Empowered lives
Resilient nations.

EVALUATION OF PLANT GENETIC RESOURCES IN ALBANIA

Report prepared by Prof. Dr. Alban Ibraliu in the framework of the UNDP-GEF Project "Strengthening human resources, legal frameworks, and institutional capacities to implement the Nagoya Protocol" (Global ABS Project).

MINISTRIA E TURIZMIT
DHE MJEDISIT

Empowered lives
Resilient nations.

EVALUATION OF PLANT GENETIC RESOURCES IN ALBANIA

ALBANIA, APRIL 2018

TABLE OF CONTENTS

Executive Summary 10

Chapter 1. Introduction 15

1.1 Albania and its agricultural sector 16

1.2 Plant genetic resources for food and agriculture 21

1.3 Genetic erosion in Albania 27

Chapter 2. Status of In-Situ Conservation and Management 31

2.1 Surveying and inventorying plant genetic resources for food and agriculture 32

2.2 Albanian protected areas and species 33

2.2.1 *Current situation* 33

2.2.2 *Albanian Protected Areas System* 33

2.2.3 *Crop Wild Relatives and Wild Food Plants in Protected Areas* 37

2.3 Gaps and needs 37

Chapter 3. Status of Ex-situ Conservation 38

3.1 Supporting targeted collecting of plant genetic resources for food and agriculture 40

3.2 Sustaining and expanding ex-situ conservation of germplasm 42

Chapter 4. Development of Database for PGR in Albania 45

4.1 Activities carried out for drafting the first steps towards an Albanian PGR Database for CWR conservation strategy 49

4.2 Case study conclusion: and key lessons learnt 50

4.3 Albania towards NATURA 2000 56

Chapter 5. Traditional Knowledge and Plant Genetic Resources 59

5.1 Traditional Knowledge (TK) 60
5.2 TK Identification and Documentation Procedures 61
5.3 Access and Benefit Sharing 62
5.4 Recognition and Protection of Farmers' Rights 63
5.5 Intellectual Property Rights (IPRs) 64
5.6 Use rights on plant genetic resources in Albania 65
5.7 Benefits from using plant genetic resources, problems and actions to be taken 66
5.8 Problems related to use of plant genetic resources 67
5.9 Actions to be undertaken on Using Plant Genetic Resources 67
5.10 Contribution of plant genetic resources to food security and sustainable agriculture 68
5.10.1 *Contribution to food security* *68*
5.10.2 *Contribution of genetic resources to a sustainable agriculture* 69
5.11 Introduction of new cultivars, seed supply systems and problems with indigenous plant varieties. 70
5.12 Transfer of the genetic material 71

Chapter 6. Conclusions and Recommendations 73

Bibliografy 76

ABBREVIATIONS

ABS	Access and Benefit Sharing
ATTC	Agricultural Technology Transfer Center
BG	Botanical Garden
CBD	Convention on Biological Diversity
CCAD	Central American Commission of Environment and Development
CGIAR	Consultative Group on International Agricultural Research
CITES	Convention on International Trade in Endangered Species of Wild Flora and **Fauna**
CWR	Crop Wild Relatives
TK	Traditional Knowledge
ITPGRFA	International Treaty on Plant Genetic Resources for Food and Agriculture
ECPGR	European Cooperative Programme for Plant Genetic Resources
EU	European Union
FAO	Food and Agriculture Organization
IP	Intellectual Property
IPM	Intellectual Property Management
IPRs	Intellectual Property Rights
IPGRI	International Plant Genetic Resources Institute
ITPGRFA	International Treaty on Plant Genetic Resources for Food and Agriculture
MARDWA	Ministry of Agriculture Rural Development and Water Administrations
NGB	National Genebank
PGRFA	Plant Genetic Resources for Food and Agriculture
PGR	Plant Genetic Resources
PIC	Prior Informed Consent
SEEDNET	South East European Development Network
SIDA	Swedish International Development Agency
WB	World Bank
WFP	Wild Food Plants
WIEWS	Early Warning System on Plant Genetic Resources
WTO	World Trade Organization

USE OF TERMS

USE OF TERMS

"Access to genetic resources" means the utilization of genetic resources for purpose of conducting any research and/or development on the genetic and/or biochemical composition of genetic resources, including through the application of biotechnology. It also includes conducting any research and development on derivatives of biological or genetic resources.

"Benefit sharing" means a commitment to channel a fair and equitable share of monetary or non-monetary returns arising from the use of TK and PGR back to rights holders, including source communities or nations, in recognition of their role in conservation and as custodians of PGR and associated TK. Such benefit sharing shall be in accordance with domestic law and/or regulatory framework and rights recognized by relevant international instruments such as the CBD, the Nagoya Protocol and the ITPGRFA.

"Conservation" means controlled utilization, protection and development of the gene pool of natural and cultivated organisms to ensure variety and variability, and for current and potential value to human welfare.

"Farmers' rights" consist of the customary rights of farmers, including the rights of farmers recognized by the ITPGRFA to save, use, exchange and sell farm-saved seed and propagating material. It also includes their rights to be recognized, rewarded and supported for their contribution to the global pool of genetic resources and to the development of commercial varieties of plants, as well as to participate in decision-making on issues related to crop genetic resources.

"Utilization of genetic resources" means to conduct research and development on the genetic and/ or biochemical composition of genetic resources, including through the application of biotechnology as defined in Article 2 of the CBD.

"Local community-farmers" means any group of individuals, whether formal or informal, settled or unsettled, organized or disorganized, monolithic or diversified, but has a common interest in the utilization, conservation and enhancement of genetic resource and the associated knowledge, intellectual practice and culture.

"Sustainable use" means the use of components of biological diversity in a way and at a rate that does not lead to the long-term decline of biological diversity, thereby maintaining its potential to meet the needs and aspirations of present and future generations.

"Traditional Knowledge associated with biological resources" means the knowledge that an indigenous or local community accumulates over generations of living in a particular environment. This definition encompasses all forms of knowledge – technologies, know-how skills, practices and beliefs – that enable the community to achieve stable livelihoods in their environment.

"Utilization of genetic resources" means to conduct research and development on the genetic and/or biochemical composition of genetic resources, including through the application of biotechnology as defined in Article 2 of the CBD.

"Variety" means a plant grouping, within a single botanical category (taxon) of the lowest known rank, defined by the reproducible expression of its distinguishing and other genetic characteristics.

EXECUTIVE SUMMARY

> Genetic material" refers to any material of plant, animal, microbial or other origin containing functional units of heredity.

The term Genetic Resources refers to any biological material which contains genes and/or metabolic material that may be derived from genes. They fall within the scope of the Nagoya Protocol on Access to Genetic Resources and the Fair and Equitable Sharing of Benefits Arising from their Utilization (Nagoya Protocol on ABS) whenever they are used for research or product development.

The Nagoya Protocol on ABS applies to the genetic resources of all organisms, excluding humans, within all the geographical areas of the contracting parties. In accordance with the Convention on Biological Diversity and the Nagoya Protocol, genetic material and genetic resources are defined as follows: 'Genetic material' refers to any material of plant, animal, microbial or other origin containing functional units of heredity. 'Genetic resources' refer to genetic material of actual or potential value. Decree number 511/2014 of the European Parliament and the Council (EU 2014) uses these same definitions.

In practice, this means that any biological matter may fall under the scope of the Nagoya Protocol (NP) if research and/or product development activities are targeted at its genes or the metabolic products derived from them. However, different countries may have different interpretations of genetic resources. If the interpretations of the definitions used by countries are different from each other, the laws of contracting Party providing such resources that is the country of origin will be applied (NP Article 5.1).

Since the Convention on Biological Diversity (CBD) came into effect in 1992, there has been increased awareness of the value of TK associated with biological resources, the role of Intellectual Property (IP) protection, and the need for developing mechanisms to ensure fair and equitable sharing of benefits resulting from the use of biological resources. In contrast, the Trade-Related Aspects of Intellectual Property Rights (TRIPS) agreement adopted by the World Trade Organization (WTO) in 1994, and which has widely been ratified, contains provisions for minimum standards of IP protection, including the extension of patent protection to plant material or providing sui generis protection as is the case with the International Union for the Protection of New Varieties of Plants (UPOV) Convention. In addition, the International Treaty on Plant Genetic Resources for Food and Agriculture (ITPGRFA) contains provisions for farmers' rights and further emphasizes fair and equitable sharing of benefits resulting from the use of Plant Genetic Resources for Food and Agriculture.

ITPGRFA

contains provisions for farmers' rights and further emphasizes fair and equitable sharing of benefits resulting from the use of Plant Genetic Resources for Food and Agriculture.

The Nagoya Protocol on ABS, an agreement under the Convention on Biological Diversity, was adopted on 29 October 2010 in Nagoya (Japan) and entered into force on 12 October 2014. It provides a transparent legal framework for the effective implementation of the 3rd objective of the Convention on Biological Diversity (CBD), the fair and equitable sharing of benefits resulting from the utilization of genetic resources. The Protocol applies to genetic resources that are covered by the CBD and to the benefits arising from their utilization. It also covers traditional knowledge (TK) associated with genetic resources held by indigenous and local communities. Contracting parties to the Nagoya Protocol need to fulfil core obligations to take measures in relation to access to genetic resources, benefit-sharing and compliance, among others.

Genetic resources are utilized for a wide range of purposes, by a wide range of different actors with different interests. Traditional knowledge associated with genetic resources is relevant in specific cases but is of limited relevance overall. Multiple actors (e.g. public, private, not-for-profit, local communities) intervene at different stages of the genetic resources value chain. This value chain ranges from collecting, storing, and making available genetic resources for research and development, to basic and applied research on genetic resources, and to the eventual development and commercialization of products and services resulting from the use of genetic resources.

The country has a total area of **28,748 km²** with a population of about **2,87 million** people.

Albania is a country in Southeast Europe which borders Montenegro to the northwest, Kosovo to the northeast, Macedonia to the east, and Greece to the south and southeast. It has a coast on the Adriatic Sea to the west and on the Ionian Sea to the southwest. The country has a total area of 28,748 km², with a population of about 2.87 million people. The majority of the country territory is hilly and mountainous. The coastal lowlands have typically Mediterranean climate, while highlands have a continental climate. Due to the climate and territory variability, the country is very rich in terms of flora and many different crops are grown.

The agricultural sector is very important for the economy as it provides employment for more than half of the active labour force in the country. The vast majority of farms are small (< 2 ha) and their production is in part for self-consumption and in part marketed. In general, farmers cultivate a mixture of annual and perennial crops, such as wheat, maize, bean, vegetables, alfalfa, fruit trees, olives etc.

Although the country is very rich in plant genetic resources, it should be noted that the interest and attention to the conservation and sustainable use of these resources took off in the '90s. Following the establishment of the National Genebank in 1998, significant efforts have been undertaken to identify, collect and conserve plant genetic resources for food and agriculture. Nevertheless, these resources, which are the base of food security, still face serious problems and threats that require continued monitoring as well as national and international coordinated efforts.

In regard to the preservation of plant genetic resources for food and agriculture (PGRFA) in Albania, the greatest efforts have been dedicated to ex-situ conservation, undertaken by the National Genebank, which is under responsibility of the Agricultural University of Tirana, and five Agricultural Technology Transfer Centres (ATTCs), under the responsibility of the Ministry of Agriculture Rural Development and Water Administration (MARDWA).

The Albanian National inventory of base collections includes a total of 4105 accessions. Out of these, 3219 accessions are maintained as seeds under long-term conservation at the National Genebank, and the remaining 886 accessions are conserved in the field collection (614 by the National Genebank and 272 by ATTC Vlora). Working collections of about 8000 seed accessions of mainly wheat, bean and vegetables, are maintained at ATTC Lushnja.

Albania ranks third in the world in its concentration of priority medicinal and aromatic plants crop wild relatives (CWR), and national parks and protected areas cover more than 80,000 hectares.

Since 2003, several collecting missions have been carried out with support from the World Bank (WB), Food and Agriculture Organisation (FAO), Swedish International Development Cooperation Agency (SIDA) and MARDWA. These missions have significantly contributed to increase the coverage and diversity of the germplasm stored in the National Genebank, in particular germplasm from local crop varieties and their wild relatives, as well as medicinal and aromatic plant species.

During the implementation of the first program in Albania for collection and evaluation of germplasm of aromatic and/or medicinal plants supported by the World Bank under the Agricultural Services Project (2003-2005), 480 samples were collected, which are characterized of their phenotypic differences and other features. These activities have contributed to complementing ex situ collections of plant genetic resources of arable crops, forage plants, etc. During the implementation of the SEEDNet Project (2005-2011), the national collection of fruit trees was established at the National Genebank.

Despite these achievements, it is considered that quite a large diversity of PGRFA in Albania has not been taken care of. Indeed, the situation of PGRFA occurring in-situ appears quite problematic. Albania ranks third in the world in its concentration of priority medicinal and aromatic plants crop wild relatives (CWR), and national parks and protected areas cover more than 80,000 hectares. Nevertheless, the management plans of these areas do not address the management of CWR and wild food plants (WFP), two very important gene-pools, which represent a major source of adaptive diversity that is particularly at risk if not adequately preserved.

Since

2003

several collecting missions have been carried out with support from the World Bank (WB), Food and Agriculture Organisation (FAO), Swedish International Development Cooperation Agency (SIDA) and MARDWA.

Under the circumstances currently faced by the country, namely a changing climate and increasing human and financial resource scarcity, the sustainable use of PGRFA is of capital importance and can offer great opportunities. Sustainable use of PGRFA entails the development and/or simply the introduction and testing of new crop varieties. It critically depends on farmers and breeders having access to the genetic diversity in order to develop and grow adapted and more productive varieties, able to use more efficiently lower amounts of inputs under a changing environment where pests and diseases are increasingly more aggressive. PGRFA can also be sustainably used through their direct introduction for production on farm, for land restoration. Traditional and local varieties play also an important social and cultural role.

The lack of a national strategy and programmes for the collection, conservation and sustainable use of plant genetic resources, together with the lack of funds, lack of inter-institutional coordination, lack of public awareness, and limited human capacity available for dealing with PGRFA management, remain a serious and urgent issue for Albania that should be addressed in the near future.

1. INTRODUCTION

Galanthus Nivalis

INTRODUCTION

1.1. ALBANIA AND ITS AGRICULTURAL SECTOR

Albania is a small Mediterranean country, which lies in the South-Eastern part of Europe (western part of Balkan Peninsula), along the Eastern coast of the Adriatic and Ionian seas, between latitude 42°39'N and 39°38'N and longitude 21°40'E and 19°16'E. It has a surface of 28 748 km2, of which 27 400 km2 is terrestrial, divided as such:

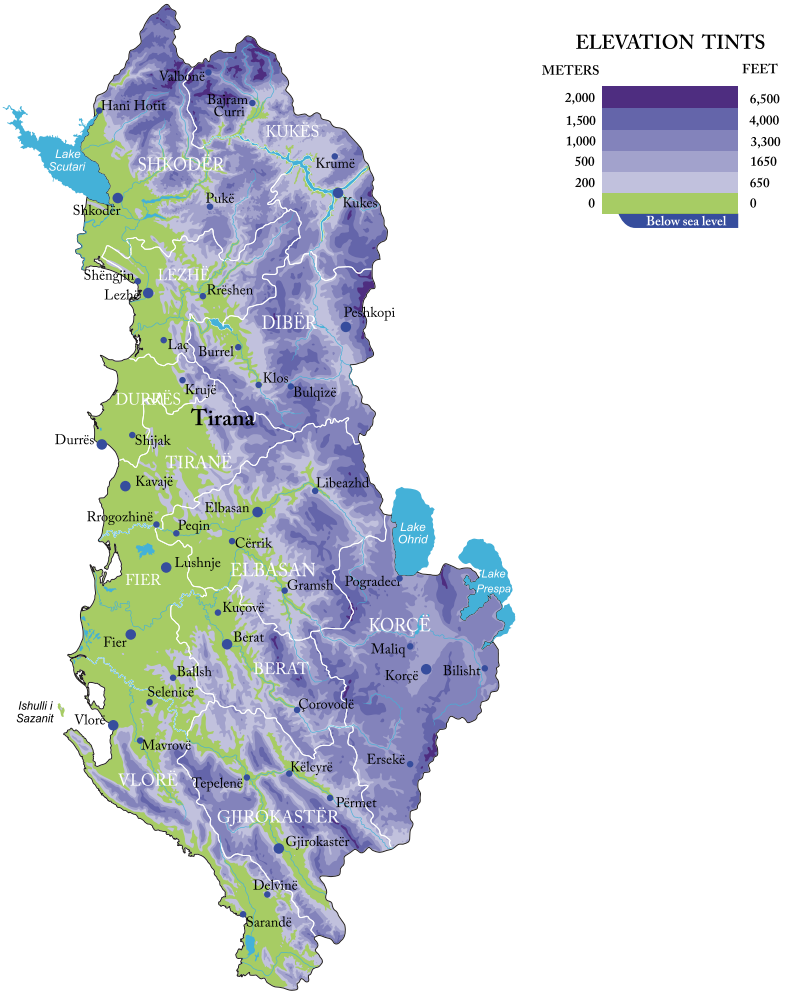
25% plains

47% hills

28% mountains

The remainder of the territory, with a surface of 1 348 km2, is represented by watermark. The boundary of Albania is 1 094 km, of which 657 km are ground boundary, 316 km marine boundary, 48 km fluvial boundary, and 72 km are lake Boundary. Albania is a Mediterranean country; it is only 72 km from the Apennine peninsula (the nearest point is Otranto Channel). The length of Albania (North-South) is 340 km and the width (East-West) is 148 km. To the North and Northwest Albania is bounded by Montenegro, to the Northeast it is bounded by Kosovo, to the East it is bounded by the Former Yugoslav Republic of Macedonia, and to the South and Southeast it is bounded by Greece (Fig 1).

Fig.1. MAP of Albania



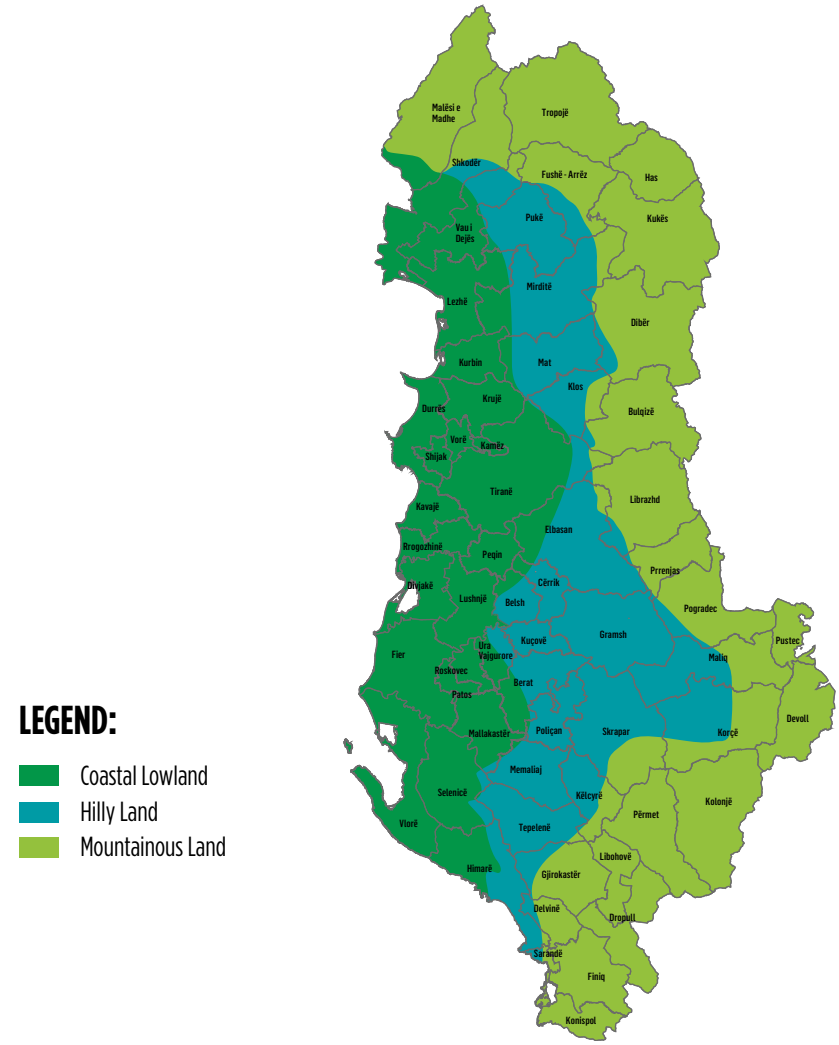
Albania is mainly a mountainous country: mountains and hills occupy 76.6% of its territory. The average altitude of Albania is 708 m above sea level. Mountains dominate there with an average height below 2 000 m and lower than 1 000 m. The highest peak is Korabi with 2 751 m, which is located in Albanian Alps. Mountains occupy the entire Northern and inner parts and forestry areas of Albania, while plains lie mainly along the Adriatic coasts from Hani Hotit in the North to Vlora and Delvina valley in the South. Plains of an altitude of more than 800 m are found in Korca valley (see fig 2). Albania has over 150 rivers and streams that flow through its territory to the Adriatic and Ionian seas. Valleys primarily stretch from the North to the West.

Albania has over

150

rivers and streams that flow through its territory to the Adriatic and Ionian seas.

Fig.2. Agro-ecologic zones of Albania



Albania occupies an overall land area of 2 875 000 ha, of which 699 000 ha (24% of the total land area) are agricultural lands; 1 041 000 ha (36%) forests; 423 000 ha (15%) meadows and pastures and 712 000 ha (25%) other land areas (urban areas, non-productive lands, internal waters, etc). Arable land covers an amount of 578 000 ha (82.69% of agricultural lands) and 121 000 ha (17.31%) are with fruit trees and vineyards. The average agricultural land per capita is therefore below 0.2 ha, which is the smallest throughout Europe.

The average agricultural land per capita is therefore **below 0.2ha,** 0.2 ha, which is **the smallest throughout Europe.**

According to the relief map, agricultural lands consist of the following:

43.3% (304 000 ha) fields

34% (239 000 ha) hilly land

22.7% (159 000 ha) mountainous land

Albania benefits from a Mediterranean climate, characterized by mild winters with abundant precipitation and hot and dry summers. The total annual precipitation is about 1500 mm. The country has relatively abundant fresh water resources (seven main rivers run from east to west).

Albania, owning to its very suitable geographic Mediterranean position, to its land features and variable relief and also to its very changeable climate, is characterized by a rich ecosystem of diversified flora. It has a considerable number of primitive cultivars and native populations and wild species. Primitive cultivars and native populations are mainly cultivated in farmers' gardens in the most remote mountain villages of the country.

Albanian Flora includes about

3250

plant species or about 30% of European Flora (Paparasito et al. 1988), of which 30 are endemic species and about 180 sub-endemic species (Vangjeli et al. 1995).

Despite its small size, Albania holds a rich biological diversity and flora. This is due to its geographical position in the Mediterranean region and in the Balkan Peninsula and to the varied types of landscape (Paparasito et al. 1988). Albanian Flora includes about 3,250 plant species or about 30% of European Flora (Paparasito et al. 1988), of which 30 are endemic species and about 180 sub-endemic species (Vangjeli et al. 1995).

The agricultural sector continues to be one of the most important sectors of the economy and contributes about 22% of the GDP (year 2014), providing employment for more than half of the active labour force in the country. The agricultural land reform implemented after 1990, produced a fragmentation of the agricultural land into thousands of small family farms, which characterize the agricultural sector.

Production is predominantly oriented to both family consumption and the market. In general, farmers cultivate a mixture of annual and perennial crops, such as wheat, maize,

vegetables, alfalfa, and fruit trees. The livestock sector is characterized by cattle and poultry production.

Agricultural activities, which are mostly run by individual farmers, have seen a progressive expansion of inter-farm cooperatives for purchasing and marketing inputs and agricultural products in recent years. Some agri-businesses targeting vegetable production, orchards and vineyards, and in some cases dairy products, are being developed by family enterprises of landowners. Such market-oriented farm operation is gradually increasing in number although it is hampered by the farm size which, on average, is still in a range of 2-3 ha.

In terms of cultivated area, the main agriculture crops are: forage crops 35% of the cultivated area with an average yield of 23.2 t/ha, wheat 20% with an average yield of 4.2 t/ha, maize 13% with an average yield of 5.1 t/ha, vegetables 8% with an average yield of 26.6 t/ha, and white bean 4% with an average yield of 1.5 t/ha. The rest (about 20%) is planted with fruit trees, olives and vineyards.1

During the last 15 years, the acreage used for individual agriculture has changed as the result of an increase of market demand for livestock products, fruits, and vegetables. Cereal cultivations have decreased considerably: only in the last 5 years, wheat cultivation area has decreased by 10%. During the same period, cultivation area of forage crops has increased by more than 18%.

5 in the last years, wheat cultivation area has decreased by **10%**

Seed production and distribution systems are entirely based on private operators who deal with importation and marketing of seeds needed for cultivation by farmers. Albania is a small market and nearly 80% of the needs for seeds are met by imports. The remaining 20% is met by farmers' saved seed. Plant breeding programmes are almost non-existent in the country and all the new cultivars released in the country in the past years have come from abroad.

Crop yields depend to a large extent on the quality of the seed used for cultivation. Based on the statistical data, about 89% of arable land cultivated with wheat is planted with seeds of uncertified quality; for maize this proportion decreases to about 13%, as more

1. Ministry of Agriculture, Statistical Yearbook 2017

than 85% of the crop is grown from imported hybrid seed. For vegetable crops also, about 17% of the surface is cultivated with seeds of uncertified quality. It should be noted that a good part of the arable land, especially in remote mountainous areas, is cultivated with local varieties of vegetables, maize and fruit trees.

For vegetable crops also,

about

17%

of the surface is cultivated with seeds of uncertified quality.

Despite the progress made in the agricultural sector, farmers still continue to face many obstacles that are beyond their control. These include, inter alia, small and fragmented land holdings, limited access to markets and poorly developed relationships with agribusinesses at the commercial and agricultural supply chains, limited access to credit, and poor rural infrastructure.

Albania is currently a candidate country for membership in the European Union, and in this context, the agricultural sector is facing major challenges. These challenges have to do with the low level of technology applied in agriculture, including mechanization, as well as the low standards applied in production, food safety and consumer protection, and increasing competition from products coming from abroad.

1.2. PLANT GENETIC RESOURCES FOR FOOD AND AGRICULTURE

Currently, about 7000 plant species are used worldwide. This figure does not include ornamental plants and shrubs. Since the beginning of agriculture nearly 10 thousand years ago, it has been possible to create a huge diversity of varieties and specific regional ecotypes from cultivated species. Since ancient times, people have also used a considerable number of wild species for food and raw material. Management of pastures and forests is based on the wild species, and in this context a lot of wild species have great usage values. As a result, genetic resources are economically and ecologically important.

Out of the 3,250 plant species existing in Albania, it is estimated that about 700 species are considered as plant genetic resources for food and agriculture. Currently, about 15 arable species, 15 forage species, 35 vegetable species, and 20 fruit-tree species are cultivated

Out of the 3250

plant species existing in Albania, it is estimated that about 700 species are considered as plant genetic resources for food and agriculture.

in the country. In addition to these agricultural species, medicinal and aromatic plants (MAPs), which widely occur in the country, comprise an important natural economic resource which is not widely and sustainably exploited. More than 300 species of MAPs belong to the Albanian flora that occur in the wild. They are important natural and economic resources of the country. About 182 of these species are rather widespread and many of them are harvested and exported.

One major problem with collection of MAPs includes the early harvesting and harvesting of herbs by removing the stalks. Eager to harvest as much MAPs quantities as possible, harvesters do not follow proper harvesting practices. Many unlicensed collectors buy herbs even if they are of weak quality. So harvesters are encouraged to collect early and do not implement proper harvesting practices. This not only affects the quality of MAPs collected but also causes damage to the wild populations. According to expert interviews and focus group discussions, late summer or early autumn harvesting heavily damages the sustainability of wild plants.

Many important Albanian medicinal and aromatic plants have been over collected to the point that the wild Albanian reserve has been designated as “threatened” as in the cases of Salvia officinalis L., Sideritis raeseri Boiss & Heldr, Origanum vulgare L., Gentiana lutea L. Harvesting techniques may often exacerbate the threat to MAPs by causing unnecessary levels of damage, where uprooting of the whole plant to use only aerial parts of the plant causes unnecessary depletion of population levels of the species, as well as damage to the top-soil. They also threatened as being part of habitats where there is a strong human impact, e.g. cutting, intensive grazing, and deforestation in some places with aim to create arable land for cultivation of agricultural plants, or by harmful collection practices. Habitat changes across most parts of Albania have also eroded species’ population levels. In the last two decades several plants are affected by the phenomenon of genetic erosion. Sixty-eight medicinal species are considered of the endangered status and 40 MAPs are included in the National Red Data Book (Table 1).

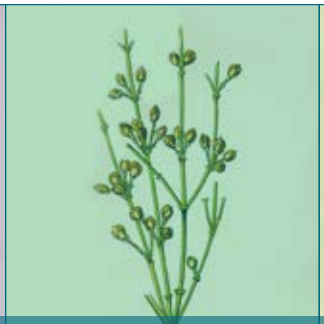
Harvesters typically use sickles to harvest sage and end up cutting the whole plant, undermining sustainability. As a rule, harvesting should be done manually so that the leaves are collected while the body of the sage plant is left intact, according to interviewed experts.

Contamination and poor quality characterise the post-harvest handling, which represents another challenge. There is a recent positive trend, however, that regional collectors have invested in drying facilities within their warehouses and use them to dry cultivated and also wild plants purchased from harvesters. On the other hand, in mountainous areas where large part of the population has left, collection of wild MAPs has decreased. In addition to this demographic trend, another reason behind the reduction of wild MAPs collection is the damage of many MAPs sites due to improper way and timing of harvesting.

Many traditional cultivars play an important role in agricultural production. A very high diversity occurs among and within traditional cultivars of crops such as maize, common bean, and vegetables cultivated in the country. Good examples are the widespread landraces of maize (Reçi, Dukati, Sulova,Yzberish 58, Gushtak, etc.), onion local ecotypes (Miras, Drishti), local bean cultivars (Kallmet, Shale, Luzni, Eçmenike etc.).

Table 1. List of MAP Species Regarded Endangered in Albania (the information is sourced from the Red Data Book of Albania and from official orders of Ministry of Environment.)

Dryas octopetala L.



Ephedra distachya L.

Eryngium maritimum L.

Galanthus nivalis L.

Gentiana lutea L.

Glaucium flavum Crantz.

Hypericum androsaemum L.

Ilex aquifolium L.

Juniperus oxycedrus L.

Juniperus communis L.

Menyanthes trifoliata L.

Nymphaea alba L.

Orchis coriophora L.

Orchis laxiflora Lam.

Orchis mascula L.

Orchis militaris L.

Orchis morio L. | *Orchis pallens L.* | *Orchis papilionacea L.* | *Orchis provincialis Balbis.*

Orchis purpurea Hudson. | *Orchis simia Lam.* | *Orchis tridentata Scop.* | *Osmunda regalis L.*

Paeonia peregrine Mill. | *Phyllitis scolopendrium (L.)* | *Rhus coriaria L.* | *Ruta graveolens L.*

Salvia officinalis L. | *Sideritis raeseri Boiss & Heldr* | *Taxus baccata L.* | *Tilia argentea L.*

The diversity of forage crops is represented by cultivated grass and leguminous species, such as a local alfalfa ecotype (Tomin), but there is a great diversity of plant species that compose the annual and perennial meadow flora.

The diversity of fruit trees is also very significant. Fruit trees are widespread in Albania as a result of the great diversity of species and cultivars, which are adapted to a variety of climatic and soil conditions. Such conditions provide the conditions to allow for centuries the cultivation of a large number of Mediterranean fruit-tree cultivars.

Currently, there are many species and varieties of fruit-trees, olives, and grapes that have a high level of adaptability to particular agro-ecosystems, with high nutritional and taste values, suitable for competitive markets, particularly for organic and traditional products. The rich diversity in the field of arboriculture and the ancientness of their cultivation is clearly expressed by the fact that many cultivars are named according to their place of cultivation such as “Hoçishti apple”, “Gjeçe apple”, “Zhei apple”,“Tropoja plum”, “Elbasani double plum”, “Karkanjozi pear”, “Pinari pear”, “Vakufi pear” etc.

In viticulture, the indigenous varieties include “Sheshi i Zi”, Sheshi i Bardhë”, “Kallmet”, while the most popular autochthon olive varieties include “Kaninjoti”,“Kokërrmadh i Beratit”, “Kokërrmadh i Elbasanit”, “Krypsi i Krujës”, “Ulliri i Bardhë i Tiranës”, etc.

Under the Agricultural Services Project (2003-2005),

480

samples were collected from 11 species of aromatic and/or medicinal plants and wild relatives of wheat, which are **characterized by their phenotypic differences and other features.**

Despite the essential role of plant genetic resources for agriculture and food security of the country, the level of attention given to their collection, conservation and sustainable use appears insufficient overall.

During the implementation of the first program in Albania for collection and evaluation of germplasm of aromatic and/or medicinal plants supported by the World Bank under the Agricultural Services Project (2003-2005), 480 samples were collected from 11 species of aromatic and/or medicinal plants and wild relatives of wheat, which are characterized by their phenotypic differences and other features. During the implementation of the SEEDNet Project (2005-2011), the national collection of fruit trees was established at the National Genebank with more than 200 accessions. At the same time a total of 500 accessions were collected and stored in the long term conservation facilities of the Albanian National Genebank.

During the implementation of the FAO project TCP/ALB/3401, 31 surveying and collecting missions have been carried out throughout the country with FAO support. Nine surveying and collecting missions targeted fruit trees, 10 vegetables and 12 medicinal and aromatic plants. During these missions a total of 551 accessions were collected and stored in the long-term conservation facilities of the National Genebank.

Overall ex-situ conservation of PGRFA in Albania has shown considerable progress in recent years, as it has benefitted from institutional support and arrangements between the Agricultural University of Tirana and the Ministry of Agriculture which have been built since the establishment of the National Genebank.

During recent times, the continuous abandonment of rural farming in Albania, combined with the progressive introduction of commercial varieties from abroad and the expansion of land use for social developments represent unprecedented threats to the local crop diversity of traditional farming systems and major causes of genetic erosion.

Furthermore, changing climatic conditions, including heat stress intensification and changed rainfall patterns, have put an increased pressure on natural habitats with negative consequences for the occurrence and distribution of crop wild relatives in the country. This phenomenon is particularly alarming as these species represent an important reservoir of diversity for crop improvement and adaption to changing environmental conditions.
To some extent, vegetable crops are an exception in this respect, as many farmers successfully cultivate local populations and the market demand for their products is increasing.

changing climatic conditions, including heat stress intensification and changed rainfall patterns, **have put an increased pressure on natural habitats** with negative consequences for the occurrence and distribution of crop wild relatives in the country.

1.3. GENETIC EROSION OF PLANT GENETIC RESOURCES IN ALBANIA

In Albania, the erosion of plant genetic resources has occurred in the past and is still occurring. During nearly half a century system of centralized economy, by cultivating local varieties created by Albanian agriculture institutions and the introduction of ones from abroad, a great number of traditional cultivars have been lost or nearly lost.

Until
1990
the agricultural economy was organized in the form of state farms or cooperatives, where everything was planned by the state and farmers did not carry out any private agriculture activity.

The main evidence of this phenomenon is the continued loss of local varieties from farmer's fields. For instance, presently there are no wheat primitive cultivars; also many maize open pollinated cultivars are lost etc. Even though a systematic assessment of the occurrence of genetic erosion in PGRFA in the country has not been carried out, experts affirm that based on observations, as well as time comparisons, genetic erosion has already affected almost all plant groups.

Until 1990, the agricultural economy was organized in the form of state farms or cooperatives, where everything was planned by the state and farmers did not carry out any private agriculture activity. In such conditions, the care and the direct support for the conservation and use of the local plant diversity was very low. This caused huge genetic erosion, resulting in losses of the diversity of valuable plants for agriculture and food in particular traditional cultivars.

This artificial genetic erosion has affected almost all cultivated plants, but it has strongly influenced wheat, maize and forages. Some farmers, in their gardens, have cultivated vegetable plants even during the above-mentioned period. Taking into account the loss of plant biodiversity in Albania, which has been identified also in research initiated for evaluating genetic erosion, there is some fatal genetic erosion, especially in medicinal and/or aromatic plants.

Based on observations carried out by agriculture research institutes, and according to the data collected during some collection missions carried out during 1941 (H. Stube) and after 1990 (K. Hammer, L. Xhuveli, D. Pignone, etc), the result indicates that during the last fifty years, the genetic erosion of some species was estimated about:

94% *Triticum Aestivum*

100% *Triticum Durum*

100% *Triticum Turgidum*

78% *Vicia Ervila*

83% *Triticum monococcum*

76% *Avena SPP*

59% *Hordeum Vulgare*

42% *Vicia Sativa*

The main driving factors of genetic erosion included:

- The replacement of local varieties by foreign varieties and hybrids;
- Collection of aromatic/medicinal plants for livelihoods and unmonitored sales of collectors employed by small and medium size enterprises;
- Exploring collected plants without any biological criteria and no regulatory framework;
- Replacing cultivation of ecotypes of agricultural plants with modern varieties;
- Frequent fires set purposely on hills for fighting plant diseases or accidental fires;
- Destruction of habitat through unplanned works, road construction or other social buildings and stone-quarries;
- Social-economic changes and demographic migration, abandonment of rural areas, mainly hilly and mountain areas, which are richer in plant genetic resources;
- Limited activities carried out so far for exploring and protecting biodiversity;

Rapid and deep economic and social changes affecting the country over the recent years, which has caused massive movement of population from rural areas towards towns and cities.

In general, the diversity of farmers' varieties (landraces) is decreasing; nevertheless, recently they are being reactivated through cultivation, especially in regards to vegetablesvegetables. Due to genetic erosion, there is a loss of a good part of the traditional cultivars.

After 1995, there is a noticeable trend in Albania of cultivating foreign cultivars and hybrids, because of higher productivity and good resistance against diseases, pests and environment conditions. This trend is more apparent in vegetable plants. Because of this reason and also of the movement of population from rural areas towards urban ones, the cultivation of old populations and cultivars has been reduced, seriously threatening their existence, or in other words, leading to genetic erosion. This phenomenon has been identified as a primary cause for the loss of a great number of landraces. Genetic erosion has affected almost all plant groups.

The main factors leading to genetic erosion in Albania are:

- Replacing local varieties with foreign hybrids and varieties;
- There is no policy or legislation for protecting the national wealth of plant genetic resources;
- Because of higher productivity of foreign varieties and cultivars there is a strong economic pressure. This is related also with lower purchasing power, which cannot afford relatively higher prices of primitive cultivars production due to their low productivity, although consumers like these products for their quality and good taste;
- Prioritizing mostly foreign germplasm of fruit trees for their higher production capacities;
- In wild plants, especially in aromatic and/or medicinal plants, the reason of erosion is their gathering without rules and regulations on their biological renovation, and also fires that cause irrevocable losses;
- Lack of programs for preserving native genetic resources and using them in rational ways;
- Social-economic changes and demographic movements, abandonment of rural areas, mainly hilly and mountain areas that are richer in genetic resources;
- Urbanization is an effective cause of erosion, especially in olive-groves surrounding cities;
- Limited knowledge on genetic resources.

Habitat changes across most parts of Albania have also eroded wild populations of medicinal and aromatic plants species (MAPs). In the last two decades several MAPs have been reportedly affected by the phenomenon of genetic erosion. Sixty-eight medicinal species are considered as endangered and 40 MAPs are included in the National Red Data Book.

In the last two decades several MAPs have been reportedly affected by the phenomenon of genetic erosion.

68 medicinal species are considered as endangered and 40 MAPs are included in the National Red Data Book.

2. Status of In-Situ Conservation and Management

Orchis Mascula

STATUS OF IN-SITU CONSERVATION AND MANAGEMENT

2.1. SURVEYING AND INVENTORYING PLANT GENETIC RESOURCES FOR FOOD AND AGRICULTURE

Surveying and inventorying are activities that engage a team of crop experts and taxonomists, and require a good knowledge of the agricultural territory together with adequate transportation facilities, which in many cases are not easily available within research institutions of the country. The lack of dedicated resources from existing research institutions has so far limited these important activities, making them extremely dependent on external funding such as international and/or regional projects.

To date, the level of surveying and inventorying of existing PGRFA in Albania is still relatively low and requires much more attention and adequate planning on a routine basis from managers and policy-makers of the public institutions, such as Agricultural Technology Transfer Centres, the University, and environmental agencies.

2.2. ALBANIAN PROTECTED AREAS AND SPECIES

2.2.1 Current situation

In Albania, there have not been and still there is no any organized institutional effort to evidence and evaluate the diversity of vegetative genetic resources of the cultivated plants and wild plants for food production. This is mainly due to the lack of a policy and strategy purely aimed at vegetative genetic resources.

In situ conservation of the wild plant relatives and wild crops for food production is still in a difficult situation and currently we cannot determine that there is a significant preservation of plants that show interest for agriculture and food. To reach this goal, it is necessary to require the institutionalization of in situ conservation in the main protected areas, as well as the establishment of gardens in the typical areas of the country. Due to a large number if species, it is necessary to determine priorities whenever biodiversity conservation measures are applied. These priorities should take into consideration the level of risk as well as their potential importance, including their potential value for the development ABS products and in the context of biotrade and bioprospecting activities.

2.2.2 Albanian Protected Areas System

Biodiversity conservation and management in protected areas are keys to enhancing Albania's biodiversity. Protected areas are critical for the conservation of wild flora and fauna and, in the long term, they might become a major repository of natural ecosystems. Although the protected areas network is not intended to protect and conserve specific forest tree species or their genetic variability, it is a first and important step towards a more sophisticated in situ management programme for forest genetic resources.

Albania contains extensive areas covered by vegetation, but the number of undisturbed areas is relatively small. The six first National parks were established by decree in 1966, and Albania has recently made significant progress in expanding the network of protected areas from 5.2% of the country's territory in 2005 to 16% in 2014. The protected areas cover about 16% (4,600 km²) of its territory. The majority of them have been designated in the category nature monument (750) and are mostly quite small in size.

The protected areas cover about

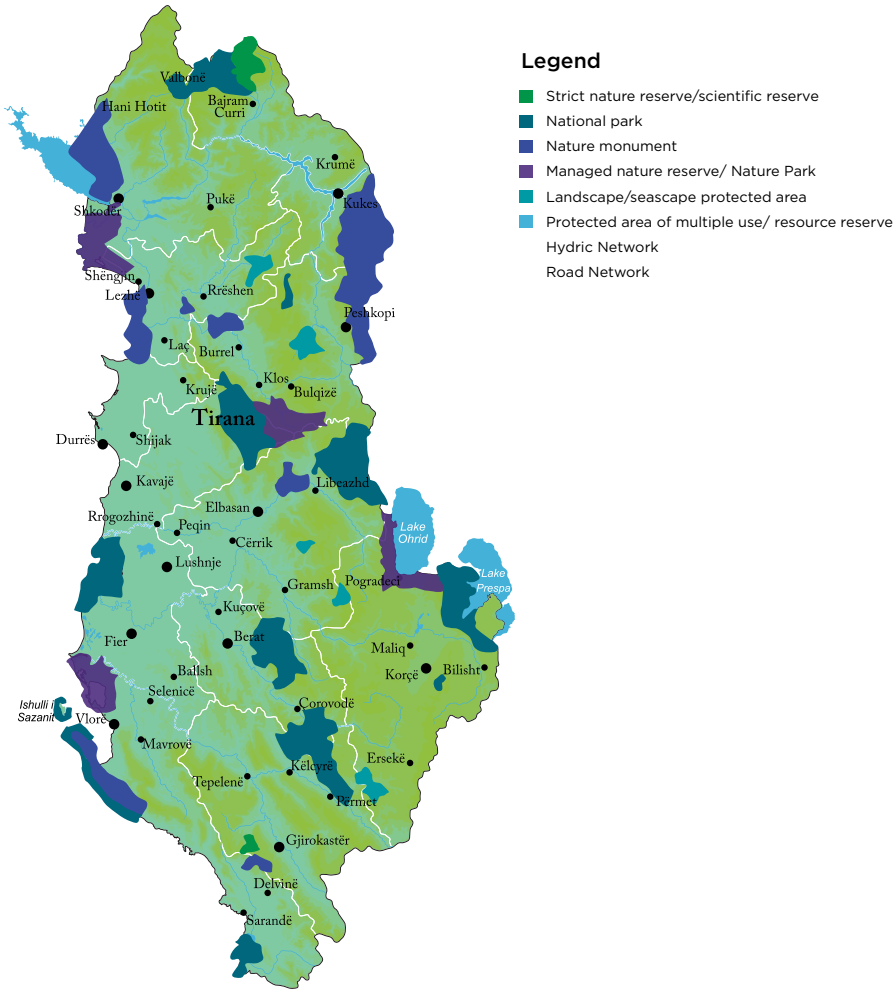
16%

(4,600 km²) of its territory.

The Ministry of Environment, Forestry and Water Management (MEFWM) is responsible for the safeguarding of protected areas and national parks, where there is a main part of the wild plant genetic resources in the form of in- situ conservation.

The Forest Genetic Resources Working Papers proposed establishing or expanding protected areas using six IUCN (Ecological Survey in Albania, 1997) management categories, including strict nature reserves/scientific reserves (category I), national parks (category II), nature monuments (category III), species and habitat management area/managed nature reserve

Fig.3. Network of Protected area in Albania



(category IV), landscape protected area (category V), and multiple-use management areas/ resource reserve/interim conservation unit (category VI).

However, the situation of in situ preservation and management of plant genetic resources of fruit-trees and forests is slightly different. In the recent years, a national program is developed for in situ conservation of forest tree species germplasm. In this field, it has been possible to increase the protected areas for all IUCN categories. This development directly influences the in-situ preservation and conservation of some of the most popular forest species founded in relevant areas. Over the last ten years, protected areas have experienced noticeable increase comprising 166,611 ha, which according to IUCN categories is divided into:

Table 2. Current and proposed protected areas in Albania

Management category		Current protected areas		Proposed protected areas		
No.	Name	Number	Surface area (ha)	Number	Surface area (ha)	Reserve corridor (km)
I	Strict name reserve/scientific reserve	4	14 500	12	16 040	2
II	National park	11	25 860	7	100 000	-
III	Nature monument	1	4 360		358	-
IV	Managed nature reserve species and habitat	26	42 940	9	16.650	44
V	Landscape/seascape protected area	3	2 550	17	120 400	145
VI	Protected area of multiple use/ resource reserve	4	18 245	3	12 400	-
-	Protection status to be determined	-	-	4	35 900	-
	All	**49**	**107 455**	**52**	**301 748**	**191**

Determination of these protected areas has a great advantage as according to experts, among the forest species preserved in these parks and protected areas is found a huge genetic wealth especially in wild fruit trees, in wild predecessors of some vegetable plants, and a lot of aromatic and medicinal plants. In the future, we should aim to conduct the inventory, observation, and evaluation on the diversity of plant genetic resources in these repositories and protected areas.

Table 3. Protected areas that coincide with known priority CWR taxa distributions

Name	Designation	IUCN Category	Number Taxa
Berzanë	Managed Nature Reserve	IV	2
Butrint	Importance (Ramsar)	Not Applicable	1
Butrinti	National Park	II	2
Karaburun/Vlorë	Managed Nature Reserve	IV	4
Liqeni i Shkodrës dhe lumi i Bunës	Importance (Ramsar)	Not Applicable	6
Llogara	National Park	II	2
Lugina e Valbonës	National Park	II	1
Mali i Dajtit	National Park	II	15
Mali i Tomorrit	National Park	II	3
Pjesa shqiptare e Liqenit të Shkodrës	National Park	IV	2
Pogradec	Protected Landscape	V	3
Prespa	National Park	II	1
Qafë-Shtamë	National Park	II	2
Sistemi ligatinor Vjosë-Nartë	Protected Landscape	V	4
Thethi	National Park	II	1
Velipoja	Managed Nature Reserve	IV	2
Zheji	Monument natyre	III	5

In-situ conservation in Albania is undertaken in national parks and protected areas, which in total amounts to about 80 thousand hectares. The main function of these parks and protected areas is the preservation of flora and fauna in general, especially the forest flora (trees and shrub species).

2.2.3 Crop Wild Relatives and Wild Food Plants in Protected Areas

In Albania a comprehensive inventory of CWR or WFP occurring in national parks and protected areas is presently missing, and, in general, the management plans of national parks and protected areas do not specifically address issues related to the conservation and management of crop wild relatives and wild food plants. Rough estimations indicate that there are a total of 472 CWR species in Albania. 25 CWR species and 18 WFP species are conserved in-situ in protected areas in the country, 14 and 11 of which are in areas with management plans, respectively.

Although national parks and protected areas have management plans, currently, these plans do not address specific needs associated to the CWR and WFP conserved. Nevertheless, the management of these areas indirectly contributes to the preservation of these plant groups. Also during the past years there have been no activities related to the implementation of management practices, involvement of local communities or implementation of plans to encourage public participation on in-situ conservation of CWR and WFP.

Rough estimations indicate that there are a total of

472

CWR species in Albania. 25 CWR species and 18 WFP species are conserved in-situ in protected areas in the country, 14 and 11 of which are in areas with management plans, respectively.

2.3 Gaps and Needs

Gaps:

- Lack of survey and inventory of CWR in National Parks
- Lack of survey and inventory of local landraces
- Lack of a system for on farm conservation in Albania

Needs for CWR:

- National strategy that addresses CWR and on farm management
- Management plans for CWR in National Parks and Protected Areas
- Evaluation of genetic diversity of CWR
- Monitoring of genetic erosion
- Research and Collection
- Strategies
- National collaboration

3. Status of Ex-situ Conservation

Ruta Graveolens

STATUS OF EX-SITU CONSERVATION

3.1. SUPPORTING TARGETED COLLECTING OF PLANT GENETIC RESOURCES FOR FOOD AND AGRICULTURE

In Albania, an overall national strategy for collecting and conserving plant genetic resources is currently missing. Nevertheless, a comparison of stored material against the mandate of the National Genebank, as well as historical and geographical references, is periodically carried out for the identification of gaps in the genebank holdings and for undertaking targeted collecting missions to fill the identified gaps that, otherwise, could not be filled by accessing other regional or international Genebanks.

Based on the above methodology, 17 crops which show incomplete geographical coverage have been identified, 14 with missing CWR and 15 with missing historical and/or known farmers' varieties (see Table 4). In addition, urgent needs were recently recognized for the collection of endangered plant species relevant to food and agriculture in areas considered particularly exposed to risks.

Notwithstanding the total lack of public funds available to address these needs, during 2009-2014, there have been some collecting activities for these plant species in high risk areas of the country through the support of the FAO project TCP/ALB/3401: 9 surveying

Table 4. Gaps in the National Genebank holdings

CROP	Mbulim gjeografik i paplotë	Të afërm të egër të kulturës që mungojnë	Varietete historike të njohura dhe/ose fermerësh që mungojnë	CROP	Mbulim gjeografik i paplotë	Të afërm të egër të kulturës që mungojnë	Varietete historike të njohura dhe/ose fermerësh që mungojnë
Almond		✓	✓	Mulberry			✓
Apple		✓	✓	Okra		✓	
Bliberry	✓			Onin		✓	
Cabbage		✓	✓	Oregano	✓		
Cantaloupe		✓		Parsely			✓
Cherry		✓		Pear		✓	
Chickpea			✓	Pepper		✓	✓
Common bean	✓			Peppermint	✓		
Common Yarrow	✓			Perforate	✓		
Cucumber	✓			Plumb	✓		
Eggplant			✓	Pomegranate			✓
Fennel	✓			Pumpkin		✓	
Goosefoot			✓	Quince			✓
Grapevine	✓	✓		Runner bean		✓	✓
Leek	✓		✓	Sage	✓		
Lemon balm	✓			Sorrel			✓
Lettuce	✓			Thyme	✓		
Melon		✓		Tomato		✓	✓
Mountain Tea	✓			Winter savory	✓		

and collecting missions have been conducted for fruit trees, 10 for vegetables, and 12 for medicinal and aromatic plants. During these missions, 551 accessions were collected and secured under long-term storage in the National Genebank. Furthermore, 43 Vitis accessions were inventoried for future collecting.

The above mentioned collecting missions covered less than 25% of the national territory. Due to the limited financial means, it was not possible to fill the geographical gaps in the collections of all the targeted plant species.

3.2. SUSTAINING AND EXPANDING EX-SITU CONSERVATION OF GERMPLASM

Since the beginning of the last century, ex-situ conservation has become the most important form for conservation of plant genetic resources. Collection, conservation, reproduction, description, and documentation of plant genetic resources is currently handled at the National Genebank (NGB) at the Agriculture Technology Transfer Centers (ATTC) and Botanical Garden (BG) in Tirana. All these institutions together conserve about 12 500 accessions in the form of seed, for base and working collections, and about 400 accessions of grapes and fruit-trees.

All these institutions together conserve about **12500** accessions in the form of seed, for base and working collections, and about **400** accessions of grapes and fruit-trees.

Ex-situ conservation has some advantages such as: the possibility of continuous control of genetic resources in conservation, the need for smaller conservation space compared to other methods, the possibility for conservation of a larger number of accessions, as well as easy access to genetic material for plant improvement. On the other hand, it is necessary to notice the disadvantages of this conservation method. Due to its limited capacity, this method does not guarantee a complete conservation of all genetic resources for wild plants. Materials being preserved away from their habitat conditions tend to change, and the tendency towards genetic drift is greater and leads to a reduction of the gene pool.

Ex situ conservation of plant genetic resources in Albania is carried out through:

- Basic collection
- Active collection
- Working collections

The country counts on a National Genebank, which was established in 1998 and is run by the Agricultural University of Tirana. The National Genebank disposes of a long term conservation facility which consists of a dark room with 15 deep freezers with the capacity of storing 4500 seed samples in 8.78 m3.

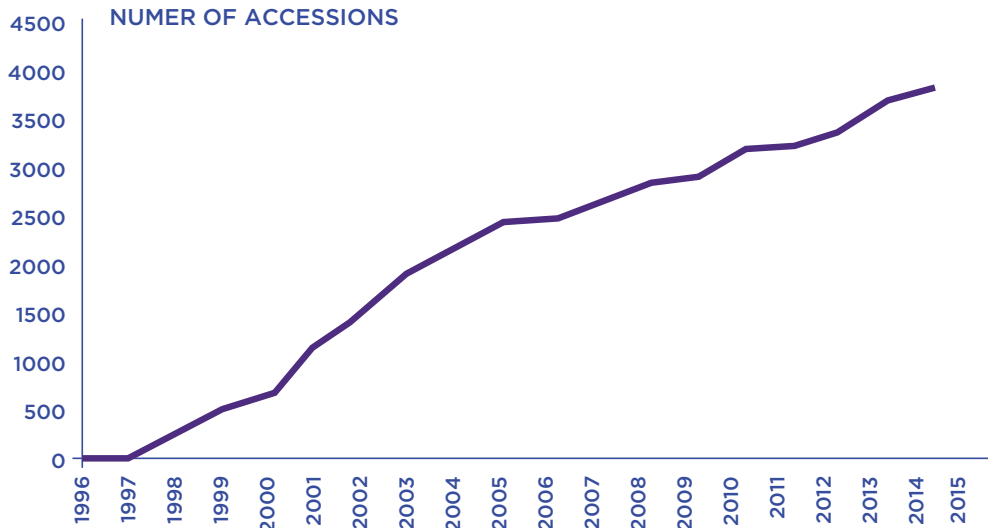
The National Genebank disposes of a long term conservation facility which consists of a dark room with 15 deep freezers with the capacity of storing

4500

seed samples in 8.78 m3.

During the last years, the country has experienced a positive trend in annual capacity for sustaining ex-situ collections. Compared to the year 2010, human and financial resources in the institutions dealing with ex-situ conservation four years later were reportedly 8-10% higher. Nevertheless, these increases appear insufficient to satisfy all current and future needs. On the other hand, over these years there has also been a significant and constant increase in investments in the infrastructure.

Figure 4. Cumulative number of accessions conserved in the national ex situ base collections (1996-2015)



Ex-situ conservation is organized in the form of base collections stored in the National Genebank and in the form of working and active collections that are managed by the five Agricultural Technology Transfer Centres (ATTC). The Albanian national inventory of base collections includes a total of 4,105 accessions (see Figure 1). Out of these 3,219 accessions

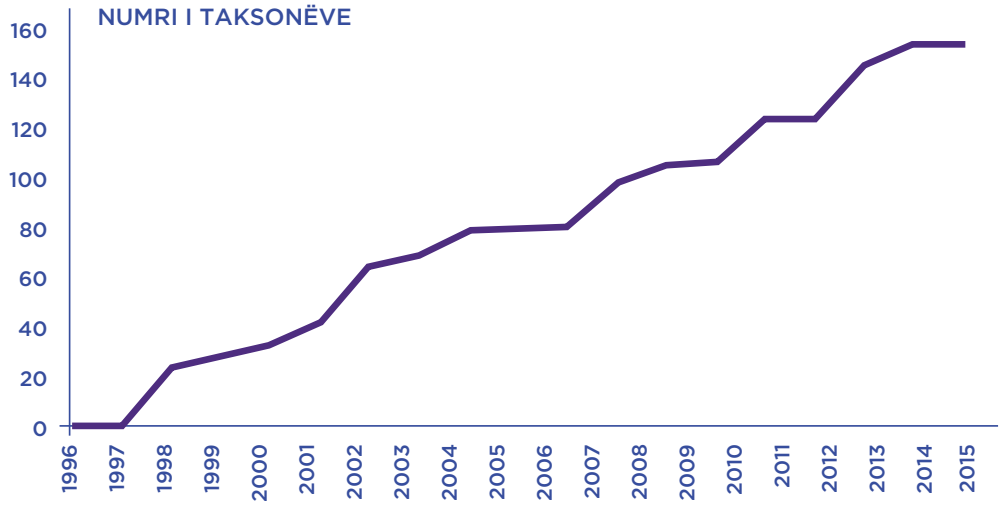
are maintained as seeds under long term conservation at the National Genebank and the remaining 886 are conserved in the field, 614 by the National Genebank and 272 by ATTC Vlora. These accessions in the national inventory represent about 147 different plant species (see Figure 2).

The Albanian working collections are composed of **8000** seed accessions which are maintained in the ATTC Lushnja (mainly wheat, bean and vegetable plants).

Active and working collections are presently stored in institutional gene banks, which are located in the Agricultural Technology Transfer Centers. The institutional gene banks are serving as centers and potentials for duplicate storage of genetic materials. The Albanian working collections are composed of 8000 seed accessions which are maintained in the ATTC Lushnja (mainly wheat, bean and vegetable plants). An accurate inventory of these working collections is missing, as documentation of these holdings is overall poor and in most cases either on paper only or scattered and non-standardized in several digital formats.

However, there are ex situ plant collections such as of barley, rye, sugar beet, wheat, beans, that are preserved in usual conditions (short-term) making regeneration and reproduction of seeds possible within short-term periods (Agriculture Technology Transfer Center in Korca).

Figure 5. Cumulative number of taxa conserved in the national ex situ base collections (1996-2015)



In order to reduce the risk of introducing duplicate accessions a molecular characterization of stored as well as newly collected accessions may be conducted in particular for the fruit tree germplasm whose cloned materials tend to show different phenotypic characteristics in different environments.

FRUIT TREES NATIONAL COLLECTION IN ALBANIA

Albanian GenBank of fruits trees has 2 parts:

- Collections of germplasm of fruit trees, olive and citrus trees and grapevines in field collections at the Agricultural Technology Transfer Center in Vlora City.
- Collections of germplasm of fruit trees, olive and vitis in filed collection (EDE) of Albanian Gene Bank
- Presently in Albania, ex situ preservation in Botanic Garden of plant genetic resources for food and agriculture is not applied yet. There are only field collections for fruit-tree growing, aromatic and/or medicinal plants and forest trees. The Botanic Garden in Albania does not have the function of preserving genetic resources, but is rather a community of spontaneous plants for demonstrative or didactic purposes.

4. Development of a Database for PGR in Albania

Albanicum Lilium

DEVELOPMENT OF A DATABASE FOR PGR IN ALBANIA

PLANT GENETIC RESOURCES OF ALBANIA – DATABASE SYSTEM

The plant genetic resources (PGR) conservation and advancements in computer technology have had a major increase in significance this past few years and this has resulted into an increase of attention of the PGR informatics. PGR Informatics increases the efficiency of PGR management by researchers, funding agencies etc. The way the information system is organized makes up a fair and accessible opportunity for all. Information of this nature is imperative for planning and implementing activities; sustainable use and sharing of benefits accrued from its use. This kind of information is crucial for planning and performing activities. PGR informatics manages and analyses various information.

The plant genetic resources (PGR) conservation and advancements in computer technology have had a major increase in significance this past few years and this has resulted into an increase of attention of the PGR informatics. PGR Informatics increases the efficiency of PGR management by researchers, funding agencies, etc. The plant genetic resources (PGR) conservation and advancements in computer technology have had a major increase in significance this past few years and this has resulted into an increase of attention of the PGR informatics. PGR Informatics increases the efficiency of PGR management by

researchers, funding agencies, etc. This database covers all the PGR from Albania. This database will contain PGR in in situ conservation, CWR, PGR ex situ conservation. In view of lack of a systematic database on PGR in Albania, we will develop the Plant Genetic Resources Database System (PGRDS) as a web-based electronic source of information on selected plant genetic resources. PGRDS as an information system will design to facilitate the compilation, organization and dissemination of information on the origin, distribution, diversity, present use and status of plant genetic resources, CWR in an efficient way and also and also serves as the virtual structure for the UNDP-GEF Project "Strengthening human resources, legal frameworks, and institutional capacities to implement the Nagoya Protocol" (Global ABS Project).

The main objectives of this project are:

- To establish a country database system that assists the plant genetic resources as a support for sustainable PGR development in Albania.
- To developing a database on biological resources to assess ABS potential at the state level;
- To develop the technical capacity of the NCC-ABS, including the creation of an interactive database to monitor the use of genetic resources.
- Assemble data and information for the database.

4.1. ACTIVITIES CARRIED OUT FOR DRAFTING THE FIRST STEPS TOWARDS AN ALBANIAN PGR DATABASE FOR CWR CONSERVATION STRATEGY

For drafting the first steps towards the development of an in situ and ex situ conservation strategy the following are necessary, based on previous experiences (Khoury et al., 2013; Berlingeri and Crespo, 2011; Magos Brehm et al. 2008; Maxted et al., 2007; http://PGRsecurespain.weebly.com/):

- To create an Albanian CWR checklist
- To create an updated and complete taxonomic Working Database of the PGR-CWR Vascular Plants at least in one Protected Area Albania. Case Study: CWR Database for Shebenik-Jabllanice Protected Area zone (since at present no taxonomic reference for the entire Albanian Database for PGR exists).

4.2. ESTABLISHING A CWR INVENTORY FOR ALBANIA

CWR face the same threats as all other wild plant species. Widespread changes in land use, increasing intensification of agriculture, threats from invasive species, overexploitation and desertification are highlighted as the key threats to botanical diversity (Ford-Lloyd et al. 2011; Bilz et al 2011). These factors are also compounded by the ever mounting pressure that global climate change is likely to put on plant species distributions (Jarvis et al, 2008); Thuiller et al, 2005). Genetic erosion occurs as a result of these factors through population decline and hybridisation with alien species. If no action was taken to halt the rate of genetic erosion in CWR species then they would inevitably lose their value as a natural resource for crop improvement. The loss of potentially useful genetic resources in this way could compromise future food security. The importance of CWR as genetic resources and the threats that face them has been recognised by international and regional policies such as the Convention on Biological Diversity (UNEP, 1992), the Global Plan of Action for the Conservation and Sustainable Utilization of Plant Genetic Resources for Food and Agriculture (FAO, 1996), the International Treaty on Plant Genetic Resources for Food and Agriculture (FAO 2001) and the Updated Global Strategy for Plant Conservation (CBD, 2010). The Updated Global Strategy for Plant Conservation outlines targets to conserve 70% of the genetic diversity of crops, their wild relatives and other species of socio-economic use by 2020. The European Strategy for Plant Conservation (Planta Europa, 2008) also makes recommendations for the establishment of genetic reserves in Europe and making an assessment of ex situ holdings in order to fill gaps in conserved diversity.

The Updated Global Strategy for Plant Conservation outlines targets to conserve

70%

of the genetic diversity of crops, their wild relatives and other species of socio-economic use by 2020.

The risk of losing potentially valuable genetic resources for feeding an ever growing population under increasing climatic strain has stimulated action to be taken in Europe.

Illustrative national strategies for the conservation of CWR are being developed under the PGR secure project in Finland, Spain and Italy[2].

This report outlines the process of developing a national strategy for Albania that will stimulate conservation action for CWR taxa, contributing to a global movement in CWR conservation.

The development of a CWR conservation strategy for Albania was divided into in the following steps:

- Selection of priority CWR taxa from a wider list of CWRs reported to be recorded in Albania;
- assessment of in situ conservation of CWR taxa;
- assessment of ex situ conservation of CWR taxa.

The current Protected Area System (PAs) covers some 6% of Albania's area, including 13 national parks (56,440 ha), 204 nature monuments (4.780 ha), 26 managed nature reserves (42.958 ha), 5 protected landscapes/seascapes (29.873 ha) and 4 resource managed reserves (18.200 ha), classified according to IUCN protected area designation criteria. In addition, there have been new designations of PAs and NPs over the last decade and today their surface has increased to 166,691 ha, 16.6 % of the total forest area. Out of these four are strictly PAs (14.500 ha).

The Strategy of Biodiversity, outlined and approved by the Government in 2000, has proposed to increase the number and size of Albania's representative network of PAs with an increase in the total area to 435,600 ha, approximately 15% of the country´s territory, with 180,000 ha of NPs. This is more than double the current PAs area, reaching the European accepted norm of 15% of land area.

In addition, there have been new designations of PAs and NPs over the last decade and today their surface has increased to 166,691 ha,

16.6%

of the total forest area. Out of these four are strictly PAs (14.500 ha).

2. https://pgrsecurespain.weebly.com/cwr-conservation.html

Table 5. Protected area in Albania

Category	No of Protected area	Area in ha
I (Strict Nature Reserves/Scientific reserves)	2	4800
II (National Parks	16	210501
III (Natural Monuments)	6	
IV(Regional Natural Park)	22	127180
V (Protected Landscape)	5	95864
VI (Protected Area of Managed Natural Resources)	4	18245
Total Protected Areas		**98180**

Albania has recently made significant progress in expanding the network of protected areas from 5.2% of the country's territory 66 in 2005 to 16% in 2014

Albania has recently made significant progress in expanding the network of protected areas from 5.2% of the country's territory66 in 2005 to 16% in 2014

Establishing a CWR inventory for Albania

Before priority CWR species can be selected it is logical that a total list of CWR species that may occur within the country is established as an inventory list of national CWR diversity. A filtered version of the Crop Wild Relative Catalogue for Europe and the Mediterranean to include only taxa reported from Albania was used to provide a foundation from which a list of priority genera could be selected for harmonization with a list of Albanian flora. The catalogue is inclusive of all CWR taxa of potential value for agriculture as a whole, not just food and fodder production, and thus the Albanian inventory captures the same CWR groups.

The priority CWR list for Albania was derived principally from the CWR catalogue for Europe and the Mediterranean rather than the Albanian flora. The decision was made to utilise the CWR Catalogue on the basis on the Albanian Flora. (table of the list of Albania). The CWR priority list for Albania has been produced to specifically address the food production system within Albania and Europe, as well as making consideration for crops of economic importance.

A recent assessment of global CWR priority taxa listed 1,667 taxa globally. The number of CWR priority differed from the national CWR strategy (81 taxa) and this can be attributed to differing methodologies and data availability. The study also shows Albania to be of global importance by the number of CWR taxa per unit area of country. This emphasises the

Table 6. List of 86 Genus of CWR and WFP in Albania

1	Abelmoschus	29	Crepis	58	Opuntia
2	Abies	30	Dactylis	59	Phalaris
3	Aegilops	31	Daucus	60	Phleum
4	Agrostis	32	Dioscorea	61	Pimpinella
5	Allium	33	Diospyros	62	Pistacia
6	Amelanchier	34	Diplotaxis	63	Pisum
7	Arbutus	35	Festuca	64	Poa
8	Arctostaphylos	36	Ficus	65	Prunus
9	Asparagus	37	Foeniculum	66	Punica
10	Astragalus	38	Fragaria	67	Pyrus
11	Atriplex	39	Hordeum	68	Raphanus
12	Avena	40	Juglans	69	Ribes
13	Barbarea	41	Juniperus	70	Rosa
14	Bellis	42	Lactuca	71	Rorippa
15	Berberis	43	Laurus	72	Rorippa
16	Beta	44	Lathyrus	73	Rubus
17	Brassica	45	Lens	74	Rumex
18	Carum	46	Lepidium	75	Sambucus
19	Castanea	47	Linum	76	Salsola
20	Celtis	48	Lolium	77	Sinapis
21	Ceratonia	49	Lotus	78	Solanum
22	Cichorium	50	Lupinus	79	Sorbus
23	Citrullus	51	Malus	80	Trifolium
24	Colchicum	52	Medicago	81	Trisetum
25	Coriandrum	53	Melilotus	82	Triticum
26	Cornus	54	Mespilus	83	Tilia
27	Coryllus	55	Myrtus	84	Vaccinium
28	Crataegus	56	Olea	85	Vicia
		57	Onobrychis	86	Vitis

Fig 6. CWR species or WFP in Albania

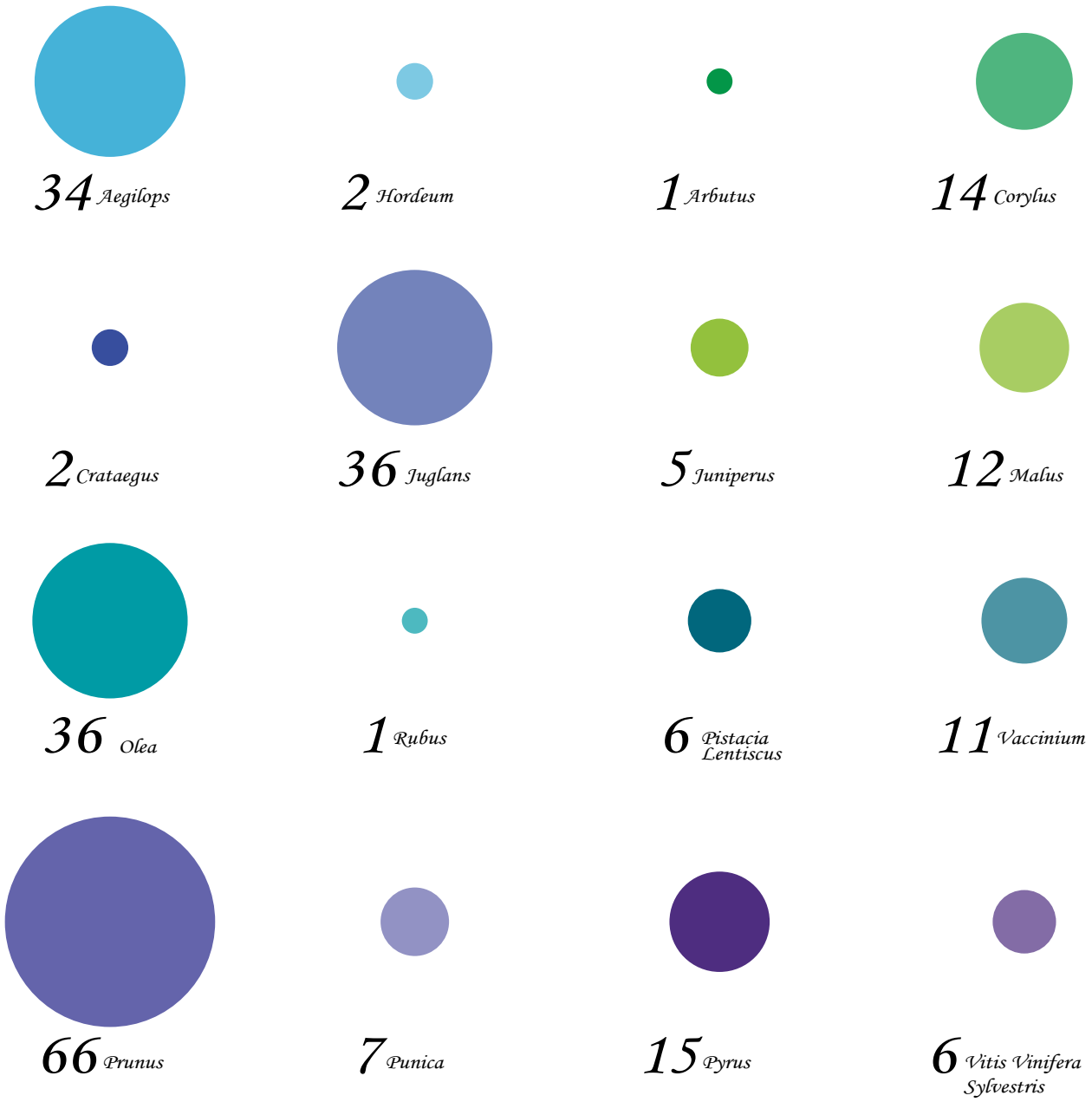

Asparagus
Astragalus
Corylus
Carthamus
Celtis
Cornus
Crataegus
Dactylis
Festuca
Festuca
Daucus
Juniperus
Lathyrus
Lupinus
Lactuca
Lens
Olea
Onobrychis
Poa
Pisum
Prunus
Phalaris
Trifolium
Pyrus
Raphanus

Table 7. Collections CWR stored in Albanian Gen Bank

ALBANIA NATIONAL INVENTORY for CWR or WFP : Accessions summary by genus:		
No.	Genus	Accessions
1	Aegilops	34
2	Hordeum	2
3	Arbutus	1
4	Corylus	14
5	Crataegus	2
6	Juglans	36
7	Juniperus	5
8	Malus	12
9	Olea europea	36
10	Rubus ulmifolius	1
11	Pistacia lentiscus	6
12	Vaccinium	11
13	Prunus	66
14	Punica	7
15	Pyrus	15
16	Vitis vinifera sylvestris	6
	Total	**254**

importance for systematic action to be taken for CWR conservation within the country. A total of 472 taxa were selected through objective and subjective reasoning to arrive at a list of priority CWRs for Albania that are most likely to meet a future requirement for genetic resources based on the production of crops within both Albania and Europe

Fig 7. Albanian Gen Bank ex situ accessions of CWR



4.3. CASE STUDY CONCLUSION AND KEY LESSONS LEARNT

The status of the PGR database system in Albania needs to be further developed and computerized. Albania needs to implement this system, as it provides the opportunity to increase, data quality and availability long term sustainability for data of ex situ conservation in Protected areas, integrate all collections and information in one management system, optimizing the national strategies for PGR to Albanian Genbank.

CWRs represent a valuable heritage in Albania and concerted efforts are needed to keep this resource available for the benefit of researchers, breeders and for the development of new cultivars adapted to the climatic conditions.

4.4. ALBANIA TOWARDS NATURA 2000

Albania lies across two bio-geographical regions, the Alpine and the Mediterranean, and encompasses four eco-regions: the Illyrian deciduous forests, the Pindus Mountains mixed forests, the Balkan mixed forests and the Dinaric Mountains mixed forests. To protect its rich biodiversity and valuable natural resources the Albanian government has protected 16% of its territory. At present 56 protected areas exist in the country covering range of IUCN categories.

Nevertheless, the Albanian system of protected areas is facing challenges, posed by the low level of investments in the infrastructure of protected areas, lack of equipment, and the need to increase of technical capacities of the protected areas' managers. As in other developing countries, Albania is confronting rapid development. New roads and infrastructure, dams, hydro power plants, oil reservoirs, and mass tourism infrastructure are meant to increase the economy of the country, but pose a serious threat to environmental protection.

To help address these issues, the project NaturAL will invest in protected areas and initiate the process of establishment of Natura 2000 network. Strengthening the national capacity in

Within the Shebenik-Jabllanicë National Park **there are over 14 small glacial lakes of great beauty** and three rivers, with a total length of 22 km.

biodiversity conservation, the project NaturAL will improve the knowledge and experience in protected areas planning and management, promote partnerships among national, regional and international organisations, build linkages among research institutions, share experience and promote education and awareness raising of the general public, eco-tourism development, and branding of local products.

SHEBENIK-JABLLANICË NATIONAL PARK

Shebenik-Jabllanicë National Park is known as one of the largest and most beautiful parks that has a very rich inventory of both flora and fauna, as well as more than one thousands water springs. One of the oldest mosques of the area is found in the Zgosht village. In Fushë-Studë there is a very picturesque lake where the surroundings resemble a beautiful spring balcony offering a spectacular panoramic view of the Lake. The Ice Cave and the Eremite Cave are found in the park, dating back to the 2nd and 3rd century of the Byzantine rule. The park is characterized by several thousand hectares of grassland and a variety of flowers ranging from the most beautiful and least frequent Narcisium poeticum to Albanicum Lilium. Within the park there are over 14 small glacial lakes of great beauty and three rivers, with a total length of 22 km. Some of the rare species that inhabit the area are Marten, Wild Boar, Roe Deer, Chamois, Lynx, Grouse, Golden Eagle, Trout, Otter, etc.

4.5. CONCLUSIONS

Crop wild relatives (CWR) collectively constitute an enormous reservoir of genetic variation useful for plant breeding initiatives and critical to meeting the challenge of global food security through enhanced agricultural production. CWR occur in a wide range of habitats but are at great risk as habitats continue to be degraded worldwide. There is an urgent need to conserve CWR both in the wild (in situ) and in genebanks (ex situ) to ensure that genetic diversity remains available for future generations.

The key to successful crop improvement is a continued supply of genetic variability and beneficial traits contained in this diversity, and wild relatives of modern crops are the source of much of this novel diversity, providing genes with improved nutritional quality, resistance to pests and diseases, as well those with traits adapted to drought and extreme temperatures.

5. Traditional Knowledge and Plant Genetic Resources

Dictamnus Albus

TRADITIONAL KNOWLEDGE AND PLANT GENETIC RESOURCES

5.1. TRADITIONAL KNOWLEDGE (TK)

World Intellectual Property Organization (WIPO) currently uses the term "traditional knowledge" to refer to tradition-based literary, artistic or scientific works, performances, inventions, scientific discoveries, designs, marks, names and symbols, undisclosed information and all other tradition-based innovations and creations resulting from intellectual activity in the industrial, scientific, literary or artistic fields. "Tradition-based" refers to knowledge systems, creations, innovations and cultural expressions which have generally been transmitted from generation to generation; are generally regarded as pertaining to a particular people or its territory; and are constantly evolving in response to a changing environment. It should be emphasized, however, that a precise definition of traditional knowledge is not a crucial requisite for establishing a system for its protection.

Actually, most patent laws do not define inventions. Likewise, most trademark laws do not define signs. The crucial element for the protection of any subject matter is the identification of some characteristics that it must meet as a condition for protection, such as novelty, inventiveness and susceptibility of industrial application for patents, and for the invention and distinctiveness of trademarks. The same criteria could be applied to TK as well (WIPO, 2002).

Documentation, rescue and revalue of TK and practices regarding production, commercialization and use of wild and cultivated native species and varieties are very important in Albania. TK is poorly documented. Hence the need to investigate and compile existing materials, promote collaborative research on these species and provide communities with the information generated. TK should be valued and recognized. It is therefore necessary to identify, document and protect TK from indiscriminate exploitation. The application of these practices should ensure effective access and profitable commercialization to the benefit of communities. Researchers of the PGR will be responsible for initiating research in their respective countries to identify and document TK. This should clearly validate and/or affirm the source and ownership of TK for protection, access and benefit sharing.

Researchers of the PGR will be responsible for **initiating research in their respective countries to identify and document** TK. This should clearly validate and/or affirm the source and ownership of TK for protection, access and benefit sharing.

5.2. TK IDENTIFICATION AND DOCUMENTATION PROCEDURES

The identification and documentation of TK is important for the protection and management thereof. It is, however, a complex and sensitive process which demands the utmost care and foresight. The following key principles should be considered:

- The community or group holds information collectively in the same way that an individual owns his/her personal information;
- Indigenous and local communities are within their rights in seeking to control all aspects of research and information management that impact them;
- Indigenous and local communities must have access to information and data about themselves and their communities, regardless of where it is actually held, and they have the right to manage and make decisions regarding access to their collective information; and
- Indigenous and local communities should have possession or physical control of

the data. WIPO[3] developed a toolkit to help design and plan a TK documentation process and understand some of its key IPRs dimensions as a means to assist in safeguarding the interests and protecting the rights of indigenous peoples and local communities.

5.3. ACCESS AND BENEFIT SHARING

In the agricultural sector, ABS regimes seek to balance the often competing interests of various contributions made by stakeholders towards certain PGR materials or products. These include local communities that have lived close to and can be considered as custodians of PGR; the holders of TK who have specific knowledge for the utilization of PGR and whose knowledge has been passed on from generation to generation; the researchers and practitioners who access and utilize TK related to the use of PGR to improve and develop materials or products, which may be granted IPR protection; and the State, which has the responsibility to provide policy guidance and regulate ABS activities.

Among other things, an effective ABS system must therefore:

- Provide an appropriate framework to facilitate and protect PGR and related knowledge based upon PIC of the Country providing such resources and of the relevant indigenous and local communities;
- Promote appropriate mechanisms for a fair and equitable sharing of benefits arising out of the use of PGR;
- Ensure full participation of the communities in making decisions regarding the distribution of benefits which may derive from the use of genetic resources;
- Provide for more stringent requirements for PIC and MAT at the actualization phase of utilization as compared to the scoping phase of utilization;
- Protect and support the rights, knowledge, innovations and practices of local communities with respect to the conservation, use and management of genetic

3. http://www.wipo.int/edocs/pubdocs/en/wipo_pub_1049.pdf

resources;

- Ensure that the transfer and movement of genetic resources and related TK takes place in a transparent and legal manner.
- Monitor compliance by users with the ABS regulatory measures of other Contracting Parties to the Nagoya Protocol.

5.4. RECOGNITION AND PROTECTION OF FARMERS' RIGHTS

Both the CBD and the ITPGRFA have recognized and made provision for the protection of farmers' rights as a distinct and important component of the conservation and sustainable utilization of PGR, especially as related to food and agriculture. Farmers' rights are recognized as stemming from the enormous contributions that local farming communities, especially their female members, of all regions of the world, particularly those in the centers of origin or diversity of crops and other agro-biodiversity, have made in the conservation, development and suitable use of PGR that constitute the basis of breeding for food and agriculture production. For farmers to continue making these achievements, therefore, farmers' rights have to be recognized and protected. Farmers' varieties are recognized and shall be protected under the rules of practice as found in, and recognized by, the customary practices and laws of the concerned local farming communities, whether such laws are written or not.

The ITPGRFA places the responsibility for actualizing farmers' rights on national governments, which must develop relevant policies and legislation. The implementation of the relevant provisions has been lagging behind the other provisions of the ITPGRFA in many countries. An important consideration for the development of farmers' rights policy and legislation pertains to the nature of these rights in comparison with the established and conventional IPRs. As community assets they are not individually owned, hence the framework of protection and benefiting from utilizing them has not been fully grasped in most countries. Farmers' rights are considered as sui generis protection mechanisms, thus different hybrid forms of protection are acceptable.

In developing policy and legislation on farmers' rights, the following are some of the considerations to be taken into account, namely farmers should have:

- the right to select, save, reuse, sell or exchange farm saved seed or propagating materials;
- the right to be recognized, rewarded and supported for their contribution to the global pool of genetic resources, as well as to the development of commercial varieties of plants;
- the right to use breeders and materials from gene banks and PGR centres to develop farmers' varieties;
- the right to a fair and equitable share of benefits arising from use of farmers varieties; and
- the right to participate in decision making, including the right to form farmers' organizations, participate in local and national decision-making bodies, and to be consulted in matters affecting farming communities.

5.5. INTELLECTUAL PROPERTY RIGHTS (IPRS)

The role of IPRs systems in relation to TK, and the question of how to acknowledge, protect and responsibly and equitably make use of TK, has been receiving increasing attention in a number of international policy discussions. Discussions address issues as diverse as food and agriculture, the environment, conservation of biological diversity, health (including traditional medicines), human rights, the rights and concerns of indigenous communities, and aspects of trade and economic development. In many instances, TK and PGR have been exploited and commercialized with no benefit to the respective local communities. There is, therefore, a need for communities to be made aware of their IPRs. Researchers of PGR should develop relevant and effective legal framework to protect TK and PGR, so that TK holders and practitioners can benefit from the commercialization of products emanating from TK and PGR.

These should involve the following:

- Development of strategies for sensitization, advocacy and dissemination of information at different levels of society;
- Encouragement of wider outreach of information by using local languages and different modes of communication;
- Development of TK and IP databases through brokerage and national and regional portals to facilitate access to information;
- Development of mechanisms for mobility and the exchange of trainers and trainees at different levels of society to interact with TK holders and other stakeholders.

Researchers of PGR should develop **relevant and effective legal framework to protect** TK and PGR, so that TK holders and practitioners can benefit from the commercialization of products emanating from TK and PGR.

5.6. PLANT BREEDER'S RIGHTS IN ALBANIA

In 2005, Albania became a member of International Union for Protection of New Plant Varieties (UPOV) and also member of Organization for Economic Cooperation and Development (OECD) only for seed schemes of corn and maize, with a two-year period for consolidation.

The accession to these organizations has been based on a series of activities in order to modify the Albanian legislation. To realize such activities intensive efforts were made during period 2002 - 2005, involving international expertise with the assistance of the World Bank through the Agricultural Services Project. This assistance was primarily focused in the field of legislation.

In this context, legislation related to seed was revised and amended, which needs to be revised due to new developments in this field. Furthermore, the Law on Breeders' Rights (On protection of new plant varieties) Nr. 8880 dt. 15.04. 2002 was also developed. Currently, we cannot discuss benefits deriving from these membership in UPOV and the OECD because Albania is in the initial stages of joining such organizations. Albania has attended the

annual events and activities of both organizations aiming to get acquainted with practices and procedures that need to be accomplished.

5.7. BENEFITS FROM USING PLANT GENETIC RESOURCES, PROBLEMS AND ACTIONS TO BE TAKEN

The use of plant genetic resources in our country has not been adequately treated from the legal point of view. Consequently, there has been no evidence related to the benefits that derive from the use of genetic resources. This is mainly due to the lack of the appropriate legislation and a good understanding of this right to benefit, which has led to their free use. Even those farmers that have provided their genetic resources for use for various purposes by the agricultural research institutes have not benefited anything from their use. Thus, plant genetic resources are not considered as possessing farmers' full rights, despite the fact that farmers have contributed in their selection, maintenance and preservation for generations.

Execution of the right of benefiting from the use of plant genetic resources should be regulated and governed by relevant legislation.

Also, the agricultural research institutes have not benefited from a wide use of their genetic resources. Even though they have been financially supported by the state budget, estimation of the benefits derived out of the use of cultivars bred by researchers is an indisputable right. Recognition of such benefits would have made institutions more developed and with a relative economic independence. This issue is even more justified today, as institution's genetic resources are being used by private farmers. Certainly, execution of the right of benefiting from the use of plant genetic resources should be regulated and governed by relevant legislation.

5.8. PROBLEMS RELATED TO THE USE OF PLANT GENETIC RESOURCES

- Lack of data on some features and characteristics due to inappropriate characterization and evaluation;
- Lack of necessary documentation on the conserved germplasm and lack of information exchange;
- A long-term commitment is required for pre-selection with a view to extending the base of selection material;
- Considerable lack of capacities, such as qualified staff, funds, training, and equipment, etc.;
- Lack of integration among collecting programs and use of plant genetic resources;
- Lack of zonal collections in the use of fruit tree genetic resources;
- Weak supporting and development policies in the field of genetic improvement (breeding) and use of resources;

5.9. ACTIONS TO BE UNDERTAKEN ON USING PLANT GENETIC RESOURCES

- Increase of selecting and improving capacities for the most important agriculture crops for agriculture and food, and those that show interest for farmer's production activity. This needs to be associated with an increase of researcher's level of qualification through special training courses;
- Strengthening cooperation among researchers, breeders, managers of the gene banks and farmers to better integrate conservation and usage of plant genetic resources;
- Stronger emphasis on the use of wild and cultivated species, which actually do not have a good level of usage and necessary support. This will increase the possibilities for cultivation of these species in free land areas and an increase of farmer's income;

- Reassessment and increase of production from indigenous varieties and cultivars in the agriculture markets, increasing choice of agriculture products;
- Promotion and support to farmers on usage of their own populations and varieties, and other genetic materials preserved in the gene banks;
- Stimulate the use of farmer's populations and varieties into the seed production and supply, by subsidizing part of the price for certain sorts of indigenous seeds and seedlings;
- Improvement of the legal framework to facilitate a wider use of the local plant genetic resources.

5.10. CONTRIBUTION OF PLANT GENETIC RESOURCES TO FOOD SECURITY AND SUSTAINABLE AGRICULTURE

5.10.1 Contribution to food security

There is an evident contribution of plant genetic improvements to food security. So, cultivars and hybrids bred through plant genetic improvement programs, due to the fact that they are bred have been adapted quite well to often difficult environmental conditions as compared to foreign cultivars that have not been competitive in this respect. This phenomenon is noticed in wheat, maize, vegetables, etc.

Programs on plant genetic improvement in Albania are led by former agricultural research institutes (currently ATTC), under the authority of the MAFCP.

Programs on plant genetic improvement in Albania are led by former agricultural research institutes (currently ATTC), under the authority of the MAFCP.

Programs on plant genetic improvement in Albania are led by former agricultural research institutes (currently ATTC), under the authority of the MAFCP. Despite the changes in the statute of former research institutes, their transformation into agriculture technology transfer centers, and transfer of plant genetic improvement to the AUT, the programs on plant genetic improvement will continue to be part of ATTC.

This due to several reasons, as:

- The agricultural research institutes, due to their experience and relations to agricultural production, qualification of staff, and adaptability toward agricultural

production requirements, are practically capable to carry.

- Contrary to this, the educational institutions currently are neither so closely connected to the problems of agriculture production, nor with practices and procedures of genetic improvement programs. The plant sorts improved at university have not been widely spread in production and have not been competitive to those of research institutes.
- The ATTCs, due to their research activities in general, and genetic improvement activity in particular, have created and possess rich working collections and possess appropriate premises for long-term conservation.
- The ATTCs staff have good knowledge on collections; have characterized, evaluated, and protected them, contrary to the University, that have not been able to preserve such collections due to their lack of interest.
- The current economic and financial situation of the country does not enable sufficient funds to support implementation of plant genetic improvement programs. The need for support will be especially critical for those local cultivars of agriculture crops cultivated in the open field. This is important in particular due to "capricious" weather conditions, which have made foreign cultivars not always successfully resistant.

In general, plant genetic improvement has accomplished its expectations onward agriculture production, however, better staff qualifications and training courses are required, both on new methods and advanced technologies that are not implemented yet, and provision of appropriate conditions and equipment to apply new techniques and technologies.

Plant genetic improvement programs **have been financed by the state budget based on short-term projects** approved by specialized structures.

Plant genetic improvement programs have been financed by the state budget based on short-term projects approved by specialized structures. Through these projects, under plant genetic improvement programs have been treated wheat, maize and vegetable plants.

5.10.2 Contribution of genetic resources to a sustainable agriculture

Albanian agriculture, even not institutionally supported during these years, thanks to farmer's experiences is developed in a sustainable way. Meanwhile, there have been changes in the structure of agricultural production. It is important to mention that plant genetic resources and their use have contributed to a sustainable agriculture. Although there are

no institutional evaluations for such contributions, these conclusions are based on the fact that despite the current conditions in Albania, cultivars used by farmers have continuously catered for a sustainable agricultural production.

In some of the marginal mountain areas, where farmers produce for self-consumption and not for the market, the majority of agriculture production is dominated by local sorts of vegetables, cereals and fruit trees. Regardless of the low yield of production compared to the new cultivars, this production system based on traditional varieties is more stable and creates the appropriate conditions for a sustainable development in such marginal areas.

5.11. INTRODUCTION OF NEW CULTIVARS, SEED SUPPLY SYSTEMS AND PROBLEMS WITH INDIGENOUS PLANT VARIETIES

The public sector, which is represented by ATTCs, produces high yielding seed categories, starting from breeder's seed to pre-base seed. There is an exception with vegetables, where their seeds are produced by the privat sector including the base category.

Production and distribution of seeds in Albania is carried out through two sectors: public and private sector. The public sector, which is represented by ATTCs, produces high yielding seed categories, starting from breeder's seed to pre-base seed. There is an exception with vegetables, where their seeds are produced by the privat sector including the base category. This is due to the requirement for small seed quantities per unit of surface, because the production of such seeds needs special technology and attention. As a rule, certified seeds are produced by private sector mainly through farmers' associations.

Although there exists a seed production system, in fact it is not an institutionalized system as regarding organic relations of both sectors and proper contractual relations. This has created problems with the proper functioning of this system. Consequently, not all pre-base or base seed is used by farmers' associations for production of respective base and certified seed, but it is used for wide production, consequently reducing the possibilities to cover a larger area with certified seed.

Nowadays in Albania introduction of new varieties in the agriculture production is a normal and legitimate demand. This is true in particular for agriculture crops cultivated in the

open field, due to the presence of diseases and pests, and the need for a better quality and higher productivity. Presently, new cultivars of agricultural crops are introduced in an unorganized way, controlled by seed traders who introduce mainly foreign cultivars through seed distribution. Currently, there is no formal system of field tests used to be carried out by research institutes. Such tests were used for new cultivars in some areas that represent ecological zones of the country. Consequently, distribution of local cultivars is difficult not only due to the lack of a field test system, but also because of the lack of information and a proper infrastructure on information distribution.

New cultivars of agricultural crops **are introduced in an unorganized way,** controlled by seed traders who introduce mainly foreign cultivars through seed distribution.

We cannot speak yet of formal consolidated markets and specific places known by farmers, who are at the same time consumers of such products (seeds and seedlings). Consequently, there is no infrastructure to propagate new cultivars, this might be due to fragmented agricultural production, represented by small farms that cannot and do not have an interest in intensifying agricultural production.

In general it has been observed that the existing system of quality seed production and distribution in Albania does not properly function along the entire chain of this process. This remains the main constraint to obtain high quality seeds for a major number of plant varieties, consequently to get high quantity and quality products. In the given conditions, there is "chaos" and irregularity in trading, controlling, and use of imported and local seeds and seedlings. Due to the main focus of traders on increasing profits, trading of seeds and seedlings during the last 15 years have raised many problems on the identification and evaluation of a part of cultivars and sorts currently used by farmers mainly in viniculture, fruit trees, citrus and olives.

5.12. TRANSFER OF THE GENETIC MATERIAL

As above mentioned, Albania does not have an organized network for exchange and transfer of genetic materials with partner institutions (within and outside the country), that deal with preservation and management of the genetic resources. The only cases identified are those of common collecting missions where the collected material is shared among collectors and preserved in their respective institutions.

Due to these common missions, part of the accessions that represent the Albanian plant germoplasm currently can be found in the institute of Gatersleben, Germany and Institute of Bari, Italy. A part of this germoplasm is repatriated, while the other part is expected to be repatriated in the future. Recently, some agreements are signed on the transfer of material among local institutions mainly between the Ministry of Agriculture and the Agriculture University of Tirana. There are no such agreements with other institutions like with the Ministry of Environment, Faculty of Natural Sciences or non-governmental organizations.

Actions to be taken on cooperation for plant genetic resources

- European agreement for PGR and a uniform directive on the transfer of material in the frame of ECPGR program;
- Formulation of agreements on cooperation and exchange of material with all local institutions and all state and private actors concerned with preservation and management of the plant genetic resources;
- Revision of all existing contact persons appointed for representation in the regional and international working groups and replacing those who have not been active and have not participated in the organized activities;
- Developing appropriate and contemporary systems of documentation and communication aiming to unify the models in order to have access on data usage for the whole region and beyond;
- Exchange of experience and technologies within the region through organization of common activities related to promotion, training and staff qualification;
- Activation of genetic material and information exchange network in the region;
- Define responsibilities on conservation of high value genetic materials among partners in the region;
- Assessment and usage of the conserved material and scientific research on topics of common interest in the field of plant resources.

Conclusions and Recommendations

Orchis Mascula

CONCLUSIONS AND RECOMMENDATIONS

Albania need to adopt a registration regime for the protection of PGR, indigenous plant material of current or potential interest to agrarian, agroforestry and landscape activities, although it excludes varieties protected by intellectual property rights. A database application for registration may be filed by any entity representing the interests of the geographical area in which the PGR, CWR or local variety are most widely found or where the spontaneously occurring indigenous material displays the greatest genetic variability.

The entity will be responsible for the in situ maintenance of the plant material. Once the specific plant material (ex-situ conservation at Albanian Genbank) has been registered, it will be included in the National Database of Registration of Plant Genetic Resources.

The entity owning the registration of the plant material has the right to be consulted prior to access, and to share in any benefits.

Traditional knowledge may also will be register in order to prevent reproduction, commercial or industrial use. Accessing the germplasm of plant material and using plants or parts thereof for industrial or biotechnological purposes requires prior authorization from Ministry of Agriculture and Rural Development. The entity owning the registration of the plant material has the right to be consulted prior to access, and to share in any benefits.

Strengthen the National Competent Authority to deal with issue of developing the frameworks including the development of a database for designing sui generis ways of

cataloguing TK and use of genetic resources to support implementation of the ABS policy and regulatory framework.

Unfortunately, the evolution of legal regulations on access to genetic resources has been separate from the national activities on conservation and sustainable use of biological diversity in Albania. The regulations on access are based on the idea of conserving biological diversity, its sustainable use and the fair distribution of its benefits.

The Ministry of Environment is the national competent authority on ABS; it approves the national policy and the guidelines and norms for the management of the genetic resources. It also establishes the international strategy for the international negotiations in coordination with other bodies and holds the register of the access contracts and national research entities, among others.

The regulations on access are based on the idea of **conserving biological diversity, its sustainable use and the fair distribution** of its benefits.

A national Strategy for Conservation of Genetic Resources in Albania is very important. It is recommended that national inventories of CWRs in Albania should be undertaken and their conservation status assessed.

- Lists of priority species for conservation and sustainable use should be drawn up and appropriate conservation actions, both in situ and ex situ, put in hand.
- It is recommended that national inventories of CWRs in Albania should be undertaken and their conservation status assessed.
- Lists of priority species for conservation and sustainable use should be drawn up and appropriate conservation actions, both in situ and ex situ, put in hand.
- A national strategy for CWR conservation should be developed in Albania and published or incorporated into the National Biodiversity Action Plan.

Urgent consideration should be given to developing a national strategy and action plan along the lines of the European PGR Forum.

BIBLIOGRAPHY

Orchis Tridentata Scop

- DSA (2009): The Medicinal and Aromatic Plants Value Chain in Albania, report prepared for USAID – Albania Agriculture Competitiveness (AAC) Program.
  EUROSTAT Trade Database (2014): http://ec.europa.eu/eurostat/en/data/database. Accessed May 2014.
- FAO (2013): Agrifood chain organization in Albania – the case of MAPs and fruits.
- Forest Genetic Resources Working Papers State of Forest Tree Genetic Resources in Albania by Maxhun Dida General Directorate for Forestry and Pasture Tirana 2003
- Ibraliu A, Faslia N, Mullaj A, and X Mi (2014): Status of Medicinal Plant Research in Albania. 2014. Current Trends in Medicinal Botany. I.K. International Publishing House Pvt. Ltd. ISSN 978-93-82332-50-3, pp 61-76.
- Ibraliu A, Mullaj F, Elezi J, Shehu and Gixhari B (2014): Genetic resources of medicinal and aromatic plants of Albania – Current status of the national collection of MAPs in Albania. Proccedings of 8th CMAPSEEC, Durrës, Albania.
- IDRA (2010): Survey on MAPs for SNV-Promali covered area (Korçë, Shkodër, Dibër, Kukës, and Elbasan).
- K. Hammer H. Knüpffer L. Xhuveli P. Perrino. Estimating genetic erosion in landraces — two case studies. Genetic Resources and Crop Evolution August 1996, Volume 43, Issue 4, pp 329–336
- Hammer, K., G. Laghetti, D. Pignone, K. Pistrick, L. Xhuveli & P. Perrino, 1994. Emergency collecting missions to Albania, 1993. Plant Genetic Resources Newsl. 97: 59–62.
- Paparisto K, Demiri M, Mitrushi I, Qosja Xh (1988): Flora e Shqipërisë [The Flora of Albania]. Vol. 1. Academy of Science of Albania, Tiranë, Albania (in Albanian).
- Red List of Wild Flora and Fauna (2013), Albania approved by ministerial order 1280, 20.11.2013
- UNDP and EU (2005): The Agribusiness Sector in Albania. Inward Investment Opportunities. Trade Liberalization and Promotion Program.
- UNSTAT Comtrade (2014): http://comtrade.un.org/data/. Accessed September 2015.
- USDA International Trade Database (2015): http://www.usda.gov/wps/portal/usda/usdahome?navid=marketing-trade. Accessed September 2015.
- Report of SEEDNet project, 2005-2011
- Vangjeli J, Ruci B, Mullaj A. (1995): Libri i Kuq (bimët e kërcënuara dhe të rralla të Shqipërisë). [Red book of threatened and rare species of flora and fauna of Albania]. Institute of Biological Research, Academy of Science, Tirana, Albania (In Albanian).
- Vezhgim Ekologjik i Pyjeve te virgjer te Shqiperise, Group authors, Tirana, 1997