

# An unassuming wild vine brings power to Uruguayan potatoes



Growing in a field, *Solanum commersonii* looks like a weak vine. But *S. commersonii* is a wild relative of cultivated potatoes whose center of diversity is in Uruguay – and it's a lot stronger than it looks, thanks to genetic makeup which has given it natural resistance to one of the world's most damaging potato diseases, a fungus known as *Ralstonia solanacearum*, or bacterial wilt.



Traditionally, bacterial wilt was found in warm climates, but in recent years it has begun spreading into more temperate zones and, in fact, was found in 39 percent of samples from potato fields of Uruguay in 2001. Its immediate effect was severe crop loss with the add-on effect of forcing the country to import potato seed because its harvested potatoes were compromised by the fungus. Potato is the main horticultural crop of Uruguay, with an annual consumption of more than 40 kg per person.



**National Institution for Agricultural Research (INIA)** of Uruguay, aware that there was no resistance to bacterial wilt in any of the country's commercial potato varieties, turned to its native wild relative, seeking to breed *S. commersonii*'s natural resistance into Uruguay's commercial varieties. Initial attempts were not successful because the genetic distance was too wide. Now, the Treaty Benefit-sharing Fund Project has circumvented this by using a "bridging" technique to take



## Building a bridge to food security

As Uruguay's main agricultural research institution, INIA operates five experimental stations, promoting environmentally and socially sustainable production system. Transferring resistant traits into cultivated potato varieties would not only increase yields and make this nutritious crop more accessible to families for consumption or sale, it also would enable commercial potato varieties to withstand the highly variable conditions that accompany climate change and thus help ensure their sustainability for the future.

the valuable genetic traits of the wild relative into the cultivated pool and also has found that *S. commersonii* has resistance to drought and cold conditions as well as resistance to bacterial wilt.

**The initial phase of the Treaty Benefit-sharing Fund Project** organized the collecting and characterizing of *S. commersonii* at national level, preparing 100 varieties for evaluation. In order to shorten the genetic distance, *S. commersonii* was first crossed with *Solanum phureja*, a bridge variety, yielding 10 hybrids and then the hybrids were crossed with the commercial varieties. This highly technical project must move methodically through the procedures required for developing new varieties across species. It is well on the way to



broadening the potato genetic base in the fields of Uruguay, but also can serve to support global food security by adding improved potato varieties with critical adaptation and resistance factors for facing climate change and outbreaks of bacteria wilt.

### ***In just one year...***

**Project objective I:** Complete collection and characterization of *Solanum commersonii* at national level.

The project has:

- ◆ collected and tested crosses to ensure they can transmit selected traits,
- ◆ evaluated 180 seeds of wild varieties,
- ◆ characterized a population resistant to the bacteria wilt fungus.

**Project objective II:** Improve *R. solanacearum* resistance characterization in foliage and tubers of *S. commersonii* and interspecific hybrids.

The project has:

- ◆ developed 10 hybrids by crossing identified resistant wild relatives with the bridge variety,
- ◆ tested to determine if resistance has transferred through observation of hybrids injected with the fungus in experimental plots,
- ◆ found the resistance level was not the same in all the hybrids.

**Project objective III:** Develop functional markers to facilitate disease resistance genes introgression from *S. commersonii* species.

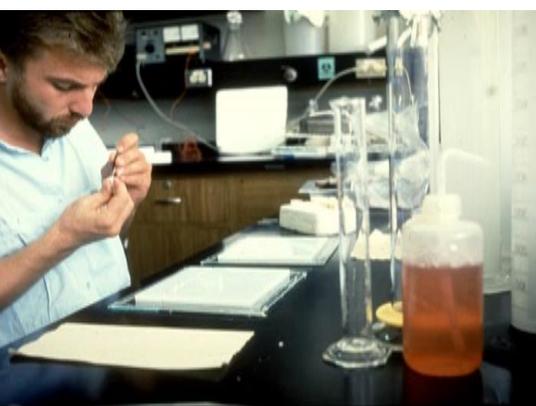
The project has:

- ◆ initiated evaluation of resistance in hybrids at molecular level, to find out where in the genetic structure the resistance is located.

**Project objective IV:** Incorporate resistance and general adaptation factors from *S. commersonii* in potato improved germplasm.

The project has:

- ◆ broken incompatibility barriers to incorporating wild germplasm into cultivated varieties by using hybrids from the bridge species,
- ◆ planted the new varieties in the field for cloning and further testing.



### ***Still to come...***

- ◆ Collect more varieties of wild crop relatives.
- ◆ Further evaluate the properties transmitted in the hybrids that emerge from the crossing of the wild crop relative *S. commersonii* with the bridge variety and then from the crossing of the hybrid and the commercial variety.
- ◆ Further study the level of toxins in the new varieties of potatoes.



#### **FOR MORE INFORMATION CONTACT:**

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