

# COUNTRY REPORT ON THE STATE OF PLANT GENETIC RESOURCES FOR FOOD AND AGRICULTURE

## ALBANIA





## COUNTRY REPORT

# THE STATE OF PLANT GENETIC RESOURCES FOR FOOD AND AGRICULTURE IN ALBANIA

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## **Note by FAO**

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# EXECUTIVE SUMMARY

## Albania and its agriculture sector

Albania lies in the South-Eastern part of Europe, in Western part of Balkan Peninsula, along the Eastern coast of 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 km<sup>2</sup>, of which 27 400 km<sup>2</sup> are lands, separated as below:

- 25 % plains
- 47 % hills
- 28 % mountains

Other part of the territory, with a surface of 1 348 km<sup>2</sup>, is represented by watermark. All 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 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 Monte Negro, to the Northeast it is bounded by Kosovo, to the East it is bounded by the Former Yugoslavian Republic of Macedonia, and to the South and Southeast it is bounded by Greece (Map 1).

Albania is a Parliamentary Republic, and the main legislative body is the Parliament. The capital of Albania is Tirana, with about 700 000 inhabitants. The population of Albania amounts to 3 563 112 people (estimation in 2005), with an increase rate of 0.52%, where young age prevails with a life average over 68 years. Recent years, the movement of population from rural areas towards urban ones has been stabilized to only few movers compared to the period of ten years ago. The Albanian language, originated from the Illyrian language, is spoken in the Republic of Albania. There are three religious faiths in Albania: Muslim, orthodox and catholic that lives in harmony with each other.

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.

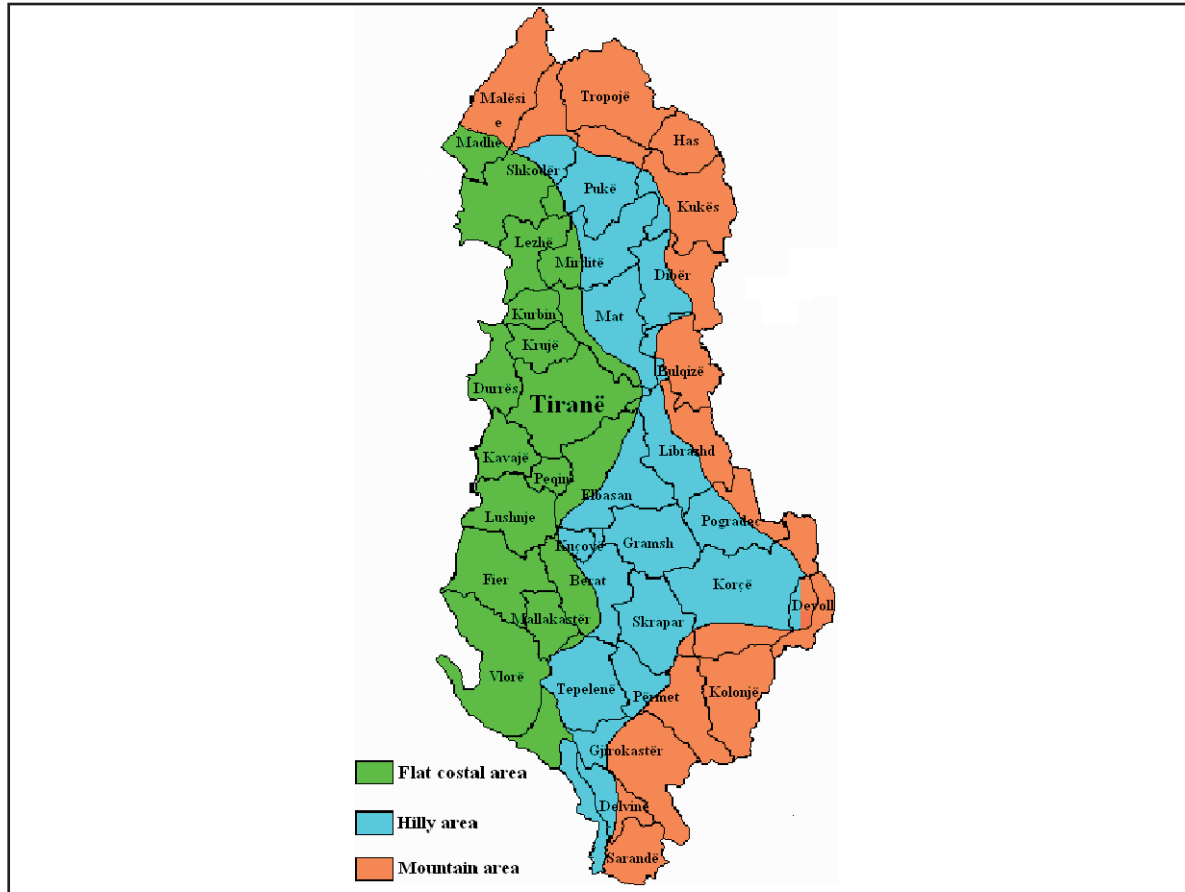
The highest peak is Korabi with 2 751 m, which is located in Albanian Alps. Mountains occupy the entire Northern and inner parts and forestry areas of Albania, while plains lie mainly along the Adriatic coasts from Hani Hotit in the North to Vlora and Delvina valley in the South. Plains of an altitude of more than 800 m are found in Korca valley (see Map 2). There are lots of rivers and streams that flow through its territory to the Adriatic and Ionian seas. Valleys are primarily stretching from the North to the West.

MAP 1

**Geographical position of Albanian Republic**



MAP 2

**Agro-ecologic zones of Albania**

Albania is located in the subtropical humid belt of the North hemisphere and is included in the Mediterranean climate zone with winter relatively short and mild (in the lower seacoast area) and with large amounts of rain in the Northern part and with long, hot and very dry summer. The Eastern part of the territory is under the influence of continental air streams.

Albania is distinguished of high sunshine that varies from 2 731 hours a year in Xarë–Sarandë to 2 722 hours in Vlora; 2 560 hours in Tirana; 2 433 hours in Korça; 2 246 hours in Peshkopi; 2 046 hours in Kukës, with the highest sun rays in June–July of about 226.32 kwh/m<sup>2</sup> and the lowest in January and December of 24.79 kwh/m<sup>2</sup>. The highest temperatures are recorded in the seacoast area, especially in Ionian seacoast, while they are lowering down towards the North and the East. The annual average temperatures vary from 17.6°C (Sarandë) to about 7°C (Vermosh), in the hottest months, June–July and in the coldest month, January. The annual active temperature is 3 500 -5 500°C. The annual average amounts of rain are 1 430 mm, with the smallest amounts in April–September of 300 - 400 mm and 1 000 mm during October–March. It snows mainly in winter, in the Northeastern region of the country, while along the seacoast and in the South and the Eastern regions it rarely snows. It hails also in winter, in the second half of autumn and the first half of spring. The greatest number of days with hail is in the South and Southeastern regions of the country.

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, nonproductive 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. According to the relief, agricultural lands consist of the following:

- 304 000 ha (43.3%) are fields
- 239 000 ha (34.0%) hilly land and
- 159 000 ha (22.7%) mountainous land



While, according to altitude above sea level, it is divided as follows:

• 0 - 600 m	354 000 ha (52.6%)
• 600 -1000 m	210 000 ha (31.2%)
• 1 000 -1 600 m	23 500 ha (3.5%)
• 1 600 -2 700 m	5 000 ha (0.7%)
• Zonal lands (aluvionale, saline, tROUPhic)	81 000 ha (12.0%)

Albania, owing 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.

Studies made about Albanian Flora have identified that there are about 3 250 species of plants in the country, from 11 000 types of plants that are in Europe (or 29.5%), with a density of 113 kinds per 1 000 km<sup>2</sup> of land area. From such diversified vegetation, more than 300 species are aromatic and/or medicinal plants, which constitute an important natural economic resource that it is not used completely and properly yet.

Aromatic and/or medicinal flora of Albanian lands is distinguished not only for its diversity of populations within species, but also for their high content of aromatical and pharmacological substance. About 35% of overall area of the country is covered with shrubs and forest trees.

During the last ten years several collecting missions have been assigned for the research and the use of plant genetic resources of the country. Such collecting missions are conducted for arable crops like: beans, chickpea, lentils, alfalfa, oats, forage peas, sorghum, and for vegetables and fruit trees. During these missions, a very large range of diversity has been found within species and interesting plant populations have been selected. Thus, for instance, various populations are found within arable crops, such as: 28 interesting populations for bean crops, 2 populations for chickpea, and two populations for lentils. Also, populations of forage plants like alfalfa, clover, forage peas, and sorghum have been found also. They have also collected 23 populations of maize, which have never been collected before or are recollected because they have lost. The same it is for vegetables and fruit trees. A program for collection and evaluation of germplasma of aromatic and/or medicinal plants was drafted and carried out for the first time in Albania. The objective of this program, supported by the World Bank under the Agricultural Services Project, was the collection of 11 species of aromatic and/or medicinal plants and wild relatives of wheat. In country level, 480 samples were collected, which are characterized of their phenotypic differences and other features. They have also borrowed germplasma from different counterpart institutions and genebanks aboard. These activities have contributed for complementing *ex situ* collections of plant genetic resources of arable crops, forage plants, etc.

It hasn't been conducted yet a wide institutional inventory and survey of wild plants for food production in Albania. For the first time, a 3 years period program, funded by the World Bank, was launched for collecting and evaluation of germplasm diversity in 11 species of aromatic and/or medicinal plants and also in wild relatives of wheat (*Aegilops sp.*). This program identified a wide range of species that were collected. In the framework of such program, there were selected species that are of economic value for the country, which are demanded also in world markets. They provide economic resources for communities in respective rural areas. Inventory of plants genetic resources diversity is also carried out with fruit trees, olive and citrus trees and also with grapevines over the last ten years. However, financial resources have never been sufficient for complete inventory and exploration of fruit-trees genetic resources, for their preservation and monitoring their genetic erosion.

Although these collecting missions, carried out in limited areas of the country, obtained and collected valuable authentic materials, for both direct use by introducing them into cultivation as crops, and also as initial materials in the work programs for genetic improvement of varieties and cultivars of the crops. However, they have not been conducted in the required technical and scientific levels in conformity with requirements of collecting missions. Deficiencies have been not only with regard to techniques and sampling ways, to their forms and sizes for getting higher diversity representations, but also concerning their passport and documentation. This is because of insufficient training of the staff in the field collection, lack of experiences and limited required supplies needed for collecting missions.

Agriculture remains one of the most important sectors of Albanian economy, contributing about 21% to Gross Domestic Products (GDP). This is not only because of the fact that agricultural production provides about 20-25% of the GDP, but it actually involves more than 50% of the population of Albania that is living in rural areas where most of them are self-employed in agricultural activities. Although the real average increase of agricultural production, during the last five years, is about 3.0-3.5% a year, the increase of the agricultural sector is below the national average rate and



far from its real capacities. This is because of some problems that agricultural sector is facing with today, among which, prevail those related to rural exode, limited amounts of farm land areas, ownership of land, product marketing, irrigation and drainage capacities, lower levels of applied technologies, poor organization of farmers, poor standards of agro-processing industries, etc.

Albanian agriculture is still subject to very small farmland areas of farms, which production is oriented mostly to fulfillment of household needs. The smallest farms are primarily located in mountain regions of the country. The total number of farms, in country level, amounts to 374 517, of which 109 513 farms with 0.1- 0.5 ha of land each; 93 223 farms with 0.6-1.0 ha of land; 133 342 farms with 1.1-2.0 ha land and 38 438 farms with more than 2.1 ha of land each. The average land area of a farm is 1.13 ha fragmented averagely in 3.9 parcels for each farm. These farms are dealing with various activities such arable crops cultivation, livestock activities, fruit-tree growing, which mostly depend also on-farm location from urban areas, etc. Formal and informal markets provide seed supplies. Almost there are no national private companies, while other organizations, private or public one, are not organized well and, concerning seed supplies, foreign companies dominate the entire market of planting materials.

The main agricultural systems are primarily integrated system, protected system (greenhouses, tunnels) and less in number is the system of biological agriculture. Presently, in country level, about 398 800 ha of land is cultivated with arable crops, of which, 49.1% comprise forage plants (195 000 ha), while the remaining land amounts are cultivated with wheat, maize, vegetables and, limited areas, with sunflower, tobacco, etc.

Although there are government control agencies, agricultural sector is facing with a range of constraints and difficulties where efficiency of carried out investments is not in required standards. The national standards of quality and food products security are not harmonized yet with those of EU. The levels for implementing the systems of quality and security like HACCP, ISO, etc. are still lower.

The developing trend of agricultural production is increasing and the highest developing rates of agricultural production are in fruit-tree growing.

It has been noticed continuous reduction of arable crops cultivation, especially wheat and tobacco because of lower economical profits from wheat and foreign competition, while in tobacco due to the lack of processing capacities in the country.

Continuous and evident increase is noticed in land areas cultivated with forages and potatoes. There is an increase and also stabilization in land areas cultivated with vegetables. Such increase responds to the emergencies and increasing demands for livestock products and for fresh vegetables.

There is also an increase of land areas in greenhouses for vegetable production. Fruit trees are increasing rapidly along with vineyards, especially after 1996.

Wheat is cultivated in 77 200 ha of land producing 230 900 tones, with an average yield of about 29.9 kv/ha. Traditionally, wheat production is of the first need for people food, it has a simple cultivating technology in the conditions of Albanian farmers and allows right crops rotation.

Maize is among the traditional plants and occupies larger land areas in field regions under irrigation. About 49 000 ha are cultivated with maize producing about 245 400 tones with an average yield of 46.0 kv/ha. It is mainly used for animal foddors; however, there are areas that use maize for bread production. By introducing processing industries demands for maize are increasing because it is an important component for the production of concentrated foddors and cooking oil also, which is largely demanded in domestic markets.

Vegetable production, thanks of appropriate conditions in our country, is increasingly developing. Today, 30 800 ha are cultivated with various vegetables producing about 687 500 tones with an average yield of 223.3 kv/ha. Distinguished development is experienced with protected areas for vegetable cultivation (greenhouses), with or without heating systems. Presently, there are 675 ha of greenhouses, which are producing more than 57 541 tones of vegetables with an average yield of 852 kv/ha. Vegetable cultivation is distinguished for implementation of improved and modern technologies that have evidently increased their production and Albanian markets, which prefer such products, are experiencing the increase of their amounts as compared to imported products.

Responding to the rapid development of livestock products, forage cultivation is also noticeably increased in both, quality and quantities. Presently, forage crops occupy about 195 000 ha (49.1% of cultivated land areas) producing about 5 222 000 tones, with an average yield of 267.8 kv/ha fresh matter.

Orcharding production is also noticeably developed. Today, 7 699 000 fruit trees are numbered, of which, about 5 881 000 trees are under production, with an average yield of 18.8 kg a tree and a total production of 110 300 tones. From 4 497 000 olive trees, 3 603 000 trees are under production. Overall olive production is 40.200 tones of olives with an average yield of 11.2 kg a tree. The number of citrus trees amounts to more than 528 000 trees (341 000 trees are under cultivation) producing about 5 600 tones with an average yield of 16.5 kg a tree. The number of vine pergola is

also increased and about 5 488 000 plants are numbered today (4 708 000 plants are under production) with an average yield of 13.0 kg a plant. Vineyards have noticeably developed; from about 580 ha of vineyards that were recorded in 1995, today vineyard areas have reached to more than 8 357 ha (6.915 ha are under production) with an overall production of over 127 800 tones, or an average yield of more than 96.6 kv/ha. Recent years, many farmers are distinguished for their cultivation of fruit trees, vineyards and olives and are attending also national and international fairs and exhibitions with their products.

Presently, it is very difficult for farmers to fulfill their needs for seed from their own production. On the other hand, seed production schemes of the former social system (state controlled) are out of function, while the new system of seed production established by private enterprises is still in its initial stage.

Forests are great national properties in many directions: for wood production, for protecting flora and fauna, for developing hunting activities and games, for collecting medicinal and/or aromatic plants and also for developing mountain tourism. Forest structure comprises mainly deciduous forests that cover 87% of the total forest areas (50% are beech and oak trees and 33% shrubs), while coniferous forests occupy 17% (pine trees, ferns, etc.).





# THE STATE OF DIVERSITY

## 1.1 The main values of plant genetic resources

*Ex situ* collections are created with genetic materials represented by:

- Native cultivars, populations and ecotypes that have been created, preserved and used through generations of Albanian people;
- Introduction of genetic materials;
- Lines and cultivars created within the country;
- Spontaneous flora of the country that has been identified, researched, collected and preserved by research institutions.

In the present conditions of Albanian agricultural development, based on cultivated land areas, the main crops are the following:

- Forage plants (49.1% of the total cultivated land areas);
- Wheat (19.5%);
- Maize (12.3%);
- Vegetables (7.8%);
- Common bean (3.8%).

For the Northeastern region of the country, potato is an important crop for its economic development. The wheat is presently cultivated in about 77 200 ha, with an average yield of 29.9 kv/ha. Wheat production is used for household consume, mainly in rural areas and especially in lower coastal regions. Wheat is also cultivated for livestock needs, especially wheat straw that is used for feed and bed of the animals.

The surface occupies by the maize occupies 49 000 ha; and why it is low, have been somewhat stabilized, but with an average yield of 46.0 kv/ha, which is not a good yield for the production capacities of this plant and for the investments that it obtains. Maize is primarily used for animal feeds and less for bread, only in certain areas.

Vegetables are cultivated in 30 800 ha, with an average yield of 223.3 kv/ha. Vegetable production has an important role for people food and demands for them are increasing rapidly, and with all over the year supply. Among the most important vegetables we may mention tomatoes, watermelons, peppers, cabbages, cucumbers, etc. The greatest land amounts cultivated with vegetables are in the lower coastal regions, where climate conditions are more appropriate for their cultivation and where the greatest number of population has been settled and demands for them are greater.

Potatoes and beans are cultivated in smaller land areas; however they are very important for people foods in Albania. Recent years, production of fruits, fresh or canned ones, is increasingly demanded in markets throughout the year. Fruit trees occupy about 17.3% of cultivated land amounts and provide 6.0% of the total agricultural production. By increasing the demands for livestock products, forage plants are of special importance.

Native populations of crops are numerous and of great values. They range widely for all the plants such as: arable crops forage plants, vegetables, fruit trees, grapevines, olives, etc. Thus, for instance, we can mention native populations of maize like "Reçi", "Dukati", "Sulova", etc; grapewine populations of "Sheshi i Zi", "Sheshi i Bardhë", "Kallmeti", etc.; olive fruits "Kokërrmadhi i Beratit"; figs "Roshnik", etc.); alfalfa (ecotype of Dibra); onion from Mirasi and Drishti, etc. Their value is not only for their use in programs for plant genetic improvements, but also they are used directly as crops.

Over the next 10 years priorities of Albanian government will include the following:

- Supporting fruit-tree growing and vineyards as important priorities of agriculture development;
- The second priority of Albania will be vegetable production, which, although has recorded noticeable increase, it is still insufficient in respect with its consume and market demands;
- Livestock production will be another priority of the government. Presently livestock is a sector of the greatest development over the years of transition period. The prioritized developments of livestock products will necessarily require the increase of forage plant production as well.



## 1.2 Diversity within and between crops

About 10 types of plants represent presently diversity within the main agricultural plants of arable crops in Albania. It seems that this diversity level will remain the same in the future also. There is a trend to increase the number of crops of vegetable plants. Thus, for instance, while 30 types of vegetables were cultivated in the lower coastal zone in 1995, the present cultivation pattern of vegetable plants comprises 38 types. In addition, there are demands in markets for vegetables of spontaneous flora such as: *Malva sylvestris* L. (mëllagë), *Amaranthus retroflexus & albus* L. (nena), *Urtica dioica* L. (hithra), *Atriplex hortensis* L. (laboti), *Cichorium intybus* L. (radhiqe), *Portulaca oleracea* L. (bordullak), *Papaver rhoeas* L. (lulekuqe), *Sonchus oleraceus* L. (rrëshyell), *Rumex patens* L. (lëpjetë), *Mentha suaveolens* Ehrh. (mendra erëmirë), *Mentha x pipertita* L. (nenexhik, mendra), etc., which are cultivated by farmers of rural areas and greatly demanded in markets.

Types of leguminous and graminaceous families that comprise meadow vegetation, annual and perennial one, represent diversity of forage plants.

Diversity is even narrower in less important plants. There are limited numbers of agricultural crops, even of cultivars within specie, apart from fruit trees, where diversity within specie is comparatively wider. Perhaps there will be no change of diversity in such type of agricultural crops.

Diversity in fruit trees is abundant. Fruit trees can be found in every region of Albania. This is because of great diversity of types and cultivars of fruit trees complying with higher variation of climate and earth conditions that characterize the country, which has allowed through centuries cultivation of maximum types of Mediterranean fruit trees. There are actually hearths of fruit-tree types and varieties, olive trees and grapevines of higher suitability to certain agro systems, of higher nutrition and taste values, required by high standard markets and especially by markets of biological and typical products. The abundant diversity of fruit-tree growing and the ancientness of their cultivation is demonstrated by the fact that most cultivars are nominated after the names of their locations like: "Molla e Hoçishtit", "Molla Gjeç", "Molla e Zheit", "Kumbulla Tropojane", "Kumbulla Çifte e Elbasani", "Dardha e Karkanjozit", "Dardha e Pinarit", "Dardha e Vakufit", grape varieties of "Sheshi i Zi", "Sheshi i Bardhë", "Kallmet", "Kalinjot", "Kokërrmadh i Beratit", "Kokërrmadh i Elbasanit", "Krypsi i Krujës", "Ulliri i Bardhë i Tiranës", etc.

Diversity within species is abundant also in vegetables. About 259 farmer populations/cultivars are collected from these plants, of which, 45 peppers, 44 tomatoes and 39 string beans. Farmers still cultivate largely all of these species.

Generally, diversity within species of wild plants is relatively abundant in Albania (about 3 200 types of wild plants are known) of which, 330 are species and varieties of forestry trees; only aromatic and/or medicinal plants are recorded more than 300 types. While diversity between species is relatively known in wild plants, diversity within the species is not known but it has been assessed that it should be very abundant. To add arguments to this, it's enough mentioning that through a program for collection and evaluation of diversity in 11 types of aromatic and/or medicinal plants and wheat relatives, funded by the World Bank under the Agriculture Services Project (ASP), about 480 samples were collected, which is quite a great number and shows the wide diversity within species.

Through observations direct in the field, during the implementation of the program for collection and evaluation as mentioned above, was revealed and identified a great genetic erosion of populations of aromatic and/or medicinal plants due to their collection without criteria, rooting them up, destroying thus their ability of natural regeneration.

There is a trend to increase diversity of Modern Plant Varieties, especially of vegetable plants. This is because of introducing foreign hybrids and varieties, which compete with their higher productivity, although they are not largely demanded in markets due to their unpleasant quality features and taste.

Generally, diversity in Landraces/farmer varieties is declining, although, many landraces are being reactivated through their cultivation in recent years, especially vegetable plants. Because of genetic erosion a large number of traditional cultivars have been lost. For instance, presently there are no wheat primitive cultivars; many maize cultivars are lost also, etc. In vegetables, many farmers are cultivating successfully local cultivars, which they are increasingly demanded in local markets.

Over the last ten years ratios between different agricultural crops have been changed. For instance, land areas cultivated with cereals have been greatly reduced: only in the last 5 years, land areas cultivated with wheat have declined 7%. Meanwhile, forage plants are increasing rapidly, during the last five years land areas cultivated with these plants are increased 18%, etc. Such change is due to increasing demands for livestock products and fruits and vegetables in local markets. This process is also influenced by economical factors: cereal production does to provide required revenues and prices of inputs are higher, their yields and selling prices are relatively lower.



### 1.3 Factors influencing the state of plant genetic diversity

Genetic erosion is very critical in Albania. During nearly half a century system of centralized economy, by cultivating home created varieties and introduction ones from abroad, a great number of cultivated plant populations have lost. 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 researches initiated for evaluating genetic erosion<sup>1</sup>, there is actually fatal genetic erosion, especially in medicinal and/or aromatic plants.

The main factors of such erosion are:

- Limited activities carried out so far for exploring and protecting biodiversity;
- Rapid and deep economic and social changes affecting our country over the recent years, which has caused massive movement of population from rural areas towards towns and cities;
- Collection of aromatic/medicinal plants for people livelihood and unmonitored sales of their collectors employed by small and medium size enterprises;
- Exploring collected plants without any biological criteria and no regulatory framework;
- Replacing cultivation of agricultural plants ecotypes with modern varieties;
- Frequent fires set purposely in hills for fighting plant diseases or fires caused accidentally or without any convincing justifications;
- Destroying their habitat through unplanned works, road construction or other social buildings and stone-quarries.

After 1995, there is a noticeable trend in Albania for 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 one, cultivation of old populations and cultivars has been refrained threatening thus seriously their existence, or in other words, being subject to genetic erosion. This phenomenon is principally assessed as primary cause for the loss of a great number of landraces. Genetic erosion has affected almost all plant groups.

The main factors of 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 of their biological renovation of them, and also fires that cause irrevocable losses;
- Lack of programs for preserving and using in rational ways native genetic resources;
- 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.

### 1.4 Future needs and priorities

In the present and actual state of plant genetic resources in Albania, it would be necessary to undertake some activities for holding back the factors that cause genetic erosion. These activities are of various nature and character.

Firstly, it should be found practical and simple ways for making aware communities of the importance of plant genetic resources, the necessity for their protection, considering them like their own properties, not only for today but also for the future generations. Through these ways the communities will be familiar with unquestionable values of primitive cultivars and will get to know the ways of natural enhance of wild plant species.

<sup>1</sup> Hammer *et al.*, 1994; Gladis *et al.*, 1995; Ricciardi e Filippetti, 2001; Filippetti *et al.*, 2001; Ricciardi *et al.*, 2001e, f

Secondly, it is necessary to draft more appropriate legislation and more active ways for law enforcement; periodic licenses might be practiced for collection of wild plants in order to allow natural regeneration of plants. In this field, the ways for protection of native populations could be encouraged, which would be more useful for future generations.

Thirdly, establishing working groups, including experts for monitoring continuously genetic erosion, actually is important.

Restrictive factors for evaluation and assessment of genetic diversity, erosion and vulnerability of plant genetic resources are due to the lack of unqualified specialists in the field of genetic erosion and also the lack of financial resources for their training, for improving technical knowledge of farmers, etc. However, the main factor is the increase of economic life standards through the efforts for reduction of poverty and increase capacities for employment.



# THE STATE OF *IN SITU* MANAGEMENT

## 2.1 Inventories and surveys, assessment and priorities

Albania hasn't had and still doesn't have any organized institutional activity for identifying and evaluating the diversity of plant genetic resources, of plant associations and of wild plants for food production. This is due to the lack of a authentic policy and strategy related to plant genetic resources.

However, it is rather different the state of *in situ* preservation and management of plant genetic resources in the field of fruit-tree growing and forests. Thus, for instance, there have been conducted inventories and observations in fruit trees with the objective of identifying abundance of genetic diversity in certain types and zones.

Recent years, a national program is developed for *in situ* conservation of forest tree species. In this field, it has been possible the increase of protected land areas for all categories of IUCN. This development influences directly the *in situ* preservation and conservation of some of the most popular of forest species founded in relevant areas. Over the last ten years, these areas have experienced noticeable increase amounting to 166 611 ha, divided according to IUNC categories as follows:

- |   |           |
|---|-----------|
| • Category I: Strict Natural Reserve/Research Reserve | 14 500 ha |
| • Category II: National Park                          | 56 440 ha |
| • Category III: Natural Monument                      | 4 780 ha  |
| • Category IV: Species Management Zone/Habitat        | 42 818 ha |
| • Category V: Landscape/Protected Marine              | 29 873 ha |
| • Category VI: Protected Zone of Managed Resources    | 18 200 ha |

Plant diversity has important and, sometimes, vital functions for the ecological environment of Albania, especially for soil protection from erosion, however, in the actual conditions of agriculture development, it has also crucial functions for assuring agricultural products because of emphatic variegation of climate and soil conditions and unpredicted weather events (extreme and prolonged drought, etc.). In such conditions, diversity between and within species mitigates their negative effects. Diversity in fruit tree genetic resources influences directly improvement of environment and consequently their features complying with environment.

However, it is actually aimed conducting inventory, observation and evaluation of diversity of plant genetic resources in the future. For carrying out such objective it is necessary to establish a group of experts, qualified and trained, and providing required conditions and supplies for documentation, management and monitoring plant diversity.

## 2.2 Management and improvement of plant genetic resources on-farm for food and agriculture

Presently, *in situ* preservation of agricultural plant genetic resources in Albania is performed through cultivation of primitive cultivars (landraces, populations) while their management is spontaneous because farmers, who are fond of their planting materials collected and transmitted through generations, mainly carry it out. This is more noticeable for vegetables and primarily in rural mountain areas in the Northeastern regions of the country. However, no activity is initiated in institutional levels for inducing farmers to preserve and maintain their traditional cultivars.



## **2.3 Restoring agricultural systems after disasters**

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There is no device in Albania for replacing plant genetic resources for food and agriculture after disasters. In present conditions, it would require establishing centers for *in situ* preservation according to specific areas of the country, with the objective of protecting species endangered to extinct and also adoption of legislation to put these species under protection and to create the capacities for their biological and natural reproduction.

For establishing such effective devices, the lack of financial public resources is the main constraint. It is yet early for Albania pretending to activate privately such resources.

## **2.4 *In situ* conservation of wild crop relatives and wild plants for food production**

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Conservation *in situ* of wild crop relatives and wild plants for food production is rather more difficult and we cannot think of it presently. For this purpose the main protected zones should be institutionalized and gardens should be established in typical areas of the country.

# THE STATE OF *EX SITU* CONSERVATION



## 3.1 The status of *ex situ* collections

*Ex situ* preservation of plant genetic resources in Albania is carried out through basic, active and working collections. Basis collections, for all plants reproducing by seeds, are maintained in the Gene Bank of Albania, which was established in 1998. 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 Gene Bank of Albania and the institutional ones maintain primarily main agricultural crops and plants that are less important.

Collections of germplasm of fruit trees, olive and citrus trees and grapevines are field collections at the Agricultural Technology Transfer Center in Vlora City. In this direction, efforts have been made for increasing such field collections also in Tirana and Korca cities. In the Agricultural Technology Transferring Center in Vlora genetic materials are also preserved in protected areas such as screen house type with the objective of increasing the security of preserved materials and protecting them to diseases and pests of plant materials, which serve also as initial sources for pre-reproduction in agencies for certification of reproduced materials.

## 3.2 Planned and targeted collecting

In order to meet increasing needs of agricultural research with the objective of genetic improvement of cultivars, some collecting missions have been organized over the last ten years. Such collecting missions have been established for arable crops such as: beans, chickpea, lentil, alfalfa, oats, forage peas, sorghum, vegetables and fruit trees. During these collections, a very abundant diversity within specie has been identified and interesting plant populations have been selected. Thus, for instance, in respect with arable crops, 28 interesting populations are found in bean plants, 2 populations in chickpea and 2 populations in lentils. The same situation is also for forage plants such as alfalfa, clover, and forage peas, sorghum. In maize 23 populations are collected which have never been collected before because of their loss from collection. The same is for vegetables and fruit trees. A program for collection and evaluation of germ plasma of aromatic and/or medical plants was drafted and carried out for the first time. The objective of this program, supported by the World Bank under the Agricultural Services, was the collection of 11 species of aromatic and/or medical plants and wild relatives of wheat. In country level, 480 samples were collected, which are characterized of their phenotypic differences and other features. They have also borrowed germ plasma from different counterpart institutions and gene banks abroad. These activities have influenced for complementing *ex situ* collections of plant genetic resources of arable crops, forage plants, etc.

In Albania, it hasn't been conducted yet a wide institutional inventory and survey of wild plants for food production. For the first time, a 3-years period program, funded by the World Bank, was launched for collecting and evaluation of germ plasma diversity in 11 species of aromatic and/or medical plants and also in wild relatives of wheat (*Aegilops sp.*). This program identified a wide range of species that underwent collection process. In the framework of such program, there were selected species that are of economic value for the country, which are demanded also in world markets. They provide economic resources for communities in respective rural areas. Inventory of plants genetic resources diversity is also carried out with fruit trees, olive and citrus trees and also with grapevines over the last ten years. However, financial resources have never been sufficient for complete inventory and exploration of fruit-trees genetic resources, for their preservation and monitoring genetic erosion.

Although through these collecting missions, carried out in limited areas of the country, there are obtained and collected valuable authentic materials, for both direct usage by introducing them to production for cultivation and also as initial materials in the work programs for genetic improvement of variety cultivars, they have not been conducted in the required technical and scientific levels in conformity with requirements of collecting missions. Deficiencies have been

not only with regard to techniques and sampling, to their forms and sizes for getting higher diversity representation, but also concerning their descriptors specifications and their documentation. This is because of insufficient training of the hired staff in the field of collection, lack of experiences and required supplies needed for collecting missions.

### 3.3 Characterization, evaluation and documentation

Today, agricultural institutions that collect, maintain, storage, research, use and distribute germplasm of plant genetic resources with which they are working, have carried out characterization and evaluation of respective germplasm. It is worth mentioning that electrophoresis characterization has never been done and in no kind of collections.

Characterization and evaluation of plant genetic resources is made using IPGRI descriptors, however, passport data and characterization and evaluation of germplasm are documented manually and/or computerized entering information in Excel and not in appropriate database. Such way of documentation reduce the use of germplasm by interested people and do not facilitate the exchange of information electronically. Even the Gene Bank of Albania doesn't have a database and is working in Excel.

### 3.4 Storage and major *ex situ* needs

*Ex situ* collections of germplasm of plant genetic resources, in the form of seeds, are stored in the Gene Bank of Albania and in three institutional gene banks at the Agriculture Technology Transfer Centers in the cities of Shkodër, Fushë Krujë e Lushnje. Samples in the Gene Bank of Albania are stored in refrigerators, while in centers for agriculture technology transfer samples are storage in cold rooms designed and devised for medium term preservation. These cold rooms are installed in recent years under the financial support of various donors such the World Bank through the ASP, USAID and CINS with the objective of storage working collections. Cold rooms are established in three centers for Agriculture Technology Transfer in the cities of Shkodër, Fushë Krujë and Lushnje, and are devised with some equipment for processing germplasm before putting them in preservation. However, there are *ex situ* plant collections such as of barley, rye, sugarbeet, wheat, beans, that are preserved in usual conditions (shortterm) making regeneration and reproduction of seeds within shortterm periods (Agriculture Technology Transfer Center in Korca). Nevertheless, in such case we have to do with a limited number of accessions most of which are of foreign origin.

Even though modest conditions have been established for *ex situ* plant collections, preservation of plant materials (seeds) is not sure because of continuous lack of electrical power. This situation is not only for the Gene Bank of Albania but also for other institutional genebanks.

Presently in Albania, *ex situ* preservation in Botanic Gardens 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 has not the functions of preserving genetic resources, but it's only a community of spontaneous plants for demonstrative or didactic purposes.

*Ex situ* preservation of forest genetic resources is realized through establishment of field collections, primarily for the species of coniferous trees. Such field collections are created in the area of Rovje in Gramshi district, (in the central region of the country), in Dumbrave, Devoll district, (in the East) and in Surroj, Kukes district (in the North of the country).

With regard to aromatic and/or medicinal plants, over the last years, some field collections have been established for *ex situ* preservation of germplasm of plant genetic resources. Such collection, for instance, of mountain tea (*Sideritis roheseri*) is established in the area of Dardhe, Korca district; another field collection is set up in Ferras, in the district of Fier, where species that need wider areas of land and have got larger productive potentials are preserved, such as: sage (*Salvia officinalis*), saturea (*Saturea montana*), drizzel (*Origanum vulgare*), etc.

There hasn't been and there aren't any security duplications for unique accessions of plant genetic resources in institutional level or under any agreement. However, most accessions are duplicated because germplasm delivered to the Gene Bank of Albania is preserved also by other relevant institutions that has used or is using it. But, in both levels of germplasm preservation there is no security for germination and their genetic values because of the lack of security conditions and also of very often regenerations of germplasm made by the Centers for Agriculture Technology Transfer. The issue of security duplications will be a priority for germplasm of plant genetic resources of primitive cultivars, i.e. those of native origin, especially for vegetable and forage plants. In order to fulfill such objective, first, a regulatory framework should be drafted for determining and governing the rules between actors for duplicated preservation of the most useful germplasm of the country, and secondly, making sure the required conditions for preservation of plant genetic materials, especially continuous supply with electric power.



### 3.5 Distribution and borrowing of plant genetic resources

Movement of germplasm from its preservation and management units to its users is limited because users of germplasm are also its possessors and consequently movement is not recorded when it has to do with an institutional genebank. Even in the Gene Bank of Albania there are no procedures for documenting movements of germplasm. There are inconsiderable movements of germplasm from this Gene Bank. This is because it is a new genebank (established in 1998), which is very late supplied with samples of plant genetic resources and it hasn't still reached even the phase for testing germination abilities of preserved materials, and also because of legislation related to the Gene Bank which actually limits and hinders distribution of genetic resources to users.

*Ex situ* collections in Albania are established at agricultural research institutes for the purpose of using them in their plant breeding programs they are dealing with. In respect with this objective, *ex situ* plant collections are mainly represented by samples of foreign origin. Therefore, there always have been made efforts and actions for borrowing genetic materials from counterpart institutions abroad. For instance, over the last ten years, they have borrowed from the Gene Bank of Gatersleben, in Germany; from North Gene Bank of Izrael; from Rumania, USA, etc. A typical example of such practice is Agricultural Technology Transfer Center (former Agricultural Research Institute) in Lushnja, which has its collection of 6 000 wheat samples.

### 3.6 The main constraints to support *ex situ* collections

For carrying out plant breeding programs during these last ten years, there have been requests for increasing and enriching *ex situ* collections for filling the gaps of genetic diversity of certain plants and also in respect with their preservation in more appropriate conditions for avoiding frequent and compulsory regeneration of germplasm that sometime has caused the loss of their genetic values, in other words, their conveyance from adaptation with the conditions of the place where regeneration is made. In this view, a great deal of genetic resources of working collections does not justify any more their preservation for the purposes they are required for. The greatest constraints for supporting *ex situ* collections have primarily been of financial character from which is caused:

- Limited financial sources for creating more appropriate conditions for preservation of *ex situ* collections of plant genetic resources;
- Lack of required equipment for dealing with genetic resources and preserving them in *ex situ* collections;
- Insufficient staff and lack of training activities;
- Limited supplies of electric power.

Upon the restructuring of agricultural research institutes in Albania, the constraints for expanding *ex situ* collections of plant genetic resources are of organizational, legal and financial character over ten coming years. This is because of the fact that currently conditions for preserving working collections have been overcome, and, as it has been initially discussed, appropriate conditions for mediumterm preservation of plant genetic resources have already been created in three Centers for Agricultural Technology Transfer. They might only need some special equipment or supplies.

An organizational and legal impeding factor is related to the fact that, upon restructuring of agricultural research institutes, research work will be a responsibility of Agricultural University, which is an educational institution under the jurisdiction of the Ministry of Education and Science. On the other hand, in the phase and development conditions that Albania is, the area of cultivation technologies and their transfer to farmers will be the priority of Agricultural Technology Transfer Centers (ATTC). The use of *ex situ* collections of plant genetic resources for other purposes is limited. However, *ex situ* collections of plant genetic resources will be needed and required more by the ATTCs in respect with germplasm of primitive cultivars for typifying, studying and evaluating them and further for producing seeds and promoting and disseminating them widely to producers. However, in this point of view, over ten coming years, not all agricultural crops will be treated equally, there will surely be prioritized crops.

### 3.7 Priorities on expanding *ex situ* collections

The priorities in the area of agricultural production development over the next ten years in Albania will be the development of fruit tree and vineyard production, on one side, and also the development of vegetable and livestock products, on the other. Based on these priorities, the first stage will include expanding and enriching *ex situ* collections of plant genetic resources of fruit trees and then of vegetable and forage plants.

For achieving such objective, forage plant collections, as well as collections of vegetables and fruit trees and arable cultivated crops will be the targets of these activities in order to escape native populations from extinction. Of course, financial resources and required equipment are needed for carrying out collecting missions; however, the most important task is the training of specialists that are going to deal with such collections.

In addition, a database is predicted for elaboration in the future, and electronical communication will be devised as well, and finally establishment of a center in the Directorate of Extension Services, Science and Agricultural Information will finalize such things.

For the conditions of Albania, priority needs in the field of *ex situ* collections in the next ten years are as follows:

- Improved management of germ plasma;
- Completing free collection spaces;
- Lower cost conserving technologies;
- Complementing security publicity;
- Developing tested collections of pathogens.

Albania needs to improve further the management of *ex situ* collections of plant genetic resources and these needs are of political, research and managerial character. Among such factors we can mention the following:

- Drafting or modifying appropriate legislation for evaluation, collection, characterization, preservation, usage and dissemination of *ex situ* collections of plant genetic resources;
- Programming and collecting, characterizing and evaluating native populations that are missing in *ex situ* collections of plant genetic resources;
- Recollecting of crop populations with the aim of updating germplasm due to its alteration from reproductions in a lot of seasons out of own placegrowth;
- Drafting appropriate procedures and documentations for distributing germ plasma to users.

# THE STATE OF USE



## 4.1 Distribution and enhancing the use of plant genetic resources

Plant genetic resources in storage are used in two main directions:

- As populations of initial material in plant breeding programmes;
- Directly as mere cultivars cultivating them in wide production for fulfilling food needs.

Plant genetic resources that are used for plant breeding programs are selected for their special features and certain characteristics and those that are of interest transferring them to existing cultivars aiming their improvement, or for breeding new cultivars through selection process for fixing required features. However, selection of parent populations or donors of certain features is conducted through preliminary study at agricultural research institutes that are dealing with relevant agricultural crops. Pursuing such directions new hybrids and cultivars are bred for wheat, maize, beans, vegetables, etc., which are suitable for climate and earth conditions of certain zones and microzones of our country. The fact that domestic breed cultivars have been successful in production shows for specific conditions of the climate of Albania, against which a great number of cultivars of foreign origin have failed to be adapted and have reacted badly with their productivity. The latter explains also the importance of using plant genetic resources selecting them based on their reaction against certain environment.

It is also of special interest the use of plant genetic resources directly in production, just as authentic cultivars. Through such a way a number of cultivars have been introduced to production, however, more interesting is reactivation of landraces. This is more noticeable for vegetables (tomato, pepper, pumpkin), fruit trees (apple, pear, fig), for some forage, common bean, maize, grapevines, olives, and some special peppers.

Despite progress achieved so far in using native genetic resources, there are still constraints in this direction. First, their use in breeding programs has been very limited because of their lower productivity and of difficulties in their manipulation due to their special features because they are less plastic, and also insufficient training of local researchers to use them successfully. For these reasons, genetic materials of foreign origin have been used, which have higher productivity, are more plastic, but their quality features are not satisfactory and are more sensitive to diseases and unsuitable to environment conditions. Wider expansion of local populations or landraces requires legal support; they are accepted by consumers who are increasingly demanding them in markets for their special quality standards, especially their taste, as compared to foreign cultivars.

Generally, agricultural research institutes have characterized and evaluated plant genetic resources based on descriptors of IBPGR, UPOV. These activities have been conducted and are also continuing with wheat, maize, common bean, vegetables, fruit trees, etc. However, there is still much work to be done in this direction because characterization and evaluation have not been completed for the entire range of plant genetic resources already possessed. Thus, for instance, these scientific procedures with vegetables are completed with 19 accessions of melon, 24 of cucumber, 18 of pumpkin, 32 of pepper, 44 of tomato, 12 of cabbage and 9 of spinach.

Resistance to diseases and pests, and also to abiotic stresses, has been and continues to be one of the main objectives in plant breeding programs. For this objective, they have worked in natural conditions and not in conditions under artificial effects or in conditions improvised for abiotic stresses. In such conditions, evaluation of genetic materials is based on the chances of epiphytic events or on inadequate environment conditions, or making use of certain zones and microzones with signs and emphasized development of main diseases, which are called "hot spots" in cultivation and evaluation of plant genetic materials.

Distribution of samples of preserved plant genetic resources for breeding programs was and is being done without any instrument or certain documentations. This is because holders, conservers and users of germplasm of plant genetic resources have been the same, either institutional or research levels. Such practice has been affected by the lack of gene banks, in institutional or country level. Also, experiences have missed for such activities. Although the Center for Agricultural Technology Transfer in Lushnja has a unit for preserving plant genetic resources, such practice is not applied

because of untrained staff dealing with such activities.

The use of plant genetic resources in agricultural production, as cultivar crops, has been largely improved in recent years. This is evident for forage plants like alfalfa (ecotypes of Peshkopi, Gjirokastra and Korça), native varieties of oat (Lushnja, Kamza and L x K), of clover, common bean (Shijak, Kallmet), and native populations of maize. In vegetables, the use of plant genetic resources in wide production as cultivars is more noticeable. Thus, for instance, the following cultivars are being cultivated: tomatoes "Agimi", "Zemër Kau", "Tirana", "Sanjollas", "Serrëke", etc.; peppers "Peza", "Laknas", "Gjorica", "Oblika", "Hundashka", "Vëthka", "Poçe", "Gogozhare", etc.; eggplants "Zallherri", "Oblika", "Përmeti", "Violet", etc); string bean "Jeshile e Përmetit", "Aishka", "Pllaçake e Verdhë e Voskopit", "Barbunja e Postribës", "Barbunja e Vërrisë", etj.; onions "E Drishtit", "E Mirasit", "E Përmetit", "E Dishnicës", "E Dukatit", "E Tushemishtit", "E Sukthit", etc.; leeks "I Kasharit", "I Bërdicës", "I Belortas", "I Përmetit", etc.; garlic "E Milotit", "E Korçës", "E Pukës", etc.; cabbages "Mishja e Korçës", "E Bilishtit", "E Postribës", "E Voskopit", "E Përmetit", etc.; spinach "I Përmetit", "I Korçës", "I Leshicës", "I Kavajës", etc.; sallad "Marule e Korçës", "Sallatë Bari", "E Bërdicës", "E Leshicës", etc.; melons "Qarrësi i Tiranës", "Qarrësi i Kastriotit", "Farashuku i Korçës", "Thelaniku", "Gorroveci", "Myselimi", "Pjepri i Dobraçit", "Dimrak i Baldushkut", "Kallmi", etc.; cucumbers "I Korçës", "I Postribës", "I Përmetit", etc.; pumpkin "Puka", "Oblika", "I Përmetit", "I Kosovës", "Pjekësi i Kuq i Tiranës", etc.

It is of great interest the use as cultivars of vegetable spontaneous flora. Here, we can mention these types: *Malva sylvestris* L., *Amaranthus retroflexus* L., *Amaranthus albus* L., *Ateiplex hortensis* L., *Urtica dioica* L., *Cichorium intybus* L., *Ocimum basilicum* L., *Portulaca oleracea* L., *Asparagus tenuifolius* L., *Datura stramonium* L., *Chenopodium album* L., *Taraxacum officinalis* L., *Papaver rhoeas* L., *Calendula officinalis* L., *Capsella bursa pastoris* L., *Sonchus asper* L., *Sonchus arvensis* L., *Silybum marianum* L., *Sinapis alba* L., *Sinapis arvensis* L., *Sinapis pubescens* L., *Stellaria media* L., *Diploxix tenuifolia* L., *Oxalis pes-caprea* L., *Reichardia picroides* L., *Primula vulgaris* Huds., *Plantago* sp., *Raphanus raphanistrum* L., *Rumex patens* L., *Foeniculum vulgare* Mill., *Mentha suaveolens* Ehrh., *Mentha spicata* L., *Mentha x piperita*, *Satureja hortensis* L., *Majorana hortensis* Malnch.

Also for fruit trees, the number of native cultivars in production is great. Thus, for instance, 39 cultivars of apples are known; 74 cultivars of pears; 7 cultivars of quince; 7 of plums; 35 of cherries; 20 of apricot; 6 of peaches; 6 of pomegranate; 32 of figs; 15 of walnuts; 7 of almonds; 53 of grapevines; 27 cultivars of olives. These cultivars have been adopted in certain areas and have obtained special features. This is so emphatic that most cultivars are named after the names of locations they are found. Thus, for instance, "Molla Faqekuqja e Vërtopit", "Molla e Zallbastarit", or "Molla Majoshe e Frakullës", etc. In fruit trees there are also wild species or wild relatives of cultivated fruit trees. Among them we can mention: *Malus silvestris*, *Pyrus communis*, *Pyrus amigdaliformis*, *Cydonia vulgaris*, *Prunus cerasifera*, *Prunus domestica*, *Prunus mahaleb*, *Prunus spicosa*, *Crataegus azarolus*, *Cerasus avium*, *Diospyrus lotus*, *Mespilus germanica*, *Prunus cerasus*, *Arbutus unedo* L., *Ficus carica caprificus*, *Olea europea* var. *oleaster*.

Native plant genetic resources have been used also in plant breeding programs, mainly in vegetable plants, along with those of foreign origin and of domestic origin. Under this practice a great number of lines have been created for tomatoes, cucumbers, melons, peppers, etc. from which some cultivars and hybrids are obtained that are included in cultivating patterns of vegetable plants. Among them we can mention the tomato hybrids of "Fitore", "IPP-14-31", "ZKC", "Zana", "Rubin 14", "Rubin 18", etc.; hybrids of cucumbers "IPP-724", "IPP-249", "Shekulli", "Smerald"; pepper cultivar of Albana and hybrids of "IPP-18-10", "IPP-17-79", etc.; melon cultivars of "Qarrës 78", "IPP-6006", "IPP-6020", etc.; cabbages of "M-140", "IPP-24-K", etc. Also in maize, a great number of native populations are included in the plant breeding programs.

Farmers, who are interested to satisfy market demands and consumer needs, require native hybrids and cultivars.

Plant genetic resources of forest trees have been widely distributed using them for new afforestations of bare and deteriorated forest areas. Planting materials are obtained from predetermined protected areas or nurseries based on carried out studies.

Also, the use of plant genetic resources of aromatic and/or medical plants is increased during the last years by establishing cultivated areas with several major types, such as, *Salvia officinalis*, *Sideritis roheseri*, *Origanum vulgare*. Seeds and vegetative cuttings for these cultivations are obtained from plants of spontaneous flora.

Despite progress achieved so far in respect with the usage of plant genetic resources, there are still difficulties and constraints, some of which are listed below:

- Lack of information for some characteristic features due to insufficient characterization and evaluation processes;
- Required documentation about conserved germplasm and exchange of information is missing;
- Long term nature of required pre-selection activities for increasing the material base for selection;
- Lack of capacities—qualified staff, funds, trainings, equipment;
- Lack of integration between selection programs and the use of plant genetic resources;
- The lack of zonal collections is also a barrier for the use of fruit tree genetic resources;
- Insufficient capacities for plant breeding;



- Poor development policies;
- Legal constraints.

Presently, Albania has some priorities with respect to the use of plant genetic resources. Among others we would mention:

- Increasing selection capacities for agricultural crops that are more important for agriculture and food and of interest for farmer production activities. This is also associated with the improvement of qualification level of researchers through special trainings;
- Strengthening cooperation between researchers, breeders, managers of genebanks and farmers for better integrating conservation and utilization of plant genetic resources;
- Emphasizing more strongly the utilization and development of species in use, which haven't actually the required support that would have increased possibilities for cultivating free lands and increase farmers revenues;
- Increasing the significance for production of indigenous varieties and cultivars in the markets of agricultural products, increasing thus, diversity of agricultural production;
- Encouraging and supporting farmers to use landraces and other genetic materials preserved in gene banks;
- Educing the use of landraces in seed production schemes and seed supply system;
- Improving legal framework and policies for facilitating larger use of native plant genetic resources.

## 4.2 Seed supply systems and the role of markets

Production and distribution of seeds in Albania is carried out by two sectors: public and private one, either associations or individual farmers. Public sector, which is represented by the Agricultural Technology Transfer Center (ATTC) produces higher seed categories, starting from Breeders' Seeds until Prebase Seeds. Exception is made for vegetables; where seeds are produced by the public sector even Prebase one. This is because smaller seed quantities are required for a land unit and the production of such seeds requires special technology and care. As a rule, private sector produces certificated seeds mainly through farmer associations.

Although there is a seed production system, it is not actually an institutional system in the sense of organic relations of both sectors and contractual relations between them, therefore it doesn't function fully. Consequently, Prebase Seed and/or Base Seed is not used entirely by farmer associations for producing respectively Base Seed and Certified Seed, but it also goes for wide production reducing thus the possibilities of bigger land areas with certified seed.

The existing system of seed production and distribution in Albania, in the last ten years and even today, is not properly functioning in its entire links becoming thus a main constraint for assuring good quality seed for a great number of plant varieties, and consequently harvesting higher and more qualitative yields. While seed production scheme is not working properly, farmers' needs for good quality seed and of wider varieties are not fulfilled. Due to actual shortages and to the economic level of farmers, informal seed markets are flourishing, which are offering seeds with lower prices but of poor quality and not certified seeds. This situation is obvious also in land parcel of seed production, for instance, of wheat seed, which are heavily infested by wild weeds. It should be recognized that even agricultural research institutes, due to the lack of financial resources, are not producing seed of good quality. As a rule, a seed production parcel of lower yields, let's say, for instance, 30-35 kv/ha of wheat seed cannot provide good quality seed.

In recent years, over a three years period (2003-2005), with the financial support of the World Bank, under the Agricultural Services Project, the production of Prebase Seed was supported in four former agricultural research institutes in the cities of Shkodër, Fushë Krujë, Lushnje e Korçë and in the Vegetable and Potato Research Institute for producing seeds of maize, alfalfa, wheat, oats, tomato and cucumber. While agricultural research institutes had not sufficient financial resources, farmers were contracted to produce such seed pursuing the required production technology and finally they were paid by the project for this service. Because of objective and subjective reasons, such support was not so profitable; however, research institutes were furnished with field and seed processing machines and equipment based on their specified demands.

In addition, the Government each year should fund production of PPB seeds because this seed category has no market value, while production of PB and base seeds should be subsidized presently for encouraging and developing seed markets.



Considering seed as an important factor in agricultural production, with the aim of improving seed production and distribution over the next ten years, several activities will be undertaken including the following:

- Strengthening Agricultural Technology Transfer Centers for producing seeds of higher viability and capable for transferring productive capacities of representing cultivars to plants derived from them. This requires providing these centers sufficient financial means for producing seed and increasing the use of inputs in seed production land parcels with the aim of harvesting higher yields;
- Revising and improving seed legislation in order to induce and assure law enforcement by all actors involved in seed production and distribution;
- Subsidizing production and distribution of Base Seed and Certified Seed for encouraging and assuring seed of good quality and preventing informal seed amounts and illegal seed producers and seed traders;
- Strengthening legal control in production and distribution of seed, starting from Prebase Seed until Certified Seed, in the entire production and distribution chain, reviewing directly in the field procedures and practices and required documentations;
- Encouraging and supporting the strengthening of seed production and distribution companies;
- Enforcing legal forms of work in relations between seed producers and several other links, i.e. between research institutes that are producing *Prebase Seed* and associations and companies that are producing *Base Seed* and *Certified Seed*.

Introducing new varieties to production is something normal and legal in agricultural production in Albania. This is true especially for agricultural crops that are cultivated in the field, because of their diseases and pests, and for getting cultivars of higher productivity and better quality. Presently, new cultivars of agricultural crops are introduced in an unorganized manner; they are practically forced by seed traders introducing mainly foreign cultivars through seed distribution. There is currently no formal system of field tests that was previously done by research institutes, for testing new cultivars in some points that represent ecological zones of the country. Consequently, distribution of native cultivars is difficult not only for the lack of a field test system, but also because of lack of information and/or of publicity infrastructure.

But the problem is worse that there is no formal market located in a certain place known by farmers, who are also consumers of such products. Consequently, there is no publicity infrastructure for propagating new cultivars and perhaps this is affected by extremely fragmented agricultural production, which is actually represented by small farms that cannot or are not much interested to intensify agricultural production.

For promoting agricultural production, especially in the field of vegetable and fruit tree, wholesale markets have been established for trading such products. So far, under the support of the World Bank and other donors of Albanian government, five fruit and vegetable wholesale markets have already been established, respectively in the cities of Lushnje, Korçë, Vlorë, Shkodër and Kukës. There is also a private market in Fier and a market in Gjirokaster is under construction. This market structure has encouraged agricultural production and surely the use of plant genetic resource as well.

### 4.3 Crop improvement programmes and food security

Agricultural research institutes that are under the jurisdiction of the Ministry of Agriculture, Food and Consumer Protection (MAF&CP) have executed programs of plant genetic improvement in Albania. Not with standing the change of the status of former research institutes and their transformation into agriculture technology transfer centers and also the transfer of plant breeding activities to the Agricultural University, programs for plant genetic improvement will continue to be pursued by Agriculture Technology Transfer Centers. This is due to some reasons, which includes:

- Agriculture research institutes, due to their experiences and relations with agricultural production, with the crops and the staff, their familiarization with requirements of such production, are worthy carrying out such activities.
- As opposite, educational institutions have been and continue to be disengaged with problematic of agricultural production and also with the practices and procedures of genetic improvement programmes. Breeds made by the Agricultural University have never been distributed widely to production and have not competed creations bred by research institutes. This is an Albanian reality, even though it cannot be accepted principally.
- Centers for transferring agricultural technology, because of known circumstances in their research activities, in general, and in plant breeding activities, in particular, have established and possess working collections considerably abundant and also have appropriate premises for their long term preservation. They are familiar with collections, they have characterized and evaluated them and have fanatically protected them; while, on the

contrary, the Agricultural University, which has had but doesn't have presently any collections because it has failed to protect them and because has had no interests, no needs and no affection for them.

- Even though actual economical and financial potentials of the country do not allow larger financing in the field of plant genetic improvement, the need for native cultivars will be evident, especially for those cultivars that are cultivated in wide fields. This is because of very changeable weather conditions against which foreign cultivars have not been always successful.

Following this argumentation, there is a formal basic center for carrying out plant breeding programs, for identifying germplasm of cultivated plants. Even though plant genetic improvement program has fulfilled its obligations against agricultural production, it still need qualification and training for its stuff, not only for the new methods and advanced technologies that have not been implemented yet, but also for creating conditions and providing required equipment for making use of such techniques and technologies.

Plant breeding programs have been funded by the government based on short-term projects approved by certain specialized organs, but not in the framework of a National Programme. These projects of plant breeding have been focused on such agricultural crops like wheat, maize and vegetables.

Contribution of plant genetic improvement on food security has been noticeable. Thus, for instance, cultivars and hybrids bred under such programs, due to the fact that they have been selected in the environments where they are cultivated, have successfully coped with unexpected and unsuitable environment conditions, as opposed to foreign cultivars, which has not been competitive in this direction. This has been obvious in wheat, maize, vegetables, etc.



# THE STATE OF NATIONAL PROGRAMMES, TRAINING NEEDS AND LEGISLATION

## 5.1 National programmes

Work with plant genetic resources is needful and vital for each agricultural research institute, especially for those dealing with plant breeding programs. Such need has made them evaluate and pay special attention to establishment of *ex situ* collections of agricultural crop germplasm, which they are working with. Initially, certain researchers have dealt with such activities, and furthermore, these institutes have set up separate sections dealing with characterization, evaluation, regeneration and management of germplasm and finally appropriate premises have been created for medium term preservation of plant genetic resources.

Although until 2005, a National Program on "Biotechnology and Biodiversity" operated under the umbrella of the Ministry of Education and Science, it mostly involved in activities for obtaining funds, on competitive basis, in support of different research institutes for financing various projects with regard to the issues of plant genetic resources, especially for collecting native populations. These funds haven't been much effective and complete because of the fact that they didn't provide the required conditions for carrying out such projects, in one side, and project funds were managed by the directors that, for the needs of their institutions, allocated and used them in other directions and area and they lacked required experiences and staff qualification for implementing successfully these projects. However, that was not a proper national program on plant genetic resources in order to carry out a strategic analysis of the state of plant genetic resources, to plan and foresee the inventory of genetic resources, to evaluate the level of genetic erosion, to forecast and undertake collecting and escaping missions, to propose more appropriate actions for protection of plant genetic resources from extinction and drafting and/or adapting relevant legislation and other activities that would have strengthened the state of plant genetic resources in Albania.

Based on this assessment, Albania hasn't got yet a National Programme on Plant Genetic Resources. Consequently, there is no institutional strategy for plant genetic resources, no action plan that should be undertaken, and no coordination of work between interested institutions related to activities of plant genetic resources. Increasing the number of accessions in *ex situ* collections, providing respective descriptors for different plants, raising the awareness of their values and also the risks that endanger genetic resources, judging all these also on the focus of the current situation of our country with the objective of evaluating the state of native plant genetic resources and also for the management and protection of such wealth for today and much more for the future, are sufficient justifications that dictate the need of establishing a National Programme on Plant Genetic Resources.

In addition, there is no special law on plant genetic resources. The issues of plant genetic resources have been partially and insufficiently treated in the Seed Law or in the Rules and Regulations of the Gene Bank of Albania.

The development of a vast range of topics on plant genetic resources, evaluation of diversity abundance between species, but more among species, recognizing the level of genetic erosion, which is actually much more higher than it has been thought, evaluation of real risks for the loss of many populations of crops, much more for spontaneous plants, primarily for aromatic and/or medicinal plants, towards which little attention is paid, have convinced not only researchers but also executive organs to undertake actions for elaborating a national Program on Plant Genetic Resources. Albania, even though has its own researchers in the fields of the knowledge and utilization of plant genetic resources, it would welcome international assistance for drafting such important document.

Our country has not developed yet a national network for plant genetic resources, even though such issue is needful and it has been raised several times.



## 5.2 Education and training

Education in the field of agriculture has its own objectives and specifics in Albania, which finally aims education and qualification of skillful specialists for agricultural production. With the level of professional market, specific education even cannot be thought for sustainable use, development and conservation of plant genetic resources. However, recently, the Agricultural University in Tirana has introduced, on selection base, the curriculum of Plant Genetic Resources for which a text book is published under the financial support of the World Bank through the Agricultural Services Project (ASP). However, the need for special expertise on the field of plant genetic resources is evident already. But, as it is pointed out above, fulfillment of such need cannot practically be solved through education, it is more possible to solve it through postuniversity qualifications and trainings.

Through participations in short-term international training courses, some specialists have been trained already about general issues of plant genetic resources. This has helped raising awareness and concerns related to this field and have induced them not only evaluating better the importance of plant genetic resources, but also dedicating to such field. In recent years, 2003-2004, under the support of the World Bank, four local specialists have been trained in the field of plant genetic resources at the Agricultural University in Tirana, based on a program developed purposely for such training.

For the coming period and in the future, trainings on special fields of plant genetic resources are needed, especially, in the areas of collections for diversity, for both, cultivated and spontaneous plants, including here technical and logistic plans, preliminary processing and packaging of samples collected in the field, etc.

## 5.3 Information systems

Passport data and also of descriptors for characterization and evaluation of germ plasma in *ex situ* collections are recorded in the books of organizations that hold such collections. Most of them have been entered into computers now, in Excel software. A portion of these data have been submitted also to the Gene Bank of Albania, along with the germ plasma stored there for long-term preservation.

However, even though a good database is developed according to international standards, still there is no national system of a mere database for maintaining and sustainable use, development and conservation of plant genetic resources.

Thus, even though there is documentation, which is used by breeders or other users of plant genetic resources within relevant institutions, other researchers that do not work in the abovementioned institutions cannot use it easily, although there is no legal impediment.

Actually, there is a need and a notion is matured for having a database on plant genetic resources and an on-line system including there all organizations that maintain and use plant genetic resources, which can be centralized by the Directorate of Extension Service, Science and Agricultural Information at the Ministry of Agriculture Food and Consumer Protection. For fulfilling this objective, which is necessary and fully feasible, the following things are needed:

- Equipment and computers for five Agricultural Technology Transfer Centers and for the Directorate of Extension Service, Science and Agricultural Information;
- Developing a complete and appropriate database for all the range of plant genetic resources that are held by relevant organizations in Albania;
- Short-term training for respective staff using this database and exchange of information between different actors;
- Financial support for carrying out such objectives.

## 5.4 Public awareness

Coming from a system of commanded economy, where the state cared for everything, not only most of indigenous genetic resources became extinct, created and maintained by series of farmer generations, but the greatest loss was sterilization of real estimation on their roles and using values. By revealing this thought we can say with high conviction that even that few diversity preserved with fanaticism by farmers, primarily for vegetable plants and fruit trees, are not estimated properly and to the required extent against the pressure exerted by imported cultivars and hybrids.

On the other hand, recent years, for immediate economic needs, collecting possibilities of medical plants for export are extremely maximized. Without denying unquestionable value of this activity, not only for the community but also

for the state, our concern is related to the ways they are collected because they are damaged, destroyed, rooted up, etc. losing thus plant ability for natural regeneration.

As to the above, speaking frankly, there is no information or information system at all in Albania. Perhaps, time has come to establish special structures for public information, something that is fully justified taking into account the values of genetic resources today and much more for the future. We are of the opinion that numerous and varied activities of public information could be conducted on many directions including:

- About special values of indigenous populations (primitive cultivars/landraces) in cultivated plants:
  - Adaptation to the environment in areas where they are cultivated, avoiding negative effects of abiotic stresses and assuring sustainable production;
  - Modest demands for inputs;
  - Special sustainability against main plant diseases;
  - Special production standards, especially their good taste required strongly by consumers.
- About the values of indigenous plants, especially of aromatic and/or medicinal plants:
  - Biological features of these plants, pointing out their reproduction ways;
  - Their role in protecting soil against erosion;
  - Their role in creating microclimates, characteristic for a certain area;
  - About the values of their utilization in popular medicine and the ways for using them;
  - Community interference for increasing and enriching their vegetation through collection and distribution of seeds directly in the field, primarily in those locations where a said plant is hardly damaged.

Implementation of these public information objectives would require:

- Organizing meetings and discussions in certain communities related to plant genetic resources;
- Producing and distributing leaflets, why not more complete publications for public information and awareness on the values, roles and importance of native genetic resources;
- Establishing a working group, furnished with required equipment, for organizing and carrying out such activities, involving also specialists and experts from relevant fields;
- Financial support for the implementation of these activities.

# THE STATE OF REGIONAL AND INTERNATIONAL COLLABORATION



## 6.1 International programmes

International cooperation of Albania, over the last 10 years, has been also limited, not so much because of recognized reasons of the period before '90, than for the transition period that our country is encountering while issues related to genetic resources are indirectly hidden. In addition, some international institutional relations are interrupted during the last ten years. For instance, our former Agricultural Research Institute (today is the Center for Agriculture Technology Transfer) in Lushnja is not exchanging genetic materials any more with the CIMMYT and later nor with Aleppo-Siria, which, telling the truth, have helped very much with the program of wheat genetic improvement breeding cultivars with higher productivity and suitable for climate and earthy conditions of Albania and for the objectives of that period.

Also other Albanian institutions have had mutual relations with their counterparts abroad. For instance, the Agricultural Technology Transfer Center (former the Research Institute of Olives and Fruit trees) in Vlora cooperated with the University of Bari, Italy, only one year for the study of germ plasma of some fruit tree species, within the framework of the Interreg II Project.

This is also a consequence of contraction of plant breeding programs, reduction of the required staff and limited financial means.

However, the foreign cooperation that has been developed has been rather a mutual institutional relation than in the level of International Programs, where Albania has not been involved, neither as a counterpart nor as a beneficiary. Even today, nearly two decades after the change of the social-economic system, Albania is not included yet in international programs of plant genetic resources.

However, last years, 2004-2006, Albania is involved in a ten-years regional project for the South East European Development Network (SEEDNet) for Plant Genetic Resources.

In the framework of the participation in this programme, the Ministry of Agriculture, Food and Consumer Protection, based on the programme sent by the donors, established a working team comprising specialists and experts from relevant areas of agricultural research institutes and the State Agency for Seed and Sapling was appointed as the national coordinator of this programme, where the National Gene Bank of Albania is under its umbrella. When the National Gene Bank of Albania passed under the jurisdiction of the Agricultural University in Tirana, i.e. under the Ministry of Education and Science (in the framework of restructuring agricultural research work in Albania), the status of the said project has been changed. The Agricultural University has made unjustified alternations of the working groups for SEEDNet Project, moving away almost all specialists and experts of agricultural research institutes, who have long year's experiences in the area of plant genetic resources, and replaced them with young specialists, who have not the required work experiences, but just to be from the Agricultural University. Without any malevolent prejudices, based on the work made so far, we are skeptic for the progress of this project so ambitious for Albania.

Under the SEEDNet Project, real possibilities will be created for making advanced steps in the development of the issues related to plant genetic resources, which will allow the realization of the needs, objectives and priorities that our country has in this field. Benefits of our country from this project would be great because its goal is encouraging and supporting very strongly the development of activities on plant genetic resources, including these activities in a certain work strategy, for establishing regional networks, institutionalization of national programs, inventory of genetic resources in country level, development of documentation and information system, raising the awareness and involving private actors, training the staff of gene banks, etc.

This would be achieved owing to the experience and support of donors for carrying out such activities where we need international assistance. Among these objectives we may include:

- Developing and strengthening a National Programme on Plant Genetic Resources;
- Developing appropriate and modern systems for documentation and communication;
- Exchanging experiences and technologies within the region;
- Strengthening cooperation within regions and inter-regional one;
- Strengthening public information;
- Exchanging genetic materials and information in the region;
- Sharing responsibilities for conservation of valuable genetic materials within partners in the region;
- Evaluation and utilization of conserved materials;
- Cooperation in research activities;
- Cooperation in trainings and establishing possible capacities.

It is of interest the benefits from the development of those activities that are directly connected with genetic resources, such as:

- Drafting the policies for the development of plant genetic resources;
- Inventory, collection and exchange of plant genetic resources;
- Characterization and evaluation of plant genetic resources;
- Documentation of information on plant genetic resources, and of traditional knowledge related to plant use;
- Improvement of infrastructure and equipment supply for plant genetic resources;
- Conservations *ex situ*, *in situ*, *in vitro*, on-farm, of plant genetic resources;
- Training, qualification and raising of public awareness on plant genetic resources;
- Cooperation between public and private sectors related to activities on plant genetic resources;
- Establishment and management of the national programme on plant genetic resources.

Taking into account all these objectives and activities aimed to be carried out under the SEEDNet Project, and also the fact that agricultural research organizations possess (*ex situ* collections in their institutional gene banks), study and use plant genetic resources, we believe that such cooperation would be more credible and consequently more fruitful.



# ACCESS TO PLANT GENETIC RESOURCES, SHARING OF BENEFITS ARISING OUT OF THEIR USE, AND FARMERS' RIGHTS



## 7.1 Access to plant genetic resources

In 2005, Albania became a member of UPOV and was accessed to the OECD seed schemes of cereals and maize, with two years consolidation period.

Documentations of these memberships stipulate the rights for using plant genetic resources and also sharing of benefits arising out of this use.

For Albanian accession to these organizations a series of activities have been performed that have aimed modification of legislation in order to comply with the requirements of EU. For fulfillment of these activities a great deal is made during the years 2002-2005 period, involving international expertise under the support of the World Bank through the Agricultural Services Project, primarily in the legislation area. In this framework, all legislation on seed was revised and amended and finally approved by the Parliament. Also the Law on Breeders' Rights (Protection of new plant varieties) was drafted and approved.

Currently, benefits deriving from these memberships cannot be reported because we are still in the first steps where these memberships have not provided yet direct and prompt contributions. Actually, we are attending annual events and activities of these organizations aiming to become more familiar with procedures and practices that our side should fulfill.

## 7.2 Fair and equitable sharing of the benefits of the use of plant genetic resources

The use of plant genetic resources in our country has never been treated in view of legislation. Consequently, there has been no evidence regarding benefits accruing from the use of genetic resources, nor anything about the share of such benefits. The lack of required legislation has led to the free use of genetic resources.

Even the farmers that have provided their genetic resources, used for different purposes also by agricultural research institutes, have not benefited anything from the use of these resources. So the use of genetic resources is not considered yet a property right of considerable value.

Also agricultural research institutes have not benefited from the use of their genetic resources. Even though the government has financed them, provision of benefits arising out of the use of cultivars bred by them is an unquestionable right, and, with such benefits these research organizations would have made further progress and would be relatively independent economically. Today, this is more justifiable because private farmers use genetic resources.

Surely, execution of this right, the right of benefiting from the use of plant genetic resources, should be regulated and governed by relevant legislation.

Regarding these activities, Albania has not had any actual progress in international level.

# THE CONTRIBUTION OF PGRFA MANAGEMENT TO FOOD SECURITY AND SUSTAINABLE DEVELOPMENT

## 8.1 Contribution to agricultural sustainability

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Even though Albania has encountered great social and economical changes over these years, its agriculture, owing to farmers' rich experiences, has made also progress leading to a sustainable agriculture, although institutional support has not been in required levels. There also have been changes in the structure of agricultural production. However, one thing is true that plant genetic resources and their use have contributed to agricultural sustainable development.

Although there is no institutional evaluation for such contributions, these conclusions are based on that that, despite actual conditions our country is encountering and undergoing, cultivars used by farmers have had continuity and sustainability in their production. This is more evident for landraces and cultivars bred in the country.

## 8.2 Contribution to food security

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Following economical and social changes after '90, Albanian agriculture encountered an obvious decline because of farmers' disorientation due to new relations established after these changes, and also unfair competition of imported agricultural products.

Importation of agricultural products confused also the market of agricultural products and decreased the values of their quality and taste.

Presently, domestic agricultural production has got its own important position. It already provides safe food products because it is mostly based on-farmers' cultivars, which have modest enquiries for inputs and limited use of pesticides against plant diseases and pests. This is a special contribution arising from the use of native plant genetic resources, something that is estimated and demanded increasingly by consumers.

On the other side, there are some plant genetic resources in Albania that do not need chemical inputs. For instance, beans are cultivated without using any fertilizer and pesticides at all; also many fruit trees and grapevines in hilly and mountainous areas are not treated with pesticides. These plants are typical biological.

## 8.3 Contribution to economic development

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Although there are not institutional assessments, the use of plant genetic resources has influenced economic development. This is demonstrated by the fact that the amounts of land areas for agricultural production are continuing to increase.

Another indicator is also the increase of exports of agricultural products, especially products of vegetable and gourd families and exportation of aromatic and/or medical plants.

# THE MAIN NEEDS AND PRIORITIES



Albania still needs to improve management level of *ex situ* collections of plant genetic resources. It also has other needs of policy, research and management character. Among these factors we would mention:

- Drafting the National Program of Plant Genetic Resources.
- Establishing an organizational and supervising authority dealing with the issues of plant genetic resources;
- Drawing up or modifying appropriate legislation on evaluation, collection, characterization, preservation, use and distribution of genetic resources in *ex situ* collections of plant genetic resources.
- Evaluating the actual situation in the field of plant genetic resources.
- Programming and collecting, characterizing and evaluating native populations, which are missing in *ex situ* collections of plant genetic resources.
- Recollecting populations of agricultural crops with the aim to update germplasm because of its alteration due to great number of regenerations out of their growth place.
- Establishing in typical areas of the country gardens for *in situ* preservation of endangered species, especially for indigenous species of economic importance for the country but are endangered to become extinct.
- Working out procedures and required documentations for distribution of germplasm to users.
- Providing computers to five Centers for Agriculture Technology Transfer and for the Directorate of Extension Service, Science and Agricultural Information.
- Developing a complete and appropriate database for all the range of plant genetic resources possessed by relevant institutions in Albania.
- Training of specialists on evaluation of genetic diversity, of erosion and vulnerability of plant genetic resources.
- Short-term training courses with the relevant staff for using database and share of information between actors.
- Organizing effective ways of public information and community awareness for the importance and values of plant genetic resources, for today and for the future.

