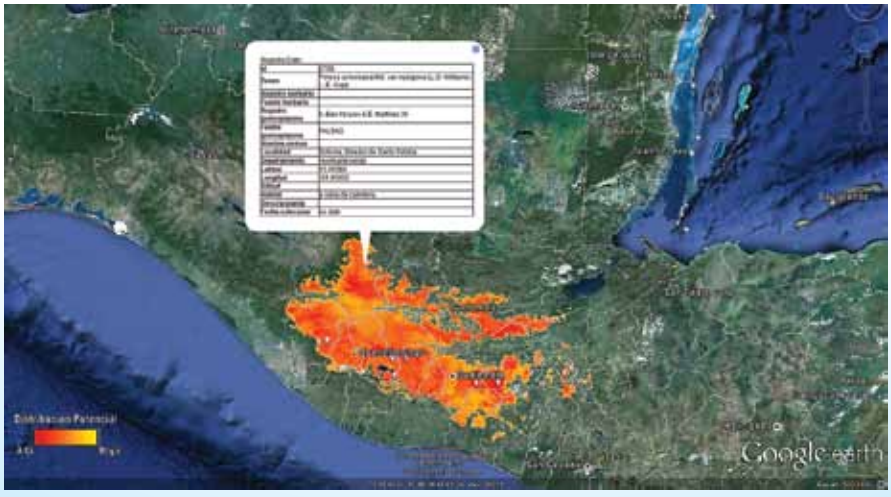

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Top: A photo of one of the plants included in the atlas—a wild lima bean, *Phaseolus lunatus*.

Left: The interactive online atlas contains useful information about crop wild relatives growing in Guatemala.