Sustainable Agriculture in Central Asia and the Caucasus

4

# *Elements of a National Strategy for Management and Use of Plant Genetic Resources in Georgia*

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# ELEMENTS OF A NATIONAL STRATEGY FOR MANAGEMENT AND USE OF PLANT GENETIC RESOURCES IN GEORGIA

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## ABBREVIATIONS AND ACRONYMS

CBD - Convention on Biological Diversity

CGIAR - Consultative Group for International Agricultural Research

CIMMYT - International Maize and Wheat Improvement Center

CIP - International Potato Center

EU - European Union

FAO - Food and Agriculture Organization of the United Nations

GCDT - Global Crop Diversity Trust

GIPB - Global Partnership Initiative on Plant Breeding Capacity Building

ICARDA - International Center for Agricultural Research in the Dry Areas

ICRISAT - International Crops research Institute for the Semi-Arid Tropics

ILRI - International Livestock Research Institute

IPRs - Intellectual Property Rights

IT-PGRFA - International Treaty on Plant Genetic Resources for Food and Agriculture

IUCN - International Union for Conservation of Nature

MoA - Ministry of Agriculture

MoES - Ministry of Education and Science

MoENPR - Ministry of Environment Protection and Natural Resources

NBG - Nordic Gene Bank

NBSAP - National Biodiversity Strategy and Action Plan

NBSPG - National Biodiversity Strategy and Action Plan - - Georgia

PFU - Program Facilitation Unit

PGR - Plant Genetic Resources

PGRFA - Plant Genetic Resources for Food and Agriculture

PVP - Plant Variety Protection

RI - Research Institute

SIDA - Swedish International Development Cooperation Agency

UC - University of California

UNEP - United Nations Environmental Program

USAID - United States Agency for International Development

WB - World Bank

# EXECUTIVE SUMMARY

Georgia is a country of rich natural resources and one of the oldest agricultures on earth. Through its agricultural legacy Georgian farmers have developed many unique varieties of plants that provide gene resources for the future in agriculture. These resources are at risk of loss and, in fact, many have been lost, as agriculture advances to be a stronger component of the national economy. Plant genetic resources (PGR), defined as the genetic materials of domesticated and wild plants that are progenitors or relatives of economic plants, must be protected for future use. Thus, the efficient conservation of plant genetic resources and their sustainable utilization in plant breeding and seed systems are a high priority as Georgia strives for greater economic strength through its agricultural industry.

## The preparation of this Study

This study is a result of the FAO project "*Designing an Integrated Strategy to Improve Georgia's Food Security through Improved Utilisation of Plant Genetic Resources*". The overall objective of the study is to strengthen Georgia's capacity for effective management and use of PGR to contribute to national food security and agricultural development. A review of the current status of PGR management in Georgia is presented, emerging challenges are identified and key recommendations towards developing a national policy on PGR conservation and use through a comprehensive integrated approach are provided. The study covers all the relevant sectors related to the management of PGR and addresses related issues on regulatory frameworks, technology transfer and capacity building.

Financial support for the project was provided by the European Commission, and the International Center for Agricultural Research in the Dry Areas (ICARDA) was a key collaborator in the implementation of the activities. A number of public and private Georgian institutions involved in PGR conservation and use provided essential inputs during the participatory process which included two national stakeholders' workshops in Tbilisi on 15-17 October and 20 November 2007. The team responsible for consolidating inputs and organizing the study was composed of one international consultant[1] and one national consultant[2], who were assisted by FAO and ICARDA officers.

## Georgia in the Global Context

Georgia was one of the early signatories of the international Convention on Biological Diversity (CBD) in 1994[3]. The CBD aims at the conservation of biological diversity, the sustainable use of its components and the fair and equitable sharing of the benefits arising out of the utilization of genetic resources, and emphasizes national sovereignty over biological resources. The CBD requires that each signatory country develop (1) a national strategy, plan or programme for the conservation and sustainable use of biological diversity, and (2) legal and administrative measures for access and benefit-sharing of its biological resources. In 2005 Georgia completed a National Biodiversity Strategy and Action Plan (NBSAP) but a national legal plan for access and benefit-sharing under the CDB has not been completed yet.

The International Treaty on Plant Genetic Resources for Food and Agriculture (IT-PGRFA)[4] aims at the conservation and sustainable utilization of PGRFA, recognizes farmers' rights and

[1] Mr. Calvin O. Qualset, Emeritus Professor and Director, California Genetic Resources Conservation Program, University of California, Davis, California USA
[2] Ms. Ana Gulbani, Manager of the Genebank, Institute of Farming, Georgia.
[3] http://www.cbd.int/convention/convention.shtml
[4] ftp://ftp.fao.org/ag/cgrfa/it/ITPGRe.pdf

establishes a multilateral system to facilitate access to plant genetic resources for food and agriculture and to share the benefits in a fair and equitable way in harmony with the CBD. The Treaty applies to over 64 crop species of major relevance for food security. To date, more than 110 nations have ratified the Treaty, but Georgia has not ratified it yet.

These international agreements, together with the Global Strategy for Plant Conservation under the CBD[5], provide the conceptual and legal framework for the development of a national program for conservation and use of plant genetic resources (PGR).

**Findings and concerns**

Within the government of Georgia three Ministries (Agriculture, Education and Science, and Environment Protection and Natural Resources) have presently jurisdiction over disparate but complementary functions of a national program.

Conservation activities and programs are mostly underfunded and understaffed with critical functions and facilities lacking or in need of modernization. Their scope is too limited to ensure sustainable conservation on a national basis. Inventorying and monitoring species composition in some 40 designated protected areas is variable.

Plant breeding programs, which used to be very effective in former times, are generally experiencing severe limitations in financial support, an aging human resource base, uncertainties about future of research land, abandonment of multi-site testing programs, and policies about development of basic seed of new varieties in flux. Even with these limitations, there is enthusiasm among scientists for their work, but morale is generally low because of lack of recognition of the value of their research and development activities.

This study has revealed that the lack of a comprehensive system for conservation, management, and use of PGR threatens the rich diversity of wild and domesticated plants of Georgia and hampers the development of agriculture. Stakeholders and representatives of the three Ministers participating in the study have expressed a strong agreement for the need for a national, integrated, and coordinated plant genetic resources management system and have agreed to proceed with strategic planning. It is really an imperative requiring immediate attention if Georgia wishes to advance economically through its agriculture and to achieve a high quality of life for its people. The first step is to assemble a strategic plan that can be subsequently adopted and authorized for enactment by the Government as indicated in the recommendations below.

**Recommendations**

The functional elements of an integrated system were reviewed in this study as an aid for planning and preparation of a strategic plan. The proposed key recommendations are grouped in three main sections comprising the most critical areas for development and improvement: (1) a national comprehensive PGR programme, (2) the establishment of institutions dedicated to the adequate management of PGR, and (3) the enhancement of the national capacity in terms of policy development and implementation, revision of legislation, the strengthening of human and physical resources and the development of information systems.

1. **Adoption of a National Coordinated PGR Programme**

   A National Integrated and Coordinated PGR Program should be created. The Programme should provide a strategic technical and policy framework for all national activities related to policy, research, conservation of plant genetic resources, crop variety and market development. Priority areas should include:

[5] http://www.cbd.int/gspc/intro.shtml

- ***In situ* conservation**. Implementation of National Biodiversity Strategy and Action Plan for Georgia with regard to PGR conservation. National coordination of on-farm conservation of landraces of traditional agricultural crops, with the involvement of local communities, enhancement of local markets and agrotourism to provide incentives for conservation.
- ***Ex situ* conservation.** Planned and targeted collecting of national PGR. Assessment and improvement of existing *ex situ* collections and establishment of new collections of landraces and wild plants including the associated traditional knowledge. Development of a central facility for long-term seed conservation and in vitro plant maintenance; develop appropriate field sites for maintenance of tree and vine species. Improved facilities for monitoring seed viability and plant health of the conserved collections. Increased capacity to regenerate threatened *ex situ* accessions.
- **Utilization**. Characterization of existing collections by field and laboratory methods, including molecular genetic methods, and multi-site evaluation of accessions for traits of current interest. An assessment of the opportunities and challenges for revitalizing plant breeding of major and minor crops in Georgia must be the first step. Development of a national initiative in crop breeding. Organization of a system for producing and distributing high quality seeds for farmers' fields from local materials to ensure full use of PGR and wealth creation.
- **Access and Benefit-Sharing**. Development and enactment of legislation and regulations for Access and Benefit-Sharing as required by the Convention on Biological Diversity and in harmony with the International Treaty on PGRFA.

2. **Establishment of national institutions for coordination of PGR activities**

- It is recommended that a **Governing and/or Coordinating body for Genetic Resources Management and Use be created at the highest level such as the National Parliament**. This body should have representatives from Ministries of Agriculture, Education and Science, and Environment Protection and Natural Resources, and other units as appropriate. Responsibilities of this body should include development and periodic updating of the National Programme on PGR, establishment of policies and coordination and implementation of action plans and budgets for national support. Collaboration and partnerships at national, regional and international level should be ensured.
- Establishment of a **National Plant Genetic Resources Advisory Council** with broad-based representation from agriculture and natural resources to provide advice to the national program administrators.

3. **Capacity building for the management of PGR**

- **Enhancement of national policy and legislation on PGR.** Review and harmonization of laws and policies governing the activities of the three ministries (MoA, MoES, MoEPNR) on protection of biodiversity and PGR. Revision of regulations on PGR transfer based on international standards (material transfer agreements). Public awareness and education to the public government leadership about plant genetic resources values and importance. In this context the ratification of the IT-PGRFA is of major relevance.

- **Strengthening human resources and infrastructure capacities.** Creation of a centralized research and education campus for integration of efforts on biodiversity research, conservation and utilization. This campus should include agricultural and natural resources research institutes, educational institutions, and jointly used laboratories for biodiversity and agrobiodiversity conservation and research. Development of a national center for molecular diversity and bioinformatics for multiple users, including government institutes, universities, and private organizations. Development and implementation of a strategic plan for upgrading facilities and human resource needs.
- **Development of a national data management system for PGR conservation and utilization.** Implementation and accessibility of databases with inventories of PGR and associated information.

The above recommendations should receive high priority by the Government to ensure sustainable financial support by public funds to planning, constructing, training, and sustaining the activities. Necessary additional funding should be aggressively solicited from international development agencies and private donors.

# 1. INTRODUCTION

Georgia is known for its rich biological diversity, of which agricultural biodiversity, called agrobiodiversity, is an integral component. The biological diversity is a product of the geographic setting of the country and the agrobiodiversity is a product of human interventions over many centuries. Georgia's agricultural diversity is reflected in the many biological entities under cultivation, some of which are the products of domestication from endemic wild species and others introduced from other regions.

*"Not a single country in Europe possesses such a rich flora and fauna as Georgia. No European country offers such diverse landscape in such a small area. Nowhere in Europe is the land preserved in such an original state as Georgia."* [Professor M. Succow of the World-Wide Fund for Nature in the 2007 edition of "Georgia: A Fabulous Surprise" produced by the Department of Tourism and Resorts of the Ministry of Economic Development of Georgia.]

Clearly, the potential economic value of tourism is recognized within Georgia, but this industry pales in the face of the economic development and food security that is desired. The relatively pristine state of large areas of the country is at risk if economic development is not designed for sustaining nature and its treasured biodiversity.

Thus, Georgia faces a serious challenge to preserve its natural biodiversity and habitats while at the same time developing policy and promoting practices that will accelerate its economic development and well-being of its people. The biological resources embodied by endemic and introduced species are integral to economic development, whether they be sustainably harvested from native stands –such as, forest trees, medicinal or ornamental plants, by livestock grazing- or protected to preserve water and soil quality. Many wild species are genetic relatives of cultivated plants and may serve as gene resources to solve serious limitations in crop production, such susceptibility to pests and diseases. Hence it is important to secure this rich biological resource indefinitely.

The rich agricultural legacy of traditional crops and landraces must be conserved and used to advance agricultural productivity in Georgia. For example, traditional varieties can be used to develop niche markets for preparation of traditional foods thereby providing new markets and income for local farm communities. Landraces are also gene resources for breeding new varieties. Many of the traditional varieties have been lost because of abandonment or replacement by modern varieties and alternate crops. Extensive surveys and collections are urgently needed to rescue and conserve the remaining landraces. As Georgia improves its agricultural system by introduction of new varieties and crops from other countries the risk of loss of valuable genetic resources is accelerated.

Georgia participates in the global efforts to conserve biodiversity and is also making great efforts to enhance the economic status of its people through industrialization and agricultural development.

The present study is a step towards creating, implementing, and sustaining a coordinated national program for conservation and use of plant genetic resources. A national program must embody a holistic view of genetic resources of Georgia. Thus, a program will have active elements for preservation of species in unmanaged or little-managed lands [on-site or *in situ* conservation] and outside of their home environments [off-site or *ex situ* conservation]. The latter is essential because *in situ* conservation cannot guarantee that species or populations of plants can be fully conserved, but also because *ex situ* collections

provide accessibility of genetic resources to scientists and others who would exploit them for scientific and economic purposes.

Leadership for a National Program must be provided by Government through adoption and enactment of policy and by provision of financial resources. This requires coordination among Ministries and other agencies that are dedicated to and responsible for sustaining agricultural production and for protecting the native biodiversity of the country. It also requires a massive nationwide education program with strong local leadership.

The fact that a National Program is needed is neither a revelation to government agencies nor to the general public. Many disparate but still relevant activities are being undertaken at present. As a requirement of the international Convention on Biological Diversity that was signed by the Government of Georgia in 1994, a national plan for safeguarding and sustaining the country's biological diversity was prepared. The resulting *National Biodiversity Strategy and Action Plan: Georgia* [NBSAP][6] was finalized and approved by the Cabinet of Ministers of Georgia on February 2, 2005. This document is comprehensive in its assessment of the biological diversity in the country and clear about the needs for action. The document also recognized that no comprehensive coordination body exists to implement the many actions that are needed.

The present study was motivated because of the rapid economic development of Georgia and of the need to rationalize development activities with biological conservation and to stabilize and improve agricultural productivity. In addition, there was general knowledge that current programs were marginalized by lack of personnel and operating funds and facilities. The NBSAP provides an excellent framework for designing programs to meet the goals for protecting biodiversity, including agrobiodiversity.

This study could be titled "In Transition: Georgia's Evolving Policy Landscape in Agriculture, Environmental Protection, Natural Resources, and Education" because, since independence from the Soviet Union, there have been dramatic changes in how agriculture is seen by government and corporations and is practiced by farmers. Major structural changes have occurred due to economic conditions resulting in reduced numbers of professional staff and infrastructure. Strategic planning by the Ministry of Agriculture has emphasized privatization and the emergence of corporate businesses as the major means of economic advancement. A goal for most of the food crops produced in Georgia is to be self-sufficient so that financial resources are not expended in foreign markets.

At the same time, increased attention has been given to environmental quality and the management of natural resources through the activities of the Ministry of Environment Protection and Natural Resources. The Ministry of Education and Science is responsible for managing and financing research institutes that were formerly operated by the Academy of Agricultural Sciences. The consolidation of programs and reassignment of responsibilities to various Ministries is on-going and is expected to result in a leaner and more efficient government. It is an opportune time to review the status and fate of plant genetic resources in this revised government setting with expectation that consensus of all agencies and stakeholders on future directions will benefit the people of Georgia.

This national study puts much emphasis on biological resources, more specifically on plant genetic resources (PGR) as a cornerstone for improving agricultural production, food security and economic advancement for the rural populations of farmers accounting for about 47% of the populace of Georgia as well as for enhancing international competitiveness in marketing products of Georgia.

[6] http://www.cbd.int/doc/world/ge/ge-nbsap-01-en.pdf

As for the agricultural economy of Georgia, we first think of crops planted and harvested for food, fuel, and fodder, but we must also think beyond those crop varieties when we consider how to protect and sustain these crops. Protection against pests and diseases is high on the farmers' risk agenda. Crops are commonly protected by incorporating genes for resistance to pests and diseases by traditional plant breeding. Improved quality of agricultural products, such as wine or bread, depends on finding the right variety for the right place, again depending on genes or PGR.

But where do those genes come from? The genes may be found in traditional Georgian landrace varieties, from introduced varieties from other countries, or from wild relatives of the crops. The wild relatives may be the progenitors of the domesticated crops, or more distantly related species. We speak of all of these types of plants as plant genetic resources. Now, because we cannot predict which crop, when, or which pathogen will attack a crop, it is imperative to have access to PGR so that a search for pest resistance or other traits can be undertaken. Thus, Georgian agriculture depends on plant genetic resources, thus conservation of plant genetic resources in seed banks, field plantations, or tissue cultures must be given a high priority by the government. For the most part, this is a public sector responsibility. Georgia is rich in its biological resources, but seeds and plants must be collected and conserved for future use. The imperative is now, because as agriculture progresses many traditional varieties are discarded or abandoned.

The goal for this study was to determine the current state of plant genetic resources conservation, management, improvement, and use in Georgia. We consider the national policy status of plant genetic resource management, the human resources available to protect them, the vitality of plant breeding programs that provide new varieties to farmers, the quality of facilities, and the role of international collaboration with both public and private sector institutions.

Plant genetic resources are broadly defined here to emphasize that the introduction/importation of seeds or plant materials from other countries for planting in Georgia are properly considered as PGR. The importation of such materials presents a responsibility to the government for assuring farmers that their crops will be enhanced, not deteriorated, and that no new pests or diseases or invasive species are introduced. This is a role for the public sector, notably the Ministry of Agriculture.

A national view for conservation, management, and use of biological resources of Georgia, as designated by the NBSAP, requires an integrated approach encompassing all of the ecological regions of the country, including lands under cultivation and those lands with native biodiversity. There are different drivers for management for agricultural biodiversity management, mainly for animal and plant genetic resources, than for natural areas, but the goals are similar and the interactions are obvious: As examples, vegetation in natural areas is often harvested by grazing of domestic animals, forests are harvested for fuel and construction uses, native plants are harvested for food, medical, ornamental uses, vegetation protects watersheds from soil erosion and enhances quality of water for agricultural and other uses, and, importantly, the native plant species may be used as gene resources for plant breeding and also for adoption under cultivation for new marketable products.

## 2. METHODOLOGY OF THE STUDY

In recent years FAO has been providing technical and policy assistance to the Government of Georgia in the management of agricultural biodiversity and particularly of plant genetic resources. In June 2007, FAO obtained financial support from the European Commission to prepare an integrated strategy on plant genetic resources in the country. This study is the result of that project. The overall objective of the study is to strengthen Georgia's capacity for effective management and use of PGR to contribute to national food security and agricultural development. A review of the current status of PGR management in Georgia is presented, emerging challenges are identified and key recommendations towards developing a national policy on PGR conservation and use through a comprehensive integrated approach are provided. The study covers all the relevant sectors related to the management of PGR and addresses related issues on regulatory frameworks, technology transfer and capacity building.

The International Center for Agricultural Research in the Dry Areas (ICARDA) was a key collaborator in the implementation of the activities within the project. An international consultant (Mr. Calvin O. Qualset, Emeritus Professor and Director, California Genetic Resources Conservation Program, University of California, Davis, California USA) was appointed to consolidate inputs and organizing the study. His Terms of Reference are given in Annex 5.1 and his program of work in Annex 5.2. The preparation included visits to 22 government offices, research institutes, and private sector and nongovernmental organizations and to a small sample of field and laboratory sites that were arranged by Dr. David Bedoshvili, agricultural coordinator for ICARDA for programs in the Caucasus countries. A national consultant, Ms. Ana Gulbani, Manager of the Genebank, Institute of Farming was appointed to ensure full coordination among stakeholders and maintain contacts with the international consultant and the national government and non-government stakeholders in order to assist in preparation of the Study. FAO fielded two missions to Georgia to guide and supervise the process (Mr. Mauricio Lopes, AGPC and Ms. Kakoli Ghosh, AGPS).

A roster of relevant research organizations and current numbers of accessions of plant and microbial genetic resource collections was provided by Ms. Gulbani (Annexes 5.3 and 5.4). In addition, a list of relevant laws relating to PGR and agricultural and environmental policies was provided, but not analyzed in detail as part of this study (Annex 5.6).

Key activities of this study were two workshops held in Tbilisi on the topic "National Integrated Strategy for Plant Genetic Resources Management and Use". The first was a three-day Stakeholders' Workshop, October 16-18, 2007, when representatives of the various organizations shared information about their goals, activities, progress, and limitations. This provided valuable dialogue and new information. The International Consultant prepared an outline for a process for generating a proposal for a national program for management and use of plant genetic resources in Georgia (Annex 5.7). This outline was presented at the Stakeholders' Workshop and circulated to invitees to the second workshop, emphasizing policy considerations on November 20, 2007. Annex 5.8 is a report of this workshop. A log-frame summary of proposed national PGR activities (Annex 5.9) was prepared by Dr. Bedoshvili based on contributions of the Consultant and the participants at the workshop. This was distributed to the Stakeholders' Workshop participants and to invitees to a one-day policy dialogue workshop. Annex 5.10 provides a summary of that workshop. An *ad hoc* working group was established at the policy dialogue workshop to continue discussions and to establish a plan for developing the national program.

## 3. THE NATIONAL STUDY: EVALUATION OF ELEMENTS OF PGR AND RECOMMENDATIONS

There is urgency in taking actions for economic development reasons and because the genetic resources are seriously at risk. **A National Integrated and Coordinated Plant Genetic Resources Program for Conservation and Use is needed and should be adopted.** A bold, energetic, and optimistic concept is provided to illustrate that PGR is but one aspect of agricultural development, protection of natural resources, and sustainable food security for Georgia. Observations and evidence presented during this study period by knowledgeable and perceptive administrators and scientists made it clear that the leadership in Georgia is aggressively pursuing economic development. Plant genetic resources conservation, research, and education are clearly high priority for achieving long-term progress and stability for the nation, but this sector is not completely addressed and national coordination and authority is underdeveloped.

During this study, it was independently expressed during individual interviews and by participants at the two workshops that a coordinated national system was needed to encompass all of the elements for the management and use of plant genetic resources.

Parameters for creating this program were presented at the Stakeholders Workshop (annex 5.8) and discussed at the Policy Workshop (annex 5.10). Rationale, organizational, technical, planning and implementation aspects are presented below with recommendations for consideration in the planning and design of the national program.

In the following sections, technical aspects for the development of a National Plant Genetic Resources Program for Georgia are discussed. In addition, for each of the three subsections below (3.1, 3.2, and 3.3), which constitute the three main recommendations for the development of a National PGR Program, specific recommendations are detailed (3.1.1-3.1.5, 3.2.1-3.2.2. and 3.3.1-3.3.3, respectively) to strengthen the main recommendations.

### 3.1 RECOMMENDATION: ADOPTION OF A NATIONAL INTEGRATED AND COORDINATED PGR PROGRAMME FOR CONSERVATION AND USE

It is suggested that general components be adopted for the elaboration of the National Integrated and Coordinated PGR Programme. In addition, the National PGR Programme should provide technical activities related to *in situ* and *ex situ* conservation, utilization and access and benefit-sharing.

Both general and technical components are described below with specific related recommendations.

#### 3.1.1 General components of a National Integrated and Coordinated PGR Programme

- ***Scope and complexity***

For emphasis, a ‘first principle’ was indicated for consideration in the planning and design of a national PGR program, that being the integration and linkage of natural biodiversity and agrobiodiversity. The National Biodiversity Strategy and Action Plan for Georgia provides the guidelines and rationale of an integrated program. This brings together several scientific disciplines. The principles and goals are identical. A strong argument for this linkage is that similar facilities are required. For example: controlled environments for storage of seed and

genomic resources, herbaria, bioinformatics facility, molecular diversity and plant breeding laboratories, field sites for regeneration and evaluations, permanent plantations for perennial plants, and others.

**Specific recommendation: The national program PGR should be integrated to address all aspects of natural biodiversity and agrobiodiversity.**

- ***Stakeholders and participants***

All of the people of Georgia are stakeholders in the country's genetic resources. Farmers cultivate and sell crop products, transporters carry them to markets, food manufacturers convert the products into attractive and nutritious items, large and small food stores sell the products to consumers. Food safety and economic vitality of the food system are prime concerns.

Active participants in carrying out the PGR include (1) scientists and technicians who collect, conserve, and distribute seeds and plants to research and plant breeding organizations, (2) scientists who conduct research and plant breeding and monitor the health of seeds and plants as they are imported from other countries, (3) producers and purveyors of planting stocks used by farmers, and (4) government agencies that provide guidance and oversight to a national PGR program through enactment and implementation of regulations for importation, exportation, and intellectual property management.

All of the above groups were represented during the interviews and at the workshops.

**Specific recommendation: The needs of each of the stakeholder groups should be identified in the strategic planning process.**

### 3.1.2 *In situ* conservation

The National Biodiversity Strategy and Action Plan gives excellent assessment and a framework for action for *in situ* conservation and monitoring. On-site protection of plant genetic resources has two focal points. The first includes vegetation in more or less natural environments that may be within protected areas, such as national parks or nature reserves or in totally unprotected or unmanaged areas. The second includes cultivated plants that have evolved within Georgia over centuries of agriculture practice. These are landraces or traditional varieties that are dynamic populations, changing as farmers select them and continue to include them in their farming system. On-farm conservation and use of these varieties assures that this gene pool remains for future use in research, but also for their inherent value for local needs for food, fuel, and markets. The NBSAP requires active programs for natural biodiversity and agrobiodiversity conservation in Georgia.

*In situ* conservation is essential, but the realization that protecting genetic resources on-site has some risks because there may be losses due to habitat destruction and other factors must be acknowledged. Hence, the "first principle", as identified earlier, requires coordinated efforts to protect genetic resources both on-site and off-site.

*- Natural areas*

During this study, the personal interviews and the workshop conclusions acknowledged that neither natural diversity nor agricultural diversity were adequately addressed by existing programs. Discussions in the Ministry of Environment Protection and Natural Resources indicated that plant diversity in natural areas was under varying degrees of study.

Responsibility for agrobiodiversity protection was seen as a responsibility of the Ministry of Agriculture. At the Museum of Natural History and the Botanical Institute/Botanical Garden at Tbilisi large collections of preserved samples are held and being enhanced by current collection programs. These efforts, while extremely significant, are small in relation to the needs. These collections are being made for taxonomic research, inventory of species, and for monitoring environmental changes over time. The NBSAP identified 40 protected areas in Georgia, varying in size from 85 ha to 58,000 ha and reported that the quality and level of monitoring of these sites was highly variable. NBSAP concludes that coordination and uniform policies for management of these sites is lacking and formation of new sites languishes because of sale or ownership of land is not governed by uniform policies or criteria among agencies to meet needs for conservation. This conclusion was amply supported during interviews and in the two workshops.

There is a long history of taxonomic research in Georgia resulting in a good understanding of the species composition of the Georgian vegetation. Still GIS vegetation mapping is not complete and monitoring of critical species associations is not systematically being done in all of the 11 recognized biomes. Priority for action should be given to endemic species at risk of being lost.

The elements for *in situ* protection of plant genetic resources include:

a. Inventory, mapping, and monitoring of species composition throughout the country with data being maintained in a globally acceptable data management system
b. Collection of seed or vegetative samples of representative populations for research and regeneration purposes
c. Assessment of quality and scope of protected areas to invoke active monitoring of existing areas and establishment of additional ones
d. Development guidelines and policy for sustainable use of plant genetic resources in natural areas
e. Coordinated management of national program

*- Agrobiodiversity*

These elements are also appropriate for agrobiodiversity. The inventory of the nation's agricultural plant genetic resources includes the assessment of crop and forage species throughout the country with special reference to landraces. Seed or vegetative propagation materials should be collected and safely conserved in seed banks or field plantations. Community or locally-based conservation (see Qualset et al., 1997) should be organized with key agricultural regions. This includes arrangements with farmers and communities to take responsibility for conservation on-farm or in community gardens or orchards. Incentives for sustainable use through niche market development and agrotourism may be very effective for ensuring protection of landraces. Oversight and minimal financial support can be provided by the National Program. Private sector participation should be encouraged. Already, ELKANA, Agvantage, and Agro Cartu have active programs for conservation and sustainable use of local landraces and in the importation of genetic resources from other countries.

**Specific recommendations:**

**- Protection of the native and agricultural biodiversity should be organized and enacted following the assessments and framework of the National Biodiversity Strategy and Action Plan for Georgia and the Global Strategy for Plant Conservation.**

**- On-farm conservation and sustainable use of landraces of traditional agricultural crops should be coordinated nationally with local communities with provision for**

**enhancement of local markets and agrotourism to provide incentives for on-farm and community-based protection of important landraces of Georgian crops.**

### 3.1.3 *Ex situ* conservation

Below are most of the functional activities needed for a national PGR management and use program. During the review it was not possible to visit most of the facilities that are engaged in these activities. In general, the work is scattered with variable quality of facilities and uncertainty about fate of collections, such as the grape plant collection at Tbilisi that must be relocated because of sale of the land where the collection is located now. Some seed collections were reported not to be viable, hence of very limited value, except for the possibility of extracting DNA for research purposes.

There are a number of examples of the design and functions of an *ex situ* conservation program. Bioversity International (formerly International Plant Genetic Resources Institute) in Rome has numerous publications on techniques for collection and maintenance of collections. The National Plant Germplasm System of the U.S. Department of Agriculture is globally the largest program. Two references are included in the publication list that describe and evaluate that system [Janick, 1989; National Research Council, 1991].

**Specific recommendations:**

**- Evaluation of all existing collections should be conducted and the needed improvements or modifications should be recommended during the strategic planning process.**

**- New collections should be made of traditional varieties from farmers and of wild species of potential for breeding or exploitation as new crops.**

- ***Niche markets, traditional varieties, and landraces***

Landraces sustained Georgia agriculture until the modern era of plant breeding beginning in the last century. Even now, landraces can be valuable for meeting traditional uses, but it is not known if or where these landraces exist. Surveys and collections are urgently needed as mentioned earlier. Landraces may find niche markets and thus fill economic gaps for a relatively small number of farmers. For example, during this study, the manager of the Farmer's Union reported that he had an inquiry about a source of seed to plant 8 ha of *Triticum macha*, a primitive wheat. Fortunately, collections of this wheat exist in the national field crops seed bank and a seed supply can be produced in two crop cycles. ELKANA has been experimenting with landraces and is promoting development of niche markets in its community-based agricultural program. This is an extremely important activity that should be expanded nationally.

One of the earliest forms of plant breeding is called landrace improvement, whereby landraces are evaluated in field trials and plant selections are made to achieve uniformity and stability of a variety. This method can be used in Georgia to prepare better landraces for speciality uses, but cannot be expected to result in significantly higher productivity than can be attained in using landraces x modern varieties in breeding programs.

**Specific recommendation: An aggressive program of collection and evaluation of landraces should be undertaken for long-term conservation and to explore the markets for traditional varieties for traditional end-uses.**

- ***Acquisition***

Accessions for inclusion in the permanent *ex situ* collections are obtained from within Georgia and from other countries. The materials received from outside the country are required to have an import permit, while those from within the country do not. An ongoing and important activity is the return of samples of traditional varieties of Georgian origin that had been collected and entered into genebanks in various countries. Presently, curators are requesting seed from the Vavilov Institute in St. Petersburg, from USDA in the USA, and elsewhere. This activity should be accelerated so that these genetic resources are available in Georgia for study, evaluation and use in plant breeding.

It is widely believed, correctly so, that many of the traditional crop varieties, called landraces, of Georgia are no longer being grown by farmers. It is urgent that collections of landraces be done of those remaining ones. ELKANA, with support of a UNEP Global Environment Facility grant, is collecting landraces and distributing them to farmers and to the seed banks in Georgia. This activity should be expanded with concurrent collection and archiving of traditional knowledge, such as the farmer's knowledge about the varieties. The National Museum and Institute of Botany/Botanical Garden are making collections of seeds and herbarium specimens of native plants. Joint collections of seeds of fruit and nut species were undertaken recently by USDA scientists and the National Museum and cooperation is on-going.

Forest tree species are subject to loss due fire and logging. Seed collections from the existing stands of trees can be assembled by provenance and stored for reforestation as may be needed in the future. The samples are also a source of seeds for research or for establishment of plantations for commercial use.

**Specific recommendation: Provisions should be made for country-wide collection of traditional crop varieties and traditional knowledge from farmers, and collection of seed samples from natural forests for future use in Georgia.**

- ***Conservation***

There are about 12 sites with collections of seeds, living plants, and microbial species in Georgia (Annex 5.4). A general conclusion expressed at the stakeholders' workshop and during personal interviews was that the conditions for conservation were not sufficient.

Seeds and plant materials, once collected, must be stored under prescribed conditions for each kind of material. There are guidelines for gene bank management published by Bioversity International and other sources. Seeds require freezing temperatures; whole plants, such as grape vines and tree species are maintained in field plantations; tissue cultures require sterile conditions with light and temperature conditions that promote very slow growth. Such facilities exist in various places in Georgia, with an acceptable facility for seeds and explants of agronomic crop species at the National Gene Bank at the Institute of Farming. In other cases, it was reported that seed collections had lost viability and therefore lost for future use. The major collection of *Vitis* varieties and species is located in Tibilisi and it is to be relocated.

It is proposed that basic seed collections be maintained in a central site, with other sites for working collections. It is important that all collections of seeds be submitted to another site, preferably in another country, for security reasons. This is called 'black box' conservation because the samples that are sent to another genebank do not become part of the working

collections at that site. Already some of the collections are being deposited at the genebank at the Institute of Farming. This proposed central facility can accommodate crops and seeds of wild plants, including forest trees.

**Specific recommendation: Develop a central facility for long-term seed conservation and *in vitro* plant maintenance; develop appropriate field sites for maintenance of tree and vine species.**

- ***Seed and plant health***

Healthy plants are necessary for a healthy agriculture. Traditional plant pathology is essential for monitoring pest and diseases, diagnosis of diseases, and prescribing prevention and control methods, all of which require qualified scientists and active research programs. Hence plant pathologists and other plant health specialists (entomologists, nematologists) are an integral component of national PGR system.

Protection of the crops requires that contaminated plant materials should not enter the country or there should be a quarantine facility to remove pathogens. Phytosanitary certificates from the country of origin should be required. Importation permits should be issued to those who wish to import seed or plant materials to indicate the conditions under which importation is possible. Throughout interviews and the workshops it was stated that the current policies for importation are weak or not followed. Facilities for quarantine to isolate plants to assure that they are pathogen free before use in agricultural fields are either unused or nonexistent.

The Institute for Plant Immunity at Kobuleti has active international collaboration and has modernized its facilities, including molecular capability for detecting pathogens. The Institute for Plant Protection in Tbilisi is in an old building, badly in need of modernization of laboratories.

**Specific recommendation: Incorporate a significant plant health component and provide for expanding and upgrading facilities and recruitment of additional scientists.**

- ***Seed viability and plant health evaluation***

It is obviously essential that the stored collections, whether as seeds, *in vitro* plants, or field plantations of vines, trees, and other perennial plants, be maintained in viable state so that regeneration by users is possible. This requires monitoring of seed viability by germination tests and monitoring the health of living plants. The requirements for seed germination testing are minimal. A controlled temperature chamber is practically all that is needed. To assess the health of tissue culture derivatives, microbial or virus assays are needed.

**Specific recommendation: Develop facilities for monitoring seed viability and plant health of the conserved collections**.

- ***Regeneration***

When seed supplies or seed viability is low, provisions for regenerating the seed are needed. Perennials require replanting at times when plants become diseased or good propagation materials are not being produced. The various institutes have land available, but there is uncertainty about future availability because of policy about sale of institute-held lands.

**Specific recommendation: Field sites or other facilities should be available for regeneration of accessions of all conserved species.**

**BOX 1. *Vitis***

Example of *in situ* and *ex situ* conservation of grapes and wild relatives in Georgia..

*Vitis* species and the cultivated grapes are especially relevant for attention because Georgia is a center of domestication of *Vitis* and grape is a major component of the agricultural economy of Georgia. Wild *Vitis* species would be collected for *ex situ* conservation in plantations or botanic gardens. Nature reserves containing wild species would be monitored and additional protected areas would be established. A large number of cultivated grapes exist in *ex situ* collections, one of which at Tbilisi may be relocated because of alternate use of the present site is anticipated. A coordinated research, conservation, and use program can developed rather easily because of the current work at the Horticulture, Viticulture and Enology Institute, the Natural History Museum, and others. The Missouri Botanical Garden of the USA and US Department of Agriculture have collaborative projects with Georgian institutions involving *Vitis.* Collaboration with Italian and other country institutes is on-going for taxonomic and molecular diversity studies.

### 3.1.4 Utilization

As Georgia expands its market economy, it has strongly encouraged private-sector development. In agriculture this has meant an increased reliance on introduced or imported plant varieties. These varieties are bred in other countries and not generally bred specifically for Georgian environments. This means that these varieties may not be as well-adapted to Georgian farms as varieties bred and evaluated in Georgia. Several institutes presently have active crop breeding programs, but during this study it was repeatedly reported that there are severe limitations in the these programs, including uncertainties of future availability of land, modern equipment, and, most seriously, an extreme down-sizing of the human resources assigned to plant breeding since the Soviet era.

- ***Characterization and evaluation***

Characterization refers to identification of the basic traits used for taxonomic purposes and other traits useful for research and plant breeding, including morphology, growth traits, molecular markers, and diversity among accessions. Evaluation refers to assessment of plants for traits of use in agriculture or basic research in plant breeding, genetics, plant pathology, physiology, and agronomy. High quality collections are well-documented, characterized, and evaluated. Evaluation is on-going, often in response to a specific need, such as finding resistance to a disease. The field crops collection at the Institute of Farming is presently being characterized and evaluated. This activity will accelerate as more collections are received from other countries and from new local collections. This is an extremely important activity with in a PGR conservation and use program.

The data obtained are used for judging genetic diversity and redundancy which is important for judging completeness of the collections, patterns of morpho-physiologic and ecogeographic diversity and, of course, for judging the potential use of accessions as gene resources in crop improvement. Basic genetic diversity analysis is greatly aided by studying diversity at the DNA level. This has been aptly demonstrated by the work on grapes at the Institute of Horticulture, Viticulture, and Enology in collaborative work with scientists in Italy. The new national program should provide for molecular characterization and diversity analysis. This is also critical for plant breeding purposes as is mentioned below.

**Specific recommendation: Provide for adequate facilities and trained personnel to (1) characterize all of the extant collections and future accessions for the critical traits by field and laboratory methods, including molecular genetic methods and (2) evaluate accessions for traits of current interest.**

- ***Research stations and on-farm testing of new and introduced varieties***

There is no doubt that Georgian economy can and does benefit from externally produced genetic resources. But a strong criticism against the reliance on other countries or multinational organizations was expressed because local monitoring of performance was not being done. Plant genetic resources, such as improved varieties, should be evaluated on farmers' conditions in each of the agricultural zones of the country. Variety adaptation trials are extremely valuable for detecting pests and diseases. Introduction of a susceptible variety can have disastrous impact on farmers and certainly negatively impacts the credibility of the organization that imports a variety doomed to failure. Presently no such monitoring program is conducted by Georgian institutions.

To rectify this situation there was strong agreement that Georgian agriculture was put at risk without a systematic monitoring of plant variety introductions. Government Research Institutes may be mobilized to conduct multi-site trials by specific programs independent of the Institutes' own plant breeding programs to assure unbiased evaluations of genetic resources from both public and private sector breeding programs.

Variety adaptation trials conducted by a government program may be partially self-supporting financially by assessing fees for each variety entered into the test program. These fees would be paid by private sector applicants, but may be subsidized by government for varieties developed by government programs.

**Specific recommendation: Organize a multi-site evaluation program for varieties all crops being offered for use in Georgia. This program would be conducted under authority of Research Institutes according to protocols established for each commodity by government agencies with public advice for each commodity.**

- ***Plant improvement through breeding to release, multiply, and distribute varieties***

Breeding programs for major crops are being conducted at various research institutes, but have severe limitations as mentioned above. These programs need to be energized by additional human resources and modern equipment. In some other countries, applied plant breeding is coupled with research on plant genetic resources, plant breeding methods, genetics, agronomy, plant pathology, and end-use properties. Because plant breeding is an integrative science, successful programs are conducted by teams of scientists representing the disciplines identified above. During this study, it became apparent that the plant breeding programs in Georgia were not receiving support or sufficient scope to sustain Georgian agriculture. The scope of the programs must be broadened to include more crops or end-use options and opportunities for Georgian farmers. Some crops of substantial local importance to Georgian farmers, but not of large national impact, should be addressed by public research institutions. These are crops that are not of sufficient importance to international plant breeding companies to warrant their investments.

It was also recognized by various previous reviews (see reports reviewed, Annex 5.5) that internationally-bred varieties have not utilized the genetic resources that evolved in Georgia

over the past millennia. With a new national emphasis on crop and crop variety development, the local genetic resources should be widely used in plant breeding programs.

**Specific recommendation: Assess, crop-by-crop, the needs and potential for plant breeding of major and minor crops in Georgia. Both public and private breeding should be considered to develop a national initiative in crop breeding.**

- ***Seed production system for diffusion of locally bred and introduced varieties***

Seed farms or fields operated by research institutes were used in the past for producing seed, but during visitations and at the stakeholders' workshop the situation was outlined as chaotic and without a plan or leadership. The main concern expressed was that varieties produced by the institutes were not being multiplied and distributed in an organized way. It is clear that a scheme for multiplication of new varieties, assurance of high quality seed, and a means for distributing the varieties to farmers must be in place if breeding programs are to be effective in advancing sustainability and profitability of agriculture.

Uncertainty about land tenure by the institutes because of land sales by the government creates uncertainty about the ability to deliver new varieties to farmers and seed producers. Harvesting and seed cleaning equipment also need renewal. This situation limits the scale-up of breeders' seed [local or imported] and larger scale-up to quantities that can sold to farmers. An orderly scale-up system is needed. A visitation to a private seed farm and processing operations was encouraging for the latter phase of scale-up to large quantities. A modern seed processing plant, financed through government credit, was under construction. This plant will have capacity to serve seed needs for several thousand hectares. The farm was also active in field-scale evaluation of new local and imported varieties.

Also a private foundation, Agro-Cartu, is in early phases of developing a facility for multiplication and distribution of planting material of fruit and vine crops. This organization has extensive goals for serving agriculture and is preparing sufficient physical facilities. ELKANA also is involved in seed and plant production, with emphasis on organic farming methods and small farms.

Organizationally, there are very encouraging activities in progress, but coordination and joint planning with research institutes, NGO, and commercial organizations are needed.

**Specific recommendation: Conduct joint assessment and planning sessions with research institutes, government agencies, nongovernmental organizations, and private sector purveyors of seed and plant materials to develop an organized system for producing and distributing high quality materials for farmer's fields. This system should consider the personnel and facility needs, especially for the public sector research and plant breeding programs.**

### 3.1.5 Access and Benefit-Sharing

The Ministry of Environment Protection and Natural Resources cooperates with the International Union for the Conservation of Nature, participates in *Red Book* listing of threatened and endangered species, and is charged with enabling the National Biodiversity Strategy and Action Plan. This ministry is also inventorying and monitoring of species diversity. Georgia has ratified the Convention on Biological Diversity (CBD), but has not enacted the required legislation for access and benefit-sharing that will protect Georgia's

financial and intellectual interests when genetic resources are removed from the country for potential commercialization.

**Specific recommendation: Take expeditious action to develop and enact legislation for Access and Benefit-Sharing as required by the Convention on Biological Diversity.**

## 3.2 RECOMMENDATION: ESTABLISHMENT OF NATIONAL INSTITUTIONS FOR COORDINATION OF PGR ACTIVITIES

Georgia does not have an active coordinated activity for PGR. The Georgian Academy of Agricultural Sciences has nominal leadership for PGR that represents the country in certain international venues, but without authority or resources for coordination of a PGR program. Each of three Ministries has interests and responsibilities for various components of a National PGR program. It is essential that communications among ministries take place to establish legal responsibilities for various aspects of the National PGR plan. It is a function of Parliament to convene and create the appropriate means for executing an effective national program.

It is suggested that a Governing and/or Coordinating body for genetic resources management and use be created as well as a National Plant Genetic Resources Advisory Council. Both bodies are described below with specific related recommendations.

### 3.2.1 Creation of a Governing and/or Coordinating body for Genetic Resources Management and Use

- ***Governance and authority***

The elements of a national program for conservation, management and use of plant genetic resources are numerous as demonstrated later in this study. The national program should be organized and managed as a public good by the government. However, there are at least three Ministries that have direct interest thus requiring that fundamental decisions are made about areas of responsibilities among the ministries; however, task may be readily accomplished after all of the components are clearly understood.

**Specific recommendation: Request Parliament to create a Governing and Coordinating body for Plant Genetic Resources Management and Use with representation from the Ministries of Agriculture, Education and Science, and Environment Protection and Natural Resources and other units as appropriate to establish policy, carry out action plans, develop budgets for national support, and assign responsibility for activities to the relevant Ministry or other agencies.**

- ***Suggested strategy for development of a National Program for PGR***

The goals of a national PGR program must be considered in the context of national goals for economic development and environmental protection. The NBSAP and the *Global Strategy for Plant Conservation* (GSPC) (adopted as Decision VI/9 of the Conference of the parties to the Convention on Biological Diversity in 2002) provide useful frameworks for strategic planning. These documents are relevant for conservation of plant diversity in natural areas

and for agricultural biodiversity as is indicated in the five objectives of the plant conservation strategy:

a. Understanding and documenting plant diversity
b. Conserving plant diversity
c. Using plant diversity sustainability
d. Promoting education and awareness about plant diversity
e. Building capacity for the conservation of plant diversity

The national PGR program must develop both short and long-term goals to meet expectations for sustainability of agricultural production and protection of biodiversity. A vision should be broadly conceived to move Georgia into a modern era of research and education. A grand plan for coordinated research and development should focus on the biological and agricultural aspects and especially on human resource development and physical environment for creative and productive work. The strategic plan should be comprehensive in scope and sufficiently detailed to guide implementation. A framework for this planning activity can usefully use the outline provided in Annex 5.8 that was produced as a product of the stakeholders' workshop.

The technical details of the strategic plan may be guided by the discussion of the various elements given below. It is essential that the plan be developed by a representative group of stakeholders, and directed by a lead Ministry or a team representing the three most relevant ministries: Agriculture, Environment Protection and Natural Resources, and Education and Science. An *ad hoc* Strategy and Implementation Task Force was established at the policy workshop (Annex 5.10) to draft the conceptual plan for the national program.

It will be important that representatives on the planning team and others make visitations to well-established and functioning national PGR programs, e.g., France, Germany, U.S., the Nordic regional program in Sweden, or others. In addition, technical workshops and seminars on specific aspects should be conducted involving local stakeholders and external specialists. Visits to successful PGR programs in other countries will take advantage of the experiences of others in developing national programs.

**Specific recommendations:**

**- Engage an *ad hoc* Strategy and Implementation Planning Task Force to develop a strategic plan for a coordinated National Plant Genetic Resources Program, with Ministerial leadership, composed of stakeholders and external resource specialists.**

**- Representatives from the *ad hoc* Strategy and Implementation development team should review successful national programs with on-site visits in one to three countries.**

- ***Periodic updating of the National Programme on PGR***

A national plant genetic resources program has many components that must be developed and made functional. This program will be dynamic with changes occurring each year. To expect sustained support for the program from public funds and other sources, the program will need to demonstrate its effectiveness. For example, with respect to utilization, surveys of adoption rates of new crop varieties and consumer/farmer satisfaction would be part of the impact analysis. Annual reporting of activities and in-depth review every five years would be appropriate. The reviews should have input from stakeholders and outside experts.

**Specific recommendation: Assessment of progress and economic impacts should be done annually and in-depth each five years. Farmer and consumer acceptance of new varieties and products should be assessed.**

- ***International Collaboration***

It is important that Georgia sustain current and initiate new collaborations with international organizations, such as national governments, FAO, IUCN, World Bank, USAID, EU, private foundations, and others. The coordinating body recommended above should assure that Georgia is represented in international policy and conservation for a so that benefits afforded by these organizations may be realized.

Active collaborations in research, plant breeding, and conservation with Caucasus neighbors will be especially useful in exchange of materials, reciprocal conservation of genetic resource collections for back-up security, and collaborative research programs.

There is active and productive collaboration with international centers of the Consultative Group for International Agricultural Research, especially with CIMMYT and ICARDA. This should be sustained and expanded. There are presently only a limited number of programs of collaboration with advanced research institutes and collaborations could be expanded with aid of international funding organizations. This would enhance training of scientists and practitioners for Georgia.

**Specific recommendation: Develop and maintain active international collaborations on policy, research, conservation of genetic resources, and crop variety and market development with advanced research centers, international organizations, and national governments.**

### 3.2.2 Establishment of a National Plant Genetic Resources Advisory Council

A council composed of a broad representation of scientists, administrators, private sector companies, educators, farmers, and nongovernmental organizations could provide advice to the governing body of the national program concerning implementation of policies, suggestions of how policy is being implemented and evaluation of performance. Such a council would have rotating membership of representatives of the sectors mentioned above.

**Specific recommendation: Establish a National Plant Genetic Resources Advisory Council with broad-based representation from agriculture and natural resources to provide advice to the national program administrators.**

## 3.3 RECOMMENDATION: CAPACITY BUILDING FOR THE MANAGEMENT OF PGR

It is recommended that capacity building for the management of PGRFA be strengthened which, in particular, would need enhancement of national policy and legislation on PGR, strengthening of human resources and infrastructures capacities and developing a national data management system for PGR conservation and utilization.

These three elements are described below with specific related recommendations.

### 3.3.1 Enhancement of national policy and legislation on PGR

The various legal requirements for international cooperation and local procedures are presently delegated to several authorities. The National Center for Intellectual Property Rights effectively prosecutes patents and licensing. Other legal and regulatory activities

include, import and export permits, material transfer agreements, and access and benefit-sharing agreements. This review found that many of the necessary procedures were in place, but that insufficient resources were available to carry out the mandated activities. Some consolidation could be effected for efficiency. The handling of imported biological materials seemed particularly in need of coordination, especially if quarantine services are needed to prevent the importation and escape of pest and diseases.

- ***Current National policy and jurisdictions***

The Ministry of Agriculture has a policy strategy for economic development that focuses heavily on privatization of lands and support to private sector activities that are meant to generate individual and national financial gains. The Ministry of Education and Science is responsible for educational programs at all levels and the research programs and facilities of the various institutes. The Ministry of Environment Protection and Natural Resources is concerned with environmental quality issues and is expected to implement the *National Biodiversity Strategy and Action Plan* (NBSAP) to meet Georgia's commitment to the Convention on Biological Diversity (CBD). This plan includes agrobiodiversity, which was understood to be in the purview of the Ministry of Agriculture. There seem to be overlapping jurisdictions and missing legislation that should be reviewed and revised. A roster of some of the relevant laws to be reviewed is given in Annex 5.6.

**Specific recommendation: Review and harmonize all laws and policies governing the activities of the three ministries to establish clear functional responsibilities regarding PGR management and use to meet national goals for economic advancement and protection of natural and agro-biodiversity.**

- ***Material Transfer Agreements***

A major feature and service of a national plant genetic resources program is to distribute seeds, plants, cuttings, or tissues to users on request. This requires that sufficient materials are always available. Distributions are made within Georgia to researchers, breeders, seed companies or farmers. The international distribution of genetic resources is vital to Georgia as a function of the desire to receive materials from other countries. Distribution of Georgia's genetic resources to others should be done according to national policy and be consistent with the International Treaty for Plant Genetic Resources for Food and Agriculture and the Convention on Biological Diversity. It was pointed out earlier that policy revision or formulation must be completed to meet the conditions of the Treaty and Convention.

**Specific recommendation: All aspects of distribution of seed and planting materials should be coordinated through a national PGR program. This could include arrangements through Standard Material Transfer Agreements[7].**

- ***Plant and seed health: inspection, quarantine, pathogen elimination***

The introduction of PGR into Georgia for research, conservation, and commercial purposes is a vital concern for the safety of Georgian agriculture. Genetic materials being introduced should have an importation permit, as is current policy, and a phytosanitary certificate. Distribution of materials requires that phytosanitary certificates accompany the materials.

[7] ftp://ftp.fao.org/ag/agp/planttreaty/agreements/smta/SMTAe.pdf

These certificates are presently issued and the procedures can be reviewed for accuracy and efficiency.

**Specific recommendation: Assess the current legal acts regulating entry of PGR into Georgia, and revise them as needed using international standards as guidelines**

- ***Public Awareness of Plant Genetic Resources***

The importance of PGR in agriculture was widely understood by the representatives interviewed during this study. The workshops were exceptional for the enthusiasm about genetic resources and the anticipation that a national activity would become a reality. That was not unexpected because the topic is not new and many of the workshop participants had been personally involved or attended international conferences on the topic. There was less familiarity about the International Treaty for PGR in Food and Agriculture or the Convention on Biological Diversity.

A task for the immediate future is to create wider understanding among government leaders about PGR as a national priority for economic development and food security.

The general public may be rather uninformed, although the concept of biodiversity may be understood. As the national program evolves, a systematic activity for publicizing stories about genetic resources would be appropriate, including the important role of global genetic resources used in Georgia and the important role that Georgia plays in supplying genetic resources to other nations.

The idea that PGR has broad scope may not be so widely understood, that is, PGR are a component of biodiversity and that naturally occurring species are part of the milieu of plants important for food, fuel, and fiber.

**Specific recommendation: Establish a public affairs office within the national program to educate the public government leadership about plant genetic resources---their origins, conservation and uses.**

- ***International policy***

Georgia has not yet ratified the International Treaty on Plant Genetic Resources for Food and Agriculture. This treaty offers several advantages to the country related to conservation and uses of genetic resources and features a multilateral Material Transfer Agreement provision that facilitates the exchange of genetic resources with other countries. The Global Crop Diversity Trust is linked to this treaty and it may provide financial support for conservation and evaluation of Georgia's plant genetic resources.

**Specific recommendation: Take expeditious action to ratify the International Treaty on Plant Genetic Resources for Food and Agriculture.**

### 3.3.2 Strengthening human resources and infrastructures capacities

- ***Creation of a Centralized Research and Education Campus***

This is an opportune time to visit the greater picture for advancing a first rate research and education system for Georgia to build upon the rapid and dramatic economic successes of the country in the short time since its independence from the Soviet era.

My brief review of the various institutes was not comprehensive, but my general impression was that physical facilities of institutes were in need of upgrading and the centers were scattered in location, even within Tbilisi. I also learned that some buildings being occupied by research institutes are to be sold or assigned to other uses. It was also reported that the Agricultural University may expand its scope to include research and outreach (extension education). As a result of these probable changes, new facilities will be needed. This suggests that a common site, a research and education campus, could be developed for co-location of several institutes and new facilities for the National Plant Genetic Resources Program. A common site, most probably in the Tbilisi area, would offer co-location of scientists that would create an intellectually stimulating environment and camaraderie for the advancement of science and education in Georgia. Such a campus would offer much operational efficiency, such as reliable electrical power, physical plant maintenance, combined administrative services, library, among other operations. It may not be feasible to co-locate all of the relevant agricultural and natural resources institutes and centers at one site because geographic orientation or other reasons.

The functional elements of the PGR program to be accommodated in the new program and its facilities are outlined in later sections of this review.

**Specific recommendation: Create a centralized research and education campus to consolidate agricultural and natural resources research institutes, educational institutions, and jointly used laboratories for biodiversity and agrobiodiversity conservation and research.**

- ***Development of a National Centre for Molecular Diversity and Bioinformatics***

Variation in nucleotide sequences in DNA can be readily assayed from tissue or seed samples. These assays are powerful diagnostic tools for determining species identity, species relationships, plant-to-plant variation within species, and, among others, can be used to associate important traits as markers in plant breeding and to guide restoration of native plant populations. The vast amount of data accumulated has spawned bioinformatics, a new field of science and capability for data management and analysis is a necessary component of molecular diversity research.

Capability for assaying molecular diversity in Georgia is limited; however, new laboratories are being established in the Natural History Museum and in the Institute of Horticulture. A laboratory for studying microbial plant pathogens is newly operational at the Plant Immunity Institute at Kobuleti. No facility is presently available to service marker-assisted selection in plant breeding programs.

Rapid extraction processes are available for DNA banking (see Savolainen et al. 2006). As plants are collected for conservation purposes, tissue samples can be obtained for later extraction of DNA and the DNA can be preserved indefinitely. Recent research has revealed that the DNA samples are extremely valuable adjuncts to whole plants conserved in herbaria. DNA can be recovered from herbarium samples as well.

The proposed National Plant Genetic Resources program can provide for molecular diversity research in a coordinated way through a molecular diversity and bioinformatics center that can be used by several institutes. Such a center would be efficient in cost and operations. For example, it is necessary to have reliable electric power sources service PCR, DNA sequencers, freezers, many other instruments, and computers. Back-up generators can be installed to service a series of laboratories at a common site.

The Georgia National Science Foundation has provided grants for equipment purchase and the recommended plant molecular diversity and bioinformatics center would be eligible to compete for funds from the Foundation.

**Specific recommendation: Develop a national center for molecular diversity and bioinformatics for multiple users, including government institutes, universities, and private organizations.**

- ***Upgrading facilities and human resources needs***

During the review process, it was clear that competent scientists are in place for some of the activities, some scientists have multiple duties, and other functions are unattended. Only a few facilities could be examined during the review process, but it was also pointed out during the stakeholders workshop (Annex 5.8) that considerable upgrading or replacement of facilities was needed.

The materials introduced into Georgia should be inspected for pests and pathogens and for species not included in the permit. Visual and diagnostic tests should be conducted for the most serious known biological agents that adversely affect or could affect Georgian agriculture. This may require chemical tests, such as ELISA or DNA tests, for detection of viruses or other pathogens. For certain pathogens a quarantined grow-out of plants from the seed or vegetative plant materials is required. Thus, qualified plant health specialists are required as are laboratory, greenhouse, and growth chamber facilities. This activity is currently lacking the critical staff and facilities to carry out effective inspection and detection.

The *ex situ* conservation program requires expertise in the following areas: (1) Curatorial, with taxonomic and crop-specific expertise, (2) plant health, (3) seed physiology, (4) agronomy and horticulture, (4) genetic diversity, and (5) informatics and data management. Administrative and technical assistance staff are needed to support each of the elements of the *ex situ* program. The numbers of staff will be determined by the scope of the program and may be determined during the strategic planning process.

The design of the facilities for the program will consider the specific needs for the conservation of each type of genetic resources, such as annual or perennial plants, seed vs. living plants, and microbial or cloned DNA. A seed storage facility, such as a –5 ºC cold room will be required, and is probably efficient for permanent storage (base collections). For smaller working collections, the Nordic Genebank model that uses small chest-type freezers is cost efficient, low maintenance and flexible. The cold room concept is convenient, but requires constant oversight, reliable electric power source, and generator backup. Cryopreservation in liquid nitrogen can be considered, but is not essential, except for microbial species and cloned DNA inserts in a bacteria. A controlled environment laboratory for *in vitro* conservation of plants produced by tissue culture is essential. Guidelines for genebank facility requirements are available and will be useful in developing detailed plans for the national PGR program.

For living plant conservation, field sites are required. These should be located in areas favorable for growing the targeted species. Adequate replication of plants is necessary to minimize risk of losses due to diseases or other causes. The field areas should be located, if possible, near the central facilities, and, of course, must have access to machinery for land preparation, spraying, and other activities.

**Specific recommendations:**

**- Assess the human and physical resource needs in all activities related to PGR conservation and use with particular interest in seed production, plant and seed health and ex situ conservation**

**- Develop a strategic plan for upgrading facilities and human resource needs in all activities related to PGR conservation and use with particular interest in seed production, plant and seed health and ex situ conservation**

### 3.3.3 Development of a national data management and information system for PGR conservation and utilization

All collections should be properly identified and conserved in local gene banks with back-up collections at one or more sites within or outside the country.

The vital statistics for each accession entering a genebank are obtained from the collection records and a permanent accession number is assigned. This includes 'passport' data, including the site at where the collection was made (GPS coordinates recommended), date of collection, collectors name, associated species, taxonomy, and physical characteristics of the habitat. As information is collected from characterization and trait evaluations discussed below it should be incorporated into the database. Bar-coding and electronic data management systems are available and a globally accepted system should be adopted. Computerization of herbarium data is underway at the Institute of Botany/Botanical Garden.

The Second Report on the State of the World's Plant Genetic Resources for Food and Agriculture will be updated with the most accurate and recent data and information available, including country reports, thematic studies and national information sharing mechanisms. The implementation of the Global Plan of Action for the Conservation and Sustainable Utilization of Plant Genetic Resources for Food and Agriculture will be monitored by countries through the establishment of national information-sharing mechanisms.

**Specific recommendations:**

**- Adopt or develop a national data management system for all species and collections.**

**- Establish a National Information Sharing Mechanism on the Implementation of the Global Plan of Action for Conservation and Sustainable Use of PGRFA**

## 3.4 Time-line and financial support

A suggested time-table is as follows: Phase I strategic planning (Year 1) and implementation planning (Year 2), and Phase II construction (Years 3-5) for establishing the integrated research and education campus and the National Integrated Plant Genetic Resources program.

Phase I, Strategic Planning and Implementation Planning, to be done over a period of two years, will require funds for assembling task force groups, conducting work shops, and visits of teams to international facilities and organizations. Government funds and grant funds can be assembled for this phase. During the review, it seemed that the European Community office in Tbilisi would be interested in receiving a proposal to provide financial support for this activity. Agencies supporting economic development in Georgia would be approached, such as EC, USAID, World Bank, FAO, and others.

The implementation planning effort will develop a strategy for site selection and construction of facilities with budgets and potential sources of funds.

For Phase II, Construction, to begin in year 3, will require government and international development funds from various sources.

For operations, development of human resources for the program is a major component. Additional scientists and support staff will be needed. It is expected that funds for training of existing and new staff would be forthcoming from international development organizations and from collaborative programs with advanced research institutions in several countries.

Long-term funding from the Government will be required and will be justified by the greater economic progress stimulated by the development of the end-use markets of products from plant genetic resources. Some off-sets can be received from fees, as for example, from importation permits, patent royalty income, fees received for field or laboratory testing services from local and international corporations, agrotourism taxes and fees, and sales of foundation seed of crop varieties or other products. Specific research activities can funded through the competitive grants program of the Georgia National Science Foundation and international organizations, such as UNEP, Global Crop Diversity Trust and others.

**Specific recommendation: The integrated national plant genetic resources program, to be developed in two phases, should receive high priority by Government to insure sustainable financial support by public funds. Additional funding should be aggressively solicited from international development agencies and private donors for planning, constructing, training, and sustaining the activity.**

## 4. ANNEXES

### Annex 4.1

### Terms of Reference

**EC/FAO CO-OPERATIVE PROGRAMME**
**EC/FAO Facility for the Provision of Consultancy Services and in Support of the Global Donor Platform for Rural Development (GDPRD)**

**Designing an Integrated Strategy to Improve Georgia's Food Security through Improved Utilisation of Plant Genetic Resources.**

### TERMS OF REFERENCE

**Duties**: Under the overall supervision of the Regional Representative for Europe, and technical supervision of AGPC and AGPS officers, the incumbent will prepare a Multi-stakeholder Study on *Elements of a National Strategy for Management and Use of Plant Genetic Resources in Georgia.* The study would comprehensively cover all aspects related to improvement and use plant genetic resources such as regulatory frameworks, technology transfer and adoption, capacity building and collaborations. It will propose a set of policy options for an integrated strategy in the sector for future growth and food security. In conducting the National Study the consultant will

a. Review and assess the present status of plant genetic resources management and use taking into account all ongoing initiatives in the country and in the region.
b. Analyse the opportunities, gaps and challenges in the national environment for management and use of biotechnologies for plant genetic resources, establishment of relevant regulatory frameworks, transfer and adoption of improved technologies;
c. Liaise will all relevant national agencies while preparing the study, review the institutional approaches and suggest areas for partnerships working with the local governments and institutes;
d. Provide a set of policy options in the thematic areas to provide guidance for developing a national strategy;
e. Present information in visual format where applicable, diagrams and charts as applicable;
f. Review and assist the national consultant in preparation of the project proposal on 'Strengthening national capacities for PGR management and Use' to ensure that it addresses capacity building needs, budget estimates and all other related issue.
g. Undertake three missions as below including for a) briefing, b) multi-stakeholder workshop and c) Policy Dialogue meeting;
h. Incorporate additional improvements and assist with the publication of the National Study; and
i. Prepare a mission report, including possible recommendations for improvements and project needs.

First mission (15 days)
Duty Station: Tbilisi, Georgia

To conduct a multi-stakeholder study to design and develop the national integrated strategy for PGR management and use. In a first mission of three weeks the international consultant working in close contacts with the National consultant will:

a. Meet all the relevant stakeholders;
b. Discuss strategies and draft study with the Government representatives;
c. Present a draft of the Study at the stakeholder workshop;
d. Participate in the national multi stakeholder workshop;
e. Incorporate inputs, recommendations of stakeholders in the National study
f. Present an outline of the Project Proposal for capacity building for further development during the stakeholder workshop;
g. Assist in facilitating the workshop.

Second mission (7 days)

Duty Station: Tbilisi, Georgia

Once the Study is near completion, the international consultant will conduct a mission to be finalising it with national stakeholders, validate and revise as necessary. In this mission the international consultant will:

a. Acquire additional data and information;
b. Share the document with stakeholders;
c. Incorporate additional improvements and finalize the study;
d. Deliver a lecture/presentation on the Study
e. Participate in the Policy Dialogue Meeting
f. Provide inputs and assistance as necessary.
g. Prepare a mission report

**Deliverables/Output**

A mission report describing the multi-stakeholder study and the strategic proposal to support development of a national integrated strategy to boost sustainable management and use of PGR for increasing national food security. Key elements of this report are:

- A study called "Elements of a National Integrated Strategy for PGR Management and Use in Georgia";
- A project proposal for strengthening national capacities for plant genetic resources management and Use'; and
- Final Consultant Report with Objective description of mission achievements towards strengthening capacity of decision makers, institutions, scientists and local stakeholders to comprehend and respond to international regulations relevant to PGR management and use.

**Required Expertise and Qualifications:** The International Consultant must have significant international experience and ample knowledge of sustainable management and use of PGR. S/he will have the following qualifications and experience:

a. Advanced degree in agriculture science and related subjects;
b. At least ten years experience in agriculture research on crop improvement and sustainable use of PGR and national policy issues;
c. Knowledge of governance, institutional and development issues;
d. Fluency in English and preferably also a working knowledge of Russian;
e. Working experience in European countries in transition will be an advantage;

f. Ability to work independently while being able to provide guidance and transfer knowledge and skills to stakeholders;
g. Computer literacy, with high proficiency in the use of standard software packages;
h. Excellent written and oral communication skills in English.

Duty Station: Tbilisi, Georgia and his/her home country.
Duration: Total sixty-five working days including twenty-two days in two missions to Tbilisi, Georgia and forty-three days at home station for preparatory work and report writing.

## Annex 4.2

## Visitations and Workshops

The study included visits to offices of the Ministries of Agriculture, Environment Protection and Natural Resources, and Education and Science, several institutes, and private sector organizations as outlined below. All visits were accompanied by Dr. David Bedoshvili and/or Ms. Ana Gulbani.

**October 6-7.**

David Bedoshvili and Ana Gulani at ICARDA office. Outline of planned visits and orientation to PGR and plant breeding in Georgia.

**October 8.**

1. Academy of Agricultural Sciences of Georgia. Guram Aleksidze, Vice President
2. Ministry of Environment Protections and Natural Resources. Ana Rukhadze, Head of Biodiversity Service.
3. Georgia State Agricultural University. Gela Javakhishvili, Rector.
4. Elkana. Mariam Jorjadze, Director.
5. Farmer' Union. Raul Babunashvili, President.

**October 9.**

6. National Intellectual Property Center. David Gabunia, Director General, David Dzamukashvili Deputy Director General; Zaur Chakhadze, Head; Nana Pantskhava, Senior Officer.
7. Ministry of Education and Science. Alexander Didebulidze, First Deputy Minister, and Shukri Japaridze, Head, Scientific-Research Institutes Coordination Division.
8. Ministry of Agriculture. Alexandre Tsintsadze, Deputy Minister.
9. FAO. Mamuka Meskhi, Assistant Representative in Georgia
10. Georgia National Science Foundation. Natia Jokhadze, Deputy Director.

**October 10.**

11. Agvantage. Konstantine Kobakhidze, Project Analyst.
12. Institute of Botany. Zaza Gamtsemlidze, Director; Maia Tavartkiladze, Deputy Director; Tsira Mikatadze-Pantsulaia, Head Department of Conservation and NGO Plant Conservation Association; Iondo Chikvardze, Information officer; Marina Gristavi, Plant Conservation Department, Marana Khutsishvili, Herbarium Curator.
13. Mamul-96 Ltd. Iosif Oqruashvili, General Director. Seed Farm.

**October 11.**

14. Botanical Garden. Temal Nakaidze, Director; Jumber Lomidze, Chief of Scientific Council; Rosa Bidzinashvili, Medicinal Plant Curator; Lana Khmaladze, Seed production curator; Ecophysiology Laboratory.
15. Museum of Natural History. George Arabuli, Director; Marane Mosulishvili, Curator; Marine Bokeria, Curator.

16. AGRO. Levan Ujmajuridze, Head, National Centre of Production Planting Material; Zviad Bobokashvili, Project Manager.

17. Institute of Forestry. Merab Machavariani, Project Leader.

**October 12.**

18. Institute of Horticulture, Viticulture, and Enology. David Maghradze, Head of Department of Grapevine and Fruits, Germplasm Research, Genetics and Breeding.

19. Institute of Plant Protection. Shaqro Kanchaveli, Director and Rusudan Keshelava, Chief of Scientific Council.

20. Institute of Farming. Tsiuri Chkhutiashvili, Director; Valerian Rukhadze, Chief of Scientific Council; Natia Sulamanidze, Vice-Director; Zurab Jinjikhadze, Maize Breeder, Lia Qirikashvili, Maize Breeder; Otar Loparteliani, Maize Breeder, Pasha Vacheishvili, Legume Rreeder; Nato Kakabadze, Curator; Ana Gulbani, Genebank Manager.

21. European Union, Delegation to Georgia and Armenia. Michel Jambou, Project Manager and Rati Shavgulidze, Policy Analyst.

**October 15-17.**

Stakeholders Workshop. Attendance roster is given in Workshop Report (Annex 7)

**October 18.**

22. Ministry of Agriculture. Alexandre Tsintsadze, Deputy Minister.

**October 19.**

23. European Union, Delegation to Georgia and Armenia. Michel Jambou, Project Manager and Rati Shavgulidze, Policy Analyst.

**November 16.**

24. Ministry of Agriculture. Constantin Khutsaidze, Deputy Head of Food Security Department.

**November 20.**

Policy Dialogue Workshop. Attendance roster is given in Workshop Report (Annex 9)

**November 21.**

25. European Union, Delegation to Georgia and Armenia. Michel Jambou, Project Manager and Rati Shavgulidze, Policy Analyst.

26. Wrap-up discussion. Kakoli Ghosh, FAO; David Bedoshvili, ICARDA; and Ana Gulbani, Genebank Director.

## Annex 4.3

## Institutes and Organizations Relevant to Plant Genetic Resources in Georgia

| Name of Institute | Location | Affiliation | Number of Staff | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | Agronomy/ Horticulture | PGR | Plant Breeding | Plant Pathology | Biotechnology | Seed technology production |
| RI of Farming | Mtskheta, | Public | 33 | 6 | 14 | 3 | 6 | |
| RI of Horticulture, Viticulture, and Wine-Making | Tbilisi | Public | 10 | 6 | 6 | 2 | 6 | 4 |
| Institute of Forestry | Tbilisi | Public | 17 | 11 | - | 4 | - | - |
| RI of Plant Immunity | Kobuleti | Public | 3 | - | 1 | 10 | - | - |
| RI of Tea, Subtropic Crops and Tea Industry | Kobuleti | Public | 1 | 1 | 5 | 2 | 1 | - |
| Biotechnology Center | Tbilisi | Public | 8 | 3 | 3 | 4 | 4 | 2 |
| Batumi Botanical Garden | Batumi | Public | 4 | 8 | 6 | 3 | 4 | 5 |
| Tbilisi Botanical Garden | Tbilisi | Public | 3 | 16 | - | 3 | 1 | 4 |
| Institute of Botany | Tbilisi | Public | - | 22 | - | 4 | - | - |
| National State Museum | Tbilisi | Public | - | 6 | - | - | - | - |
| Agro | Tbilisi | Private | 1 | 2 | 1 | - | - | - |

**Annex 4.4**

**Plant and Microbial Genetic Resources Collections in Georgia**

| Name of Institute | Location | Affiliation | Number Accessions | Species | Groups | Seed or Plants | Herbaria Collections | Microbial Collections | Number of Staff |
|---|---|---|---|---|---|---|---|---|---|
| RI of Farming | Mtskheta | Public | 2323 | 57 | 10 | Seeds | - | - | 6 |
| RI of Horticulture, Viticulture, and Wine-Making | Tbilisi | Public | 1519 | 1519 | Grape Fruits | Filed/Live collections | - | - | 8 |
| Institute of Forestry | Tbilisi | Public | 99 | 90 | | Seeds | 211 | - | 5 |
| RI of Plant Immunity | Kobuleti | Public | 343 | 6 | - | 370 seeds 4 plants | 511 strains of 85 pathogens | | 10 |
| RI of Tea, Subtropic Crops and Tea Industry | Ozurgeti | Public | - | 155 | 9 | Filed/Live collections | - | - | 6 |
| Biotechnology Center | Tbilisi | Public | 75 | 75 | Potato | Tubers | - | 5 | 9 |
| Batumi Botanical Garden | Batumi | Public | - | 2037 | - | 800 Seed, 8000 Plant | 38 000 (800 species) | | 11 |
| Tbilisi Botanical Garden | Tbilisi | Public | - | about 2 000 | 6 | Filed/Live collections | - | - | 20 |
| Institute of Botany | Tbilisi | Public | 520 | 280 | 105 | Seeds | More than 500 000 | - | 26 |
| Agricultural University | Tbilisi | Public | 748 | 9 | Food Legumes | Seeds | - | - | 3 |
| National State Museum | Tbilisi | Public | - | 176 000 | 9 | - | 200 000 | - | 6 |
| Agro Cartu | Tbilisi | Private | 475 | Vitis vinifera | 3 | Filed/Live collections | - | - | 4 |

**Annex 4.5**

## Reports and Publications Reviewed


Bedoshvili D. 2005. Report on Plant Breeding and Biotechnology Survey – Georgia. 45 p. Available at http://apps3.fao.org/wiews/wiews.jsp.

Cabinet of Ministers of Georgia. 2005. *National Biodiversity Strategy and Action Plan-Georgia.* Tbilisi, Georgia. 106 p. [Adopted by, February 2, 2005.]

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Etienne, Konrad N. 2006. Support to policy development and institutional reform in the area of plant protection seed multiplication/certification in Georgia. Final report. Euronet Consulting. Brussels. 54 p.

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Guimaraes, E.P., D. Bedoshvili, and A. Morgounov. 2007. Georgia Workshop on Plant Breeding and Biotechnology Capacity. Final Summary Report. Tbilisi. 3 p.

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Janick, J. [Editor] 1989. *The National Plant Germplasm System of the United States.* Plant Breeding Reviews. **7**. Timber Press, Portland, Oregon. USA. 230 p.

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document] 10 p.

Moore, G. and W. Tymowski. 2005. Explanatory guide to the International Treaty on Plant Genetic Resources for Food and Agriculture. IUCN Environmental Law Paper No. 57. IUCN. 212 p.

National Research Council Board on Agriculture. 1991. *Managing Global Genetic Resources: The U.S. National Plant Germplasm System*. National Academy Press. Washington DC. 171 p.

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Postman, J., E. Stover, M. Moshulishvili, and A. Nersesyan. 2006. Trip report: Expedition to Georgia and Armenia to Collect Termperate Fruit and Nut Genetic Resources, 15 September-20 October 2006. USDA Agricultural Research Service. 13 p.

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Qualset, C.O., A.B. Damania, A.C.A. Zanatta, and S.B. Brush. 1997. Locally-based crop plant conservation p. 160-175. In: *Plant Conservation: The* In- situ *Approach*. N. Maxted, B.V. Ford-Lloyd, and J.G. Hawkes, eds. Chapman and Hall. London.

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Wood, D. and J.M. Lenné [eds.]. 1999. *Agrobiodiversity: Characterization, Utilization and Management.* CABI Publishing. Wallingford UK and New York USA. 490 p.

## Annex 4.6

## Roster of Georgian Laws Relevant to Agriculture and Natural Resources

These documents were not reviewed in this study. See Etienne (2006).

Law of Georgia on the Protection of Plants from Harmful Organisms (Georgian Parliament, October 12, 1994);

Law of Georgia on Pesticides and Agrochemicals (Georgian Parliament, November 25, 1998);

Law of Georgia on Agricultural Quarantine (Georgian Parliament, May 15, 1997; revised December 28, 2005);

Law of Georgia on the Approval of Spreading the Agricultural Cultivar Variety, Quality Seeds and Sapling Materials (Georgian Parliament, June 25, 1999; revised December 28, 2005);

Georgian Law on Protection of Plant Varieties (Georgian Parliament, December 29, 2006)

Georgian Law on Science, Technologies and their Development (Georgian Parliament, November 22, 1994, revised December 23, 2005 #2469)

Law of Georgia on Higher Education (Georgian Parliament, December 21, 2004, revised March 17, 2006)

## Annex 4.7

## Elements of National Integrated Strategy for Plant Genetic Resources Management and Use in Georgia

**Outline of a proposal to elaborate the needs, opportunities, and institutional framework of a National Integrated Strategy for Plant Genetic Resources Management and Use**

Prepared by C.O. Qualset, FAO Consultant, for Stakeholders Workshop, Tbilisi, Georgia, October 19, 2007

Topic I gives a listing of the essential elements of an integrated PGR system. Topic II sets the stage and justification for development of a coordinated, integrate PGR system. Topic III identifies the critical components that must be addressed in creating an integrated PGR system. Topic IV provides an orderly process for developing a proposal. Minimal elaboration of details are required on each subtopic. Finally, Topic V represents personal views of the Consultant about a vision for modern agricultural research and development in Georgia.

I. Essential elements of a National Integrated Strategy for PGR Management and Use

- Multiple clients and users [public, private, farmers, consumers]
- Fully coordinated through a central agency
- National support as a public good for the advancement of Georgian economy and conservation of natural and agricultural biodiversity,
- Full range of activities from conservation to uses of PGR in genetic and plant breeding research, and product development and deployment.
- Modern facilities
- Well trained scientists and managers
- Advisory Council composed of a broad sampling of scientists, administrators, private sector companies, educators, farmers, and nongovernmental organizations

II. Topics for elaboration

1. A statement on the biodiversity and agrobiodiversity of Georgia.
2. Importance of PGR for current and future economic development.
3. Evaluate the current situation for PGR conservation, management, and use. Identify and assess current activities among disparate organizations, including roles of the three Ministries—Agriculture, Environment and Natural Resources, and Education and Science.
4. Review policy environment in Georgia: Laws, within or among the Ministries of Agriculture, Environment and Natural Resources, and Education and Science.
5. Evaluate International policy environment, including the Convention on Biological Diversity, the International Treaty on Plant Genetic Resources for Food and Agriculture, UPOV, and various marketing and trade agreements.
6. Establish a vision and goals for a new PGR System.

7. Identify and elaborate the functional elements of an integrated PGR System and suggest a logistical plan for facilities, coordination, and financing.
8. Identify the participants from all sectors (public, private, consumer)
9. Identify the administrative needs and assignment of functions of each component to a responsible agency or organization.
10. Establish a planning group with wide sector participation to assess and prioritize the various components.
11. Recommend the policy requirements for implementation of the system and of each of its components.
12. Prepare an implementation strategy for the PGR System, including the requirements for human resources, operational finances, and facilities.
13. Set timelines and goals for implementation of the PGR System.
14. Identify the budget requirements to carry out the planning work.

III. Essential components of a National Program for PGR Conservation and Use [Item 7]

- Centralized coordination
- Legal Support: Permits, MTAs, intellectual property management, CBD Access and Benefit-Sharing legislation, Ratification of International Treaty for PGR for Food and Agriculture, Import and Export Permits.
- Acquisition: field collections, introductions
- Characterization for taxonomic traits, including morphology, growth traits, and diversity
- Documentation and information management: Passport, taxonomy, morphology, molecular markers
- Plant/seed health: inspection, quarantine, pathogen elimination
- Conservation: Cold storage, field planting, in-vitro, in-situ sites and monitoring
- Seed viability testing
- Regeneration: Plantings from collected seeds or plant materials
- Evaluation and research: Genetic diversity, trait evaluation
- Distribution: To researchers, plant breeders, international collaborators
- Utilization: Plant improvement through breeding and introduction, to release, multiply and distribute varieties.
- Impact: Assess value of new varieties to farmers, seed/plant producers and distributors, and consumers.
- Public awareness of agrobiodiversity

IV. Sequential steps needed to carry out the study.

1. Establish goals and vision
2. Consider each of the components required to have an efficient, comprehensive, and integrated PGR system.
3. Assess the current situation for each component, including the facilities, personnel, financial support, and state of the technologies being used.
4. Identify the successful attributes of current activities and limitations.

5. Elaborate facilities required, personnel, and financial needs.
6. Consider sources of finance to operate the system, including fees, royalties, Ministry allocations, and grants
7. Elaborate scenarios for practical ways to assemble the functional units of the system spatially and in relation to other functions in State Government. Consider single site and multiple sites.
8. Recommend a planning strategy to review similar centers in Europe, North America, Scandinavia, and International Centers, such as ICARDA, ICRISAT, or CIMMYT, for guidance on logistical and management matters.
9. Set time-table for inauguration of the System.

V. A vision of an idealized site plan for a National Plant Genetic Resources System and coordination of agricultural research and development in Georgia.

This seems to be an opportune time to consider the research and development situation for agriculture in Georgia. Many changes in ownership of buildings and land are underway during the downsizing and privatization processes. The Research Institutes are scattered geographically and the co-location of at least four of these Institutes [Horticulture and Viticulture, Farming, Forestry, Plant Protection, for example] at a common site would promote science and agricultural R & D, create administrative efficiencies, and, most importantly, would upgrade facilities for new types of research and provide work environments that would be conducive to recruitment of new scientists. My review of various institutes and agencies has revealed scientists who are enthusiastic about their work, but demoralized because of lack of modern facilities and low operating funds, as well as low salaries.

The following was not discussed at the Stakeholders Workshop and represent my personal views that I hope will provide a context for discussions.

I visualize a campus comprised of a Conservation, Molecular Diversity, Plant Breeding, and Bioinformatics Center and modern Research Institutes directed toward agronomic research and crop genetics, breeding, and utilization research. The Center would have staff offices to support all of the PGR functions, controlled environment facilities for active and permanent collections of seeds, tissue and cell culture transfer lab and controlled temperature and light chambers for maintaining plantlets, laboratories for molecular analysis for diversity and plant breeding and for managing and collecting data. Greenhouses and adjacent field facilities would be essential for the Center and for the Research Institutes. Conference rooms and a lecture hall would be available in the Center or Research Institutes. This campus would provide efficiency in many aspects of research operations, such as purchasing, physical plant maintenance, library, payroll management and so on. It would promote cooperation with Universities for student internships and advanced degree training.

In the current structure, this campus would comprise of units now operated through the Ministry of Agriculture [conservation and use], Ministry of Education and Science [research institutes], and Ministry of Environment and Natural Resources [agrobiodiversity conservation and monitoring].

This concept requires considerable investment of funds and financing strategies are needed. Investment of revenues received from the sale of state property would be one

source of funding, on-going Ministry funds would be another, and grants from international development agencies and local donors could also be expected.

## Annex 4.8

## Report of Stakeholders Workshop, 15-17 October 2007, Tbilisi, Georgia

**International Center for Agricultural Research in the Dry Areas (ICARDA)**

**Report of the Multi-Stakeholder Workshop in Georgia**

**ELEMENTS OF A NATIONAL INTEGRATED STRATEGY FOR PLANT GENETIC RESOURCES MANAGEMENT AND USE**

**15–17 October 2007**
**Tbilisi, Georgia**

Contents



### Background Information

The International Center for Agricultural Research in the Dry Areas (ICARDA), with the support of Food and Agriculture Organization (FAO) of the United Nations organized a three-day multi-stakeholder workshop "Elements of a National Integrated Strategy for Plant Genetic Resources Management and Use" in Tbilisi, Georgia, 15-17 October 2007.

The workshop was preceded by a study on Elements of National Integrated Strategy for Plant Genetic Resources Management and Use in Georgia, which had been conducted by International Consultant Dr. Calvin Qualset (University of California, Davis). In his study, the consultant covered all aspects related to improvement and use of plant genetic resources (PGR), such as regulatory frameworks, technology transfer and adoption, capacity building and collaborations.

The objective of the multi-stakeholder workshop was to gather critical inputs from the key national partners including ministries, governmental institutions, private sector, etc. through participatory approach and develop a project proposal for the PGR sector through national consensus. Some 50 persons participated over the three-day period.

The ultimate goal of the workshop, as well as the study was to facilitate developing an integrated strategy that would strengthen Georgia's capacity for effective management and use of plant genetic resources to contribute to food security and agricultural development.

ICARDA, in close consultation with FAO, provided technical and logistical support to the consultant during his mission in Georgia, developed detailed agenda of the meeting, identified and invited participants, and made all necessary arrangements for successful implementation of the project. The workshop provided a forum to exchange experience on PGRFA management in the country, and identify gaps, needs and concerns of stakeholders in this regard and develop project proposal outline through consensus.

The workshop report is followed by seven annexes, which include the workshop agenda (Annex 1) and the list of the participants (Annex 2).

**Summary of the Workshop Presentations**

**The First Day**
**15 October, 2007**

**Inaugural Session**

The inaugural welcoming session on **Day 1** was co-chaired by Acting President of Academy of Agricultural Sciences **Acad. Shota Chalaganidze** and **Dr. Zakir Khalikulov** (PFU/ICARDA-CAC). The 50 persons present at the opening included **Dr. Mauricio Lopes** (AGPC/FAO), **Mr. Mamuka Meskhi** (FAO assistant representative), **Dr. Shuqri Japaridze** (Ministry of Education and Science), **Ms. Mariam Gelashvili** (Ministry of Agriculture), **Dr. Qualset** (UC Davis) and representatives of the Georgian State Agrarian University, Research Institutes of Agriculture, Institute of Botany, Agvantage (ACDI/VOCA), ELKANA, Private Farmers Union, private seed production companies, ICARDA, other local and international organizations.

**Dr. Khalikulov** (ICARDA-CAC) greeted the workshop participants on behalf of ICARDA and PFU, CGIAR Program for CAC, and indicated that the successful results achieved through the collaboration of Georgian NARS with ICARDA, and other CGIAR Centers in the areas of plant genetic resources and germplasm enhancement can serve as an important element for further joint initiatives of various national and international stakeholders, especially in such highly important areas as development of integrated national strategy for management and use of PGR in Georgia and for strengthening national and international collaborative initiatives for effective management of plant genetic recourses. **Dr. Sh. Japaridze** (Ministry of education and Science) in his opening remarks spoke about the importance of agriculture for Georgia, touched the biosecurity issues, briefly reviewed the reform of research sector of Georgia and stressed the importance of the workshop in development of elements for a strategy for effective PGRFA. **Ms. Mariam Gelashvili** (Ministry of Agriculture) greeted the participants and underlined importance of national policy on plant genetic resources for provision of farmers with seeds and planting materials. **Acad. Shota Chalaganidze** (Agricultural Academy) emphasized that plant genetic resources are among the most important priorities of the Academy of Agricultural Sciences. About one month ago, the Academy established a council for coordination of research of the plant genetic resources. He thanked international organizations for their support in

improvement of *ex situ* conservation of PGRFA and management. **Dr. Mauricio Lopes** (FAO) in his opening statement emphasized the objectives of the workshop; he spoke about international cooperation in the field of plant genetic resources and underlined the importance of establishing links between conservation and use for building national capacity of PGRFA management for future generations. **Mr. Mamuka Meskhi** (FAO) briefed the participants about the joint efforts FAO and European Commission on agricultural capacity building in Georgia; he rested his hope on the present workshop that it would facilitate development of a national strategy PGR, which is a very important issue of the country.

**Dr. Calvin Qualset** (UC Davis, USA), in his introductory speech, stressed that Georgia is very rich in PGR; he spoke about his study, noted the significance of his meetings with stakeholders, which had been conducted prior to the workshop, gave definition of the plant genetic resources and listed the objectives of the workshop: (a) Identify critical plant genetic resources (PGR) in Georgia, (b) Understand the current and potential uses of PGR in Georgia, (c) Identify constraints and limitations of PGR conservation and management, (d) Develop national policy options for PGR, including participation in the Convention of Biological Diversity and the International Treaty on Plant Genetic Resources for Food and Agriculture, (e) Propose a National Coordinated PGR Program for Georgia and (f) Develop a proposal for implementation of a national PGR program

**Session I. Role of Agriculture in Economy of the Country**

**Ms. Mariam Gelashvili** (Ministry of Agriculture, Department of Sectoral Development) briefly introduced the current state of the Georgian agricultural sector and, namely, of the crop production. She highlighted importance of new approaches to access new markets for the Georgian agriculture and emphasized assistance provided by international development and donor organizations (World Bank, FAO, IFAD, DFID, GTZ, USAID, etc.) in re-building agricultural capacity of Georgia under the new political, economic and market conditions. One of the priorities of the Georgian Ministry of Agriculture is to adjust the national legislature to the international treaties and conventions, which would facilitate access of Georgian to new agricultural technologies, attract new investments and provide for development of the country.

**Mr. Konstantin Kobakhidze** (Agvantage) discussed the mission and activities of Agvantage and reviewed market opportunities for Georgian fresh agricultural produce. Agvantage is a USAID-funded project, which provides local producers, processors and exporters with technical support to increase their competitiveness. At present, major export agricultural commodities are fruits and potherbs. The major markets are the former SU countries (excluding Russia, banned Georgian imports in 2005) and EU. Agvantge has sites in almost all regions of Georgia. To address the needs of the new markets, Agvantge had to bring nurseries of new varieties of apple and berries and carry out their evaluation and selection.

Session 1 concluded with a short discussion. Mr. Machavariani (Institute of Forestry) emphasized importance of cooperation between the ministry of environment and natural resources and the ministry of agriculture. According to him, because of low cooperation between the ministries, the national action plan for biodiversity missed many important sections including that of environment pollution. Mr. Babunashvili (Private Farmers Union) provided examples illustrating the need of old varieties: the

union was approached by farmers willing to grow old land races of wheat (*Triticum macha*), but seed material is not available through local collections. Acad. G. Aleksidze (Agricultural Academy) emphasized that the national plant genetic resources had many stakeholders and all of them should have been involved in decision-making process. Dr. Leri Shatberashvili (GFID) stressed the need of a national, coordinated effort and an advisory board, which would include representatives of the various stakeholders, first of all researchers of the scientific centers. Ms. Mariam Gelashvili, on behalf of the Ministry of Agriculture, expressed interest in close cooperation with the researchers. Mr. Kobakhidze (Agvantage) mentioned that Agvantage cooperated with the local researchers and several representatives of the Research Institute (RI) of Horticulture, Viticulture and Wine-growing were hired to work with the imported nurseries; however the company established the breeding site itself and did not pass the nurseries to a local institute for evaluation. Acad. P. Naskidashvili (National Academy of Sciences) emphasized the importance of state variety evaluation prior to their release to producers and seed traders.

**Session II. Introduction to Management of PGRFA in Georgia**

**Dr. Zakir Khalikulov** (PFU/ICARDA-CAC) briefed the participants about the mission and activities of CGIAR centers in the area of PGR conservation and sustainable use in Central Asia and the Caucasus (CAC) region. He highlighted the role of ICARDA in supporting a local and regional PGR collection networks through organization of joint collection missions and establishment of storage facilities for PGR long-term conservation, as well as making inventories and capacity building. He stressed the importance of germplasm screening and characterization of accessions for their better use in breeding programs. He underlined the role of national strategies on PGRFA management, which should be in synergetic coherence with regional strategies on PGR.

**Acad. Petre Naskidashvili** (National Academy of Sciences) briefly descried the soviet era system of PGR in Georgia and reviewed the present status of the PGR system in the country. He emphasized the Georgian environment is very divers and told that as many as 61 variety trial stations existed in different administrative districts of Georgia in the 1980-s to address diversity of environment, which were abolished during the first years of independence. Acad. Naskidashvili described the system of plant breeding and its linkages with seed production and multiplication of vegetatively propagated crops. He characterized the present status of PGR management system as insufficient as improved germplasm is mostly obtained from abroad and sourced to farmers without any testing for health or yield advantage.

**Dr. David Bedoshvili** (PGU/ICARDA/CIMMYT-Caucasus) introduced the results of a survey of plant breeding and biotechnology capacity in Georgia, which was completed in 2005. he informed about the number and educational levels of the plant breeders, budget allocations by crops, germplasm enhancement activities, budget distributions by major areas of breeding research, average numbers of crosses, numbers of segregating populations, trials, and locations managed by the breeding programs, sources of germplasm used in the breeding programs, as well as the most limiting constraints for the success of the crop breeding programs.

Session 2 was concluded by brief discussion, which emphasized the lack of modern equipment and young specialists in plant breeding and seed production. Prof. Diana Dzidziguri (Tbilisi State University) mentioned about endangered status of many plants

at Batumi Botanical Garden. However, Dr. David Baratashvili (Batumi Botanical Garden) replied that it had been already several years since a sponsor (Mr. B. Ivanashvili) provided the garden with support sufficient to remove all threats to the collection and at present there is no any danger of loosing them.

**Session III. Policy Framework for Effective Management of PGRFA in Georgia**

**Dr. Calvin Qualset** (UC, Davis) briefly reviewed the issues that are relevant to the national policy framework for PGR. He emphasized importance of Convention of Biological Diversity (CBD), which has been ratified by Georgia. CBD is important for Georgia as its implementation would provide for enhanced conservation and sustainable use of PGR in the country, fair and equitable benefit-sharing mechanisms (still needs to be incorporated in National legislation by Georgia) and sovereign rights of Georgia to control the use their genetic resources. International Treaty on Plant Genetic Resources for Food and Agriculture (ITPGRFA) is another important international treaty, which has not been ratified by Georgia yet. This treaty is important as it provides for Multilateral System for Access and Benefit-sharing for plant genetic resources, which are important for agriculture of Georgia (64 crops listed in Annex 1). In terms of the national policy priorities, Dr. Qualset emphasized the following: (a) develop and coordinate a national program, (b) promote intellectual plant variety protection, (c) invest in facilities and sites for PGR conservation, distribution and research and (d) straighten the seed system for dispersal of varieties produced by Georgian plant breeders.

**Ms. Ana Rukhadze** (Ministry of Environment Protection and Natural Resources) made a presentation on Convention of Biological Diversity, which was ratified by Georgia in 1994. Ms. Rukhadze briefly defined the scope of biodiversity, mentioned about the objectives of the convention and reviewed the national action plan on biodiversity. She listed some successes of the CBD implementation such as establishment of a species conservation center, biodiversity database (Tbilisi state University), national parks and publishing of a new edition of the Red Book in 2006. Also, Ms. Rukhadze emphasized that the action plant contains a chapter on agrbiodiversity. Most of the agrbiodiversity on-farm conservation activities are carried out by non-governmental organization ELKANA. Ministry of Environment Protection and Natural Resources is aware of the broad spectrum of ex-situ activities, which are carried out by local research organizations through international cooperation; however there is no good communication about it. Ms. Rukhadze briefly told about difficulties in developing Access and Benefit-Sharing legislature (ABS) in Georgia and concluded by listing priorities for agrobiodiversity in Georgia: elaboration of a state program on agrobiodiversity protection and restoration, elaboration of ABS-legislature, capacity building, inventory/database and red book on agrobiodiversty, enhancement of import/export legislature, special status for endemic wild relatives and land races, mini-reserved areas for wild relatives and land races, raising public awareness and educating farmers.

**Dr. Mauricio Lopes** (FAO), in his presentation, briefly introduced Global Partnership Initiative for Plant Breeding Capacity (GIPB), which is an internationally facilitated platform dedicated to enhancing the capacity of developing countries to improve crops for food security and sustainable development. Motivations to structure and implement GIPB included implementation of the International Treaty on Plant Genetic Resources for Food and Agriculture (PGRFA) and the results of an FAO Survey for Assessment

of Plant Breeding Capacity in Developing Countries. The survey showed that among the 60 assessed countries, no two countries were alike in terms of political, social and education systems and internal stability; environment, natural resources base, including plant genetic resources and history of crop improvement, plant breeding & seed systems. Every country had critical capacity needs, but those needs differed both qualitatively and quantitatively. However there are deficiencies that are in common for all countries: (a) poor recognition by policy-makers and institutions of the key role of improved crops, breeding and adequate planting materials and the need for continuing support, (b) Salaries and support are inadequate, affecting morale and retention, (c) inadequate operational support for core infrastructure and breeding activities, (d) poor communication among scientists and limited access to new information and technology and (e) private sector participation in the seed system usually minimal. In light of the described challenges and taking into account several international declarations and national and international efforts, a Global Partnership Initiative for Plant Breeding Capacity Building (GIPB) was launched in Madrid in June 2006 at the time of the First Governing Body Meeting of the FAO International Treaty on PGRFA. The GIPB is proposed as a partnership platform of public, private and civil society sectors working in a concerted and systematic manner by complementing existing efforts. It can provide developing countries with establishment of a decision making mechanism that would provide compliance with national and international legislature including CBD, ABS mechanisms, IPRs, TRIPS, etc.

**Mr. Zaur Chikadze** (Georgian Patent Center) briefly reviewed the law on plant variety protection, which was developed in full compliance with the UPOV requirements and said that Georgia is about to join UPOV. He reminded the participants about the criteria for variety protection: novelty, distinctness, uniformity and stability and informed about availability of forms necessary to fill, while applying for protection. Mr. Chikadze also mentioned that unfortunately the Ministry of Agriculture has not yet registered criteria for accreditation of entities that can conduct DUS-testing and the council on variety release is not functional yet. Georgian Patent Center can accept for protection without DUS-testing only those varieties that are protected in other UPOV-member countries.

The presentation of **Acad. Gogotur Agladze** (Agricultural Academy) on influence of state regulations on conservation and use of PGR was presented by **Ms. Ana Gulbani**. The presentation stressed three immediate objectives for Georgia: adoption of an appropriate legislature, elaboration of national programs for PGR conservation and plant breeding, and facilitation of farmer involvement in decision making process on PGR conservation and use. He emphasized importance of PGR for the national economic development, sustaining those numerous small-scale farms that had been formed after land privatization and called for more active involvement of the government, the ministry of agriculture on the first place, in coordination of PGR FA activities in the country. From his point of view, it is urgent to revise old or adopt new laws on plant genetic resources, land cadastre and crop and forest species seed production.

The ensuing discussion highlighted the necessity of official testing of new or imported varieties before introducing them in production, introduction of legislation for access and benefit-sharing to accommodate requirements of CBD, and ratification of International Treaty on Plant Genetic Resources for Food and Agriculture. Dr. Mauricio Lopes (FAO) mentioned that Georgia could be a pilot country for introduction of the decision making tool, which had been developed as a part of the

Global Partnership Initiative for Plant Breeding Capacity to assist developing countries in national policy formulation and implementation, attracting investments in capacity building and consolidation with international efforts and resources. Acad. Guram Aleksidze spoke in favor of ratification of the international treaty and stressed that the government will need international assistance to elaborate a good strategy in PGR management and use.

**The Second Day**
**16 October, 2007**

**Session IV. Conservation of PGRFA in Georgia**

**The second day of the meeting** began with a short presentation of **Dr. Calvin Qualset** (UC, Davis). To provide a framework for discussion for the Session 4, Dr. Qualset reviewed major types of collections of natural biodiversity (unmanaged open areas, managed nature reserves and parks, botanical gardens and arboreta) and agrobiodiversity (production fields on farms, seed banks, field plantations, botanical gardens and arboreta, tissue and cell culture) and listed priorities for discussion: (a) Coordinated national PGR conservation strategy, (b) Biodiversity and Agrobiodiversity inventory, (c) Continued collection of landraces and wild species, (d) Define and designate areas for in-situ conservation, (e) Establish or upgrade facilities,(d) Diversity and Bioinformatics Center, and (f) Coordinate with national and international gene bank centers

In his presentation, **Acad. Guram Aleksidze** (Agricultural Academy) reviewed the national program of conservation of plant genetic resources. The program is coordinated by the Academy of Agricultural Sciences. It consists of four components: *in-situ* conservation, *ex-situ* conservation, use of PGR and training. The academician briefly described the main *ex-situ* collections of the country and presented the structure and mission of the genebank, which was established at RI of Farming through support of ICARDA and continues to receive assistance from several international organizations. Acad. Guram Aleksidze reported on the PGR projects, seminars, workshops and trainings, which had been implemented or attended by Georgian scientists and concluded his presentation by formulating major objectives of the national PGR research: (a) research strategy development, (b) ITPGRFA ratification, (c) integration in AEGIS (European system of the genebanks), agreement with the Norwegian Genebank on the long-term storage of Georgian wheats, (d) raising public awareness, (e) use of PGR in breeding and (f) transformation of the Genebank of RI of Farming to the national genebank.

**Ms. Tamar Jinjikhadze** (Institute of Botany) reported about the PGR database, which had been developed through support of international centers and agencies. The database contains information on accessions stored at RI of Farming, RI of Horticulture, Viticulture and Wine-making and Institute of Botany. She briefly described the type and structure of information, which is entered and stored in the database.

**Acad. Petre Naskidashvili** (National Academy) presented a strategy of linking conservation and use of plant genetic resources on basis of his long-term wide hybridization research. He briefly reviewed the variability of wheat in Georgia, which, unlike Armenia, comprises only cultural forms and wild relatives were not found in Georgia. There are 14 wheat cultural species and subspecies (out of total 27) found in

Georgia. Out of them 5 species are endemic to our Country: *Triticum timopheevii, T. georgicum, T. cartlicum, T. macha* and *T. zhukovskii*. All 14 species and subspecies were studied and found vary variable in terms of polyploidy level and important agronomic traits (threshing, resistance to shattering, lodging, disease and pests). Special attention was given to the genes of necrosis and chlorosis. Such resources allowed for successful hybridization of the cultural species with *Triticum aestivum* and incorporation of adaptation genes in modern varieties of bread wheat.

During the discussion, which followed Session IV, **Dr. Mauricio Lopes asked** a question about the collection management and phytoquarantine system in the Country. **Acad. Guram Aleksidze** (Agricultural Academy) replied that there were curators for different crops at the genebank of RI of Farming, which had been trained by ICARDA and the other international research centers. As far as it concerns the phytoquarantine system, it is not functioning well as it was split by the decision of the government in two parts. Nowadays, the examination of the imported plant materials is carried out by the customs inspectors, while examination of the exported plant materials is made and import permits are released by State Department of Veterinary and Food Safety, which is subordinated to Ministry of Agriculture. The Ministry of Agriculture is responsible for policy formulation. Unfortunately, the linkages between the ministry and the customs are very week. **Ms. Mariam Gelashvili** (Ministry of Agriculture) expressed her appreciation with the work carried out by research institutions and mentioned that it had been unknown to her and very likely to other Ministry Staff. She considers it as a big gap, which needs to be eliminated through better communication between the ministry and the research institutions. **Acad. Guram Aleksidze** (Agricultural Academy) replied that he made a presentation on the PGR program at the ministry a couple of years ago and the deputy ministries promised to convince the decision-makers to increase support to the research institutes dealing with conservation and utilization of PGR. Unfortunately it did not happen. The former Minister of Agriculture had been invited to a big meeting at ICARDA headquarters, but he did not go. **Dr. Zurab Iakobashvili** (UMCOR) raised the issue of modern methods of characterization of PGR. **Acad. Guram Aleksidze** (Agricultural Academy) noted that several Georgian researchers had been trained in molecular characterization of PGR and molecular labs had been purchased for RI of Horticulture, Viticulture and Wine-making and RI of Plant Immunity through international cooperation projects.

**Session V. Use of PGRFA in Georgia**

**Dr. Calvin Qualset** (UC, Davis) provided examples of use of natural and agricultural biodiversity. Extractive and sustainable harvest, controlled grazing, and biodiversity monitoring and research are major issues for natural biodiversity. Agricultural biodiversity deals mostly with landraces and improved varieties. For sustained on-farm use of landraces, it is necessary to maintain landrace populations for on-farm and plant breeding, and promote crop/varietal diversity and land rotation in the farming systems and provide for pest monitoring and control. For sustained use of improved varieties the following issues should be discussed: maintain diversity of varieties, avoid monocultures, monitor pests and diseases, stabilize markets, use landraces in breeding programs, role of public plant breeding programs and role of private sector breeding programs.

**Dr. Zurab Jinjikhadze** (Research Institute of Farming) informed about the results of the field crop germplasm program of RI of Farming. He highlighted the major

challenges and objectives in wheat, barley, maize, food legume and vegetable production and breeding, and presented the list of evaluated and released varieties in Georgia. The institute has developed about 80 varieties of field crops (including 10 wheat, 11 barley, 17 maize, 7 soybean and 8 common bean varieties) and vegetables (including 4 cabbage, 3 tomato and 3 onion varieties). Nowadays, it employs 44 persons, out of which 14 are plant breeders). The institute is involved in international cooperation. Joint research projects are carried out together with ICARDA and CIMMYT. ICARDA has assisted the institute in establishment of a genebank. Several high-yielding wheat lines were selected from Turkey-ICARDA-CIMMYT material and one of them was released (Mtskheta-1). CIMMYT subtropic maize germplasm was found to combine well with the Georgia varieties and promising parent combinations have been identified for which multiplication of inbred parents has been initiated. Among the constraints that limit efficiency and impact of the breeding programs are (a) obsolete machinery and equipment, (b) low purchasing power of farmers, and (c) inefficient variety release system in Georgia. He advocated the dissemination of good practices, training field days, and traveling workshops to promote capacity building

**Dr. Larissa Vashakidze** (Research Institute of Horticulture, Viticulture and Wine-making), in her presentation on the breeding program of the institute, spoke about the major research directions, which include (a) acquisition, conservation and evaluation of local forms and varieties of grapevine and fruits (stone and seed fruit crops), assessment of their diversity, agronomic and technological characteristics (b) introduction and evaluation of foreign varieties and forms, (c) identification of parents and development of new varieties, and (d) elaboration of recommendations for farmers on the variety use by agricultural zones. Within international collaboration projects and to address specific needs of the germplasm conservation, the institute also evaluates varieties according to the UPOV requirements, completes passport data using international descriptors, maintains a database for grapevine and fruit crops, propagates collection to establish duplicates and re-introduces lost germplasm from foreign collections. Dr. Vashakidze presented officially released local and introduced grapevine and fruit crop varieties, described economic impact of introduction of new Georgia-USA hybrid Phylloxera resistant rootstocks, briefed about effect of induced mutagenesis in grapevine, and described the results of cytology and embryology research. Dr. Vashakidze requested the representative of the Ministry of Agriculture to help the institute in maintaining a collection of local grapevine varieties, which is to be moved to a new site as the land was sold to a private company.

**Ms. Mariam Jorjadze,** Director of the Association of Bio-farmers ELKANA, presented the main activities of the association, which are directed at promotion of organic agriculture and agro-tourism in Georgia. She briefly described the local legislature and highlighted importance of organic agriculture for such a small but environmentally diverse country as Georgia, with numerous small-scale farms, whose chances to compete on international commodity markets are low. Ms. Jorjadze emphasized role of local agrobiodiversity for development of organic agriculture and agro-tourism and presented results of the ELKANA projects on the use of agro-biodiversity in South Georgia (GEF/UNDP) and the development of agro-tourism in Georgia (SDC). The agro-biodiversity project multiplies and disseminates planting material and seed of local crops such as wheat, barley, rye, millet, chickpea, lentil, pea, vetch, flax, apple (22 varieties) and pear (18 varieties), which are grown by more than 120 farmers. The number of the farmers is growing fast as ELKANA assists them in packaging and selling their products. The agro-tourism project, which had been

recently launched, found significant interest among the local farmers and stressed the need for local varieties, as consumption of local food and wine are an important components for agro-tourists in any country.

**Dr. Zurab Iakobashvili,** UMCOR, in his brief presentation, compared the state of plant breeding research in late 1980-s with that of the recent period. From his point of view, there is a drastic decline in funding of research, number of the released varieties and published papers. However the country has changed and it is necessary to look for new approaches to the agricultural research and plant breeding. The role of farmers has increased significantly during the last few years. There is a seed farm in Marneuli district; its director is Mr. Kakha Lashkhi, who cooperates with local researchers very closely and has achieved great success in promoting and selling seed of the locally developed and selected field crop varieties. A different approach has been chosen by Mr. Soso Okruashvili a Sartichala farmer, who invested in the Petkus "state-of-the-art" seed processing plant, imports high generation seed from abroad for multiplication and promotes foreign field crop varieties. Both farmers are very successful, which demonstrates importance of private initiative and educated farmers in seed production and breeding. However, there are still many issues, which require state support and funding as private sector is not able to take over of many important components of the PGR system such as acquisition and conservation, pre-breeding, variety protection and release, etc. Dr. Calvin Qualset could agree that public investment is very important for plant breeding even in USA, where cooperation between the public and private sectors is the basis for sustainable agricultural research and production.

The ensuing discussion concentrated on importance of having a reliable system for variety testing, plant health protection and biosecurity. Dr. Diana Dzidziguri (Tbilisi State University) commented that many farmers that import varieties from abroad are not aware of their origin and methods used for their development. The participants also touched the issues of strengthening cooperation between the private and public sectors. Ms. Jorjadze commented that ELKANA uses collections of Institute of Botany and Agricultural University as sources of seed for multiplication and that public researchers are actively involved in implementation of the agro-biodiversity project in South Georgia.

**Session VI. National Cooperation and Institutional Links**

**Dr. Qualset** (UC Davis) briefly introduced the concept of the coordinated national PGR activity, which requires concerted effort on many issues including UPOV and intellectual property management, CBD Access and benefit-sharing legislation, International Treaty for PGR ratification, human resource development, innovative financing, etc. While essential components of a National Program for PGR Conservation and Use are: (a) legal support: permits, MTAs, IPR; (b) acquisition: field collections, introductions; (c) information management: passport, taxonomy, morphology, molecular markers; (d) plant/seed health: inspection, quarantine, pathogen elimination; (e) conservation: cold storage, field planting, in-vitro; (f) seed viability testing; (g) regeneration: plantings from collected seeds or plant materials; (h) evaluation and research: genetic diversity, trait evaluation; (i) distribution: to researchers, plant breeders, international collaborators; (j) utilization: varieties bred and distributed and (k) impact evaluation: value of varieties to farmers, seed/plant distributors, and consumers

**Dr. Zoia Sikharulidze,** Chair of the Board of RI of Plant Immunity, briefly described the main research activities of the RI of Plant Immunity: plant diseases surveys (surveys of crop fields, determining disease incidence and severity, sampling and identification of pathogens), pathogen population genetics (pathogen risk determination), germplasm screening and culture collection (mainly fungi). Through international cooperation (Central Science Lab of UK), the institute managed to purchase a molecular lab and use new molecular biology methods for improved plant diseases diagnosis and screening of virulence markers and assessment of the genetic diversity of pathogens. Several years ago, the institute began cooperation with local and international plant breeding centers. The institute screens wheat germplasm of RI Institute of Farming and CIMMYT under field conditions and artificial inoculation for resistance to yellow, brown and stem rusts. A pathology research on Helmintosporium has been initiated together with the maize breeders from RI Institute of Farming. The cooperation proved to be successful as saved resources and provided for efficiency of screening process. RI of Plant Immunity began collaboration with Batumi University and Batumi Botanical Garden, which broadened the research agenda and attracted young scientists.

**Dr. Rusudan Dzidzishvili,** Dean of Agronomy Department of Agricultural University, briefly discussed the results of the reform of the Agricultural University and presented its new structure. She reviewed main research activities conducted by the faculty members of the Agricultural University. Dr. Dzidzishvili spoke in detail about the plant breeding curriculum and highlighted the necessity of cooperation between the Agricultural University and Research Institutes. The cooperation is especially important for hands-on training of students, student supervision, degree research and facilitation of employment for the graduates. In future, the Agricultural University is supposed to become a basis for consolidation of the agricultural research and extension and, therefore, the University will strengthen its efforts in research cooperation. Dr. Dzidzishvili concluded by listing the issues that are related to capacity building and strengthening cooperation with the private sector and require immediate attention to improve teaching process and competitiveness of the graduates in the labor market.

**Dr. Levan Ujmajuridze (**Head of National Center for Production of Planting Material) described the program of a recently established non-commercial legal entity "National Center for Production of Planting Material". Its purpose is to provide farmer with disease-free planting material of grapevine and fruit trees. Dr. Ujmajuridze highlighted the main problems of the fruit and grape growing sector of Georgia: aging of the plantations, obsolete varieties, unacceptable phyto-sanitary conditions, wide spread of virus and bacterial diseases, stock susceptible to phylloxera and viruses, varietal purity and ignorance of clonal breeding. The objective of the Center is to conserve local biodiversity of grape and fruits and establish collection plots, establish a modern farm with necessary facilities and multiplication of virus-free stock. The center has already purchased 54 ha of land near village Jighaura (Saguramo) to establish the farm and is going to import equipment for production of virus-free planting materials.

**Dr. Avtandil Korakhashvili (**Agricultural University) briefly introduced the legume research activities of the Agricultural University and discussed the importance of international cooperation to support agricultural research in Georgia. The Agricultural University maintains a collection of food legume germplasm, which includes 71, 33, 46 and 46 accessions of soybean, pea, chickpea and lentils, respectively. The number of

accessions of the legume grasses exceeds 400. Several varieties of food legumes have been released in Georgia during the last decade.

**Session VII. Breakout working groups, focused on five key topics identified in the preceding sessions**

Five themes were identified as topics for analysis by small working groups. The available participants divided themselves among the groups. Each group was provided with a questionnaire developed by the workshop organizers (Annex 3), which included questions on the national objectives, achievements, and weaknesses relevant to the respective topics. The working groups were also asked to list priorities, actions, and tools relevant to their topics that are needed for enhancing the whole system of PGR conservation and use in Georgia. The group discussions and preparation of group presentations continued through the end of the second day. The composition of the groups is given in Annex 4.

**The Third Day**
**17 October, 2007**

**Session VIII. Group presentations and discussion**

The third day began with groups presentations. A member of each working group reported on their results. A number of outcomes emerged relating to conservation and use of PGRFA, social-economic aspects, seed production, and coordination at national level. The discussions focused on providing useful and practical ways to improve conservation of PGRFA, creating a strong links between conservation and use as well as between breeding and seed production, and strengthening the coordination and cooperation on national, regional, and international levels for effective management of PGRFA. The role of different ministries, international organizations, agencies, the private sector, and NGOs in strengthening the use of PGR and PGR management systems was also discussed. The roles of the Ministry of Agriculture, Ministry of Education and Sciences and Ministry of Environment Protection were emphasized to be at the level of implementation of institutional reforms, enabling policies, and increased control and coordination functions. The participants called for strengthening agricultural NGOs to provide better extension services, contributions in public advocacy, and awareness rising. The private sector should be expected to invest more into PGR-related activities, marketing, market studies, and raising competitiveness through introduction of modern management methods, organic certification, etc. The role of research institutes and universities is mostly in PGR conservation, use, and related research and training. International organizations can be responsible for technical backstopping and donor support. Tabulated results of the working group discussions are given in Annexes 5 and 6.

**Session IX. Conclusions, recommendations, and draft outline of a proposal**

**Dr. David Bedoshvili** summarized the results of the group discussions and proposed an outline for a proposal on “Capacity Building for an Integrated System of Use and Management of Plant Genetic Resources in Georgia”. Workshop participants agreed with presented outline (see Annex 7) and it was decided that a group of the participants will continue working on the proposal and that the first draft would be distributed to the participants and critical inputs would be collected for incorporation in the proposal. The

final draft will be presented to the participants of Policy Dialogue Meeting, which will be held in November 2007.

**Recommendations of the Workshop**

The following general recommendations were distilled from the previous three days of presentations and discussions, and agreed upon by the participants:

- There is a need to enhance activities of both *in-situ* and *ex-situ* conservation, through improvement of quality of collections and information. It is crucial to enhance information and germplasm exchange between relevant institutions and international centers, as well as among collection-holder institutions and PGR users, and raise public awareness on the importance of PGRFA.
- There is currently a limited capacity for effective use of PGRFA in breeding; there is a need for strengthening the use of PGR for development of new high-yielding varieties resistant to abiotic and biotic stresses through capacity building (human resources and facilities) and application of modern breeding technologies; in parallel to this, there needs to be greater recognition for the contribution of breeders and a mechanism established to recognize breeders' rights.
- In the social-economic context, the effective use and management of PGRFA can be considered as a tool for improvement of livelihoods. There is a need for raising public awareness and improving the investment climate in the PGR area through the inclusion of PGR-related courses in the curricula of educational institutions and providing trainings for researchers, policy-makers, farmers, students, etc.
- A favorable environment for promotion of sustainable seed and planting material multiplication in Georgia should be created through provision of agricultural producers with access to quality seed and planting material, and training of seed producers in updated seed standards, seed production technologies, etc.
- There is a need to strengthen the national coordination and cooperation for effective management of PGRFA through mainstreaming of PGRFA conservation and utilization issues into the country's policy and enhancement of functions and activities of an inter-ministerial committee on PGR.

## Annexes

### *Annex 1: Workshop agenda*

**October 15, 2007 (Monday)**

| | |
|---|---|
| **09:30-10:00** | **Registration** |

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| **10:00- 10:25** | **Inaugural Session** |

*Chairpersons: Dr. Shota Chalaganidz (Academy of Agricultural Sciences) and Dr. Zakir Khalikulov (PFU/ICARDA-CAC)*

| | | |
|---|---|---|
| 10:00-10:05 | Welcome | Dr. Zakir Khalikulov (PFU/ICARDA-CAC) |
| 10:05-10:10 | Opening statement | Dr. Shota Chalaganidze, Acting President of Academy of Agricultural Sciences |
| 10:10-10:15 | Opening remark | Dr. Shuqri Japaridze, Ministry of Education and Science |
| 10:15-10:20 | Opening remark | Ms. Mariam Gelashvili, Deputy Head of Sectoral Development Department, Ministry of Agriculture |
| 10:20-10:25 | Opening remark | Dr. Mauricio Lopes, FAO |
| 10:25-10:30 | Opening remark | Mr. Mamuka Meskhi, FAO |
| 10:30-10:35 | Special remarks | Dr. Calvin Qualset, UCDavis, USA |

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| 10:35-11:00 | **Group Photo and Tea/Coffee Break** |

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| **11:00-12:00** | **Session I: The importance of crop production in Georgia** |

*Chairpersons: Dr. Shuqri Japaridze (Ministry of Education and Science) and Acad. Petre Naskidashvili (Academy of Sciences)*
*Rapporteur: Ms. Ana Gulbani*

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|---|---|---|
| 11:00-11:15 | The importance of crop production in Georgia: policy, availability of resources, technologies and legal framework | Ms. Mariam Gelashvili (Ministry of Agriculture) |
| 11:15-11:35 | Marketing opportunities for the Georgian crop producers and importance of varieties for successful marketing | K. Kobakhidze, ACDI/VOCA |
| 11:35-12:00 | General discussion | |
| **12:00-13:30** | **Session II: Introduction to PGRFA** | |

*Chairpersons: Ms. M. Gelashvili (Ministry of Agriculture) and Acad. G. Aleksidze (Academy of Agricultural Sciences)*
*Rapporteur: Ms. Ana Gulbani*

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|---|---|---|
| 12:00-12:20 | The review of PGRFA activities in the Caucasus | Dr. Zakir Khalikulov, ICARDA/PFU-CAC |
| 12:20-12:40 | Review of PGRFA Management and Utilization in Georgia | Acad. Peter Naskidashvili, Agricultural University |
| 12:40-13:00 | Survey of the national plant breeding and biotechnology | Dr. David Bedoshvili, PFU-ICARDA-CIMMYT, the Caucasus Sub-Office |
| 13:00-13:30 | General discussion | |
| 13:30-14:30 | **Lunch** | |
| **14:30-18:00** | **Session III: Policy framework for PGRFA conservation and use in Georgia** | |

*Chairpersons: Dr. Mauricio Lopes (FAO) and Dr. Rusudan Dzidzishvili (Agricultural University)*
*Rapporteur: Ms. Ana Gulbani*

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|---|---|---|
| 14:30-14:45 | Presentation by consultant | Dr. Calvin Qualset, UC Davis, USA |
| 14:45-15:05 | Implementation of Convention on Biodiversity in Georgia | Ms. Ana Rukhadze (Ministry of Environment and Natural resources) |
| 15:05-15:30 | Global Initiative in Plant Breeding | Dr. Mauricio Lopes, FAO |
| 15:30-16:00 | **Tea/Coffee Break** | |
| 16:00-16:20 | Status of the new crop variety protection system in Georgia | Mr. Zaur Chikadze (Saqpatent – National Patent Center) |
| 16:20-16:40 | Impact of regulations on PGRFA management and use. | Acad. Gogotur Agladze (Academy of Agricultural Sciences) |
| 16:40-17:40 | General discussion | |
| 17:40-18:00 | Organizational issues for the next day | |

## October 16, 2007 (Tuesday)

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| **10:00-11:20** | **Session IV: Conservation of PGRFA in Georgia** |

*Chairpersons: Acad. P. Naskidashvili (Academy of Sciences) and Dr. Zakir Khalikulov (PFU/ICARDA-CAC)*
*Rapporteur: Ms. Ana Gulbani*

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|---|---|---|
| 10:00-10:10 | Presentation by consultant | Dr. Calvin Qualset, UC Davis, USA |
| 10:10-10:30 | Status of the PGRFA conservation in Georgia | Acad. Guram Aleksidze (Agricultural Academy) |
| 10:30-10:45 | Inventory and documentation of PGRFA in Georgia | Tamar Jinjikhadze (Institute of Botany) |
| 10:45-11:05 | Strategies to link conservation and use of PGRFA | Acad. Peter Naskidashvili, Academy of Sciences |
| 11:05-11:20 | General discussion | |
| 11:20-11:45 | **Tea/Coffee Break** | |
| **11:45-13:15** | **Session V: Use of PGRFA in Georgia** | |

*Chairpersons: Acad. G. Aleksidze (Academy of Agricultural Sciences) and Dr. Bidzina Korakhashvili (Agricultural University)*
*Rapporteur: Ms. Ana Gulbani*

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|---|---|---|
| 11:45-11:55 | Presentation by consultant | Dr. Calvin Qualset, UC Davis, USA |
| 11:55-12:15 | Plant breeding research in RI of Farming | Dr. Zurab Jinjikhadze (RI of Agriculture) |
| 12:15-12:35 | Plant breeding research RI of Horticulture, Viticulture and Wine-making | Dr. Larisa Vashakidze (RI of Horticulture, Viticulture and Wine-making) |
| 12:35-12:55 | Traditional crop diversity and its importance for smallholding farms | Ms. M. Jorjadze, ELKANA |
| 12:55-13:15 | Strategies/efforts to link use of PGRFA and seed delivery | Dr. Z. Iakobashvili, UMCOR |
| 13:15-13:30 | General discussion | |
| 13:30-14:30 | **Lunch** | |
| **14:30-15:30** | **Session VI: National Cooperation and Institutional Links** | |

*Chairpersons: Dr. Tsiuri Chkhutiashvili (RI of Farming) and Dr. Mauricio Lopes (FAO)*
*Rapporteur: Ms. Ana Gulbani*

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|---|---|---|
| 14:30-14:40 | Presentation by consultant | Dr. Calvin Qualset, UC Davis, USA |
| 14:40-15:00 | Possibilities for cooperation of plant breeders and plant pathologists in wheat and maize breeding | Dr. Zoia Sikharulidze (Georgian Institute of Plant Immunity) |
| 15:00-15:15 | Importance of national cooperation for degree-training and research in plant breeding | Dr. Rusudan Dzidzishvili (Agricultural University) |
| 15:15-15:30 | The status of and modern approaches to planting materials production in Georgia | Dr. Levan Ujmajuridze (AgroCartu) |
| 15:30-15:50 | Linkages/cooperation on PGRFA at policy-making level | Dr. A. Korakhashvili, Agricultural University |
| 15:50-16:00 | General discussion | |

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| 16:00-16:30 | **Tea/Coffee Break** | |

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| **16:30-18:00** | **Session VII: Group discussions** |

*The workshop participants will be grouped in the following 5 groups according to their interests:*

**Group 1: Conservation of PGR**
**Group 2: Use of PGR**
**Group 3: Seed production**
**Group 4: Cooperation at the national level**
**Group 5: Socio-economic impact**

*The conference organizers provided the groups with the questions and presentation plan. The purpose of the group discussions is to identify issues and develop recommendations for the project proposal outline.*

## October 17, 2007 (Wednesday)

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|---|---|
| **10:00-18:00** | **Session VIII: Group presentations** |

*Chairpersons: Mr. M. Gelashvili (MoA) and Dr. Mauricio Lopes (FAO)*
*Rapporteur: Ms. Ana Gulbani*

| | | |
|---|---|---|
| 10:00-10:15 | Presentation by Group 1: Conservation of PGR | |
| 10:15-10:30 | Presentation by Group 2: Use of PGR | |
| 10:30-10:45 | Presentation by Group 3: Seed production | |
| 10:45-11:00 | Presentation by Group 4: Cooperation at the national level | |
| 11:00-11:15 | Presentation by Group 5: Socio-economic impact | |

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|---|---|
| 11:15-11:45 | **Tea/Coffee Break** |

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|---|---|
| **11:45-15:30** | **Plenary Session** |

*Chairpersons: Dr. Zakir Khalikulov (PFU/ICARDA-CAC) and Dr. Mauricio Lopes (FAO)*
*Rapporteur: Ms. Ana Gulbani*

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|---|---|---|
| 11:45-13:00 | Discussion of the group presentations | |

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| 13:00-14:30 | **Lunch** |

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|---|---|---|
| 14:30-15:00 | Summary of the workshop | Dr. David Bedoshvili |
| 15:00-15:30 | Closing Remarks | |
| | - Dr. Mauricio Lopes | |
| | - Dr. Calvin Qualset | |
| | - Dr. Zakir Khalikulov | |

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|---|---|---|
| **15:30-17:00** | **Official Ceremony on the occasion of the FAO World Food Day** | **Mamuka Meskhi, Assista FAO Representative in Georg** |

## *Annex 2: List of participants of the multi-stakeholder workshop*

| # | Family name | Name | Organization | Position | Address | Telephone | e-mail |
|---|---|---|---|---|---|---|---|
| 1 | Aleksidze | Guram | Presidium of Agricultural Academy | Vice-president | 13th km on David Aghmashenebil Alley, Tbilisi 0131 | 59 56 95 | guram_aleksidze@yahoo.com |
| 2 | Babunashvili | Raul | Union of Private Farmers | President | 142a Tsereteli Av. Tbilisi 0119 | 95 12 00 | office@gfu.ge |
| 3 | Baratashvili | David | Batumi Botanical Garden | Department Head | Mtsvane Kontskhi, Makhinjauri, Batumi | 7 -26 -57 | davit_batratshvili@yahoo.com |
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| 16 | Goliadze | Vakhtang | RI of Tea, Subtropic Crops and Tea Industry | Department Head | 1, Mecniereba Street, Anaseuli, Ozurgeti 3503 | 296 6 46 00 | |
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| 19 | Jakeli | Iosif | RI of Tea, Subtropic Crops and Tea Industry | Plant breeder | 1, Mecniereba Street, Anaseuli, Ozurgeti 3503 | 296 6 46 00 | |
| 20 | Japaridze | Shuqri | Ministry of Education and Science | Department Head | 52, Uznadze St., Tbilisi 0102 | 96 34 09 | shukrijaparidze@mes.gov.ge |
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| 22 | Jinjikhadze | Zurab | RI of Farming | Consultant/maize breeder | Tserovani Mtskheta 3300 | 26 13 06 | tamrikoj@yahoo.com |
| 23 | Jinjikhadze | Tamar | Institute of Botany | Researcher | 1, Kodzhori Highway, Tbilisi | 22 73 26 | tamrikoj@yahoo.com |
| 24 | Jorjadze | Mariam | ELKANA | PGR specialist | Delisi St. , Plot 16, Tbilisi 0177 | 53 64 85 | director@elkana.org.ge |
| 25 | Khalikulov | Zakir | CGIAR/ICARDA CAC | Consultant/Deputy Head | P.O. 4564, Tashkent, 100000, Uzbekistan | 998-71-137-21-69 | z.khalikulov@cgiar.org |
| 26 | Khutsishvili | Manana | Institute of Botany | Curator of the herbarium | 1, Kodzhori Highway, Tbilisi | 98 74 27 | |

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|---|---|---|---|---|---|---|---|
| 27 | Kobakhidze | Konstantine | Agvantage | Analyst | 39a, Chavchavadze Av., Tbilisi 0162 | 25 02 83 | kkobakhidze@agvantage.org.ge |
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| 29 | Lamparadze | Shota | Batumi University | Associated Professor | Qobuleti district, village wyavroka | | davit_batratshvili@yahoo.com |
| 30 | Lashkhi | Kakha | Lomtagora | Director | Lomtagora, Marneuli | 257 2 29 03 | |
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| 33 | Lopes | Mauricio | FAO | Senior Officer | Room C-778, Viale delle Terme di Caracalla, Rome 00100, italia | 39-06-5705-39-26 | Mauricio.Lopes@fao.org |
| 34 | Machavariani | Merabi | Institute of Forestry | Project Leader | 9, Mindeli Str. Tbilisi 0086 | 31 79 69 | biodiv@caucasus.net |
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| 44 | Rukhadze | Ana | Ministry of Environment and Natural Resources | Department Head (CBD FP) | 6, Gulua St., Tbilisi 0114 | 72 72 32 | biodepbio@moe.gov.ge |
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| 46 | Shengelia | Nugzar | Union of Private Farmers | President | 142a Tsereteli Av. Tbilisi 0119 | 95 12 00 | office@gfu.ge |
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| 50 | Vashakidze | Larica | RI of Horticulture, Viticulture and Wine-making | Researcher | 6, Gelovani Street, Tbilisi 0159 | 52 69 08 | larisa5@posta.ge |
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## *Annex 3: Questions and presentation outline for the working groups*

What is the main country objective in this particular area?
What are the main achievements, success stories?
What are the weaknesses and obstacles?
What are the priorities (not less than 3) in this particular area, please rank?
Suggested actions to implement the selected priorities?
Suggested tools to address each priority action?

| Priorities | Suggested actions | Suggested actions |
|---|---|---|
| | | |
| | | |
| | | |
| | | |

Role of different institutions in this particular subject:
ministries -
research org. -
communities -
private sector -
universities -
NGOs -
international organizations –

Specific questions

For Group 1 - priority crops for PGRFA conservation
For Group 2 - primary sources of PGRFA
For Group 2 - necessity of full scale breeding programs versus adaptation breeding
For Group 3 - awareness about applications Treaty and ratified Conventions
For Group 4 - incentive mechanisms to find financing sources
For Group 5 - importance of long-term policies in effective management and utilization of PGRFA
For Group 1 and 2 - how to strengthen linkages between stakeholders in conservation, use and seed production

## *Annex 4: Composition of the groups*

**Group 1 – PGR conservation**

Guram Aleqsidze – Academy of Agricultural Sciences;
Nino Eradze – Tbilisi Botanical Garden;
David Baratashvili – Batumi Botanical Garden;
Shota Laparadze – Batumi University
Levan Ujmajuridze- Agro-Cartu
Tamar Jinjikhadze – Institute of Botany;
Ana Devidze – RI of Farming, Genebank;
Ana Gulbani - RI of Farming, Genebank;
Larisa Vashakidze – RI of Horticulture, Viticulture and Wine-making;

**Group 2 – PGR use**

Peter Naskidashvili – National Academy of Sciences;
Liana Qirikashvili - RI of Farming;
Nana Chkhutiashvili – RI of Farming;
Nana Bitsadze – RI of Plant Protection;
Zurab Jinjikhadze - RI of Farming;

**Group 3 – Seed production**

Otar Liparteliani - RI of Farming;
Irakli Rekhviashvili – Asureti farm;
Pasha Vacheishvili - RI of Farming;
Nugzar Shengelia – Private Farmers Union;

**Group 4 – National cooperation**

Mariam Gelashvili – Ministry foi agriculture;
Zaur Chikadze – Patent Center of Georgia;
Nana Pantskhava – Patent Center of Georgia;
Avtandil Korakhashvili – Agricultural University;
Zoai Sikharuldze – RI of Plant Immunity;
Cira Miqatadze-Pantsulaia – Institute of Botany;
Diana Dzidziguri – Tbilisi State University.

**Group 5 – Socio-economic aspects**

Mariam Jorjadze – ELKANA;
Tsiuri Chkhutiashvili – RI of Farming;
David Bedoshvili – PFU/ICARDA/CIMMYT-Caucasus

## *Annex 5: Status of the PGR sector-based on the results of the group discussions*

| Group | Country objective | Achievements | Weaknesses |
|---|---|---|---|
| 1) PGR conservation | 1. Elaboration of the country strategy on PGR;<br>2. Strengthening PGR research;<br>3. Establishment of the National Genebank; | 1. Genebank at RI of Agriculture;<br>2. Georgian genetic resources stored at US National Center for PGR;<br>3. Field collection of grapevine at RI of Horticulture, Viticulture and Wine-making;<br>4. Duplicate collection at RI of Horticulture, Viticulture and Wine-making;<br>5. Wild species genebank at Institute of Botany<br>6. Collections at Botanical Gardens<br>7. On-farm conservation by ELKANA | 1. In-situ and in-vitro conservation is very week;<br>2. Weak cooperation between the public and private sectors;<br>3. Weak ex-situ duplicate collections;<br>4. No access to modern germplasm storage technology and characterization methods. |
| 2) PGR use | Development and introduction of high yielding, high quality, highly adapted, stable varieties | More than 150 grain, vegetable and feed crop varieties developed involving local genetic resources, out of which 80 varieties were widely used in production.<br>Numerous varieties of grapevine, seed and stone fruit, citruses, subtropic crops and tea. | 1. The breeding programs are idle or less effective.<br>2. Local germplasm is not used and emphasis is made on imported ready material;<br>3. The number of breeders declined.<br>4. Salaries are low; royalty and licensing fess are not collected.<br>5. No access to small-scale machinery, labs and equipment.<br>6. There no training and re-training program for plant breeders. |
| 3) Seed production | Provide agricultural producers with access to quality seed and planting material | By 1990s, the agricultural producers were provided with high quality seed and planting material | 1. The variety testing system doesn't exist anymore;<br>2. Un-tested and unknown varieties prevail in production;<br>3. Local Georgian varieties are not used;<br>4. No variety maintenance;<br>5. Quality of seed and planting material is not checked; no seed certification. |
| 4) National cooperation | Elaborate a policy that would strengthen coordination and cooperation on national, levels for effective management and use of PGRFA | Except for very few cases, the national cooperation on PGR is almost non-existent. | Weak awareness among high level policymakers about the PGR issues;<br>No policy or will to manage and use PGR;<br>No investment in the system of PGR management and use. |
| 5) Socio-economic impact | Strengthen sustainability of agricultural production and improve socio-economic status of farmers. | Georgia is signatory to CBD and other PGR-relevant treaties.<br>Certain interest of donors to support activities related to plant genetic resources conservation<br>General trend to infrastructural improvements in the country (roads, packaging, processing, etc.)<br>Practical experiences of work with farmers/on grassroots level. | Land fragmentation, lack of agricultural machinery<br>Laws on biosafety, food safety, access and benefit sharing doesn't exist; most of the existing laws related to the sector do not work in practice<br>Lack of farmers' cooperatives, lack of traditional knowledge among farmers; lack of modern professionals in agribusiness.<br>Low competitiveness of Georgia's Agricultural produce on internal and external markets<br>Lack of investments in agribusiness |

***Annex 6: Priorities, actions, and tools for the PGR sector based on the results of the group discussions.***

| Group | Priorities | Actions | Tools |
|---|---|---|---|
| 1) PGR conservation | Improved *in situ* and *ex situ* conservation<br>Improved information management<br>Collecting of local crop land races and wild relatives<br>Characterization of the accessions | Improved administrative and research activities<br>Germplasm exchange<br>Upgrade facilities and equipment; Training<br>Student and researcher exchange programs<br>International cooperation research projects | Improved National cooperation;<br>Improved coordination of the PGR conservation and research,<br>Improved linkages between Universities, research institutes and private sector |
| 2) PGR use | Development of improved varieties with tolerance to abiotic and biotic stresses and higher yield and quality. | Use of local and introduced germplasm in breeding.<br>Improved access to germplasm, application of modern breeding technologies | Characterization of genebank collections, upgrading equipment and machinery, international and regional cooperation, improved state support |
| | Capacity building. | Update skills and familiarize with modern methods, involve young breeders<br>Upgrade facilities, labs and machinery | Training (degree and non-degree), workshops, field days, hands-on training, exchange programs, increased state funding, donor support |
| | Strengthening protection of intellectual properties in plant breeding | Establishment of royalty collection mechanism. Inauguration of the PVP system at its full strength. | Training on IPR in plant breeding and PVP systems. Accreditation of the entities eligible for conducting DUS testing. |
| 3) Seed production | Increase quality of seed and planting materials | Strengthen phyto-quarantine, updated seed standards, upgrading equipment and labs or checking seed quality and seed fields. | Training of seed producers, phyto-quarantine inspectors and policy-makers. Purchase of equipment. |
| | Protect the local market from untested varieties and reduce the risks associated with unknown varieties | Conduct testing of imported and release varieties. | Restore variety release system |
| | Improvement of seed production practices | Maintain primary seed production at Research Institutes and facilitate commercialization of seed multiplication activities | Facilitate commercialization of seed multiplication through provision of credits and lowering taxation. |
| 4) Socio-economic impact | 1. Improve the investment climate in the PGR area and thereby raise productivity of agriculture in general | Revise existing regulations; elaborate and implement incentive schemes; improve law on cooperation | Workshops<br>Expert meetings<br>External consultancy |
| | 2. Improve competitiveness of Georgia's agricultural produce | Introduction of quality management systems;<br>Introduction of organic certification scheme;<br>Develop strategy to promotion products from local PGR to internal and external markets.<br>Product development activities and promotion events/fairs | Training, workshops, roundtables; experts' meetings<br>External consultancy; Market surveys<br>Business plans<br>Branding and awareness raising, networking |

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| | 3. Capacity building | Introduction of a scheme: research-extension-farmer | Training, field days, knowledge upgrade courses; internships, demonstration models; Inclusion of PGR-related courses in the curricula of educational institutions |
| | 4. Improve regulatory framework | Elaborate laws on biosafety, on access and benefit-sharing; activate laws on food safety | Capacity building for relevant staff in the Ministries<br>Workshops, roundtables, networking |
| 5) National cooperation | Establishment of a national legislature in compliance with the international requirements | Assessment of the PGR sector in the country and elaboration of a integral view. | Training, workshops, roundtables; experts' meetings<br>External consultancy |
| | Effective coordination and collaboration among various Ministries and Agencies relevant to PGR | Development of an inter-institutional agreement on coordination and distribution of mandates on PGR FA activities in Georgia | Establish and approve a Council on PGR FA. Discuss and define the structure and functions of the council |

## Annex 4.9: Draft Proposal Outline

### Capacity-Building for Efficient Management and Use of the Plant Genetic Resources in Georgia

### 1. Policy Awareness in Georgia

The public society is hardly aware of importance of the PGR system for agricultural development and food security and the global efforts directed on conservation and sustainable use of PGR undertaken by the international community. Many national strategies and policies must be connected to the global policy landscape, which is quite complex and, in many cases, poorly known and/or poorly interpreted to regional/national contexts.

Proposed actions:

(a) Advocacy materials need to be developed and used in diverse fora to raise awareness; preparation in Georgian language and dissemination of short and easy-to-read publications on PGR, PVP, IPRs, IT PGRFA, GIPB, WIPO, Cartagena Protocol, UPOV etc.

(b) Dissemination of positive experiences from other countries;

(c) Ratification of IT PGRFA by Georgia;

(d) Establishment of an advisory board on PGR including local and international experts.

### 2. Strengthening decision-making process in Georgia

Policy planning and reform is a necessary dimension of sound national governance for food security and sustainable agricultural development and there is an important role to play in advocating at the policy maker level to help governments develop national genetic resources and plant breeding strategies compatible with country needs. Many national strategies and policies must be connected to the global policy landscape, which is quite complex and, in many cases, poorly known and/or poorly interpreted to regional/national contexts. Also, national decisions on genetic resources, plant breeding and associated fields (like biotechnology) involve a range of public institutions and agencies, all of which need to work together to ensure effective country response.

Proposed actions:

(a) Updating the Georgian legislature in compliance with the national treaties;

(b) Decision support tools at the national level;

(c) Georgia participates in (becomes a pilot country for) GIPB

### 3. Policy Dialog and Coordination

National decisions on sustainable use of biological resources, access and protection of intellectual property, biological security, etc, have direct impact on use of Plant Genetic Resources for Food and Agriculture (PGRFA) and crop improvement programs. These decisions involve a range of public institutions and agencies, all of which need to work together to ensure that global developments related to access and use of biological resources contribute to country development. Therefore, continuous dialog and consensus building among ministries and agencies involved in biological resources policymaking and negotiations is essential to good governance, ensuring commitment to adequate policy formulation, coordination and implementation, as well as full

understanding of the legislative, regulatory and economic implications, as well as its effects on institutional capacity and human resource needs.
Proposed actions:
(a) Establishment of a national committee on PGR;
(b) Revising the national legal framework to promote cooperation;
(c) Identification needs for capacity building in different institutions to promote cooperation and coordination.

**4. Training and education in plant breeding and related biotechnology capacities**

There is now a need to develop capacity, including in pre-breeding and related biotechnologies, for national programs to be able to take advantage of new scientific advances that can increase the efficiency of crop improvement programs and widen the genetic and adaptability base of improved cultivars. Also, there is a pressing need to build and improve capacity in support to institutional consolidation, better organization and management of breeding programs and to strengthen links with delivery systems.

Actions:
(a) influence national leaders and donors to make the investment required to develop and maintain adequate plant breeding capacity;
(b) development of abilities and expertise in organization and management (in public, private and civil society settings), including capacities in priority setting and planning, related legislation and regulations, integration with technology transfer systems, etc.
(c) stimulate organization and consolidation of integrated efforts between universities and research institutes to ensure optimal use of limited resources while ensuring complementarities of programs;
(d) stimulate linkages with extension, outreach and education for farmers to facilitate more participatory approaches to plant breeding;

**5. Access to technologies in the form of tools, methodologies, know how and facilities.**

Technical opportunities are becoming available to improve the effectiveness and efficiency of plant breeding programs. These opportunities are based on the strengths of conventional breeding coupled to advances in the science of genomics, marker assisted breeding, bioinformatics, cellular and molecular biology, which provide tools and methodologies for addressing the need to strengthen the genetic base for biotic and abiotic stress tolerance, food quality and functionality. Valuable assistance to developing country programs in plant breeding and crop improvement could come from technology partnerships to provide conventional and new methodologies, shared laboratory facilities and guidance for finding solutions to constraints like environmental stresses, product quality, or human nutritional and health needs.
Actions:
(a) influence national leaders, decision makers and donors to develop, enhance and support adequate technology partnerships and alliances to enable the country to benefit from breakthroughs and advances in technologies applicable to crop improvement;
(b) establishing a centre of excellence with easily accessible facilities for training/research/source of information, etc, could be explored as a way to promote access and sharing of conventional and new methodologies, critical infrastructure, information and technological tools;
(c) promote public-private functions and responsibilities in relation to funding, development and sharing of technological innovation in developing countries;

(d) develop a networking approach to breeding and biotechnological research

**6. Facilitation of access to plant genetic resources that could widen the genetic and adaptability base of improved cultivars in the country.**

Accessions in the international collections are expected to increasingly become characterized for their valuable adaptability, productivity and quality enhancing traits to improve utilization and incorporation into active collections and finished products. Genetic resource partnerships would support efforts by the International Treaty on Plant Genetic Resources for Food and Agriculture and the Global Crop Diversity Trust (GCDT) to strengthen germplasm conservation, characterization and utilization by developing country breeding programs.

Actions:

(a) Develop and consolidate a process to influence national leaders, decision makers and donors to support adequate national genetic resources polices, in compatibility with international laws and regulations, in order to allow national breeding programs to benefit from global efforts and opportunities towards facilitated access and use of genetic variability;

(b) Stimulate and support national capacity building programs directed to improve managers and leaders' skills and knowledge to interpret and respond to international norms, legislations and regulations related to access and exchange of genetic resources;

(c) Participate and support efforts of the international centers on characterization of germplasm collections for their productivity enhancing traits, including tolerance to biotic and abiotic stresses, enhancing nutritional and yield quality, and fortifying primary products with trace elements, minerals and vitamins;

(d) Improve quality and accessibility of the information on genetic resources as means to facilitate access, exchange and benefits to crop breeding and improvement programs.

**Annex 4.10**

**Report of Policy Dialogue Workshop, 20 November 2007, Tbilisi, Georgia**

**International Center for Agricultural Research in the Dry Areas (ICARDA)**

**Proceedings of the**

**Policy Dialogue Workshop in Georgia:**

**Elements of a National Integrated Strategy for Plant Genetic Resources Management and Use**

**20 November 2007**
**Tbilisi, Georgia**
Contents



## Background Information

The International Center for Agricultural Research in the Dry Areas (ICARDA), with the support of Food and Agriculture Organization (FAO) of the United Nations, organized a Policy Dialogue Workshop "Elements of a National Integrated Strategy for Plant Genetic Resources Management and Use" in Tbilisi, Georgia, November 20, 2007.

The workshop was preceded by a study "Elements of National Integrated Strategy for Plant Genetic Resources Management and Use in Georgia" that had been conducted by International Consultant Dr. Calvin Qualset (University of California, Davis) in early October 2007 and by a three-day multi-stakeholder workshop[8] organized by ICARDA, held in Tbilisi, October 15-17, 2007.

[8] Elements of a national integrated strategy for plant genetic resources management and use. Proceedings of the Multi-Stakeholder Workshop. Tbilisi, 15-17 October 2007. ICARDA. 32 p.

In his study, the International Consultant (Dr. Qualset) covered all aspects related to conservation, improvement, and use of plant genetic resources (PGR), including the the status of conservation and use of plant genetic resources in Georgia, regulatory frameworks, technology transfer and adoption, capacity building and collaborations. During the multi-stakeholder workshop, he presented his observations and some of his policy recommendations. The participants of the multi-stakeholder workshop (representing ministries, academies, research institutes, other governmental institutions, and private sector) presented their programs with accomplishments and limitations. They discussed the findings of Dr. Qualset's study and provided critical inputs to improve the study. The workshop participants participated in the elaboration of he elements for a project proposal for building capacity in the PGR sector. The multistakeholder workshop background materials were translated to Georgian language and circulated among the workshop participants and to the invited participants of the Policy Dialogue Workshop.

The purpose of the Policy Dialogue Workshop was to present the study of the International Consultant to the policy-makers from the key ministries (Agriculture, Education and Science, and Environment Protection and Natural Resources), the parliament Agrarian Issues Committee, Intellectual Property Protection Center, heads of the research institutes and universities, international organizations, nongovernmental agricultural organizations, and private farms to discuss a project outline for building capacity in the PGR sector, that was developed from the recommendations of the multistakeholder workshop.

ICARDA, in close consultation with FAO, provided technical and logistical support to the international consultant during his mission in Georgia, developed detailed agenda (Attachment 1), identified and invited participants for policy dialogue (Attachment 2) meeting, made all necessary arrangements for successful implementation of the project and worked closely with the participants of the stakeholder meeting to develop a project proposal outline (Attachment 3).

**Summary of the Workshop Sessions**

***Inaugural Session***

The inaugural session was co-chaired by Mr. Konstantine Khutsaidze, Deputy Head of Agricultural Development Department of Ministry of Agriculture and Dr. Kakoli Ghosh (Agricultural Officer, FAO). Introductory statements were made by the following representatives of their respective organizations.

**Mr. K. Khutsaidze (Ministry of Agriculture)** greeted the workshop participants and underlined the importance of the PGR policy for food security of the country and thanked international organizations for supporting agricultural development in Georgia. He spoke about the necessity to develop an appropriate national legal framework for management and use of plant genetic resources (PGR), which has to be in conformity with the international regulations and expressed his hope that this workshop would be productive.

**Dr. K. Ghosh (Agricultural Officer, FAO)** welcomed the participants on behalf of FAO and briefly touched the issue of the national strategy for management and use of the PGR, which has to be based on the national capacity. Dr. Ghosh emphasized the importance of the study, conducted by International Consultant Dr. C. Qualset, for

elaboration of the strategy and said that using experience of the developed countries in developing such a strategy could be a very productive approach.

**Dr. Z. Shkvatsabaia (the Agrarian Issues Committee of the Parliament)** greeted the workshop participants and thanked European Commission Delegation, FAO, ICARDA and other international organizations for participation in this effort. He also touched the urgent need to improve the legal framework and correct some mistakes that were made in the seed law two years ago. The Agrarian Issues Committee will support all efforts towards betterment of the legal framework and strengthening agricultural production in Georgia.

**Dr. Sh. Japaridze (Ministry of Education and Science)** welcomed the participants and spoke about the importance of education and fostering young generation through master and doctoral programs.

**Mr. Mamuka Meskhi (FAO)** greeted the participants and noted that the fact of planning and implementation of a PGR strategy project under the aegis of FAO and European Commission underlines the importance of such a strategy for development and food security of the country.

**Mr. I. Kartsivadze (Ministry of Environment Protection and Natural Resources)**, after greeting the participants, talked about Convention of Biological Diversity (CBD) and the issues that are important for its implementation in Georgia; the most urgent issues is access and benefit sharing legislature and the ministry is ready to participate in its elaboration.

**Dr. C. Qualset (UC Davis)** thanked the participants for support and participation and said that for him it was real pleasure to work in Georgia and see great enthusiasm among the breeders and other scientists involved in the PGR sector about their work. He also touched the issue of the national strategy, which has to include all major players, identify their roles, incorporate their interests and assign responsibilities among them. Dr. C. Qualset also emphasized the role of the ministries in the development of the national strategy on the use and management of PGR.

**Dr. David Bedoshvili (PFU/ICARDA/CIMMYT-Caucasus)** welcomed the participants, thanked representatives of the participating ministries, Parliament, institutes and other organizations and wished everybody a productive day.

***Session 1: Importance of the Plant Genetic Resources in the Agricultural and Environmental Policies of the Country***

**Dr. Qualset (UC Davis) - "Managing Plant Genetic Resources: Agricultural and Environmental Imperatives"**

**Dr. Qualset** began by emphasizing the difficulties and barriers on the way towards establishing an efficient PGR management and use system.

He discussed the definition of the PGR, which is the constellation of all genes in a species, a resource for potential use or an object of conservation such as plants, seeds, pollen, or cloned DNA. Conservation of plants growing in their native habitat is called in situ conservation. Samples of seeds or plant parts stored in controlled conditions which can be used to regenerate plants are considered as ex situ conservation.

Collections of cloned DNA representing all genes or specific targeted genes are in vitro collections. The functions of an ex situ genebank are collection of seeds or plants from native habitats, documentation, storage, characterization, evaluation, regeneration, and distribution.

While talking about the natural biodiversity, in situ conservation and use of wild progenitors and relatives of crop plants, forest trees, ornamental species, medicinal plants, and forage species were discussed and aesthetic value of biodiversity landscape was emphasized. In contrast, agrobiodiversity conservation implies both in situ and ex situ conservation of domesticated (crop landraces, improved varieties, locally bred varieties and varieties introduced from other countries) and non-domesticated (species in plantations for medicine, forage, or ornamental uses) plants; agrobiodiversity also includes mushrooms, plant associated microorganisms, such as pathogens (e.g. *Phytophtora*) and beneficial organisms (e.g. *Rhizobium*), and also soil-borne organisms, cloned DNA, etc.

If Georgia wants to manage and efficiently use its PGR, it is necessary to develop a national strategic plan for PGR management, develop an inter-ministerial-coordinated national program and assemble an advisory committee for plant genetic resources.

There are agricultural and environmental imperatives in Georgia, such as implementation of the Georgia National Biodiversity Action Plan and completion of the legal requirements for PGR access and benefit-sharing provisions of CBD and International Treaty on PGRFA.

To strengthen the PGR sector, it is necessary to (a) protect crop production and quality, (b) monitor pre- and post-entry plant and seed health, (c) update a seed multiplication system, (d) scale-up plant breeding of selected crops, and (e) collect, curate and conserve the plant genetic resources. It is vitally important for agricultural research to renew human resources, renew and consolidate physical facilities and develop a strategic plan for land use and disposal.

The environmental imperatives include (a) complete GIS mapping of ecozones, (b) adopt/develop globally adopted electronic bioinventory system, (c) update herbaria facilities and expand plant collections, (d) collect seed from populations of important species, (e) implement 2007 Forest Management Strategy, (f) adopt criteria for sustainable use of forest and grazing lands, and (g) update criteria and laws for ownership of forest and other natural diversity lands.

A future vision is needed to develop a good system for management of plant genetic resources for conservation and use, which is a complex and multidisciplinary enterprise. Because of crosscutting sciences and applications and commitment of the Georgian government to the reforms, it is an opportune time to consider a broad-based program for Georgia. For this, it is necessary to consider the efficiencies of a common campus or research park where the various institutes and other units can be co-located that can be shared by all specialties related to PGR and the related agricultural and environmental sciences. Such a campus would include modern laboratories, greenhouses, offices, conference rooms, seed storage and seed handling rooms, which would be convenient to various research groups. Nearby fields would accommodate plant breeding, PGR evaluation, and seed multiplication. The center would also accommodate undergraduate and postgraduate students for experiential activities. The

costs will be reduced as human resource management (payroll etc.) could be handled by a common office for all units. However, there are big challenges, such as location (multiple sites are needed for some activities), finance for development of the central campus (consider external development agencies for initial support; consider revenues from sales of excess agricultural or forest lands to provide construction funds). Also, reorganization of Ministry-delegated responsibilities may be necessary.

**Dr. K. Ghosh (FAO) "The Importance of International Instruments for Conservation and Efficient Use of PGR"**

**Dr. K. Ghosh (FAO)** reviewed international regulations, which are related to PGR and emphasized international instruments, which have been designed to promote efficient conservation and use of PGR in developing countries. One of the most important instruments is the Global Plan of Action (GPA) for the Conservation and Sustainable Use of Plant Genetic Resources for Food and Agriculture, which was approved in 1996 by 150 countries, including Georgia. There are 20 priority areas identified in the GPA, which are important for conservation and efficient use of PGR. Some of them are being implemented in Georgia by FAO and its partners, e.g. an integrated national PGR database, which is being developed by Institute of Botany.

Dr. K. Ghosh spoke about the International Treaty on PGR which includes the GPA as a supporting element and also Convention on Biological Diversity (CBD), which provides framework for conservation and use of biodiversity combined with equitable sharing benefits arising from use of the PGR. She also elaborated on the Cartagena Protocol to CBD, which is an important international tool to protect biodiversity from the potential risks posed by the transboundary moving of living modified organisms, resulting from modern biotechnology. It establishes an advance informed agreement procedure for ensuring that countries are provided with the information necessary to make informed decisions before agreeing to the import of such organisms into their territory. Dr. K. Ghosh expressed hope that the workshop would manage to bring the issues of PGR policy to the government's attention and facilitate better coordination at the national level.

**Discussion**

**Ms. Mariam Jorjadze (Elkana)** supported Dr. Ghosh's assessment of the importance of Cartagena Protocol, while Mr. I. Kartsivadze (Ministry of Environment Protection and Natural Resources) reminded the participants that the Ministry had submitted a proposal to ratify the Protocol to the Parliament twice, but the Parliament rejected it as a result of debates.

**Mr. Raul Babunashvili (Private Farmers Union)** emphasized the need for traditional varieties as some farmers want to grow them and cannot obtain seed. This should be an important topic for local plant breeders and germplasm conservation specialists.

**Ms. M. Jorjadze (Elkana)** remarked on the International Treaty on Plant Genetic Resources for Food and Agriculture (IT PGRFA) and said that a national regulatory framework is needed to speed up ratification and implementation of this treaty and protect farmer rights.

***Session 2: Presentation and Comments on the National Study and Policy Recommendations***

**Dr. Calvin Qualset (UC, Davis)-"Enhancing the Efficiency of the PGR Conservation and use Through Better Policies, National Cooperation and Capacity-Building"**

**Dr. Qualset** reported on the main findings of his study. From his point of view, there are plenty of challenges at the national and institutional levels that need to be addressed to enhance efficiency of the PGR conservation and use in Georgia. There is an urgent need to create and implement a National Program for PGR Management and Use (through multi-ministry collaboration) and to establish an administrative coordination office for international relations and formal protocols for exchange of genetic resources. In the first place, the legal review should be carried out to harmonize national laws related to PGR management and revise current policy regarding the early multiplication of seed and plant materials of new locally bred and introduced varieties.

Ratifying of the International Treaty on Plant Genetic Resources for Food and Agriculture and enacting of the legislation on access and benefit-sharing provision of the Convention on Biological Diversity could promote development of the enabling legal framework for PGR use and management. The CBD-compliance is complex and needs elaboration of many issues, such as access and benefit-sharing, monitoring and enforcement, ownership of genetic resources, biodiversity conservation, intellectual property rights, and protection of traditional knowledge. To improve linkages and coordination among the different stakeholders, it is necessary to clarify roles of various units in addressing PGR issues, such as plant quarantine; enhanced collaboration among institutes in bioinformatics, and molecular markers, support to private sector stakeholders in introduction of new crops and new varieties, reinstate multi-site evaluation of introduced and new crop varieties, and enhanced training of university students in practical agriculture with internships at research institutes and other agricultural organizations. There are significant resources at the international level that can be used to promote reforms and efficient use of PGR in the country. It is desired to expand collaboration with CGIAR centers (ICARDA, CIMMYT, ICRISAT, ILRI, CIP, Bioversity), Advanced Research Institutes, national agricultural research systems in the Central Asia and Caucasus countries and others, continue collaboration with international PGR programs for collecting, storage, and exchange of genetic resources.

For such an important program, Georgia should seek financial support by collaboration with international funding agencies and foundations: World Bank, SIDA, USAID, USDA, Global Crop Diversity Trust, UNEP, and many others. Capacity-building is related to considerable efforts to enhance human resources through in-service training, sabbatical leaves to improve research and teaching capabilities, and creation of incentives for educational advancement and retention of employment in Georgia by means of creation of new positions based on the strategy for PGR.

More efficient use of physical resources can be achieved through a "Consolidated Agricultural and Environmental Sciences Research and Education Center". Its new or renovated laboratories, greenhouses, and plant growth chambers can be used by other agricultural scientists or degree-students for research purposes. Such a center could harmonize the land needs for seed production, conservation, and research and provide for higher quality trials through use of modern field plot machinery. There should be a

way to provide for financial sustainability of the PGR-system through public funds, collecting royalty fees and fees for variety and product testing, grants from national and international benefactors, and generating income from product sales, such as foundation seeds.

**Questions and General Discussion**

**Acad. Petre Naskidashvili (Academy of Agricultural Sciences)** wanted to know which agency should be responsible for testing imported germplasm in Georgia from the Dr. Qualset's point view. Dr. Qualset replied that agricultural research institutes are supposed to test imported germplasm, which should be funded by the government. Acad. Petre Naskidashvili briefly talked about diversity of environment and agricultural crops in Georgia and stressed the endangered status of the local traditional and aboriginal varieties and the problems that resulted from cancellation of the state service for variety testing and release. It is not possible that research institute conduct variety testing as they are itself breeding varieties and they can be biased in their assessments.

**Dr. Rusudan Dzidzishvili (Georgian State Agricultural University)** mentioned that it was necessary to underline the role of education and the importance of participation of the Agricultural University in research and evaluation programs of the research institutes so that their infrastructure is fully used for educating the young generation.

**Dr. Temur Dekanosidze (RI of Viticulture, Horticulture and Wine-making)** talked about his institute, which has long history of involvement in PGR-related research and is the leading research center in management of plant genetic resources of perennial crops in Georgia with internationally recognized achievements. It maintains one of the largest collections of grapevine, which includes as many as 500 local forms and varieties. The Institute has received equipment for a modern molecular laboratory, which is being installed at present. This will broaden the research agenda of the institute, which can proceed with study of biodiversity of the perennial crops at the molecular level. This should be taken into account while developing a strategy of PGR management and use.

**Dr. Merab Machavariani (RI of Forestry)** highlighted two issues in the Dr. Qualset's presentation. The first issue was related to establishment of an administrative coordination office for international relations, which could have much higher impact if all participating ministries are represented there. The other issue is establishment of a research park (campus), which requires assessment of available infrastructure in the country and only after that we can make a correct decision.

**Dr. Tsiuri Chkhutiashvili (RI of Farming)** reviewed the research program of the Institute of Farming and highlighted its three components: conservation, plant breeding and seed production. The mandate crops of the institute are field and vegetable crops. The institute has several research stations, which carry out yield trials and multiply seed. The Institute considers strengthening links between its breeding programs and producers as the key issue for achieving impact on production. Dr. Chkhutiashvili emphasized that the institute cooperates closely with international organizations such as ICARDA and CIMMYT, while linkages with the local research institutions are very weak. Dr. Ghosh (FAO) thanked Dr. Chkhutiashvili for a very informative and detailed remark and asked her whether the local farmers used the varieties developed by the breeders of the institute. Dr. Chkhutiashvili noted that the institute had released about

80 varieties of field and vegetable crops in total and that these varieties had been highly used in production by the state farms in the past. At present, the situation has changed, the private sector has formed and numerous private farmers have fledged for which new approaches should be found. She concluded that strengthening cooperation with the growing private sector should be a priority for a strategy on PGR manage and use.

**Dr. Sh. Japaridze (Ministry of Education and Science)** supported the idea of establishing a consolidated center, as proposed by Dr. Qualset in his presentation. Such a center can coordinate research related to plant breeding, participate in legal framework improvement, facilitate new technology transfer, contribute in education of young generation and re-training of researchers, and evaluate imported germplasm.

**Ms. A. Rukhadze (Ministry of Environment Protection and Natural Resources)** mentioned that plant genetic resources also include biological diversity of pastures, forests, wetlands, mountains, lakes and desert, and therefore the issues of their protection should be addressed in the strategy. Dr. K. Ghosh (FAO) replied to the latter remark by emphasizing FAO's approach to strategy development through national consensus and that the policy recommendations should be based on the views of as many stakeholders as possible.

**Ms. Mariam Jorjadze (Elkana)** considered the issues that were raised in the Dr. Qualset's presentation as very important and noted that efficiency of PGR management and use in Georgia can be improved through addressing these issues. National cooperation and right vision are very important for developing a right strategy. A good strategy document should contain not only expected results, but also consequences of not having implemented of such a strategy.

**Dr. Levan Ujmajuridze (Agro-Cartu)** discussed the issues of deficit of certified seed and sapling material, aged plantations and vineyards, unacceptable phyto-sanitary conditions and irrational farming practices in Georgia. From his point of view, all these issues should be addressed in the strategy. The Agro-Cartu National Center of Multiplication of Planting Material has begun working towards production of quality saplings. He reviewed the programs of grapevine, fruits, vegetables and potatoes and added that Georgian farmers would be provided with certified planting material soon. Many international experts have been hired by Agro-Cartu to help with launching the production.

**Dr. Gia Gagoshidze (Georgian State Agricultural University)** spoke about the need to establish exchange programs for students and faculty with western and international centers, which will update skills and facilitate technology flow from the developed countries. Dr. K. Ghosh (FAO) supported the latter proposal and emphasized that University of California (Davis) could be an excellent place for re-training Georgian researchers.

**Mr. Zurab Neparidze (Sakpatent)** thanked Dr. Qualset for his presentation and stressed that the presentation incorporates the most important priorities of the country and right assessment is given to the issue of intellectual property rights in plant breeding. All private initiatives in plant breeding require legal protection, which will facilitate growth of private investment.

**Mr. K. Khutsaidze (Ministry of Agriculture)** underlined that the strategy describes in detail all issues related to management of PGR. There is a need to establish a coordinating commission that will coordinate efforts of all three ministries. The international experience must be used to avoid waste of time. To facilitate development of seed and sapling material production, certification service should be restored. Unfortunately, the state variety release agency has been cancelled and the present law does not require the importers to test the imported varieties. The working group, which will work on the strategy, should demonstrate clearly the expected impact from implementation of the strategy and negative consequences of not having such a strategy. Only with such justification can obtain support at the national level.

**Mr. Iveri Akhalbedashvili (Parliament)** added that it was necessary to establish a decision-making mechanism and consider international experience.

***Session 3: Presentation and Comments on the Project Proposal***

**Dr. David Bedoshvili (PFU/ICARDA/CIMMYT-Caucasus) - Capacity-building for an Integrated System of Use and Management of PGR in Georgia** (Project proposal presentation)

**Dr. D. Bedoshvili** presented a project proposal, the outline (Attachment 3) of which was prepared based on the results of the Dr. Qualset's study and on the conclusions of the multi-stakeholder workshop, which was conducted in October 15-17, Tbilisi. The speaker proposed to formulate a goal that would harmonize objectives and activities in the proposal. As it was stressed many times by the participants, Georgia is an agricultural country, where about 50% of the population lives in the rural areas and work in the agricultural sector. Georgia is very rich in biodiversity and its plant genetic resources have global importance. Therefore, it can be proposed as the goal of the proposal that Georgia become the leader in the region in PGR conservation and use for food security and development.

To achieve this goal, three objectives were identified by the first workshop participants: (1) policy awareness, national policy framework and coordination, (2) capacity-building at the research and education level and (3) improved access to PGR collections and its efficient use.

It is proposed to promote policy awareness through (a) translation and dissemination of advocacy and awareness information, publications, country reports and success cases of policy coordination and implementation; (b) training of policy-makers on international treaties related to management of PGR and (c) study tours to developed countries with the well-managed PGR system.

To improve the legal framework, it is necessary to review and revise the existing national biodiversity plans, laws, quarantine regulations, variety protection and release, seed policies, biotechnology policy, biosecurity policy etc. and make them consistent among each other and compliant with international regulations and develop and implement access-and-benefits-sharing legislature. Coordination and decision making can be improved if the Ministry of Agriculture, in coordination with the Ministry of Environment and Natural Resources and Ministry of Education and Sciences establishes (a) a PGR-management unit with defined vision, goal and objectives; (b) identifies participants from all sectors and develops and implements a mechanism to support policy dialogue and effective coordination; (c) identifies the administrative

needs and assigns functions of each component to a responsible agency or organization; (d) and elaborates a National plan (implementation strategy) for the PGR Management and Use.

The most cost-effective way to upgrade facilities for PGR conservation, strengthen degree and non-degree training and facilitate technology transfer is to establish a center of a scientific excellence – Conservation, Molecular Diversity, Plant Breeding, Plant Pathology and Bioinformatics Center. The Center would have staff offices to support the PGR functions, controlled environment facilities for active and permanent collections of seeds, tissue and cell culture, transfer labs and controlled temperature and light chambers for maintaining plantlets, laboratories for molecular analysis for diversity and plant breeding and computer labs for managing and collecting data. Greenhouses and adjacent field facilities would be essential for the Center and the affiliated Research Institutes for field observations, yield trials and collection regeneration. Conference rooms and a lecture hall would be available in the Center or Research Institutes. This campus would provide efficiency in many aspects of research operations, such as procurement, physical plant maintenance, library, payroll management and so on. It would promote cooperation with universities for student internships and advanced degree training. The complementary activities should include promotion of international cooperation for technology transfers and strengthening linkages among the agricultural university, the biodiversity center and agricultural research institutes.

To improve efficiency of plant breeding programs, it is necessary to enhance quality of germplasm characterization through provision of training and improving facilities, update skills of the plant breeders, provide them with modern plot-planting machinery, facilitate multi-disciplinary approach, provide farmers with information on improved varieties and involve them in joint variety evaluations and demonstrations. (Please refer to attachment 3 for more details).

There are significant resources in the country that can be used for building an efficient system of PGR conservation and use. There is a Georgian government's commitment to reformation of the agricultural research system and enhancing the agricultural research in the country. Investment of revenues received from the sale of state property would be one source of funding, while on-going Ministry funds would be another. Besides, grants from international development agencies such as EU, FAO, World Bank, SIDA, USAID, USDA, Global Crop Diversity Trust, UNEP, and many others can be obtained for such an important project. The proposal contains considerable activities to enhance human resources, which could be accomplished through collaboration with FAO, CGIAR centers (ICARDA, CIMMYT, ICRISAT, ILRI, CIP, Bioversity), Advanced Research Institutes, etc.

**Questions and General Discussion**

**Acad. Petre Naskidashvili (Academy of Agricultural Sciences)** commented that it was necessary to specify in the proposal that the seed laws should be revised to restore variety testing and seed certification.

**Dr. M. Machavariani (RI of Forestry)** wondered who was supposed to proceed with further development of the strategy. Dr. David Bedoshvili (PFU/ICARDA/CIMMYT-Caucasus) replied that the strategy, which will be based on Dr. Qualset's policy

recommendations, should be completed through national consensus and, therefore, it is proposed that the participants of the policy-dialogue workshop form a group, which will continue to develop the elements of the national strategy.

**Mr. K. Khutsaidze (Ministry of Agriculture)** emphasized the need to develop a proposal through national consensus, but the Ministry of Agriculture could be considered as the project recipient organization. He also discussed the necessity to restore the variety testing system and emphasized, that it can be done by research institutes together with farmers. Mr. Kakha Lashkhi, the farmer, who is participating in the meeting, represents an excellent example of cooperation with local researchers. He conducts joint evaluations of the varieties and is very successful in seed production.
**Dr. M. Machavariani (RI of Forestry)** discussed possibilities of establishment of Conservation, Molecular Diversity, Plant Breeding, and Bioinformatics Center under aegis of the Ministry of Agriculture.

**Ms. M. Jorjadze (Elkana)** mentioned that the proposal should include a separate component for farmers as they are the major users of PGR.

With regards the idea of a research Center, there were differences in opinions on the rationale, necessity and duplication. **Dr. Temur Dekanosidze (RI of Viticulture, Horticulture and Wine-making)** mentioned that he would be against of consolidating of research institutes in one center. **Dr. D. Bedoshvili** replied that the idea of a center for biodiversity and bioinformatics does not mean consolidation of different research organizations in one legal entity, but it is emphasized that co-location of units at a common site, to the extent possible, would lead to high quality program and greater efficiency in administration and operations. There are excellent examples of cooperation that benefited from reducing costs without losing independence or merging facilities. One example is Nordic Genebank (NGB), which conserves plant genetic resources from all Nordic countries. Since the countries have refrained from building up own seed storage and documentation systems, a duplication of efforts has been avoided and a great saving of resources resulted from this co-operation. NGB's organizational structure and form of work has created a model that has attracted international attention and has served as a design for other regions. Dr. Qualset commented that he did not specify in detail the way of forming the center and talked about a joint campus or research park for several research institutions, which can use the facilities of the center.

**Mr. K. Khutsaidze (Ministry of Agriculture)** underlined that his understanding was that everybody was discussing the need, not the structural changes. There should be a way to accommodate everybody's interest and find an optimal structure for efficient agricultural research system.

**Dr. K. Ghosh (FAO)** thanked every one for the Study and the proposal outline. She felt that the proposed activities could be grouped in three levels: policy, institutional and research. A level should also be identified, which can include some of the activities from other components and be formulated as strengthening farmers' ability to use efficiently PGR. Successful implementation of a national program at all four levels can produce good results. However, elaboration of an integral strategy for PGR management and use is not a short-term work, while setting an efficient system for PGR conservation and use requires considerable investment in capacity and time. Therefore each of the components can be treated as separate project proposal in case

there are no funds available for implementation of the whole program. The National Study and the project proposal will be submitted to the Government of Georgia and FAO would be ready to assist in any future programmed developments. Dr. K. Ghosh requested that the National Study and the process through which the Study was developed must be incorporated in the Country Report, which is being prepared by Institute of Botany through a FAO-funded project within the Global Plan of Action, which implies completion of the PGR inventory and elaboration of a country status on PGR in Georgia.

**Dr. D. Bedoshvili** proposed that a Follow-up Working Group be established to look into the proposed proposal from all aspects, before it was finalized. There was a consensus that the groups should include representatives of the three ministries (agriculture, education and science, and environment protection and natural resources), four research institutes (RI of Farming, RI of Horticulture, Viticulture and Wine-making, RI of Tea, Subtropical Crops and Tea Industry and RI of Forestry, RI of Plant Protection), Georgian State Agrarian University, Elkana, National Academy, Intellectual Property Protections Center and Private Farm Lomtagora.

***Closing***

**Dr. K. Ghosh** thanked all participants for the interesting and productive day and underlined that strengthening the PGR sector to facilitate agricultural development is one of the major objectives of FAO. We all have heard many interesting discussions and opinions. This should be considered as the very first step towards building an efficient PGR sector in Georgia. However, it is a long-term effort and requires considerable investment.

**Dr. C. Qualset** said that it was great working with everybody and that enthusiasm of the Georgian stakeholders inspires him to work harder to complete his national study report and policy recommendations.

**Dr. David Bedoshvili** thanked all participants for support and promised to continue the effort to develop a strategy, which would accommodate the needs and interest of all stakeholders.

***Conclusions of the Workshop***

- The workshop participants found the Dr. C. Qualset's study findings are important and policy recommendations relevant.

- The participants affirmed in behalf of their organizations that it is imperative that Georgia fully develop a national policy and program for plant genetic resources conservation, management and use. It is also imperative that Georgia elaborates a plan for *ex situ* and *in situ* conservation of wild species in natural reserves and in collections.

- ICARDA will translate the Dr. C. Qualset study report to Georgian and disseminate it to all workshop participants, policy-makers and other stakeholders in the country.

- A follow-up working group will be established to look into the project proposal and policy recommendations and continue work to elaborate policy recommendations to develop an integrated strategy for efficient management and use of PGR. The document will accommodate interests of all stakeholders.

## Attachments

***Attachment 1: Policy Dialogue Meeting Agenda***

***"National Integrated Strategy for Plant Genetic Resources Management and Use"***
**November 20, 2007**
**Tbilisi, Georgia (Metekhi Palace, #20 Telavi Street, Hall Narikala)**

## Program

**09:30-10:00 Registration**

**10:00-10:40 Inaugural Session**

*Chairpersons: Mr. Konstantine Khustaidze (Ministry of Agriculture) and Dr. Kakoli Gosh (FAO)*

| | | |
|---|---|---|
| 10:00-10:05 | Welcome | **Mr. Konstantine Khustaidze,** Department Deputy Head, Ministry of Agriculture |
| 10:05-10:10 | Opening statement | **Dr. Shuqri Japaridze,** Department Head, Ministry of Education and Science |
| 10:10-10:15 | Opening remarks | **Mr. Ioseb Kartsivadze,** Department head, Ministry of Environment Protection and Natural Resources |
| 10:15-10:20 | Opening remarks | **Dr. Kakoli Ghosh,** FAO, Senior Officer |
| 10:20-10:25 | Special remarks | **Dr. Calvin Qualset,** UC Davis, USA |
| 10:25-10:30 | Special remarks | **Mr. Mamuka Meskhi**, FAO Assistant representative in Georgia |
| 10:30-10:35 | Vote of thanks | **Dr. David Bedoshvili**, PFU-ICARDA-CIMMYT-Caucasus |

**10:35-11:40 Session 1: Importance of the plant genetic resources in the agricultural and environmental policies of the country**

*Chairpersons: Dr. Shuqri Japaridze (Ministry of Education and Science) and Mr. Ioseb Kartsivadze (Ministry of Environment Protection and Natural Resources) (Rapporteur: Dr. Ana Gulbani)*

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|---|---|---|
| 10:35-10:55 | Managing plant genetic resources: agricultural and environmental imperatives | **Dr. Calvin Qualset** (UC Davis, USA) |
| 10:55-11:15 | The importance of international instruments for conservation and efficient use of PGR | **Dr. Kakoli Ghosh** (FAO) |
| 11:15-11:35 | Discussion of the presentations | |

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| 11:35-12:00 | **Group Photo and Tea/Coffee Break** |

**12:00 - 14:00 Session 2: Presentation and Comments on the Study and Policy Recommendations**

*Chairpersons: Mr. Konstantine Khustaidze (Ministry of Agriculture) and Dr. Kakoli Gosh (FAO)*
*Rapporteur: Ms. Ana Gulbani*

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| 12:00-12:20 | **Study presentation**:<br>Enhancing the efficiency of the PGR conservation and use through better policies, national cooperation and capacity building | **Dr. Calvin Qualset** (UCDavis, USA) |
| 12:20-13:00 | Questions and general discussion | |
| | **Comments**: | |
| 13:00-13:10 | Ministry of Education and Science | **Mr. K. Khutsaidze** |
| 13:10-13:20 | Ministry of Agricultural | **Dr. Sh. Japaridze** |
| 13:20-13:30 | Ministry of Environment Protection and Natural Resources | **Mr. I. Kartsivadze** |
| 13:30-13:40 | FAO | **Dr. Kakoli Ghosh** |
| 13:40-13:50 | ICARDA | **Dr. David Bedoshvili** |

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| 13:50–14:00 | Lunch |

**14:00 - 17:00 Session 3: Presentation and Comments on the Project Proposal**

*Chairpersons: Dr. Kakoli Ghosh (FAO) and Dr. Calvin Qualset (PFU/ICARDA-CAC)*
*Rapporteur: Ms. Ana Gulbani*

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| 15:00-15:20 | **Project proposal Presentation**:<br>Capacity Building for an Integrated System of Use and Management of PGR in Georgia | **Dr. David Bedoshvili** (PFU/ICARDA/CIMMYT-Caucasus) |
| 15:20-16:00 | Questions and general discussion | |
| | **Comments**: | |
| 16:00-16:10 | Ministry of Agricultural | **Mr. K. Khutsaidze** |
| 16:10-16:20 | Ministry of Education and Science | **Dr. Sh. Japaridze** |
| 16:20-16:30 | Ministry of Environment Protection and Natural Resources | **Mr. I. Kartsivadze** |
| 16:30-17:00 | **Tea/Coffee Break** | |
| 17:00-17:10 | FAO | **Dr. Kakoli Ghosh** |
| 17:10-17:30 | Closing remarks: **Dr. Kakoli Ghosh** (FAO),<br>**Dr. Calvin Qualset** (UC Davis, USA),<br>**Dr. David Bedoshvili**, PFU/ICARDA/CIMMYT-Caucasus. | |

## *Attachment 2: Workshop Participants*

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***Attachment 3: Capacity-Building for an Integrated System of Use and Management of PGR in Georgia (Proposal Logical Framework)***

| Objectives | Activities | Expected results |
|---|---|---|
| Component 1. National Policy Framework and Coordination | | |
| Objective 1.1 Promoted policy awareness | 1. Translate and disseminate advocacy and awareness information, publications, country reports and success cases of policy coordination and implementation;<br>2. Organize visits to developed countries with the well-managed PGR system. | • Complexity of international regulations understood and interpreted into local laws;<br>• IT PGRFA ratified;<br>• Georgia better controls its PGR;<br>• A PGR-management unit and the role of the Ministry of Agriculture in PGR policy strengthened.<br>• The major national players of PGR identified and lines of their responsibilities defined and a coordinating body established.<br>• Coordination and policy dialogue improved.<br>• The variety protection and release systems become functional and efficient;<br>• Public funding to support PGR-related research and conservation activities increased. |
| Objective 1.2 Improved local legal framework | 1. Review and revise the existing national biodiversity plans, laws, quarantine regulations, variety protection and release, seed policies, biotechnology policy, biosecurity policy etc. to make them consistent among each other and compliant with international regulations;<br>2. Develop and enact CBD access-and-benefits-sharing legislation. | |
| Objective 1.3 Promoted coordination and decision making | 1. Assist the Ministries of Agriculture, Education and Sciences and Environment Protection and Natural Resources in establishment of a PGR-management unit, define its vision, goal and objectives;<br>2. Identify participants from all sectors and a mechanism to support policy dialogue and effective coordination develop and implement;<br>3. Identify the administrative needs and assignment of functions of each component to a responsible agency or organization;<br>4. Develop a national plan and an implementation strategy for PGR management and use. | |
| Component 2. Capacity building at the research and education level: modern scientists and facilities, and access to technologies | | |
| Objective 2.1: Renewed and upgraded facilities for PGR conservation | 1. Establish a center of a scientific excellence - Conservation, Molecular Diversity, Plant Breeding, Plant Pathology and Bioinformatics Center;<br>2. Provide laboratories, equipment, greenhouses and land necessary for conservation, regeneration and evaluation of PGR accessions. | • Modern facilities, laboratories and conservation facilities are accessible for local scientists; |

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| Objective 2.2: Renewed human resources and strengthened degree and non-degree training | 1. Include in the PhD and master courses classes related to PGR conservation, and use;<br>2. Re-store the continued education system for updating skills of the researchers;<br>3. Train policy-makers on international treaties related to management of PGR;<br>4. Improve linkages among the agricultural university and research institutes;<br>5. Train breeders in modern plant breeding methods and biotechnologies relevant to plant breeding;<br>6. Train PGR specialists in long-term storage, live plant collection management, database management, molecular methods of characterization, germplasm health management etc. | • A system of continuous education and updating skills/knowledge established;<br>• Modern scientists and breeders;<br>• Georgian researchers are involved in international cooperation. |
| Objective 2.3: Facilitate technology transfer | 1. Promotion of international cooperation for technology transfers;<br>2. promotion of policies to facilitate development and adoption of new technologies; | |
| Component 3. Access to PGR and its efficient use | | |
| Objective 3.1: Improved access to plant genetic collections | 1. Improve quality of data on genetic resources and establish an integral database as means to facilitate access, exchange and benefits to crop breeding and improvement programs;<br>2. Cooperate with the international centers in characterization of germplasm collections;<br>3. Promote in situ conservation of natural populations;<br>4. Promote on-farm conservation of landraces. | • Local genetic resources are accessible for plant breeders;<br>• Information on the local genetic resources is included in the global databases;<br>• Improved access to international germplasm;<br>• Plant breeding research uses achievements of plant pathology, biochemistry, physiology, molecular biology, etc.<br>• Improved high-yielding crop varieties |
| Objective 3.2: Improved efficiency of plant breeding programs | 1. Provide breeding programs with modern breeding machinery and equipment;<br>2. Promote international cooperation and germplasm exchange;<br>3. Promote multi-disciplinary approach to planning and implementation. | |
| Component 4. Strengthened farmers' ability of using PGR | | |
| Objective 4.1: Improved availability of information on varieties and seed sources | 1. Provision of farmers with variety yield and quality data, as well as advises on traditional and improved varieties;<br>2. Arrange demonstration trials for improved varieties and conduct field days;<br>3. Introduce farmer participation in joint breeding and evaluation; | • Crop varieties that are demanded by the market;<br>• Increase of private investment in plant breeding;<br>• Improved competitiveness of agricultural production in Georgia. |
| Objective 4.2: Strengthened links with the private sector | 1. Establish mechanisms for collection of license and royalty fees;<br>2. Establish an association of plant breeders and seed/planting material producers to lobby their interests. | |

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