The ECPGR concept for *in situ* (on-farm) conservation in Europe

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Index

Premise

The concept was developed as follows: the 'On-farm management and conservation of landrace' Task Force was established and initially agreed on the issues to be developed, then issues and recommendations were developed, elaborated and shared among the group.

The draft concept was then circulated to the Documentation and Information Network (WG) and voluntary experts for feedback.

As a consequence, this Concept for On-farm Conservation is to be considered the collective work of, not only the Authors, but of all the people who volunteered to contribute. Thanks are due to all of them.

We would like to note that the proposed concept was developed so that it might be applied within EU and non-EU member states alike and taking into account all the elements of the Terms of Reference (Annex 1).

We would also like to note that across the document specific references to the main documents of international relevance for *in situ* (on-farm) conservation and useful examples are included.

It is widely acknowledged that actions towards an effective and efficient *in situ* (on-farm) conservation are not systematically established in Europe, yet landrace diversity is known to be being depleted and on-farm implementation should be urgently taken following the concept provided. The Authors hope this concept will serve the purpose.

1. Recommendations of the Task Force

The Task Force, recognizes:

1) The compilation of both individual country and European on-farm activity and landrace inventories,

2) The compilation of individual country inventories and of a European inventory of agro-biodiversity hot spots (Most Appropriate Areas for Conservation), and

3) The building of individual National and European networks of unique landrace materials and on-farm sites for coordinated and integrated *in situ* (on-farm) conservation,

as actions of primary importance for *in situ* (on-farm) conservation in Europe and, on this basis,

it recommends that:

- *ECPGR should enhance its networking function and facilitate a better co-operation between the On-Farm WG and the others WG, so that a comprehensive and integrated European* in situ *(on-farm) and* ex situ *conservation system can be achieved.*
- *ECPGR should facilitate the cooperation between the formal PGRFA sector, farmer organization and breeding networks.*
- *ECPGR should take the lead role in lobbying the European Commission/Agencies/Joint Research Centers, International centers, Governments and Foundations for funding cooperative work addressed to* in situ *(on-farm) conservation and positive encourage On-farm WG members to apply for funding for collaborative projects.*
- *ECPGR members should lobby at National level so that National agro-environmental measures are linked to* in situ *(on-farm) conservation actions.*
- *ECPGR members should actively lobby at National level to obtain funds for the compilation of a National inventory of landrace diversity,* in situ *(on-farm) maintained materials and of the* Most Appropriate Areas for conservation*.*
- *ECPGR On-farm WG members should research and create a web-enabled evidence base for on-farm management practice and investigate the various means of sustaining on-farm maintenance.*
- *ECPGR On-farm WG members should promote the direct use of variable materials by farmers or growers in agriculture and by breeders in varietal improvement programs.*
- *ECPGR On-farm WG membership should include stronger representation of the informal sector (i.e. farmer organisations) to complement its existing formal sector constituency as this is likely to facilitate on-farm implementation.*

2. A Concept for *In Situ* (On-farm) Conservation in Europe

2.1. On-farm conservation definition

In the most relevant documents that bind signatory countries to a proper conservation of Plant Genetic Resources (PGR), the following definitions for *in situ* conservation can be found, i.e.:

- The Convention on Biological Diversity (CBD 1992, Definition Article 2: Use of Terms) and the International Treaty on Plant Genetic Resources for Food and Agriculture (ITPGRFA 2001, Article 2: Use of Terms):
  "In-situ conservation *means the conservation of ecosystems and natural habitats and the maintenance and recovery of viable populations of species in their natural surroundings and, in the case of domesticated or cultivated species, in the surroundings where they have developed their distinctive properties"*.

We can eventually note that, similarly,

- The Commission Directives 2008/62/EC 20 June 2008 and 2009/145/EC 26 November 2009 state: "*conservation* in situ *means the conservation of genetic material in its natural surroundings and, in the case of cultivated plant species, in the farmed environment where they have developed their distinctive properties"*.

No specific mention to the term 'on-farm' conservation is given in these documents, although it should be acknowledged that, with specific reference to cultivated taxa, the term 'on-farm conservation' came into use.

Considering the principal need to refer to the above mentioned documents, by virtue of their binding nature, the Task Force decided to

- maintain the exact meaning of '*in situ conservation*' that is given by the CBD and the ITPGRFA and consequently define "on-farm conservation" as the ''*conservation of ecosystems and natural habitats and the maintenance and recovery of viable populations of domesticated or cultivated species in the surroundings where they have developed their distinctive properties*''
- refer about *in situ* (on-farm) conservation in this document. The term '*in situ* (on-farm)' will be used for conservation activities that are carried out on-farm, but also in home and community gardens. Likewise the term 'farmer/s' is meant to include 'gardener/s' and 'maintainer/s'.

The primary characteristic of *in situ* (on-farm) conservation is its dynamic nature in contrast with *ex situ* conservation which is primarily static. In addition, *ex situ* conservation is generally focused on a single genetic resource, while a complex of populations can be preserved and evolutionary processes can continue through *in situ* (on-farm) conservation. *In situ* (on-farm) populations continue to evolve in response to biotic and abiotic pressures and to adapt to their environment. They are, therefore, an always updated source of adaptive alleles for crop improvement, particularly of crops that are growing in adverse environmental conditions resulting from climate change (see for example Negri and Tiranti, 2010; Nevo *et al*., 2012; and references therein).

2.2. Aims of *in situ* (on-farm) conservation

- to maintain and develop landrace (LR) diversity for local communities and breeding (including participatory plant breeding), as a pre-requisite to ensure food security, productivity as well as resilience to biotic and abiotic stresses in a scenario of climate change and unpredictability,
- to maintain viable agro-ecosystems and useful agro-ecosystem services,
- to develop new (e.g. environmentally friendly) farming systems that are based on 'diverse' varieties in such answering the changing needs of farmers (like organic farmers) and the consumer demand for a sustainable production systems,
- to develop farming systems that rely on landraces to produce high value typical products,
- to maintain different traditions and uses of a crop while extending crop and varietal uses,
- to increase farmer capacities that are related to selection for improving yield, adaptation and quality and to conservation methods.

2.3. *In situ* (on-farm) conservation focus

In the context of the definition given above, and taking into account available bibliography on the matter (Maxted *et al.* 2002; Negri 2003, 2005), there are two possible focuses for *in situ* (on-farm) conservation:

- on a certain cultivated Plant Genetic Resource (PGR) population/clone *per se* and
- on a certain agro-ecosystem where a/several population/s is/are cultivated, i.e. a holistic approach.

Both are presented below.

The first one is the most common approach. Never the less, the CBD and ITPGRFA, that we used to define on-farm conservation [and also the definitions given by European Union (EU) Directives on the commercialization of 'conservation variety' seeds], implicitly suggest a comprehensive approach that takes into consideration all the biotic and abiotic components of a certain agro-ecosystem, i.e. a holistic approach to conservation.

2.3.1. The approach aimed to conserve a certain Plant Genetic Resource (PGR) *per se*

If the focus is on a certain cultivated PGR *per se*, considering the above mentioned aims, only genetically diverse populations are suitable for *in situ* (on-farm) conservation.

To the purpose of developing an *in situ* (on-farm) concept that is suitable for different countries and taking into account that a) the Task Force must be respectful of the decisions already taken by some countries on the use of terms as well as of each country sovereignty over its own genetic resources (ToR, Annex 1), b) it is acknowledged (from contacts between ECPGR on-farm WG members and from personal knowledge of the Task Force members) that different materials are involved in *in situ* (on-farm) conservation activities that are carried out in Europe,

the Task Force considers that the genetically diverse populations suitable to *in situ* (on-farm) conservation are:

i) *sensu stricto* LR, including all the criteria listed by several definitions and Authors, *sensu stricto*, a LR should be defined as a 'variable population, which is identifiable and usually has a local name, (generally) lacks formal crop improvement, is characterized by a specific adaptation to the environmental conditions of the cultivation area (tolerant to the biotic and abiotic stresses of that area) and is closely associated with the uses, knowledge, habits, dialects and celebrations of the people who have developed and continue to grow it (Negri *et al*. 2009; Polegri and Negri 2010). They are often structured populations made up of several subpopulations. Also clonally propagated LR (e.g. vines, olive trees and other crops) often possess some within-cultivar genetic variability (clonal polymorphism) (Fornek *et al*. 2003; Cipriani *et al*. 2002; Halapija Kazija *et al*. 2013) and are often part of a genetically diverse germplasm (Gasi *et al*. 2010; Gasi *et al*. 2013a,b).

In short, they are extant LR, which have continuously maintained their link with the territory of adaptation (also see a discussion on the LR concept in Annex 2). S*ensu stricto* LR are often under threat of extinction and thus deserve the highest attention.

ii) Re-introduced LR, are *sensu stricto* LR that were once cultivated in a certain area and have been re-introduced in cultivation (from genebanks) in the same area of previous cultivation after a certain period of time.

iii) Introduced LR, are LR that originated in an area different from that where they are presently grown.

However, beside LR, there is a wide range of materials that are presently being used with the aim to enhance the diversity in the field, *in situ* (on-farm) conservation should then also take into account the following types of material:

iv) Broad Genetic Base Varieties (BGBV) are purposely developed by farmers/farmer organisations and by breeders, derived from different initial materials (LR by LR or cultivar crosses, wide crossings among cultivars, etc.) and obtained with different breeding practices (often by participatory plant breeding) that are continuously maintained on-farm.

v) Obsolete cultivars (OC) those that are composed of different genotypes and are maintained in the farms.

All of the above mentioned are important PGR. Hereafter, we will address to the above defined types of populations cultivated by farmers collectively referring to them as 'variable materials'.

2.3.2. The holistic approach

As noted above, the CBD and ITPGRFA definitions of *in situ* (on-farm) conservation imply that a certain genetic resource is maintained in its environment of adaptation, i.e. within the abiotic and biotic context where it evolved its distinctive characteristics. Then, this should be the true perspective to look at *in situ* (on-farm) conservation. However, the topic has been largely neglected up to now.

Beside the presence of intraspecific diversity (i.e. different varieties and variable materials of the same crop), the diversity of other living beings (i.e. interspecific diversity) and of the agro-ecosystems should be considered in a holistic approach.

The areas that are richest in the above mentioned components should be considered the Most Appropriate Areas (MAPAs) where to set or enhance *in situ* (on-farm) conservation activities. Among them, those areas where other important and threatened genetic resources (like Crop Wild Relatives, CWR) are present appear to deserve the highest conservation attention and priority.

It has to be noted that agriculture is a process that indeed belongs to nature, also when it takes advantage of resources that have been developed by mankind (as LR), since mankind is part of nature; there is no substantial reason why the dichotomy between natural world and mankind world (including agriculture) should be maintained. On the other hand, agriculture does take advantage of wild species that are components of agro-ecosystems (e.g. nitrogen fixing wild legumes or wild pollinators) and, in some cases, is based on wild species (e.g. natural grasslands).

Negri *et al*. (2012) considered as MAPAs the areas where different LR of different crops, different types of agro-ecosystems, high number of protected areas and of CWR species, have the highest concentration. By making specific reference to LR, the concept of MAPAs proposed by Negri *et al*. (2012) develops that of 'High Nature Value Farmland' (HNVF), initially proposed by Baldock *et al*. (1993) and Beaufoy *et al*. (1994), and defined at the EU level (SEC(2011) 540 Final) as ''*farmland/forested areas characterised by high biodiversity*''.

The introduction of this concept appears to be fully justified also taking into account the following relevant documents.

The 2nd Global Plan of Action (GPA, FAO 2012) recommends that "*agricultural biodiversity and biodiversity more generally are not addressed as separate entities*", underlines that ''*ecosystems contain important PGRFA, including rare, endemic and threatened CWR and wild food plants*'' and suggests to ''*include, as appropriate, among the purposes and priorities of National parks and protected areas, the conservation of PGRFA, in particular appropriate forage species, CWR and species gathered for food or feed in the wild, including in their biodiversity hotspots and genetic reserves*'' and to '' *consider integrating the conservation and management of PGRFA, particularly CWR and wild food plants, in land-use plans in their centres of origin, centres of diversity and biodiversity hotspots*''.

The EU 2020 Biodiversity Strategy (European Parliament Resolution, 2012) first target is: "*Halting the loss of biodiversity and the degradation of ecosystem services in the EU* by 2020, and *restoring them* in so far as feasible, while *stepping up the EU contribution to averting global biodiversity loss*"; the second is the 2050 vision: "By 2050, *EU biodiversity and the ecosystem services it provides – its natural capital – are protected, valued and appropriately restored for biodiversity's intrinsic value and for their essential contribution to human wellbeing and economic prosperity, and so that catastrophic changes caused by the loss of biodiversity are avoided*." It also "*calls for a strengthening of Pillar II* [of the Common Agricultural Policy, CAP] *and for drastic improvements in all Member States to the environmental focus of that pillar and to the effectiveness of its agri-environmental measures, including … support for High Nature Value and organic farming*…"

On the other hand, ''*Maintain and restore ecosystems and their services*'', ''*Increase the contribution of agriculture and forestry to maintaining and enhancing biodiversity*'', ''*Halting biodiversity loss*" were clear

targets (T2, T3, T6, respectively) in the 'Accompanying the document Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions. Our life insurance, our natural capital: an EU biodiversity strategy to 2020' (SEC(2011) 540 Final).

The European Parliament Resolution (2012) also indicates that the key to the EU 2020 Biodiversity Strategy is the reform of the *CAP* […] which is "*designed to support farming that ensures food safety"* (in a context of climate change) and includes, among its three priorities, the "*sustainable management of natural resources"*. It specifically mentions measures to help farming meet the challenges of soil and water quality, "*biodiversity* "and climate change. It also specifically mentions the need to "*favour crop diversification"*, … and "*conserving areas of ecological interest"*. For the Rural Development, the CAP foresees, among its six priorities, "r*estoring, preserving and enhancing ecosystems"* and the possibility for the Member States / regions to design thematic sub-programmes to pay especially detailed attention to [among others] the climate change mitigation / adaptation and "*biodiversity issues*."

However, Member states have not received inputs from the Commission on how to or where to address exactly measures or programs in favour of agro-biodiversity conservation.

Since MAPAs are agro-biodiversity hotspots, activities aimed at halting the loss of biodiversity and the degradation of ecosystem services as well as at restoring ecosystem services could well be funded by the CAP.

2.4. Distinctive but complementary roles for private citizens and Public Authorities in *in situ* (on-farm) conservation

Distinctive but complementary roles are foreseen for private citizens and Public Authorities (Fig. 1).

- It is the farmers, or the gardeners, or, in general, the private citizens, sometimes enrolled in organizations, who maintain variable materials across years: they are the main actors of on-farm conservation. The farmer specific roles in on-farm conservation are: propagation, sowing (transplanting), growing, donating/exchanging (or selling, if it can be the case) propagation materials to other farmers, within a certain farmed area.

- The countries that are signatories to both the CBD and the ITPGRFA have an obligation and responsibility for the conservation of their agro-biodiversity of potential or actual use. Furthermore, if the requirements of other relevant international, Regional and National policies and legislation are to be met, they need to be able to systematically conserve agro-biodiversity *ex situ* and *in situ* (on-farm), as well as promoting its sustainable use. Citizens cannot carry out *in situ* (on-farm) conservation entirely on their own. They need different types of support from the Public Authorities of a country: besides creating an appropriate policy environment for on-farm maintenance, assisting with the development of markets and protecting farmers' rights, promoting, organizing, coordinating, monitoring, giving technical, legal and administrative and economic support for *in situ* (on-farm) conservation, carrying out *ex situ* conservation for safety duplication, assisting and favouring the registration of materials suitable for on-farm conservation following the

rules set by the European seed legislation, where appropriate. None of these activities can be carried out without an adequate information basis.

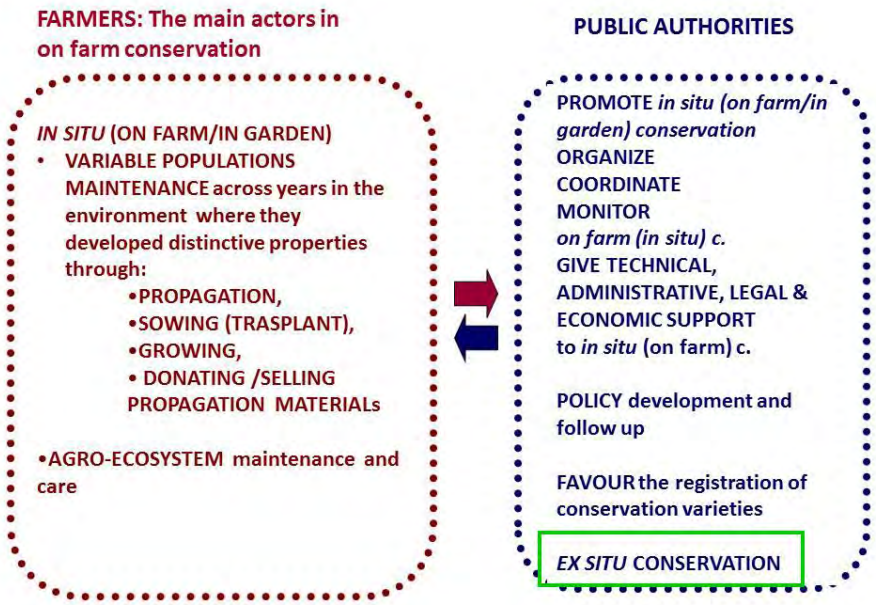

Figure 1. Respective roles of famers/gardeners/private citizens and Public Authorities in *in situ* (on-farm) conservation.

3. The ECPGR On-farm WG Action Plan for a Strategic Approach to *In Situ* (On-Farm) Conservation in Europe

3.1. Identification of the actions of primary importance

On the basis of the international framework set by the 2nd GPA (FAO 2011) and the ITPGRFA (FAO 2001) and of the information reported in Veteläinen *et al*. (2009a,b; 2012) and gathered within the ECPGR On-farm WG and the EC FPVII PGR Secure project (www.pgrsecure.org), the Task Force extensively lists in Annex 3 the issues to be considered towards a European strategic approach to conserving crop LR.

In summary, considering the practical implementation of *in situ* (on-farm) conservation, they concern conservation, utilisation, policies, legislation, public awareness and education, socio-economy and cooperation. The Task Force underlines that the promotion of use of variable materials in agriculture and in breeding is the mean to *in situ* (on-farm) conservation.

To support conservation actions, research is also needed to improve our knowledge on present level of *in situ* (on-farm) diversity, population dynamics in relationships to factors such as migration, drift and human and environmental selection pressures, impact of climate change on diversity, how variable populations should be managed to adapt, mitigate effects or be resilient to the climate change effects in the face of its

potential impact, agro-biodiversity rich areas, usefulness of variable materials in environmental friendly agronomic systems and in breeding, socio-economic factors driving *in situ* (on-farm) conservation.

All these issues are mentioned in the 2nd GPA (FAO 2011) which also underlines how the regional and international cooperation remains very important for the conservation and sustainable use of PGRFA and needs to be strengthened.

Considering the diverse agro-ecosystem, the different social-economic frameworks and the different perspectives of PGR use of each European country, there is no common focus or implementation way for *in situ* (on-farm) conservation activities.

For example, the focus generally is on introduction, re-introduction and development of BGBV in France and Germany, while it generally is on the maintenance of *sensu stricto* LR in Italy, Norway, Sweden and Finland. In addition, the focus also is on the maintenance (or recovery) of 'farmland/forested areas characterised by high biodiversity' in some countries (especially those including mountainous areas).

It has also to be noted that a different level of experience exists in Europe. Some countries have developed specific *in situ* (on-farm) conservation activities since long time. In Italy, for example, Regional laws that protect *sensu stricto* LR have existed since 1997 (Porfiri *et al*. 2009; Negri 2012). This country was also the first in Europe that developed, as part of its 'National Plan for Agricultural Biodiversity', specific 'Guidelines for the Conservation of Plant Genetic Resources for Food and Agriculture' (http://www.politicheagricole.it/flex/cm/pages/ServeBLOB.php/L/IT/IDPagina/305, in Italian). A Summary of these Guidelines was submitted by the Italian Government to the ITPGRFA for the implementation of Article 6 (http://www.planttreaty.org/sites/default/files/Submission_Italy.pdf).

In spite of the differences that exist among European countries, common needs and elements for a strategic and cooperative approach to *in situ* (on-farm) conservation do exist and are identified as follows:

- to gather information on variable materials maintained *in situ* (on-farm),
- to enhance cultivation of variable materials, both for local and wider markets and family use,
- to enhance their use in breeding and participatory plant breeding,
- to identify and describe different models of (environmentally and economically) sustainable production systems based on variable crop populations in multiple countries across Europe (i.e. to build up a European on-farm evidence base),
- to carry out studies on *in situ* (on-farm) diversity level and evolution,
- to establish a coordinated European network of conservation and demonstration field/gardens of *in situ* (on-farm) maintained materials,
- to promote a sound policy environment in favour of agro-biodiversity conservation at European (and National) level,
- to back-up *in situ* (on-farm) conservation with *ex situ* conservation,
- to make available *ex situ* stored material (and related information) available for re/introduction or for the development of BGBV.

A key constrains to an integrated and cooperative European approach to *in situ* (on-farm) conservation remains lack of information on

- the variable materials that are presently cultivated (see also sections 3.2 and 3.5) and/or can be usefully introduced, re-introduced or used to develop BGBV and

- on the areas of highest interest for the conservation of useful agro-biodiversity.

Following the reasoning reported above, among the several key issues towards an *in situ* (on-farm) conservation, the Task Force considers the following as actions of primary importance:

1) The compilation of individual country inventories and of a European inventory of variable materials (i.e. extant, re-introduced and introduced LR, BGBV and OC) that are maintained on-farm, and, in a second time,

2) The compilation of individual country inventories and of a European inventory of hot spots for agro-biodiversity conservation (MAPAs) inventory. Finally, over the long run

3) The building of a European network of unique materials and sites for a coordinated and integrated in situ *(on-farm) conservation.*

The compilation of inventories will be a contribution to the implementation of ITPGRFA (Article 5c) of which many European countries and the EU are contracting parties. ITPGRFA Article 5c reads as follows: "*Each contracting party should promote or support and appropriate farmers and local communities with efforts to manage and conserve on farm and their plant genetic resources for food and agriculture*''.

The 2nd GPA (FAO 2011) policy and strategy for In Situ Conservation and Management also stresses that ''*The surveying and inventorying of PGRFA should be considered as the first step in the process of conservation and reducing the rate of biodiversity loss*''. The same document (chapter 3, Promoting *in situ* conservation and management of crop wild relatives and wild food plants) also recommends to ''*consider integrating the conservation and management of PGRFA, particularly CWR and wild food plants, in land-use plans in their centres of origin, centres of diversity and biodiversity hotspots*'' (like MAPAs are).

These actions then appear to be fully pertinent to the context of international policies and strategies for a sustainable use of PGRFA.

3.2. The compilation of country and European inventories of variable materials that are maintained *in situ* (on-farm)

Considering the approach to *in situ* (on-farm) conservation that takes into account single PGR (i.e. single LR, BGBV and/or OC), both a 'bottom up additive' and a 'top down strategy' should be used that are described below.

A bottom up additive strategy

Considering the sovereignty of each country over its own genetic resources, a European inventory should be based on National inventories and each Nation's decision to contribute data which are needed to compile the European inventory with a bottom up strategy. Procedures and actors of this strategy are graphically presented in Figure 2 and can be summarized in the following steps:

a) Creation of official National inventories of (extant, re-introduced and introduced) LR, BGBV and OC.
b) Merging of each National inventory into a unique European inventory after a National filtering process that sees each country to decide on which of the above mentioned variable materials is to be considered worthwhile to be included.

c) Construction of a solid, efficient data base that contains the European *in situ* (on-farm) inventory information.

Following the example of EURISCO, the role of ECPGR On-farm WG members (Fig.2, in italics) would initially be to stimulate each country's Government to construct its National inventory of on-farm maintained PGR. Gathering data for inventories can rely on information provided by farmer/farmer networks, ECPGR WG members and other stakeholders. The inventories construction can take advantage of the information recording tools already purposely developed (for LR: the 'Descriptors for web-enabled National *in situ* landrace inventories' and the 'MS database for *in situ* LR data recording', both available from www.pgrsecure.org LR help desk, see also Annex 4), while Descriptors for BGBV have to be developed still.

Once these National Inventories have been built up, and after a filtering process carried out by the National Inventory Focal Points in agreement with the National Coordinators, their data can be merged into a unique European inventory.

European data should be stored into a database that is linked to other formal (EURISCO, Central Crop Databases, genebank databases, PGR Diversity Gateway, under development in the PGR Secure project) and to farmer/farmer organisation network databases (Figure 2, green diamond).

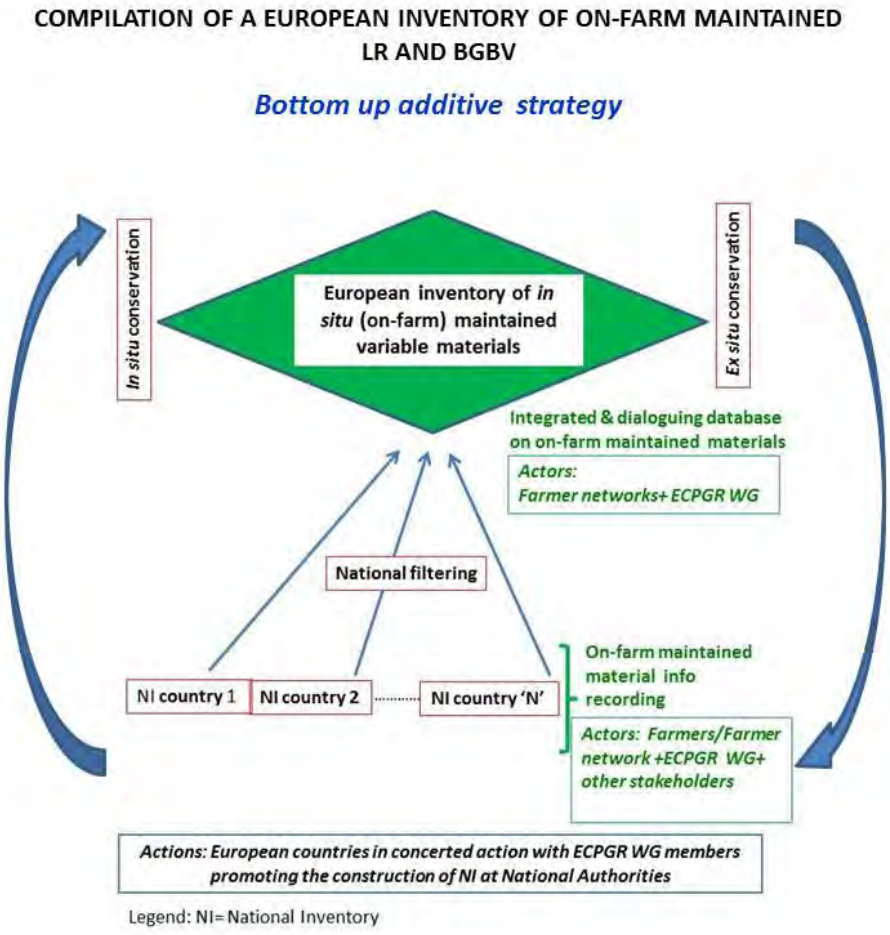

Figure 2. The compilation of a European inventory of on-farm maintained variable materials through an approach aimed to conserve a certain PGR population *per se*: bottom up strategy actions needed. Actors are mentioned in italics. What is related to information gathering and management is reported in green. Arrows show periodic reworking.

Inventories of the type, that include the information mentioned in the 'Descriptors', have already been/are being developed in some countries (i.e. Italy and Finland).

In Italy they are compiled in the frame of Regional Laws and other initiatives that protect agro-biodiversity (also including animal and microbial diversity, see the exemplar Law of Lazio Region in Annex 5) and are retrievable from dedicated Regional web sites. Recently, The First inventory of *In Situ* Maintained Landraces of Italy (Negri *et al*. 2013) was also compiled based on these Regional works.

It is useful to note that these inventories are already used in Italian Regions to fund (through the European Agricultural Fund for Rural Development, EAFRD) activities aimed to protect, monitor and enhance utility of GRFA *in-situ* (on-farm) (Fig. 3) and specifically to:

- give technical and economic support to *in-situ* (on-farm) conservation of protected GRFA within the distribution area where they have been selected;
- where possible, favour the re-introduction or extension of culture of protected GRFA within the distribution area where they have been selected;
- constitute, on voluntary basis, 'guardian' farmer (or breeder, for animals) Networks,
- assign to 'guardian' farmers, under the strict control of the Region, the multiplication of GRFA that they themselves have conserved up to present day;
- control the exchange of the propagation material produced and make it available both to the farmers that apply for its cultivation (or for livestock rearing), and for scientific purposes such as genetic selection and improvement;
- apply cultivation (or livestock rearing) models, studied on the basis of those adopted by tradition, that should exalt the quality and productivity of the protected GRFA;
- coordinate the subjects included in the Network in order to promote the economic and cultural enhancement of the GRFA that are protected by law, through the establishment of protection associations, protected trademarks, consortia and their involvement in fairs.

Genebanks and living collections are also established in some Regions. For plants, the implementation steps of these laws are summarized in Figure 3 below (details can be found in Annex 5).

It is on the basis of these regional experiences that Italy recently adopted the above mentioned 'Guidelines for Conservation of Plant Genetic Resources for Food and Agriculture'.

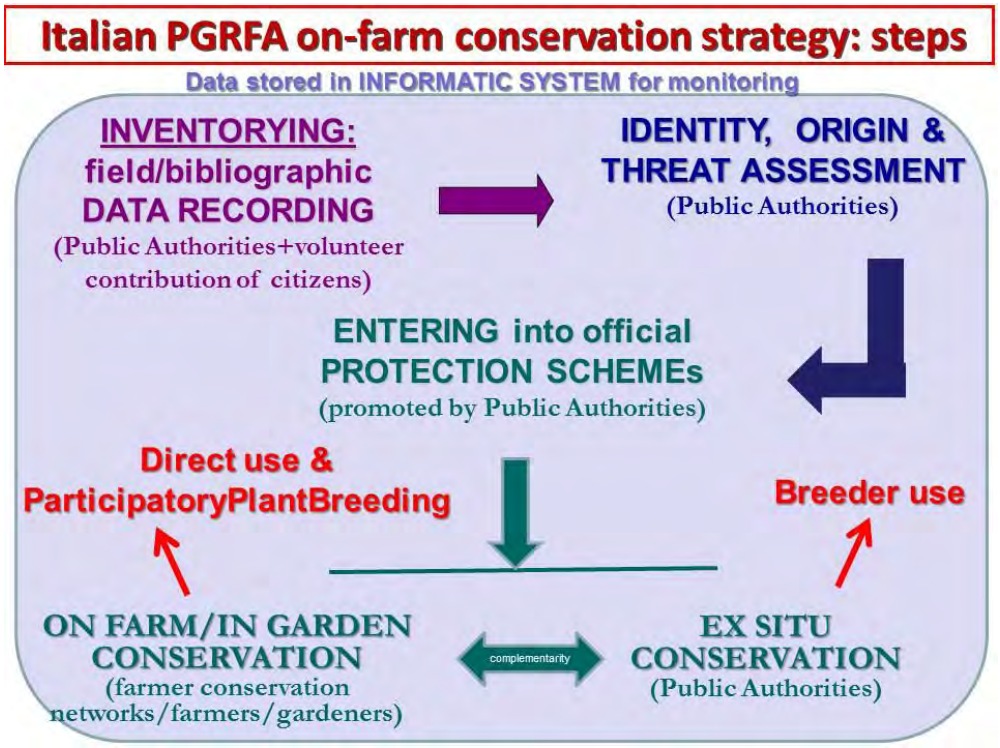

Figure 3. Implementation steps of the Italian Regional laws for PGRFA *in situ* (on-farm) conservation.

A top down strategy

However, considering the facts that i) to compile National inventories cannot be immediately feasible for some European countries, ii) different areas of Europe have different level of on-farm maintained diversity (i.e. different numbers of variable materials in the fields) the possibility to take an overview from an European perspective should also be taken into account with a 'top down' approach (Figure 4).

This would also require an initial informative dataset on diversity maintained i*n situ* (on-farm). This can be developed by retrieving available bibliographic information and database data by the ECPGR WG members and other stakeholders or querying EURISCO, GENESYS or other international databases holding information on variable material and subsequently by checking actual existence in the field.

From the initial informative dataset, variable materials maintained *in situ* (on-farm) that are of priority importance for Europe and worldwide will be subsequently identified. Criteria to identify materials of priority importance for Europe and worldwide need to be discussed and agreed first.

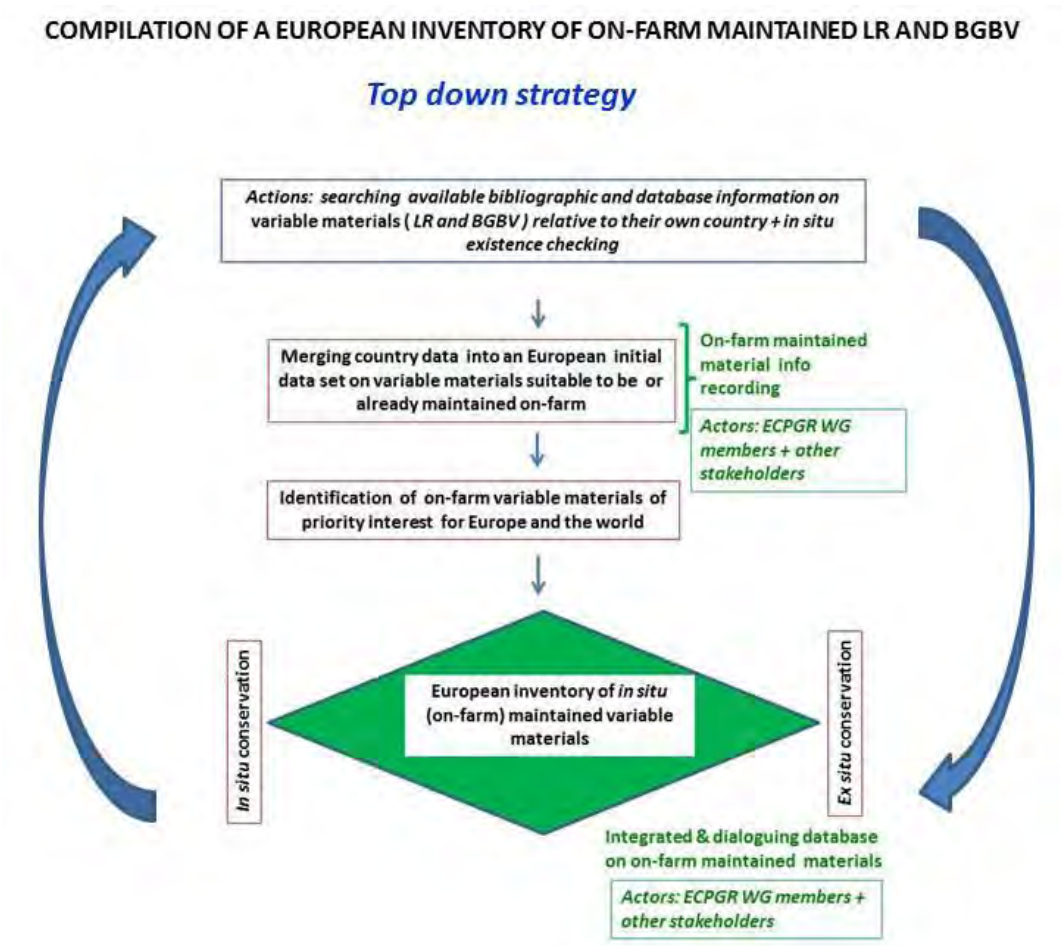

Figure 4. The compilation of a European inventory of variable materials that are maintained on-farm through an approach aimed to conserve a certain PGR population *per se*: top down strategy actions needed. Actors are mentioned in italics. What is related to information gathering and management is reported in green. Arrows show periodic reworking.

Though, of course, even if important varied material is identified in a country, its inclusion in the European inventory would ultimately be the decision of the appropriate National agency, incentives could be provided by the European coordinating agency to persuade National authorities to become actively involved.

It must be finally noted that both the bottom up and the top down strategies would require a periodic reworking because *in situ* (on-farm) inventories deal with very dynamic situations (growers come and go, new variable population arise meanwhile, so that situations can change rapidly) and research is continuously piling on new data on LR, BGBV and OC diversity maintained in the field and its utility.

The European inventory will be the needed informative basis for promoting *ex situ* and *in situ* (on-farm) conservation actions. No action plan for *in situ* maintained materials can be developed to answer the 2nd GPA (FAO 2011), the ITPGRFA (FAO 2001) and the EU 2020 Biodiversity Strategy (the European Parliament Resolution, 2012) if there is not any informative base. The same considerations hold true for the development of plans for *in situ* (on-farm)conservation and their implementation at Nation level. As mentioned above, these plans should rely on different elements (depending on the country and country area), but the information collected will assure the possibility of:

- collecting materials not already present in *ex situ* collections. On the matter it is worthwhile to note that a recent gap analysis made comparing EURISCO data with data included in the above mentioned First Inventory of *In Situ* Maintained Landraces of Italy (Negri *et al*. 2013) showed that most of them (97.4%) have no matching record in EURISCO and are possibly not conserved in the main genebanks (Negri pers. comm.),
- promoting the use variable materials in agriculture in such also achieving their *in situ* (on-farm) conservation. This can be done by enhancing economic and cultural motivations to maintain them, for example:
    - enhancing the value of variable material products by the use of mark labeling (i.e. Protected Designation of Origin, Geographic Designation of Origin, Traditional Specialty, certified product from Organic Agriculture, etc.). Many products from variable materials, especially *sensu stricto* LR, already take advantage of this possibility,
    - developing of local food supply systems based on variable materials, in the EU this is presently facilitated by the adoption of the new CAP. There are several examples in Europe based on variable materials like campaigns that promote the commercialization of food from 'nearby' farms in local markets, grouping consumers for obtaining reductions to the prices, offering agri-touristic services, serving local food in restaurants,
    - enhancing the use of variable materials in environmentally and economically sustainable farming systems, which presently answer the needs of farmers (like organic farmers) and the consumer demand for a sustainable production systems,
    - developing food chains based on variable materials,
    - enhancing the use of variable materials in community and home gardens,
    - enhancing the cultural anchorage of a certain community to the variable material it developed,
- promoting the use of variable materials in breeding and participatory breeding by exploiting their genetic diversity,
- promoting research on variable materials for
    - within- and among- genetic diversity level, for traits conferring
        - resistance/tolerance to biotic stresses
        - resistance/tolerance to abiotic stresses
        - quality,
    - *in situ* (on-farm) genetic diversity evolution under changed climatic conditions,
    - level of genetic diversity that can be maintained under
        - different agro-ecosystems,
        - different management systems (e.g. environmental friendly agronomic systems vs 'conventional' agronomic systems),
    - socio-economic factors that drive conservation, in such answering unsolved research questions, (see Annex 3 of this document for details),
- developing the research needed to identify agro-biodiversity hot spots (MAPAs) and compile their European inventory, (see below).

The development of European inventory also

- allows to assess overall progress implementation and related follow-up processes of the 2nd GPA (FAO 2011) following the criteria and indicators set by Commission on Genetic Resources for Food and Agriculture in draft formats (CGRFA-14/13/Inf.9 Rev.1) (i.e. most of indicators and question

mentioned in there are included in the 'Descriptors for web-enabled national *in situ* landrace inventories'),

- facilitates the cooperation among ECPGR WG and support their activities within ECPGR,
- facilitates the cooperation among the formal sector and the networks of farmers and farmer organizations.

Finally, it will be a useful example to develop

- *in situ* conservation actions at the global level.

3.3. The compilation of country and European MAPA inventories

Considering the holistic approach that was described above, the identification of MAPAs would promote planning and implementing *in situ* conservation activities at National, European and global level. In fact, MAPAs could be proposed to National Authorities as the sites where to set or enhance *in situ* (on-farm) conservation activities with priority because of their high value for agro-biodiversity conservation.

On the basis of National inventories of on-farm maintained variable materials and the information contained in them, hot spots of diversity (MAPAs) could be identified following a bottom up or a top down strategy similar to that described above for variable material inventorying.

From National inventories of MAPAs, a European MAPA inventory could then be developed that would serve as a basis of an integrated system of high value areas for agro-biodiversity conservation in Europe (Figure 5). In particular, MAPAs could be usefully integrated into the Natura 2000 site network which currently only addresses wildlife protection. In addition, at the global level MAPAs might usefully be integrated into the FAO GIAHS – 'Globally Important Agricultural Heritage Systems' (www.fao.org/giahs/giahs-home/en/) which promotes the dynamic conservation and adaptive management of unique traditional agricultural heritage systems around the world.

This fits what is recommended by the 2nd GPA (FAO 2011) and the present EU policy requirements and foreseen achievements in terms of conservation of biodiversity and agricultural policies (The European Parliament Resolution 2012; SEC(2011) 540 Final) that were mentioned above (see pagg. 8-9).

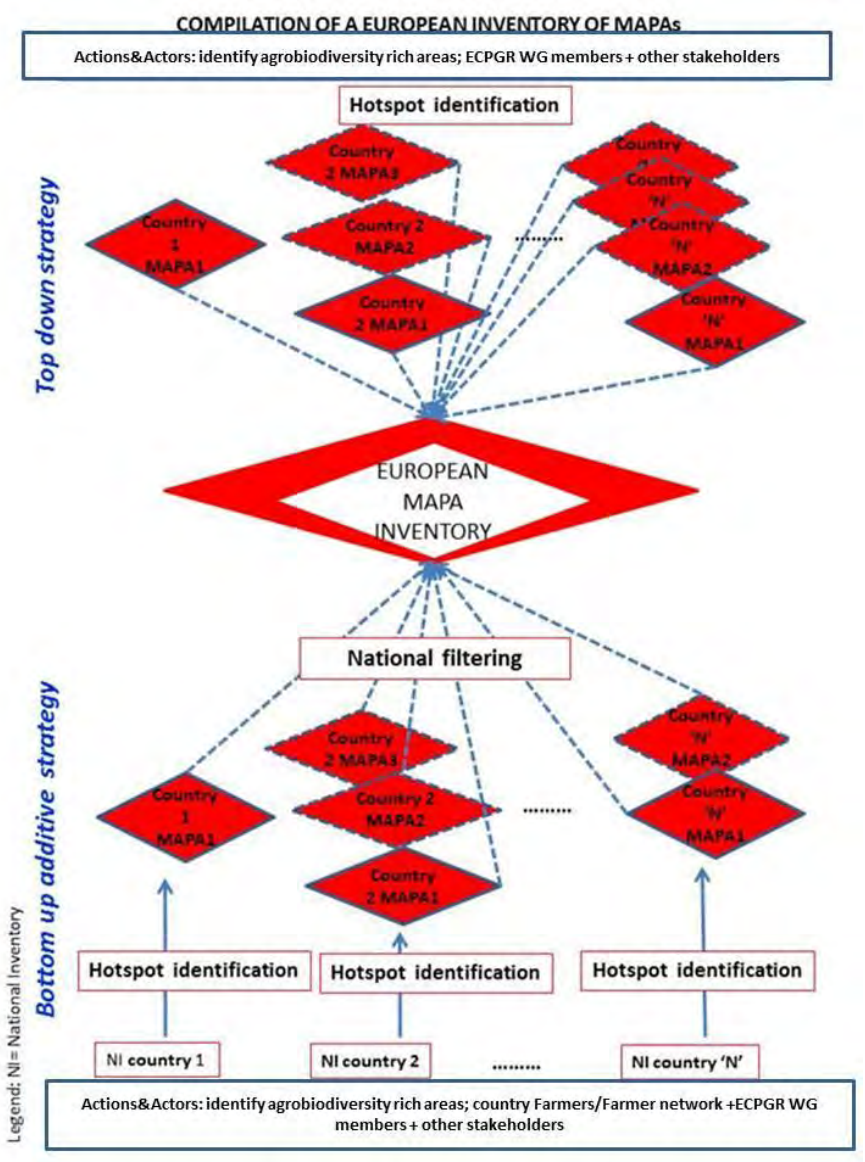

Figure 5. Outline of the European MAPA identification following a bottom up (bottom) and a top down (upper part) strategy.

As a consequence, the compilation of a European inventory of MAPAs would:

- facilitate the development of plans for *in situ* biodiversity conservation and their implementation at National and European level, in general, and
- facilitate the application of EU policies in favour of biodiversity conservation and agriculture.

Finally, it will be useful to develop

- *in situ* conservation actions at the global level.

3.4. A European network of unique materials and sites for a coordinated and integrated *in situ* (on-farm) and *ex situ* conservation activities

It is important for agro-biodiversity conservation to maintain unique variable materials, like extant LR that are cultivated in just one farm and/or that are characterised by unique alleles, as well as unique MAPAs, like those including relic/irreplaceable habitats and include a high number of unique variable materials. Unique variable materials should immediately be sampled, conserved in genebanks, so to make them available for re-/introduction and research and breeding.

From the European inventories of variable materials and of MAPAs, material and sites that have the distinctive characteristics of being unique could be selected and proposed by ECPGR *in situ* (on-farm) WG members to European countries (and through them to the EU) as materials and sites that deserve the highest conservation priorities. For these materials and sites specific funding for conservation, monitoring and managing should be foreseen that allow an efficient and effective conservation across years.

The unique *in situ* (on-farm) maintained variable materials would be the source of unique *ex situ* collections meanwhile offering the opportunity to monitor how diversity evolve in response to climate changes and farmer management.

All the same, the unique MAPAs will offer the possibility of monitoring over time the changes of the three components of agro-biodiversity: habitats, number of species and level of intraspecific diversity.

In the end, to create a European network of unique materials and sites would lead to a fully coordinated and integrated *in situ* (and, via the population safety backup, *ex situ)* conservation (Figure 6) of salient agro-biodiversity hotspots and PGR for the benefit of the future European generations.

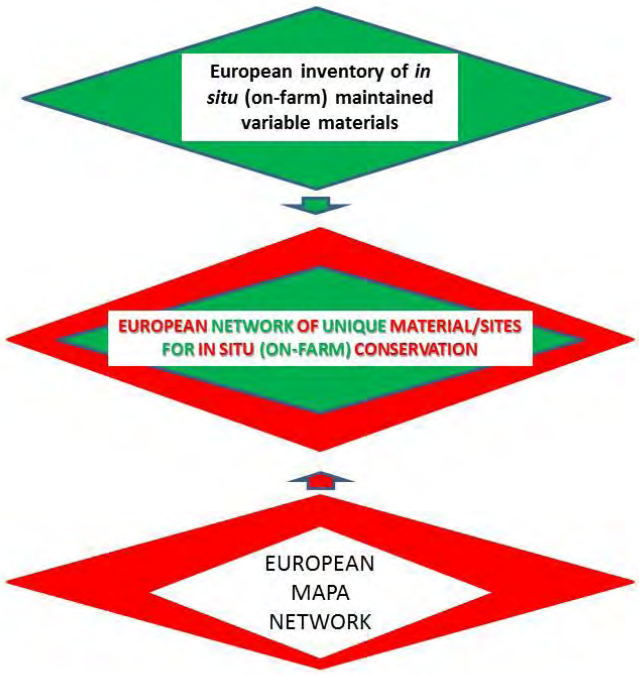

Figure 6. A European network of unique materials and sites for a coordinated and integrated *in situ* conservation.

3.5. Inputs needed to the action plan

Appropriate information has to be collected for the action plan. 'Descriptors for Web-enabled National *in situ* LR Inventories' to build up National inventories of extant, re-introduced and introduced LR have been already developed inside the PGR Secure project and implemented in a 'MS Database for *in situ* LR Data Recording' tool (both are available from www.pgrsecure.org., see also Annex 4).

The 'Descriptors' (and consequently the MS database tool) were developed taking into account all the information that was discussed at the 'Crop Wild Relative and Landrace Conservation Training Workshop' held in Palanga Lithuania, 7-9 September 2011, by the officially nominated *in situ* National Inventory Focal Points, the ECPGR Documentation and Information WG members and the PGR Secure team working on LR. The above mentioned Descriptors were tested by two Italian Region officers (L. Polegri and P. Taviani, Umbria and Lazio Region, respectively) in the frame of the compilation of the above mentioned "The first inventory of In Situ Maintained Landraces of Italy". It may be incidentally noted that similar descriptors have extensively be used since long time to record *in situ* (on-farm) conservation activities in different countries (e.g. Romania, Italy) (see for example Annex 6.2. of the Italian Guidelines for Conservation of Plant Genetic Resources for Food and Agriculture).

However, to build up comprehensive National inventories more inputs on how to develop descriptors for BGBV are required. The ECPGR Documentation and Information WG could possibly contribute to the matter.

The ECPGR Documentation and Information WG could possibly also provide means to merge information into and develop a European inventory of variable materials (Figure 2, in green evidence).

Finally, inputs from the ECPGR Documentation and Information WG are likely to be required on how to build up an information system that contains the information of the European inventory of variable materials and dialogs with other information systems (Figure 2 and 4, in green evidence).

4. Better Integration of the ECPGR Working Groups

The Task Force considers useful that a cross cutting discussion and collaboration among different WG is facilitated within ECPGR.

Being often strictly connected with breeders, the crop-based WG members could enhance the use of *in situ* (on-farm) maintained materials in breeding programs and also support farmer organisations/farmers/gardeners/ who wish to re-/introduce variable materials into agriculture with *ex situ* stored accessions (see below).

Considering the action plan implementation in particular, it would be greatly facilitated by continuing the present close integration of the On-farm WG with the *In Situ* WG activities and by a better integration of the On-farm WG with the crop-based WG activities.

The crop-based WG members could contribute information on the *in situ* (on-farm) materials in the compilation of the inventories on a side, while having facilitated the task of safely duplicate *ex situ* accessions that have been overlooked up to now on the other side. At the same time they could actively contribute to the filtering process described above for the compilation of inventories, the development of plans for *in situ* conservation and their implementation at National and European level.

5. Better Integration Between the Formal Sector and Farmers/Farmer Networks (Answering The Needs Of Farmers/Farmer Networks)

As mentioned above, to enhance the cultivation of variable materials on the farms/in gardens, both for local and wider markets and family use, and their use in breeding and participatory breeding, are among the common needs and elements for a strategic and cooperative approach to *in situ* (on-farm) conservation, since the farmers are the main actors in conservation. Viewing to ensure the good condition of the habitats that are home to the agro-biodiversity we wish to preserve in Europe, to maintain a close relationship between local actors and direct managers of the land and the formal sector should be encouraged, paying attention to the needs of the former.

To this end the formal sector (like the ECPGR WG members, individually and in a cooperative manner) can provide support i) to make genebank material and related information available to a wider extent for initial introduction and re-introduction or for developing BGBV, ii) to give technical support to *in situ* (on-farm) activities, and iii) to assist and favour the registration of the materials for *in situ* (on-farm) conservation as 'conservation varieties'. These issues are briefly discussed below.

5.1. To make genebank material and related information available to a wider extent

The first need of farmers/farmer communities to use variable materials in agriculture is to have access to (ideally local) variable materials and to information related to them.

As mentioned above, *in situ* documented inventories are the starting point for a safe *ex situ* back up of variable materials suitable for *in situ* (on-farm) conservation. Subsequently, *ex situ* collection can be sources for re-/introduction activities of materials and for developing new variable materials for *in situ* (on-farm) conservation.

However, when LR are maintained *ex situ*, they often are as working collections in (often) small genebanks, mainly devoted to research, if public, or to breeding, if private, than to conservation purposes, which are not purposely structured (or willing to) to distribute accessions.

In addition, if the main genebanks in Europe are distributing materials on request, the quantity of seed usually available is small and information related to accessions not always complete so to serve at best the needs of farmers willing to re-/introduce variable materials in cultivation or develop BGBV from them. For

these activities, farmers often need enough propagation material to sow (at least) small plots and are mostly interested in evaluation traits (especially adaptability, growth and quality traits) specifically recorded for their proposed environment.

About the use of *ex situ* material for re-/introduction purposes, it should also be noted that diversity and information on newly collected LR (i.e. those collected while making *in situ* inventories) should be compared with those related to previously collected LR to detect if the former contain novel diversity and if eventual duplicates are already present *ex situ.* All the same, a thorough control of the status of an accession is needed and a better integration between accession data of different genebanks is to be achieved to facilitate an effective use of *ex situ* stored PGR *in situ* (on-farm). In some cases, accessions of seed propagated crops (like old varieties that are constituted of one genotype only and not of different genotypes) are mislabeled as LR.

To make the information widely available to farmer communities interested in *in situ* (on-farm) conservation purposely developed genebank web sites are also needed. Information systems like the 'PGR Diversity Gateway' (under development in the PGR Secure project) could address this need.

In short,

- genebank materials that are available to farmers/farmer networks should be:
    - multiplied to a wider extent,
    - adequately publicized and made 'visible' to potential users,
    - documented, not only with characterization data, but also with evaluation data,
- structures purposely developed to evaluate and multiply materials in a certain environment should be developed, and at the same time,
- small genebanks, which hold materials suitable to *in situ* (on-farm) use should be adequately supported to provide the above mentioned services to the potential users.

The development of public - private dedicated projects and companies, such as the 'Programme for Diversity of Cultivated Plants' developed in Sweden (http://pom.info/english/index.htm), could also help in achieving a better integration between the formal and informal sector, especially for the re-/introduction of genetic diverse material in cultivation.

5.2. To give technical support to *in situ* (on-farm) activities

A specific mention deserves the case of *sensu stricto* LR for which conservation activities are aimed at maintaining them in their adaptation area through financial support to the farmers, on a side, and promotion of the product, on the other side. In this case the formal sector is also called to assess the identity and distinctness of a certain LR from other LR and varieties available on the market, since cases of synonymy and mislabeling do exist. For the purpose, general criteria and specific case studies are reported in the Chapter 5 and 6 of the already mentioned 'Italian Guidelines for Conservation of Plant Genetic Resources for Food and Agriculture'. Morpho-physiological descriptors to record traits useful in distinguishing and ascertaining identity of LR are also reported in Annex 6 of the above mentioned document. They were worked out combining different types of descriptors (e.g. UPOV/CPVO and

IPGRI/Bioversity International) to suit the particular case of *sensu stricto* LR or newly developed where they were not available.

As for technical support to *in situ* (on-farm) activities, another source of materials for *in situ* (on-farm) conservation are 'community genebanks' run by farmer themselves, of which some examples exist in Europe. The formal sector can help community genebanks by suggesting appropriate multiplication and seed conservation techniques and material exchange schemes that suit their purposes (either to maintain high the level of genetic diversity, or to maintain the identity of a certain material or to check the level of diversity at multiplication cycles). Community genebanks like these may have an 'active' backup in the formal sector as is demonstrated by the Scottish Landrace Protection Scheme (Green *et al*. 2012).

In short, concerning the technical support to *in situ* (on-farm) conservation activities, the formal sector can

- check the identity and distinctness of LR,
- check synonymies and mislabeling,
- counsel about appropriate seed multiplication and seed exchange schemes.

5.3. To assist and favour the registration of the materials for *in situ* (on-farm) conservation as 'conservation varieties'

Finally to assist and favour the registration of variable materials as 'conservation varieties', in the EU countries, can be seen as task of the formal sector for their *in situ* (on-farm) conservation. It allows, through seed commercialization, wider use in agriculture of variable materials and so wider *in situ* (on-farm) conservation, can help in developing seed companies specialized in this niche sector and, in particular, for *sensu stricto* LR that have a limited seed market and commercial interest, is a sort of official protection because links them to the specific territory of origin (Spataro and Negri 2013).

It is obvious that to promote a better integration between the formal and informal sector not only willingness from both parts is required, but also appropriate means and structures, in other words human and monetary investments are required.

What mentioned above answers the In Situ Conservation and Management issue 2 of the 2nd GPA (FAO 2011) as well as the European Parliament Resolution (2012) on the EU biodiversity strategy to 2020 especially for the 71 and 72 issues related to agriculture.

6. Option Investigation to Promote Awareness and Raise Additional Funding for *In Situ* (On-Farm) Conservation in Europe

PGR activities are presently mainly focused on *ex situ* conservation in Europe. Lack of consistent and continuous funding is at present, along with the lack of variable material inventories, the primary constrain

towards an *in situ* (on-farm) integrated and cooperative European approach to conservation. The On-farm WG of ECPGR, has been playing an active role at the regional level in raising concern, sharing information, developing conservation tools and proposing on-farm diversity conservation examples. However, its activities are based on inputs-in-kind contribution and cannot go beyond what mentioned above if funds are not raised.

One of the missions for ECPGR should be to actively lobby for funding integrated and coordinated activities in favour of practical *in situ* (on-farm) conservation as well as *in situ* (on-farm) research.

All the same ECPGR should lobby for funding activities aimed at empowering genebanks allowing them to make available a larger quantity of seed and better evaluation of variable materials stored that can serve the needs of the farmers (see 5.1. above).

At global level the interest of the ITPGRFA, Global Environment Facility (GEF), the International Union for Conservation of Nature (IUCN), the Conservation International, the CGIAR Centers, and of foundations, like the Global Crop Diversity Trust, in funding specific *in situ* (on-farm) conservation actions should be investigated. The ITPGRFA is already committed to fund such activities within budgetary limitations. There currently appears no global organization able to play a substantial role in funding *in situ* (on-farm) conservation, a donor gap that needs to be addressed.

At the EU level, the Task Force considers the European Commission (EC) as the primary organisms where to lobby for promoting awareness on conservation and rising funds for specific regional *in situ* (on-farm) research and dissemination activities (Horizon 2020, AGRIGENRES context, if eventually refunded, or a re-orientated Life + funding agency).

For example, further developing infrastructure and methods on conservation and sustainable use of PGR *in situ* (on-farm) could be suggested as a topic within the Societal Challenge _ Food Security, Sustainable Agriculture and Forestry, Marine, Maritime and Inland Water Research and the Bioeconomy frame.

However, it is recognized that short-term research funding is not entirely suitable to sustain long-term *in situ* (on-farm) activities, thus there is a need to explore simultaneously, the interest of European Agencies, like the European Environment Agency (EEA), of the Institute for Environment and Sustainability (IES, one of the European Commission's Joint Research Centers), of the Technical Center for Agricultural and Rural Cooperation (CTA) to provide the policy and context, governance and ultimately fund specific *in situ* (on-farm) conservation. Although it is recognized that these European agencies have primarily an environmental remit and therefore discussion directly with EC Agriculture should also be a high priority.

Finally, the interest of Government agencies, like the UK Darwin Initiative and the German Agency for Technical Cooperation should also be investigated.

In particular, research needs funds to assess present LR diversity, population dynamics and impact of climate change on LR diversity, proper ways of LR managing to favour their future adaptation, to identify agro-biodiversity rich areas, to assess LR, BGBV and OC utility in environmental friendly agronomic systems.

As for the practical side of the matter, at EU level, policy measures in favour of wildlife conservation in farmlands and support schemes for semi-natural grasslands, landraces of farm animals and other incentive measures aiming at preserving biodiversity are already foreseen in the CAP. Specific forms of support for the farmers willing to facilitate the survival of CWR and LR taxa with appropriate management should also

be foreseen as a form of compensation to farmers for the delivery of public goods such as the maintenance of important PGR that continue to evolve *in situ*. The increasing farmer interest in nature conservation, the development of recreational activities, and the need to develop 'alternative farm enterprises' that can give additional income to farmers (Sokos *et al*., 2013 and references therein) could facilitate the application of such measures. To this end, the status of "Farm Maintaining Plant Genetic Resources" could be suggested to the EC and attributed to farms really involved in CWR and cultivated variable materials *in situ* conservation.

EU member states should take better advantage of the EAFRD funds for protecting LR and highly diverse agro-environments (e.g. MAPAs) and improving the diversification of the rural economy by using variable materials. Examples of effective uses of EAFRD funds exist (see the Italian Region experiences that are reported above) that could be followed.

In addition, it can be noted that EAFRD also funds cooperative work among EU countries for rural development. Of this specific frame of funding EU countries could take advantage for the compilation of European inventories.

Finally, ECPGR WG members should take a more active role in promoting policies and in requesting funds for *in situ* (on-farm) conservation actions.

7. Bibliographic References

ANDERSON E., CUTLER H.C. 1942 - Races of *Zea mays*: I. Their recognition and classification. Annals of Missouri Botanical Garden 29: 69–89

ASFAW Z. 2000 - The barleys of Ethiopia. In: Brush S.B. (ed.) Genes in the field. IPGRI, Rome/IDRC, Ottawa/Lewis Publishers, Boca Raton, FL. pp. 77-107

BALDOCK D., BEAUFOY G., BENNETT G.E., CLARK J. 1993 - Nature conservation new directions in the common agricultural policy. IEEP London

BEAUFOY G., BALDOCK D., CLARK J. 1994 - The Nature of Farming: Low Intensity Farming Systems in Nine European Countries. IEEP, London

BRUSH S.B. 1992 - Ethnoecology, biodiversity and modernization in Andean potato agriculture. Journal of Ethnobiology 12: 161-185

BRUSH S.B. 1995 - *In situ* conservation of LR in centers of crop diversity. Crop Science 35: 346-354

CBD 1992 - Convention on Biological Diversity: Text and Annexes. Secretariat of the Convention on Biological Diversity, Montreal, http://www.cbd.int/convention/ (accessed Feb. 2013).

CAMACHO VILLA T.C., MAXTED N., SCHOLTEN M.A., FORD-LLOYD B.V. (2005) Defining and identifying crop landraces. Plant Genetic Resources: Characterization and Utilization 3(3): 373–384.

CIPRIANI G.,·MARRAZZO M.T., MARCONI R. ,·CIMATO A., TESTOLIN R. 2002 - Microsatellite markers isolated in olive (*Olea europaea* L.)are suitable for individual fingerprinting and reveal polymorphism within ancient cultivars. Theor Appl Genet 104:223–228

COMMISSION DIRECTIVE 2008/62/EC of 20 June 2008 providing for certain derogations for acceptance of agricultural landraces and varieties which are naturally adapted to the local and regional conditions and threatened by genetic erosion and for marketing of seed and seed potatoes of those LR and varieties. OJ L 162, 21.6.2008, pp. 13–19

COMMISSION DIRECTIVE 2009/145/EC of 26 November 2009 providing for certain derogations, for acceptance of vegetable landraces and varieties which have been traditionally grown in particular localities and regions and are threatened by genetic erosion and of vegetable varieties with no intrinsic value for commercial crop production but developed for growing under particular conditions and for marketing of seed of those LR and varieties. OJ L 312, 27.11.2009, pp. 44–54

COMMISSION DIRECTIVE 2010/60/EU of 30 August 2010 providing for certain derogations for marketing of fodder plant seed mixtures intended for use in the preservation of the natural environment Text with EEA relevance. OJ L 228, 31.8.2010

COSTANZA M.T., BARBAGIOVANNI MIRACOLO I., TAVIANI P., PAOLETTI S., REA R., LELLI L., GARZIA J.H., PORFIRI O., NARDI P., TANCA M. 2012 - On-farm conservation of plant genetic resources in Lazio Region - Italy. Implementation of the Regional Act 1st March 2000 n.15. In: Maxted N., Dulloo M.E., Ford-Lloyd B.V., Frese L., Iriondo J.M. and Pinheiro de Carvalho M.A.A. (eds.). Agrobiodiversity Conservation: Securing the

Diversity of Crop Wild Relatives and LR. CAB International, Wallingford, UK. pp 161-172. ISBN-13: 978 1 84593 851 2

CGRFA (COMMISSION ON GENETIC RESOURCES FOR FOOD AND AGRICULTURE) -14/13/Inf.9 Rev.1 2013 - Draft Reporting Format For Monitoring The Implementation Of The Second Global Plan Of Action For Plant Genetic Resources For Food And Agriculture (available from http://www.fao.org/docrep/meeting/027/mg071e.pdf)

European Parliament Resolution 2012 - European Parliament Resolution of 20 April 2012 on our life insurance, our natural capital: an EU biodiversity strategy to 2020 (2011/2307(INI)) (available from http://www.europarl.europa.eu/sides/getDoc.do?type=TA&language=EN&reference=P7-TA-2012-147)

FAO 2001 - International Treaty on Plant Genetic Resources for Food and Agriculture. Available online at http://www.planttreaty.org/ (accessed Feb. 2014).

FAO 2011 - Second Global Plan of Action for the Conservation and Sustainable Utilization of Plant Genetic Resources for Food and Agriculture. Food and Agriculture Organization of the United Nations, Rome, Available online at http://www.fao.org/agriculture/crops/core-themes/theme/seeds-pgr/gpa/en/ (accessed Feb. 2014).

FORNEK A., KONRADI J., BLAICH R. 2003 - A Genetic Variation Analysis of *Vitis vinifera* cv. Pinot noir. In: E. Hajdu and É.Borbás (eds.), 'Proc. VIIIth International Congress on Grape', Acta Hort 603, ISHS 2003, 167-170

GASI F., SIMON S., POJSKIC N., KURTOVIC M., PEJIC I. 2010 - Genetic assessment of apple germplasm in Bosnia and Herzegovina using microsatellite and morphologic markers. Sci Hortic 126:164–171

GASI F., SIMON S., POJSKIC N., KURTOVIC M., PEJIC I., MELAND M., KAISER C. 2013a - Evaluation of apple (*Malus* x *domestica*) genetic resources in Bosnia and Herzegovina using microsatellite markers. Hort Sci 48:13–21

GASI F., KURTOVIC M., KALAMUJIC B., POJSKIC N., GRAHIC J., KASIER C., MELAND M. 2013b - Assessment of European pear (*Pyrus communis* L.) genetic resources in Bosnia and Herzegovina using microsatellite markers. Sci Hort 157:74–83

GREEN N., CAMPBELL G., TULLOCH R. and SCHOLTEN M. 2009 - Scottish Landrace Protection Scheme. In: Veteläinen M., Negri V. and N. Maxted (eds.), 'European Landraces: On-farm Conservation, Management and Use'. Bioversity Technical Bulletin No. 15, Bioversity International publ., Rome, Italy, pp 233-243. ISBN 978-92-9043-805-2

HALAPIJA KAZIJA D., VUJEVIĆ P., JELAČIĆ T., MILINOVIĆ B., PEJIĆA I., ŠIMON S., ŽULJ M., DRKENDA P., GAŠI F., KURTOVIĆ M., NIKOLIĆ D. 2013 - Genetic identification of 'Bistrica' and its synonyms 'Požegača' and 'Hauszwetsche' (*Prunus domestica* L.) using SSRs. In: Evans K.M. *et al*. (eds.), Proc. of the 13th Eucarpia Symposium on Fruit Breeding and Genetics, Acta Hort 976, ISHS 2013, 285-287

HARLAN J.R. 1975- Our vanishing genetic resources. Science 188: 618-621

LORENZETTI F., LORENZETTI S., NEGRI V. 2009 **-** The Italian law on conservation varieties and the National implementation of the EU Directive 2008/62 EC. In: Veteläinen M., Negri V. and N. Maxted (eds.), 'European Landraces: On-farm Conservation, Management and Use'. Bioversity Technical Bulletin No. 15,

Bioversity International publ., Rome, Italy, pp 300-304 ISBN 978-92-9043-805-2, also available at http://www.bioversityinternational.org/index.php?id=19&user_bioversitypublications_pi1[showUid]=3252
MAXTED N., GUARINO L., MYER L., CHIWONA E.A. 2002 - Towards a methodology for on-farm conservation of plant genetic resources. Genetic Resources and Crop Evolution 49 (1): 31-46

MAXTED N., NEGRI V., VETELÄINEN M. 2009 - Landrace Inventories: Needs and Methodologies. In: Veteläinen M., Negri V. and N. Maxted (eds.), 'European Landraces: On-farm Conservation, Management and Use'. Bioversity Technical Bulletin No. 15, Bioversity International publ., Rome, Italy, pp 45-52 ISBN 978-92-9043-805-2, also available at http://www.bioversityinternational.org/index.php?id=19&user_bioversitypublications_pi1[showUid]=3252

MAXTED N., AKPAROV Z.I., ARONSSON M., ASDAL Å., AVAGYAN A., BARTHA B., BENEDIKOVÁ D., BERISHVILI T., BOCCI R., COP J., CURTIS T., DAUGSTAD K., DIAS S., DUARTE M.C., DZMITRYEVA S., ENGELS J., FERANT N., FREUDENTHALER P., FRESE L., HADAS R., HOLLY L., IBRALIU A., IRIONDO ALEGRÍA J.M., IVANOVSKA S., KIK C., KORPELAINEN H., JINJIKHADZE T., KAMARI G., KELL S.P., KRISTIANSEN K., KYRATZIS A., LABOKAS J., MAGGIONI L., MAGOS BREHM J., MALOUPA E., MARTINEZ J.J.R., MENDES MOREIRA P.M.R., MUSAYEV M., ORPHANIDOU P., RADUN M., RALLI P., SANDRU D., SARIKYAN K., SCHIERSCHER-VIRET B., STEHNO Z., STOILOVA T., STRAJERU S., SMEKALOVA T., TAN A., VOROSVARY G., VETELÄINEN M., VÖGEL R. and V. NEGRI 2012 - Current and future threats and opportunities facing European crop wild relative and LR diversity. In: Maxted N., Dulloo M.E., Ford-Lloyd B.V., Frese L., Iriondo J.M. and Pinheiro de Carvalho M.A.A. (eds.). Agrobiodiversity Conservation: Securing the Diversity of Crop Wild Relatives and LR. CAB International, Wallingford, UK. pp 333-353. ISBN-13: 978 1 84593 851 2

NEGRI V. 2003 - Landraces in central Italy: Where and why they are conserved and perspectives for their on-farm conservation. Genetic Resources and Crop Evolution 50: 871-885

NEGRI V. 2005 - Agro-Biodiversity Conservation In Europe: Ethical Issues. Journal of Agricultural and Environmental Ethics 18, 1: 3-25

NEGRI V. 2012 – Policies supportive of on-farm conservation and their impact on custodians farmers in Italy. In: Padulosi S., Bergamini N. and Lawrence T. (eds.), On farm conservation of neglected and underutilized species: status, trends and novel approaches to cope with climate change. Proceedings of an International Conference, Frankfurt, 14-16 June 2011. Bioversity International, Rome, pp. 211-217. ISBN 978-92-9043-907-3

NEGRI V., TIRANTI B. 2010 - Effectiveness of in situ and ex situ conservation of crop diversity. What a *Phaseolus vulgaris* L. landrace case study can tell us. Genetica. 138, Issue 9: 985_998 DOI: 10.1007/s10709-010-9485-5

NEGRI V., MAXTED N., VETELÄINEN, M. 2009 - European LR conservation: an introduction. In: Veteläinen M., Negri V. and N. Maxted (eds.), 'European Landraces: On-farm Conservation, Management and Use'. Bioversity Technical Bulletin No. 15, Bioversity International, Bioversity International publ., Rome, Italy, pp 1-22 ISBN 978-92-9043-805-2, also available at http://www.bioversityinternational.org/index.php?id=19&user_bioversitypublications_pi1%5bshowUid%5d=3252" \t "_blank

NEGRI V., BAROCCO R., PACICCO L., VERONESI F., VENANZONI R. 2012 - An Approach Towards Prioritising Landrace Rich Areas as A Priority For Protection In Europe. In: Maxted N., Dulloo M.E., Ford-Lloyd B.V.,

Frese L., Iriondo J.M. and Pinheiro de Carvalho M.A.A. (eds.), Agrobiodiversity Conservation: Securing the Diversity of Crop Wild Relatives and LR. CAB International, Wallingford, UK. pp 118-124. ISBN-13: 978 1 84593 851 2

NEGRI V., PACICCO L., BODESMO M., TORRICELLI R. 2013 - The first Italian inventory of in situ maintained landraces. On CD ROM. ISBN 978-88-6074-279-7. Morlacchi Editrice, Perugia (also available from http://vnr.unipg.it/PGRSecure/)

NEVO E., YONG-BI F., PAVLICEKA F., KHALIFAA F., TAVASIA M., BEILES A. 2012 - Evolution of wild cereals during 28 years of global warming in Israel. PNAS February 28, vol. 109 no. 9 3412-3415, www.pnas.org/cgi/doi/10.1073/pnas.1121411109

PAPA C. 1996 - The 'farre de Montelione': LR and representation. In: Padulosi S., Hammer K. and Heller J. (eds.) Hulled Wheats. Promoting the Conservation and Use of Underutilised and Neglected Crops. Proceedings of the First International Workshop on Hulled Wheats, 21-22 July, (1995), Castelvecchio Pascoli, Italy. IPGRI Publisher. Rome, pp. 154-171

PAPA C. 1999 - Il farro a Monteleone di Spoleto: pratiche agrarie, consuetudini giuridiche e ritualità. In: C. Papa (ed.) Il Farro. Saperi, Usi e Conservazione delle Varietà Locali. Quaderni del CEDRAV 1. CEDRAV Cerreto di Spoleto, Italy. pp. 9-26

PORFIRI O., COSTANZA M.T., NEGRI V. 2009 – Landrace Inventories in Italy and the Lazio Region Case Study. In: (Veteläinen, M., Negri V. and N. Maxted eds.) 'European Landraces: On-farm Conservation, Management and Use'. Bioversity Technical Bulletin No. 15, Bioversity International publ., Rome, Italy, pp 117-123 ISBN 978-92-9043-805-2, also available at http://www.bioversityinternational.org/index.php?id=19&user_bioversitypublications_pi1[showUid]=3252

POLEGRI L., NEGRI V. 2010 - Molecular markers for promoting agro-biodiversity conservation: a case study from Italy. How cowpea landraces were saved from extinction. Genetic Resources and Crop Evolution 57: 867-880 DOI: 10.1007/s10722-009-9526-z

SAXENA S. and SINGH A.K. 2006 - Revisit to definitions and need for inventorization or registration of landraces, folk, farmers' and traditional varieties. Current Science 91(11): 1451-1454

SEC (2011) 540 - Final Commission Staff Working Paper Impact Assessment. Accompanying the document Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions. Our life insurance, our natural capital: an EU biodiversity strategy to 2020 (available from http://ec.europa.eu/environment/nature/biodiversity/comm2006/pdf/2020/1_EN_impact_assesment_part1_v4.pdf)

SOKOS C.K., MAMOLOS A. P., KALBURTJI K. L., BIRTSAS P. K. 2013 - Farming and wildlife in Mediterranean agroecosystems. Journal for Nature Conservation 21: 81–92

SPATARO G., NEGRI V. 2013 - The European seed legislation on conservation varieties: focus, implementation, present and future impact on landrace on-farm conservation. Genetic Resources and Crop Evolution 60: 2421-2430, doi:10.1007/s10722-013-0009-x

VETELÄINEN M., MAXTED N., NEGRI V. 2009 - An European Strategic Approach to Conserving Crop Landraces. In: Veteläinen M., Negri V. and N. Maxted (eds.), 'European LR: On-farm Conservation, Management and Use'. Bioversity Technical Bulletin No. 15, Bioversity International publ., Rome, Italy, pp 305-325 ISBN 978-92-9043-805-2 also available at http://www.bioversityinternational.org/index.php?id=19&user_bioversitypublications_pi1[showUid]=3252

VETELÄINEN M., MAXTED N., NEGRI V. 2009b - European Landraces: On-farm Conservation, Management and Use. Bioversity Technical Bulletin No. 15, Bioversity International publ., Rome, Italy. ISBN 978-92-9043-805-2 also available at http://www.bioversityinternational.org/index.php?id=19&user_bioversitypublications_pi1[showUid]=3252

VETELÄINEN M., NEGRI V., MAXTED N. 2012 - A second look at the European Strategic Approach to Conserving Crop Landraces. In: Maxted N., Dulloo M.E., Ford-Lloyd B.V., Frese L., Iriondo J.M. and Pinheiro de Carvalho M.A.A. (eds.), Agrobiodiversity Conservation: Securing the Diversity of Crop Wild Relatives and Landraces. CAB International, Wallingford, UK. pp 181-185. ISBN-13: 978 1 84593 851 2

ZEVEN A.C. 1998 - Landraces: A review of definitions and classifications. Euphytica 104: 127-139

8. Most Used Acronyms

CBD: Convention on Biological Diversity

BGBV: Broad Genetic Base Varieties

ECPGR: European Cooperative Programme for Plant Genetic Resources

EU: European Union

EC: European Commission

EAFRD: European Agricultural Fund for Rural Development

GPA: Global Plan of Action

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

LR: Landrace/s

MAPA: Most Appropriate Area

OC: Obsolete Cultivars

PGR: Plant Genetic Resources

PGRFA: Plant Genetic Resources for Food and Agriculture

ToR: Terms of Reference

UPOV: International Union for the Protection of New Varieties of Plants

WG: Working Group/s

Annexes

Annex 1: ToRs

ToRs for the two Task Forces for:

(1) *In situ* conservation of crop wild relatives

(2) On-farm management and conservation of LR

Background: The activities will address the ECPGR outcome 3: *In situ* and on-farm conservation and management concepts are agreed. http://www.ecpgr.cgiar.org/about_ecpgr/objectives.html

1. Two Taskes Forces will be established to develop two concepts:
    a. *In situ* conservation of crop wild relatives in Europe
    b. On-farm management and conservation of LR in Europe
2. The draft concepts should be based upon the "Strategy Paper on the ECPGR Relationship with the European Union/European Commission" (see document no. 11: http://www.ecpgr.cgiar.org/steering_committee/13th_sc_meeting/background_documents.html)
3. The draft concepts should be applicable to all the European countries (EU member states and Non-EU countries) but not prescriptive and be respectful of the sovereignty each country has on its own genetic resources. However, they should be developed in such a way that they could also become part of a future EU *strategy for the conservation of genetic resources in food, agriculture and forestry.*
4. The Task Forces should use the internationally agreed definitions and concepts of *in situ* and on-farm conservation (CBD, EC, GPA) where such definitions are available.
5. The draft concepts should be developed by the two Task Forces in close collaboration with the *In situ* and on-farm Network and the draft concept for on-farm management and conservation should also be developed in close collaboration with the Documentation and Information Network.
6. The draft concepts should describe the interface between *in situ* conservation, on-farm management and conservation and *ex situ* conservation of PGRFA.
7. The draft concept for *In situ* conservation of crop wild relatives in Europe should give special attention to locations of high diversity (hot spots) and if they fall inside (specific genetic reserve management) or outside protected areas (complementary conservation measures).
8. The draft concept for On-farm management and conservation of LR in Europe should give special attention to the development of national inventories of LR maintained on-farm as

defined by the respective national focal points as *plant genetic resources naturally adapted to the local and regional conditions and under threat of genetic erosion.*

9. The draft concepts should investigate options to improve the complementarity of *ex situ* and *in situ* crop wild relatives and LR conservation in Europe through better integration of the initiatives of the *In situ* and on-farm Network and those of the crop-based Working Groups.

10. The draft concepts must explore the approach of unique and important accessions for *in situ* conservation (like in AEGIS).

11. The draft concepts should investigate options to promote awareness and raise additional funding for *in situ* crop wild relatives and LR conservation in Europe.

12. The draft concepts should not exceed 10 pages each.

13. The draft concepts should be sent to the SC by the end of September 2013.

14. The SC members (National Coordinators) will be invited to undertake a national consultation and provide amendments and corrections to the draft concepts.

15. The SC will seek to finalize the two concepts by the end of 2013 and will offer them to the European Commission for its consideration when developing a future EU *strategy for the conservation of genetic resources in food, agriculture and forestry.* The concepts will also be the basis for the conservation strategy of ECPGR for *in situ* conservation and on-farm management and will be offered to the European countries if they wish to use them for their relevant national strategies.

Annex 2: Landrace: a brief discussion on definitions

There are several definitions for the term 'LR' (Anderson and Cutler 1942; Harlan 1975; Brush 1992, 1995; Papa 1996, 1999; Zeven 1998; Asfaw 2000; Negri, 2003, 2005; Camacho Villa *et al*. 2005; Saxena and Singh 2006; Commission Directive 2008/62/EC 20 June 2008; Commission Directive 2009/145/EC 26 November 2009) that highlight the multiple facets of a LR.

Including all the elements variously put in evidence by several definitions and Authors, *sensu stricto*, a LR should be defined as a 'variable population, which is identifiable and usually has a local name, (generally) lacks formal crop improvement, is characterized by a specific adaptation to the environmental conditions of the cultivation area (tolerant to the biotic and abiotic stresses of that area) and is closely associated with the uses, knowledge, habits, dialects and celebrations of the people who have developed and continue to grow it (Negri *et al*. 2009; Polegri and Negri 2010).

This definition emphasizes: the aspects of a long standing, unbroken and active management of LRs in a specific human context and underlines that a LR belongs to the people who developed it and feel to be its owner. In this sense it answers the need for recognizing (and remunerating) the farmers' rights that have been so often highlighted in International binding documents.

While there are LR traits that are common to all of the above mentioned definitions (i.e. to be variable populations, the lack of formal crop improvement, the adaptation to the environment of the cultivation area) it has to be noted that, as already stated by Zeven (1998), it is not easy to define a landrace and, consequently, there is not a complete consensus on the (comprehensive of many) definition given above.

In addition, there are LRs that are autochthonous in one region and are being introduced into another region and/or have been reintroduced in the origin area from genebank specimens. These will become locally adapted with time, but cannot be considered as *sensu stricto* LR (e.g. following Negri *et al*. 2009; Polegri and Negri 2010), because they do not belong to the people who developed them (see further discussion on the matter in Negri *et al*. 2009).

Annex 3: Towards a European strategic approach to *in situ* (on-farm) conservation: issues

based on Veteläinen et al. 2009a, 2012, and recent updates taken into consideration by the Task Force

Conservation issues

- To carry out complete inventory of European LR and BGBV and then identify what needs to be protected *in situ* (on-farm).
- To identify unique and important accessions and agro-biodiversity rich sites (MAPAs) for *in situ* conservation.
- To assess extinction threat of extant LR in order to address appropriate funding to counteract the threat.
- To assess genetic erosion of extant LR.
- To collect and safely duplicate *ex situ* LR diversity (systematic national and regional *ex situ* back-up duplication is critical). *In situ* and *ex situ* conservation are the two strategies to be used in the conservation of plant genetic resources (Art. 9 CBD).
- To establish of local seed depositories/community seed banks that can facilitate on-farm conservation activities.
- To assess what motivates LR maintainers in Europe, how do farmers choose which LR to maintain and which seed to save, how dynamic in terms of genetic diversity are European on-farm systems, and what role do the wide range of local (NGOs, farmer co-operatives), national (governmental agencies, breeders, farmer bodies) and European (EC legislation and policy) actors can play in LR maintenance and use. All what above can inform future conservation activities.-
- To disseminate LR and on-farm information so to build up a repertoire of expertise and ways to on-farm conservation.
- To monitor on-farm conservation activities across time so control effectiveness and efficiency of conservation actions.
- To establish *In situ* on-farm conservation of LR diversity priorities to ensure European food security in a period of climate change.
- To assess extinction (by comparing *ex situ* collection holdings with *in situ* conservation activities, through a gap analysis process Maxted *et al*. 2008) if reintroduction activities are needed.

Utilisation issues

Conservation is not an end in itself, if conservation is to be sustained the conserve biodiversity must have some form of value to society, further value infers some form of utilisation. Support and development of different forms of LR and BGBV use enhances their maintenance within dynamic on-farm management systems:

- Support to wide range of product development including support to small scale production of LR (home gardens, community gardens, local agricultural systems) for old and new uses should be given.
- The links between on-farm conservation in organic production systems, in urban agriculture, in social farming and in multifunctional agriculture should be strengthened.

- Further utilisation of PDO (Protected Designation of Origin), PGI (Protected Geographical Indication), TSG (Traditional Speciality Guaranteed) schemes and other product labelling systems should be promoted.
- The development of seed industries that produce 'conservation variety' seed should be promoted.
- Support schemes for production of seed or propagating material should be encouraged.
- LR improvement, possibly through participatory plant breeding (PPB), should be actively explored.
- LR use in 'formal' plant breeding should be enhanced. This can be obtained also taking advantage of new technologies: they are a powerful tool to screen genetic resources for useful traits and can also be a way to raise the interest of the seed industry.

Research issues

To support the actions proposed above, there are a number of particular areas of research that are needed to improve our knowledge:

- Present LR diversity.
- Population dynamics in relationships to factors such as migration, drift and human and environmental selection pressures.
- Impact of climate change on LR diversity and how LR might be managed to adapt, mitigate effects or be resilient to the climate change effects in the face of its potential impact.
- How to identify agro-biodiversity rich areas where to promote CWR, LR and BGBV *in situ* (on-farm) conservation.
- Usefulness of LR in environmental friendly agronomic systems.
- Socio-economic factors driving on-farm maintenance of LR.

Political and legal issues

LR and BGBV management on-farm is an integral part of the European food security. Therefore, variety and seed production legislation that conflicts with on-farm diversification need to be questioned seriously on the national and European levels:

- Variety protection laws or European production standards are anecdotally thought to have negatively impacted European agrobiodiversity. Therefore it would be wise to monitor the changes in agriculture in the countries recently joining the European Union.
- The recent legislative developments at European level (i.e. Commission Directives 2008/62/EC 20 June 2008, 2009/145/EC 26 November 2009 and 2010/60/EU 30 August 2010) on seed production and marketing opened a new way to safeguard LR, as well as other variable populations, because they are aimed "to ensure *in situ* conservation and the sustainable use of PGR", as their premise states. Previously the registration to the Common Catalogue required, beside distinctness and stability, uniformity a trait that variable populations do not have. At present it is possible to commercialise their seed as 'conservation variety' seed or 'amateur variety' seed because of the derogations on the standards required for varieties that were introduced by the Directives (see a review in Spataro and Negri, 2013). The registration of sensu stricto LR as conservation varieties could promote their on-farm conservation and maintain their link with the territory of origin (as defined in the Directives).However, it is possible that the future European seed legislation, currently in review process, will/will not facilitate the seed commercialisation of variable materials like LR and farmer developed populations.
- Legislative models based on the need to preserve PGR (instead of on commercializing them) exists (Lorenzetti *et al*. 2009; Costanza *et al*. 2012) and their wider implementation would be more appropriate to guarantee future food security at local and regional levels.

- Given as argued above there is a need to establish a coherent Global Network of *In situ* (on-farm) Conservation, there would be a need to provide legislative protection of the on-farm sites to ensure their long-term financing and survival.

Public awareness and education

There is an immediate need to increase awareness about the importance of LR diversity and on-farm conservation in the all levels of the society: farmers, farmer communities, researchers and research communities, policy makers, common people and local, national and international authorities. Only when a wider understanding exists will the long-term preservation of LR can be achieved. In this context:

- Education of the youngest generations of farmers from the primary to University level is crucial,
- Publications, web sites, leaflets about LR maintenance activities to be widely distributed.
- Maintenance of local, gene banks and living collections of LR should involve local people, either through school visits to open trial days dedicated to farmers and or gardeners showing local LR diversity and offering seed opportunities to farmers (following the example of some countries like Sweden).
- Wide LR seed duplication and distribution will ensure LR retention – *don't put all your LR 'eggs' into one basket* (either in terms of LR maintainers or genebank holdings)!

Socio-economic issues

For the fact that farmers are the conservationist the value of socio-economic studies should not underplayed.

- Regional development, agro-business and environmental schemes should include management of genetic resources in its entirety (e.g., on-farm conservation, product development, participatory plant breeding and legal issues as they relate to LR).
- Routinely globally now when developing financial support for on-farm project a critical element of the project is examining the increased commercial value of LR, niche market and market chain enhancement and the development of entirely novel market, there seems to be much scope for further application of these techniques to European LR.
- Fears over global warming are promoting the localization of production and consumption of food and these initiatives should be supported whenever economically possible, as this is the socio-economic sphere in which LR can thrive.
- Support for local seed production should be given, some successful private-public systems already operate in some countries (e.g. Sweden) that could be followed as examples.
- Reinforcement of local cultural identity and linking local crop with local culture, 'agro-biocultural restoration' and transmission to the future generations of pride in their agronomic heritage will achieve both the conservation of LR as well as the on-farm system itself.

Cooperation issues

To facilitate the exchange of information on on-farm conservation activity and problem solving the widest cooperation and exchange of information among national and European Institutions, Agencies, farmer organisations, NGOs and individual people is desirable and should be promoted at the national and European level.

The On-farm Working Group of ECPGR, is currently playing a leading role at the regional level, but, in addition, an interregional cooperation would be most useful.

Because the ECPGR On-Farm Working Group activities are mainly supported by in kind contributions a mission for ECPGR should be to actively lobby for funding integrated and coordinated activities in favour of practical *in situ* (on-farm) conservation as well as *in situ* (on-farm) research.

As a consequence, a mission for ECPGR should be to actively lobby for funding integrated and coordinated activities in favour of practical *in situ* (on-farm) conservation as well as *in situ* (on-farm) research.

Annex 4: Descriptors

Novel characterization of crop wild relative and landrace resources as a basis for improved crop breeding' PGR Secure EC FPVII, GA n. 266394

DESCRIPTORS FOR WEB-ENABLED NATIONAL IN SITU *LANDRACE INVENTORIES*

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Bioversity International

Novel characterization of crop wild relative and landrace resources as a basis for improved crop breeding' PGR Secure EC FPVII, GA n. 266394

Note of the Authors

Landraces are part of agro-biodiversity in urgent need of conservation. A prerequisite of any active conservation is some form of inventory of what is conserved.

In this context, the EC Framework 7 PGR Secure project is aimed to provide help in generating National Landrace Inventories in European countries and so to begin the process of creating a European Landrace Inventory pivoted on the National Inventories.

A European LR Inventory can only be based on National Inventories considered that the responsibility to conserve and sustainably use landrace diversity (as well as any other biodiversity component) lies with individual Nations and that any concerted action will be implemented at national level, even when driven by policy at European level.

This draft descriptor list was worked out to facilitate the development of National Inventories of landraces that are still maintained *in situ* (i.e. on farm or in garden).

It was drafted to record different types of information that were discussed at the "Crop Wild Relative and Landrace Conservation Training Workshop" held in Palanga Lithuania, 7-9 September 2011 by the *in situ* National Inventory Focal Points, the ECPGR Documentation and Information Network members and the PGR Secure team working on landraces.

However, it also takes into account the contribution that the ECPGR On-farm Conservation and Management Working Group of the In Situ and On-Farm Conservation Network gave through years to the definition of descriptors for extant landraces (see draft descriptor list downloadable from http://www.ecpgr.cgiar.org/networks/in_situ_and_on_farm/on_farm_wg.html).

The draft descriptor list includes fields related to the Inventory, taxon, landrace, site and farmer identification, the landrace status, characteristics and use and finally fields concerning conservation and monitoring actions eventually taken in favour of the landrace diversity maintenance.

Fields with one asterisk (*) indicate the most relevant fields that were suggested as 'mandatory' by the National Inventory Focal Points and ECPGR Documentation Working Group at the Palanga workshop.

In addition, an added asterisk (**) indicates fields that are of particular relevance also for the PGR secure purposes.

Acknowledgments. Thanks are due to Adriana Alercia (Bioversity International, Rome), Theo van Hintum (Centre for Genetic Resources _ Wageningen University and Research Centre, the Netherlands) and Lorenzo Maggioni (ECPGR Secretariat, Rome) for helpful suggestions and comments.

Novel characterization of crop wild relative and landrace resources as a basis for improved crop breeding' PGR Secure EC FPVII, GA n. 266394

Descriptors For Web-Enabled National *In Situ* Landrace (LR) Inventories

Index

1. INVENTORY IDENTIFICATION

1.1. National Inventory code (NICODE) *

Country code identifying the National *in situ* LR Inventory; the code of the country preparing the National Inventory. For country codes use the three-letter ISO 3166-1 (see: http://unstats.un.org/unsd/methods/m49/m49alpha.htm)
Example: NLD

1.2. National Inventory edition number (NIENUMB) *

Code identifying the edition of the National *in situ* LR Inventory made up of the edition number and the year of publication.
Example: the first edition that is compiled in 2012 will be coded as 001/2012
Example: the second edition that is compiled in 2014 will be coded 002/2014

1.3. Institute code (INSTCODE) *

FAO WIEWS code of the institute (see: http://apps3.fao.org/wiews/institute_query.htm?i_l=EN) who is responsible at the national level for the production of the National *in situ* LR Inventory.
Example: NLD037

2. TAXON IDENTIFICATION

2.1. Genus (GENUS) **
Genus name for taxon, in Latin. Initial uppercase letter required.
Example 1: *Vigna*
Example 2: *Vicia*

2.2. Species (SPECIES) **
Specific epithet portion of the scientific name, in Latin, in lower case letters.
Example 1: *unguiculata*
Example 2: *faba*

2.3. Species authority (SPAUTHOR) **
The authority for the species name.
Example 1: (L.) Wald.
Example 2: L.

2.4. Subtaxa (SUBTAXA)
This field can be used to store any additional taxonomic identifier (in Latin, in lower case letters) preceded by the rank (for example: subspecies, convariety, variety, form, cultivar group). The following abbreviations are foreseen for the rank: 'subsp.' (for subspecies); 'convar.' (for convariety); 'var.' (for variety); 'f.' (for form), 'Group' (for cultivar group).
Example 1: subsp. *sesquipedalis*
Example 2: subsp. *faba* var. *minuta*

2.5. Subtaxa authority (SUBTAUTHOR)
The subtaxa authority at the most detailed taxonomic level.
Example 1: (L.) Verdc.
Example 2: (hort. ex Alef.) Mansf.

2.6. Taxonomic references (TAXREF)
Taxonomy used by Inventory compiler to identify the material (e.g.. The Plant List, Euro+Med PlantBase, GRIN taxonomy, etc)
Example 1: The Plant List
Example 2: GRIN Taxonomy

2.7. Common crop name (CROPNAME)
Name of the crop in colloquial language, preferably English if any.
Example1: yard–long-bean
Example2: tick-bean

3. LANDRACE/POPULATION IDENTIFICATION

3.1. Landrace *in situ* recording date (LRRECDATE)

Date on which the LR was recorded in the current *in situ* Inventory, as YYYYMMDD. Missing data (MM or DD) should be indicated with zeros. Leading zeros are required.
Example: 19980000
Example: 20020620

3.2. Landrace number (LRNUMB) **

Unique progressive number which identifies the *in situ* LR in the Inventory, not to be duplicated (i.e. reassigned) for other LRs or the same LR that is cultivated by other farmers in the current Inventory. To be assigned by the institute which is responsible at the national level for the production of the National LR *in situ* Inventory.
Example: 00010

3.3. Landrace local name/s (LRNAME) **

Local name/s of the LR in the colloquial language of the farm. Free text.
Example: fagiolina, cornetti, fagiolino dall'occhio

3.4. Landrace language code/s (LRLANG)

The language code of the LR local name. Use ISO 639-2 is the alpha-3 code in Codes for the representation of names of languages (see: http://www.loc.gov/standards/iso639-2/php/code_list.php).

4. SITE/LOCATION IDENTIFICATION

4.1. Farm location: primary administrative subdivision of the country where farm is located (FARMFIRSTADMIN)
Name of the primary administrative subdivision of the country where the farm is located for the most part of its extension. Free text.
Example: Umbria Region

4.2. Farm location: secondary administrative subdivision (FARMSECONDADMIN)
Name of the secondary administrative subdivision (within the primary administrative subdivision) of the country where the farm is located. Free text.
Example: Perugia Province

4.3. Farm location: lowest administrative subdivision (FARMLOWESTADMIN)
Name of the lowest administrative subdivision (i.e. municipality). Free text.
Example: Panicale municipality

4.4. Location of the nearest known place. (LOCATION)
Information relevant to the nearest known place, distance from nearest named place, and directions from the nearest named place. Descriptive field as detailed as possible. Free text.
Example: 7 km south of Panicale towards Perugia on SS.74

4.5. Farm coordinates
Coordinates of the farm house or headquarters, to be recorded as either Degrees Minutes and Seconds-DMS or Decimal Degrees- DD as specified below.

4.5.1. Latitude of farm site (FLATDMS) **
Degrees (2 digits) minutes (2 digits), and seconds (2 digits) followed by N (North) or S (South). Every missing digit (minutes or seconds) should be indicated with a zero. Leading zeros are also required for figures that are lower than ten.
Example: 45° (i.e. 45 degrees), 4' (i.e. 4 minutes) and unknown seconds North (Turin latitude) is coded as 450400N
Example: 45°, 4' and 8'' (i.e. 8 seconds) North (Turin_Mole Antonelliana latitude) is coded as 450408N
Example: 40° 25' 6" N (Madrid) is coded as 402506N
Example: 00° 13' 23'' S (Quito) is coded as 001323S
OR
4.5.1.BIS Latitude of farm site (FLATDD) **
Latitude expressed in decimal degrees. Degree measurements should be written with decimal places like 45.069031° with the degree symbol behind the decimals. Every missing digit should be indicated with a zero. Positive values are North of the Equator; negative values are South of the Equator.
Example**:** the same latitude of Turin_Mole Antonelliana reported above is coded as 45.069031°
Example: the Madrid latitude reported above is coded as 40.418446°
Example: the Quito latitude reported above is coded as -0.222900°

4.5.2. Longitude of farm site (FLONGDMS) **
Degrees (3 digits), minutes (2 digits), and seconds (2 digits) followed by E (East) or W (West). Every missing digit (minutes or seconds) should be indicated with a zero. Leading zeros are also required for figures lower than ten.
Example: 7° 41' and unknown seconds E (Turin) is coded as 0074100E (2 zeros before the 7 degrees because longitude varies from 0 and 180 degrees and needs 3 digits).
Example: 7° 41' 36" E (Turin_Mole Antonelliana longitude) is coded as 0074135E

Example: 3°42' 51'' W (Madrid) is coded as 0034251W
Example: 78° 30' 19'' W (Quito) is coded as 0783019W
OR

4.5.2. BIS Longitude of farm site (FLONGDD) **

Longitude expressed in decimal degrees. Degree measurements should be written with decimal places like 74.044636° with the degree symbol behind the decimals. Every missing digit should be indicated with a zero. Positive values are East of the Greenwich Meridian; negative values are West of the Greenwich Meridian.
Example: the same longitude of Turin_Mole Antonelliana reported above is coded as 7.693154°
Example: the same longitude of Madrid reported above is coded as -3.714277°
Example: the same longitude of Quito reported above is coded as -78.505386°

4.5.3. Geodetic datum (FEPSGCODE)

The geodetic datum or spatial reference system upon which the coordinates given in decimal latitude and decimal longitude are based. If not known, use 'not recorded', when not known the default WGS 1984 Datum will be used.
Example: WGS84 (for World Geodetic System 1984 – EPSG 4326)

4.5.4. Geographic data recording system (FGPS)

Data recorded by GPS: Yes or No.

	Code
Yes	10
No	20

4.5.5. Maximum error distance (FRADIALED)

To be compiled if the field GPS is 'No'. The upper limit of the distance (in meters) from the given latitude and longitude describing a circle within which the whole of the described locality must lie.

4.6. Elevation of farm site (FELEVATION) **

Elevation of farm site expressed in meters above sea level. Negative values are allowed.
Example: 763

4.7. Coordinates of the LR site

Coordinates of the field where the LR is/has been grown in the year the Inventory is compiled; to be recorded as either Degrees Minutes and Seconds-DMS or Decimal Degrees- DD, as described above for 'Farm coordinates'.

4.7.1. Latitude of LR site (LRSLATDMS) **

Degrees (2 digits) minutes (2 digits), and seconds (2 digits) followed by N (North) or S (South).
OR

4.7.1.BIS Latitude of LR site (LRSLATDD) **

Latitude expressed in decimal degrees.

4.7.2. Longitude of LR site (LRSLONGDMS) **

Degrees (3 digits), minutes (2 digits), and seconds (2 digits) followed by E (East) or W (West)
OR

4.7.2. BIS Longitude of LR site (LRSLONGITUDEDD) **

Longitude expressed in decimal degrees.

4.7.3. Geodetic datum (LRSEPSGCODE)

The geodetic datum or spatial reference system upon which the coordinates given in decimal latitude and decimal longitude are based. If not known, use 'not recorded', when not known the default WGS 1984 Datum will be used.

4.7.4. Geographic data recording system (LRSGPS)

Data recorded by GPS: Yes or No.

	Code
Yes	10
No	20

4.7.5. Maximum error distance (LRSRADIALED)

To be compiled if the field GPS is 'No'. The upper limit of the distance (in meters) from the given latitude and longitude describing a circle within which the whole of the described locality must lie.

4.8. Elevation of LR site (LRSELEVATION) **

Elevation of LR site expressed in meters above sea level. Negative values are allowed.

5. THE FARMER (I.E. THE MAINTAINER)

(Note: may be not a farmer in a 'legal' sense, he/she can be, for example, a home gardener whose main activity is something different from farming.)

5.1. Farmer identification number (FARMERID)

Unique number identifier of the farmer who maintains the LR and provides information (Landrace maintainer unique ID to be held in database). It is assigned by the institute that is responsible at the national level for the production of the National LR *in situ* Inventory. This number should not be duplicated or reassigned to other unit. This number should be composed of the 'National Inventory Code (NICODE 1.1.)' + 'National Inventory Edition Number (1.2.NIENUMB)' + 'Landrace number (3.2. LRNUMB)'

Example: NLD001/201200010

(Note: it is suggested that farmer details (i.e. farmer name, surname, postal address, email address, phone number/s, etc.) are recorded in a separated and not public database. FARMERID should then correspond to FARMERID of the above mentioned separate database to link the two databases).

5.2. Farmer year of birth (FARMERYB)

Recorded as YYYY. If not certain, indicate that this is an estimate in REMARKS.

5.3. Holding/tenancy of the farm/estate (FARMHT)

See codes in the table below. Multiple choices are allowed since the farm can be made of several types of holdings. Multiple choices are allowed separated by a semicolon (;) without space.

	Code
Owner	**10**
Tenant	**20**
Life tenant	**30**
Cultivating public land	**40**
Other (elaborate in REMARKS)	**99**

5.4. Farmer identification restrictions** (FIR)

Restriction in making the above mentioned (i.e. 5.2. and 5.3.) farmer data publicly available: 'Yes' or 'No'. If 'No' only FARMERID (5.1) will be public.

	Code
Yes	**10**
No	**20**

6. THE LANDRACE

6.1. Landrace total area (LRTOTAREA) *

The total area (ha) cultivated under the inventoried LR on that farm as from farmer statement.

6.2. Landrace cultivation period (LRCULTPER) **

The length of time the LR was cultivated on that farm as from farmer memory, i.e. cultivated for an unknown number of years, over 50 years, less than 50 years; in the latter case it can be specified the time. See codes in the table below.

	Code		Specific code
Does not answer	**10**		
Over 50years	**20**		
Under 50years	**30**		
		Less than 10 ago	31
		11-25 years ago	32
		26-50 years ago	33

6.3. Landrace status (LRSTATUS) **

The status of the LR on that farm, i.e. whether inherent the farm or reintroduced in the farm as from farmer statement. For 'inherent the farm' a cultivation period over 25 years in that farm should be intended. If introduced/reintroduced from other farms it can be specified from where. See codes in the table below. To be eventually elaborated in REMARKS.

	Code		Specific code
Does not answer	**10**		
Inherent[1)]	**20**		
Reintroduced by the family which presently cultivates the LR from a different estate belonging to the same family[2)]	**30**	Provide details under REMARKS	
Introduced/Reintroduced from gene bank	**40**		
		Provide Gene Bank name in REMARKS	
Introduced/Reintroduced from other farms	**50**		
		Neighbouring farm	51
		Farm in the same district	52
		Farm in different district/country	53
Introduced/Reintroduced from the seed market	**60**		
Other (elaborate in REMARKS)	**99**		

[1)] should match with LRCULTPER 20 or 33, at least.

[2)] for example: the very same LR has been grown for several decades and generations in the same family at the same farm/garden, but now it is grown at the summer cottage in different district/neighboring house belonging to the same family.

6.4. Landrace seed/propagation material supply system (LRSSS) **

From where the seed (or propagation material in general) initially came, as from farmer statement. See codes in the table below.

	Code		Specific code
Informal sector	**10**		
		Own family harvest	11
		Exchanges with relatives, neighbours	12
		Exchanges between close villages via barter system	13
		Local / regional market	14
Formal sector	**20**		
		Certified material from the seed market	21
		Genebank (to be specified from which genebank in REMARKS)	22
Does not answer	**30**		
Other (elaborate in REMARKS)	**99**		

6.5. Landrace continuity (LRCONT) *

Whether the LR maintainer plans to continue to grow LR for the foreseeable future. See codes in the table below.

	Code
Undecided	**10**
Will stop next year	**20**
Will continue, but considers changing within a few years	**30**
Will continue as long as possible	**40**
Other (elaborate in REMARKS)	**99**

6.6. Landrace distribution (LRDISTR)

Whether the LR maintainer plans to give/exchange the LR to/with other growers. If 'Yes', fields related to 'to whom' can be filled in. See codes in the table below.

	Code		Specific code
Yes	**10**	To whom:	
		relative	11
		friend or neighbour	12
		another grower	13
		seed/seedlings-swap event	14
		plant genebank	15
No	**20**		
Undecided	**30**		

6.7. Farmer motivations for growing the landrace (LRFARMERMOT) *

Taken from farmer statement. See codes in the table below. Multiple choices are allowed separated by a semicolon (;) without space.

	Code		Specific code		Specific code
Agronomical traits	**10**				
		Easy/simple cultivation required	11		
		Precocity (early development or maturity)	12		
		Lateness	13		
		Lodging resistance	14		
		High yield	15		
		Stable yield	16		
Resistance to stresses	**20**				
		Abiotic factors	21		
				cold	211
				drought	212
				high humidity	213
				salinity	214
		Biotic factors	22		
				fungal/bacterial/virus	221
				insect/nematode/etc	222
Cultural and religious motivations	**30**				
		Personal affection	31		
		Special family food preparations	32		
		Special family ceremonies	33		
		Ritual or religious use of the community	34		
		Local fairs/festivals	35		
		Historical/collector/ amateur interest	36		
Quality traits (taste, fragrance, colour, etc.)	**40**				
Market traits (good storability, easy transformation etc.)	**50**				
Other (Elaborate in REMARKS)	**99**				

6.8. Farmer LR selection criteria (LRFARMERSELCRI)

The main criteria farmer uses when selecting material for propagation. See codes in the table below.

	Code
Yield	**10**
Organ size	**20**
Taste	**30**
Colour	**40**
Shape	**50**
Uniformity	**60**
Other (Elaborate in REMARKS)	**99**

6. 9. Part of the plant used (PPU)

Part/s of the plant used by the farmer, as from farmer statement. See codes in the table below. Multiple choices are allowed separated by a semicolon (;) without space (Bioversity and The Christensen Fund, 2009).

	Code
Entire plant	**10**
Branch	**20**
Seedling/germinated seed	**30**
Gall	**40**
Stem/trunk	**50**
Bark	**60**
Leaf	**70**
Flower/inflorescence	**80**
Fruit/infructescence	**90**
Seed	**100**
Root/corm	**110**
Exudate	**120**
Other (Elaborate in REMARKS)	**999**

6.10. Product use (LRPRODUSE) *

Type of use of the product obtained from the LR: if as direct product or as processed product for larger use, as from farmer statement. See codes in the table below. Multiple choices are allowed separated by a semicolon (;) without space.

	Code		Specific code
As direct product	**10**		
		Food (e.g. vegetable, soups)	11
		Fodder	12
		Spice - aromatic	13
		Medicinal purpose	14
		Odoriferous purpose	15
		Ornamental purpose	16
As processed product	**20**		
		Bakery product	21
		Long term storage culinary product (e.g. canned food)	22
		Distillery product	23
		For oil extraction	24
		For textile fibers production	25
Other(elaborate in REMARKS)	**99**		

6.11. Main destination of the product (LRPRODEST)

Where the product from the LR is mainly destined for use, as from farmer statement. See codes in the table below.

	Code		Specific code
Owner's household	**10**		
Market	**20**		
		in local market	21
		in district / regional markets	22
		national markets	23
		international sale	24
Other (elaborate in REMARKS)	**99**		

6.12. Market landrace demand (LRMARKTDEMAND)

Demand for LR / LR product as from farmer statement. See codes in the table below.

	Code
Does not answer	**10**
Strong existing market demand	**20**
Growing market demand	**30**
Stable market demand	**40**
Falling market demand	**50**
Other (elaborate in REMARKS)	**99**

6.13. Loss risk as for the farmer (LRTHREATF)*

Risk of losing this LR as perceived by the interviewed farmer. It helps to decide if conservation is needed and plan monitoring actions. See codes in the table below.

	Code
Does not answer/know	**10**
Null / scarce	**20**
Low	**30**
Medium	**40**
High	**50**
Other (elaborate in REMARKS)	**99**

6.14. Loss risk as assessed by the collecting team (LRTHREATCT) *

Risk of losing this LR as perceived by the team recording data. It helps to decide if conservation is needed and plan monitoring actions. See codes in the table below.

	Code
Unable to judge/assess	**10**
Null / scarce	**20**
Low	**30**
Medium	**40**
High	**50**
Other (elaborate in REMARKS)	**99**

7. CONSERVATION AND MONITORING

7.1. Conservation actions (CONSERVACTIONS)

Whether any structured and funded *in situ* conservation action related to the LR is in place at the moment of the Inventory compilation. See codes in the table below.

	Code		Specific code
Yes	**10**		
		Policy-based actions	11
		Educational actions (didactic gardens, living museum etc.)	12
		Other (To be specified in REMARKS)	99
No	**20**		
Unknown	**30**		

7.2. Conservation organiser (CONORG)

To be compiled if CONSERVACTIONS is 'Yes'. Name of the Authority/Public subject/Farmer organisation/Foundation that has organised the conservation action. Free text.

7.3. Monitoring (MONIT)

Whether any monitoring of the *in situ* maintenance of LR is foreseen across years. Yes or No.

	Code
Yes	**10**
No	**20**

7.4. Monitoring responsible (MONITRESP)

To be compiled if MONIT is 'Yes'. Indicate who is in charge of monitoring. Free text.

7.5. Monitoring interval (MONINT)

To be compiled if MONIT is 'Yes'. Indicate the monitoring interval in years.

7.6. Safety duplication *ex situ* (EXSECURE) *

State if a sample was collected for safety duplication in gene bank. Yes or No.

	Code
Yes	**10**
No	**20**

7.7. Location of *ex situ* duplicate/s (EXDUPL) *

To be filled in if the answer of EXSECURE (7.6) is 'Yes'. FAO WIEWS institute code/s of the institute/s where an *ex situ* safety duplicate of the landrace has been eventually deposited. The codes consist of the 3-letter ISO 3166 country code of the country where the institute is located plus a number. Multiple codes are separated by a semicolon (;) without space.

8. REMARKS

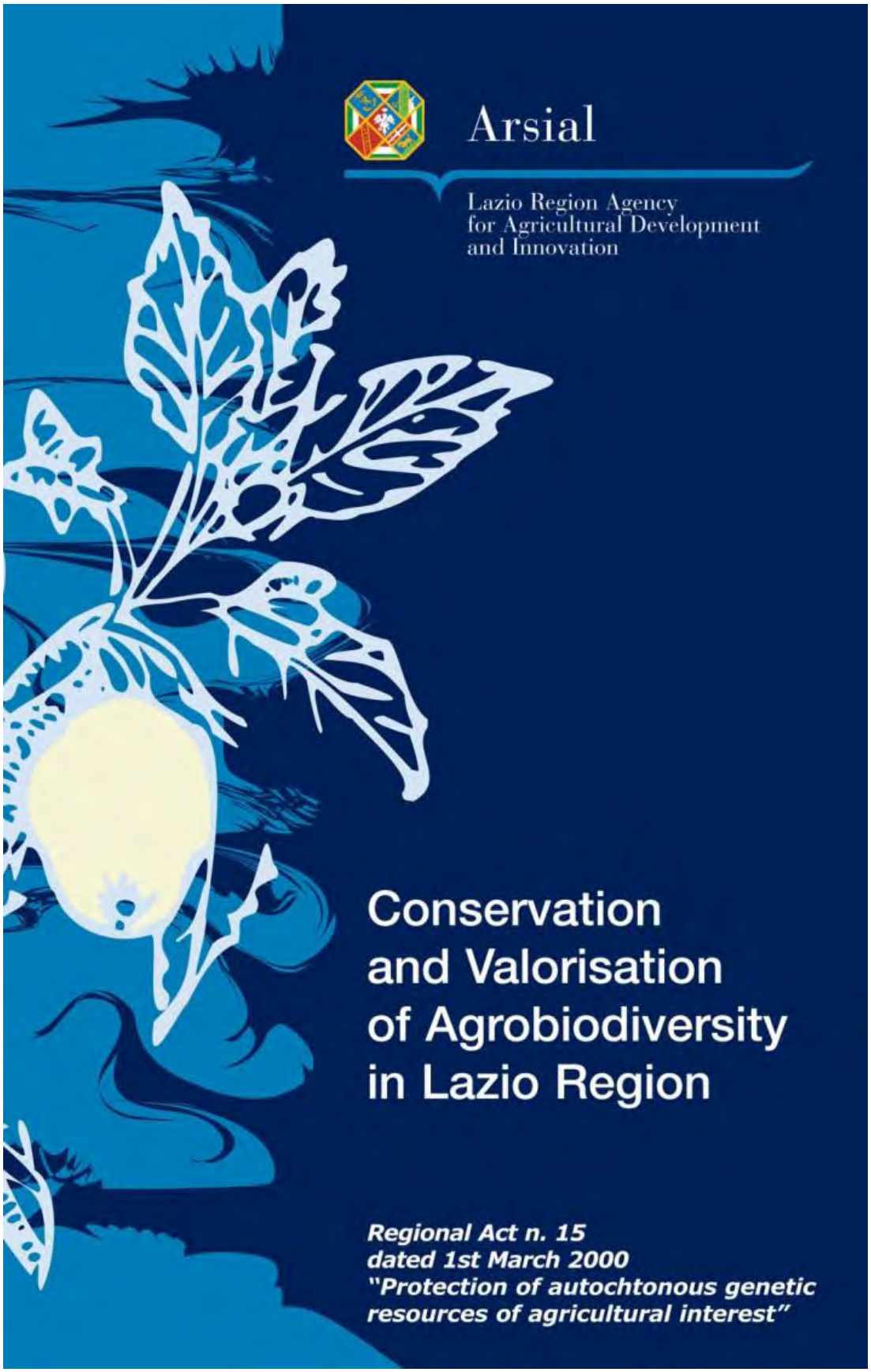
The remarks field is used to add notes or to elaborate on descriptors with value 99 or 999 (=Other). Prefix remarks with the field name they refer to and make them follow by a colon (:). Distinct remarks referring to different fields are separated by semicolons (;) without space.
Examples: The farmer often observes flower colour instability; PRODUCTUSE: chaff also used for fuel pellet and pillow filling; LRMARKTDEMAND: falling locally but growing in the district nearby.

Cited bibliography

Bioversity and The Christensen Fund, 2009. Descriptors for farmer's knowledge of plants. Bioversity International, Rome, Italy and The Christensen Fund, Palo Alto, California, USA.

ISBN 978 88 87652 27 7
3736 - 203987

Annex 5: Law of Lazio Region


Arsial
Lazio Region Agency
for Agricultural Development
and Innovation
Conservation
and Valorisation
of Agrobiodiversity
in Lazio Region
Regional Act n. 15
dated 1st March 2000
"Protection of autochtonous genetic
resources of agricultural interest"

Introduction

The expression "agricultural biodiversity", or "agrobiodiversity", is used to indicate the entire heritage of plant, animal and microbial genetic resources as a result of biological mechanisms and natural selection in the long period of evolution; these resources have been accumulated since the beginning of agriculture, about 10,000 years ago, by generations of farmers that domesticated, selected, and transferred, from different geographical areas, all those species useful for supplying mankind.

Thanks to the heterogeneity of its landscape, due to its rough horography and to a set of quite variable bioclimatic factors, Italy is one of the richest country in flora and fauna, which is biodiversity, in the entire European continent.

Its central position in the Mediterranean, together with a more ancient and extended presence of man than elsewhere, has allowed the overlap of a number of flora and fauna components whose evolution has been very deeply affected by the action of man. Even more than in other countries, this diversity of land layouts has allowed the establishment and conservation of a large variety of cultivated plants and domestic animals well adapted to the different agroecosystems that have developed in the millennia.

The Lazio Region itself, is located centrally in the Italian peninsula, and is characterised by a complex morphology and by a great bioclimate variability. Because of all the peculiarities described above, many authors agree on considering the Lazio Region very rich in biodiversity.

Since the second half of '900, in our country, as in the rest of the world, the development of an intensive type of agriculture and animal rearing has favoured the spreading of new plant cultivars and breeds of zootechnical interest, characterised by a greater yield and uniformity of genetic characters. This together with the undergone deep changes in rural and agroforest ecosystems caused a significant decrease in biodiversity. The progressive loss of diversity of species and breed/variety level is called "genetic erosion".

The loss of biodiversity is always a loss of wealth in our environment because the loss of species and traditional varieties implies the loss of landscapes, of production systems, of know-how and of local cultures.

Agriculture, in particular ecosustainable agriculture, can not leave aside the identification and conservation of this genetic heritage which is threatened with extinction, though perfectly adapted to the environment in which it is conserved.

Therefore its protection is extremely important both for the economic and cultural enhancement of traditional agricultural and animal productions, and for the conservation of the rural and agro-forest landscape.

Moreover, considering the fast evolution of climatic conditions, this genetic heritage represents a precious reserve from which to draw on genes from new selection programmes aimed by ecosustainability. Ecosustainable agriculture and livestock rearing have to be suitable for more and more difficult environmental conditions

A law for the protection of agro biodiversity in Lazio

Within the policies of development, promotion and protection of agroecosystems and quality productions, based on the indications of the Convention on Biodiversity (CBD, Rio de Janeiro 1992), implement by Italy with the Act no.124 dated 14/04/1994, has issued the Regional Act no.15 dated 1 March 2000 "Protection of autochthonous genetic resources of agricultural interest".

The Regional Law protects all species, races, populations, ecotypes, clones, and cultivars, including the wild species of the cultivated plant species, as well as the animal breeds and populations of zootechnical interest:

- that are autochthonous, i.e. are original to Lazio or have been introduced and have integrated into the agroecosystem of Lazio at least for the past fifty years;
- that are of agricultural interest i.e. are used for agricultural, zootechnical, agro-forest;
- for which there is an economic, scientific, environmental, and cultural interest;
- that are threatened with genetic erosion caused by abandonment or by genetic hybridisation with the introduction of new, more productive, resistant cultivars or animal races.

Moreover the Region also protects all genetic resources that have disappeared from the regional territory but are currently conserved in experimental institutions, botanical gardens, public and private genetic collections and banks, also in other Regions and countries.
The Act entrusts ARSIAL (Regional Agency for Agricultural Development and Innovation in Lazio) with the management of the two operating tools with which protection is implemented: the Regional Voluntary Register and the Conservation and Safety Network.

Regional Voluntary Register

The Regional Voluntary Register is the official repertoire of the Lazio Region, where the autochthonous genetic resources of agricultural interest at risk of genetic erosion are registered subject to the opinion of two Scientific Commissions, one for the Plant Sector and one for the Animal Sector.
In the Register, available on line on ARSIAL's website, are documented the morphological characteristics and the historical and technical information concerning every genetic resource.
The registration may be carried out through ARSIAL initiative or subsequently throughout the Regional Committee proposal, by public or scientific institutions, by private organizations or by a single citizen proposal. The registration form, is available on ARSIAL's website, it must be submitted to ARSIAL which will record the genetic resource in the Register, without charging.
The genetic resources can be withdrawn from the Register, whenever they do not fulfil the law specifications any longer.

GENETIC RESOURCES REGISTERED IN THE RVR

(1th May 2010)

n. 172 plants and n.26 animals

TREES	N°	HERBACEOUS	N°	ANIMALS	N°
Apricot	2	Strawberry	1	Cow	1
Azzeruolo	1	Garlic	2	Ass	4
Chestnut	1	Tomato	3	Horse	**7**
Cherry (sweet)	14	Pepper	1	Goat	4
Apple	**36**	Zucchini	1	Sheep	2
Pomegranate	4	Celery	1	Pig	3
Hazelnut	3	Artichoke	2	Chicken	1
Olive	13	Fennel	1	Rabbit	1
Pear	23	Bean	**15**	Crayfish	1
Peach	4	Chickpeace	1	Carpione	1
Plum	4	Lentil	3	Troute	1
Wine grapes	28	Emmer	2		
Table grapes	4	Corn	1		
Cherry (sour)	1				
	138		**34**		**26**

Rural Development Program of the Region of Lazio (RDP) 2007-2013 and agricultural biodiversity protection measures

Every year the RDP genetic resources lists are updated with knew resources registered on the Regional Voluntary Register, so to grant the economic support provided by the two measures, Action 214.8 – Animal Agricultural Biodiversity Protection and Action 214.9 – Plant Agricultural Biodiversity Protection, to those who want to cultivate or breed the protected genetic resources.

ENTITY OF THE GRANTS TO FARMERS THAT COLTIVATE/BREED OR MOLTIPLICATE ON FARM, *IN SITU*, THE PROTECTED VEGETABLES AND ANINALS GENETIC RESOURCES

CEREALS: 250-300* Euro/ha
HORTICULTURE CROPS: 500-600* Euro/ha
TREE-PLANTS: 800-900* Euro/ha
SINGLE TREE: 70-90* Euro/plant
Up to a maximum of 5 tree-plants per variety

ANIMALS: 200 Euro/LU (Livestock Unit)

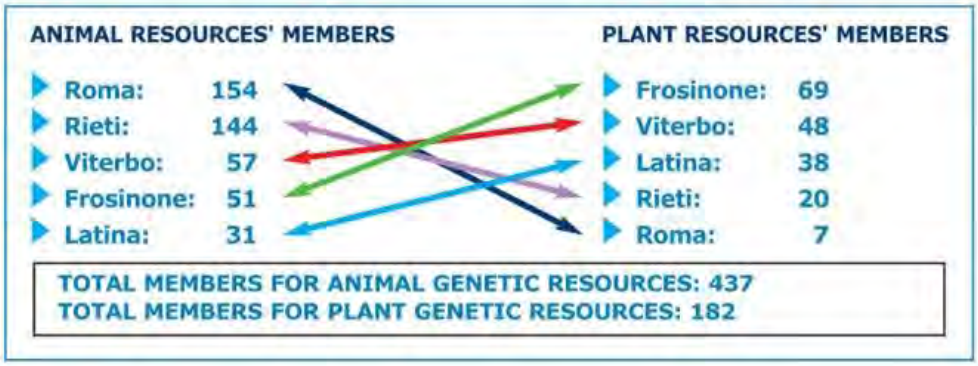
*The maximum amount given to who cultivates ***in situ*** protected local varieties to produce seeds and/or multiplication materials, following a specific **Disciplinary** worked out by **ARSIAL** together with the **Servizio Fitosanitario Regionale.**

Conservation and Safety Network

Anyone that owns, grows, or breeds plants or animals registered in the Regional Voluntary Register may become a member of the Conservation and Safety Network managed and coordinated by ARSIAL. Also other organizations which can become members of the network are: municipalities, universities, research institutions, botanical gardens, national parks, nurseries, individual farmers, and associations of farmers.
The Network aspires in the development of an economic benefit that should make the active conservation of protected genetic resources possible.
The aims of the Conservation and Safety Network can be summarised as follows:

- to support *in situ* and *on farms* conservation of protected genetic resources, cultivating and the breeding of them on farms, the distribution area where they have been selected;
- where possible to favour the reintroduction or extension of culture or breeding of protected genetic resources;
- to assign to farmers or "guardian" breeders, under the strict control of ARSIAL, the multiplication of genetic resources that they themselves have conserved up to present day, by providing them the necessary assistance to enhance the techniques for the multiplication and propagation of material;
- to control the exchange of the propagation material produced and to make it available both to the farmers that apply for it for cultivation or livestock rearing, and for scientific purposes such as genetic selection and improvement;
- to apply cultivation or livestock rearing models, studied on the basis of those adopted by tradition, that should exalt the quality and productivity of the protected genetic resources;
- to coordinate the subjects included in the Network in order to promote the economic and cultural enhancement of the genetic resources, protected by law, through the establishment of protection associations, consortia or protected trademarks and its involvement in wine and food fairs.

N° Members of the Conservation and Safety Network per District



Agricultural autochthonous genetic resources census

In order to know, to protect and to increase the value of the autochthonous genetic heritage of Lazio Region, ARSIAL is carrying out a census on the entire regional territory of plant and animal resources threatened by genetic erosion.

The census activity consist in genetic resources recognition that have been classified and kept in scientific institutions' collections in Italy and abroad; in a bibliographic research, including the examination of archives to verify the historical autochthony of the resource found; and in an active search on the entire territory for the genetic resources in a state of abandonment.

Local population is involved in the research and directly involved in the census and in the rediscovery of the autochthonous genetic heritage they have, with all the traditions linked to it. The census in progress, includes, through ethnographic methods, a deepening of the social-cultural knowledge linked to biodiversity, making possible its potential economic valuation and the risk related to the loss of biodiversity and culture. Interviews on farms, give the possibility to collect audio-visual documentation on traditions and on the culture of small local communities of farmers resource keepers

"Piazza del popolo", Roma, 1890

Monte S. Biagio (LT) 2007 Capra Bianca Monticellana

The technical-scientific census approach provides a description and a classification of the resources found. All the genetic plant and animal resources found are accurately described in their morphologic, physiologic and genetic characteristics, also through molecular analysis, together with the environmental characteristics of the agroecosystem in which they have been conserved. Information will be gathered on the distribution area of cultivation and on the agronomic practices traditionally used.

Plants propagation material is collected for comparative research studies in nursery, for the classification of the variety found and for its conservation in *ex situ* Collection Fields and in ARSIAL's Germplasm Bank.

ARSIAL also takes care of the evaluation of the TGA (Autochthonous Genetic Types) population entity, of the breed standards definition and its registration in the National Books of Italian Autochthonous Breeds.

The research activity is carried out in collaboration with different scientific institutions.

Census and characterisation of fruit trees germplasm: the activity is carried out in collaboration with the Plant Production Department of Tuscia University, Viterbo and with CRA – FRU (Centro di Ricerca per la Frutticoltura – Rome).

Census and characterisation of grapevine germplasm: the activity is carried out in Lazio Region's project "Agricultural Quality", for the valorisation of regional quality productions, and in collaboration with CRA-VIT (Centro di Ricerca per la Viticoltura – Conegliano Veneto).

Census and characterisation of olive germplasm: the activity is carried out in collaboration with C.R.A. - OLI (Centro di Ricerca per l'Olivicoltura and the Industria Olearia – Spoleto).

Home Garden
Valle dell'Aniene

Experimental Field
ARSIAL

Census and characterisation of crop germplasm: in range of Crop Seeds Operative Program – Lazio (financed by MiPAAF) and under the Scientific Supervision of two experts, ARSIAL has enhance the landraces (crop local varieties) census activity for their conservation and for on farm multiplication.

Census and characterisation of TGA animals (Autochthonous Genetic Types): The activity is carried out in collaboration with ConSDABI (Consorzio per la Sperimentazione, Divulgazione e Applicazione di Biotecniche Innovative).

To reduce the risk of animal and plant genetic heritage loss, to support the "active" conservation *in situ* and *on farm*, ARSIAL has started projects for their economic and cultural valorisation.

Ponzano Romano (RM)
2009
Cavallo
Maremmano
Tradizionale

Monte S. Biagio (LT)
2007
Capra Bianca
Monticellana

REGIONAL VOLONTARY REGISTER

GENETIC RESOURCES REGISTERED UP TO DATE 1ST MAY 2010

Arsial

ANIMAL GENETIC

Animals	Species	Breed Name	Livestock Year Book/Genealogical Book
Equidae	*Equus caballus L.*	Cavallo Maremmano	Genealogical Book - ANAM
		Cavallo Maremmano Tradizionale	In stage of registration on the Livestock Year Book
		Cavallo Tiro Pesante Rapido (TPR)	Genealogical Book - ANACAITPR
		Cavallo del Circolano	
		Pony di Esperia*	Livestock Year Book - AIA
		Cavallo Tolfetano	Livestock Year Book - AIA
		Cavallo Lipizzano	Genealogical Book - CRA
	Equus asinus L.	Asino dell'Amiata	Livestock Year Book - AIA
		Asino di Martina Franca	Livestock Year Book - AIA
		Asino dei Monti Lepini	In stage of registration on the Livestock Year Book
		Asino Ragusano	Livestock Year Book - AIA
Cattle	*Bos taurus L.*	Bovino Maremmano	Genealogical Book - ANABIC
Goates	*Capra hircus L.*	Capra Bianca Monticellana	Livestock Year Book - ASSONAPA
		Capra Grigia Ciociara	Livestock Year Book - ASSONAPA
		Capra Capestrina	Livestock Year Book - ASSONAPA
		Capra Fulva	In stage of registration on the Livestock Year Book
Shep	*Ovis aries L.*	Pecora Sopravvissana	Genealogical Book - ASSONAPA
		Pecora Quadricorna	
Pigs	*Sus domesticus L.*	Suino Casertana	Livestock Year Book - ANAS
		Suino Nero del Reatino	Livestock Year Book - Suino Apulo-Calabrese - ANAS
		Suino Nero dei Monti Lepini	Livestock Year Book - Suino Apulo-Calabrese - ANAS
Courtyard Animals	*Gallus gallus L.*	Pollo Ancona	
	Oryctolagus cuniculus L.	Coniglio Leprino di Viterbo	
Fish	*Austropotamobius pallipes L.*	Gambero Nostrano di fiume	
	Salmo fibreni L.	Carpione del Fibreno	
	Salmo macrostigma L.	Trota Macrostigma	

Capra Grigia Ciociara

Capra Fulva

RESOURCES

Arsial

	Consistence, N° reproduction female in EU	Distribution area for *in situ* breeding
	2394	LAZIO
	118	LAZIO
	3175	province di VITERBO, ROMA, LATINA, RIETI
	23	provincia di RIETI
	1012	LAZIO
	1132	province di VITERBO, ROMA, LATINA, RIETI
	4067	LAZIO
	622	province di VITERBO, ROMA, RIETI
	309	province di VITERBO, LATINA, RIETI
	4	province di LATINA, FROSINONE, ROMA
	1256	provincia di RIETI
	5242	LAZIO
	3000	province di FROSINONE, LATINA
	119	province di FROSINONE, LATINA
	1000	province di LATINA, FROSINONE
	200	province di LATINA, ROMA
	4330	LAZIO
	300	provincia di FROSINONE
	421	province di LATINA, FROSINONE
	191	provincia di ROMA, LATINA, FROSINONE, RIETI
	40	provincia di ROMA, LATINA, FROSINONE
	300	provincia di ROMA
		LAZIO
		Alto Lazio
		Bacino del Fibreno
		Bacino del Fibreno

Suino Nero Casertano

Suino Nero Reatino

Suino Nero dei Monti Lepini

Capra Bianca Monticellana

Pecora Quadricorna

Arsial

Agenzia Regionale per lo Sviluppo e l'Innovazione dell'Agricoltura del Lazio

PLANT GENETIC

Fruit tree

	Variety	Conservation *in situ* distribution area
Apple(*Malus domestica* Bork)	Agre di Sezze[a]	Lazio
	Agre di Viterbo[a]	Lazio
	Appia[a]	Lazio
	Bebè[a]	Poggio Mirteto (RI)
	Calvilla[a]	Lazio
	Capo d'Asino[a]	Lazio
	Cerina (Zitella, Gelata)[a]	Lazio
	Cipolla[a]	Lazio
	Cocoina[a]	Lazio
	Dolce di Sezze[a]	Lazio
	Francesca[a]	Lazio
	Francesca di Castellini[a]	Castellini e Sora (FR)
	Mbriachella[a]	Provincia di Roma e Rieti
	Nana[a]	Lazio
	Paoluccia[a]	Lazio
	Paradisa[a]	Lazio
	Pianella (Rosa)[a]	Lazio
	Pontella[a]	Lazio
	Rosa[a]	Lazio
	Rosa gentile[a]	Provincia di Roma
	Rosa piatta cinciara[a]	Provincia di Frosinone
	S. Giovanni(a)	Provincia di Viterbo
	Spugnaccia[a]	Provincia di Viterbo
	Velletrana[a]	Subiaco e Velletri (RM)
	Verdona[a]	Provincia di Rieti
	Verdonica[a]	Provincia di Rieti
	Zuccherina o Gelata[a]	Lazio
	Fragola[a]	Lazio
	Gaetana[a]	Lazio
	Maiolina[a]	Lazio
	Prata(a)	Lazio
	Rosetta o Rosone[a]	Lazio
	S. Agostino[a]	Lazio
	Sublacense[a]	Provincia di Roma
	Tommorella[a]	Lazio
	Limoncella[a]	Lazio
Pear (*Pyrus Communis* L.)	Abitir[a]	Alatri (FR) e limitrofi
	De la Preta[a]	Grisciano (RI) e limitrofi
	Del Principe[a]	Soriano al Cimino (VT)
	Montelcone[a]	Castiglione in Teverina, Bolsena, Acquapendente (VT)
	Angina o Ancina[a]	Province di: Roma e Latina
	Baccelli[a]	Genazzano (RM) e limitrofi
	Barocca - Invernale di S. Vito[a]	Genazzano (RM) e limitrofi
	Biancona[a]	Province di: Roma e Latina
	Bottiglia[a]	Alatri (FR)
	Campana[a]	Borbona (RI)
	Cannella[a]	Grisciano (RI)
	Castresi[a]	Province di: Roma e Latina
	Cocozzola (Cucuzzara, Zucchina)[a]	Provincia di Roma
	Di Posta[a]	Provincia di Frosinone
	Di S. Cristina (Peñazza)[a]	Bolsena (VT)
	Fegatella[a]	Province di: Roma e Latina
	Pero-melo[a]	Province di: Roma e Latina
	Rossa di Maenza[a]	Maenza (LT) e limitrofi
	Sellecca[a]	Alatri, Ferentino e limitrofi (FR)
	Spadona di Castel Madama[a]	Castel Madama (RM) e limitrofi
	Spina di Valle Imperiale[a]	Province di: Roma e Latina
	Spina (Spinacarpi, Coccia d'Asino, Casentina)[a]	Camerio Sabino (RI), Palombara Sabina (RM)
	Trentonce[a]	Borbona (RI)
	Tunnella[a]	Province di: Roma e Latina


Mela Bebe


Mela Limoncella


Mela Cerina


Mela Rossa di Alatri


Mela Mbriachella


Pera Bottiglia

Genetic erosion threat :
(a)→ High
(m)→ Medium
(b)→ Low

RESOURCES

Germplasm

Arsial

Agenzia Regionale per lo Sviluppo e l'Innovazione dell'Agricoltura del Lazio

Variety		Conservation *in situ* distribution area
Apricot (*Prunus armeniaca* L.)	Di Monteporzio [90]	Frascati, Monteporzio Catone,Colonna, Montecompatri (RM)
	S. Maria in Gradi -AL1 [19]	Provincia di Viterbo
Azzeruolo (*Crataegus azarolus* L.)	Azzeruolo Rosso [64]	Lazio
Chestnut (*Castanea sativa* Mill.)	Marrone Prematico (Prematico, Primaticcio) [101]	Provincia di Viterbo e Comune di Manziana (RM)
Cherry-sweet (*Prunus avium* L.)	Bella di Pistoia [31]	Province di Rieti, Viterbo e Roma
	Biancona [8]	Province di Rieti, Viterbo e Roma
	Buonora [9]	Province di Rieti, Viterbo e Roma
	Core (Durmna) [42]	Province di Rieti, Viterbo e Roma
	Crognolo [54]	Province di Rieti, Viterbo e Roma
	Graffione [66]	Province di Rieti, Viterbo e Roma
	Maggiolina [76]	Province di Rieti, Viterbo e Roma
	Morona [83]	Province di Rieti, Viterbo e Roma
	Ravenna a gambo corto [93]	Province di Rieti, Viterbo e Roma
	Ravenna a gambo lungo [94]	Province di Rieti, Viterbo e Roma
	Ravenna precoce [95]	Province di Rieti e Roma
	Ravenna tardiva [96]	Province di Rieti e Roma
	Petrocca [85]	Montelibretti e limitrofi
	Lingua de Fori [60]	Montelibretti e limitrofi
Pomegranate (*Punica granatum* L.)	Di Gaeta MG1 [50]	Provincia di Latina
	Di Gaeta MG2 [51]	Provincia di Latina
	Di Formia MG3 [52]	Provincia di Latina
	Di Formia MG4 [53]	Provincia di Latina
Hazelnut (*Corylus avellana* L.)	Barrettona [99]	Provincia di Viterbo
	Casanale o nostrale (Comune di Sicilia) [14]	Provincia di Viterbo
	Rosa (Nocchia R.) [89]	Provincia di Viterbo
Peach (*Prunus persica* L.)	Ala (a)	Velletri (RM) e limitrofi
	Reginella Pesca Uovo (Early Crawford) (a)	Provincia di Roma e Viterbo
	Reginella II (a)	Provincia di Roma
	Tardiva di San Vittorino (a)	Tivoli (RM) e limitrofi
Plum (*Prunus insititia* L.)	Coscia di Monaca di Ponzano Romano (m)	Ponzano Romano (RM)
	Di Gallinaro (m)	Sora (FR)
	Recinella (a)	Giuliano di Roma e limitrofi (RM)
	S. Giovanni (m)	Arce (FR)
Cherry-sour (*Prunus cerasus* L.)	Nana dei Castelli (a)	Castelli Romani (RM)


Lingua de Fori


Graffione


Ravenna precoce


Bella di Pistoia


Morona


Pera Abitir


Albicocco di S. Maria in Gradi


Albicocco di Monteporzio


Pera Uncino


Pesca Reginella I


Pesca Reginella II

Arsial

Agenzia Regionale per lo Sviluppo e l'Innovazione dell'Agricoltura del Lazio

PLANT GENETIC

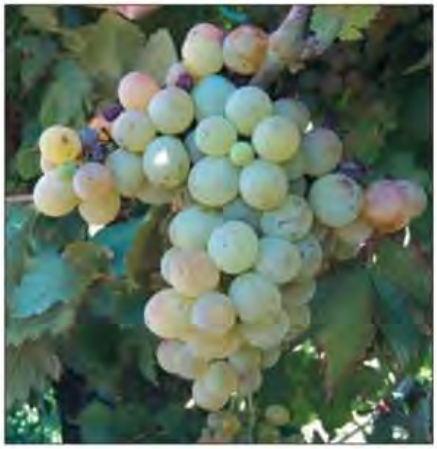
Grapevine

	Variety	Conservation *in situ* distribution area
GRAPEVINE (*Vitis vinifera* L.)	**Wine registered in the Regional Register of Wine Varieties**	
	Abbuoto n. (m)	Provincie di Viterbo, Roma, Latina
	Aleatico n. (b)	Provincie di Viterbo, Roma, Latina, Rieti
	Bombino bianco b. (b)	Lazio
	Bombino nero n. (m)	Province di Roma, Frosinone
	Cannaiola di Marta n. (m)	Marta, Bolsena, Tuscania (VT)
	Capolongo b. (m)	Provincia di Frosinone
	Greco b. (m)	Lazio
	Greco bianco b. (m)	Provincie di: Viterbo, Roma, Latina
	Greco nero n. (m)	Provincie di: Viterbo, Roma, Latina
	Lecinaro n. (m)	Provincia di Frosinone
	Maturano b. (Motulano) (m)	Provincia di Frosinone
	Moscato di Terracina (b)	Province di: Roma, Latina, Frosinone
	Nero Buono n. (b)	Province di: Latina, Roma
	Olivella nera n. (m)	Provincia di Frosinone
	Pampanaro b. (m)	Provincia di Frosinone
	Passerina b. (b)	Province di: Roma, Frosinone
	Pecorino b. (m)	Provincia di Rieti
	Rosciola r. (m)	Provincia di Roma
	Verdello b. (b)	Province di: Viterbo, Rieti
	Wine in a registration stage in the Regional Register of Wine Varieties	
	Albarosa (a)	Grottaferrata
	Angelica (a)	Frosinone
	Nerone (a)	Agosta, Canterano, Cervara di Roma, Gerano, Marano Equo, Rocca Canterano, Subiaco
	Nostrano (a)	Piglio (FR)
	Uva dei vecchi (a)	Montefiascone (VT)
	Cesanese di Castelfranco (a)	Rieti
	Maturano nero (Motulano) (a)	Frosinone
	Pedino (a)	Montefiascone (VT)
	Romanesco (a)	Montefiascone (VT)
	Uva Mecella (a)	Pecosolido (FR)
	Table Grapevine	
	Pellegrina (m)	Lazio
	Pizzutello bianco b. (den. locali: Pizzutello di Tivoli, Dito di Donna) (b)	Provincie di: Roma, Latina
	Pizzutello nero (a)	Province di: Roma e Latina

Genetic erosion threat:
(a)→ High
(m)→ Medium
(b)→ Low

additional 10 autochthonous grapevine varieties are in characterization

Cesanese di Castelfranco



Uva dei vecchi

RESOURCES

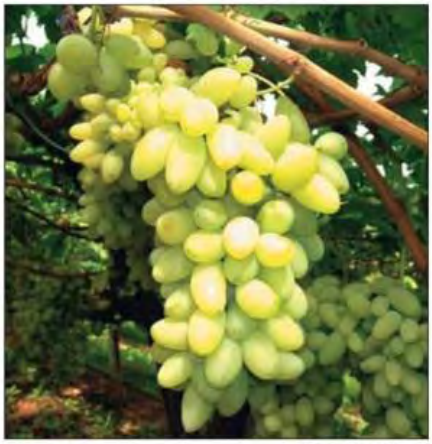
Germplasm

Arsial

Uva Mecella

Uva Angelica

Pizzutello nero



Pizzutello di Tivoli

Uva Albarosa

Uva Zinnavacca

Arsial

Agenzia Regionale per lo Sviluppo e l'Innovazione dell'Agricoltura del Lazio

PLANT GENETIC

Olive Germ

Variety		Conservation *in situ* distribution area
Olive (*Olea Europea* L.)	Oliva dei Monti [m]	Monti Lucretili
	Palmuta [a]	Tivoli, S Polo dei Cavalieri, Marcellina e limitrofi
	Rappatana [b]	Tivoli, Marcellina e limitrofi
	Romana [m]	Tivoli, Marcellina e limitrofi
	Roscetta Gagliarda [a]	Tivoli, Marcellina e limitrofi
	Rosciola Nostrana [a]	Tivoli, Marcellina e limitrofi
	Rotonda di Tivoli [a]	Tivoli, Marcellina e limitrofi
	Salvia cl. Montelibretti 6 [m]	Montelibretti, palombara Sabina, Neroli (RM)
	Sbuciasacchi [a]	Tivoli, Marcellina e limitrofi
	Sirole cl. Sorate 1 [b]	Civitella S.Paolo, Fiano Romano, Filacciano, Nazzano, Ponzano Romano, Rignano, S. oreste, Torrita Tiberina (RM)
	Marina [m]	S. Donato Val Valcomino, Alvito, Gallinaro, Settefrati (FR)
	Minutella Casarè [m]	Priverno, Sonnino, Itri (LT)
	Vallanella [m]	Priverno, Sonnino, Itri (LT)

Genetic erosion threat:
(a)→ High
(m)→ Medium
(b)→ Low

additional 10 autochthonous olive varieties are in characterization

Oliva dei Monti

RESOURCES

plasm

Arsial

Rappaiana

Romana

Olivo Rotondo di Tivoli

Sbuciasacchi

Rosciola nostrana

Palmuta

Arsial

PLANT GENETIC

Herbaceous

CULTURE	Species	Landraces	Genetic erosion threat	Conservation *in situ* distribution area
COMMON BEAN	*Phaseolus vulgaris* L.	Fagiolo a Pisello	High	Colle di Tora (RI)
		Fagiolina Arsolana	High	Arsoli, Marano Equo, Vivaro Romano, Riofreddo, Vallinfreda, Vallepietra (RM)
		Fagiolo Cioncone	High	
		Fagiolo Regina di Marano Equo	Medium	
		Fagiolo Cappellette di Vallepietra	High	
		Fagiolo Bommenese di Vallepietra	High	
		Pallino di Vallepietra	High	
		Fagiolo Ciavattone piccolo	High	Provincia di Viterbo
		Fagiolo di Gradoli o del Purgatorio	Medium	
		Fagiolo Giallo	High	
		Fagiolo Solfarino	High	
		Fagiolo Verdolino	High	
		Fagiolo Cannellino di Atina	Basso	Atina, Casalattico, Civitaveri, Gallinaro, Picinisco, Villa Latina (FR)
		Fagiolo Borbonicano	Medium	Borbona (RI)
SPAIN BEAN	*Phaseolus coccineus* L.	Fagiolona di Vallepietra	High	Arsoli, Marano Equo, Vivaro Romano, Riofreddo, Vallinfreda, Vallepietra (RM)
LENTIL	*Lens culinaris* L.	Lenticchia di Onano	Medium	Onano (VT)
		Lenticchia di Rascino	Medium	Fiamignano e Petrella Salto (RI)
		Lenticchia di Ventotene	Medium	Ventotene (LT)
CICKPEA	*Cicer arietinum* L.	Cece di Canepina	High	Canepina (VT)
STRAWBERRY	*Fragaria vesca* L.	Fragolina di Nemi	High	Nemi e comuni limitrofi
TOMATO	*Lycopersicum esculentum* L.	Pomodoro Scatolone di Bolsena	High	Bolsena (VT)
		Pomodoro Spagnoletta di Formia e Gaeta	Medium	Itri, Gaeta, Formia, Minturno, Castelforte, Spigno Saturnia, SS Cosma e Damiano (LT)
		Pomodoro da secca di Minturno	High	Minturno, Formia e Castelforte (LT)
PEPPER	*Capsicum annum* L.	Peperone Corneto di Pontecorvo	Low	Pontecorvo, Esperia, S. Giorgio a Liri, Pignataro Interamna, Villa S. Lucia, Piedimonte S. Germano, Aquino, Castrocielo, Roccasecca, San Giovanni Incarico (FR)
ZUCCHINI	*Cucurbita pepo* L.	Zucchino di Cervetri tipo Romanesco	High	Cervetri (RM)
CELERY	*Apium graveolens* L.	Sedano Bianco di Sperlonga	Low	Fondi e Sperlonga (LT)
FENNEL	*Foenicum vulgare* L.	Finocchio di Tarquinia	High	Tarquinia, Monte Romano, Montalto di Castro e Tuscania (VT) Allumiere e Civitavecchia (RM)
ARTICHOKE	*Cynara cardunculus* var. *scolymus* L.	Carciofo Campagnano	Medium	Provincie di: Roma, Viterbo e Latina
		Carciofo Castellanese	Medium	Provincie di: Roma, Viterbo e Latina
GARLIC	*Allium sativum* L.	Aglio Rosso di Castelliri	Medium	Castelliri e Isola Liri (FR)
		Aglio Rosso di Proceno	Medium	Proceno (VT)
EMMER	*Triticum dicoccum* Schrank.	Farro dell'alta Valle del Turano e della Valle dell'Aniene		Cittù Romano, Riofreddo, Vallinfreda e Vivaro (RM)
		Farro dell'Alta Valle del Tronto	Medium	Licenessa e Amatrice (RI)
MAIZE	*Zea mays* L.	Mais Agostinella	High	Vallepietra (RM)

In range of Crop Seeds Operative Program 600 of about 50 crop species indications have been found. Throw this indication 271 accessions (seeds donated by farmers) have been collected and about 100 morph-physiologically characterized.
Currently are in characterization 82 accessions:

garlic	(2)	strawberry	(1)	zucchini	(2)
rapa-broccoletto	(16)	lentil	(2)	red clover	(1)
chickpea	(1)	maize	(11)	alfalfa	(4)
cicerchia	(3)	tomato	(11)		
bean	(24)	pumpkin	(4)		

RESOURCES

Germplasm

Arsial

Aglio Rosso di Castelliri

Pomodoro Scatolone di Bolsena

Mais Agostinella

Zucchino di Cerveteri

Fasciolone di Vallepietra

Carciofo Campagnano

Sedano Bianco di Sperlonga

Lenticchia di Ventotene

Farro dell'Alta Valle del Tronto

Finocchio di Tarquinia

Peperone Cornetto di Pontecorvo

Soil biomonitoring

Beyond the activities related to the application of the Regional Act 15/2000, in 2005 a programme on **soil biological fertility and microbial diversity monitoring** of Lazio Region has started, in collaboration with CRA-RPS "Centro di Ricerca per lo Studio delle Relazioni tra Pianta e Suolo". The study of soil biodiversity is basic to understand agricultural earth capability, its concerning parameters for its determination are nowadays the less known and monitored.

Since 1992, when the International Convention on Biodiversity (CBD) was signed, which in Art. 8 the importance of microbial diversity importance is underlined, many initiatives have started to actuate a soil biomonitoring programme. In 2006 the E.U. has issued a main theme Strategy for soil protection (COM 2006, n. 232) where the main aspects are biologic and genetic soil erosion.

The characterisation of soil biodiversity is developed throw the following points:

a) basic and biochemical sampling and physical-chemical analysis for soil biologic fertility determination;

b) molecular analysis for structure and composition study of microbial communities;

c) microbiologic examination for the identification of bacterial strains characteristic of local cultivations soil;

The results of this research will achieve to the following objects:

a) creation of a Data Base on soil biomonitoring of Lazio Region;

b) implementation of a soil biological fertility "basic" map, so to allow the individuation of the main risk areas threatened with fertility and/or biodiversity loss;

c) sites biomonitoring interested by cultures local varieties;

d) identification of soil microbial communities and of soil bacteria strains characteristic of local culture;

e) isolation and collection ex situ of "typical" autochthonous microorganism strains.

REGIONAL ACT N°15 DATED 1ST MARCH 2000

PROTECTION OF AUTOCHTHONOUS GENETIC RESOURCES OF AGRICULTURAL INTEREST

Regional Act N°15 dated 1st March 2000
Protection of autochthonous genetic resources of agricultural interest

Art. 1 *(Subject)*

1. As part of its policy of development, promotion, and protection of the agroecosystems and quality production, the Regione Lazio favours and promotes the protection of autochthonous genetic resources of agricultural interest, including wild plants that mixed with cultivated species, such as spices, races, varieties, populations, cultivars, ecotypes, and clones for which there is an economic, scientific, environmental, or cultural interest, threatened by genetic erosion.

2. For the purposes of sub-section 1, autochthonous are also those species, races, varieties, and cultivars of foreign origin that have been introduced in the regional territory for least fifty years, and having integrated into the agroecosystem of Lazio, have taken up such specific characteristics as to arouse an interest in their protection.

3. Moreover, species, races, and varieties that have disappeared from the Region and are kept in botanical gardens, breeding farms, experimental institutions, public or private genetic banks, and research centres of other regions or countries, the reintroduction of which there is an interest to promote, can also be the subject of protection according to this law.

Art. 2 *(Regional Voluntary Register)*

1. The Regional Voluntary Register is established for the protection of the genetic heritage. It is subdivided into two sections: the animal section and the vegetable section. The register includes species, races, varieties, populations, cultivars, ecotypes, and clones of regional interest according to article 1.

2. The Register described in subsection 1 is managed by the Regional Agency for Agricultural Development and Innovation in Lazio (ARSIAL).

3. Within six months of this act coming into force, the Regional Council shall determine the modalities for the keeping of the Regional Voluntary Register, and for entering the species and varieties as described in article 1, taking into account the following criteria:

a) the Regional Voluntary Register, which is made up of an animal section and a vegetable section, is organised in such a way as to take into account the technical characteristics of existing analogous tools at the national and international level, so as to make it as homogeneous and comparable to other structures as possible;

b) for accessions to be registered in the Regional Voluntary Register according to article 1, sub-section 1, they must be identifiable by a minimum number of characters defined for each individual entity;

c) lenrolment in the Regional Voluntary Register is free of charge and is carried out by ARSIAL, subject to thr favourable opinion of the competent technical scientific board according to article 3.

d) enrolment will be made ex-officio on the initiative of ARSIAL, in other words upon the proposal of the Regional Council, scientific bodies, public bodies, private organisations and associations and individual citizens;

e) specific historical-technicalscientific documentation will be annexed to the application for enrolment;

f) ithe material enrolled in the Regional Voluntary Register may be cancelled by ARSIAL, subject to the favourable opinion of the competent technical-scientific board according to article 3, if the requisites according to article 1 subsection 1, are no longer valid.

Art. 3 *(Technical-scientific boards)*

1. A technical-scientific board for the animal sector and a technicalscientific board for the vegetable sector are established to carry out the tasks pertaining to this Act.

2. The technical-scientific board for the animal sector is made up of the following elements:

a) an official of the competent regional department in genetic animal resources in agriculture;

b) an ARSIAL official competent in genetic animal resources in agriculture;

c) a farmer that owns animal material whose protection is provided for by this act, representing the agricultural world;

d) five experts from the scientific and academic world competent in genetic animal resources in agriculture.

3. The technical-scientific board for the vegetable sector is made up of the following elements:

a) two officials of the regional department competent in the genetic resources of herbaceous, arboreal, and forest plants of agricultural interest;

b) two ARSIAL officials competent in the genetic resources of herbaceous, arboreal, and forest plants of agricultural interest;

c) a farmer that owns herbaceous, arboreal, or forest material whose protection is provided for by this act, representing the agricultural world;

d) ten experts from the scientific and academic world competent in the genetic resources of herbaceous, arboreal, and forest plants of agricultural interest;

4. The boards in sub-sections 2 and 3 remain in office for a term of five years and elect the Chairman of the Board among them.

5. As regards designation and appointment of the members of the board according to subsections

2 and 3, payment of an attendance counter for each session, and refunding of travelling expenses and possible mission allowance, the regional legislation in force on the matter will apply.

6. Through its offices, ARSIAL will provide the necessary technicaloperational support for the running of the boards as of sub-sections 2 and 3.

Art. 4 *(Conservation and Safety Network)*

1. The protection and conservation of autochthonous genetic resources of agricultural interest, enroled in the Regional Voluntary Register according to article 2, is implemented through a Conservation and Safety Network, hereafter referred to as Network, which is managed and coordinated by ARSIAL. The members of the Network may be the Communes, consortia of mountain communities, experimental institutions, research centres, agricultural universities, associations of interest, and single or associated farmers.

2. The Network is in charge of the conservation in situ or in a farm of the genetic material of regional interest as defined in article 1, and of the propagation of such material with the aim of making it available to those agricultural operators that should request it, either for purposes of cultivation or selection and improvement.

3. ARSIAL prepares the lists by province of the sites in which the conservation is carried out according to sub-section 2 and transmits them every year to the involved Communes, who shall

see to the information relating to the existence of the sites themselves.

4. The farmers included in the Network may sell a reasonable quantity of seeds produced by them. This quantity shall be established for each entity at enrolment in the Regional Voluntary Register. Moreover, the farmers included in the Network may resow the seeds within the farm.

5. Farmers, bodies, research centres, agricultural science universities, and associations that own protected vegetable or animal material according to this Act, not members of the Network, are obliged to supply ARSIAL with a part of their living material for propagation, in order to guarantee the conservation of genetic information in other sites.

Art. 5 *(Heritage of genetic resources)*

1. Without prejudice to the right of ownership on each plant or animal enrolled in the Register as of article 2, the heritage of the genetic resources of these plants and animals belongs to the indigenous local communities, within which the benefits must be distributed equally, according to article 8j of the Rio Convention on Biodiversity (1992), ratified with Act no. 124 dated 14th February 1994.

Art. 6 *(Sectorial plan of action)*

1. Every three years, by the 30th June the Region shall approve a sectorial plan of action, in which the guidelines for the activities applicable to the protection of autochthonous genetic resources of agricultural interest are established.

2. In the sectorial plan mentioned in subsection 1, the Region shall:

a) favour public and private initiatives that tend to conserve autochthonous biodiversity of agricultural interest, and to propagate the knowledge and innovations for the use and upgrading of autochthonous materials and products, whose protection is guaranteed by this Act;

b) directly take up specific initiatives aimed at the protection, improvement, propagation, and upgrading of the autochthonous genetic resources;

c) provide for specific initiatives to give incentives to farmers that are members of the Conservation and Safety Network.

3. Within the sectorial plan described in sub-section 1 and in application of it, for each year in the three-year period, the Region shall prepare an annual operative programme for the implementation of planned activities and initiatives, specifying among other things the available economic resources, the amount of each subsidy as well as the beneficiaries, the modalities of access and distribution of the benefits, the priority areas of intervention, and the forms of control on the initiatives that have been carried out.

4. All the operators that are members of the Network and all the farmers that produce on the market autochthonous material of agricultural interest singled out in the Regional Voluntary Register are beneficiaries of the subsidies provided for by the operative programmes.

5. The annual operative programmes are implemented by ARSIAL and are controlled and monitored by the regional department competent in agriculture.

Art. 7 *(Prohibitions and penalties)*

1.The use of genetically modified organisms is banned in the protected natural areas of the region, in the areas of interest to the community, the country, and the region, singled out by resolution of the Regional Council no. 2146 dated 19th March 1996, in the sites included in the list as of article 4, sub-section 3, and in the zones neighbouring the above areas for at least 2 km.

2. The following penalties are applicable in the event of violations of the provisions established by this Act:

a) a fine of between 1 and 6 million Italian Lire for whoever infringes the ban under sub-section 1;

b) a fine of between 500 thousand and 3 million Italian Lire for whoever infringes the ban under article 4, sub-section 5;

c) a fine of up to 1 million Italian Lire for violations not expressly provided for.

3. Violations are established according to Act no. 689 dated 24th November 1981 and further amendments and supplementation, governed by Regional Act no. 30 dated 5th July 1994.

4. The Communes competent by territory are entrusted with the surveillance and imposition of the penalties under sub-section 2. The sums from the inflicted fines shall be distributed between Region and Communes according to the provisions of article 182, sub-section 2 of the Regional Act no. 14 dated 6th August 1999.

Art. 8 *(Suspensive clause and cumulation ban)*

1. The subsidies provided for by this Act come into force when notice is published on the Official Bulletin of the Region (BUR) that the compatibility test of the Commission of the European Communities has been passed according to articles 87 and 88 of the Treaty establishing the European Community.

2. The subsidies granted according to this Act are not to be combined with others provided for the same initiatives by other State and Regional Acts. 2003

Art. 9 *(Financial provision)*

1. The charges relating to this Act fall within the annual allocations provided for in favour of ARSIAL in Regional balance sheets.

Note:(1) Published on the Official Bulletin of the Lazio Region no. 9 dated 30th March 2000.