# Endangered African rice varieties gain elite status

May 21 2010

As part of a redoubled effort to stave off future food crises by bringing Africa's rice production in line with its rapidly growing consumption, scientists have announced a paradigm shift in rice research for the region, which will give elite status to genetically diverse indigenous varieties. Long considered a poor cousin of the Asian rice grown around the world, African rice will be the focus of a major scientific initiative to break the yield ceiling in farmers' fields.

New findings reported today by the Benin-based Africa Rice Center, which is supported by the Consultative Group on International Agricultural Research (CGIAR), counter the widely held view that African rice, preferred by local consumers for its taste, is inherently lower yielding than Asian rice. They also confirm its remarkable adaptability to harsh growing conditions in Africa and hence its value for developing improved varieties suited to a changing climate.

Rice consumption in Africa is growing faster than that of any other major staple. In West Africa alone, it expanded at an annual rate of 4.5 percent from 1961 to 2006, making rice the subregion's single most important source of dietary energy; it is the third most important for sub-Saharan Africa as a whole. But production during that same period grew more slowly, creating a gap between rice supply and demand. This has saddled African governments with huge import bills, estimated at US$3.6 billion in 2008.

African rice - known scientifically as *Oryza glaberrima* - was

domesticated about 3,500 years ago in West Africa, where it thrived for centuries. But today it is grown only in scattered pockets, near the brink of extinction. Most African rice farmers have abandoned their native varieties for high-yielding Asian rice (O. sativa), which was introduced to the continent through European trade with Asia via Africa about 450 years ago.

"African rice was initially ignored by mainstream research," said Dr. Koichi Futakuchi, an ecophysiologist at AfricaRice. "Later, when scientists realized that it had valuable characteristics, they began using it as a source for desirable traits to improve the higher yielding Asian rice. But now for the first time, we're reversing the gene flow, extracting desirable traits from the Asian rice and transferring them into the African rice."

In the 1990s, AfricaRice researchers crossed the two rice species with the aim of developing varieties that combine the adaptability of O. glaberrima to local growing conditions with the high yields of O. sativa. The result was New Rice for Africa, or NERICA. More than 80 NERICA varieties have been developed for rainfed environments, adopted by farmers in about 20 African countries and the demand for NERICA seed is very high across the region.

The hardiness of O. glaberrima results from its strong ability to compete with weeds and to withstand rice pests and diseases, fluctuations in water depth, infertile soils (including toxic levels of iron), severe weather and even human neglect. For example a single variety like CG14, which was the O.glaberrima parent of the first group of NERICA varieties, is resistant to multiple constraints. "This makes it highly desirable for poor farmers. But, since such resistance is controlled by many genes, it will be difficult to transfer them fully to O. sativa." said Dr. Futakuchi.

AfricaRice has recently embarked on an ambitious program to improve

O. glaberrima, which will offer farmers varieties that are well armed against Africa's multiple constraints and have acceptable yield potential in rainfed environments. A major objective of the new research is to overcome two main drawbacks that account for low yields of O. glaberrima: lodging (a tendency for plants to fall over when the grain is ripe) and shattering (shedding of ripe grain at crop maturity).

"African rice generally yields better than Asian rice under harsh conditions, where pests and other stresses are intense. But if the problems of grain shattering and lodging were overcome, it could also give a quite acceptable yield of 5-6 tonnes per hectare in more favorable, rainfed lowland environments," Dr. Futakuchi said. To make the African rice more commercially viable, AfricaRice is attempting to improve its grain quality as well.

According to AfricaRice scientist Dr. Semon Mande, the NERICA breakthrough offered scientists a new opportunity to unlock the treasure trove of genes in O. glaberrima, "But most of its wealth of genetic diversity remains to be tapped," he said. "The NERICA varieties were developed from just a handful of O. glaberrima parents. Yet, we have at our disposal nearly 2,500 samples of O. glaberrima, preserved in the AfricaRice genebank."

Using a novel strategy, Dr Mande has developed shorter O. glaberrima-type plants that are less prone to lodging and do not shatter. These promising varieties with acceptable yield potential are being evaluated in farmers' fields in partnership with national programs, using gender-sensitive farmer-participatory approaches.

The work on O. glaberrima is part of the overall strategy of AfricaRice to develop a wide range of rice varieties suitable for the diverse ecologies of Africa through collaborative projects with the International Rice Research Institute (IRRI) and other partners using conventional and

advanced scientific tools. To facilitate this work, a new rice breeding task force for Africa under the coordination of Dr. Moussa Sie, AfricaRice scientist, was launched recently.

"Since Africa depends on imports to meet 40 percent of its rice demand, it is urgent that we develop more productive, stress-tolerant rice varieties. The recent food crisis, which hit African countries badly, underlined the need for bold new efforts to boost local rice production through the improvement of both Asian and African rice," said Dr. Papa Abdoulaye Seck, director general of AfricaRice.

Provided by CGIAR