ICARDA

Science for resilient livelihoods in dry areas

MAINSTREAMING THE MAINTENANCE AND COMMERCIALIZATION OF LANDRACES INTO THE FORMAL SEED SECTOR – THE EXAMPLE OF GREECE

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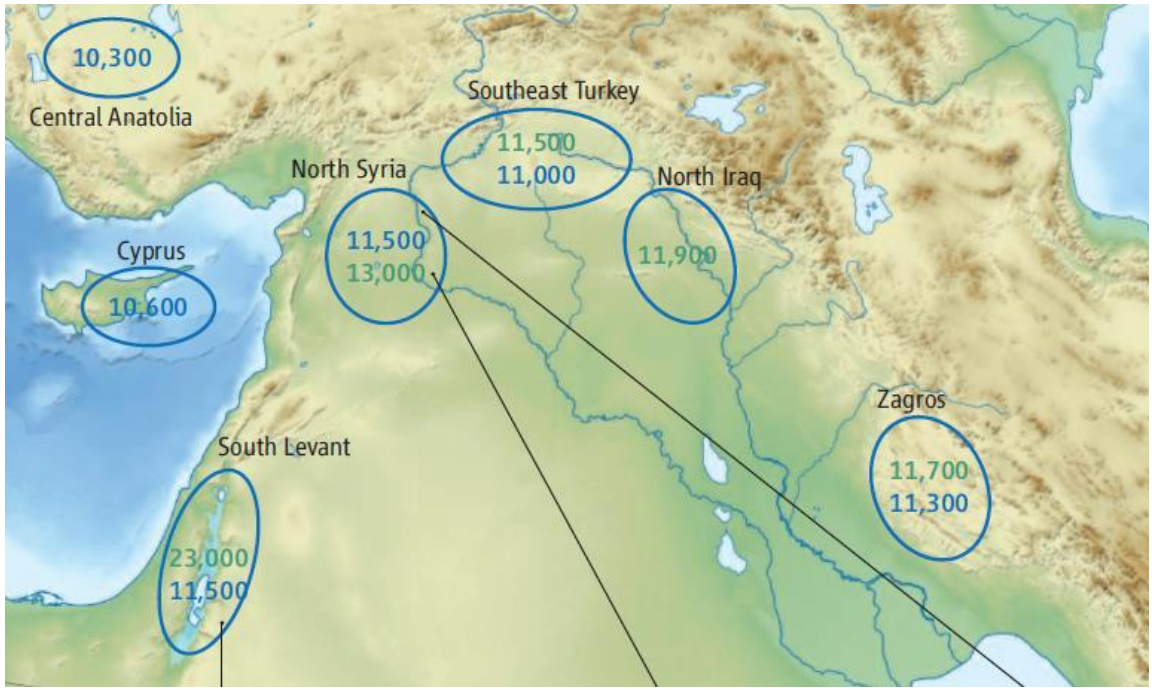
Photo courtesy: Greek Genebank

The Birth of Agriculture



a) Mortar and pestle from Wadi Hammeh in the southern Levant, 14,000 years ago. b) Bases querns in a room at Jerf el Ahmar, northern Syria and c) Quern from Tell 'Abr, northern Syria, all dated to 11,300 years ago. From Wilcox (*Science* 341, 39 (2013)).

Neolithic Period - people controlled their own food supply by **cultivating** plants and breeding animals (approx. 10,000 BC)

- Wild forms
- Primitive forms
- Landraces
- Modern cultivars

Why Landraces Matters…

The value of landraces

- Adding novel diversity to the elite germplasm (source of specific traits)
- Important role in agricultural production (marginal environments)
- Fulfil a commercial role, in specialist production for niche markets (PDO, PGI, etc.)
- Associated with multipurpose use or the self-sufficiency movement (permaculture, alternative farming systems, organic agriculture, etc.)
- Associated with the tradition, heredity and specific needs of the local people
- Play a key role in food security (traditional and subsistence farming systems)

Photo courtesy: Greek Genebank

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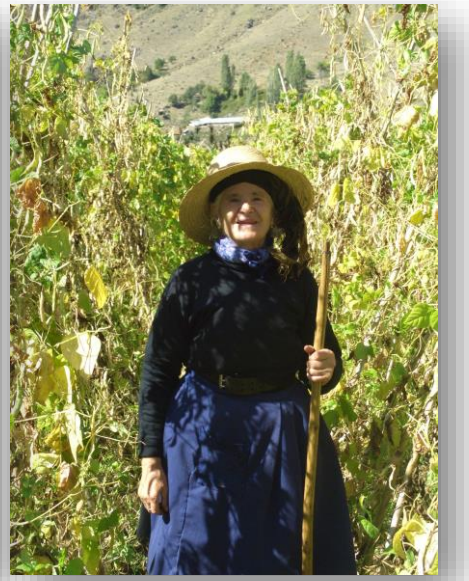
Definition of a Landrace…

A landrace is **a dynamic population(s)** of a cultivated plant that has **historical origin**, **distinct identity** and **lacks formal crop improvement**, as well as **often being genetically diverse**, **locally adapted** and **associated with traditional farming systems** (Camacho Villa et al., 20016).

These elements are commonly present but not necessarily all always present in the landraces



Photos courtesy: Greek Genebank

Basic Elements of a Landrace…

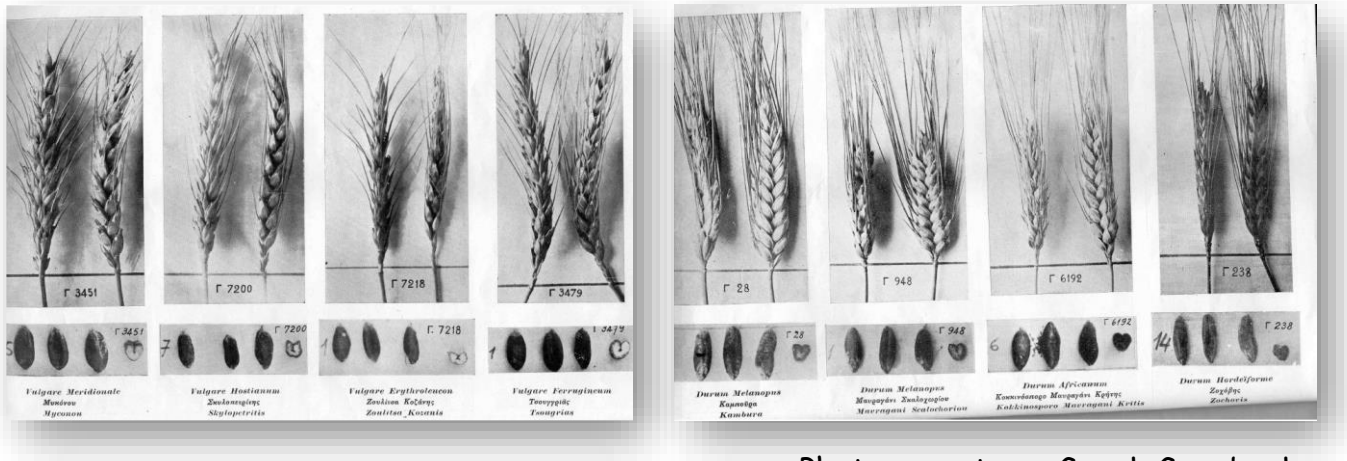
Historical origin

A. Temporal component:

- Relatively long history (significantly more than the ephemeral life-span of modern cultivars)
- No explicit about the amount of time a landrace must be grown to be considered a landrace

B. Spatial component:

- Landraces are associated with one specific geographic location (in contrast to the modern cultivars… wide adaptation)
- Often associated with the name of the location
- Migrations though of landraces from their region of origin to new regions have also occurred



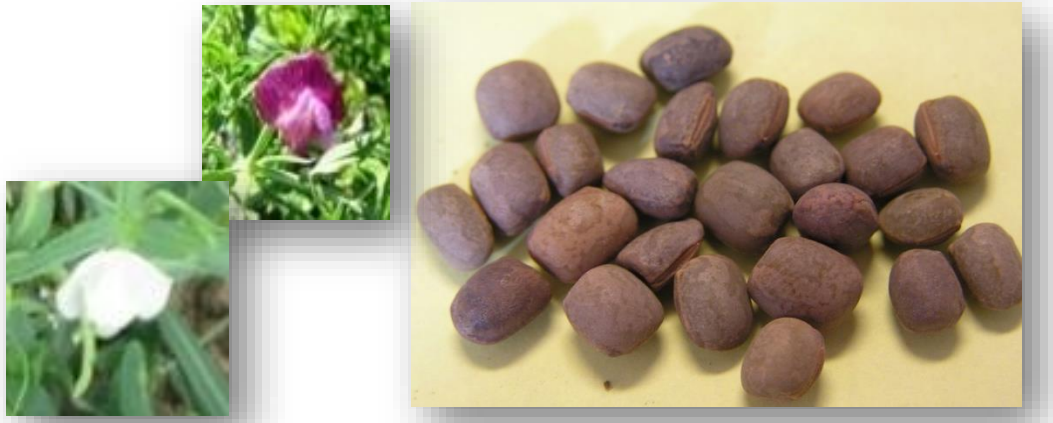
Photos courtesy: Greek Genebank

Basic Elements of a Landrace (continue…)

Recognizable identity

- Although landraces… intrinsically have genetic diversity
- A landrace is recognizable as distinct entity via common shared traits
- These traits allow the distinction of one landrace from the other
- Sometimes they will give rise to landrace name

"Tomataki Santorinis", a well known small-sized greek tomato landracse



"Fava Santorinis", a unique grasspea greek landrace belonging to *Lathyrus clymenum*

Basic Elements of a Landrace (continue…)

Lack of formal genetic improvement

- Important… Different forms of selections has given rise to landraces
  - ✓ "No human selection" result of time and natural selection
  - ✓ "Human selection" in the sense of unconscious selection
  - ✓ A certain degree of consciousness is involved in the selection
  - ✓ Sometimes involved in the oficial breeding process, through participatory schemes of plant breeding

Basic Elements of a Landrace (continue…)

High degree of genetic diversity

- Landrace is considered as "population" and contrast to cultivars is considered significantly more diverse

Diversity in fruit shape for the Greek squash landrace "Kalkampaki"

Local adaptation

- Continues cycles of local planting… landraces selected for local environmental and agroecosystems conditions and practices
- Assumption is made that landraces are more suited to cultivation in particular locations than commercial cultivars that are bred for wide adaptation

Basic Elements of a Landrace (continue…)

Association with traditional farming systems

- Traditional farming systems on cultivation, storage and uses along with traditional knowledge are key components on landrace identification

- It involves also…
  - Varietal selection by farmers
  - Seed exchange between farmers
  - Farmers' seed networks

The problem may arise…

No control on seed exchange and eventually seed commerce

Photos courtesy: Greek Genebank

The First Attempts

The case of Greece…

First legislation adopted on 2009 (Joint Ministerial Decision: 324975/11378/16-11-2009)

- Harmonized with the COMMISSION DIRECTIVE 2008/62/EC

Purpose:

- To establish measures for the derogating acceptance of **local agricultural populations** and local varieties which are naturally adapted to the local and regional conditions and threatened by genetic erosion.

Local agricultural population explicit defined with the term "landrace"

- A set of populations or clones of a particular plant species which are specifically adapted to the local environmental conditions of the region of their origin.

Procedural Requirements

Essential documentation:

- The description of the candidate variety and its denomination (applicant)
- Knowledge gained from practical experience during cultivation, reproduction and use (applicant)
- Results from DUS test (Variety Research Institute of Cultivated Plants)
- **Report by the official authorities for conservation of plant genetic resources, including any relevant information for the candidate variety (GGB)**
- Reference sample if available by the official authorities for conservation of plant genetic resources (GGB)

Lack of report from GGB:

- Stops the process to continue further

Procedural Requirements (continue…)

Region of origin:

- Applicant should identify the region or regions in which the variety has historically been grown and adapted
- Report of the national authorities for conservation of plant genetic resources (GGB) is taken into account
- When the origin is located in more than one regions, then shall be identified by all regions concerned by common accord

Procedural Requirements (continue…)

Distinctiveness, Uniformity and Stability tests (DUS):

- One year DUS test, considering only uniformity vs two years for registration of commercial varieties in the National-European Catalogue
- Deposit fees at the cost of 15% in comparison to the commercial varieties
- "Loose" requirements for seed samples to be tested (e.g., cereals: 200 seeds in case of landraces vs 2,000 seeds for commercial varieties)
- "Loose" criteria for uniformity based on off-type individual plants, allowing a 10% of off-type plants and an acceptance probability 90%

Thus…

- Wheat varieties candidate for registration in the National/European Catalogue:

A stand of 2000 plants needed and 5 off-types are allowed

- Wheat landraces candidate for registration in the National Catalogue for Conservation varieties:

A stand of 200 plants needed and 20 off-types are allowed

Procedural Requirements (continue…)

Registration and Maintenance:

- After qualifying in the DUS test the VRICP reports to the Technical Committee for the Plant Propagated Material
- The Committee advise for the acceptance or not of the landrace to be registered into the National Catalogue of Varieties under Conservation
- The landrace is registered in the Catalogue with "Maintainer" not "Breeder"
- "Maintainer" should have appropriate infrastructure and apply all standards for the maintenance of genetic integrity of the landrace (land, appropriate equipment (harvesting and threshing machines), fumigation facilities, storage capacity (cold chambers), drying chamber, employing agronomist, etc.)
- **Landrace should be maintained in its region(s) of origin**

Procedural Requirements (continue…)

Seed certification:

- The seed fulfills the requirements for certification of "Certified Seeds", according to the legislation applied for the commercial varieties registered in the National/European Catalogue (e.g., seed viability standards, seed health standards, etc.)
- The seed lots descend from seeds produced according to well defined practices for maintenance of the variety under conservation (i.e., landrace)

Seed Production and Commercialization:

- The seed of a registered variety under conservation can be produced only in the region(s) of origin
- If the requirements for seed certification cannot be fulfilled in the region(s) of origin (e.g., due to a specific environmental problem), the Minister of Rural Development and food, defines additional regions for this purpose, taking into consideration all pertinent information regarding the variety under conservation

Procedural Requirements (continue…)

Who has the right to produce the seed:

- The Maintainer of the variety registered under conservation
- Seed companies (provided that fulfill the requirements for this purpose according to the national legislation)
- Entities/organizations that can prove involvement on plant genetic resources (e.g. NGOs)
- Agricultural co-operatives
- Individual farmers

Interested parties are required to obtain the original seed quantity before proceeding for seed production from the Maintainer of the variety under conservation.

All interested parties for the seed production of the variety under conservation have prior to submit an application for registration into the catalogues of their regional Center for Certification of the Propagated Material and Fertilizers Control (KEPPYEL), as the case for the official seed production of the varieties registered in the National/European Catalogue

Procedural Requirements (continue…)

Post control of seed lots:

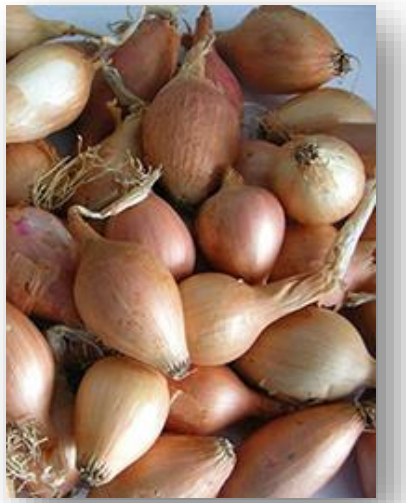
- Seed lots of a variety registered under conservation are subjected to official random post control, to confirm trueness to type (i.e. genetic identity and integrity)
- Criteria of acceptance in post control… 10% off-type plants

Quantitative restrictions:

- For each variety registered under conservation, **the seed quantity available at the market should not exceed the 0.5%** of the total commercial available seed in the country for the species of interest within the cropping season **or quantity needed for seeding 100 ha**, depending which of the two above thresholds is higher.
- For the species *Pisum sativum*, *Triticum* spp., *Hordeum vulgare*, *Zea mays*, *Solanum tuberosum*, *Brassica napus* and *Helianthus annuus* this **percentage should not exceed 0.3%** or **quantity needed for 100 ha**
- **The total available seed quantity of all varieties** registered under conservation for a specific plant species, **should not exceed the 10%** of the total commercial available seed within the country for the specific species

"Thespies" onion (Κρεμμύδι Θεσπιών)

- Thespies is a village at the prefecture of Boeotia (central Greece, 38° 18′ 13″ N, 23o 09′ 02′ E) of about 1,200 habitants
- First reference of the local onion landrace back in 1911 by Hesiod
- Currently is cultivated in the región in a total areas of ~180 ha (farmers' fields 0.5-12 ha)
- The landrace generates for the region higher income than the other major crops, i.e., potato and bread wheat (onion: 3,670 Euros/ha, potato: 3,300 Euros/ha, bread wheat: 590 Euros/ha)



Landraces registered as "Varieties under Conservation"

Legislation established since 2009, though up to now…

- Only one landrace has been qualified to be registered as variety under conservation in Greece
- Many applications are still pending, due to lack of different supporting reports and documentation (mainly supporting report on behalf of GGB)

Still… not officially seed production and available in the market as registered variety under conservation regime

Landraces registered as "Varieties under Conservation"

Thus…

- Long way still to go…. But it is the correct way

All that needs is..

- Collaboration and steps ahead in terms of communication among national authorities and also between national authorities and stakeholders

THANK YOU FOR YOUR KIND ATTENTION!