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INCREDIBLE FEATS OF PLANT BREEDING

GLOBAL HEATING GOT YOU DOWN?
DESERT SISTER
of COMMON BEANS to the RESCUE!



It's time for **TEPARY!**
Breeders develop beans
that won't frizzle when
it starts to sizzle!

SEE INSIDE FOR DETAILS!

THE PROBLEM

For a tasty meal and good nutrition, people around the world rely on common beans (*Phaseolus vulgaris*) as a staple food crop. But common beans are **susceptible** to a number of pests and diseases, as well as the **heat and drought stress** that global heating keeps dishing out. All that stress discombobulates the beans, threatening the loss of a vital source of protein and fiber from our tables. Happily, the unsung **tepary bean** (*P. acutifolius*) can help! Desert-adapted and productive in hard conditions, tepary is relatively unphased by these challenges – but transferring its stress resistance genes to common bean has proven difficult. You may wonder: Why don't we just eat more tepary beans? Well, until now, they've been relatively **neglected** by breeders and are a bit smaller than common beans – but mainly, most people haven't heard of them.

THE SCIENCE

With origins in the **Sonoran Desert** region, tepary bean is a remarkably **climate resilient crop**, first domesticated by indigenous people of present day Central America, Mexico, and the US Southwest. A sister species of common bean, tepary boasts similar flavor and nutritional qualities – and it yields well too! In fact, its productivity in **marginal agricultural areas** affected by drought and heat has led to increasing international interest in its potential. In 2008, scientists at the USDA's Tropical Agriculture Research Station (TARS) in Puerto Rico initiated a small breeding program for tepary bean. Instead of focusing on the challenge of transferring traits from tepary to common bean, TARS plant breeders decided to focus on tepary as a crop in its own right. To do this, they used both **wild and cultivated** tepary lines to create new tepary cultivars with improved agronomic and seed characteristics.

THE IMPACT

The work has paid off. The team has created new tepary lines with **improved traits** for farmers and consumers. TARS-Tep 22 and 23 are broadly adapted lines with improved plant architecture, shortened growing time, and **larger seeds**, as well as **enhanced tolerance** to diverse levels and timing of heat and water stress. Both also protect against rust and blight, devastating diseases of common bean. Another selection (Tep 32) from a tepary landrace is a striking yellow bean with improved seed size and quality. And the recently released variety '**USDA Fortuna**' combines improved culinary traits, reduced cooking time, increased seed size, and multiple pest and disease resistances, all with an attractive speckled seed pattern (see cover). Given the rapid rate of **global heating**, these improved lines are being shared for testing and selection worldwide, providing an urgently needed alternate **pulse crop for marginal environments**.

THE TEAM



Dr. Tim Porch (USDA-ARS, right) and Mr. Luis Santos, (Alliance Bioversity - CIAT, left) prepare wild tepary herbarium samples during a collection trip in the Gila Mountains of New Mexico



TARS Bean team technicians Giovanni Lorenzo, Iveth Rodriguez, Stephanie Cozme (left to right)

