



◀ Harvested barley ready for threshing in Dekemare.

single growing season, they have no difficulty in managing it has positive effects on research efficiency too. When farmers make the selections, the time required for 'specific adaptation'—the production of germplasm adapted to a specific set of environmental conditions—is significantly shortened, because the process is done 'on site'. And because farmers are used to raising multiple crops in a single growing season, they have no difficulty in managing the process for several crops at the same time. Plant breeders, in contrast, work much more slowly and usually focus only on a single crop.

The ultimate aim of the project is to disseminate technology, not just to develop it. This involves scaling up and out—taking the new lines to non-participating farmers and encouraging local communities to take the reins and continue with the management and marketing of the technologies themselves (see box for the latest developments). The project will also build scientific capacity, providing relevant postgraduate degree training.

The visible result of this will be a spread throughout the region of community-based seed multiplication schemes and farmers' seed fairs, with Eritrean researchers continuing the work.



CGIAR Challenge Program on  
**WATER & FOOD**

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■ **Project information**

Project title: Improving water productivity of cereals and food legumes in the Atbara River Basin of Eritrea

■ **Partner organizations**

- International Center for Agricultural Research in the Dry Areas (ICARDA), Syria
- Systemwide Program on Participatory Research and Gender Analysis (PRGA) at Centro Internacional de Agricultura Tropical (CIAT), Columbia.
- Asmara University, Eritrea
- Ministry of Agriculture, Department of Agricultural Research and Human Resource Development (DARHRD), Eritrea



# Participatory crop breeding reaps benefits for Eritrea

Crop breeding and management research is enabling farmers in Eritrea to develop and grow improved varieties of food crops that are particularly well adapted to the harsh conditions of their land.

■ Research Highlight #1



CGIAR Challenge Program on  
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Few countries are in such acute need of agricultural development as Eritrea, a nation plagued by recurring drought. Its soils are largely parched and unproductive, leading to chronic hunger and poverty for many of its people. Increasing the water productivity of the country's most widely grown crops is a priority for government and national researchers.

A CPWF project is building on previous work in this field to do just that. Its focus is the Setit-Tekeze River Basin in the western corner of Eritrea. (This is also called the Atbara Basin, Atbara being the name for the Tekeze River as it winds through Sudan before joining the Nile).

The project, "Improving water productivity of cereals and food legumes in the Atbara River Basin of Eritrea", aims to develop and disseminate varieties of barley, wheat, chickpea, lentil, faba bean, cowpea and grass pea that combine drought tolerance with good nutritional characteristics and resistance to diseases and pests. It is also exploring optimum blends for mixed cropping, a risk avoidance strategy that mitigates against the worst effects of drought.



## ■ Breeding the farmers' way

A distinguishing feature of the project is its participatory approach. Farmers are involved from the outset, contributing their knowledge of the crops and the land to the setting of priorities, the planning and implementation of trials, and the evaluation of results. Farmers grow and test new breeding lines themselves, then select and adopt the ones they think will perform best given the stresses experienced in their fields, while at the same time possessing their preferred cooking and taste characteristics. This approach means that control over the flow of genes from one generation of crops to the next lies in the hands of those who most need the benefits.

Farmers, rather than breeders, also take responsibility for the naming, adoption and advertising of new varieties and the production of seed. The methodology used by the project capitalizes on previous work done by the International Center for Agricultural Research in the Dry Areas (ICARDA) and by the CGIAR's Systemwide Program on Participatory Research and Gender Analysis (PRGA).

▼ Barley and wheat fields in Weki.



Photo: Salvatore Ceccarelli/ICARDA

The crops currently under research are barley, bread wheat, faba bean, chickpea and lentil. Hanfets, a barley/wheat mixture important for yield stability, is also the subject of intensive research (see box)

Three of the eight areas are hosting agronomy trials in addition to the breeding work. Farmers and researchers are assessing the effects of cultural practices such as weeding and ridge building, with a view to increasing crop water productivity while maintaining soil fertility and minimizing

## ■ Harvesting achievements

### Drought-tolerant barley lines

Three barley selections, initially developed quickly with farmers because of their drought tolerance. One of these selections, named Shishai, is now well established in the village of Terra Emni, where 900 kg of the crop was harvested in November 2005. Shishai seeds will be distributed to 11 farmers for multiplication next year. A village-based seed enterprise is planned.

### Risk-minimizing mixtures

Mixed cropping of barley and wheat is common in the highlands of Eritrea. Called

hanfets, the system is geared to yield stability under drought conditions. This is achieved through such factors as better use of available soil moisture, more prolonged canopy cover, reduced incidence of pests and diseases, and reduced tendency to lodge. The CPWF project is exploring ways of improving on the local hanfets mixtures by varying the crop ratios, densities and varieties to achieve higher yields. In the first year's trials the new CPWF mixtures outyielded local mixtures at two out of three locations.

▼ A multiplication field of the Shishai barley variety, and the farmers who selected it.



Photo: Salvatore Ceccarelli/ICARDA

## ■ Trials under way

Selection trials are up and running on the fields of 15 host farmers living at eight 'cooperation villages' in six different areas of the country. These farmers play a direct role in the implementation of trials, the selection and evaluation of crops, and decisions on the composition of next year's trials. A further 83 'partner farmers' input knowledge and opinions to the project without playing a direct role in the trials. Nearly a quarter of the participating farmers are women, in keeping with the gender-sensitive nature of the project.

erosion. Conservation agriculture practices, involving the intercropping of barley and grasspea, are also under evaluation at different sites. All these activities are complemented by back-up research at the Halhale Research Center in Asmara.

Farmers are particularly enthusiastic about this work because of the degree of involvement and ownership they are enjoying. This stimulates them not just to adopt the technologies but also to further develop them.