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INTERNATIONAL

Brazilian farmers turn away from tilling

BY Paulo Prada

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CABECEIRAS, Brazil - When Albino Ampessan bought 620 acres here in 1982, the plucky farmer was undeterred by the scrubby bushes, gnarled trees and wiry grasses typical of Brazil's vast, central savannas.

He planted soybeans with the help of his three sons.

Then the wet season came, flooding much of his first crop. Subsequent years brought more rain, time and again washing away topsoil, seedlings and most of the new farm's promise.

"We lost a lot," says Ampessan, 77. "We had to try something new."

So the Ampessans turned farming on its head. Instead of plowing before each planting, they leveled the previous crop, let the residue decompose and seeded the following year's harvest directly in the mulchy remains.

The runoff ceased, and within a decade the farm boasted a layer of topsoil that "now grows whatever you plant," says Ampessan. While the land initially produced 1,870 pounds of soybeans per acre, last year the farm produced 3,470 pounds of soybeans per acre, plus other crops including corn, sunflower and pineapple.

The Ampessans, who now have 12,000 acres, were pioneers in Brazil of no-till farming, a practice increasingly used worldwide to fight erosion and enhance soil fertility. First developed by U.S. scientists in the 1960s, the technique, also known as conservation tillage, has taken root here faster than in any other country and helped Brazilian farmers become some of the world's most productive, competitive exporters.

BIGGER AND BETTER

"Conservation tillage is helping Brazil conquer the world market," says Wayne Reeves, research leader at the Department of Agriculture's Agricultural Research Service, or ARS, in Watkinsville, Ga. "They copied it from the U.S., but did it bigger and better."

The technique spread just as advances in plant genetics were allowing tropical growers to cultivate crops, like soybeans, that once grew only in temperate climates. And a drop in the value of the real, Brazil's currency, over the past decade made exports cheaper. Together, the factors made Brazil the world's largest exporter of sugar, beef and orange juice, and the second largest exporter of soybeans.

Traditionally, farmers till land to kill weeds and make soil pliable.

But plowed dirt can wash or blow away. Tilling also exposes lower layers of earth to sunlight, evaporating moisture and burning nutrients.

As herbicides grew cheaper and less dangerous, many agronomists began urging farmers to forgo tilling altogether. "It's radical to throw your plow out the window, but it does wonders," says John Landers, an English agronomist in Brasília who helped introduce no-till farming to Brazil.

Because no-till plots retain water otherwise lost to runoff, Brazilians first used the practice in areas like the central savannas that suffer from erosion or drought. But lower costs -- practitioners spend less time on tractors plowing soil -- led farmers throughout Brazil to follow suit.

"Farmers economize fuel and labor," says Dimas Resck, a scientist at the soil research center operated by the state-run Brazilian Agricultural Research Corp., or Embrapa, near Brasília. "But they end up boosting crop yields, too."

MILLIONS OF ACRES

While Brazil had some 5 million acres of no-till farmland in 1992, by the end of 2004, more than 54 million acres, or half the country's farmland, was no-till, according to the Brazilian No-Tillage Federation, in the southern city of Ponta Grossa.

The practice is growing apace worldwide.

Farmers in neighboring Argentina and Paraguay, for example, have begun following Brazil's lead. In Western Australia -- Australia's biggest, but one of its driest states -- conservation tillage boosted wheat and barley production such that the practice grew to cover 92 percent of the state's farmland over the past decade, according to Rolf Derpsch, a German agronomist recently hired by Australian growers to study their farms.

SLOW U.S. ADOPTION

Adoption in the United States is slower.

Though many farmers in the Great Plains use no-till planting -- overplowing, combined with drought, created the dust bowl of the 1930s -- other American growers have been loath to alter conventional methods. No-till plots at present account for only 23 percent of U.S. farmland, according to the Conservation Technology Information Center in West Lafayette, Ind.

Yet studies in the United States indicate conservation tillage could boost crop yields even in regions like the Southeast, where plowing has traditionally been deemed a must. In a joint study published last year, ARS and Auburn University researchers said no-till methods boosted average annual cotton production on experimental plots in eastern Alabama by as much as 324 pounds per acre, or nearly 15 percent, over a three-year period.

SUBSIDIES' IMPACT

One reason American farmers remain slow to adopt the practice, scientists argue, is that government subsidies numb them to the growing competitive advantage it lends foreign producers. Compared with Brazilian farmers, who compete on the world market with little or no state support, U.S. growers this year are expected to receive \$19.5 billion in government subsidies -- nearly twice as much as in 2004, according to the USDA.

"There's a lack of economic incentive," says Ardell Halvorson, a soil scientist at the ARS' Soil Plant Nutrient Research Unit in Fort Collins, Colo. "Without grants, it would have spread more."

In Brazil, further adoption hinges on agriculture's sustainability. Rapid increase in soybean production, for instance, this year led to a glut in supply, causing farmers to lose money and scale back planting for 2006.

Environmental concerns exist, too.

In addition to the encroachment of croplands in the Amazon and other forests, ecologists question no-till farming's reliance on herbicides. The technique, after all, works because farmers prepare plots by poisoning weeds that compete with crop seedlings.

CROP ROTATION NEEDED

The rapid adoption of no-till methods also leads environmentalists to worry that some farmers, convinced the technique is a cure-all, forego other basics besides plowing. Farmers who abandon crop rotation, for one, discover that untilled soil remains just as vulnerable to disease and mineral depletion as conventional farmland.

"You have to remain on guard," warns Roberto Smeraldi, director of the Brazilian chapter of Friends of the Earth in Sao Paulo. "You can still drain the soil of nutrients. You can go overboard on the chemicals."

Those who switch from conventional farming say the practice in time allays many of those concerns.

Despite the use of herbicides, more fertile soil means a more efficient use of other chemicals, like fertilizers, they argue. And richer soil, scientists say, also means less demand for additional farmland.

"Much of the forest already cut would not have been had the know-how existed earlier to improve productivity in other parts of Brazil," says Norman Borlaug, the 1970 Nobel Peace laureate for research that helped increase global food supply, in a telephone interview from his office in Mexico City.

The Ampessan farm sits squarely in the middle of an area historically considered unproductive.

A two-hour drive from Brasília, the farm and surrounding savannas once were thought useful only for grazing cattle. But the advances of recent decades transformed the region into the breadbasket of Brazil, responsible for half the country's production of soybeans and a third its production of corn.

Roberto, Albino's 52-year old son, drives a visitor from the red-brick farmhouse to a small pond amid two fields littered with corn and soybean stalks. Vicente, his younger brother, points to a dozen ducks paddling across it, their brown feathers camouflaged against the muddy water.

"It dried up when we plowed," Vicente says, explaining how rainfall that once evaporated or rushed into nearby streams now trickles slowly through the soil and into the pond. "After a few years, the pond and the ducks came back."