

The Panel also recommends that measures be adopted to counteract pressure towards acceptance of genetically modified crops, and in this respect urges that due attention be given to the precautionary principle and to the potentially negative social impacts, particularly for smallholders, of the use of such crops. More attention should be given to assessing the potential of existing biodiversity.

The Panel recognizes that intensified agricultural production will be required in order to meet the increasing needs of a growing population and to compensate for production lost in environmentally stressed areas, but recommends that measures be adopted to ensure that the intensification of production at all times protects the poor and food-insecure and ensures environmental sustainability.

## THE LOSS OF CROP BIODIVERSITY IN THE CHANGING WORLD

### **Globalization and crop genetic diversity**

The accelerating increase in communication is mixing ideas, technologies, cultures and even people throughout the world. This process seems to be taking us towards one homogenous global culture. However complex this evolving global culture might turn out to be, it is inevitable that we will have lost much of the content of our former diversity in the process of achieving it. We have already witnessed a high level of attrition in our crop genetic diversity. And yet, the very process of globalization is changing the world's environment through monocultures, rainforest clearing for biofuel targeted agriculture, etc., which in turn increases the need for crop genetic diversity to adapt agriculture to the changing environmental conditions. If human survival into the indefinite future is to be assured, globalizing humanity has to put all its efforts into increasing crop genetic diversity and not fatalistically accept its accelerating decrease.

The southern parts of Europe constitute a part of the Mediterranean Vavilovian Centre. This is now part of the industrialized world, also often referred to as the North. The rest of the industrialized world is relatively unimportant as a source of crop genetic diversity. All the other important Vavilovian centres are in the developing world, also referred to as the South. Thus, geographically speaking, the problems of conserving crop genetic diversity are problems of the developing world although the erosion of crop genetic diversity concerns humanity as a whole. Because of these and related reasons, the difficulties in the actions that are required in order to maintain crop genetic diversity remain intimately linked to the problems of development that the South is facing in this era of economic globalization. The fact that globalization is led by the North while crop genetic diversity is mostly in the South confounds the responsibilities for the failure to protect diversity and makes it difficult to solve these problems, even if there is the political will to do so. Usually, in fact, there is insufficient national, let alone global, will to take all the needed action. Industrialization of agriculture and changes in food habits are emerging as the main factors in accelerating the global erosion of crop genetic diversity. The very process of globalization, which is exacerbating the erosion of crop genetic diversity, is also making that very diversity

essential for the continuation of human well-being into the future. The climate is changing and a commensurate increase in crop genetic diversity is required in order to adapt to that change.

In the second half of the twentieth century, many scientists and scientific institutions realized that the world's future food supply was in danger because of crop genetic erosion and that something had to be done. The simplistic action was to store in gene banks the crop genetic diversity that would have disappeared otherwise. There are now many gene banks around the world that are trying to save as much crop genetic diversity as they can. Many problems have been confronted in the past and their success has sometimes been limited. However, some of the national gene banks and the institutions of the Consultative Group on International Agricultural Research have in recent times increasingly been able to preserve agrobiodiversity. It is time to move forwards to use these gene banks for sustainable agriculture practices.

More recently, genetic engineering appeared to hold the promise to synthesize any desired crop variety in laboratories, although single gene transfers are still the main features. However, some of the thus newly synthesized varieties have emerged with unforeseen problems (see e.g. New Scientist [2005]) on the abandoning of transgenic peas because of their allergenic impact). In addition, there is ample evidence in scientific literature that transgenics from crops can be incorporated in the genomes of wild relatives through cross-pollination and thus, for example, make some weeds pernicious (Chèvre et al., 1997; Mikkelsen, Andersen and Jørgensen, 1996). For these reasons, genetically engineered crop varieties have now become highly controversial in many parts of the world.

In many parts of the developing world, e.g. Ethiopia, there are vibrant farming communities that are still increasing crop genetic diversity, both through breeding new farmers' varieties of existing crops and by domesticating altogether new crop species. However, when the whole trend is considered, erosion is far greater than generation of crop genetic diversity even within the developing countries in Vavilovian Centres, let alone globally.

### **Agricultural intensification and crop genetic diversity**

The strategy used in the type of agricultural intensification that is referred to as the green revolution is based on the use of irrigation and chemical fertilizers to provide a homogenous environment so that a crop variety selected for the purpose produces an evenly high yield throughout the cultivated land. In this way, crop varieties that had been adapted to the diversity of environmental conditions that had existed in an area prior to its coming under industrial agriculture are being eliminated. The resulting extensively grown monocultures become susceptible to disease and pest epidemics. According to the World Resources Institute et al. (1998), soil is now being eroded globally at a rate that is 16–300 times faster than at which it is being formed, and much land is lost owing to salinization (Brown and Flavin, 1997; Pretty, 1995).

### **Changes in food habits and crop genetic diversity**

Globalization has induced a tendency towards uniformity in eating habits. A report

prepared for the United Nations Environment Programme (UNEP) states that although about 7 000 species of plants have been used as human food in the past, urbanization and marketing have now reduced them. Only 150 crops are now commercially important, with rice, wheat and maize accounting for 60 percent of the world's food supply. The genetic diversity within each crop has also been eroding fast. For example, only nine varieties account for 50 percent of the wheat produced in the United States of America and the number of varieties of rice in Sri Lanka has dropped from 2 000 to less than 100 (Board on Agriculture of the National Research Council, 1993, pp. 23–25).

Partly as a reaction to the erosion of crop genetic diversity and even more because of a growing realization that industrial agriculture pollutes the environment and is, in the view of the Panel, unsustainable in the long run, the organic movement is now growing globally. This will help slow the erosion of crop genetic diversity. However, the organic movement that is being generated in response to the globalizing processes is not making sufficient linkages with those local farming communities that have not yet been engulfed by the process of globalization. However, these two sectors have commonalities and could strengthen each other.

### **Genetic engineering - not a universally accepted source of crop genetic diversity**

Adherents of genetic engineering, a special kind of biotechnology, have mistakenly asserted that it will create new varieties that could solve many or all agricultural cultivation problems. This assertion has swayed even the United Nations Development Programme, which wrote in 2001 that biotechnology “offers the only or the best ‘tool of choice’ for marginal ecological zones ... home to more than half of the world's poorest people” (UNDP, 2001). However, no varieties that increase agricultural production compared with their non-genetically engineered counterparts have so far been produced through genetic engineering. In one study using data collected by US Department of Agriculture, it was found that in most cases the yields from the genetically modified crops were lower (Fernandez-Cornejo and McBride, 2002), which does not exclude that the genetically modified crops may be economically more profitable.

On the negative side, genetically modified plants may have unexpected impacts that harm human and animal health, agriculture and the environment. In order to prevent such unexpected impacts, from the food safety perspective, the Codex Alimentarius Commission (2003a, 2003b) has developed *Principles for the Risk Analysis of Foods derived from Modern Biotechnology and Guidelines for the Conduct of Food Safety Assessment of Foods derived from Recombinant-DNA Plants*, which can be used by governments when they approve genetically modified crop varieties for use as food. The Cartagena Protocol on Biosafety could help in providing protection against possible adverse effects on the conservation and sustainable use of biodiversity arising from the transfer, handling and use of genetically modified organisms, but major producers of genetically modified crops, e.g. Canada and the United States of America, are not parties to the Protocol.

There are reports of biopharming with transgenic crops - planting crops genetically modified to produce pharmaceuticals or other chemicals - in the United States of America.

This means that we may face a future when food crops are likely to be permanently contaminated with medicines or even other chemicals through cross-pollination with the varieties planted for biopharming. We may lose some crops completely because of unfortunate events that result in extensive cross-pollination of this nature. The fact that the countries where biopharming is being developed are generally not parties to the Cartagena Protocol on Biosafety complicates the problem.

Contemporary globalization processes are eroding crop genetic diversity faster than ever. Climate change, a product of the very process of globalization, is also changing the environment rapidly. To continue feeding ourselves and to enable future generations to feed themselves, agriculture must keep adapting to the changes in the environment as fast as they occur. To be sure that agriculture can keep changing as fast as necessary, we need more crop genetic diversity than we have ever had. If we stopped atmospheric pollution immediately, the Earth's climate would still change, although it would probably stabilize after some time. Even if we were able to stop polluting the atmosphere immediately, we would still need the widest possible crop genetic diversity. This makes it necessary to conserve all the crop genetic diversity that we have as well as to regain in full the capacity to generate the crop genetic diversity that we have partly lost in the last 100 years.

### Recommendations

It is recommended that FAO:

- Promote sufficient funding of existing gene banks and the building of new ones as needed for ex-situ crop genetic diversity conservation in order to:
  - a) maintain all existing unique collections, ensuring that they are all always viable and accessible for breeding;
  - b) regenerate all existing unique collections without genetic drift changing their unique identities;
  - c) build new unique collections before they disappear for ever.
- Encourage the growing organic movements to make their agricultural production systems crop genetic diverse so as to match the environmental diversity of the land that is under cultivation.
- Encourage the establishment of mutually supportive linkages between the primarily subsistence farming communities in the South and the growing commercial organic farms that are primarily in the North for developing agricultural systems suited to the diversity of environments so as to maximize both production and crop genetic diversity.
- Promote the in-situ conservation of crop genetic resources by organic farmers, both primarily subsistence and commercial, both in the North and in the South – by subsidies if required.
- Help organic farmers, both commercial, primarily in the North, and subsistence, in the South, in research and development for maximizing both crop genetic diversity and yields in the diverse environmental conditions of the changing Earth - this is also needed because agrochemicals are becoming expensive over time.

- Object to the patenting of crop varieties when this makes use of crop genetic diversity from subsistence farming communities but restricts the resulting varieties to circulate only among the rich, and when natural cross-pollination passes patented genes from genetically modified crop varieties to non-modified varieties. Consequently, Article 27.3(b) of the TRIPS Agreement should be revised by the World Trade Organization (WTO).
- Promote critical research addressing problematic aspects of biotechnology developments. The old tradition of countering mistakes with the truth through publishing in scientific literature is the only reliable way of protecting the public interest.
- Object to biopharming using food crops, and seek to have it prohibited. Even biopharming with non-crop plants should be kept to a minimum and under strictly contained conditions in order to ensure environmental safety.

## ON HUNGER AND THE RIGHT TO FOOD

In its first report (2000), the Panel noted that the fundamental ethical commitment of FAO is to ensure humanity's freedom from hunger and to promote the access of everyone to adequate food, as stated in the Organization's Constitution and subsequent commitments. This concern has been pursued at all subsequent sessions of the Panel. On World Food Day on 16 October 2007, the Director-General of FAO stated: "We must place the human being at the centre of our attention, our policies and our actions." This Panel fully endorses this statement and hopes that Member States of FAO will see this as a core concern in the reform of the organization.

### **The right to food and food security**

As defined by the UN Committee on Economic, Social and Cultural Rights, the right to adequate food is realized when every man, woman and child, alone or in community with others, has physical and economic access at all times to adequate food or means for its procurement.

FAO defines food security as a "situation that exists when all people, at all times, have physical, social and economic access to sufficient, safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life."

The vast majority of states have recognized that everyone has a fundamental right to be free from hunger (*International Covenant on Economic, Social and Cultural Rights*, Article 11.2 [UN, 1966]). States Parties to the International Covenant on Economic, Social and Cultural Rights have undertaken to respect, protect and fulfil the right to food. *Respect* by refraining from taking measures that might deprive individuals of their right to food, for example, confiscating land or deviating watercourses used for agriculture, without justification and without adequate compensation. *Protect* by ensuring that individuals are not deprived of their access to food by third parties; for example, ensuring that permits for industrial activities (such as forestry operations) do not impede access