Drought-resistant Argentine soy raises hopes, concerns

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Transgenic soy plants in a field near Santa Fe city, northwest of Buenos Aires. Researchers in Argentina have isolated a drought-resistant sunflower gene and spliced it into soy, bolstering hopes for improved yields as the South American agricultural powerhouse grapples with global warming.

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Raquel Chan's team identified the HAHB4 gene that makes sunflowers resist dry conditions and implanted it in rockcress flowering plants known as arabidopsis, whose resistance to drought increased considerably.

Her team has signed an agreement with Argentine firm Bioceres, which is co-owned by over 230 agricultural producers, to use and exploit the gene. The firm has conducted tests on soy, wheat and corn crops.

Soy is the biggest cash crop in Argentina, a major exporter of byproducts like soybean oil and flour, but the prospect of creating a transgenic soy plant has some experts concerned about the potential for environmental harm.

Supporters of the technology say the boost in productivity could mean as much as $10 billion in added profits each year, particularly after a severe drought recently slashed Argentina's soy output by more than a third.

But the environmental advocacy group Greenpeace said the transgenic seeds would promote deforestation and the expansion of soy crops into new regions such as Patagonia, as well as cause a "significant loss" in biodiversity and force thousands of farmers and native people to relocate.

And because it is genetically modified, the new soy seed would have little to no prospects of being sold in markets where such crops are opposed or outlawed, as in Europe.

Transgenic crops are far more widespread in South America, where environmentalists worry they could rush the shift to single-crop farming and denounce the encroachment of soy crops and the increased use of pesticides.

With an eye on feeding a world population set to rise from seven billion to 9.5 billion by 2050 and predictions of the worsening impact from climate change, scientists in many parts of the world are working on pinpointing genes that could help crops cope with harsher weather or marginal soils.

In separate projects reported this year, scientists in Australia developed strains of wheat and rice resistant to salt, enabling the crops to be grown in saline soils damaged by excessive irrigation or tsunami waves.

Argentina is the world's second-biggest exporter of corn, the largest international supplier of soybean oil and soymeal, and the third biggest for soy seeds. But these crops are located in regions often hit by drought.

A lack of rain has hit Argentina hard during the

Southern hemisphere summer, which is now coming to an end. The country's most severe drought in a century saw agricultural output drop some 37 percent in 2008-2009.

Once HAHB4 was artificially inserted in soy, wheat or corn, yields increased between 10 and 100 percent, depending on the crop's quality and local conditions.

"The tougher the environment, the more advantageous the transgenic plant," said Chan, who heads the Agrobiotechnology Institute at the National University of the Coast. She said the genetically modified crops also performed better in salty soil and, she suspected, in other arduous conditions.

The seeds do need some water, but only about 500 millimeters (20 inches) per year. The most productive areas receive an average 950 millimeters (37 inches) of rain per year.

-- 'Revolutionary for agriculture' --

Bioceres formed a joint venture named Verdeca with the US-based agricultural technology company Arcadia Biosciences to invest as much as $30 million to further develop the technology.

The deal, announced with great fanfare in February by President Cristina Kirchner, promises to increase productivity and profit in Argentina.

But the government has not yet licensed the seeds, setting a 2015 target date to do so.

Over the next three years, officials will first have to prove that the seeds are at least as nutritious as conventional ones, that they are neither toxic for animals or humans and that they do not have a negative impact on the environment and other crops.

"Biotechnology can provide answers, help produce more food, but hunger is solved by political decisions," said Chan, who studied at the Hebrew University of Jerusalem and lived in Israel during Argentina's 1976-1983 dictatorship.

"The idea is not to reduce the amount of arable land. Rather, (biotech advances) allow producers to have the same return using less land."

Her findings have encouraged farmers, but Greenpeace coordinator Hernan Giardini warned that the transgenic seed could "spell the end of native forests in the Gran Chaco."

Genetically modified soy has also "exponentially increased the use of chemicals causing adverse effects to human health and the environment," he said.

Carlos Manessi, vice president of the center for environmental protection in Santa Fe, said soy crops can influence rural communities, where fewer and fewer people are living.

"Why? Because soy crops require very little labor, but also because of the huge amount of chemicals used, which forces people to leave," he said, pointing to a field once full of clementine trees and now covered with soy.

But Rural Society of Santa Fe president Hugo Iturraspe hailed the HAHB4 gene -- which boosts both drought resistance and resistance to saline soils -- as nothing short of "revolutionary for agriculture."

The 62-year-old farmer and former polo player, who owns 300 hectares (740 acres) planted with soybeans, hopes to make early purchases of the genetically modified soybeans.

Standing in the middle of a field about 80 kilometers (50 miles) outside Santa Fe, Iturraspe showed soybean plants hit hard by a drought in December and January.

"The drought has taken its toll on the size of the beans; they're smaller, and scrawnier, and overall lead to fewer kilos harvested. But if we use this new development, we would have far bigger beans like before, and that would of course hugely increase the value and our yield," he said.