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ETHIOPIA'S LIVING LABORATORY OF BIODIVERSITY

by Pattie Lacroix

At first glance, the sorghum head that farmer Hassain Saide Adem holds seems unremarkable. But, in fact, this cereal crop used as a staple porridge in Ethiopia is the result of several thousand years of farming. The seeds contained in the head of his 15-foot high sorghum stock are the ancestors of seeds that have been planted and conserved by farmers throughout generations in this ancient land.

Here in Ethiopia, home of one of the most publicized famines in the mid-1980s, scientists are discovering the pivotal role farmers play in preserving and enhancing some of the world's most unique seed genetic material. Ethiopian traditional seeds, or "landraces," contain genetic properties such as drought tolerance and pest resistance. These genetic traits have evolved on farms throughout the country such as that of Hassain Saide Adem and his wife Kadija. They plant sorghum, a cereal grass called teff (*Eragrostis abyssinica*) and corn on their 4-ha farm 400 km north of the capital Addis Ababa.

Amid Ethiopia's diverse topography, climate and soil conditions, farmers have developed a tremendous base of food-producing seeds. Today, Ethiopia is recognized as the centre of origin for many crops such as sorghum and coffee and the centre of diversity for many others such as wheat and barley. However, during 30 years of civil war and severe droughts, farmers like Hassain were hard pressed to save enough of their landrace seeds to sow from one planting season to the next.

Ethiopian scientists soon discovered that farmers left with few options were planting imported hybrid seeds that needed fertilizers and pesticides to produce harvests. In an effort to ensure Ethiopia's seed genetic diversity, scientists are discovering that farmers are not merely an adjunct to conserving and enhancing this diversity but are key actors.

This discovery is in part the result of an IDRC-supported project. With co-funding from the Unitarian Service Committee (Canada) and in conjunction with Ethiopia's Plant Genetic Resources Centre, the project is exploring traditional crop production in Shewa and Welo, regions of central and northeast Ethiopia respectively. The project is led by plant genetic scientist Dr Melaku Worede and by Prof John Lambert of Canada's Carleton University. It supports on-farm conservation and utilization of landrace seeds. At the same time, the project seeks to integrate traditional farming knowledge, which is critical to the protection of genetic material and in developing a sustainable food supply not just for Ethiopia but around the globe. IDRC's larger strategy of support for the conservation of genetic resources includes the "Seeds of Change" television documentary, video, and educational kit, and the book People, Plants and Patents.

A DELIBERATE FORCE

Through practices such as planting diverse crops, seed collection and preservation and fallow systems, carried out for centuries by farmers such as Hassain, Ethiopia's diverse seed base has been safeguarded.

"Farmers have a deliberate role in determining the level of biodiversity in an area," explained the project's researcher Awegechew Teshome. "They are not merely another natural factor like the soil or the climate, they are a deliberate and major force in determining the level of diversity within a field and a crop. Their decision-making process is connected to their livelihood."

Eighty percent of Ethiopians are farmers. With the average farm size measuring just 2 ha, farm income is limited. The cost of investing in fertilizers and pesticides is not an option for most. For centuries, farmers have relied on the consistent yields provided by landrace seeds that require no chemical inputs.

"I will continue planting landrace seeds because they are extraordinary. I am very impressed with my seeds. For example, I had 29 stocks of sorghum from one seed -- so I am convinced this is a good producer," said Hassain.

The key to sustaining good yields with no inputs under stressful growing conditions is the seed selection process. At this stage the knowledge of farmers is fundamental in ensuring their livelihood. "I weed the crops and help with the seed selection; I help determine the right seed for the field, the right seed for storing and for cooking," explained Kadija.

It is the farmer's knowledge of individual seed properties that scientists are finally recognizing as a primary element within the equation of developing and sustaining food supplies.

"There is a wealth of information that farmers have. Rather than imposing methods and information on farmers, we have to listen to them," observed Awegechew. In farmers' fields, scientists are discovering a dynamic living laboratory of tremendous biological diversity sustained primarily by small-scale farming communities.

CULTURAL RESOURCES

"Biological resources are not just natural, they are also cultural. Issues such as seed storage, taste and livelihood all play a part in an area's biological diversity," said Awegechew.

It is this collaboration between scientists and farmers in Ethiopia that is breaking new ground in developing long-term food supply solutions for that country's 50 million residents and for communities around the world. The genetic diversity protected through Ethiopia's traditional farming culture may be a future source of new seeds capable of producing food in changing climates and of resisting unforeseen diseases and pests. "When we started with in situ, or on site, conservation we had very little knowledge, so we capitalized on the knowledge of farmers and how they managed landraces," explained Dr Melaku Worede.

"There are three major factors integral to in situ conservation: time, space and diversity. It is the interaction of these three aspects that are important in spreading the risks. Farmers use these three factors to ensure a harvest," explained Dr Melaku.

So as Hassain uses his 4 ha of land to plant sorghum, teff and corn, he is not banking entirely on any one crop nor for that matter on any one species. "I have planted three types of sorghum throughout my fields and even though the rains came late I have a very good crop," noted Hassain as he stood before a towering stock of wofe-aeybelash sorghum planted from traditional landrace seeds.

Linking the informal and undocumented knowledge of farmers such as Hassain with the research of scientific institutions has proven quite a remarkable process. Over 200 farms have been selected in Awegechew's research and to date he has identified 58 landrace sorghum types. In addition, 4,500 plants were measured, and over 200 soil samples were collected.

In recognition of his work, Awegechew has won the Vavilov Prize, awarded by the International Plant

Genetic Resources Institute. No doubt the longer-term reward is the discovery of a treasure chest of local knowledge and genetic material that could grow into solutions for our future food security.

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