On farm Landrace conservation

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Outline

• Context:
  – Policies, threat, value of landrace (LR) diversity

• PGR Secure activities
  – Preparation of tools to aid the implementation of on-farm conservation of LR
  – National LR conservation strategies
  – European strategy for LR on-farm conservation

  • Constrains and key elements to Increase LR conservation through use:
    – successful examples
    – the European Seed Legislation on Conservation Varieties
    – Better Information systems needed

  – Other anticipated results

• Conclusions
• Convention on Biological Diversity: Strategic Plan & Global Strategy for Plant Conservation 2011 – 2020 (CBD, 2010 a, b)
• Global Plan of Action for the Conservation and Sustainable Utilization of Plant Genetic Resources for Food and Agriculture (GPA) (FAO 2011),
• International Treaty on Plant Genetic Resources for Food and Agriculture (ITPGRFA) (FAO, 2011),
• FAO CGRFA-13/11/Report
Threat Facing LRs

Context:

A CENTURY AGO
In 1903 commercial seed houses offered hundreds of varieties, as shown in this sampling of ten crops.

80 YEARS LATER
By 1983 few of those varieties were found in the National Seed Storage Laboratory.*
Context: why to maintain LR (especially on farm/in garden)?

LR serve the interests and are already widely used by:
- Local communities (many references)
- Breeding and Participatory Plant Breeding

LR facilitate:
- Production & development of typical local products
- Development of new (e.g. environmentally friendly) farming systems based on ‘diverse’ varieties
- Development of local food supply systems
- Maintenance of local traditions and community identity

On farm/in garden:
- they maintain their adaptation to the local environment and, therefore,
- their value as sources of genes for crop improvement, particularly to adapt crops to the increasingly adverse environmental conditions resulting from climate change
LR are severely threatened elements of global biodiversity today

because:

- We have no idea how many LR exist (inventories are badly needed!!!)
- Farmers (i.e. private citizens) are the main actors in on-farm conservation! They are ‘commercial’ subjects who **will grow what yields the highest economic return**
- LR maintainers are often old and their number is dwindling each year
- Seed companies, breeders and government agencies are actively promoting modern cultivars
- LR seed is scarcely available on the market
- In most countries no agency has direct responsibility for their conservation

Need action now or further loss and complete extinction is the only possible conclusion!


On the conservation and sustainable use of plant genetic resources in Europe: a stakeholder analysis_Workshop in Wageningen, November 25–29, 2013
Context: how to contrast this situation?

To promote conservation through use.
PGR Secure: main objectives for LR on farm conservation

- To increase awareness and capacities

- To carry out a National (and European) LR inventory for all crops

- To draw a generic European LR conservation strategy

- To the end of promoting conservation through use

PGR Secure present achievements:

- Increased capacities:
  - *ECPGR_NIFP LR training workshop* (Palanga, LT)
  - Assistance made available through the *PGR Secure helpdesk* (several documents & useful links)

- Tools to facilitate LR inventorying made available:
  - *LR Descriptors*
  - *MS database for in situ LR data recording* (available from [www.pgrsecure.org](http://www.pgrsecure.org) and CD-ROM)

- LR knowledge and awareness raised
  - *on line journal* Landraces

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PGR Secure: National LR conservation strategies – present achievements

• **Finland**
  – National inventory of LR apple, pear, cereals and potato onion on-going
  – Morpho-pysiol-genetic characterization on going
  – *Ex situ vs in situ* gap analysis completed with apples, pears and cereals

• **Italy**
  – has already drawn *Guidelines for LR on farm conservation* [http://www.reterurale.it/flex/cm/pages/ServeBLOB.php/L/IT/ID](http://www.reterurale.it/flex/cm/pages/ServeBLOB.php/L/IT/ID)
  – The *Guidelines*’ implementation is in progress in several Italian Regions
  – The **First national inventory of in situ maintained LR is completed** (available in CD-ROM): 2365 LR (4806accs), belonging to 329 different spp
  – *Ex situ vs in situ* gap analysis almost completed
  – Many LR already characterised (morpho-pysiol-genetic traits)

• **UK**
  – Science and Advice for Scottish Agriculture (SASA) established the *Scottish LR Protection Scheme* (2006)
  – *Defra Information Portal on Genetic Resources for Food and Agriculture* ([http://grfa.org.uk/](http://grfa.org.uk/)), *cereal & forage LR inventory in progress*
  – But the LR number and location is still largely unknown
Italian LR on farm conservation strategy: steps

INFORMATION

INVENTORYING:
field/bibliographic
DATA RECORDING +
(Public Authorities)

IDENTITY, ORIGIN &
THREAT ASSESSMENT
(Public Authorities)

ENTERING into official
PROTECTION SCHEMES
(promoted by Public Authorities)

ON FARM/IN GARDEN
CONSERVATION
(farmer conservation
networks/farmers/gardeners)

EX SITU
CONSERVATION
(Public Authorities)

complementarity

Breeder use

Direct use

PPB
PGR Secure: towards a European LR on farm conservation strategy - Challenges

Different countries focus on different types of LR (extant/reintroduced/introduced)

Different countries focus on different end users (e.g. S.&N. Europe: farmers, C. Europe: breeders)

In situ maintained LR identification (differential characterization, which is costly and time consuming, needed to distinguish between a LR and other materials)

Ex situ maintained LR identification (i.e. country of origin is not necessarily the country where LR was originally developed, LR name is not always a reliable indicator)

Commercial sensitivity and possible legal repercussions over registered varieties

Insufficient time and resources for development of National LR Strategies

LR maintained for numerous & complex reasons

Lack of scientific understanding of how LR diversity evolves under in situ management

Focus: (a) on LR per se, (b) on the agro-ecosystems, or (c) LR maintainers?

These challenges are not insurmountable! Lessons learned from PGR Secure national LR studies will inform future conservation and use, as well as highlight future research
PGR Secure: towards a European strategy for LR on farm conservation

Already clear that it has to pick up common elements from national strategies, while being respectful of the differential elements of each country.

Already identified key elements:

1. **Need to create a European inventory of LR**
2. **Different means to promote LR use on the farm**
3. **The European seed legislation context as a favourable context to facilitate LR use in agriculture**
4. **Public Authorities should take an active role in promoting on farm conservation**
5. **The need of *ex situ* complementary safeguard of extant LR** (Italy: most of extant LR are not safely duplicated *ex situ*)
6. **How to assess genetic erosion & extinction risks on farm**
7. **The need to have connected informative systems**

Will Identify (among others):

1. Methods to identify the Most APpropriate Areas where to set or enhance policies in favour of agro-biodiversity conservation
Means for promoting LR conservation through use – successful examples

Wider use on the farms (ok in the new CAP!)

1. Produce & develop typical local products
2. Development of new (e.g. environmentally friendly) farming systems based on ‘diverse’ varieties
3. Development of local food supply systems, including community and home gardens
4. Develop companies purposely dedicated produce and sell seed/propagation material of LR

Wider use in breeding (participatory breeding):
5. Vaso project in Portugal
Cultures and crops

In Italy some on farm maintained LR's sustain local economies in marginal areas. The 'Farro di Monteleone di Spoleto' (an emmer wheat LR) is an example. Archeological studies showed that this crop has been cultivated in the area since Roman times. This LR has been maintained in the area after World War II because of its adaptability to marginal conditions, rituals, and traditional uses (i.e., soup preparation and animal feeding).

A emmer soup is prepared by the parish priest for all the parishioners on Saint Nicholas' day (December 6th) since ages. Products from this LR are now protected by a Protected Designation of Origin quality mark. The farmer on the right (Mr. R. Cecchetti) and his family have developed new uses and products from this LR. They include: biscuits, cakes, pasta, flakes, but also hull and chaff are sold to produce anatomical pillows and pellets for house heating, respectively. The possibility to develop new uses (i.e., new culture) was allowed by the LR maintenance for centuries. Meanwhile, the within population diversity has been continuously enriched and reshaped by evolutionary factors. Because of their within population diversity, LR's are dynamic populations that maintain adaptation to the changing environment.

Enhancing local economy based on LR also helps in maintaining local culture and environmental services.

Example 1: emmer wheat landrace based profitable local economies

25 years ago: an almost disappeared crop
Today: a business of

- 2 millions of euro/year in Italy
- 250 000 euro/year in Monteleone di Spoleto only (Protected Designation of Origin emmer), many different products: from grain to pillow filler
Example 2. Organic farmers, looking for higher stability more than for higher yields, ask for ‘genetically diverse’ materials: several initiatives in Europe

German biosphere reserve at Schorfheide-Chorin

- Successfully marketed organic bread & bear from landraces and old cultivars
- Successful networking of farmers, bakers and brewers

Recorded advantages of LR and old cultivar vs modern cultivars:

- Competitive yield under low input conditions
- Special value for wildlife (nature protection)
- Agrotouristic advantage (local products)
- Biomass yield, tolerance, environmental advantage
Data from the FPVII Project SOLIBAM confirm that variable materials (LR & Syn) are more stable under low input conditions than uniform varieties.

AMMI1 analysis: Landrace & SYNs vs HYB Variety Broccoli_2YS_3 locations
Example 3. Development of local food supply systems, including community and home gardens

A very successful campaign of the main Italian farmer organisation to better connect farmers and consumers through many different activities

- Food from ‘0 km’ farms in local markets (sometimes obtained from LR)
- Grouping consumers for obtaining reductions to the prices
- Agritourist services
- Restaurants serving local food….
Example 4. Develop companies dedicated to produce and sell LR propagation materials

Programme for Diversity of Cultivated Plants in Sweden: “keeping the cultivated heritage alive” through

Public_Private Sector (including seed industries) cooperation.

The general public can request small seed samples/plants to grow and propagate further, possibility for nurseries to propagate and sell plants from the national genebank.
Example 5: Successful PPB – VASO project in Portugal
6 new varieties developed from LR (courtesy PMMoreira)
The EU Seed Legislation on Conservation Varieties: a favourable context... provided that the opportunity is caught

- To register a LR in the Common catalogue (Commission Directives 2008/62/EC 20 June 2008, 2009/145/EC 26 November 2009) as ‘conservation variety’ is an opportunity to:
  - Clearly link a LR to its own territory & farmers
  - Facilitate
    - LR use by farmers and on farm conservation
    - Commercialisation of LR products as ‘typical’ products
  - Develop purposely dedicated seed commercialisation business....
  - ....but not many farmer are aware of this opportunity

- The registration of Conservation Varieties should be strongly promoted by Public Authorities (in Italy is for free)

- Public Authorities should also promote the use of conservation varieties (possible with the PAC)

- The new EU seed legislation will possibly loosen present restrictions
informative systems connected each other could help

EUROPEAN INFORMATIVE SYSTEM including data on LR other variable populations maintained on farm and ex situ
PGR Secure: other anticipated results for LR

- Partial European LR inventory
- Coherent European and national strategies for LR conservation and use
- Breeders working interactively with agrobiodiversity conservationists
- Strengthen linkage between agrobiodiversity conservationists and breeder communities
- Information systems containing patchy LR data
Thank you for attention

We hope that what is being developed in PGR secure could lead to an effective on farm conservation of landraces