

THE ESTABLISHMENT OF A DOCUMENTATION SYSTEM FOR THE IN SITU CONSERVATION OF PLANT GENETIC RESOURCES IN THE REPUBLIC OF MOLDOVA

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INTRODUCTION

While plant genetic resources activities have traditionally been conserved with *ex situ* conservation, the importance of supporting *in situ* conservation activities is now increasingly recognized. *In situ* conservation of plant genetic resources (PGRs) is a complementary strategy to *ex situ* conservation. Formal *in situ* conservation activities are implemented for wild relatives of crop plants and for local crop varieties (Worede M. 1997). *In situ* conservation concept, which covers a range of different situation, involves wild population and species, domesticates, ecosystems, agroecosystems, landscapes and bioregions (Heywood V.H). Brush S. B.(2000) proposed to distinguish two types of *in situ* conservation: first, refers to the persistence of genetic resources in their natural habitats, including areas where everyday practices of farmers maintain genetic diversity on their farms, second, refers to specific projects and programs to support and promote the maintenance of crop diversity, sponsored by national governments, international programs, and private organizations. In this context Luu Ngoc Trinh et al, 2007 suggest that *in situ* conservation has potential to: conserve the processes of local adaptation of crops to their environments; conserve diversity at all levels – the ecosystem, the species, and the genetic diversity within species; improve the livelihood for farmers; maintain or increase control and access of farmers over their genetic resources; integrate farmers into the national PGR system and involve farmers directly in value addition process; link farming community to gene bank for conservation and utilization.

The plants are therefore conserved according to current and future needs and/or usefulness (Pineda B., Hidalgo R., 2007). In this context is necessary to establish and define the conservation strategy. For *in situ* conservation this strategy covers the aspects show in table 1.

Table 1. For more information see: Multi-Institutional Distance Learning course on the Ex situ conservation of Plant Genetic Resources, 2007

Class of diversity	Conservation system	Target germplasm	Period of conservation
Global biodiversity	Protected areas	1. Ecosystems 2. Wild species (plants and/or animals)	Depends on the degree of stability of protected areas
Agro biodiversity	Protected areas	Wild ancestral	Depends on life cycle and number of renewals
	On farm	Traditional varieties	Medium or long term
	Gardens	Mixtures of traditional species in communities	Depends on life cycle and number of renewals

The main activities for this type of conservation consist of: collection; reproduction and multiplication; characterization and evaluation and the finally conservation and documentation.

All this stages have your particular signification and only respect their sequence you can lead to effective conservation process. One problem with respect to the potential use of material conserved in situ is information management system. The information on plant genetic resources that can be used, depend very much on the quality of documentation system in gene bank.

"Documentation" in term of work with PGRs is understood to be the process of identifying, acquiring, classifying, storing, managing and disseminating information on germplasm. Documentation implies the organization of a documentation system that will store and conserve data.

Documentation system is necessary for setting priorities, planning activities and managing resources.

Also this system is used to store, maintain process, analyze, and exchange data (Painting et al., 1997). Two basic issues required addressing in terms of conservation data management: identifying and accessing the sources of existing information that may assist in the development of appropriate conservation strategy, and how to manage the data associated with specific *in situ* conservation activities (Pellew, 1991).

In contrast to the extensive accumulated experience in documentation system for *ex situ* collections in genebanks, the documentation of *in situ* conservation data has been little addressed. Establishment of documentation system for *in situ* conservation of PGRs development of the documentary was produced after 1995. The concepts had to be developed on the basis of *ex situ* documentation systems, but additional descriptors would need to be developed. Brockhaus and Oetmann (1996) proposed a system of descriptors for *in situ* conservation of PGRs, based on a comparison with *ex situ* descriptors.

Thormann et al. (1999) divided the information necessary for the development of conservation strategy for wild plant species into four categories, which apply also for the conservation of PGR in home garden:

1. species information including taxonomy, biology, conservation, distribution and use;
2. size and type of protected areas;
3. physical environment of species distribution areas;
4. organizations and resources people.

Regarding the categories of documented information about *in situ* conservation Maxted N et al. (1997) proposed five basic kinds of data that need to be recorded for the "populations" found in genetic reserves:

1. Nomenclatural – information concerning the accepted taxonomic name of the particular population at any site;
2. curatorial – information used to managed and identify populations;
3. Descriptive – information used to distinguish and described taxa;
4. management – information related to the management plan for any particular site within the particular genetic reserve;
5. Monitoring – information related to the monitoring policy for population in the particular genetic reserve.

One of the most important differences between the information requirements of the two different conservation strategies *in situ* and *ex situ* is the necessity to monitoring measurement of population size and density that should be recorded for any collected germplasm.

Knüpffer H. (2001) for each species the home garden database purposed to include the following information:

1. taxonomy and nomenclature information (accepted name, authors and place of publication, important synonyms, plant family);
2. ethnobotanical information (vernacular names in local languages, possibly including dialects, multiple plant uses and plant parts used);
3. references to the sources of information (e.g. project reports, publications);
4. HTML documents providing details on the infraspecific variation of selected crops (e.g. cultivar groups, farmer's varieties, their principal uses, morphological description);
5. Images (color photographs or slides) of plants;
6. Link to relevant other databases that provide additional information about the species.

The literature review on documentation in *in situ* conservation of PGRs has shown that much needs still to be done to achieve a similarly good situation as *ex situ* conservation. For this reason we are proposed to establish the *in situ* documentation system in Republic of Moldova.

MATERIAL AND METHODS

Information on Plant Genetic Resources is essential for a gene bank to make effective decision on their conserving and sustainable using. The Center for Plant Genetic Resources of Institute of Genetics and Plant Physiology, Academy of Sciences of Moldova, which is the main coordinator of actions on preservation of a gene pool of Republic, this aspect of problem is considered as the most important. In order to realization of the given purpose, information system *ReGen*, that provides an opportunity on storage, processing, search and distribution of the necessary information on samples in a collection *ex situ* and *in situ* has been developed.

For elaboration of information system *ReGen* was used programming language Visual Fox Pro 6.0.

The system was set up for operation system Microsoft Windows 2000 and XP. This DB is intended for definition of structure and interpretation of the stored information and provides fast input and editing of the data.

It is necessary to note that fact, that actions on development of a database it is carried out rather recently. Nevertheless, the certain achievements have been marked.

RESULTS AND DISCUSSIONS

The system for the documentation of *in situ* conservation data in Republic of Moldova is called *ReGen*. Creation of this system was possible due to the detailed analysis of literature about the structure of different database, experiences of other gene bank (European and international) in this area, and consultation with experts in the field of plant genetic resources documentation. *ReGen* system for *in situ* conservation has general character that offer the possibility to handle all forms of *in situ* preservation (in nature, in culture, in cultivation), and at the same time specific to handle the special requirement for each type. This system covers a wide range of taxonomic, biological, ecological and geographical data.

Maxted (1997) revealed five basic kinds of data that need to be recorded for the "population": nomenclatural,, curatorial, descriptive, management, and monitoring. Knüpffer H. (2001) proposed six categories of information. The *ReGen* system developed by Centre for Plant Genetic Resources regarding *in situ* conservation consists of six kinds of data which are described below:

1. *Initial data*, which included: collection data (year, month, date), collection place (country, region, municipality), collecting number, and the person who has collected.
2. *Location* – described the condition under which germplasm is collected, that are certainly applicable in the *in situ* sense: longitude, latitude, elevation, collected sources;
3. *Sample identity* – information concerning the accepted taxonomic name: scientific name (genus, species, subspecies, botanical variety), local name, biological status;
4. *Sampling* – consists of information about the maintenance of sample in natural condition, which include distribution (individual or population), cultivating area (m²), population number, number of individuals in population, type of propagation, sample types, collected plant part;
5. *Molecular data* – information which may allow to identify plants as the taxonomic level or to make very accurate assessments of the relative quantity of variation within populations and therefore to determine which populations to target for conservation;
6. *Gene bank localization* – include traditional information for gene bank conservation such as accession number, acquisition date, country of origin, type of conservation,

accession status, plant part used for conservation.

Also you have possibility to visualize (or not, if it's no necessary) the photos of sample from collected place.

The collections of plant genetic resources provides access to the greatest possible amount of genetic variability in a particular species and help reveal the ecological and geographical distribution of plant species (Bennette, 1970). In this context *ReGen* system offer the possibility to represent especially geographical distribution of species on a digital map. This map consists of points of the records, corresponding to geographical coordinates.

The main purpose of this aspect is the visualization and exploration of spatial data that includes distribution map of a taxon on a national level.

Use the map to determine the geographical distribution of samples is only just beginning. In the future we plan to extend this structure to introduce new opportunities that will allow us to use effectively information about the *in situ* and *ex situ* preservation.

The structure and design of this database correspond to the central objective: to facilitate handling and access to information regarding the entire process of plant genetic conservation.

This system allows:

1. input and checking of data;
2. to store the information corresponding to the descriptors for *in situ* conservation;
3. availability of data for multiple analysis and use;
4. to obtain the necessary information from BD in the form of report, queries, and different graphical presentations
5. facilitate access to actual germplasm, both *in situ* and *ex situ*
6. integrate the available data on plant genetic resources provide by different institutes, organizations in Republic of Moldova, involved in PGR activities.
7. exchange of information with other gene banks.

Is important to mention that data management and database for *in situ* conservation are linked and is complementary to existing *ex situ* management and documentation system.

The *ReGen* system was established for the easy and efficient use, control and handling of the plant genetic resources conservation in Republic of Moldova. Since the *in situ* conservation is the protection of genetic variation of a species at its native sites (Schmidt L., 1997), it is represent a dynamic form of conservation and a source of continuous variability.

Due to this fact the documentation of *in situ* conservation of plant genetic resources has a obligatory character and represent some specific aspects such as cultivating area, population size, density, environment condition etc.

CONCLUSIONS

As a result of consulting a considerable number of bibliographic sources and taking into account the experiences of other gene banks documentation system for *in situ* conservation of plant genetic resources was developed database structure and determined the types of information necessary for this purpose.

The system for the documentation of *in situ* conservation data in Republic of Moldova is called *ReGen* and has both general (handle all forms of *in situ* conservation) and specific characteristics (handle the special requirement for each type). So we structured database in six compartments: initial data, location sample identity sampling molecular data, gene bank localization.

This system covers a wide range of taxonomic, biological, ecological and geographical data. *ReGen* system offer the possibility to represent especially geographical distribution of species on a map that consists of points of the records, corresponding to geographical coordinates.

An important aspect represents the possibility of this system. From this point of view *ReGen* allows to enter, store and analyze, integrate and change information about the *in situ* conservation of Plant Genetic Resources.

ABSTRACT

The purpose of this paper is to illustrate the importance of documentation system for the *in situ* conservation of Plant Genetic Resources (PGRs). The paper gives information about the international experience in the field of documentation for *in situ* conservation, and described the most important kinds of information that will increase and make more efficient the process of *in situ* preservation.

The documentation system *ReGen* developed by Centre for Plant Genetic Resources of Institute of Genetics and Plant Physiology, Academy of Sciences of Moldova regarding *in situ* conservation consists of six kinds of data: initial data, location – described the condition under which germplasm is collected, sample identity – information concerning the accepted taxonomic name, sampling – consists of information about the maintenance of sample in

natural condition, molecular data, gene bank localization – include traditional information for gene bank conservation.

Utilization of this information will contribute significantly to the value of plant genetic resources.

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