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LATIN AMERICA WELCOMES AGRICULTURAL INVASION

by Bob Stanley

MEXICO, IDRC--Until about 20 years ago sorghum was little more than a curiosity in most of Central and South America. But since then production has taken off, and the hardy African grain is now second only to maize in the region -- and is still on the increase.

The impetus for this agricultural "invasion" comes not from Africa, but from the north, from the prolific experimental plots of the International Centre for Maize and Wheat Improvement (CIMMYT) at El Batan, just outside of Mexico City. In Mexico, sorghum planting doubled between 1966 and 1976. For the same 10-year period Costa Rica has tripled its sorghum production, Guatemala's has more than doubled, El Salvador is up by more than 50 percent. In some South American countries -- Brazil, Colombia, Peru and Venezuela, for example -- there have been similar increases in production.

Maize is still the preferred staple grain of Latin America, and is likely to remain so for some time to come, but the increase in land planted to sorghum in the region has been nothing short of phenomenal. There are good reasons for the growing interest in sorghum in the region. It is a hardy grain that generally withstands poor soil, drought and other adverse conditions better than maize. It also yields better than maize, but most people still prefer the flavour of maize in their tortillas, so they grow sorghum as animal feed, taking advantage of its better yields, or as an "insurance crop" in case the maize fails.

There is another, more prosaic reason, according to plant breeder Elmer Johnson, of CIMMYT. Sorghum, he points out with a farmer's directness, is harder to pilfer. "Corn is easy, somebody just breaks off an ear and sticks it in his pocket, and before you know it, in a few days there's half the corn crop walking down the road."

Johnson may well be one of the people responsible for the sorghum boom in Latin America. He became interested in the crop when he first moved to Mexico in 1958, and never lost his interest, even though he was officially working with maize, and had no budget for sorghum research. The varieties available in the early days were from Texas, they were ideal for feed grains and hot climates. But what he wanted was a white grain for human consumption that would thrive in the cool of the hills.

In those days, says Johnson, there was no network of international agricultural research centres as there is today. In fact CIMMYT itself was not yet an international centre. But Ethiopia was the acknowledged "home" of sorghum, and there were some Ethiopian students studying at CIMMYT who were more than willing to write and ask their families or friends to send them some seed.

The first African varieties had an unfortunate tendency to grow very tall very quickly, and then fall flat before they had time to set seed. But when crossed with more adapted varieties they quickly became more productive. Elmer Johnson believes that sorghum will eventually replace maize in Central America, because it is more tolerant and on average yields twice as much grain. It is just a matter of breeding the right type of sorghum, he says. "Improving a plant is like filling a truck with sand - one shovelful at a time. All it takes is time and patience."

But it also takes funding, and there must also be someone with the time available. In 1973 Canada's International Development Research Centre (IDRC) became involved in the sorghum research. It provided a grant for a project with the specific aim of developing a cold-tolerant, drought-resistant sorghum that could be made available to small-scale farmers in the region's highland areas.

In 1977 the International Crops Research Institute for the Semi-Arid Tropics (ICRISAT) also became involved in the project. With its headquarters in Hyderabad, India, ICRISAT is an internationally funded centre with special responsibility for sorghum research.

Although IDRC's support for the project ended in 1980, ICRISAT's support continues, and additional grants have been obtained from the Mexican government and from universities in the United States. Vartan Guiragossian is a plant breeder with ICRISAT who moved to Mexico at the end of 1977 to carry on the research. He believes that the work done in the 20-odd years since Elmer Johnson began his "hobby" amounts to a major breakthrough. The first requirement has been met: to diversify the cold-tolerant genotypes to produce a stable, fertile variety that the farmer can keep and plant year after year.

Says Johnson: "This cold-tolerant sorghum can be grown on the Canadian prairies or in Pakistan -- anywhere conditions are similar." Problems caused by different day length, such as those that affected the early varieties from Ethiopia, are easy to overcome, he adds.

At CIMMYT Guiragossian has built a frame house covered with black plastic sheeting that can be rolled back to artificially create "days" of any length. Here varieties least sensitive to day length are selected. Every single plant is bagged to ensure that it is really fertile, and not randomly fertilized from outside.

The resulting white-seeded varieties, says Guiragossian, yield from three to seven tonnes of grain per hectare, and are suitable for making tortillas and other local flatbreads. Mexico's National Institute for Agricultural Research (INIA) is also involved in the research, and has committed over one million pesos to a study on the preparation of tortillas from white-seeded sorghums. In INIA's test kitchens Guiragossian has produced hundreds of tortillas, using dozens of different combinations of sorghum and maize flours. They are evaluated for everything from taste and texture to colour and consistency.

He has also recently published a book on how to identify sorghum types suitable for tortilla making.

There is still more research to be done, however, before Guiragossian will be satisfied that he has the "right" sorghum for the highland farmers. He is now identifying varieties with higher protein content and less tannin and phenol. High phenol and tannin content darkens the colour and restricts protein availability. These problems can be overcome, he says, and meanwhile the new varieties are undergoing farm trials in Mexico and Guatemala, and there is interest from Bolivia, Colombia, Ecuador and Peru.

Guiragossian foresees the day when two million hectares of high-altitude farmland in Central America will be planted to the new sorghums, broadening the farmers' options, and giving them added insurance against drought. It is help that the region badly needs, with an estimated one-third of its people suffering from malnutrition. Agricultural production is barely succeeding in maintaining even the existing low nutritional levels as the population continues to grow at a rate of 3 percent a year -- threatening to double in just 25 years.

The sorghum invasion will not solve all of Central America's food or other problems, but it is already providing a much needed boost to many of the region's farmers. And if the research at CIMMYT succeeds, it could be that Elmer Johnson is right, and that some time in the future the sorghum tortilla will be as popular as its maize counterpart is today.

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Bob Stanley is editor of IDRC Features, and a writer on science and development.