Plant genetic resources are deeply rooted in our culture and economy. Their wide diversity, still present in the country, needs to be preserved and wisely managed. In fact, it represents an immense treasure for the development of our society, in particular agriculture, the principal economic sector accounting for about half of the total Gross Domestic Product and employing more than 80% of the national labour force. As part of the component on plant genetic resources for food and agriculture (PGRFA) under the Agricultural Biodiversity Project, funded by the FAO - Netherlands Partnership Programme, the following activities have been implemented during 2006 and 2007.

**INTRODUCTION**

Plant genetic resources are deeply rooted in our culture and economy. Their wide diversity, still present in the country, needs to be preserved and wisely managed. In fact, it represents an immense treasure for the development of our society, in particular agriculture, the principal economic sector accounting for about half of the total Gross Domestic Product and employing more than 80% of the national labour force. As part of the component on plant genetic resources for food and agriculture (PGRFA) under the Agricultural Biodiversity Project, funded by the FAO - Netherlands Partnership Programme, the following activities have been implemented during 2006 and 2007.

**PRIORITIES AND RECOMMENDATIONS**

The Government has expressed through different policy documents that conservation and utilization of plant genetic diversity is highly important to improve food security, alleviate poverty, and promote rural development. Based on the results and discussions under this Project the following priorities and recommendations have been agreed.

- Existing regulations for protecting plant diversity have to be applied and enforced properly. This may require neighbouring countries' collaboration when resources are taken from protected areas close to national borders. An awareness raising campaign on the need to preserve plant genetic resources and the benefits derived from their sustainable management could also be conducted among farmers' communities living within or near forest areas.

- Surveying and inventorying of crop intra-specific diversity and wild species of vegetables, fruits, forages and medicinal plants need to be systematically and comprehensively carried out to better cover existing diversity of PGRFA and fill in gaps in ex situ collections.

- Ex situ conservation is a central element of the national conservation and utilization strategy. Existing facilities should be upgraded to provide for long term conservation of plant genetic resources' collections. Regeneration protocols should be followed after international standards.

- Documentation and information management are liaison elements between conservation and utilization activities. Information systems currently in use do not meet the requirements for efficient PGRFA management. Strengthening of the established National Information Sharing Mechanism on PGRFA and the adoption of a crop-independent, accession-level genebank information management system would help to improve ex situ conservation and facilitate genetic improvement efforts.

- To meet the growing food demand in the coming years, the agricultural sector will have to significantly evolve towards an intensification and diversification of existing cropping systems. The introduction and development of improved varieties and the availability of quality planting materials will be essential for pursuing these objectives. Therefore, adequate provisions of resources for breeding, evaluation and multiplication programmes will have to be ensured.

- Overall the National PGRFA Programme suffers from an acute shortage of trained staff in PGRFA conservation and use. This shortage extends from taxonomists to breeders, and from information technologists to socio economists. Although there are staff engaged in postgraduate programmes overseas, their number still appears too limited to meet the country's demand for expertise in PGRFA management. There is an urgent need to invest in capacity building, to increase the number of scientists involved in conservation and utilization activities and to improve their educational level.

- In March 2006, the country became a Party to the International Treaty on PGRFA, a multilateral agreement to promote PGRFA conservation, access and utilization, as well as the equitable sharing of benefits derived from their use. Opportunities disclosed by the implementation of the International Treaty on PGRFA need to be taken promptly. In this regard a task force could be established to guide the implementation of the Treaty in the country and to foster collaboration with national programmes of neighbouring countries, regional and international research centers, as well as participation in PGRFA networks.

**CONSERVATION AND SUSTAINABLE UTILIZATION OF PLANT GENETIC RESOURCES**

A National Information Sharing Mechanism on PGRFA (NISM) was established in 2006. It consists of a network of five research centres from the National Agriculture and Forestry Research Institute (NAFRI) which conserve and/or use plant genetic resources. Through this Mechanism, participating institutions are given an opportunity to (a) increase understanding about the status and dynamics of PGRFA, (b) contribute to decision-making processes, (c) strengthen partnerships and (d) widen their visibility at national and international levels. The Mechanism relies on a database, built by participating institutions, addressing in situ and ex situ conservation, as well as utilization of PGRFA, and a web portal. (see Figure 1 and http://www.pgrfa.org/gpa/lao).

A National Plant Breeding and Biotechnology Capacity Assessment was carried out in 2007. Results from this assessment were analyzed and discussed by a composite team from national agricultural research institutions. Collected data together with the final report are published in a dedicated website within the framework of the Global Partnership Initiative for Plant Breeding Capacity Building (GPPI) (see http://waicent.fao.org/test/agricult/app/gpcc Newfoundland).

A Country Report on the State of Plant Genetic Resources for Food and Agriculture, based on the information available under the NSM and through the National Plant Breeding and Biotechnology Capacity Assessment, was prepared in 2007. It will be submitted to the FAO Commission on Genetic Resources for Food and Agriculture as the Lao PDR contribution to the preparation of the Second Report on the State of the World’s Plant Genetic Resources for Food and Agriculture.

Findings, as well as priorities and recommendations, which resulted from these participatory processes are hereunder summarized.
CONSERVATION

Since the early 1990s, the changing socio-economic situation has increasingly put pressure on plant genetic resources, in some cases leading to a severe loss of their diversity. For this reason, most vulnerable areas at risk of genetic erosion have been demarcated and protected by forest law and regulations. However, law enforcement in most of the protected areas has not been as effective as expected. Therefore some improvements in this regard may need to be considered. This particularly applies to the in situ conservation of wild species from the forest and wetland ecosystems, including wild, domesticated and cultivated species, which play an important role for rural people in terms of food security, both quantitatively and nutritionally. It is also urgent to make provisions for the preservation of the indigenous knowledge associated with the culinary and medicinal use of wild species, a knowledge that is being lost due to urbanization and lifestyle changes of younger generations. Likewise, it is necessary to assist the on-farm management of traditional landraces, which bear adaptive traits essential for crop improvement programmes and to implement it in an adequate ex situ conservation strategy of these resources.

During the past 12 years NAFRI's Nakhon Agricultural Research Center (ARC) and Haddokkei Horticulture Research Centre (HRC), in collaboration with international organizations, have carried out systematic PGRA surveys and collection missions targeting mainly rice, whose primary centre of origin includes our country. Additional sporadic surveys have been conducted for maize, cassava, sweet potato and sugarcane, as well as species for non-wood forest products and medicinal plants. Surveyed materials have also been collected and conserved in situ in medium term storage facilities set up in our country. These amount for about 15,000 traditional cultivars/landraces and wild accessions, rice being the biggest collection with more than 13,000 samples conserved at ARC, followed by the vegetable collection, which consists more than 2,130 landraces held at HRC. The rice collection represents one of the largest collections of glutinous rice, worldwide. During the past years despite serious measures taken by the genebank for the proper management of this collection, some losses due to electrical power failure had occurred. In order to reduce the risk of further losses of materials of this unique rice collection, the entire collection was duplicated and put in long-term storage at the International Rice Research Institute (IRRI), as per an agreement signed by the Ministry of Agriculture and Forestry and this institute.

Both in situ and ex situ conservation policies of plant genetic resources in the country have resulted in achievements in the past twelve years. However an integrated strategy for PGRA conservation and management has been very slowly developed and implemented. Insufficient human and financial resources are among the main constraints that prevent the National PGRFA Strategy from dealing with the increasing needs of communities that depend on these resources.

UTILIZATION

The national policy for PGRA aims to establish sustainable food security systems and to alleviate poverty in the rural sector, while protecting the diversity of crop genetic resources. Rice is the most important agricultural product of the country. With the significant contribution of national and international germplasm, substantial progress has been made in increasing the productivity of rice during the past decade. However, to meet the internal demand in 2010, rice production should increase up to 3.2 million tonnes, almost 1.0 million tonnes more than currently produced. Crop improvement is therefore a high priority for the rice industry. Traditional breeding can still play a major role in rice improvement. The genebank’s rice collection is an important source of traits for stabilizing yield under low input management, where modern varieties do not achieve high yields. Recent genetic evaluation programmes with landraces have shown positive effects on drought adaptation and high yielding in aromatic rice. The country has also benefited from collaborative efforts with international organizations. Information on genetic material from breeding programmes of IRRI, Thailand-IRRI and the Asian Vegetable Research and Development Research Center (AVDRC) has contributed to significant increases in rice yield over the last 10 years. Corn varieties with high and low waxy endosperm have been identified following evaluation trials of the materials at ARC. This is the existing crop improvement programme that aims to improve yield and agronomic characters of non-waxy varieties for use in animal feed. Currently, a selection programme is being implemented by the IRRI for non-waxy germplasm. ARC is receiving a corn population (F3) from the International Maize and Wheat Improvement Center (CIMMYT) at the cassava population (F3) from the International Center for Tropical Agriculture (CIAT) for the development of new corn and cassava varieties. ARC also implemented a soybean breeding programme in which several crosses were made with locally available materials. Introduction of vegetable seed development programme at the HRC mainly concentrates on leafy vegetables as well as eggplant, chili, tomato and others. The pure line selection programmes for wet and dry season vegetables are highly successful. Descriptors from the Asian Vegetable Research and Development Research Center (AVDRC) are usually applied for the selection of materials.

As a result of the emphasis placed on PGRA utilization, the number of scientists from NAFRI involved in plant breeding activities almost doubled in the last decade. Their educational level also showed a significant improvement (Table 1). However, this overall capacity appears insufficient for a country with diverse agro-ecological conditions, high indigenous crop genetic diversity and an agricultural sector so important for the economy and livelihoods. There is an urgent need to invest in capacity building, to increase the number of scientists involved in plant breeding activities and to improve their educational level.

Table 1: Number of scientists involved in plant breeding activities at NAFRI during 1995-2007

<table>
<thead>
<tr>
<th>Year</th>
<th>BSc</th>
<th>MSc</th>
<th>PhD</th>
</tr>
</thead>
<tbody>
<tr>
<td>1995</td>
<td>3</td>
<td>5</td>
<td>1</td>
</tr>
<tr>
<td>2000</td>
<td>4</td>
<td>7</td>
<td>2</td>
</tr>
<tr>
<td>2007</td>
<td>12</td>
<td>15</td>
<td>8</td>
</tr>
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Since 1995, mostly rice benefited from some genetic improvement activities although the amount of resources devoted to plant breeding has been in general too limited. Despite the progress, other highly important crops such as vegetables have been insufficient. Consequently, farmers’ demand for...