

# Agricultural Biodiversity and Human Well-Being

Emile Frison\*

Agricultural biodiversity is generally seen as a source of improved productivity for larger harvests through improved crops and livestock. This paper argues that, while agricultural biodiversity is indeed important for plant and animal breeding, it offers far more. In particular, it can deliver increased food security and improved health through better nutrition.

Agricultural biodiversity exists at three levels: farm systems and ecosystems, the species they contain, and the genetic diversity within species. It contributes to human well-being in several ways. The classic view is of agricultural biodiversity as a source of traits for improved varieties and breeds. Thus, farmers and scientists use existing diversity deliberately and by selection to create new combinations that more nearly meet their immediate requirements.

Beyond breeding, agricultural biodiversity also contributes to food security by making harvests more stable over time, through increased resistance to pests and diseases and ability to withstand environmental fluctuations. To take one example, Zhu and his colleagues have demonstrated clearly that growing a mixture of rice varieties, some susceptible to rice blast disease and others resistant, makes good economic sense.<sup>1</sup> Farmers plant modern varieties, which are resistant to rice blast but which are not liked and fetch a poor price at market, and within each bed of modern varieties a row of traditional glutinous rice, susceptible to rice blast but valuable at market. Disease severity was almost zero in the mixtures, while the yield of glutinous rice in the mixtures was almost double that in monoculture.

Species diversity also contributes to yields and overall stability of production. Livestock, for example, convert inedible resources such as grass into forms that people can make use of. They also add to incomes, nutrition and sustainability. The International Coconut Genetic Resources Network (COGENT), which IPGRI coordinates, has pioneered an innovative approach to adding animal diversity to farming systems.<sup>2</sup>

There are clearly many ways in which agricultural biodiversity can contribute to human well-being, and equally clearly much that needs to be done to make full use of agricultural biodiversity. The Platform for Agrobiodiversity Research is a

---

\* Director General, International Plant Genetic Resources Institute, Rome, Italy.

<sup>1</sup> Zhu et al (2000) Genetic diversity and disease control in rice. *Nature* 406: 718-722. See also <http://www.apsnet.org/education/advancedplantpath/topics/cultivarmixtures/top.htm> accessed 1 June 2006.

<sup>2</sup> P. Batugal and J. Oliver eds (2005) *Poverty Reduction in Coconut Growing Communities, Volume III: Project Achievements and Impact*, IPGRI-APO, Serdang, Malaysia.

multistakeholder effort to help researchers and farmers to use agricultural biodiversity effectively. The Platform is being supported by IPGRI and the CGIAR's System-wide Genetic Resources Programme, with support from France and The Netherlands, and has just held a first meeting to determine the ways in which it can coordinate efforts and serve the community by collating and disseminating research results.

Agricultural biodiversity's biggest contribution, however, is to improve human health through better nutrition. The world has made great strides in meeting the need for adequate protein and calories. While recognizing that more than 840 million people remain chronically hungry, more attention needs to be given to the hidden hunger of missing micronutrients. Deficiencies of vitamin A, iron, zinc and other essential nutrients afflict more than 2 billion people worldwide, most of them women and young children. Coupled with this is the rise in poor countries of diseases more often associated with affluence, such as heart disease, type 2 diabetes, cancers and obesity. In fact, the double burden – of micronutrient malnutrition and diseases of affluence – is now increasingly found in single households, where children may suffer anemia or vitamin deficiency diseases at the same time as their parents are overweight and diabetic.

The reasons for the rising double burden of disease are not difficult to understand. At heart is a simplification of the diet, from one rich in traditional vegetables, pulses and cereals, to one that is much less diverse and that depends on the ready availability, especially in the ballooning cities of the developing world, of cheap refined carbohydrates and fats. Agricultural biodiversity – through diverse diets – has the power to remedy this state of affairs. There is considerable evidence that dietary diversity protects against some diseases of affluence. There is also evidence that traditional crops are generally nutritionally superior to exotic “imports” grown locally. Inspired by this, IPGRI has been working with local partners in several parts of the world to promote traditional crops, often neglected by modern science, in an integrated effort to boost the importance and value of these species.

In East Africa, the focus has been on traditional leafy vegetables. More than 200 different species are eaten in Kenya alone, but many of these have fallen out of favor with rural families, as they are perceived as “backward”. In the cities too, shoppers thought of traditional leafy vegetables as backward and associated with poverty. IPGRI worked with local partners such as the NGO Family Concern Inc. and Uchumi Supermarkets to tackle every link in the chain. Farmers learned how to grow, prepare and pack the vegetables to the highest quality standards. Colourful leaflets told supermarket shoppers about the benefits of traditional vegetables and how to cook them. Ministers of Parliament and the media promoted the campaign. Results were nothing short of astonishing: growth in sales of more than 1100% in just two years.

Small and localized successes like this have prompted IPGRI to call for a new approach to satisfying hidden hunger: use agricultural biodiversity to diversify diets

and thereby improve their nutritional value.<sup>3</sup> This approach has been adopted by the Conference of the Parties to the Convention on Biological Diversity (CBD), which asked IPGRI to work with the United Nations Food and Agriculture Organization (FAO) and the CBD Secretariat to implement a “cross-cutting initiative on biodiversity for food and nutrition”.

Much remains to be done, not only in using agricultural biodiversity to improve nutrition and thus well-being, but also in the realm of agricultural improvement and environmental protection. Nevertheless, one can be confident that a wider and more effective deployment of agricultural biodiversity has the potential to improve human well-being considerably.

---

<sup>3</sup> Frison, E.A., I. F. Smith, T. Johns, J. Chérfas, and P. Eyzaguirre (2006) Agricultural biodiversity, nutrition, and health: Making a difference to hunger and nutrition in the developing world. *Food and Nutrition Bulletin*, 27: 167–179.