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NATIONAL STRATEGY

FOR CONSERVATION AND
MANAGEMENT OF PLANT GENETIC
RESOURCES FOR FOOD AND
AGRICULTURE IN LEBANON



2015 - 2035






National Strategy
For Conservation and Management
of Plant Genetic Resources for Food and Agriculture
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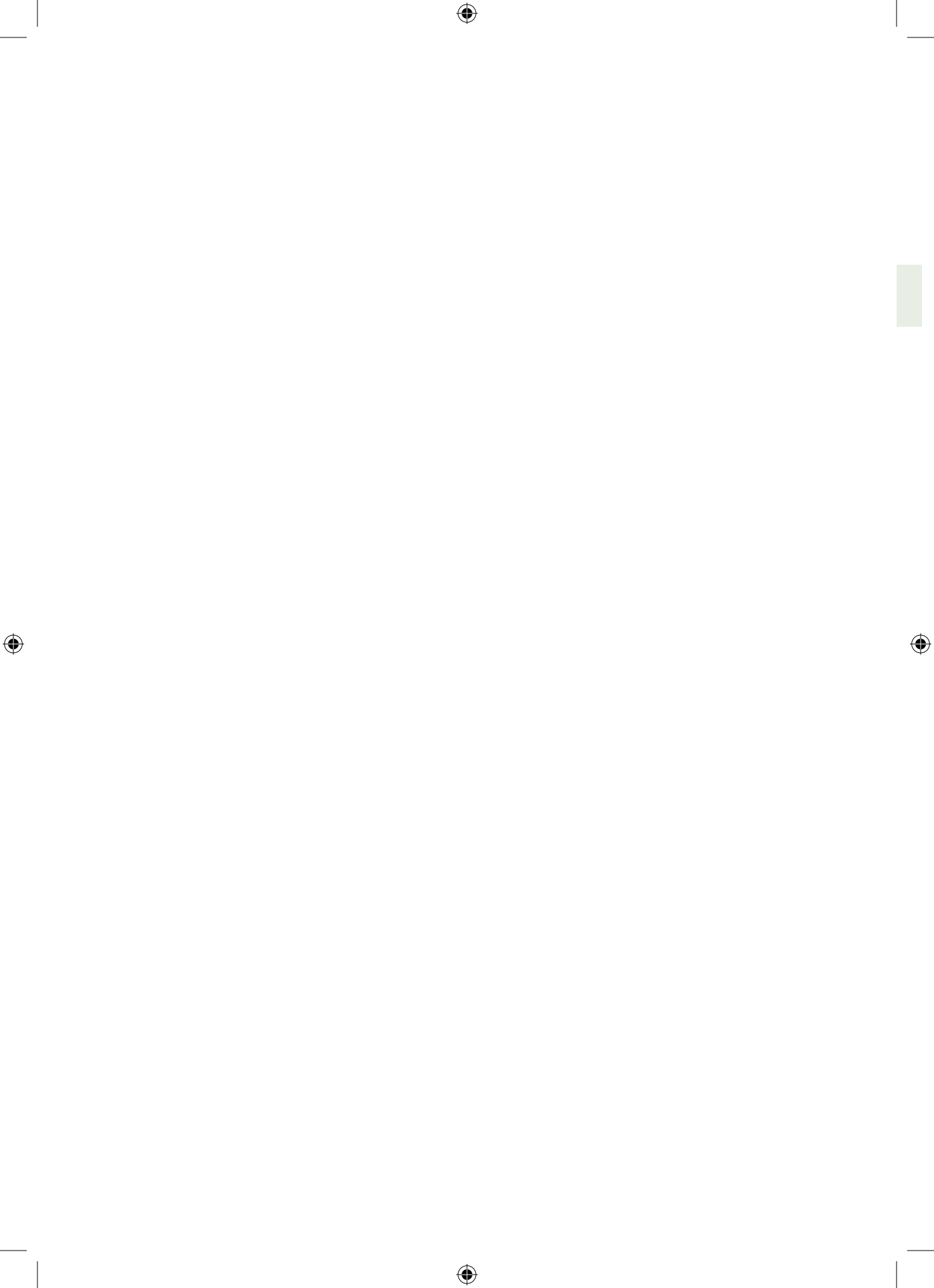


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Foreword

Plant genetic resources are the biological basis of food security and, directly or indirectly, support the livelihoods of every person on Earth. Plant genetic resources for food and agriculture (PGRFA) consist of diversity of seeds and planting material of traditional varieties and modern cultivars, crop wild relatives and other wild plant species. These resources are used as food, feed for domestic animals, fiber, clothing, shelter and energy. The conservation and sustainable use of PGRFA is necessary to ensure crop production and meet growing environmental challenges and climate change. The erosion of these resources poses a severe threat to the world's food security in the long term.

The Near East region is known to have been the cradle of Agriculture and is the centre of origin of major crops including wheat, barley, lentils and many forage and fruit species. Despite this rich diversity Near East countries are experiencing difficulties in addressing climate change adaptation and optimally use their plant genetic resources for their own benefit.

The National Strategy for Conservation and Management of Plant Genetic Resources for Food and Agriculture in Lebanon has been prepared in a participatory approach involving all concerned stakeholders under the coordination of the Ministry of Agriculture in the context of the TCP/SNO/3401 project "Optimizing the Use of Plant Genetic Resources for Food and Agriculture for Adaptation to Climate Change".

This strategy document is being made available by the Food and Agriculture Organization of the United Nations (FAO) and the Ministry of Agriculture. It aims to promote and ensure the rationalized conservation and management of genetic resources in the country. It presents a succinct review of the status of plant genetic resources management in Lebanon, identifies the emerging challenges, and formulates a National Plan of Action for the coming 20 years with a set of key actions covering conservation and utilization, to seeds delivery, in a comprehensive integrated approach.

This strategy calls for aligning the activities relevant to the International Treaty of Plant Genetic Resources for Food and Agriculture with other long-term national development plans relevant to the International Convention on Biological Diversity.

Minister of Agriculture
Mr. Akram Chehayeb

FAO Representative in Lebanon
Dr. Maurice Saadé

Written and compiled by

Lamis Chalak

Regional Project Coordinator, TCP/SNO/3401

Head of National PGRFA Committee

Professor, Faculty of Agriculture, The Lebanese University

Members of National PGRFA Committee contributing in the finalization of the National Strategy for PGRFA in Lebanon

Ms. Mona Sibli, Horticulture & Field Crops, Ministry of Agriculture, TCP/SNO/3401/NPC

Mr. Ali Chehade, National Focal Point for the ITPGRFA, TCP/SNO/3401/NC

Ms. Joelle Breidy, National Gene Bank, TCP/SNO/3401/NC

Dr. Khaled Makkouk, Research Program, Lebanese National Council for Scientific Research

Dr. Samih El Hajj, Plant Genetic Resources, The Lebanese University

Dr. Faten Raad, Seed System, Ministry of Agriculture, Lebanese Agricultural Research Institute

Mr. Rabih Kabalan, Plant Breeding, Lebanese Agricultural Research Institute

Mr. Charles Zarzour, Service of Import Export, Horticulture and Field Crops

Ms Lara Samaha, Ministry of Environment, National Focal Point for the CBD and Nagoya Protocol

Mr. Nizar Hani, Ecosystems Department, Ministry of Environment

Dr. Anis Haddad, Seed Bound, Private Sector

Dr. Hassan Machlab, International Center for Agricultural Research in the Dry Areas, Lebanon

Ms. Marie Louise Hayek, FAOR Lebanon

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Acronyms

ACSAD Arab Center for the Studies of Arid zones and Dry lands

AOAD Arab Organization for Agricultural Development

CBD Convention on Biological Diversity

CGIAR Consultative Group on International Agricultural Research

CITES Convention on International Trade of Endangered Species of Fauna and Flora

FAO Food and Agriculture Organization of the United Nations

GDP Gross Domestic Product

GEF Global Environment Facility

GPA Global Plan of Action

HORTIVAR Horticulture Cultivars Performance Database

IBA Important Bird Areas

ICARDA International Center for Agricultural Research in the Dry Areas

IPR Intellectual Property Rights

ITPGRFA International Treaty on Plant Genetic Resources for Food and Agriculture

IUCN International Union for Conservation of Nature

LARI Lebanese Agricultural Research Institute

MAP Medicinal and Aromatic Plants

MoA Ministry of Agriculture

MoE Ministry of Environment

NBSAP National Biodiversity Strategy and Action Plan

NENA-PGRN Near East and North Africa Plant Genetic Resources Network

NISM National Information Sharing Mechanism

NCSR Lebanese National Council for Scientific Research

NGO Non-Governmental Organization

PGRFA Plant Genetic Resources for Food and Agriculture

PVP Plant Variety Protection

SPA Specially Protected Area

SPAMI Specially Protected Areas of Mediterranean Importance

UNDP United Nations Development Programme

UNEP United Nations Environment Programme

UNESCO United Nations Educational, Scientific and Cultural Organization

UPOV International Union for the Protection of New Varieties of Plants

Terms Used

Agrobiodiversity: includes all biodiversity components relevant for agricultural production, including food production, sustaining livelihoods and habitat conservation of agricultural ecosystems (CIP-UPWARD, 2003).

Biodiversity: the variability among living organisms from all sources including, *interalia*, terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are part; this includes diversity within species, between species and of ecosystems (CBD, 1992).

Ex situ collection: collection of plant genetic resources for food and agriculture maintained outside their natural habitat.

Ex situ conservation: conservation of biodiversity outside its natural habitat; in the case of plant genetic resources conservation can be in seed banks, in vitro collections in germplasm banks, or as live collections in the field.

Genetic material: any material of plant, animal, microbial or other origin containing functional units of heredity (CBD, 1992).

Germplasm: the reproductive or vegetative propagating material of plants (FAO, 1993).

GPA: the Global Plan of Action on PGRFA adopted at the Fourth International Technical Conference on Plant Genetic Resources (FAO, 2010).

In situ conservation: the conservation of ecosystems and natural habitats and the maintenance and recovery of viable populations of species in their natural surroundings and, in the case of domesticated or cultivated plant species, in the surroundings where they have developed their distinctive properties (ITPGRFA, 2009).

International Treaty on PGRFA (ITPGRFA): the only multilateral instrument regulating the conservation and sustainable use of plant genetic resources for food and agriculture.

Multilateral System of the ITPGRFA: a system that allows the exchange between Contracting Parties of genetic diversity and information associated with genetic diversity located in genebanks and ensuring the fair and equitable sharing of the benefits arising out of their use (ITPGRFA & FAO, 2013).

NISM: the National Information Sharing Mechanism on implementation of GPA-PGRFA is one tool for transparent and effective monitoring of the implementation of GPA; its objective is also to improve countries' capacity in exchanging and analyzing PGRFA information for future planning (FAO, 2010).

Participatory plant breeding: application of methodologies of genetic improvement, with the involvement and active participation of farmers in all the technological innovation process (FAO, 2011).

Plant genetic resources for food and agriculture (PGRFA): any genetic material of plant origin of actual or potential value for food and agriculture (ITPGRFA, 2009).

Resilience: the capacity of an organism, ecosystem or community to recover from major disturbance events (Thompson, 2011).

Traditional knowledge: knowledge, innovations and practices of indigenous communities embodying traditional lifestyles relevant for the conservation and sustainable use of biological diversity (CBD, 1992).

Value chain: the full range of activities which are required to bring a product or service from conception, through the different phases of production (involving a combination of physical transformation and the input of various producer services), delivery to final consumers, and final disposal after use (Kaplinsky and Morris, 2001).

Variety: a plant grouping, within a single botanical taxon of the lowest known rank, defined by the reproducible expression of its distinguishing and other genetic characteristics (ITPGRFA, 2009). According to the context, it can refer to breeds and “native” or local varieties, as well as to improved, hybrids and commercial varieties.

Preamble

In the context of the International Treaty on Plant Genetic Resources for Food and Agriculture (ITPGRFA)¹, Plant Genetic Resources for Food and Agriculture (PGRFA) refers to any material of plant origin, including reproductive and vegetative propagating material, containing functional units of heredity, of actual or potential value for food and agriculture. Within a country therefore, PGRFA encompasses the entire diversity of plants used, or with the potentials to be used, in agriculture for food, fodder, and fiber. These include accessions of germplasm holdings (*ex-situ* collections), wild species found in nature (*in situ*) that may be either related to crops (i.e., crop wild relatives) or harvested or used directly; landraces or traditional varieties maintained on farms; breeding materials in crop improvement programs; and improved varieties registered and/or released for cultivation.

Though a small country (10452 km²), Lebanon encompasses a rich plant biodiversity representing the Mediterranean and Fertile Crescent centres of diversity. The topographical and landscape diversity allows a large number of plant species from temperate to subtropical crops to live and flourish. The country is extremely rich in crop wild relatives, landraces as well as different breeding varieties of cultivated plants that offer a rich pool of genetic resources for utilization in agriculture at present and in the future. However, many of these resources are at risk of extinction due to over-use, land degradation and habitats fragmentations in addition to the underlying factors of lack of awareness, growing human pressure and climate change. The efficient conservation of plant genetic resources and their sustainable utilization are of high priority in Lebanon as they strive for greater economic strength through sustainable agricultural development.

Within the framework of TCP/SNO/3401 FAO project “Optimizing the Use of Plant Genetic Resources for Food and Agriculture for Adaptation to Climate Change” and based on the PGRFA assessment and recommendations stated in the “Lebanon Second Country Report on the State of Plant Genetic Resources for Food and Agriculture”, the “National Strategy for Conservation and Management of Plant Genetic Resources for Food and Agriculture in Lebanon” was developed under the coordination of the Ministry of Agriculture.

The strategy aims to promote and ensure the rationalized management of PGRFA in the country from conservation to sustainable use including seed delivery in a continuum approach. It calls for aligning the PGRFA relevant activities with other long-term national development plans e.g. National Biodiversity Strategies and Action Plans (NBSAP), and meeting the Aichi Biodiversity Targets of the Convention on Biological Diversity.

1 International Treaty on Plant Genetic Resources for Food and Agriculture (ITPGRFA). Food and Agriculture Organization of the United Nations, Rome, Italy. <http://www.planttreaty.org>

The strategy presents a succinct revision of the status of PGRFA management in Lebanon, identifies the emerging challenges, and formulates a National Plan of Action for the coming 20 years with key actions interlocking conservation, use to seeds delivery, in a comprehensive integrated approach.

The strategy was finalized by the National PGRFA Committee and then discussed and validated by a number of public and private Lebanese institutions involved in PGRFA management during the national stakeholders workshop held in Beirut on 19 May 2014 (Annex 1).

Chapter 1: State of PGRFA in Lebanon

1.1. Lebanon agrobiodiversity and plant genetic resources

Despite its limited area of 10 452 km², the phyto-geographic position of Lebanon as a geo-centre between the three continents of the Old World makes it a hot spot for regional surrounding biodiversity. Its topographical and landscape diversity and the presence of high mountains close to the coast and oriented north-south with numerous perpendicular valleys in the east-west direction, resulted in five geomorphological regions that give rise to around 22 bioclimatic zones and many types of habitats (Abi-Saleh and Safi, 1988). In addition, Lebanon contains many semi-natural habitats that have adapted to anthropogenic activities and pressures and that contain a large number of plant and animal species and where the plant domestication started ten thousand years ago (Harlan, 1992). Moreover, it is characterized by the presence of various microclimatic conditions and biological reshuffling (Sattout and al., 2005). The ecosystems diversity allows the cohabitation of cold requiring crops and subtropical crops within a distance of less than 20 km.

Earlier studies on plant biodiversity in Lebanon reported more than 3948 species (Post and Dinsmore, 1933; Mouterde, 1966). This number decreased to 2612 species in the latest study of Tohme and Tohme (2014). Actually the Lebanese flora is experiencing quick genetic erosion due to various anthropogenic pressures such as lack of awareness, adoption of new high yielding varieties, land reclamation, climate change and overgrazing. Yet there is no National Red List for species in Lebanon but recent IUCN reports list 96 terrestrial plants as rare or threatened (MoA/UNEP/GEF, 1996; Walter and Gillett, 1997; IUCN, 2011).

Current estimations indicate that around 400 plants are endemic to Lebanon, Syria and Palestine, of which 92 are only endemic to Lebanon. Endemism in Lebanon (12%) is considered high when compared to other Mediterranean countries.

The country is particularly rich in plant genetic resources having the potentials to be used in agriculture for food and/or feed. Besides ornamental, medicinal, wild edible, forest and forage plants, more than 80 species for food and agriculture are currently cultivated and/or utilized in the country (Chalak et al., 2011). They mostly include wheat, barley, lentils, medics, onion, garlic and many fruit trees such as almonds, pears, plums, pistachio. Additionally, many wild harvested plants are used as food including leafy vegetables and aromatic plants.

Moreover, Lebanon is included in the center of diversity for many wild species (Davis, 1969) particularly *Triticum* (*T. thoudor*, *T. dicoccoides*, *T. urartu* and *T. boeoticum*), *Hordeum* (*H. spontaneum*, *H. murinum*, *H. marinum* and *H. bulbosum*), *Aegilops* (20 species). The country is also housing many wild species of *Allium*, *Astragalus*, *Avena*, *Capsicum*, *Cicer*, *Dactylis*,

Lathyrus, Lens, Lolium, Medicago, Phaseolis, Pisum, Trifolium, Trigonella and *Vicia* (ICARDA, 2009; Atallah et al., 2008a; 2008b). Additionally the country contains a large number of landraces for many of cultivated forms of these species.

The agricultural sector has always been an essential component of the Lebanese economy although its contribution to GDP does not exceed 6% (Ministry of Agriculture, 2004). About 30% of the Lebanese population is currently involved in the agricultural sector and the agro-food industries. Only 34% of this sub-population is entirely counting on agriculture. Out of the total Lebanese area, about 36% are agricultural lands, 13.6% are covered by forests (FRA 2005) and 57% are non-cultivated lands or natural pastures. In 2010, the cultivated area was about 231 000 Ha out of which 113 000 Ha (48.9%) are irrigated (Ministry of Agriculture, 2012). The agricultural lands are located mainly in the narrow coastal plains in Akkar, in the in-land Bekaa valley, in Marjayoun plain in the South and the terraces along the mountain sides. The main agricultural products are olives, citrus fruits, grapes, tomatoes, apples, vegetables, potatoes, tobacco, poultry, sheep and goats. Lebanon is an exporter of fruits and vegetables, it is self-sufficient in poultry but is an important importer of wheat and sugar. However, Lebanon is still a large net importer of food, importing more than 80% of food consumption (Sassine, 2013). Moreover, due to the high population density and the mountainous landscape of the country, the arable land per capita is very limited (Abi-Saleh and Safi, 1988; Chalak and Abi Antoun, 2007). Consequently, food security as a reasonable objective for some field crops mainly cereals became a national priority.

1.2. International agreements relevant to PGRFA in force for Lebanon

Convention on Biological Diversity.

Ratified by Lebanon in 1994, CBD has three objectives: 1) the conservation of biological diversity, 2) the sustainable use of its components and 3) the fair and equitable sharing of the benefits arising out of the utilization of genetic resources. The CBD has many obligations among which inventorying and reporting on PGR *ex situ* and *in situ* conservation efforts, developing appropriate legislating regulations and harmonizing existing relevant legislation to be in line with the CBD. Many relevant actions have been achieved in this regards, such as creating about 50 protected areas of natural habitat through *in situ* conservation (including natural reserves that cover nearly 24% of Lebanese territory), launching various national and local initiatives to use biodiversity sustainably, mapping land cover, creating partnerships among stakeholders, and supporting the development of biodiversity laws and decisions. National country reports under the CBD have been produced by the Ministry of Environment (MoE, NFP of CBD) through a national collaborative process namely the first, second, third and fourth biodiversity national reports and a National Biodiversity Strategy and Action Plan (NBSAP) was prepared by MoE in 1998 to respond to the requirement of the CBD. At present, the MoE is executing a project in collaboration with UNEP and with funds from GEF to update the NBSAP in line with the new CBD Strategic Plan for biodiversity for the 2011-2020 and the new Aichi Biodiversity global targets. The revised NBSAP will integrate the new biodiversity targets while taking in consideration both global and local needs and aspirations.

International Treaty for Plant Genetic Resources for Food and Agriculture (ITPGRFA).

Ratified by Lebanon on 11/2/2004 (Law No. 559), the treaty has obligations for “the conservation and sustainable utilization of plant genetic resources for food and agriculture and the fair and equitable sharing of the benefits arising out of their use, in harmony with the Convention on Biological Diversity, for sustainable agriculture and food security” (ITPGRFA). Involved institutions have started the implementation of some projects related mostly to PGR collecting, *ex situ* conservation, characterization and use in pre-breeding. However further activities extended to *in situ* conservation and sustainable use are strongly recommended and international funds are needed. As Party to the International Treaty on PGRFA, Lebanon is committed to provide access to all materials listed under Annex I of this agreement, according to the terms set under the Multilateral System of Access and Benefit-Sharing and the Standard Material Transfer Agreement, adopted by the Treaty’s Governing Body in 2004.

Nagoya Protocol on Access to Genetic Resources and the Fair and Equitable Sharing of Benefits Arising from their Utilization to the Convention on Biological Diversity

Lebanon government signed this international agreement in 2012. The protocol aims to regulate access to genetic resources related to biological diversity between the provider of these resources and the user (with the aim of scientific research or the aim of industrial and commercial), and to ensure the fair and equitable sharing of benefits arising from the use of these resources on the basis of conditions agreed upon by the parties through signed contracts. This is one of the important innovations of this protocol that preserves the sovereign rights of states over their natural resources, especially for developing countries, with the right to take advantage from the use of natural resources by any other party especially in cross-border cases. The MoE has recently prepared a draft law to regulate access to biological and genetic Lebanese resources and sharing of benefits arising from their use, and sent it to the Council of Ministers to be adopted as a national legislative mechanism to apply the provisions of the Protocol and organize the process of “Access and Benefit Sharing” on a national scale.

Additionally, Lebanon has ratified several other agreements related to biodiversity including the UN Convention on Combating Desertification (1995), the UN Framework Convention on Climate Change (1994), and more recently the Cartagena Protocol for Biosafety (2013). However, some of these international instruments are not yet efficiently implemented in the country.

1.3. National institutions involved in PGR related activities

In Lebanon, agricultural research is carried out predominantly by the Lebanese Agricultural Research Institute (LARI) which is a governmental institution working under the supervision of the Minister of Agriculture. LARI is the focal point of the International Treaty on Plant Genetic Resources for Food and Agriculture and is assumed to be responsible of the implementation of the Treaty components in Lebanon. LARI is conducting actions relevant to PGR along with the collaboration of different departments of the Ministry of Agriculture (MoA), MoE and universities on collecting, storing and assessing PGRFA. LARI is hosting the national gene bank (LARI-NGB), officially launched in July 2013, where 1380 seed accessions are stored under long term conditions, with duplicates held at Kew’s Millennium Seed Bank of the Royal Botanic Gardens.

Additionally, the American University of Beirut (AUB, private academy) established a seed bank holding currently more than 18000 seed samples of cereal, legume, and their wild relatives recuperated from the International Center for Agricultural Research in the Dry Areas (ICARDA) seed bank, of which 2500 accessions previously collected in Lebanon.

NGOs and private sector are also involved in many activities related to biodiversity, environmental and genetic resources studies.

On the other hand, the Lebanese National Council for Scientific Research (NCSR) is a governmental institution having a role in the preparation and updating of the national science policy and programs, promoting capacity building and national and international cooperation in various scientific field, and allocating funds and grants to research activities. Noted here are the considerable efforts of the NCSR to serve as a link between academia, researchers and the government in the sector of biodiversity and natural resources management. However, the limited funds available to NCSR have considerably hindered such activity.

Nevertheless, agriculture research relevant to PGR is mostly consisting of scattered efforts and initiatives and poorly linked among Lebanese institutions. Research programs are formulated and carried out at the institutional level with little or no coordination with other relevant stakeholders units in the country. The main constraints and limitations of agriculture research in Lebanon are mostly related to manpower, facilities and funding.

At the education level, both public and private universities incorporated courses on biodiversity. More recently Saint Joseph University developed with the support of NCSR and through a participatory approach the Lebanon e-flora data base. Nevertheless, only the Faculty of Agronomy of the Lebanese University (public academia) is formally incorporating in its M.Sc. curriculum specific courses on plant breeding and plant genetic resources.

Scientific collaboration and trainings as well are mainly provided by the International Center for Agricultural Research in the Dry Areas (ICARDA) and the Arab Center for the Studies of Arid zones and Dry lands (ACSAD).

1.4. Information and data management structures

Lebanon published several documents related to plant genetic resources. The most relevant one is the second report on the state of plant genetic resources for food and agriculture (Chalak and Sabra, 2007) that has been prepared through a consultative participatory process and led to the establishment of the Lebanese Information Sharing Mechanism on the implementation of the Global Plan of Action (GPA) for the Conservation and Sustainable Utilisation of PGRFA. The Lebanese Agricultural Research Institute (LARI), acted as the coordinating organization for the establishment of the Mechanism in the country, which counted on the participation of more than 30 experts from 14 national stakeholders. An informal Steering Committee of key stakeholders was formed to help guiding the GPA monitoring process and to prepare the Country Report. Finally a reporting phase was carried out based on the analysis of the information provided by the participating stakeholders and recorded under the Mechanism's database, resulting in the preparation, by the Steering Committee, of a strategic assessment of the state of PGRFA in Lebanon.

The latest inventory of species in Lebanon was made in 1996 through the Biodiversity Country Study developed by the Ministry of Environment in collaboration with UNEP with GEF funds (MoA/UNEP/GEF, 1996). This study consisted of nine volumes and included an inventory of fauna and flora in the different ecosystems in Lebanon with terrestrial, fresh water and agricultural habitats.

In 2009 the fourth national report of Lebanon to the Convention on Biological Diversity indicates that Lebanon achieved some progress in implementing the CBD through the considerable increase in the number of protected areas of different categories (8 nature reserves, 3 biosphere reserves, 16 protected forests, 16 protected natural sites/landscapes, 4 Ramsar sites, 5 World heritage sites, 15 IBAs) (MoE/GEF/UNDP, 2009). But currently, the number of nature reserves has further increased to 15, the protected natural sites to 18, and protected forests to 17.

For networking, the most relevant one is the first Global Plan of Action for the Conservation and Sustainable Utilization of Plant Genetic Resources for Food and Agriculture (GPA1). It was developed for Lebanon in 2006 through the establishment of the National Information Sharing Mechanism (NISM) as an efficient tool for the implementation of ITPGRFA components through various national priority activities including *in situ* and *ex situ* conservation and sustainable utilization of PGRFA. However this GPA will be updated and well promoted among national stakeholders for exchanging and analyzing PGRFA information for future planning (as to the second GPA). Besides, NISM objective is also to improve countries' capacity in exchanging and analyzing PGRFA information for future planning and is currently being updated.

As to the regional level, the Association of Agricultural Research Institutions in the Near East and North Africa (AARINENA) in collaboration with ICARDA, through the PGR-NENA Network, developed in 2012 a draft strategy on the conservation and sustainable use of plant genetic resources for the region. The strategy aims to conserve and safeguard diversity of PGRFA and to enhance the contribution of national institutions to national and regional agricultural development and food security in the countries. Also it seeks to strengthen capacities and to formulate appropriate policies and regulatory frameworks in addition to raising public awareness. Yet this regional strategy has not been implemented.

On the other hand, Lebanon is part of the pilot knowledge and information exchange management system of national components of FAO Regional Plant Genetic Resources Platform of Near East and North Africa (<http://plantgenetic.com>). This regional network includes modules on documents, institutions, experts and projects, news, events, good practices, success stories, agricultural PGR bulletins, question and answer services and farmers problems; it also enables the exchange of information and knowledge relevant to PGRFA among stakeholder groups at national and regional levels.

1.5. National Legislations relevant to PGRFA

Being the national implementing authority of CBD, the Ministry of Environment with GEF financial support developed in 2005 a draft law regulating the access to the biological and genetic resources of Lebanon and the benefit sharing arising from their utilization, through the UNDP/GEF Top-Up Biodiversity Enabling Activity project and with the technical assistance

of the Initiative for Biodiversity Studies in Arid Regions at the American University of Beirut (IBSAR/AUB). The draft law was submitted recently to the Council of Ministers for approval and for submission to the Parliament for endorsement.

Recognizing the potential threats of genetically modified organisms on its biological diversity, Lebanon has developed its National Biosafety Framework under the provisions specified in the Cartagena Protocol on Biosafety since July 2005 (Sattout et al., 2005). Also a draft decree to implement the provisions of the CPB in Lebanon was developed by the Ministry of Environment in 2005, but it is still not endorsed yet (Chalak, 2010). The only restriction is provided in paragraph 4 of article 14 of the Law on Plant Quarantine and Phytosanitary Measures No. 778 of 2006. This instrument prohibits the importation of genetically modified seeds and seedlings that may introduce new diseases and toxins into the country.

A draft law on the management of PGRFA in Lebanon was prepared in 2009 by a working group of national stakeholders established at LARI and with the support of AOAD (Arab Organization for Agricultural Development). This draft law included twenty articles related to legal and administrative measures necessary to promote the conservation and sustainable use of PGRFA, facilitate access to PGRFA and ensure a fair and equitable sharing of the benefits arising out of their use. The GEF-UNDP dryland agrobiodiversity project has also produced an expert report on policies and legislations aiming to conserve agrobiodiversity (www.lari.gov.lb).

On the other hand, the Ministry of Agriculture developed in January 2014 through the TCP/LEB/3302 project a draft law on seed and propagating material. This draft law aims to organize seed and seedling production and marketing to ensure access to high-quality, disease-free and true to type varieties. The draft seed law includes 33 articles, consists mainly to establish a seed committee for regulating seed affairs, registration, release and protection of varieties within the authority of the ministry and in collaboration and coordination with all concerned stakeholders.

More recently, the new strategy of the Ministry of Agriculture for the years 2015-2019 was formulated through a participatory approach in strategic planning under the framework of the EU funded Agriculture and Rural Development Programme (Ministry of Agriculture, 2015). The component 5.3 of this strategy is fully dedicated to the enhancement of the conservation of biodiversity and plant genetic resource. Hopefully, this strategic component should facilitate the implementation of actions for conservation and sustainable use of plant genetic resources, although the relevant draft laws are not endorsed yet.

1.6. Ongoing activities on PGRFA at the national level

Surveying and inventorying diversity. After the first flora assessment undertaken in the thirties (Post and Dinsmore, 1933) and the sixties (Mouterde, 1966), surveying and inventorying activities have been rather neglected in Lebanon. In recent years, the biodiversity country report developed by the Ministry of Agriculture delivered an assessment of the flora diversity in Lebanon (MoA/UNEP/GEF, 1996). Later on, the Ministry of Environment delivered an assessment of the flora diversity in the Nature Reserves through the Protected Areas project (MoE/GEF/UNDP, 1996-2001) and the MedWetCoast project (MoE/FFEM/

UNDP, 2002-2006). Between 1999 and 2005, LARI has executed in collaboration with UNDP/GEF and ICARDA the “Conservation and Sustainable Use of Dryland Agro-biodiversity of the Near East (LEB97/G34) project in three main priority areas located in the semiarid zone of Bekaa valley and experiencing a quick loss in plant diversity and richness (Barnes, 2002; Assi, 2005). This project has allowed to assess and monitor agrobiodiversity and its threats in Aarsal, Ham/Maraboun and Nebha regions, and to develop actions for promoting its *in situ*/on-farm conservation and sustainable use. Hot spots for conservation of species of global importance were recommended. Other scattered efforts have been undertaken in this regard through research activities by LARI, universities and non-governmental organizations. It is the case of the “Certification project” executed by LARI which aimed at performing clonal selection and pomological description of stone fruits and grapevine (Hamze et al., 2007) and the “Olive RESGEN project” aiming at selecting local olive varieties and supported by the International Olive Oil Council. Nevertheless, yet no mechanisms are set for regularly assessing genetic erosion and monitoring it in the country (Chalak et al., 2011).

Uses of PGR. In Lebanon, the characterization and evaluation of plant genetic resources is mostly limited to morphological descriptors and agronomical traits. It has been applied so far to landraces and improved varieties of fruit trees, olive, field crops and some vegetables. Molecular characterization has only been applied to a limited number of crops using European funds (Chalak et al., 2014). Financial and technical supports are needed to expand plant genetic resources characterization and evaluation by using advanced techniques, strengthening skills and acquiring adequate equipments. Only breeding activities of cereals and food legumes have been carried out in Lebanon and in collaboration with ICARDA. They are limited to wheat, barley, chickpea and lentil. Regarding fruit tree species, breeding activities are restricted to some clonal selection activities that have been recently conducted for stone fruits and grapevines. There is an urgent need to establish a national strategy for the breeding and improvement of priority crops to Lebanon. As a precaution, some actions are needed now to broaden the genetic basis maintained and used on-farm. An increasing attention is being paid to the wild edible flora which is harvested from its natural habitat and for which domestication attempts are being experienced. There is a need to establish a legal framework to support the sustainable use and marketing of under-utilized crops, and the domestication of wild edible species.

Seed system. Lebanon imports most of its seed needs. It is estimated that the local production does not exceed 3% of the seed market. The limited seed production exists for few local varieties, cereals and pulses. The seed and seedlings supply system in Lebanon has three origins: a) public sector (LARI limited production of cereal and pulses seeds), b) private sector representing the main source of vegetable and some forage seeds based on importation (agricultural companies) and fruit seedlings based on local production (nurseries) and c) informal sector (on-farm seed and planting material production and distribution systems used in rural farming communities).

In 2010, the Ministry of Agriculture adopted a seed multiplication program aiming at procuring to farmers at subsidized prices, certified seeds of improved and released varieties of wheat, barley, chickpea and lentils, based on what LARI produced in 2013 and for the first time the national needs of certified seeds for wheat and barley (7000 tons). ICARDA has provided the technical support to this government action including the establishment of seed health certification.

Yet there is no seed Law in Lebanon, and thus registration of varieties and release system is not implemented. Nevertheless, a seed law has been recently drafted by the Ministry of Agriculture and FAO to organize the seed system in the country within the framework of the TCP/LEB/3302 Seeds and Seedlings Policy project. Nevertheless, the national law No. 240 on patents issued by the Ministry of Economy and Trade in August 2000 and precisely paragraph f of article 2, ensures the protection of novel varieties.

In situ management. Concern for *in situ* conservation and management of genetic resources has increased in Lebanon over the recent years. This is reflected by an important increase in the number of protected areas spread across the country. Fourteen Nature Reserves have been established by law since 1992. They are: Al Shouf Cedars (Law 532, 24/7/1996), Tannourine Cedar Forest (Law 9, 20/2/1999), Horsh Ehden (Law 121, 9/3/1992), Bentaël (Law 11, 20/2/1999), Yammouneh (Law 10, 20/2/1999), Palm Islands (Law 121, 9/3/1992), Tyre Coast (Law 708, 5/11/1998), Wadi Hujeir Reserve (Bent Jbeil, Marjayoun, and Nabatieh cazas; Law 121, 23/7/2010), Shnanir Nature Reserve (Kesrouan; Law 122, 23/7/2010), Kafra (Bent Jbeil; Law 198, 18/11/2011), Ramia (Bent Jbeil; Law 199, 18/11/2011), Debl (Bent Jbeil; Law 200, 18/11/2011), Beit leef (Bent Jbeil; Law 201, 18/11/2011), and recently Jaj Cedars (Jbeil caza, Law 257, 15/4/2014). Al-Shouf Cedar Nature reserve is the largest Nature Reserve in Lebanon, covering nearly 2% of Lebanese territory. In Horsh Ehden, the amount of plant species recognized till now accounts for nearly 40% of plant species in Lebanon (1,058 plant species). Management plans were developed for some of the nature reserves and other protected areas to identify the activities needed for the protection and conservation of biodiversity and for the sustainable use of the sites. Additionally, several relevant projects on *in situ* conservation of biodiversity have been undertaken by MoE particularly the “Strengthening of National Capacity and Grassroots *in situ* Conservation for Sustainable Biodiversity Protection” project or Protected Areas Project (MoE/GEF/UNDP; 1996-2001); The Conservation of Wetlands and Coastal zones in the Mediterranean or MedWetCoast project (MoE/FFEM/UNDP; 2002-2006); The “Integrated management of cedars forests in Lebanon in collaboration with other Mediterranean countries” Project (MoE/ UNEP/GEF in collaboration with AUB; 2004-2007); The “Stable Institutional Structure for Protected Areas Management (SISPAM) Project” (MoE, EC LIFE; 2004-2007). Furthermore, MoE has implemented some initiatives related to rehabilitation and restoration of the forest sites outside protected areas mainly through the development and implementation of the National Reforestation Plan (NRP) (2002-present) which aims at the rehabilitation of degraded forest land through the reforestation activities by the use of native forest trees, and the “Safeguarding and restoring Lebanon’s woodland resources” project (MoE/GEF/UNDP; 2009-2014) which aims at developing a strategy for safeguarding and restoring Lebanon’s woodland resources and implementing it through capacity building and execution of appropriate sustainable land management (SLM) policies and practices.

Outside protected areas, some projects have been implemented to support *in situ* conservation and sustainable use of biodiversity like the “Mainstreaming Biodiversity Management Considerations into Medicinal Plants Production Processes” project (LARI/GEF/UNDP, 2008-2012) and the previously mentioned Agrobiodiversity project (LARI/UNDP/GEF, 1999-2005), where (ICARDA) was responsible for the regional coordination and the technical backstopping of the project in cooperation with ACSAD and IPGRI. The project followed a community-based approach and worked with farmers and NGOs. Focus was given to target

crops of global significance for food and agriculture such as wheat, barley, forage species and many local fruit trees and their wild relatives. Agro-ecological and eco-geographic studies, as well as socioeconomic, indigenous knowledge, and botanical surveys were conducted in some 11 natural habitats and with three communities in Aarsal, Ham/Maaraboun, Nabha. Nurseries and seed-cleaning units have also been established in order to promote *in situ* conservation of landraces (Assi, 2005). This project has allowed, in addition to monitoring the biodiversity, to develop management plans with clear technological, socio-economic, institutional and policy option to promote the conservation of dryland agrobiodiversity. It has allowed the introduction of biodiversity conservation in the education system and has allowed establishing business oriented activities to enhance the incomes of the custodians of agrobiodiversity.

Ex-situ management. The collection of plant genetic resources in Lebanon started fifty years ago, covering mainly the traditional landraces of wheat, barley and forages through collaborative project between LARI and ICARDA. Around 2500 accessions are currently conserved at CGIAR/ICARDA gene banks. On the other hand, around 355 Lebanese accessions of wild and cultivated species are currently stored in European genebanks. Currently, LARI-NGB is holding 1380 seed collections stored under long term conditions, with duplications held at Kew's Millennium Seed Bank of the Royal Botanic Gardens. These collections comprise wild edible, medicinal, aromatic, wild relatives of cultivated crops, wild forages, and endemic species. Moreover a great number of wheat and barley landraces, as well as improved varieties of wheat, barley, lentil, chickpea, and vetch are also conserved at LARI-NGB and are regularly regenerated every five years. On the other hand, many fruit trees collections have been made and field gene banks were established at LARI for olive, grapes and stone fruits. *In vitro* facilities are already available but no conservation activity in this regards has been undertaken nor cryopreservation techniques.

Over the years, ICARDA has organized several national capacity building activities relevant to PGR use and management in Lebanon including training and support for sampling, collecting and data analysis and management.

1.7. Threats and challenges facing PGRFA in Lebanon

Nowadays, plant genetic resources and crop production as well, are seriously threatened by the climate change that may further aggravate the already existing problems such as drought, salinity and heat stresses, pests and diseases and loss of biodiversity. People living in marginal lands who are already vulnerable and food insecure are likely to be the first affected. During the last four decades, Lebanon was subject to a decrease in the snow cover and precipitations by 12-16%. Even in (2013-2014) the precipitations didn't exceed 30% of the annual average (Michel Afram, personal communication). The status is quite alarming and the impact of drought on Lebanese biodiversity and agriculture might be tangible.

Moreover, the Lebanese flora is experiencing genetic erosion in the last decades due to various anthropogenic pressures such as adoption of new high yielding varieties, introduction of new species, land reclamation and overgrazing, in addition to lack of awareness.

A comprehensive seed system is not established yet. Intellectual property rights aiming at

protecting the national PGR and relevant farmers' knowledge almost do not exist.

Up to date, only a limited number of PGRs constituted mainly of wheat, barley and few legumes were investigated; while many others including wild relatives and landraces are still considered as non priority crops and are consequently neglected.

On the other hand, the real values of PGR as direct economic value and potential in breeding, and indirect environmental, ecological and cultural landscape values, are not yet estimated in the country.

In addition, national agricultural research on PGR is constrained by the lack of appropriate resources, facilities and funding. PGR research activities are formulated and conducted at the institutional level with little or no coordination with other relevant stakeholders units in the country, thus in the absence of a national program or comprehensive action plans.

At the educational and knowledge level, courses specific to PGRFA and plant breeding are not formally common in the academia. A worst situation is prevailing in rural areas where local communities are not really aware of the importance of biodiversity and PGR.

Although, Lebanon has signed several international agreements related to biodiversity and PGR, the full implementation of these instruments needs further work at country level, inter alia, to satisfy monitoring and reporting obligations. A unified and regularly updated PGR database and a platform for better information exchange and dissemination at the national, regional and international levels are required.

For that end, the establishment of a National PGRFA Strategy for Lebanon involving all components in the country that contribute to the management, i.e., conservation, use and seed delivery system, is strongly recommended in order to face the emerging challenges of climate changes and economic crises.

Chapter 2: Formulation of a National PGRFA Strategy

As to the major recommendations of the Second Country Report on PGRFA and based on the updated analysis presented in this document, the establishment of a National PGRFA Strategy for Lebanon is a must. For that end and within the framework of the TCP/SNO/3401 FAO project “Optimizing the Use of Plant Genetic Resources for Food and Agriculture for Adaptation to Climate Change”, a National PGRFA Committee is established involving all components in the country that contribute to the PGRFA management i.e., conservation, use and seed production. This committee formulates the National Strategy for PGRFA management in Lebanon based on a National Plan of Action.

2.1. Establishment of a National PGRFA Committee

A National Plant Genetic Resources Committee is established by the Minister of Agriculture (Decision 394, date 12/05/2014). It consists of germplasm curators, plant breeders, seed system, import export services, academicians and researchers in genetics, plant biology, environmental sciences, and private sector. It gathers representatives of authorities and institutions involved in PGRFA: Ministry of Agriculture, Lebanese Agricultural Research Institute (i.e. National Gene Bank and National Focal Point for the International Treaty on Plant Genetic Resources for Food and Agriculture), Ministry of Environment (National Focal Point for the CBD and Nagoya Protocol), the Lebanese University, National Council for Scientific Research, ICARDA and FAO. Policy makers and regulators may be invited to join the committee when needed.

The mission of this National PGRFA Committee is to provide advisory functions to the Ministry of Agriculture (and other entities involved in the management of PGRFA) and the practical mechanism for coordination and fostering synergies among various stakeholders. In this context, the Committee should guard from the potential risk of centralization and rigid bureaucratic system by playing the role of facilitator for the implementation of the strategy activities.

More specifically, the Committee should:

- Drive the process of preparing, finalizing and validating the National Strategy for PGRFA and lead the identification of specific objectives and strategic actions that will reflect the continuum approach to the management of PGRFA including the three components, i.e., conservation, use, and delivery, and the intervening linkages thereof.
- Select and advise *ad hoc* working groups of various stakeholders to participate in the implementation of activities relevant to the strategy.

- Monitor progress, evaluate milestones and update the National Plan of Action of the strategy with contributions from the focal points, stakeholders, consulted experts, and working groups.
- Assist in mobilizing support and financial resources for the implementation of the strategy.
- Serve as the interface for national responses regarding PGRFA to regional and international requests.
- Advise on issuing permits for access (collecting, getting seeds) and benefit sharing (ABS) of PGRFA at national, regional and international level for all PGRFA.
- Advise on legislations and policies related to PGRFA including farmer's rights.
- Advise on public awareness.

2.2. Identification of PGRFA involved stakeholders

The National PGRFA Committee identifies stakeholders who should be involved in the finalization of the National PGRFA Strategy (Annex 1). Stakeholders include representatives of relevant governmental authorities, national institutions, universities, researchers, extension services, economists, seed sector, value chain, organizations, NGOs, civil societies, policy makers, regulators, media and individuals who represent the diverse sectors and interests to PGRFA. The key roles of stakeholders include the following:

- Discussing the national strategy for PGRFA and its National Plan of Action, and identifying its strategic priorities.
- Serving as communication channels for the National PGRFA Committee in its efforts to extend awareness and enhance communication and information sharing.
- Supporting and advising the National PGRFA Committee when needed.
- Participating, through ad hoc working groups, in the implementation of the national strategy.

2.3. Strategy vision statement and goals

The national PGRFA strategy long term vision states that PGRFA are of great importance for people of Lebanon and national interests in terms of food security, agricultural and rural development, and management of natural resources.

The strategy addresses the national development planning for agriculture, environment and socio-economic sectors. It aims to create/strengthen/rationalize coordination among involved PGRFA stakeholders and players within the ministries of agriculture and environment for an efficient management of PGRFA in the country with respect to the priority areas of the second FAO Global Plan of Action (second GPA) relevant to conservation, sustainable use,

policy, and building capacities. It will align the PGRFA relevant activities with other long-term national development plans, e.g. National Biodiversity Strategies and Action Plans (NBSAP) and the Aichi Biodiversity Targets of the Convention on Biological Diversity.

In this context, the main goals of the strategy are the following:

- a) to ensure the conservation of PGRFA as a basis for food security, sustainable agriculture and poverty reduction by providing a foundation for current and future use;
- b) to promote sustainable utilization of PGRFA as well as to provide options for adapting to and mitigating climate change and responding to food, feed and other needs;
- c) to promote the exchange of PGRFA and relevant data between holders, users, seed producers and farmers;
- d) to foster economic development through PGR value chain products;
- e) to set the conceptual bases for the development and adoption of national policies and legislation, as appropriate, for the conservation and sustainable use of PGRFA;
- f) to assist relevant stakeholders in identifying priorities for action;
- g) to strengthen national programmes including research, education and training on the conservation and use of PGRFA and to enhance institutional capacities;
- h) to promote information sharing and cooperation on PGRFA among national stakeholders and institutions, to ensure cost efficiency, complementarities, and effectiveness in efforts to conserve and sustainably use PGRFA;
- i) to promote information sharing and partnerships within the region and with international organizations;
- j) to strengthen the implementation of the ITPGRFA and other international tools.

2.4. National Plan of Action for PGRFA conservation and management in Lebanon

A National Plan of Action for PGRFA conservation and management is formulated for Lebanon for the coming 20 years addressing the national development planning for agriculture, environment and socio-economic sectors. Four main thematic components are stipulated in order to ensure the further implementation of the Plan of Action. A set of specific objectives are convened for each component reflecting the continuum process to the management of PGRFA, interlocking relevant activities from conservation, use, to seeds delivery, through a coordinated alliance and partnerships between national institutions. These specific objectives should be fully integrated into the national programmes within the relevant ministries and addressing the country's priority crops including cereals, vegetables and fruit trees.

A. Conservation Component

Specific objective 1. To ensure reliable on-farm and *in situ* conservation of PGRFA

This specific objective responds to the need to promote *in situ* conservation of cultivated PGRFA and their wild relatives taking into account the reciprocal relation existing between local communities and PGRFA. The establishment of biocultural territories is proposed, referring to the set of biological resources, comprising PGRFA diversity in terms of food and feed, the agricultural systems, and the landscapes and ecosystems which host them, as well as to the traditions and good agricultural practices of rural populations, including local communities, which are often the custodians of cultivated PGR and de-facto guardians of the agrobiodiversity. The establishment and appropriate management of biocultural territories require baseline information describing all the important aspects of such territories, as well as monitoring mechanisms. These territories are therefore considered integral parts of on-farm and *in situ* conservation strategies. Reinforcing and acknowledging local seed systems as fundamental elements for maintaining agrobiodiversity in biocultural territories is crucial for the effective conservation of cultivated PGRFA.

Specific objective 2. To ensure *ex situ* conservation of PGRFA and improve their access and usefulness

This specific objective is to improve the *ex situ* conservation of PGRFA and to ensure the access to germplasm and information between gene bank and institutions. A national programme for germplasm collection based on inventories, in consultation with experts and using GIS tools, with emphasis on either endangered materials or materials potentially adapted to climate change is proposed. The national genebank should guarantee the genetic integrity and phytosanitary quality / viability of germplasm conserved through adequate documentation, characterization and evaluation, applying agreed standards and best practices. A national repository for native lignified species is strongly required. The interesting germplasm should be available to users including materials for direct planting and research or plant breeding. The long-term conservation of non-orthodox germplasm, through collections of "live" plants in the field should be ensured. Where the context allows, multiplying germplasm for its distribution to farmers, particularly in term of seed shortage, as well as after natural disasters should be accomplished. A national network will be established through the NISM and GPA2 website linking data base with inventory and monitoring systems and strengthening the liaison between the stakeholders (national genebank, universities, local communities, civil society) and promoting cooperation among them, avoiding duplication of efforts. Access to and distribution of germplasm to users through the Multilateral System of the ITPGRFA or other relevant national, regional or international legislation should be promoted and facilitated.

B. Sustainable Use Component

Specific objective 3. To make available PGR and information on their potential use

The challenge is to reconnect conservation and use in an integrated and effective system for managing PGRFA and facilitating access of users to documentation on existing collections. Pre-breeding activities are enhanced. Local landraces adapted to emerging biotic and abiotic

constraints are evaluated. Their use through seed multiplication and distribution to respond to food security, climate change and market demand is promoted and their local registration system is enhanced.

Specific objective 4. To enhance farm diversification and improve farmers livelihood

Introducing greater number of crops for climate change risk management and health, food and nutrition security is improved allowing the farms to produce an important amount of edible species, directly benefiting farmers and promoting new income-generating alternatives. Greater use of native local crops, landraces and varieties in existing food and agricultural assistance programmes is promoted. Local knowledge on PGR and underutilized edible species is documented, complemented with scientific information and promoted. Diversification of PGR value-added products should be prioritized, and transformation and commercialization processes should be promoted.

Specific objective 5. To enhance utilization of inter- and intraspecific diversity

This specific objective promotes plant breeding using participatory, conventional and molecular methods for developing varieties with characteristics that enable adaptation to climate change and meet the diverse needs and preferences of farmers. Both inter- and intra-specific diversity of crops and associated local knowledge are fully deployed in agricultural innovation processes. Producers' organizations and their entrepreneurial capacity for producing and selling quality seeds and agricultural products are strengthened.

C. Policy and Legal Component

Specific objective 6. Policy measures to support PGRFA management

This objective proposes to raise awareness of policy-makers on international legal instruments addressing PGRFA. It will formulate policies supporting *in situ* and *ex situ* conservation and sustainable use of PGRFA making them sustainable over time thanks to the support of public policy measures, thus in harmony with other relevant national legislations such as seed and seedling law. PGRFA management will be displayed as a priority area in national research program. Increasing coordination and promoting cooperation among stakeholders and germplasm channels will be enhanced to cut across the institutional boundaries. Increase in funding for PGRFA related programs research is required. Intellectual property rights and legislation for seed crops registration will be developed. Harmonizing PVP system with international standards for joining UPOV is also foreseen.

Specific objective 7. Implementing the ITPGRFA

The National PGRFA Committee will advise the national institutions to establish procedures and determine which genetic materials to include in the Multilateral System. Activities are coordinated at the national level, in both the institutional and the legal frameworks, for the effective implementation of the ITPGRFA, in harmony with the CBD and Nagoya Protocol.

Specific objective 8. Promoting farmers' rights

This objective recognizes the farmers' rights and developed measures for their promotion in legal, administrative and policy instruments at the national level. It proposes enhancing local seed systems in national seed laws, finding alternative mechanisms for registration and quality certification, facilitating legalization and registration of enterprises or cooperatives, and improving access to quality seeds by small-holder farmers. The fair and equitable sharing of benefits arising from the use of traditional knowledge associated to PGRFA, in line with the ITPGRFA and Nagoya Protocol is promoted. Incentives should be created to improve conservation and use of cultivated and wild PGR, especially for small-holder farmers, and local communities, through participatory plant breeding programmes and compensation payments for conservation of agricultural biodiversity, facilitated access to markets of PGR value-added products, inclusion in value chain fairs for new products, and designation of geographic origin. Agro-tourism will be promoted.

D. Networking, Education, Capacity Building and Raising Awareness Component**Specific objective 9. Networking**

Enabling data entry into NISM/GPA2 and appropriate national, regional and international data bases is proposed. Linkage among PGRFA holders, users and seed producers is enabled.

Specific objective 10. Education and research

Specialized courses in taxonomy, molecular tools, breeding and seed technology will be reinforced. Graduate programmes and studies in PGR will be supported by offering scholarships and research funds to academic institutions. Curricula and extra-curricular activities in PGR included in the primary and secondary education systems will be encouraged.

Specific objective 11. Capacity building

Strengthening and/or developing human resources with the skills required to carry out the activities of the National Plan of Action is proposed. These needs include updating and generational renewal of active PGRFA professionals, training new generation of extension agents with a broader mandate, strengthening farmers' organizations to make better use of information for confronting climate change through the use of PGRFA, and building capacity of decision makers at multiple levels for their informed participation in implementing international commitments related to PGRFA. At the technical level, trainings are required in taxonomy and para-taxonomy; modern approaches and novel techniques in pre-breeding; conventional and advanced breeding including molecular and biotechnology tools; bioinformatics; seed production practices and methodologies; seed health and quality control testing based on updated standards; IPR in plant breeding and PVP systems.

Specific objective 12. Raising public awareness

Demonstrative field days will be organized to introduce advantages of both PGR and modern breeding varieties. Learning materials will be developed (leaflets, posters, booklets, DVD, TV spots, social media, etc.).

2.5. Validation

The National Plan of Action is evaluated, discussed and reviewed through a participatory process during the first national stakeholder's workshop held in Beirut on 19 May 2014. Based on stakeholder's advice, the National PGRFA Committee agrees on the National Plan of Action and finalizes the national strategy. Thus the national strategy is considered validated.

2.6. Reviewing and updating

The strategic specific objectives will be evaluated, reviewed and updated every five years by the National PGRFA Committee with the support of involved actors, experts and stakeholders, and through participatory stakeholders' consultations.

Chapter 3: Implementing the National Strategy for PGRFA

The implementation of the National PGRFA Strategy will certainly require several years of efforts and the involvement of a diverse range of specialists and institutions. Annual planning and budget availability are essential. Enabling capacities should be ensured in line with specific objectives of the National Plan of Action.

3.1. Implementing structure and modalities

The concerned national authority is the Ministry of Agriculture advised by the National PGR Committee while the national lead agency is the Lebanese Agricultural Research Institute (LARI) who is already acting as the National Focal Point of the ITPGRFA. Actually LARI is housing the National Gene Bank, in addition to the Plant Breeding, Seeds and Biotechnology Units. LARI has a limited permanent staff with expertise in several of the PGR priority areas; they are already assigned in the relevant activities which are part of the ongoing work and the internal budget.

LARI is committed to promote mainstreaming, to facilitate the interaction with PGR stakeholders through access to germplasm and data as well, and to guard centralization or monopolization of PGRFA.

The gene bank of the American University of Beirut with its important resources and facilities will also play an important role as PGR holder through a Memorandum of Understanding signed with the Ministry of Agriculture and proper coordination with the national authority to maximize efficiency.

Free access to germplasm will be ensured upon a letter of agreement signed between the PGRFA holder and the beneficiaries.

The Ministry of Environment will have a key and complementary role in PGRFA activities in protected areas and also through their NBSAP which is being updated currently and their national focal points.

Universities working on biodiversity and PGRFA are the national partners. Both LARI and/or universities could lead PGRFA projects. NGOs, farmers and local communities are associated when needed through participatory approach in relevant actions and activities.

The NCSR, through its role in the preparation and updating of the national science policy and programs will promote national research and cooperation in the field of PGRFA.

Concerned regional and international organizations such as ICARDA and ACSAD can be consulted in the implementation of the National Plan of Action.

3.2. Ad hoc working groups

For each thematic component or specific objective of the National Plan of Action, five years work plans focusing on country's priority crops and species will be further formulated and implemented by involved institutions. Thematic groups will be convened for each component or specific objective with an appointed coordinating agency. Partners will be committed to share together all available facilities and resources to ensure the effective implementation of the strategic activities.

3.3. Enabling capacities

The National PGRFA Committee is committed to advise the decision makers and international organizations on the necessity of training resource persons on various relevant tasks of the National Plan of Action and enabling national capacities to become appropriate for strategy implementation. Enabling capacities will mainly address the following components:

- Policy: to formulate and lead policy reform; to implement policies; to comply with the ratified international tools.
- Knowledge: to access, generate, manage, and exchange data, information and knowledge.
- Technical: to access and use both conventional approaches and advanced techniques including molecular tools.
- Partnerships: to engage in well coordinated networks, alliances, and relevant groups of interest.
- Management: to implement and deliver programs and projects from planning to monitoring and evaluation, and to identify funding resources.

Detailed trainings relevant to the different specific objectives are indicated in the National Action Plan (Specific Objective 11).

3.4. Mobilizing funds and resources

The National PGRFA Committee is committed to advise the decision makers on the necessity to provide a core domestic budget for the implementation of the action plan. The National Committee with the lead agency and universities will work to secure the internal funds for well defined activities that are parts of their internal working plan.

However, for the other activities that are not benefiting from the running cost, the same actors are engaged to search and mobilize fund raising from other sources including assistance from external partners and donors such as the Global Crop Diversity Trust and the Benefit

Sharing Funds of ITPGRFA. Thematic groups should systematically work on drafting projects and establishing external partnerships.

The NCSR will consider supporting the establishment of an Associated Research Unit (URA) serving as specific platform for PGR characterization, *in situ* conservation and on farm management and liaising partners from various relevant institutions.

3.5. Challenges

The major challenges that may hinder the efficient implementation of the strategic plan of action are mostly inherent to the unstable political and security situation of the country, and the limited funds, resources and capacities available.

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Annex 1

List of national stakeholders involved in the finalization of the National PGRFA Strategy for Lebanon.

Organizations / Institutions	Names
National Focal Point for the ITPGRFA (LARI)	Mr. Ali Chehade
National Focal Point for the CBD and Nagoya Protocol	Ms. Lara Samaha
Ministry of Agriculture Directorate of Plant Resources Service of Horticulture and Field Crops Service of Import Export Service of Marketing and Economy Service of Extension and Education Service of Programs and Developmental Projects Department of Range Lands, Public Garden and Resources Agriculture Research Development Project Legislator	Mr. Mohamad Abou Zeid Ms. Mona Siblini, Ms. May Mezher Mr. Charles Zarzour Ms. Hala Abdallah Ms. Abir Abou Khoudoud Mr. Anwar Kozoh, Mr. Michel Bassil Ms. Lamia Eltawm Mr. Hussein Hoteit Judge Ahmad Abdallah
Lebanese Agricultural Research Institute (LARI) President Director General National Gene Bank Plant Breeding Seed System Biotechnology Biotic Stress Environmental Sciences Water Resources Management	Dr. Michel Afram Ms. Joelle Breidy Mr. Rabih Kabalan Dr. Faten Raad Mr. Ahmad Elbitar Dr. Rola Amil, Ms. Zinate Moussa Dr. Ihab Joumaa Ms. Randa Masaad
Ministry of Environment Department of Ecosystems and Protected areas	Mr. Nizar Hani
National Council for Scientific Research Research program	Dr. Khaled Makkouk

<p>Lebanese University / Faculty of Agriculture Head of Plant Production Department Regional Coordinator, TCP/SNO/3401 Plant Genetic Resources Agrobiodiversity Medicinal Plants</p>	<p>Prof. Lamis Chalak Dr. Samih El Hajj Dr. Souzi Roufael Dr. Nisrine Karam</p>
<p>Lebanese University / Faculty of Sciences Medicinal and wild relatives Biodiversity</p>	<p>Dr. Jihad Noun Dr. Jean Stephan</p>
<p>American University of Beirut (AUB) Nature Conservation Center, Landscape Design and Ecosystem Management</p>	<p>Prof. Salma Talhouk</p>
<p>Beirut Arab University Research Center for Environmental Development</p>	<p>Dr. Safaa Baydoun</p>
<p>International Expertise Bioflora, Pharmacopea Biodiversity</p>	<p>Prof. Nelly Arnold Dr. Elsa Sattout</p>
<p>Seed Sector Seed private sector representative</p>	<p>Mr. Anis Haddad</p>
<p>Farmers Representative Agricultural Cooperative for Medicinal and Aromatic Plants</p>	<p>Mr. Mohamad Neameh</p>
<p>International Organizations ICARDA FAO</p>	<p>Dr. Hassan Machlab Dr. Mariana Yazbek Ms. Marie Louise Hayek</p>





Babda - Lebanon
P.O.Box: 40010
Tel: +961 (5) 924005/6/7
Fax: +961 (5) 922128
E-mail : fao-lb@fao.org
Website: www.fao.org