Red Lists for Cultivated Species

why we need it and suggestions for the way forward

Padulosi S., P. Bala Ravi, W. Rojas, S. Sthapit, A. Subedi, E. Dulloo, K. Hammer, R. Vögel, M.M. Antofie, V. Negri, N. Bergamini, G. Galluzzi, M. Jäger, B. Sthapit, R. Rana, I. Oliver King, N. Warthmann

The world´s food basket is today shrinking at an alarming rate and most concerning is the reduction in the number of species and varieties used by humankind for food and nutrition, which raises serious concerns about the sustainability of feeding the world today and in the future.

Yet, whereas we deploy consistent efforts in monitoring the status of wild biodiversity, very limited is the research in monitoring diversity of plants used by farmers, assess threats of genetic erosion, understand how diversity is helping farmers in coping with climate change, etc..

Documenting and monitoring agrobiodiversity on farm is fundamental for enhancing its sustainable use and prevent losses of both genetic diversity and indigenous knowledge to happen before it is too late.

These actions are also consistent with the predicaments of important international conventions and agreements, such as the CBD (Art. 7), the ITPGRFA (Art. 5), and the FAO GPA for PGRFA (Activity 18).

However, except a few recent attempts of limited application, research on monitoring and Red Listing of cultivated species is still very poor. Reasons for that include the sheer number of crop species and varieties on-farm, the difficulty in assessing their distribution, the dynamic nature of cultivation deploying diversity in different ways, the absence of farmer-based mechanisms to which to anchor a monitoring system, and the lack of supportive policies such as those related to access and use of information generated from these efforts.

Currently, an international UN Project supported by IFAD and the CCAFS Programme of the CGIAR is being implemented in Nepal, India and Bolivia.

‘Why’ on-farm conservation ?

Biological considerations
Only in cultivation the evolutionary and dynamic processes are at play, which ensure adaptation of species and varieties to ever changing biotic and abiotic stresses. Many plant species simply cannot be conserved *ex situ* in seed gene banks, because they produce no seed at all or non-storable seeds.

Financial considerations
Conserving all species useful to humankind in *ex situ* gene banks is prohibitively expensive. Species of local importance may never command national or international attention.

Cultural considerations
Only on-farm use will preserve the wealth of indigenous/traditional knowledge associated with them. This knowledge relates to their cultivation, harvest, use, and valorization. It is the foundation of local food systems.

Ecological considerations
On-farm conservation makes important contributions to the conservation of ecosystems and landscapes, which they are an integral and representative part of.

Social considerations
Strengthening peoples' capacities to safeguard agrobiodiversity and associated indigenous knowledge (IK) is also a strategic way to contribute towards their empowerment. These interventions will allow them to better play their role as custodians of biodiversity and IK in line with the expectations of the CBD (Art. 8) and of the International Treaty for PGFA (Art. 6).

Critical Issues in on-farm Conservation

- How much agrobiodiversity and associated knowledge is maintained on-farm?
- How is it distributed on the territory and how can it be best monitored?
- What is its use and relevance to people's livelihood?
- What are the threats to its genetic diversity?
- How do people use and conserve agrobiodiversity and what are the challenges they face?
- What policies and legal frameworks are needed to support on-farm conservation?

Why an IUCN Red List Approach Cannot be Used for Cultivated Species

- Sheer number of crop species and varieties present on-farm
- Need to capture also knowledge and culture associated with genetic diversity
- A cultivated variety should be viewed as a specific, useful combination of traits
- Diffuse presence of diversity, from large areas to small patches of land and home gardens
- Dynamic nature of cultivation that deploys various crops and varieties in different ways
- Specialist knowledge needed for Red Listing resides with farmers and not with scientists

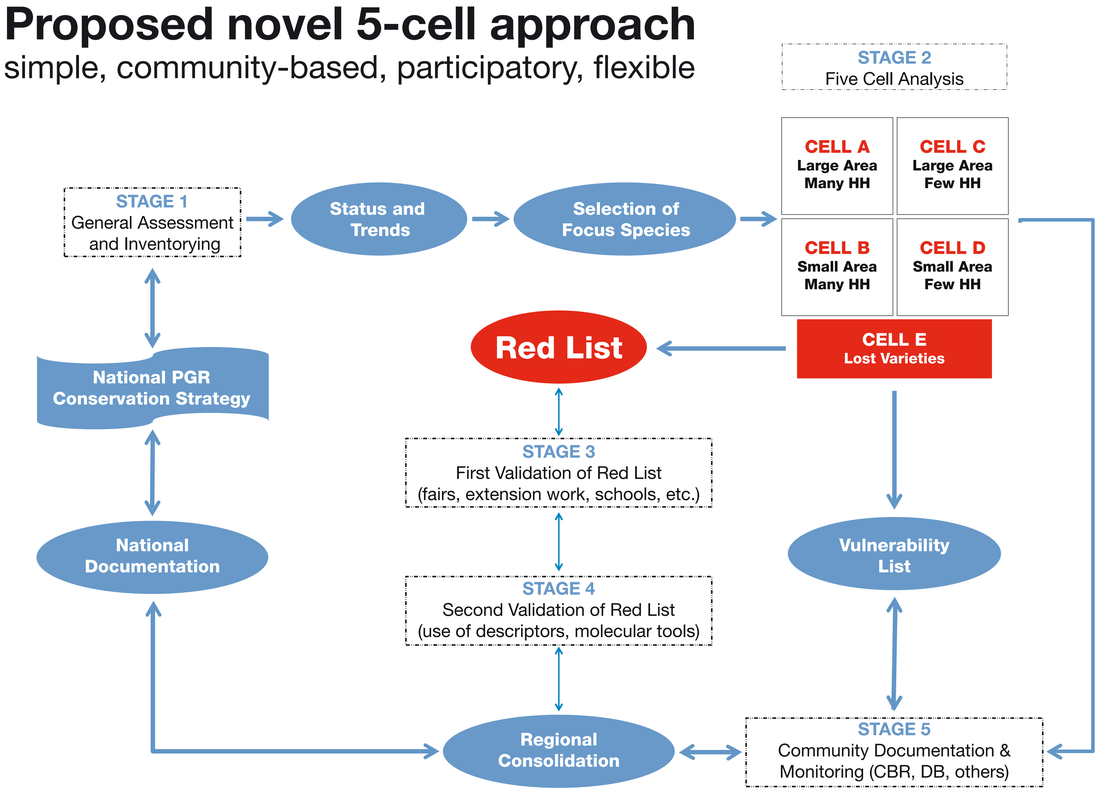
Purpose of a Red List for Cultivated Species

Red lists are instruments to monitor biodiversity as well as to inform and alert decision makers and the public for its proper conservation.

- For cultivated species, the ultimate objective of monitoring is to secure their effective use by people so as to sustainably meet their livelihood needs, as well as to prevent genetic erosion in order to ensure future options for the diversity present in locally cultivated varieties.
- This objective is quite different from that pursued through the IUCN Red Listing approach for wild species, where attention is directed towards the conservation of the species itself.
- The taxonomic unit being monitored by conventional Red Lists is the species, whereas for cultivated species the monitoring unit needs to be the variety, because its unique and distinctive combination of traits and associated knowledge is what needs to be conserved.
- When use of a variety has declined dramatically and its benefits are no longer reaching the local users a large, such a variety in real terms is *de facto* already lost. Listing it into a Red List for cultivated species would be very helpful to guide its rescue, promotion and effective use, in order for it to continue contributing to human wellbeing.

Proposed novel 5-cell approach

simple, community-based, participatory, flexible



The 5 CELLs

CELL A (large areas* and many households**):
Varieties grown for food security, or the market or with multiple use values

CELL B (small areas* and many households**):
Landraces for socio-cultural purposes (traditions, religious rituals, food culture)

CELL C (large areas* and few households**):
Varieties with specific adaptation traits (poor soils, drought, shade, swamp)

CELL D (small areas* and few households**):
Varieties with specific uses or use values limited to particular families

CELL E (lost):
Varieties that farmers believe to have been are lost

* small area < 0.2 ha < large area
** few households < 5 HH < many households

Validations

STAGE 3 – socially/culturally based

- Compare judgments and classifications across areas
- Establish authentication
- Lead group discussions at agricultural events (seed fairs)
- Disseminate through school students, extension workers, newspapers, radio broadcasts

-> information goes to governmental agencies who will
- Consolidate local data into red lists
- Promote reintroduction programs

STAGE 4 – scientifically based

- Phentoypic comparison of the plant with species/variant descriptors
- Authetication by molecular characterization in the laboratory
- Establishing and documenting the use in terms of combination of traits

Other Benefits

- Raise awareness on dwindling of Plant Genetic Resources
- Guide a sustainable agro-ecological landscape management
- Provide a means to support the implementation of CBD, ITPGRFA, FAO GPA for PGRFA
- Complement *ex situ* conservation strategies
- Provide a basis for allocating resources for sustainable conservation and use of agrobiodiversity (e.g., EU funds for promoting PGR)
- Help to safeguard the identity of food culture around the world

Challenges in Implementing a Red List for Cultivated Species

- Current absence of farmer-based mechanisms to which to anchor the monitoring system
- Policy aspects related to access and use of information generated during the monitoring
- Mainstreaming the participatory approach across countries and cultures
- Establishing Identity and matching names/varieties

Relevant text of the **CBD**
Convention on Biological Diversity

Article 7. Identification and Monitoring:
Each Contracting Party shall, [....]

(a) Identify components of biological diversity important for its conservation and sustainable use [....]

(b) Monitor, through sampling and other techniques, the components of biological diversity [...], paying particular attention to those requiring urgent conservation measures and those which offer the greatest potential for sustainable use;

(c) Identify processes and categories of activities which have or are likely to have significant adverse impacts on the conservation and sustainable use of biological diversity, and monitor their effects through sampling and other techniques; and

(d) Maintain and organize, by any mechanism data, derived from identification and monitoring activities pursuant to subparagraphs (a), (b) and (c) above.

Relevant text of the **FAO - GPA for PGRFA**
FAO - Global Plan of Action for the Conservation and Sustainable Utilization of Plant Genetic Resources for Food and Agriculture, Activity 18:

279. Assessment: Erosion of plant genetic resources for food and agriculture can occur in ex situ collections, in farmers' fields and in nature. [...]

281. Long-term objectives:
To minimise genetic erosion and its impact on sustainable agriculture by monitoring key elements of genetic resources conservation and the various factors causing genetic erosion, and assembling information to enable remedial or preventive action to be taken.

282. Intermediate objectives:
To determine the underlying causes of genetic erosion. To encourage monitoring at the national, regional, and global levels. To establish mechanisms to ensure that information is transferred to appropriate points designated as responsible for analysis, coordination and action. [...]

Relevant text of the **ITPGRFA**
The International Treaty on Plant Genetic Resources for Food and Agriculture

Article 5 - Conservation, Exploration, Collection, Characterization, Evaluation, and Documentation of Plant Genetic Resources for Food and Agriculture

5.1 Each Contracting Party shall [...] promote an integrated approach to the exploration, conservation and sustainable use of plant genetic resources for food and agriculture and shall in particular, as appropriate:

a) Survey and inventory plant genetic resources for food and agriculture, taking into account the status and degree of variation in existing populations, [...] and, as feasible, assess any threats to them;

b) Promote the collection of plant genetic resources for food and agriculture and relevant associated information on those plant genetic resources that are under threat or are of potential use;

c) Promote or support, as appropriate, farmers and local communities' efforts to manage and conserve on-farm their plant genetic resources for food and agriculture;

d) Promote in situ conservation of wild crop relatives and wild plants for food production, including in protected areas, by supporting, inter alia, the efforts of indigenous and local communities;

[...]

5.2 The Contracting Parties shall, as appropriate, take steps to minimize or, if possible, eliminate threats to plant genetic resources for food and agriculture.

References:

Padulosi, S, Dullo, E. (2012). Towards a viable system for monitoring agrobiodiversity on-farm: a proposed new approach for Red Listing of cultivated plant species. In: Padulosi, S., N. Bergamini and T. Lawrence, (Editors). On-farm conservation of neglected and underutilized species: status, trends and novel approaches to cope with climate change, Proceedings of the International Conference Friedrichsdorf, Frankfurt, 14–16 June, 2011, pp. 171-199.
Antofie, M.M. (2011). The Red List of Crop Varieties for Romania. Publishing House, Lucian Blaga University, Sibiu, Romania. 288 p. - **Hammer, K. and Khoshbakht, K. (2005)**. Towards a 'red list'for crop plant species. Genetic Resources and Crop Evolution (2005) vol. 52 pp. 249-265. - **Joshi, K.B., Upadhyay, M., Gauchan, D., Sthapit, B. & Joshi, K. (2004)**. Red Listing of agricultural crop species, varieties and landraces. Nepal Agricultural Research, 5: 73–80. - **Padulosi, S., Hodgkin, T. and Williams, J.T. (2002)**. Underutilized crops: trends, challenges and opportunities in the 21st Century. pp. 323–338, in: J.M.M. Engels, V. Ramanatha Rao, A.H.D. Brown and M.T. Jackson (editors). Managing Plant Genetic Diversity. CAB International, Wallingford, UK, and IPGRI, Rome, Italy. - **Sthapit, B.R., Ram Rana, A., Subedi, S., Gyawali, J., Bajracharaya, P., Chaudhary, B.K., Joshi, S., Sthapit, K., Joshi, D. & Upadhyay, M. (2005)**. Good Practice 3: Participatory four-cell analysis (FCA) for local crop diversity. pp. 14-17, in: B.R. Sthapit, P.K. Shrestha and M.P. Upadhyay (editors). On-farm management of agricultural biodiversity in Nepal. Good practices. IPGRI, Rome, Italy.