



A global plant breeding initiative

"Conservation of crop genetic diversity will be futile if plant breeding programmes in developing countries are unable to fully utilize it..."

At last count, the world's genebanks conserved some 1.5 million unique samples of food crops and their wild relatives, providing the world's plant breeders with an almost inexhaustible source of genetic diversity for crop improvement programmes. In Mexico, for example, the International Maize and Wheat Improvement Center holds 22,000 maize accessions stored at -3°C in specially design vaults that ensure seed viability for 25 to 40 years.

Now zoom across to Mozambique, where maize is a staple food, to the National Institute of Agriculture Research in Maputo. There, maize seed samples are stored in refrigerators, and a total of four senior plant breeders serve the entire country, dividing their time between work on maize, cassava and beans. The country's only other source of improved maize, the Mozambique Seed Company, has long since abandoned its maize programme following the termination of donor funding. Result: in the years between 1985 and 2001, the institute released only a handful of improved maize varieties that have had little impact on maize production - farmers' maize yields continue to average a low one tonne per hectare.

The state of plant breeding in Mozambique, and the results of FAO surveys of plant breeding programmes in 44 other developing countries, will be reported during the first session of the governing body of the International Treaty on Plant Genetic Resources for Food and Agriculture, being held in Madrid on 12-16 June 2006. There, FAO will propose a Global Partnership Initiative for Plant Breeding Capacity Building (GIPB) aimed at helping developing countries to improve their agricultural productivity through sustainable use of plant genetic resources.

"The Treaty's first session is an important opportunity to strike a better balance between the conservation and utilization of crop diversity," says Elcio Guimarães, senior officer for crop breeding at FAO. "All the work that has been done to conserve plant germplasm will be futile if local plant breeding capacity is not in place to fully use it."



► Why is plant breeding capacity so important for developing countries?

"All of the countries we surveyed need to increase crop production, both to ensure food security and to increase income in their agricultural sectors. By some estimates, most crops in developing countries are realizing only 20% of their yield potential. Most of the deficit is due to abiotic stresses - unsuitable soils, drought - with the rest due to biotic stresses such as diseases, insect pests, weeds and poor plant nutrition. Plant breeding alone will not bridge the gap, but plant breeders can contribute to higher yields by developing improved varieties that are suited to their countries' particular agro-ecological conditions, and robust enough to tolerate stresses in areas where fertilizer, chemicals and irrigation are often too costly or unavailable. Another looming challenge is climate change, which is likely to affect crop productivity in tropical regions. Plant breeding programmes will need to use all available tools in adapting to those changes.

"In addition, developing regions are highly dependent on so-called 'orphan crops', such as sorghum, yam, cassava and plantain - those crops are of little or no importance to breeders in the developed world, so little research is being done on them."

► **What findings have emerged from FAO's surveys of plant breeding programmes in developing countries?**

"So far we have completed surveys of 44 countries in Africa, Asia, Eastern Europe and Latin America, looking at trends in plant breeding and related biotechnology capacity in the period 1985 to 2005. We found that the capacity for germplasm evaluation and varietal development in most countries is clearly inadequate, owing to massive reductions in public investment in crop improvement. In Africa, where we surveyed 19 countries, in nearly all cases there is less financial support for plant breeding today than in 1985. The result is that the number of plant breeders is much lower than in the developed world. They have limited training in traditional breeding and almost no training in newer technologies, such as marker-assisted selection. Even where a country does have biotechnology capacity, linkages between biotechnologists and plant breeders are poor. In fact, breeders said one of the most important factors limiting their programmes was lack of knowledge of molecular techniques, followed by the lack of laboratory infrastructure to carry out experiments in advanced plant breeding.

"Another major problem is the lack of long-term commitment to plant breeding, both on the part of donors and national governments. While National Agricultural Research Systems should be the first source of funding, resources are simply not available in many countries and most breeding programmes do not even approach sustainability. National programmes are heavily dependent on external funding, which is often short-term. Other constraints we identified are the poor state of germplasm conservation, limited access to international genetic resources, and weak links between breeding programmes and the market - farmers can't obtain seeds of improved varieties or the varieties that are available do not meet their needs."

► **How will a Global Partnership Initiative for Plant Breeding Capacity Building improve that situation?** "The main goal of GIPB is to facilitate action to enhance the capacity of developing countries to effectively use plant genetic resources by upgrading their plant breeding programmes and seed delivery systems. Our surveys have highlighted opportunities for a range of capacity-building activities, including training, modernizing procedures for on-station and on-farm trials and testing, and obtaining finished or near-finished cultivars from private and public sources. The GIPB would serve as a

clearing house for information, and work with developing countries to identify their needs so that partners in the initiative can then develop plans to provide the required training, germplasm or technologies. Strong, sustained commitment from national government to provide people, facilities and long term support for their plant breeding programmes would be a major requirement for their participation."

► **Who would you like to see participate in the initiative?** "Essentially, the GIPB would be a multi-party initiative of knowledge institutions and agencies around the world that have a track record in supporting agricultural research, working in partnership with country programmes committed to developing stronger plant breeding capacity. Partners would include the CGIAR Centers, National Agricultural Research Centers, regional centres of excellence in agricultural research, universities and other academic institutions, professional agricultural societies and NGOs. Farmers would also play a crucial role by participating in setting the goals and objectives of breeding programmes and in local selection activities. Just as important will be participation by private sector companies."

► **How would the Global Partnership Initiative work with the International Treaty on Plant Genetic Resources for Food and Agriculture and the Global Crop Diversity Trust?** "Countries that ratify the International Treaty undertake to implement a Funding Strategy 'to mobilize funding for priority activities, plans and programmes, in particular in developing countries and countries with economies in transition'. So the GIPB might operate as an independent work programme under the policy guidance of the Treaty's governing body, and as an element within its Funding Strategy. That strategy could use the knowledge generated by the GIPB to orient its priorities. What we envisage is a mechanism that identifies and prioritizes needs for capacity building, then seeks support from GIPB partners. That might entail creation of a steering committee to match donors and country needs. Through consultations such as those we will be holding in Madrid, we hope to create a shared vision of what needs to be done and identify those who can contribute. We see the GIPB as a complement to the Global Crop Diversity Trust - while the Trust focuses on conservation of crop diversity, the initiative would take concrete steps to ensure that developing countries have the capacity to utilize it."