



Funded by the
Horizon 2020
Framework Programme
of the European Union

Farmer's Pride

Networking, partnerships and tools to enhance *in situ* conservation of European plant genetic resources

Proposal of a set of criteria for evaluating the efficiency of a network in securing and giving access to *in situ* LR diversity.

Citation

Negri V and Raggi L 2020 Proposal of a set of criteria for evaluating the efficiency of a network in securing and giving access to *in situ* landrace diversity. https://more.bham.ac.uk/farmerspride/wp-content/uploads/sites/19/2020/10/MS4_Network_efficiency_criteria_for_LR_access.pdf

Contents

1. Introduction.....	4
1.1 Case studies description.....	5
1.1.1 The conservation and safety networks implementing the Italian regional laws	5
1.1.2 Introduction	5
1.2 Structure and best practices	6
1.3 References	8
2. The networks created for commercialising or distributing conservation variety seed	9
2.1 Introduction	9
2.2 Structure and best practices	9
3. The community seed bank of the AEGILOPS network	10
4. The ProSpecieRara network.....	11
5. Case studies analysis	13
6. List of proposed criteria for evaluating the efficiency of a network in securing and giving access to in situ LR diversity	14
a. Criteria to assess the extent to which a network secures national and regional LR diversity.	14
b. Criteria to assess the extent to which a network facilitates the access to resources to users.....	15
6.1 Scores for evaluating the efficiency of a network in securing and giving access to in situ LR diversity through proposed criteria	15
Annex 1.....	17

1. Introduction

It is widely recognised that the diversity held by crop wild relatives (CWR) and landraces (LR) is a vital resource for our future food, nutrition and economic security so that there is a strong need for concerted efforts to conserve them in situ (in nature and on-farm). In fact, despite their recognised value, CWR and LR are threatened by changes in land use and management, replacement with modern cultivars (this aspect affects LR only), habitat degradation, and effects of climate change. In recent years recommendations have been given by different national and international organizations for the establishment of a global in situ/on-farm network to support germplasm users' needs and create more awareness of the value and necessity of in situ conservation and on-farm management of plant genetic resources for food and agriculture (PGRFA).

In the EC H2020 Call New partnerships and tools to enhance European capacities for in situ conservation the Project entitled Networking, partnerships and tools to enhance in situ conservation of European plant genetic resources (short name, 'Farmer's Pride') is focusing on both LR and CWR conservation through the establishment of a network for on-site conservation and sustainable use of Europe's plant diversity for food, nutrition and economic security throughout the European region. With specific focus on LR, different European and non-European in situ conservation networks and their structure have been analysed by the Consortium and a collection of case studies produced by the University of Perugia in collaboration with the University of Birmingham (Review of European and non-European PGRFA in situ stakeholders, networks and network structures; Farmer's Pride Project MS1; annex 1).

Relying on a detailed analysis of four quite different network case studies, the information reported in the ECPGR Concept for on-farm conservation and management of plant genetic resources for food and agriculture (www.ecpgr.cgiar.org/working-groups/on-farm-conservation), project partners experiences of in situ conservation, and on the above-mentioned document (MS1) we here propose a set of criteria for the evaluation of the efficiency of collaboration platforms for in situ conservation of LR.

In particular, two different sets of criteria are proposed to evaluate the ability of a network in

- i) securing national and regional LR diversity and
- ii) facilitating access to LR material by different users (e.g. farmers, farmers' associations, gardeners, gardeners' associations, seed savers, researchers, NGOs, plant breeders and seed companies).

1.1 Case studies description

1.1.1 The conservation and safety networks implementing the Italian regional laws

Country: Italy. Example provided by UNIPG and Agenzia Regionale per lo Sviluppo e l'Innovazione dell'Agricoltura (ARSIAL Regione Lazio).

1.1.2 Introduction

Italy was the first country in Europe to protect genetic resources (GR) and LR, in particular, with both national (Table 1) and regional (Table 2) laws.

Table 1. List of national Italian laws for genetic resources protection.

Law number	Content	Application
no. 212/2001	Setting a section for conservation varieties in the National Register of varieties	Whole Italian territory
no. 101/2004	Adopting the International Treaty on Plant Genetic Resources for Food and Agriculture	Whole Italian territory
no. 46/2007	Defining <i>conservation varieties</i> and terms of seed commercialisation.	Whole Italian territory
no. 194/2015	A set of rules for biodiversity conservation and valorisation	Whole Italian territory

Table 2. List of regional Italian laws for genetic resources protection.

Law number	Region	Law number	Region
no. 50/1997	Tuscany	no. 1/2008	Emilia Romagna
no. 64/2004	Tuscany	no. 26/2008	Basilicata
no. 15/2000	Lazio	no. 19/2013	Sicily
no. 25/2001	Umbria	no. 16/2014	Sardinia
no. 11/2002	Friuli Venezia Giulia	no. 14/2018	Calabria
no. 12/2003	Marche	no. 11/2019	Piedmont
no. 1/2007	Campania	-	-

In Italy the responsibility for maintaining natural and agricultural resources lies with the regions, while the Ministry of Agriculture has only a coordination role. To the purpose of coordinating the conservation work of the 20 different Italian regions, the Ministry of Agriculture promoted and published 'Guidelines for the Conservation of Genetic Resources for Food and Agriculture' (www.reterurale.it/flex/cm/pages/ServeBLOB.php/L/IT/IDPagina/9580). The Italian Regional legislation clearly aims to protect local agro-biodiversity, with the declared goals of:

- Reducing the "genetic erosion threat" of local (autochthonous animal, plants, microbial) GRs,
- Promoting of genetic resources (GR) conservation in situ or on-farm,
- Developing an economic interest for food products based on local GRs, and

- Enhancing information and information exchange regarding local GRs.

As all the Italian Regional legislation are quite similar, the implementation of such laws is also similar.

The example of Lazio Regional Law no. 15 (1st March 2000) “Protection of autochthonous genetic resources of agricultural interest” is typical. The law is implemented by the Lazio Regional Agency for Development and Innovation in Agriculture (ARSIAL), with funding coming from the European Agricultural Fund for Rural Development (EAFRD) under EU Regulations EC 1698/2005 and 1974/2006 through the Lazio Rural Development Plan (Negri 2012).

1.2 Structure and best practices

For LR in particular, the implementation plan foresees several phases (Costanza et al., 2011):

- I. the production of a LR inventory,
- II. the characterisation of each LR considering both morpho-phenological and, sometimes, genetic traits,
- III. the assessment of the LR's identity, autochthony and threat by a scientific commission,
- IV. only after the positive result of the listed investigations a certain GR is registered into a Regional Voluntary LR Register and enter into the planned protection scheme (see details below),
- V. the protection scheme is realised as:
 - In situ conservation by a Farmer Conservation and Safety Network,
 - Ex situ conservation by ARSIAL, which collects and stores propagation material in its genebank and in field collections, and
 - Promotion of the products from LR, as main elements.

A summary of the five phases is shown in Figure 1. Members of the Farmer Conservation and Safety Network can be public and private institutions, ‘associations of interest’ and single or associated farmers. The conservation activities of the network are coordinated by ARSIAL. In 2011 the network involved 255 farmers (Costanza et al., 2011). To maintain the LR on-farm these farmers receive monetary incentives, established on the basis of the type of cultivated crop (rates are in the range of €250–300/ha for cereals and €500–600/ha for vegetables). In 2018, 172 different LR were protected in the Lazio Region (Costanza et al., 2011; Taviani pers. comm. 2018):

- 138 fruit tree LR belonging to 13 different species, and
- 34 herbaceous crop LR belonging to 14 different species.

As mentioned above, similar networks have been established in other Italian regions on the basis of regional laws and with the same regulations to be part of the regional network.

Through the networks, the registered LR is cultivated across years in the area where it was initially found, but enlargement of a LR cultivation area through seed increase and seed exchange among local farmers is also foreseen starting from the ex situ conservation in the regional genebank or from the Farmer Conservation and Safety Network itself.

In addition, in some cases the regions also promote with funds the constitution of community seed banks at certain farms. These community seed banks also exchange LR that have not been registered in the regional repertory. For example, in the Umbria region such a community seed bank was established in a farm nearby the Trasimeno Lake; this community seed bank exchanges seed of 35 LR belonging to 11 different agricultural species. In 2019, 72 LRs were exchanged with local farmers. It should also be noted that all data concerning the LR under the regional systems are available online.

Finally, the regions also facilitate the acquisition of quality brands for LR and organize events to spread information on LR identity, quality and link with the territory all activities that positively input on LR continued cultivation in the future.

Overall, it appears that the Italian regional laws facilitate:

- The compilation of National Inventories based on the Regional Inventories, which are the information base necessary for any conservation action,
- Further registration in the European Conservation Variety Register,
- Wider commercialisation/exchange of seed of (some) LRs and, consequently, wider on-farm and in situ conservation (Negri, 2012).

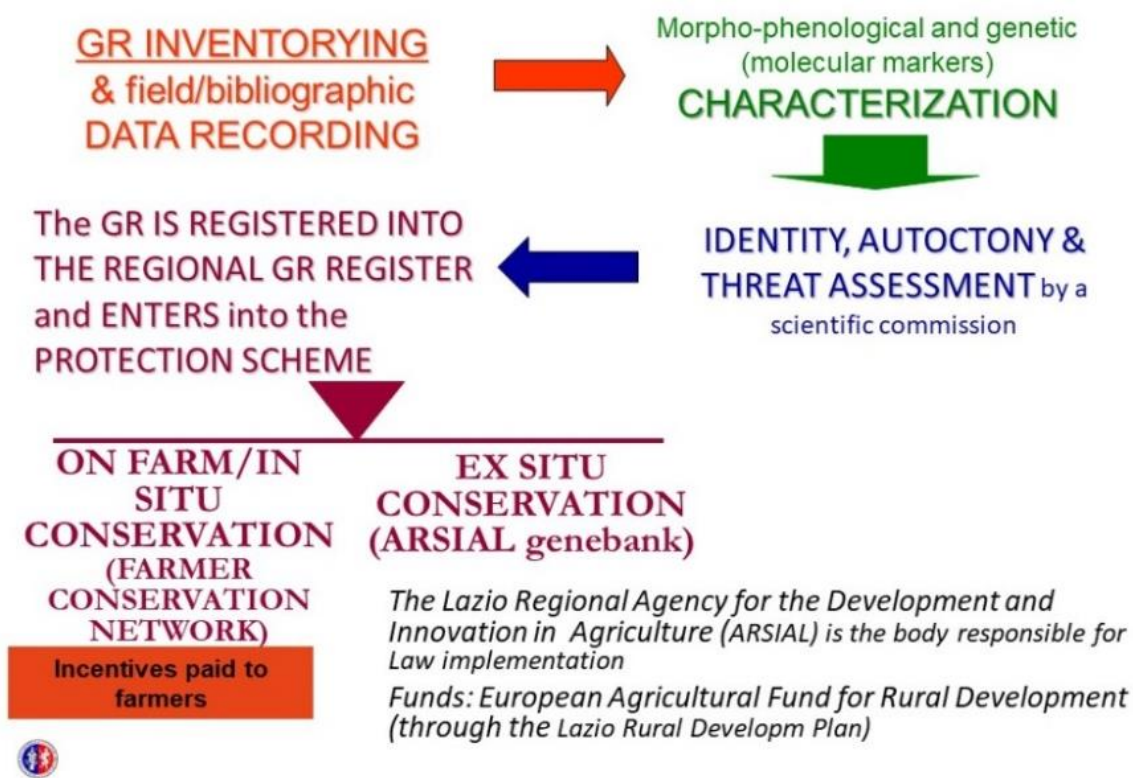


Figure 1. Implementation plan of Lazio Regional Law no. 15 (1st March 2000) “Protection of autochthonous genetic resources of agricultural interest”.

1.3 References

Costanza MT, Barbagiovanni Miracolo I, Taviani P, Paoletti S, Rea R, Lelli L, Garzia JH, Porfiri O, Nardi P & Tanca M (2011). 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. (editors). *Agrobiodiversity Conservation: Securing the Diversity of Crop Wild Relatives and Landraces*. CAB International, Wallingford, UK. Pp 161–172

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. Bioersivity International, Rome, pp. 211–217. ISBN 978-92-9043-907-3

2. The networks created for commercialising or distributing conservation variety seed

Country: Italy. Example provided by UNIPG and Cooperativa agricola Agri 90 (Trentino-Alto Adige Region).

2.1 Introduction

In Italy, several LRs have been registered in the European catalogue as being a conservation variety, following the Commission Directive [2008/62/CE](#) of 20 June 2008 which provides certain derogations for acceptance (i.e. for the registration of landraces and varieties in the Common Catalogue and the marketing of their seed) 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 landraces and varieties. The derogations are addressed to the so-called “agricultural species” in the European seed legislation meaning (i.e. Directives 66/401/EEC, 66/402/EEC, 2002/54/EC, 2002/56/EC and 2002/57/EC i.e. most open field crops).

Among the registered conservation varieties there is ‘Nostrano di Storo’ – a maize LR traditionally cultivated in the ‘Chiese’ valley (Trentino-Alto Adige Region, Province of Trento) over an area of approximately 350 hectares. The landrace is produced under the Municipalities of Storo, Bondone, Condino, Bleggio Superiore, Comano Terme, Fivà and Stenico.

2.2 Structure and best practices

Within the cultivation area, farms producing ‘Nostrano di Storo’ are grouped in a cooperative, funded in 1990 and named “Agri 90”. At the time, the cooperative aimed to promote the use and commercialisation of the landrace as, at the end of the 80s, its cultivation was very limited. Currently, the cooperative groups more than 100 farmers producing circa 1,500 tons of ‘Nostrano di Storo’. 80% of the farmers cultivate ‘Nostrano di Storo’ in small fields (from 2,000 to 10,000 square meters) as integration of their family income. The other 20% is cultivated in bigger farms where the cultivation of the landrace is carried out on larger areas.

Maize is a predominantly allogamous species. Regarding ‘Nostrano di Storo’, the cooperative oversees its seed multiplication. Every year, some of the members – especially the ones holding long-time expertise – select a fraction of their fields in which they carry out manual harvest of the ears by discarding plants not corresponding to the 26 morphotypes constituting the ‘Nostrano di Storo’. In order to avoid cross-pollination with maize hybrid-varieties (or other varieties) the selected fields must be surrounded by other crops or ‘Nostrano di Storo’ itself.

After the harvest, the ears are carefully tied together (20–30 ears) and dried (natural-air drying). When humidity of the kernel reaches 13–14% (typically at the end of March) the farmers and experts of the cooperative select ears according to their colour, size, number and appearance of the rows. Once the best ears are chosen, only the seeds located in the central part of the ear are picked for seed. The procedure occurs every year in multiple locations.

The multiplication procedure effectively ensures preservation of the peculiar morphological features of the landrace, reducing the risk of cross-pollination events with other maize varieties that might lead to the loss of some of the particular traits of ‘Nostrano di Storo’. All the seeds are then bulked together and distributed to all the members of the cooperative according to their needs. Similar procedures are applied for other conservation

varieties, while in other cases it is a single farm, or a few farms, which produce seed for the others. About the latter, it should also be noted that, for the Italian law, a farm can commercialise the seed of a conservation variety produced on his/her farm in a simplified manner with respect of a seed company (i.e. with a simplified license).



Figure 2: 'Nostrano di Storo' ears and kernel (courtesy of the cooperative "Agri90", www.agri90.it/).

3. The community seed bank of the AEGILOPS network

Country: Greece. Example provided by UNIPG and Dr Kostas Koutis, The Greek Network for Biodiversity and Ecology in Agriculture (AEGILOPS).

The Greek Network for Biodiversity and Ecology in Agriculture (AEGILOPS) is a network that tries to build on various pillars (community seed banking, organic breeding and seed schools) to maintain and develop local varieties, as well as strengthen the role of organic farmers in the conservation of genetic resources (www.aegilops.gr/en/itemlist?start=9). It was founded in 2004 in Volos, Central Greece, focusing on the preservation – re-cultivation of local varieties/heritage crops (cereals, vegetables, forages, fruits and olives) and organic breeding. AEGILOPS has adopted participatory processes with farmers and other stakeholders in the food chain for the evaluation and selection of these local varieties to produce local quality food products. AEGILOPS is a not-for-profit organization in which organic farmers, individuals, groups or scientists who agree with the organizations' aims can freely participate. The organization relies on the financial and voluntary contribution of members and friends to meet its needs.

Members of AEGILOPS actively support the protection and conservation of agricultural biodiversity and organic farming in Greece. They can also purchase local seed varieties from the network for experimentation and

testing, from Focal Points and from the various eco-festivals and meetings of the organization, where seed exchanges and donations are made. Operative links exist with the Hellenic Agricultural Organization – Demeter. Presently AEGILOPS:

- Involves 400 members,
- Conserves 1,500 accessions belonging to 32 species in its community seed bank and
- Has donated/exchanged 2,000 samples among farmers (in 2018).



Figure 3: A farmer of the AEGILOPS network in his field.

4. The ProSpecieRara network

Country: Switzerland. Example provided by Dr Béla Bartha, ProSpecieRara.

ProSpecieRara (PSR) was founded in 1982; it works on conserving and maintaining a wide selection of plant varieties and animal breeds. Through the network of farmers and gardeners, comprising approximately 2,500 individuals and institutions, ProSpecieRara has managed to conserve and sustainably use a collection of about 1,400 vegetable varieties, 1,800 fruit varieties and 700 berry accessions. PSR is also building a collection of about 1,000 ornamental plants. In addition to the farmers and gardeners who are part of the network maintaining and developing this diversity, ProSpecieRara also works together with gene banks, research institutions, food chains, organic farmers, breeder organizations and the Swiss Commission for the Conservation of Cultivated Plants. To increase awareness about the importance of keeping alive the biodiversity of agriculture and associated traditional knowledge, ProSpecieRara has opened up part of their network of farms, gardens and orchards to the public that are visited by about 300,000 people every year. The organization also disseminates information and contributes further to the preservation of traditional knowledge by collecting and publishing it in books. As a result of these activities, about 28% of the Swiss population are now familiar with the name ProSpecieRara and its meaning. ProSpecieRara maintains its own ex situ collection (that is part of the Swiss gene bank). But its most important assets are the broad mobilisation of partners from civil society for in situ maintenance, and the

application of the “conservation through sustainable use” principle by cooperating with partners in the production value chain.

Examples of its activities:

- Private people can join as ‘variety custodians’. After training they take care/produce seeds of one or two plant varieties in their own home gardens; sending back half of the produced seeds to PSR. Through this system, around 2,000 people look after breeding animals, vegetables, and fruit trees.
- PSR works with the organic seed company SATIVA for the multiplication of its seeds. They are marketed as “niche varieties” under the directive 916.151.1. (see next paragraph). SATIVA also undertakes maintenance of varieties for PSR.
- There is demand for PSR-labelled products (seeds, seedlings, vegetables/flowers). They are produced by market-gardeners and farmers and marketed inter alia by the retailer COOP.

Since 1/7/2010 the new CH directive 916.151.1 has been put into force. This article is quite helpful for ProSpecieRara work because it does not regulate the marketing of small quantities of seeds and it creates a new category of varieties that can be marketed without fulfilling the registration criteria to the official catalogue: niche-varieties. This provides organizations like ProSpecieRara with the legal space they need to carry out conservation projects that involve circulation of propagation material from traditional varieties.

Biodiversity management (vegetables)

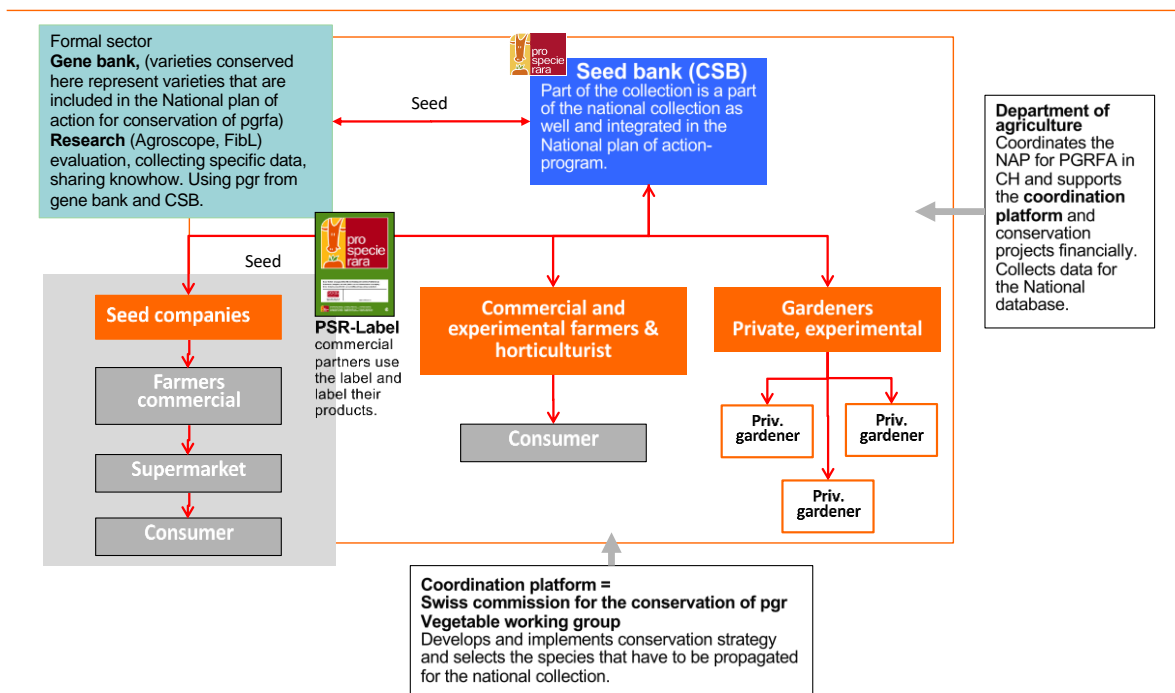


Figure 4. How ProSpecieRara works and is interlinked with other stakeholders (an example using carrots/vegetables).

5. Case studies analysis

As from the reported examples, and from the other sources mentioned in the introduction, it is evident that there are different network models in Europe, especially because of the different legislation or implementation systems of conservation networks existing across the region. In some cases networks are managed by national and/or regional entities, while in other cases they entirely depend on private organizations (e.g. consortia of producers and NGOs).

Different networks may also have different goals; some of these goals are very common such as:

- Local agro-biodiversity protection and conservation,
- Reduction of the genetic erosion threat of autochthonous genetic resources,
- Enhancement and circulation of information on GR and
- Support provision to custodians.

In addition to these, other aspects of in situ conservation and sustainable use of GR are of interest and/or managed in other networks. These include production of “special quality food” to help the farmers have revenue in niche markets (especially in Italy and Greece), development of an economic interest for food products based on local GR, development of a market for GRs’ seed, building up systems of innovative experiments (including Participatory Breeding), facilitate the mobilisation of financial resources to promote conservation and sustainable utilisation of PGRFA.

Networks working in the conservation and sustainable use of GR mainly promote: morpho-phenological characterisation and ex situ backup of conserved materials, cultivation, seed production exchange and commercialisation and the development of web-based catalogues of materials for knowledge sharing. There are key aspects that can contribute to the development of a network really able to guarantee conservation and sustainable use of in situ materials. Such a network should take in due consideration:

- International, national and regional laws,
- Motivations and benefits of members in joining and remaining in the network;
- Conserved materials, favouring increased knowledge of their presence in situ, description, cultivation, use in organic agriculture, valorisation of the product and registration of conservation varieties,
- Seeds of conserved materials, favouring seed increase, circulation and commercialisation,
- Benefits deriving from ex situ backup of in situ managed materials,
- Possibilities offered by the new technologies in supporting members inclusion, sharing materials knowledge and monitoring material cultivation,
- National and international fundraising opportunities.

6. List of proposed criteria for evaluating the efficiency of a network in securing and giving access to in situ LR diversity

On the basis of the examined examples and of the outcomes of the MS1 “Review of European and non-European PGRFA in situ stakeholders, networks and network structures” UNIPG is proposing the following criteria for evaluating the ability of a network in securing and giving access to in situ LR diversity.

a. Criteria to assess the extent to which a network secures national and regional LR diversity.

How it is promoted (with specific reference to material selection):

- The production of LR inventories (national or regional),
- The LR characterisation to enter the network (both morpho-phenological and genetic),
- The assessment of LR identity, autochthony, threat and value of diversity.

How it is promoted (with specific reference to material management):

- The cultivation of the LR:
 - I. in the area where it was initially found,
 - II. by the maximum possible number of farmers,
 - III. for at least 15 years.
- The application of “selection for trueness to morphological type” according to the LR’s reproduction system/propagation strategy (e.g. autogamous, allogamous and clonal),
- The valorisation of the LR product/s building up new market chains for single LR/underutilised species,
- The development of monitoring system related to a dynamic management of LR including an alert system for LR conservations status,
- The development of decentralised or centralised facilities for LR product cleaning and storing,
- The characterisation of LR for traits of special interest for research and development institutions (e.g. universities and breeding companies).

How support to custodian farmers is given in:

- Increasing the recognition of their role as custodians and of the value of their work (e.g. through the development of labelling system, institutions of awards for particular products),
- Coordinating and helping in organizing the conservation work (e.g. helping in fieldwork, cleaning and sending out samples to other network members),
- Giving technical provisions,
- Periodically monitoring the effects of in situ conservation on the LR diversity,
- Giving – or facilitating the access – to incentives (monetary or of different nature) according to the type of cultivated LR developing projects to get access to public or private funding.

b. Criteria to assess the extent to which a network facilitates the access to resources to users

How it is promoted:

- The knowledge of LR maintained in situ through the use of digital freely accessible online databases;
- The circulation of LR seed (or other propagation materials) within the network – thus increasing direct access to LRs to other network members – in accordance with relative national and international laws, seed protection laws, ITPGRFA and NAGOYA protocol;
- The safe conservation of propagation materials in ex situ facilities (i.e. gene banks or community seed banks) by means of periodical ex situ backups thus guaranteeing access to an “updated version” of the LR;
- The registration of LR in the European Conservation Variety Register; thus guaranteeing access since seed of Conservation Varieties can be commercialized under the actual European seed law;
- The solution of phytosanitary problems that can restrict access and material transfer;
- the collaboration with research and development institutions (e.g. universities and breeding companies).

UNIPG also proposes that these criteria can be assessed by using scores (from 0 to 5), as reported in Table 1.

6.1 Scores for evaluating the efficiency of a network in securing and giving access to in situ LR diversity through proposed criteria

Table 1. Proposed scores to evaluate the efficiency of a network to maintain LR *in situ* in relation to conservation and access: activities not carried out=0, poor=1, good=3, excellent=5.

TYPE OF ACTIONS RELATED TO CONSERVATION	SCORE
1. Promote (with specific reference to material selection)	
a. production of LR inventories	
b. LR characterisation to enter the network (both morpho-phenological and genetic)	
c. assessment of LR identity, autochthony, threat and value of its diversity	
2. Promote (with specific reference to material management)	
a. cultivation of the LR	
b. application of <i>selection for trueness to morphological type</i>	
c. valorisation of LR product/s	
d. development of LR monitoring system	
e. development of facilities for seed management	
f. LR characterisation for traits of special interest	
3. Give support to the custodian farmers	
a. increasing recognition of custodians	
b. coordinating and helping with the work	
c. giving technical provisions	
d. periodically monitoring the effects of <i>in situ</i> conservation on the LRs diversity	
e. giving - or facilitating the access - to incentives (monetary or of different nature)	

TYPE OF ACTIONS RELATED TO ACCESS	SCORE
1. Promote	
a. the knowledge of LR maintained <i>in situ</i> through the use of digital freely accessible on line databases	
b. the circulation of LR seed or of other propagation materials	
c. the safe conservation of propagation materials in <i>ex situ</i> facilities (i.e. gene banks or community seed banks) by means of periodical <i>ex situ</i> backups	
d. the registration of LRs in the European Conservation Variety Register	
e. solution of phytosanitary problems	
f. collaboration with different type of institutions	

Annex 1

Summary

Conservation and Safety Network of Lazio Region (Italy).....	18
Stichting De Oerakker (Netherlands).....	20
Plant Micro-Reserves network. Valencian Autonomous Community (Spain).....	22
Network for Nordic heritage cereal varieties (Nordic countries)	24
Pro-loco Cave (Italy)	25
Frøsamlerne; Danish Seed Savers (Denmark).....	27
The Finnish Landrace Association (Finland).....	28
Informal Nordic Crop Wild Relative Network (Nordic countries)	29
AEGILOPS – Greek Network for Biodiversity and Ecology in Agriculture (Greece).....	31
ÖMKi on-farm network (Hungary).....	34
Kárpát-Medencei Gyümölcsész Hálózat (Orchard Network of the Carpathian Basin) (Hungary).....	36
Magház (Seed-house) Community network for agricultural diversity (Hungary).....	38
Seed Exchange Network and TaTuTa Ecological Farm Visit Programme of Buğday Association for Supporting Ecological Living (Turkey).....	40
Genetic Reserve Network for Wild Celery	42
SADC Plant Genetic Resources Centre (SPGRC) (Southern Africa)	44
Asia Pacific Forest Genetic Resources Programme (APFORGEN) (Asia and the Pacific).....	46
Sri Lankan Case on Conservation and Sustainable Use of Crop Wild Relatives (CWR) (Sri Lanka)	48

Contributor: UNIPG

Conservation and Safety Network of Lazio Region (Italy)

Description

Italy was the first country in Europe to protect Genetic Resources (GRs) and Landraces (LRs) with National Laws (no. 212/2001, setting a section for conservation varieties in the National Register of varieties; no. 101/2004, adopting the International Treaty on Plant Genetic Resources for Food and Agriculture and no. 46/2007, defining 'conservation varieties' and terms of seed commercialisation) and Regional Laws (Tuscany Laws no. 50/1997 and no. 64/2004; Lazio Law no. 15/2000; Friuli Venezia Giulia Law no. 11/2002; Marche Law no. 12/2003 and Emilia Romagna Law no. 1/2008), all protecting local GRs.

The Italian Regional legislation clearly aims to protect local agro-biodiversity, with the declared goals of: reducing the "genetic erosion threat" of local (autochthonous) GRs, promoting GR conservation in situ or on-farm, developing an economic interest for food products based on local GRs, and enhancing information and information exchange regarding local GRs.

As all the Italian Regional legislation is quite similar, the example of Lazio Regional Law no. 15 (1st March 2000) "Protection of autochthonous genetic resources of agricultural interest" is typical. The law is implemented by the Lazio Regional Agency for Development and Innovation in Agriculture (ARSIAL), with funding coming from the European Agricultural Fund for Rural Development (EAFRD) under EU Regulations EC 1698/2005 and 1974/2006 through the Lazio Rural Development Plan.

Structure and best practices

The implementation plan foresees several implementation phases (Costanza et al., 2011):

Phase 1) GR inventorying, Phase 2) Characterisation of each GR (morpho-phenological and, potentially, genetic traits), Phase 3) Assessment of the GR's identity, autochthony and threat by a scientific commission, Phase 4) Only after the positive result of the listed investigations a GR is registered into a Regional Voluntary GR Register and enter into the planned protection scheme, Phase 5) The protection scheme is realized: as in situ conservation by a Farmer Conservation and Safety Network, and as ex situ conservation by ARSIAL, which collects and stores propagation material in its genebank and in field collections.

Members of the Farmer Conservation and Safety Network can be public and private institutions, 'associations of interest' and single or associated farmers; the conservation activities of the network are coordinated by ARSIAL. Through the network the GR is cultivated across years in the area where it was initially found, but enlargement of a GR's cultivation area through seed increase and seed exchange among local farmers is also foreseen.

The network currently involves 255 farmers (Costanza et al., 2011). To maintain the GRs on-farm these farmers receive monetary incentives, established on the basis of the type of cultivated crop (rates are in the range of € 250–300/ha for cereals and € 500–600/ha for vegetables). At the time of writing 172 plant LRs were protected

in the Lazio Region (138 fruit tree LRs belonging to 13 different species, and 34 herbaceous crop LRs, belonging to 14 different species) (Costanza et al., 2011; Taviani pers. comm. 2018).

Similar networks have been established in other Italian Regions on the basis of Regional laws and with the same regulations to be part of the Regional network. Overall, it appears that the Italian Regional laws facilitate:

- The compilation of National Inventories based on the Regional Inventories, which are the information base necessary for any conservation action;
- Further registration in the European Conservation Variety Register;
- Wider commercialisation of seed of (some) LRs and, consequently, wider on-farm and in situ conservation.

Future integrated *in situ* conservation stakeholder networking options

Presently, having contacted the existing Network, it is unclear if it (or any of the involved farmers) will join the future European network that is being built in Farmer's Pride, possibly due to the Regional mandate and administrative restrictions.

References

Costanza MT, Barbagioanni Miracolo I, Taviani P, Paoletti S, Rea R, Lelli L, Garzia JH, Porfiri O, Nardi P & Tanca M (2011). 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. (editors). *Agrobiodiversity Conservation: Securing the Diversity of Crop Wild Relatives and Landraces*. CAB International, Wallingford, UK. Pp 161-172

Contributor: CGN

Stichting De Oerakker (Netherlands)

Description

Stichting De Oerakker (SDO; Foundation De Oerakker) was established in 1995 and led until 2006 a largely unknown existence. Coordinated by the Dutch national genebank, CGN (cgn.wur.nl) a larger group of agro-initiatives¹ joined this foundation and currently over 100 agro-initiatives are members of SDO (deoerakker.nl). The main reason these agro-initiatives joined SDO was their concern of the gradual disappearance of Dutch biocultural heritage of crops and their cultivars.

Structure

SDO consists of three networks, namely network Eeuwig Moes (Eternal Mash), which is focussed on vegetables, network De Bekoring dealing with cereals and their associated flora, and the National Fruit Network concerned with fruit trees. Network Eternal Mash is the oldest network with most participants involved, network De Bekoring has led until present a somewhat obscure existence and the National Fruit Network is the youngest established network with a group of active participants. Twice a year SDO organises a meeting: the first meeting is held in the first part of the year and involves a visit to a few initiatives in which practical learning from each other is an important aspect of the meeting; the second meeting is in the second half of the year is held in Wageningen and focusses on general information exchange, vision development and networking. Contacts are present with Foundation Rare Animal Breeds (SZH; Stichting Zeldzame Huisdierrassen; szh.nl), which is involved in the protection of rare Dutch animal breeds.

Best practises

In order to establish which varieties qualify as Dutch biocultural heritage a list was developed of varieties which were cultivated until World War II in the Netherlands (before WWII the effects of plant breeding on the variation in varieties was not that strong). The Dutch biocultural heritage was called the Oranje lijst (Orange list; oranjelijst.nl) indicating the precarious status of the material and the national royal colour. Currently the list consists of 6,575 varieties from five arable and 34 vegetable crops, next to varieties from four fruit tree species. For around 20% of the varieties plant (including seed) material is still available. The Orange list is increasingly seen as a standard list for Dutch biocultural heritage concerning crops and their varieties. On the basis of this Orange list a core of around 400 varieties were selected for their economic importance, regional origin, and interesting stories. To maintain the varieties in more or less their original/present state, they are currently being described, as since the 1960s varieties were described on the basis of distinctness, uniformity and stability (DUS) to obtain breeders rights. For the description of the varieties the asterisked characteristics in the CPVO Protocols

¹ agro-initiative is a broad term of organizations and people interested in the maintenance of living cultural heritage; they can be professional and hobby farmers/gardeners, small scale seed companies, historical gardens; often the people involved are elderly.

for DUS are used (cpvo.europa.eu/en/applications-and-examinations/technical-examinations/technical-protocols). In between, the 10 and 20 agro-initiatives are currently busy describing the Dutch heritage varieties facilitated by members of CGN.

Future integrated *in situ* conservation stakeholder networking options

On the crop side, a platform has been developed for the on-farm/in garden community. This functions properly for the vegetables and fruit tree networks. The cereal network is not really functioning and for the time being this network is included in the vegetable network. On a higher hierarchical level SDO works together on an ad hoc basis with SZH, connections with Forestry are not yet very well established. Contacts of SDO and SZH with European umbrella organizations like SAVE have been established.

Contributor: URJC

Plant Micro-Reserves network. Valencian Autonomous Community (Spain)

Description

This network was created by the Regional Wildlife Service of the Valencian Government (Servicio de Vida Silvestre, Generalitat Valenciana), in 1998. Its main objective is to complement the existing network of protected areas, ensuring the protection of endemic, endangered or rare plants of the Valencian Community. Around 25% of the Crop Wild Relative (CWR) species listed in Rubio Teso et al. (2018) (232 species) are protected by the Plant Micro-Reserve (PMR) network, 142 of them are listed in the prioritised list of CWR.

Structure

Initial financial support by a Life project afforded the first works related with the creation of the network, starting with the approval of the normative in 1994 (Laguna et al., 2014). Since 1998, when the first PMR was created, more than 300 sites have been added to the network. In June 2018, the PMR network is composed of 304 sites, foreseen to be 312 by the end of the year. These 304 (312) PMRs are (will be) legally protected areas covering less than 20 ha each that represent around 23 km² of the Valencian Autonomous Community (around 0.1% of the Valencian territory and thus a negligible surface area of Spain which has more than half a million square kilometres). The PMR network covers more than 65% of the native Valencian flora (more than 1,700 species) (Fos et al., 2017), 232 of them considered to be CWR. Around 76% of the sites are of public ownership, 15% of them belong to municipal entities and around 9% to private owners in which particular citizens, NGOs or conservationist organizations are included (Servicio de Vida Silvestre 2013).

Best practices

The PMR network is compatible with the existing Natural Parks in the Valencian autonomous community and could be considered complementary to them (Laguna et al., 2016). Some of the programmed and scheduled activities within the network are the reintroduction or reinforcement of threatened plant species, having rigorous control of invasive species or performing regular censuses of the species inhabiting the PMR (Laguna et al., 2013). The model has been successfully implemented in other autonomous communities in Spain (i.e. Castilla y León since 2007 (BOCL 2007), Castilla La Mancha or Baleares) and even exported to other countries such as Cyprus or Bulgaria – through two Life projects counting with the assessment of the Valencian team – in addition to Egypt, Slovenia, Greece or Latvia where the model was already working (press release, Europa Press 2010: europapress.es/comunitat-valenciana/noticia-medio-ambiente-exporta-modelo-microrreservas-flora-chipre-bulgaria-20100405164424.html).

Finally, the regulation law of the PMR network also establishes the commitment by the administration to collect and store germplasm of the most relevant species of the flora covered by the network (Emilio Laguna, pers. comment).

Future integrated *in situ* conservation stakeholder networking options

Regarding the participation of the PMR network in a European integrated network of *in situ* conservation, we have received a preliminary positive answer. However, they point at the huge load of work that can represent facilitating non-standardised information. We believe that this is related to the limited human and economic resources available.

References

- BOCL (2007) Boletín Oficial de Castilla y León, num 119 del 20 de Junio de 2007. Decreto 63/2007 por el que se crean el Catálogo de Flora Protegida de Castilla y León y la figura de protección denominada Microrreserva de Flora.
- Fos S, Laguna E, Jiménez J & Gómez-Serrano MA (2017) Plant micro-reserves in Valencia (E. Spain): A model to preserve threatened flora in China? *Plant Diversity* 39 (6):383-389. doi.org/10.1016/j.pld.2017.10.002
- Laguna E, Fos S & Jiménez J (2014) Efectividad comparada de las redes valencianas de MRF y ENP en la protección pasiva de plantas singulares. *Biogeografía de Sistemas Litorales. Dinámica y Conservación*. In: Cámara R, Rodríguez B, Muriel JL (eds) *Sistemas vegetales y Fauna en Medios Litorales: Avances en su caracterización, dinámica y criterios de conservación*. Universidad de Sevilla y Asociación Española de Geógrafos. Pp: 237 – 243.
- Laguna E, Ballester G, Deltoro V, Fos S, Carchano R, Oltra JE, Pérez-Botella J & Pérez-Rovira P (2013) A Pioneer Project: The Valencian PMR Network. In: Kadis C, Thanos C, Laguna E (eds): *Plant micro-reserves: From theory to practice. Experiences gained from EU LIFE and other related projects*. PlantNet CY Project Beneficiaries. Utopia Publishing. Atenas. ISBN 978-618-80647-2-0. Pp: 13 – 23.
- Laguna E, Fos S, Jiménez J & Volis S (2016) Role of micro-reserves in conservation of endemic, rare and endangered plants of the Valencian Region (Eastern Spain). *Israel Journal of Plant Sciences* 63 (4): 320 – 332. dx.doi.org/10.1080/07929978.2016.1256131
- Rubio Teso ML, Torres E, Parra-Quijano M, De la Rosa L, Fajardo J & Iriondo J (2018) National inventory and prioritization of crop wild relatives in Spain. *Genetic Resources and Crop Evolution* 65: 1237 – 1253. doi.org/10.1007/s10722-018-0610-0
- Servicio de Vida Silvestre 2013: Informe técnico 08/2013: Valoración de la figura de microrreserva de flora Valencia. Available online: agroambient.gva.es/documents/91061501/109945340/Valoraci%C3%B3n+de+la+figura+de+Microrreservas+de+Flora/f63aa1f9-f8d5-47f7-ab81-855dc18c08b1 (last accessed 14/06/2018)

Contributor: LUKE

Network for Nordic heritage cereal varieties (Nordic countries)

Description

The network for Nordic heritage varieties started in 2008, in the programme for New Nordic Food, and every year it holds a Nordic conference. The network was established by Hans Larsson, a researcher at the Swedish University of Agricultural Sciences, to gather farmers, millers, bakers, conservationists and researchers to share information about heritage cereals in the Nordic countries. Heritage varieties consist of landraces and old cultivars of cereals (rye, wheat, barley and oats).

Structure

There is no common registered organization behind the network. The yearly conference held by the Nordic countries offers the meeting forum for the network. The first conference was held in Brandbu, Norway. Later it has been held three times in Sweden, twice in Denmark, Norway and Finland. The three-day-conference is mainly targeted for millers, bakers, brewers, chefs and farmers but also conservationists and researchers of heritage cereals. The conference gathers around 60–80 participants mainly from Sweden, Norway, Denmark and Finland but also from Estonia, Russia, UK and some other countries. Besides the lectures the conference agenda consist of excursions to the local small bakeries, breweries, millers and farms using heritage cereal varieties. Participants have the possibility to show examples of their special products, e.g. flours, bread, at the conference. The conference lunches and dinners offer tastings of special food products as well.

Best practises

The network aims to inspire Nordic food culture with heritage varieties for increased biodiversity, encouraging local food, especially organic, production and use of food when promoting the region. The aims are to express the purity, freshness, simplicity and ethics associated with the Nordic region; to base Nordic cooking on ingredients and produce whose characteristics are particular to Nordic climates and landscapes; to combine the demand for good taste with modern knowledge of health and well-being; to promote Nordic products and the variety of Nordic producers – and to spread the word about their underlying cultures; to combine local self-sufficiency with regional sharing of high-quality products.

Future integrated *in situ* conservation stakeholder networking options

The network aims for the increased production and use of heritage cereals in Nordic cuisine, linking farmers and local processors and distributors. Especially in Sweden, Norway and Denmark new actors, products have entered the consumer markets; and increasingly also in Finland. Because it is organized as a loose network around the yearly conference, it has no official contacts to e.g. *in situ* or *ex situ* conservation organizations. However, the representatives of conservation organizations participate regularly as keynote speakers.

Contributor: UNIPG

Pro-loco Cave (Italy)

Description

Pro loco Cave (prolococave.it/, Perugia, Italy) is a local association of Cave di Foligno (Perugia, Italy) whose main aims are:

- Cultural enhancement
- Valorisation of territory and landscape
- Heritage preservation and
- Development of good territorial practices.

The association has been involved for decades in the valorisation, preservation and promotion of a common bean (*Phaseolus vulgaris*) landrace that is registered under the regional repository of landraces as “Fagiolo di Cave”. Throughout the past 25 years, Pro-Loco Cave favoured the traditional cultivation of the landrace and created an annual event (prolococave.it/sagra/) to promote the product. The association currently holds the brand “Fagiolo di Cave” and carries out coordination activities favouring the networking among the producers.

Best practises

In order to favour conservation and to valorise diversity, the collective brand “Fagiolo di Cave” was registered for two types of Cave’s beans: the yellow and the greenish one. Moreover, through accurate research, the association drew the boundaries of the traditional production area. The cultivation methods and phases, that were part of the local oral tradition, were formalised into written guidelines that farmers needed to endorse in order to use the brand. The above-mentioned agronomical practices are analogous to the ones used under organic farming systems and thus constitute an additional value for the final product.

Since 1978, through the annual event “Sagra del Fagiolo”, the association increased year-by-year the local market and the general interest in the product. In fact, for this event beans are processed according to traditional recipes that valorise the peculiar culinary features of the bean. Indeed, “Fagiolo di Cave” is characterised by high digestibility and a fast-cooking feature as a soaking process is not required. Pro-Loco Cave is in charge and favours the subscription of new members to the network. Pro-Loco Cave recently implemented a website in which an important section reports useful information on the product and the annual event (prolococave.it/sagra/).

Future integrated *in situ* conservation stakeholder networking options

Future duties and responsibilities of Pro-Loco Cave are:

- Maintenance or enhancement of the existing productive levels
- Adoption of a well-structured *in situ* strategy to effectively maintain the local ideotypes
- Development of new strategies to cope with the effects of climate changes on “Fagiolo di Cave” production
- Enhancement of alternative promotional and marketing strategies to foster growth and consolidation of the market and

- Inclusion of other actors of the production chain as food packagers and food suppliers able to bring the product to other alternative markets.

Presently, having contacted the network, it is unclear if it will join the future European network that is being built in Farmer's Pride.

Contributor: DSS

Frøsamlerne; Danish Seed Savers (Denmark)

Description

The Danish seed savers (DSS – Frøsamlerne) is the only network carrying out in situ conservation of cultivated crops in Denmark. In situ conservation is not officially recognised in Denmark. In the official Danish strategy for Plant Genetic Resources, on-farm conservation is not mentioned. In situ conservation of wild species is mentioned, but not practiced. DSS works to increase seed access to private individuals and small-scale professional gardeners and farmers.

Structure

DSS is an organization with close to 900 members carrying out collection, maintenance, conservation and distribution of a range of crops. The seed list comprises 600 varieties of vegetables, herbs, fruits and berries, cereals and even ornamentals. DSS is structured into 13 plant groups and runs a plant adoption programme counting 110 varieties.

Best practice

The crops:

- Danish and Nordic culinary plants with a story, like heirloom varieties or varieties with a traditional regional distribution
- Varieties formerly on the market that have now disappeared from seed catalogues and shops
- Plants used in former times that have now lost attention and interest
- Valuable plants from other countries that are adapted to Danish cultivation conditions
- Immigrant varieties brought by immigrants that thrive in Denmark.

Plants are grown in a traditional way in situ and conserved by harvesting and re-sowing next season, all seed propagated varieties in DSS are open-pollinated and easy to maintain. DSS do not have a central storage facility; some varieties/accessions are stored in The Nordic genetic resources centre (NordGen) as a safety backup. DSS runs a plant database where the material is documented and characterised. We do seed production and distribution through various channels like market stands, seed pop-ups, and through our spring and autumn seed list. Presently, an online seed store is under development. Furthermore, education on various aspects of conservation and seed handling are popular.

Future integrated *in situ* conservation stakeholder networking options.

DSS collaborate with a number of sister organizations, with companies, online seed traders and the genebank NordGen. DSS is running and participating in projects and collaborates with other seed saver organizations in the Nordic region and in Europe. Denmark is characterised by having favourable climate conditions for seed production and a big commercial seed production takes place. Consequently, the national seed legislation is very supportive of commercial seed production, which is occasionally controversial for in situ conservation and agro biodiversity. The situation is improving and DSS works on further progress to increase agro biodiversity in Denmark. DSS is now represented on the National Committee on Plant Varieties and Seeds and the Advisory plants genetic resources board.

Contributor: LUKE

The Finnish Landrace Association (Finland)

Description

The Finnish Landrace Association (Maatiainen ry in Finnish, Det lantliga kulturarvet in Swedish) is a non-governmental association for conserving traditional varieties of plants and animals and rural landscapes in Finland. It was established in 1989 and presently has almost 2,000 citizen members. It works for in situ conservation of traditional varieties of ornamental and cultivated plants, plans plant exchange days, and gives courses and talks on related topics such as original landraces, domestic animals and rural landscapes, and aims to promote their active utilisation in Finland.

Structure

The association's office is situated in Helsinki, but has local contact points in other parts of Finland. It publishes a quarterly bulletin containing articles on current topics. In addition to members, researchers and conservationists also provide articles. Yearly field trips are organized both in Finland and abroad to acquaint members with local people and their landscapes as well as with plants and animal landraces. It arranges plant exchange days, and gives courses and talks on related topics.

Best practises

The distribution of seeds is an important part of the activities. Members collect the seeds of old landraces of ornamental and cultivated plants, as well as wild plants. For each batch of seed collected the member receives a packet of seeds in exchange. Each batch is sufficient to fill several packets so that the remainder can be sold to members and the general public. The association's unique collection comprises some 500 named accessions. The seed lots collected each year are sent to a packaging centre where a list is drawn up to be published in the year's first bulletin.

The association was instrumental in rescuing a traditional, tasty variety of turnip with good storage capacity and a strain of broad bean well-adapted to Finnish conditions. It chooses a traditional landscape, plant and animal of the year, which it draws to the attention of the community at large. It has a representative in The National Advisory Board for Genetic Resources that advises and monitors the Finnish National PGR Programme.

Future integrated *in situ* conservation stakeholder networking options

The association has some collaboration with sister associations in Europe, especially in Estonia and Sweden. The contacts can be strengthened and enlarged in future to exchange of knowledge and best practices in Europe.

Contributor: NordGen

Informal Nordic Crop Wild Relative Network (Nordic countries)

Description

The Nordic CWR network was established in 2015 with project funding from the Nordic Council of Ministers and there is currently funding to continue until the beginning of 2019. The project comprises participants from Denmark, Finland, Iceland, Norway and Sweden, including the National Coordinators of plant genetic resources from four of these countries and is coordinated by NordGen. The aim of the network is knowledge exchange and cooperation within the field of Crop Wild Relative (CWR) conservation and sustainable use.

Structure

The CWR network is not a formal structure, but rather a network established by project funding. However, there is a formal long-term structure behind this network. The Nordic countries established the Nordic Gene Bank in 1979 and have since then been working to facilitate the cooperation within the field of plant genetic resources. Today NordGen, which includes the former Nordic Gene Bank, continues to work for cooperation and for example arranges, yearly meetings with the National programs as well as in five crop specific Nordic working groups. The main focus of these meetings is ex situ conservation but in situ conservation is also discussed. These are activities that will continue independently of additional CWR funding. The aim is that some form of the CWR network will be maintained long-term, but how is not clear at the moment.

Best practises

The network has so far achieved the following: two stakeholder workshops (Stockholm 2015, Vilnius 2016), a common homepage dedicated to Nordic CWRs (nordgen.org/cwr), policy recommendations on CWR conservation and use (Policy brief), a common Nordic CWR checklist (Fitzgerald et al 2018) and a priority list, communication via social media, conference presentations and publications (i.e. Weibull et al 2016) and the first in situ conservation planning effort on the Nordic level. The latter analysis identified potential complementary conservation sites for the priority species across the Nordic region. Since the Nordic countries share many species and habitats across the region, the goal is that joint conservation planning on the Nordic level should make national in situ conservation activities more efficient.

Future integrated *in situ* conservation stakeholder networking options

Aims for the future are to secure a more long-term Nordic network dedicated to CWR conservation, including both ex situ and in situ partners. Today the core of the network consists of people with the main competence in ex situ conservation, but a strong involvement from the nature conservation side is needed for progress on in situ CWR conservation.

References

Fitzgerald H & Helpdesk GN (2018). Nordic Crop Wild Relative (CWR) Checklist. Version 1.11. Nordic Genetic Resource Center (NORDGEN). Checklist dataset <https://doi.org/10.15468/itkype> accessed via GBIF.org on 2018-07-25.

Policy brief: Crop Wild Relatives – actions needed to assure conservation of an important genetic resource.

Weibull J, Fitzgerald H, Lund B, Palmé A & Porbjörnsson H (2016) Conservation and sustainable use of crop wild relatives: a Nordic initiative. Sveriges Utsädesförenings Tidskrift 2-2016

Contributor: DIMITRA

AEGILOPS – Greek Network for Biodiversity and Ecology in Agriculture (Greece)

Description

In Greece, in 2000 the Ministry of Rural Development and Food started the registration of the plant genetic resources that were threatened from genetic erosion into national catalogues. They also started the implementation of projects aimed at maintaining agricultural biodiversity, promoting the sustainable management of plant genetic resources and enhancing the cultivation of local varieties as well as the on-farm conservation of a wide range of crops from farmers. The rural development policy for Greece is implemented through the National Rural Development Programme with the financing support of the European Agricultural Fund for Rural Development (Joint Ministerial Decision 135644/2005 for the implementation of Measure 3.8 "Conservation of plant genetic resources that are threatened from Genetic Erosion" of Axis 3 "Agri-environment Measures" of the Document for Rural Development Programme 2000–2006. The Agro-environmental Measure that was implemented in Greece started in 2007 and lasted five years. During this Measure monetary incentives were given to farmers for the cultivation of landraces on-farm in specific areas of Greece. The list of landraces was updated recently and a similar project will run again soon.

Also, the last years, actions have been made from the Greek authorities and local communities to register landraces in the national catalogue in compliance with Commission Directives 2008/62/EC, European Commission 2008 and 2009/145/EC, European Commission 2009. Many Greek individual farmers and gardeners and networks of farmers and gardeners conserve plant genetic resources on-farm (inside or outside the frame of the above laws and directives). One of these networks is mentioned below.

Network

AEGILOPS – Greek Network for Biodiversity and Ecology in Agriculture (aegilops.gr/), Volos, Greece, is a non-governmental organization founded in 2004 whose main aims are:

- i) To conserve heritage varieties and traditional agricultural knowledge and to restore landrace varieties into contemporary agricultural practice in ways that benefit community.
- ii) To develop plant varieties adapted to local organic production that utilise the benefits of locally adapted genetic resources for ecological agriculture.
- iii) To strengthen the role of the farmers in the conservation of genetic resources as well as to protect their rights in taking part in the management and benefits of agrobiodiversity.

AEGILOPS has developed Focal Points in various regions of the country (Volos, Athens, Thessaloniki, Patra, Kastoria, Aridaia, Kefalonia Island and Lesvos Island). Each Focal Point conserves a Community Seed Bank and coordinates activities working closely with an organic farmers' group.

AEGILOPS works in close collaboration with the Greek Gene Bank of the Hellenic Agricultural Organization-DEMETER, Universities and Research Institutes to evaluate and select landraces that can thrive in variable organic environments. Finally, AEGILOPS is member of LLD (Lets Liberate Diversity) and SAVE (Safeguard for Agricultural Varieties in Europe), European Agrobiodiversity Networks.

Best practices

Under AEGILOPS' framework and its focal points coordination in various regions of Greece, seed collection, documentation and conservation activities are carried out. Landraces, population varieties and farmer's seeds are being evaluated under organic farming conditions so they can lead to the production of special, quality food and to help the farmers have revenue in niche markets. Assessments and case studies are carried out in participatory schemes involving producers, professional groups, research and educational institutions, local seed saving networks and citizens groups. Research in the field has already revealed that many Greek heritage varieties showed good agronomic adaptation under organic farming. On-farm conservation and selection enables landraces to evolve and adjust to anticipated changes of climate, which is most important for food security of the region and globally. AEGILOPS has collected, trialled and selected various landraces of cereals and vegetables to be given to organic farmers for cultivation.

In 2012 AEGILOPS successfully began the Greek Seed School and since then, is every year coordinating training courses for farmers, processors, consumers and seed savers in many regions of the country. In 2018 AEGILOPS developed a website (aegilopslocalfood.gr) that links consumers to farmers and highlights their products. The page includes information about the agronomic, cultural and nutritional values of the varieties, stimulates the holistic approach of quality and the contribution of organic farming and the small farmer to the conservation of genetic resources, food security and food sovereignty.

Future integrated *in situ* conservation stakeholder networking options

Future duties and responsibilities of AEGILOPS are:

- i) Broaden on-farm conservation network regionally
- ii) Enhance participatory activities focusing on PGR valorisation and food chain synergies
- iii) Extend conservation activities including medicinal and aromatic plants and crop wild relatives
- iv) Develop further research and training sections collaborating with national and international relevant stakeholders active on conservation and sustainable use of PGR.

Presently, having contacted the Network, AEGILOPS will join the future European network that is being built in Farmer's Pride and contribute with its experience in on-farm conservation and utilisation of PGR.

References

Douma C, Koutis K, Thanopoulos R, Tsigou R, Galanidis A & Bebeli P (2016) Diversity of agricultural plants on Lesvos Island (Northeast Aegean, Greece) with emphasis on fruit trees. *Scientia Horticulturae* 210: 65–84

Koutis K (2011) Conservation of local landraces at the national level of Greece. International Symposium on “Agriculture & Biodiversity” organized in the framework of the REVERSE project, Conference Centre of the Mediterranean Agronomic Institute of Chania (MAICH), 24/6/2011, Crete, Greece

Koutis K, Vakali C, Nathanailidou M, Tsigkanou K, Psomoulia E, Kotsakou T & Stavropoulos N (2016) On-farm conservation and participatory evaluation/breeding of heritage agrobiodiversity by AEGILOPS NGO. In: Proceedings of 16th Scientific Conference of the Hellenic Scientific Society of Genetics and Plant Breeding, 28-30/9/2016, Florina, Greece, p.106

Mavromatis A, Manta P, Koutis K, Svintridou V, Vlachostergios D & Fyntanis A (2014) Synthetic breeding scheme of durum wheat landraces for the development of cultivars with high yield performance under organic farming. SOLIBAM Congress, “Diversity strategies for organic and low input agricultures and their food system”, 7-9/7/2014, Nantes, France

Vacali C & Kouti K (2014) Conservation of Biodiversity for Organic Farming in Greece. IFOAM Organic World Congress, “Building Organic Bridges”, 13-15/10/2014, Istanbul, Turkey

Contributor: ÖMKi

ÖMKi on-farm network (Hungary)

Description

In 2012, the Hungarian Research Institute of Organic Agriculture (ÖMKi) started to develop a participatory on-farm research network, which is unique in the country, in order to build up a system of innovative experiments, under real-life conditions with production goals set by the farmers. This network is also used to raise awareness and interest in landraces, and to conduct comparative field trials of different landrace accessions under organic growing conditions. ÖMKi presently collaborates with more than 100 farmers countrywide on several on-farm research topics.

Structure

There are eight on-farm networks focusing on different species or groups of species (tomato, potato, soybean, cereals, viticulture, apiculture, horticulture). In two of them, namely the tomato and the cereal networks, there are comparative studies running on landraces. Until 2016, with the help of 28 contributing farms, 35 tomato landraces were tested on-farm. In 2017 the cereal on-farm network launched the first landrace comparative experiments with 12 emmer and einkorn varieties. Also in 2017 an evolutionary breeding trial was launched with a diverse durum population, which was sown on-farm and also on small plots. The landraces for the on-farm experiments are, come in the case of the tomato primarily from the Hungarian Diversity Centre (nodik.hu/english/) with a collection of more than 60,000 accessions. The collaborating growers, received tomato landraces that were collected from their production region. In case of emmer and einkorn, landraces accessions were received primarily from Pro Specie Rara, the Hungarian Diversity Centre. Control varieties were sent by the Agricultural Research Centre of the Hungarian Academy of Sciences, and by the Louis Bolk Institute. Emmer and einkorn trials are conducted in frame of the DIVERSIFOOD project. The durum population was bred in Montpellier, by SupAgro, and was supplied by Jacques David, in frame of the SolACE project.

The work in the network is based on a strong cooperation between the different stakeholders (farmers, researchers, breeders, processors, producers, retailers) of the food chain. The meetings, field days, tasting events and workshops have a beneficial community forming effect.

Best practices

The relatively simple, realistic experiments are planned together with farmers, who play an active role in the project, addressing problems, which are important to them. The data collection is also performed together with the farmers, after evaluation, the results are published to the general public and also to the scientific society. The farmers who take part in the research get information directly about their own land and cultivation technology.

Farms, often characterised by very different growing conditions, are involved for each research topic, so the results can provide a broader view on variety performance, organic production practices and on the applicable solutions for specific practical challenges.

The specialty of on-farm experiments is that the varieties are tested countrywide, under particularly different “circumstances”. The farmers may use their own farming methods/technology while the focus is on the local performance of different varieties. The results of these comparative tests support the farmers to choose the best performing varieties under the given “circumstances”. Meanwhile the results of the whole network can give some guidelines for the variety choice of different regions.

Future integrated *in situ* conservation stakeholder networking options

ÖMKi wishes to sustain and further develop its on-farm network, not only through testing landraces and populations, but also through introducing participatory breeding to organic farming in Hungary. This started already with durum wheat, and will continue in frame of the LIVESEED project as well.

Another strategic direction is to involve home growers into *in situ* conservation. ÖMKi launched its first “adopt a landrace tomato” campaign in 2018, where citizens could choose and buy landrace tomato seedlings to cultivate at home. Introducing landraces and populations to home gardening is developed further through a just starting cooperation with one of the discount chains, interested in marketing organic landrace tomato seedlings. Through getting landraces back on the market, we aim to raise awareness about agricultural diversity, and create more openness towards sustainable farming and *in situ* genetic conservation.

References

Aendekerker R, Drexler D, Hilgertová M, Kranzler A, Pelikan B, Stoll E & Vrešák M (2015) Participatory on-farm research for organic farmers.

https://www.researchgate.net/publication/298767400_GUIDEBOOK_PARTICIPATORY_ON-FARM_RESEARCH_FOR_ORGANIC_FARMERS)

On-farm research (2013) Results of the second year (In Hungarian: On-farm kutatás 2013: A második év eredményei) Drexler Dóra (ed.) Budapest: Ökológiai Mezőgazdasági Kutatóintézet, 2014.

<https://biokutatas.hu/on-farm-halozat/>

<https://biokutatas.hu/pelyvas-gabona-kiserletek-tonke-alakor-tonkoly/>

Contributor: ÖMKi

Kárpát-Medencei Gyümölcsész Hálózat (Orchard Network of the Carpathian Basin) (Hungary)

Description

The Kárpát-Medencei Gyümölcsész Hálózat, a non-formal organization, was set up in the mid-2000s, to collect, save and bring back to use neglected and endangered traditional and old fruit varieties, all over the Pannonian Basin. They combine science, know-how and enthusiasm to protect these varieties through regular meetings, trainings, joint volunteering and information exchange in a network of more than 1,000 registered members.

Structure

The network has a core group of 30-40 volunteers, most of them living in the Western part of Hungary, having remarkable private collections of old fruit varieties from all over the region, but with an accent on local varieties. The members of the core group keep in regular contact with each other and organize most of the activities of the network. There is also a mailing list with about 1,000 registered members, many of them who participate in meetings and other events. The network is also active on social media, mainly Facebook, with close to 8,000 followers.

Training is organized by the core group during winter time, with practical (variety characterisation, collection, grafting, fruit storage and processing) and theoretical (sustainable agriculture – sustainable food systems) programme points. Furthermore they have regular field trips and volunteer working events across the Carpathian Basin. Each year in November there is an annual meeting with presentations, graft exchange, a fruit exhibition and tasting. The information and experience exchange in the network is facilitated by personal meetings, conferences, orchard days, through the mailing list, social media and website (gyumolcsesz.hu).

Best practises

Around 2010, 50 of the most popular traditional fruit varieties were described and illustrated, in order to help with identification and give more opportunities for awareness raising. In 2011, a simple standardised data sheet was made for fruit variety survey, which after a short introduction to the topic, is suitable to anyone to describe varieties found in his or her area.

A monthly event, namely Orchard Days, was recently introduced by the core group. The event takes place in a small village, called Ráksi, in the Western part of the country, where beside presentations from pomologists and expert collectors, information exchange and a variety exhibition, a fruit market is organized with traditional varieties.

Between 2010–2012 several members of the core group compiled an “Orchard Strategy”. The goal of this strategy is to eliminate the problems generated by intensive fruit production, with the establishment of a new orchard system, called “alkalmazkodó gyümölcsészet” (adaptive fruticulture/adaptive orchards) by looking at orchards in a holistic way. Adaptive orchards have the structure of natural vegetation, they are very diverse

and consequently resilient, due to their mixed composition, according to different species, varieties and age distribution. Adaptive orchards are parts of a landscape, dominated by fruit trees, offering a large amount and diverse benefit for humans, but also require a continuous maintenance. The condition of operation is the presence of the pomologist, who is connected to the place, taking part and living in the landscape and in the orchard.

The three main directions defined in adaptive fruticulture are, adaption:

- To the landscape, to the order of the landscape, where the landscape is the "whole" and the orchard is a "part" of it
- To the people (pomologist), living in the landscape, being part of the landscape and the orchard (and also other systems)
- To the consumers of the orchard products (to consumers' needs), which consumers are belonging to the landscape, having a relation with the orchard, with the pomologist, utilising a part of the orchard's products (surplus or surplus generated for deliberate use).

The resilience of such a system is also assured by supporting smaller, but numerous, local collections in contrast with a few large centralised ones.

Future integrated *in situ* conservation stakeholder networking options

The Orchard Network of the Carpathian Basin wishes to sustain and further develop its network, through continuing and developing the existing activities, particularly the monthly Orchard Days, where personal meetings and experience exchange could strengthen the network and bring together consumers and pomologist, while raising awareness about the importance and benefits of diversity and sustainable farming. Furthermore, there are initiatives for scientific cooperation with the University of Keszthely and University of Debrecen. In the next three years, the development of the Adaptive fruticulture system will be in focus, due to a cooperation with the Forest Research Institute, through collecting and assessing data on soil conditions, ground-water level, precipitation and comparative nutritional studies.

References

dokumen.tips/documents/elofalu-halozat-201011-tel-hirlevel-87.html

Contributor: ÖMKi

Magház (Seed-house) Community network for agricultural diversity (Hungary)

Description

In 2012, the Hungarian seed savers network, Magház, was organized by a couple of people, horticulturists, agronomists and biologists, concerned about the diversity of cultivated plants. They started to build up a network and connect enthusiastic people, who use and maintain seeds of old varieties/landraces (arables, vegetables, ornamentals, herbs, fruits) and share both the seeds and knowledge about these plants. At the moment there are more than 150 registered members countywide.

Structure

The Hungarian seed savers movement was reaching a critical turning point and started to be organized in 2011, when the Let's Liberate Diversity international meeting took place in Szeged. This event provided the opportunity for the first time for volunteer "agrobiodiversity savers" to gather and initiate meaningful conversations about the state-of-the-art seed exchange issues in Hungary. Some of the later Magház members also participated in this and other international meetings in Austria and France in 2012. In 2013 the Bese Nature Conservation Society joined the Network, and since then this NGO has been providing the official and legal background and the most relevant support for the informal Magház group.

Beyond farmers, the network is open to everyone with an interest in food self-provisioning, and invites them into community building around seed saving and swapping. The heart of the network is cultivation of trust-based relations. There is a core group of five volunteers, organizing events, writing articles for the website, sharing information on social media, facilitating seed-swaps, running workshops and training on seed-saving. The network is not centralized, they do not have common office or seed conservation facilities, the varieties are grown, propagated and conserved by the members of the network and the core group is managing and organizing the activities voluntarily.

Best practises

The website of Magház (maghaz.hu) has two main functions. It is a platform for sharing information about seed-saving, traditional varieties, upcoming events, policy issues according to agrobiodiversity conservation. For registered members there is an extra service, with an online seed swap function. The idea is to give the opportunity for seed and experience exchange in between seed-swap periods as well. Furthermore, the aim was while uploading accessions, to educate people in the correct determination of different species and varieties that are easily confused, by providing a simplified but accurate descriptor list, and other user-friendly tools for identification.

In 2014 the core members of the network compiled a booklet, fulfilling a niche as a Hungarian publication in the field of seed saving and awareness raising, on agrobiodiversity conservation for hobby gardeners and small-scale farmers. The booklet is downloadable from the website of Magház, it provides free access to useful tips

and advice on growing, propagation, isolation, cleaning and storage of vegetables and their seeds of traditional varieties. It promotes agricultural diversity around the globe and explains the history of the Hungarian seed maintaining efforts, encouraging novice gardeners to try themselves as breeders.

Future integrated *in situ* conservation stakeholder networking options

Magház wishes to develop this network by providing regular activities and information published on the website in connection with variety maintenance and awareness raising.

Furthermore, in cooperation with the Center for Plant Diversity (nodik.hu/english/) they are planning to involve home gardeners in growing and describing varieties originating from their region. After experimenting and selecting the varieties that are growing well, the aim is to create a database with these successful varieties, indicating the place where they are grown, publishing it on the website of Magház in order make them available as a “show garden” and seed source for other gardeners and farmers.

References

transitsocialinnovation.eu/sii/maghaz-seed-house

Contributor: AARI

Seed Exchange Network and TaTuTa Ecological Farm Visit Programme of Buğday Association for Supporting Ecological Living (Turkey)

Description

The Buğday Association for Supporting Ecological Living has been officially operating as an association in Turkey since 2002, with 3,500 members.

Buğday Association is a member of IFOAM (International Federation of Organic Agriculture Movements), Organic Farming National Guidance Committee of Turkish Ministry of Food, Agriculture and Husbandry, ACR+ (Association of Cities and Regions for Sustainable Resource Management), PAN (Pesticide Action Network) Europe, FoWO (Federation of WWOOF Organizations) and hosted the 18th IFOAM Organic World Congress in Istanbul in 2014.

Buğday's past and present activities include 100% Ecological Farmers Markets, WWOOF (Worldwide Opportunities on Organic Farms) Turkey coordination (locally named TaTuTa), Seed Exchange Network, Nature Friendly Urban Gardens, local and nationwide compost projects, CSA projects, trainings (Ecological Beekeeping, Ecological Living, Urban Gardening, Organic Agriculture, Compost), and free distribution of information (through books and booklets, newsletters, social media, radio).

The structure

The farmers within the Seed Exchange Network and TaTuTa ecological farm visit programme (91 host farmers nationwide) together constitute a loose network of heirloom seed growers.

About Seed Exchange Network (yasadintohumlar.org/)

Seed Exchange Network started as a project in 2011. The project aimed to pass on the local seed varieties inherited from our ancestors to the next generations. This project tried to find local seed varieties that are no longer cultivated and share them among different ecological farms to sow them, harvest the new seeds again and enlarge the barter network of these valuable local seed varieties. Buğday Association has also set up a free public online monitoring system for each seed variety shared by farmers or hobby gardeners to the network.

About TaTuTa programme (tatuta.org/)

TaTuTa is the Turkish operation of international WWOOF (Worldwide Opportunities on Organic Farms) network. It provides an online platform for volunteers who are willing to visit organic farms (not all certified). The Turkish network includes 91 hosts nationwide with various scales and product ranges. Some host farmers actively participated in Buğday's Seed Exchange Network and helped saving the local seed varieties of their geographical areas.

Best practice

169 local varieties have been sown in 27 farms on approximately 471 hectares during the active phase of the Seed Exchange Network project.

Future integrated *in situ* conservation stakeholder networking options

Host farmers of TaTuTa and other active farmers who have participated in the Seed Exchange Network can engage again with *in situ* conservation of local varieties if supported with training, consultation, labour and finance.

Contributor: JKI and BLE-IBV

Genetic Reserve Network for Wild Celery

Description

The National Program for Plant Genetic Resources of Agricultural and Horticultural Crops of the Federal Ministry for Food and Agriculture (BMEL) foresees the development of an *in situ* management strategy for socio-economic important plant species and explicitly recommends the implementation of the genetic reserve conservation technique. The Genetic Reserve Network for Wild Celery (*Apium graveolens* ssp. *graveolens*, *Helosciadium repens*, *H. inundatum*, *H. nodiflorum*) is currently being developed within the framework of a four year model and demonstration project and will be established in mid-2019. The main objective is to promote the practical realisation of the genetic reserve conservation technique. To this end, genetic reserve sites for 10-12 populations of each of the four wild celery species distributed in Germany are currently being designated.

Structure

The project started in the year 2015, is funded by the Federal Ministry for Food and Agriculture and coordinated by the Julius-Kühn Institute (JKI). Fifty five candidate genetic reserves sites have been identified by applying a modified monographic approach, of which 20% are situated outside protected areas. The genetic reserve conservation technique includes inter alia the active conservation of the selected populations. To this end, a spatial plan of the genetic reserve, interventions are needed to maintain or improve the conservation status of the populations, and tasks related to monitoring and reporting are discussed with all relevant stakeholders at the local and Federal State (Laender) level. The outcome is established in a genetic reserve cooperation agreement for each site. By signing the agreement all partners join the Genetic Reserve Network for Wild Celery, which is an organizational structure led by a specialist unit. The specialist unit assists the local genetic reserve management and reviews the operation of the whole network. It also delivers information about the network's achievements and *in situ* data to the Information and Coordination Center for Biological Diversity (IBV) of the Federal Office for Agriculture and Food (BLE). All data, including the results of genetic analyses, required to track and understand the process resulting in the designation of a genetic reserve is documented in an information system. Network members can update and complete the database via a web-based interface. The system also supports the genetic reserve site monitoring and reporting. The Wild Celery network will be embedded in the German Network of Genetic Reserves, which is being developed as the national framework and reporting infrastructure for the *in situ* conservation of CWR.

Best practices

Depending on the individual Federal State, all four wild celery species are classified as more or less threatened. The network for wild celery species is therefore fully compatible with the ongoing activities of the species conservation sector in Germany as it complements and strengthens conservation actions. The genetic reserve technique is considered a module of general species conservation, strengthening the position of nature conservation in land use competition (Zehm und Weber 2013).

Future integrated *in situ* conservation stakeholder networking options

Germany supports the implementation of the ECPGR *in situ* management concept and the integrated approach detailed in the concept paper. The discussion between the agricultural plant genetic resources conservation community with the nature conservation community on a systematic and coordinated implementation of a national *in situ* management strategy in Germany started in 2015 and is ongoing.

The IBV is the coordinator of the German Genetic Reserves Network, which is being established initially with four sub-networks of CWR populations. The first sub-network for wild celery will be coordinated by JKI. The other three sub-networks for wild grapevine, wild fruit trees and a selected number of pasture plant species will be coordinated by appropriate authorities. The German Genetic Reserves Network with its sub-networks is interested to cooperate at the European level in developing European genetic reserve networks for these genepools and in sharing of experiences on conservation, documentation, accessibility and sustainable use of these CWR *in situ* populations.

Zehm A, Weber G (2013) Umsetzung eines landesweiten floristischen Artenhilfsprogramms – Konzepte und Erfahrungen. – ANLiegen Natur 35, 40 – 54.

Contributor: Bioversity International

SADC Plant Genetic Resources Centre (SPGRC) (Southern Africa)

Description

The Southern African Development Community (SADC) Plant Genetic Resources Centre (SPGRC) was established in 1986 as a result of the adoption of a 20-year strategy on agricultural research in the SADC region under the Southern African Centre for Cooperation in Agricultural Research (SACCAR) and a 20-year project developed by IBPGR (now Bioversity). The project was funded by Nordic countries for an initial 10 years, followed by a joint funding with an increasing contribution of the SADC member states in the second 10-year period, such that at the end of 20 years, it would be fully funded by the members states. SPGRC runs a plant genetic resources (PGR) network with a regional genebank serving as a long-term base collection in Zambia for the member states of the SADC region and National PGRC centres established in each country are responsible for collecting, processing and conserving their germplasm within their respective national genebanks and sending a duplicate sample to the SADC regional genebank. NPGRCs are also responsible for multiplying and regenerating their accessions. The mandate and functions of the SPGRC are defined in the Memorandum of Understanding, establishing the SPGRC signed by member states in 1993, and includes the following main functions:

- Hold the base collection of the member states as well as maintain and manage medium to long term storage facilities for active collections of the member states
- Make available all PGR collected and/or maintained at SPGRC or anywhere in the Region under the genetic resources programmes, national or regional, to all bona fide users nationally, regionally or internationally
- Acquire and exchange with NPGRCs relevant plant germplasm
- Develop, maintain and manage the Regional Central Accession Database for the indigenous PGR of the member states – ex situ as well as in situ
- Co-ordinate the inventory, collection, evaluation, rejuvenation and multiplication of indigenous genetic resource material of the member states
- Keep records in a Regional Central Database of such introduced exotic plant genetic material as agreed to be of common interest for the member states
- Prepare and issue catalogues of PGR available from or obtainable through the SPGRC.

Structure

An MOU formally establishing the SPGRC was signed by the 10-member countries in 1994. Since then, other countries in the region joined and currently 16-member states² form part of SADC, with Comoros Island recently

² <http://www.sadc.int/member-states/>

joining. NPGRCs were initiated in the Member States, which together with SPGRC form a well-coordinated network of genebanks for the region. By 2009, at the end of the funding from the Nordic programme, SPGRC was taken under the aegis of SADC and continued to operate as a SADC programme, with its basic costs provided for by SADC Secretariat through contributions from member states. SPGRC has three programmes, namely Ex situ Conservation, In situ Conservation and a Documentation & Information, each headed by regionally-recruited Senior Programme Officers, who report to the head of the centre. The Centre is governed by the SPGRC Board, which is composed of the chairpersons of each of the NPGRC member states and head of SPGRC and a representative of Bioversity. However, the SPGRC Board is now being replaced by a Technical Advisory Committee under the new revised MOU, which is yet to be adopted by the SADC Council of Ministers.

Best practices

SPGRC has developed policy guidelines to provide strategic direction to its member states to develop domestic policies that are in harmony with the regional needs in the field of PGRFA, particularly in respect to conservation, access, equitable sharing of benefits arising from the use of PGRFA and its traditional knowledge. This should allow member states to achieve specific objectives such as to:

- Set regional standards for conservation of and use of PGRFA
- Guide the development of and sharing of information on best practices and approaches in conservation, sustainable utilisation, access and benefit-sharing arrangements and mechanisms to realize farmers' rights and protection of PGRFA and related indigenous knowledge
- Improve information flow and setting of standards among Member States;
- Provide capacity-building for the effective negotiation and implementation of global and regional treaties and agreements
- Promote sharing of relevant technologies and develop suitable mechanisms for technology transfer and scientific cooperation in the field of PGRFA
- Promote awareness of implementation of relevant treaties and agreements
- Contribute to the development of mechanisms for access and benefit-sharing regimes that recognise the protection of traditional knowledge, innovations and practices of indigenous and local communities, as well as regulate ABS and Indigenous Knowledge (IK) regarding PGRFA of regional commonage
- Facilitate mobilisation of financial resources to promote conservation and sustainable utilisation of PGRFA
- Contribute to mechanisms for poverty alleviation and support to the realisation of human food security, commercialisation/marketing of traditional products, health and cultural integrity.

Future integrated *in situ* conservation stakeholder networking options

The functions of SPGRC is mainly concerned with the *ex situ* conservation in safeguarding of the plant genetic resources in the region in its regional genebank. The *in situ* programme is not well developed and is limited to providing technical backstopping to countries for on-farm management of PGRFA. They are also working with local communities and promoting the establishment of community seed banks. SPGRC is also very keen to

develop a regional strategy for the *in situ* conservation of crop wild relatives. SPGRG is well positioned to play an effective role in coordinating efforts at the regional level for *in situ* conservation of PGRFA.

NON-EUROPEAN NETWORK

Contributor: Bioversity International

Asia Pacific Forest Genetic Resources Programme (APFORGEN) (Asia and the Pacific)

Description

APFORGEN, (apforgen.org) was established in 2003, and is the only network in Asia and the Pacific that focuses on the conservation and sustainable use of forest genetic resources. APFORGEN is a regional programme and network that brings knowledge and use of Asia's forest biodiversity to a new level – from a traditional focus on ecosystems or species diversity to include genetic diversity that underlies ecosystem functioning, productivity and adaptive capacity. APFORGEN brings relevant genetic knowledge from laboratories and specialists to forest managers, conservationists, restoration practitioners and policy-makers in an easily understandable form, helping them to manage the region's tree diversity for environmental and societal benefits. Through its network of geneticists, forestry professionals and funding partners in 15 Asian countries, APFORGEN shares knowledge and good practices, implements multi-country research and development projects, operates a Regional Training Centre and serves as a onestop-centre for forest genetic resources information and initiatives in the Asia-Pacific.

The objectives of the network, as defined in the network's Strategy 2018–2022, are:

- Mobilise political and financial support for the implementation of the Global Plan of Action on Forest Genetic Resources in the Asia-Pacific region
- Make available information about the forest genetic resources in the region
- Develop conservation and sustainable use strategies for regionally important and threatened tree species
- Strengthen tree seed supply systems to facilitate ecosystem restoration, support local livelihoods and climate change adaptation and mitigation.

Structure

APFORGEN is a network of 15 countries and two institutional members (Bioversity and APAFRI). Each member country of APFORGEN appoints a National Coordinator to serve as a link between the country and the network. The National Coordinators elect among themselves a Chair, up to two Vice-Chairs and a Secretary to coordinate the network's activities, for a three-year term at a time. APFORGEN's day-to-day activities are managed by a Secretariat, typically hosted by the Chair's organization. Bioversity International, a CGIAR research centre, provides technical support to APFORGEN. APFORGEN also collaborates with Asia Pacific Association of Forestry Research Institutions (APAFRI) and Food and Agriculture Organization of the United Nations (FAO). The network thus consists of officially appointed country representatives, which enables it to seek high-level and formal support for the different activities. The challenge is that the number of people in the network is then limited, and not all the nominated representatives are FGR experts.

Best practices

By aligning its four strategic objectives to the FAO's Strategy for the Implementation of the Global Plan of Action on Forest Genetic Resources, APFORGEN ensures that they are contributing to the global agenda on FGR. The activities foresee action in, among other issues, advocacy and international awareness, development and support of relevant global and regional networks, and supporting countries in the development of national and regional strategies and in securing adequate and sustainable funding for the implementation of the Global Plan of Action on FGR.

APFORGEN has established four Working Groups to implement the objectives of the Strategy, which is open to any interested parties. To support the effective implementation of the Global Plan of Action on FGR, and to harness the full potential of FGR for the Sustainable Development Goals, APFORGEN seeks to:

- Enhance the integration of conservation and sustainable use of FGR into relevant processes and programmes, from local to national and regional levels;
- Establish partnerships with research, extension and education institutions, civil society organizations and the international community to pool expertise, share good practices, build on synergies and raise the visibility of FGR;
- Strengthen human capacities through the Asia Pacific Regional Training Centre on Forest Genetic Resources, development of training materials, and mentoring and scientific exchange programmes, to cultivate the next generation of experts in FGR conservation and management in Asia and the Pacific;
- Mobilise resources for implementing this programme of work, including through regional research and development projects.

Future integrated *in situ* conservation stakeholder networking options

APFORGEN is implementing a regional project "APFORGIS – Filling the knowledge gaps for genetic conservation of priority tree species in Asia" which aims at improving knowledge on the species distribution of ecologically and socio-economically important tree species and the threats they are facing. They are developing up to date distribution and threat maps for valuable tree species, and decision support tools for setting up a network of genetic conservation units, similar to the conservation units established in EUFGIS.

Contributor: Dharshana Kumara <dharshanaset1981@gmail.com>

Sri Lankan Case on Conservation and Sustainable Use of Crop Wild Relatives (CWR) (Sri Lanka)

As Sri Lanka possesses unique Agrobiodiversity, Sri Lanka is one of the biodiversity hotspots in the world. The varied ecosystems of the country are rich in different Crop Wild Relatives (CWR). CWR include wild relatives of crop ancestors and other species. In fact, they are a critical source of genes for resistance to diseases, pests and stresses such as droughts, floods and temperatures. Most wild relative species populations are not found in protected Areas (PA) and are vulnerable to deforestation, urbanisation, expansion of agriculture lands and land clearing. Many species are also vulnerable to climate change and landslides. Some species are over-extracted as food.

Prior to 2004, little attention was given to conserving and utilising CWR and few had been comprehensively studied or researched. An inventory of food CWR in Sri Lanka was compiled using already published material on the Sri Lankan flora (Hasanuzzaman et al, 2003) and the records of the national herbarium. The list includes 410 species of food CWR, belonging to 47 families and 122 genera. Out of these, 366 are native species and 77 are endemic relatives of food crops, while 44 species are naturalised exotics. This is only a preliminary list, which needs to be further refined. To recognise the true genetic relationships of these species, detailed studies must be carried out. These CWR species of agricultural importance generally occur as members of disturbed communities within the major vegetation types of the country. Open canopy forest areas, secondary forests, disturbed grasslands and shrub jungles are rich in these plants. However, the relatives of fruit plants are largely associated with semi-evergreen, intermediate and wet evergreen forests. There are a large number of agricultural important wild species in different crop groups.

As those CWR are under threatened conditions, the project “In situ Conservation of Crop Wild Relatives through the Enhance Information Management and Field Application” was implemented in Sri Lanka to conserve CWR in Sri Lanka under in situ conditions.

The project concerned mainly the wild relatives of rice, Vigna, banana, cinnamon and pepper varieties. An eco-geographic survey of crop wild relatives was conducted in protected and non-protected areas and eco-geographic descriptors for the above crop species were prepared. There were many activities involved during project period. The main activities were related to preparing the list of above crop wild relatives based on available information, Island-wide eco-geographic surveys, lists of important morphological characteristics and herbarium specimens of important taxa which have difficulties in identification, collected ethno-botanical notes of wild relatives of priority crop wild relatives, prediction maps and distribution maps using data of latitude and longitudes and geographic, ecological, taxonomic and conservation notes for eco-geographic descriptions. Wild rice distribution was mapped in the Puttalam District in North Western Province (NWP). This habitat was gazetted as an Environmentally Protected Area (EPA) under the Provincial Environment Statute (PES) of North Western Province of Sri Lanka.

Achievements

- Locate and map wild relatives populations of rice, banana, Vigna, cinnamon and pepper
- Collect eco-geographical information from relevant areas
- Identify potential sites for the establishment of genetic reserves to conserve priority crop wild species
- Identify threatened species and populations
- Study species diversity of priority crop wild relatives
- Develop eco-geographic descriptors for priority crop wild species.

Threats

Sri Lanka's natural forests contain a wide range of useful plant species. At the beginning of the last century, 70% of the land area is said to have been covered by natural forests. The latest figures, however, show that natural forest cover has decreased to about 22% of the land area. There are two factors that have posed serious threats to the preservation of natural floristic diversity in Sri Lanka.

- The heavy rate of deforestation due to various development projects, village expansion and settlement schemes.
- Selective felling of trees for timber and removal of plant species, particularly those with medicinal value.

Thus many species that were once plentiful are now considered to be seriously threatened. In addition, unplanned land use, pollution and fragmentation have contributed to the loss of CWR.

Introduction

Sri Lanka is one of the most biologically diverse countries in Asia. Together with the Western Ghats of India, Sri Lanka has been recognised as one of the biodiversity hotspots in the world due to varied climate and topography, which has resulted in rich biodiversity, distributed within a wide range of ecosystems. As genetic diversity of crops and domestic animals used in agriculture is part of the wider genetic diversity of the country.

Sri Lanka also has a rich agricultural history dating back more than 2,500 years. At present, the agriculture sector contributes about 7.5% to the national (Gross Domestic Production) GDP of the country. Today this diversity of agricultural genetic resources remains under threat from the continuing adoption of inappropriate and ultimately unsustainable production practices and global climatic changes. The rich and diverse ecosystems of the country have many wild relatives of cultivated species and the gene pools represented by these wild plants are a resource of considerable potential value that could be used for the genetic improvement of cultivated plants. Genetic erosion of wild relatives of crops in Sri Lanka is occurring rapidly in natural habitats. Thus increased attention is now being given to the ways and means of conserving these wild species, which are regarded as actual or potential genetic resources for future use.

Therefore, the wild relatives of important crop species are collected and conserved in ex-situ by the PGRC. Ex-situ approaches were applied as most of these food crops produce seeds that can easily be preserved in the gene bank. But some species of crop wild relatives are not sustainable under ex situ conservation conditions,

hence conservation of these species is possible and becomes useful only under in situ management. In situ conservation activities of crop wild relatives are a means to conserve and manage existing crop wild relatives in their natural habitat with a minimum management strategy. The well-organized *in situ* conservation approaches benefit the present generation and have potential to meet the requirement of future generations too.

***In situ* conservation of Crop Wild Relatives (CWR)**

Though an in situ conservation programme has been applied in Sri Lanka mainly for conservation of forest tree species and wild life eco-systems, there was no sound programme for conservation of crop wild relatives rather than very limited ex situ collections holding by the gene bank, botanical garden and plant breeders etc. Therefore, the project “In situ Conservation of Crop Wild Relatives through the Enhance Information Management and Field Application” was implemented in Sri Lanka from 2005–2009. The project concerned mainly the wild relatives of rice, Vigna, banana, cinnamon and pepper as they represent high species diversity and are threatened with extinction for various reasons.

Eco-geographic survey of crop wild relatives and preparation of descriptors for priority crop species (Rice, Vigna, Banana, Cinnamon and Pepper) are a major component of the CWR project. Eco-geographic survey of crop wild relatives provides information of the existing genetic diversity, distribution and threatened habitats that need immediate action for conservation. According to the available information, Sri Lanka is rich in wild relatives of food crops and wild food plants. Intensive surveys of these species help to find new locations of populations. Therefore, the project carried out the island-wide eco-geographic survey in protected areas, outside the protected areas, forest borders, forest areas and other ecosystems.

The activity of eco-geographic survey of the crop wild relatives undertook eco-geographic studies including herbarium examinations and passport record examinations of Sri Lankan priority crop wild species in order to facilitate their in situ conservation. The results of the complete eco-geographic survey could be used to predict new areas for survey and can be extended to the formulation of collection and conservation priorities. The CWR project concerns species richness of CWR mainly in important protected areas as well as outside the protected areas, because the protected areas in the dry zone are rich in wild species of cereals, vegetables and underutilised crops, and the protected areas in the wet zone are dominant in wild species of fruit crops, cinnamon, pepper and orchids. One of the objectives of this programme is to conserve the wild species of *Oryza* and *Vigna* occurring in habitats found outside the protected areas, with the participation of the community.

The species richness of CWR is concerned in important protected areas as below.

<i>Oryza.nivara</i>	<i>Piper longum</i>
<i>Oryza rufipogon</i>	<i>Piper chuvya</i>
<i>Oryza eichingeri</i>	<i>Piper siriboa</i>
<i>Oryza granulata</i>	<i>Piper sylvestre</i>
<i>Oryza rhizomatis</i>	<i>Piper zeylanicum</i>
<i>Vigna.aridicola</i>	<i>Piper trineuron</i>
<i>Vigna dazelliana</i>	<i>Piper walker</i>
<i>Vignamarina</i>	<i>Cinnamomum capparucoronde</i>
<i>Vigna radiata Var. ublobata</i>	<i>Cinnamomum citriodorum</i>
<i>Vigna stipulacea</i>	<i>Cinnamomum dubium</i>
<i>Vigna trilobata</i>	<i>Cinnamomum litseaefolium</i>
<i>Vigna trinervia</i>	<i>Cinnamomum ovalifolium</i>
<i>Musa acuminata</i>	<i>Cinnamomum rivuloru</i>
<i>Musa bulbisiana</i>	<i>Cinnamomum sinharajaense</i>

The eco-geographic descriptor is developed by using taxonomic, geographic, ecological, ethno-botanical and conservation information for each wild species. According to the eco-geographic survey, even if most of the biological rich habitats for CWR are in protected areas, they receive little attention to in situ conservation within them. The existing in situ conservation protected areas systems mainly pay attention to conserve animals and economically-important large timber plants. Therefore, awareness programmes for protected area managers and relevant officials were conducted.

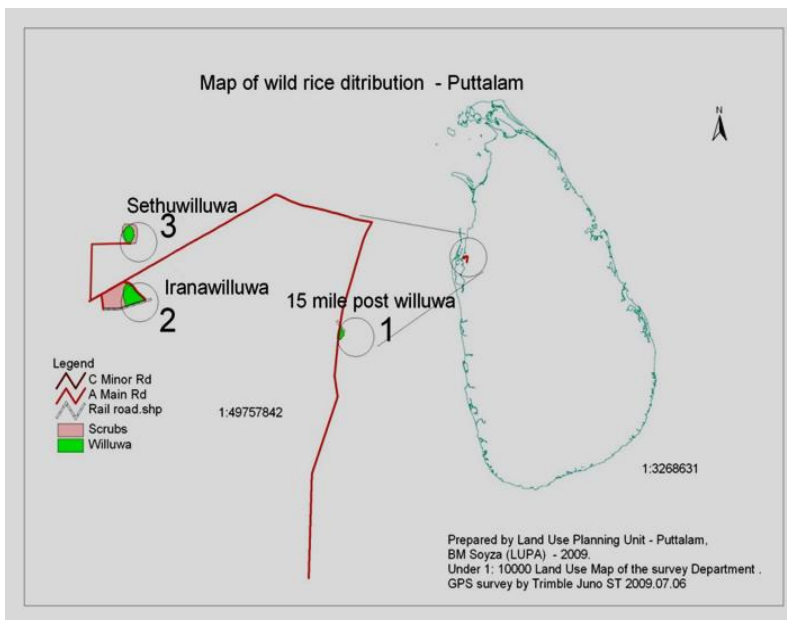
Legally designated protected areas in Sri Lanka account for more than 28% of the total land area in the island, which is a higher percentage of Protected Areas (PA) compared to that of Asia and the World. The ‘conventional’ in situ conservation programme is used in Sri Lanka for the conservation of forest tree species and wildlife ecosystems, which is defined as a ‘Coarse Filter Approach’. However in situ conservation of Plant Genetic Resources for Food and Agriculture (PGRFA) and wild relatives on domesticated crop species have not yet been integrated systematically into the national PA system. A recent eco-geographic survey conducted by the Plant Genetic Resources Centre (PGRC) reveals that majority of the CWR populations occur outside the PA system.

In-situ conservation of genetic diversity of wild species and other underutilised food crops (a ‘Fine Filter Approach’) have received little attention in existing PA systems, as the focus has been on conservation of threatened species communities and maintenance of species habitats. As such, PAs do not take into account in situ conservation of CWR/PGRFA unless they grow inside the PA, and have been identified as an endangered species. The existing PA system in Sri Lanka is administered and managed by three government institutions; the Department of Wildlife Conservation, Forest Department, and the Central Environmental Authority.

Best practices through this project

The maintenance of genetic diversity among wild relatives of crops has received considerable attention through the CWR project implemented by the Ministry of Environment and Natural Resources, in collaboration with the Department of Agriculture (DOA). This project has enabled the documentation of 415 species of wild relatives, of which 89 are endemic. The proposed “PA for WRR” was a first step in establishing a fully dedicated nationally designated PA network for CWR. This would provide a realistic opportunity to address the ongoing loss of CWR

genetic diversity by mainstreaming the CWR conservation aspects into the national planning process in Sri Lanka and complement sustainable development initiatives.



The first phase of the “PA for WRR” project selected two seasonal villu habitats (12–14 ha each) containing a considerable population density of *Oryza nivara* (Red List category: Near Threatened). The two habitats lying within the DL2 Agro Ecological Zone in the arid zone of the country, located close to North Western coastal belt in Wanathawilluwa Divisional Secretariat of the Puttalam District of North Western Province (NWP).

In addition, a large population of the endemic *O. rizomatis* (Red list category: Endangered) have also been recorded in the above area. The presence of rhizomes

in the root system of this species has enabled it to survive unfavourable situations, such as drought conditions.

That habitat was gazetted as an Environmentally Protected Area (EPA) under the Provincial Environment Statute (PES) of NWP. This Act complements the National Environmental Act No. 47 of 1980 and the amendment No. 56 of 1988. This Act provides for identification of environmentally sensitive areas termed Environment Protection Areas (EPAs) outside the PAs, as well as biodiversity rich sites within Protected Areas. As such, it complements the two key legislations related to conservation of the Fauna and Flora Protection Ordinance (FFPO) enforced by the Department of Wildlife Conservation (DWLC) and the Forest Ordinance (FO) enforced by the Forest Department (FD). So far eight EPAs have been declared to date. The PES of the NWP allows only identified activities within these areas and all development activities were monitored. In situ conservation of CWR species was identified as prior activity in the National Biodiversity Action Plan & Addendum (2007) and Provincial Biodiversity Profile and Action Plans (2009). Importance of CWR was also identified in the Government 10-year Development Plan Executed by the Presidential Secretariat.

An important feature of this initiative is the fact that it promotes active conservation, where the gazette process is complemented by the interventions of a diverse range of provincial stockholders for preparation and implementation of the management and monitoring plans of the proposed PA. The key conservation planning partners in this process include the provincial government NRM & administrative organizations, Provincial Environment Authority, provincial universities, provincial agricultural and crop research centers, NGOs, provincial schools, private sector Agri-business companies and the largest cement manufacturing company in Sri Lanka.

Creating awareness of CWR inside protected areas

Protected areas are one of the most important locations for in situ conservation of CWR. They also receive large numbers of visitors annually. Most often these visitors have little or no understanding of the kinds of wild relatives in the protected area, or their importance. This presents a useful opportunity for public awareness activities. In Sri Lanka, public awareness work was undertaken in the Kanneliya Forest Reserve with the aim to help visitors learn about the biodiversity of wild cinnamon in the park and efforts to enhance in situ conservation. Signboards were placed throughout the park and posters hung in visitors' dormitories, which explained the role and importance of CWR. And also a display focusing on CWR was created at the entrance to the Forest Reserve.

Rice breeding programme with wild *Oryza nivara* in Sri Lanka

Presently, Brown Plant Hopper (BPH) resistance is incorporated into all new rice varieties and the source of the resistance was found decades ago in rice variety PTB 33 (A line collected from IRRI). Due to continued use of the single resistance source, new biotypes of BPH have developed and the crops resistance has been compromised. Rice breeders in Sri Lanka have been looking for a new source of resistance and have investigated wild rice as a possible genetic resource. There are five wild *Oryza* species in Sri Lanka, namely *O. nivara*, *O. rufipogon*, *O. eichingeri*, *O. rhizomatis* and *O. granulata*. Of these five species, *O. nivara* and *O. rufipogon* are in the same genome group as cultivated rice, *Oryza sativa*. Hence, both species are relatively easy to hybridize with cultivated rice.

With assistance from the CWR project, plant breeders at the Central Rice Research and Development Institute in Sri Lanka collected 40 different accessions of *O. nivara* and these accessions were tested for BPH resistance using standard screening procedures, and it was found that three accessions were highly resistant to BPH while 15 accessions were within the moderately resistant category. It was found that these three accessions survived even after the death of the resistant variety PTB 33 from the intensity of BPH attack, indicating the resistance in the three *O. nivara* accessions was different from that of PTB 33. When crosses were made between *O. nivara* and cultivated rice, it was revealed that percentage of resistant to BPH was gradually increased at generation to generation. Rice Breeder: PV Hemachandra

Lessons learned

In the case of priority species, the absence of prior agreed guidelines for their selection led to considerable confusion. On the other hand, it is quite clear in discussions that the choice of areas and species was mainly influenced by the information already available on CWR conservations, as well as local knowledge of the situation in the Sri Lanka concerned and that a largely pragmatic approach was adopted. Considering that, for the purposes of the project, only a small number of priority species were selected, the choice of CWR related to important crops, and the selection of well-known protected areas in which they occurred is understandable. It has been understood that to make a schedule for survey for an appropriate suitable period was extremely difficult for some CWR. Some wild species are very seasonal and they are not seen year-round. This was one of the main problems in multi-species survey programmes. E.g. – *O. rhizomatis*, *O. nivara* and *O. rufipogon* can be seen in the field only between December and April.

Conclusion

A general conclusion that can be drawn is that it is very difficult and probably unrealistic to expect that uniform sets of criteria can be used to select species and areas for CWR conservation. Nonetheless, it is important, especially when selecting the taxa, that as much information as possible be taken into account so that CWR representing a wide range of situations and values are chosen for conservation, subject of course to the availability of financial and technical resources.