

Food heroes

Local communities have conserved the diversity of agricultural species for thousands of years. Supporting them is key to achieving global food security, says M.S. Swaminathan.

Global food security is entering a critical phase. International prices of wheat, rice, maize and other crops are increasing due to escalating demand. With oil prices reaching record levels, both farmland and grains are being diverted for biofuel production. Climate change, resulting in more frequent drought, floods and pest epidemics, is adding unprecedented stress. Against this backdrop, the conservation and sustainable use of biodiversity, particularly agricultural biodiversity—the plants, animals and micro-organisms used for food and agriculture—should assume top priority.

Plant and animal breeding has been practiced for thousands of years by tribal and rural people who make a significant contribution to food and health security, yet this remains largely unrecognized and unrewarded. They have spent hundreds of years observing, experimenting and selecting species and genes for desirable qualities such as drought-resistance, and have amassed a vast knowledge bank. This fact received little attention until the UN Food and Agriculture Organization promoted the concept of Farmers' Rights and the Convention on Biological Diversity (CBD) recognized the conservation traditions of tribal and rural families. Biodiversity is the feedstock for biotechnology. With every species and gene lost, we are limiting our options for future success, particularly in adapting to climate change.

The CBD calls on Parties to respect, preserve and maintain the knowledge, innovations and practices of indigenous and local communities engaged in traditional lifestyles as well as ensuring the equitable sharing of benefits arising from their use. The absence of an internationally-agreed system for sharing economic benefits from the commercial use of biodiversity with the primary conservers and holders of traditional knowledge is leading to a growing number of accusations of biopiracy being committed by business in developing countries.

Equity in benefit sharing is fundamental to retaining the on-farm conservation traditions of rural and tribal families. Institutions belonging to the Consultative Group on International Agricultural Research (CGIAR) are adopting a Material Transfer Agreement procedure which will help prevent the monopolistic exploitation of public-funded research on plant genetic resources for commercial profit. But benefit-sharing procedures still need to be developed at the individual and community levels.

For individual farmers or innovators, the same procedures for seeking recognition and reward as those available to professional plant breeders can be used but help is needed in obtaining patents under national legislation. The problem is more complex in the case of benefit sharing with entire communities. Procedures are available for identifying the area from which critical genes responsible for the commercial success of a new variety came. Thanks to molecular techniques, this possibility also extends to genes controlling quantitative traits like yield and quality. Appropriate reward can be given from the Community Biodiversity and Gene Funds proposed to be established under Biodiversity and Plant Variety Protection Acts in several developing countries.

India is so far the only country that has a law recognizing the rights of both breeders and farmers; it acknowledges the triple role of a farmer, namely as a cultivator, conserver and breeder. The Indian Plant Variety Protection and Farmers' Rights Act rewards farmers and farm communities through the National Gene Fund for their invaluable contributions to the

conservation and improvement of genetic resources. In areas rich in agrobiodiversity like the Koraput region, tribal families have preserved and improved rice genetic material over many centuries. Tribal families who have conserved important genetic material for the public good at personal cost were recently honoured by the Indian Government with the first Genome Saviour Award.

Recent research breakthroughs have opened up enormous opportunities for creating new genetic combinations of great value to food, health and livelihood security. Super wheats, capable of yielding about 8 t/ha are now in the breeders' 'assembly line'. These plants have a complex pedigree and are derived from species from several countries. This illustrates the importance of genetic resources conservation and exchange and the need for the multilateral system of access and benefit sharing enshrined in the International Treaty on Plant Genetic Resources for Food and Agriculture.

Commercialization is leading to over-exploitation of habitats rich in biodiversity like rainforests and coral reefs. It is important



that we reverse the paradigm and create an economic stake in conservation. Conservation, cultivation, consumption and commerce should be dealt with in an integrated manner. Public policies should promote the diversification of food habits resulting in the revitalization of former food traditions which involved a wide range of food plants. Community level gene, seed, grain and water banks should be promoted to ensure local level food and water security. The future of our food and health security systems will depend upon our success

in making biodiversity conservation everybody's business. ■

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Future options

The world is losing its livestock breeds at an alarming rate, according to a 2007 report by the UN Food and Agriculture Organization (FAO). About 20% of the world's breeds of cattle, goats, pigs, horses and poultry are currently at risk of extinction. At least one livestock breed a month has become extinct over the past seven years, with their genetic characteristics lost forever. The FAO said modern agricultural methods had overlooked the benefits of genetic traits that have evolved in breeds found in developing countries. Features

such as resistance to disease or adaptation to climatic extremes are being lost. Uganda's indigenous ankole cattle, for example, could become extinct within 20 years. They are being replaced by Holstein-Friesian cows, which produce more milk, but cannot walk the long distances required to reach the nearest water supply. Genebanks need to be established to ensure the long-term survival of breeds from developing nations and safeguard livestock diversity, according to FAO.

www.fao.org

Caring for the relatives

Plant species genetically related to those in cultivation are called crop wild relatives and their genes are used to boost the nutritional value, disease resistance and productivity of our food crops. However this genetic diversity is at risk in the wild: more than one in 20 of the Poaceae species—crops such as wheat, maize, barley and millet—are threatened with extinction. Just last year the wild apricot *Armeniaca vulgaris*, the origin of all cultivated apricots, was classified as Endangered on the IUCN Red List of Threatened Species. IUCN's Crop Wild Relatives Specialist Group (part of the Species Survival Commission) is working to protect wild plants with socio-economic value. The group works to conserve these species through *ex situ* and *in situ* projects, awareness raising, and training for species assessments.