Planning and implementing national and regional conservation strategies

Workshop Proceedings

Nordic/ECPGR Joint Workshop

19-22 September 2016, Vilnius, Lithuania
CWR CONSERVATION STRATEGIES
Planning and implementing national and regional conservation strategies

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Nigel Maxted, Juozas Labokas and Anna Palmé


Front cover photograph: Chives Allium schoenoprasum (Birutė Karpavičienė)
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Acknowledgement

We are pleased to acknowledge the financial support of ECPGR Project “CWR Conservation Strategies”, without which it would not have been possible to organise and hold this meeting.

CWR Workshop Summary
1. Workshop Context

An important background document for wild species conservation activities is the "ECPGR Concept for in situ conservation of crop wild relatives in Europe". It states that "achieving effective and systematic in situ conservation of CWR diversity in Europe centres on two core levels of conservation strategy planning: national and regional (European). At each level, priority CWR populations (Most Appropriate Wild Populations) are designated for inclusion in an in situ management network of national and regional MAWPs as part of an integrated CWR conservation strategy for Europe. The integrated strategy therefore combines complementary national (bottom-up) and regional (top-down) approaches to conservation planning". This requires input from different stakeholders at both levels. The implemented EC funded projects PGR Forum, AEGRO and PGR Secure have stimulated the development of National CWR conservation strategies and the identification of priority CWR populations in Albania, Armenia, Azerbaijan, Belarus, Bulgaria, Cyprus, Czech Republic, Finland, Greece, Ireland, Italy, Lithuania, Portugal, Norway, Spain, Sweden and UK. A regional CWR conservation strategy for Europe is being developed as part of the PhD research by Shelagh Kell at the University of Birmingham, UK. Yet, a lot of questions remain unanswered and much work is needed to achieve effective and systematic CWR conservation, particularly, the creation of the integrated European CWR conservation strategy, for which the basis is national CWR strategies. The experts from the In situ WG and the Nordic CWR project acknowledge that it is of crucial importance to effectively share knowledge and experience between as many European countries as possible, not only including experts from the In situ WG but also from crop specific WGs, dealing largely with wild species, like forages, medicinal and aromatic plants, as well as representatives of nature conservation agencies and other stakeholders.

To tackle these issues the project proposal "Promoting implementation of national and regional crop wild relative (CWR) conservation strategies through sharing of knowledge and experience to create an integrated European strategy for CWR conservation" (Acronym: "CWR Conservation strategies") was prepared and submitted by the ECPGR Wild Species Conservation in Genetic Reserves Working Group for funding under the second Call of the ECPGR Activity Grant Scheme. The ECPGR Executive Committee, during its meeting on 28-30 October 2015, approved for funding the proposal “CWR Conservation strategies”, the main action of which was preparation and implementation of In situ WG workshop.

The Nordic project “Ecosystem services: Genetic resources and crop wild relatives” was approved funding from Nordic Council of ministers, 2015-2016. The goals of the project are to increase Nordic cooperation, networking and knowledge exchange concerning CWR conservation as well as use, to facilitate interactions between in situ and ex situ conservation actors and influence CWR policy in the Nordic countries.

To involve as many experts as possible and to generate an added value it was decided to organize a joint workshop between the two projects and employ internet broadcast of the main sessions.

The joint Nordic/ECPGR workshop was held 19–22 September 2016 in Vilnius and hosted by the Nature Research Centre, Vilnius, Lithuania.
## 2. Workshop Overview

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<th>Time</th>
<th>19 Monday September</th>
<th>20 Tuesday September</th>
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<tr>
<td>AM 9-11</td>
<td>ECPGR in-country reports on CWR conservation</td>
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<td><em>Ex situ</em> conservation and integration with <em>in situ</em> conservation</td>
<td>ECPGR Discussion 3 on post-workshop activities, horizon scanning</td>
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<td>AM 11-13</td>
<td>Nordic</td>
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<td>PM 14-16</td>
<td>Introduction and policy context</td>
<td>Discussion session 1</td>
<td>Field trip to Trakai Historical National Park</td>
<td>Meeting of the Nordic and Baltic National programs</td>
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<td>PM 16-18</td>
<td>CWR conservation planning</td>
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(Green: common sessions; Blue: ECPGR only sessions; Yellow: Nordic only session; No colour: associated meetings)
3. Workshop presentation

3.1 Progress with national CWR conservation (ECPGR alone)

3.1.1 In-country Report Albania  
Alban Ibraliu

The vascular flora of Albania consists of about 3250 species. Of these, 27 and 150 species are endemic and sub-endemic, respectively. The Flora of Albania can be divided into four main types – Mediterranean, Balkanic, European and Euro-Asian and about 400 plant species are CWR considerable proportion of these taxa are crop wild relatives (CWR). About 230 different wild plant species are found as priority list of CWR or WFP species in Albania. Crop wild relatives (CWR) and wild harvested plant species (WHP) constitute an important element of a nation’s plant genetic resources (PGR) available for utilization. Our collection result suggests that there is an urgent need to identify and effectively conserve crop wild relatives. While increased habitat conservation will be important to conserve most species, those that are predicted to undergo strong range size reductions should be a priority for collection and inclusion in our genebank.

3.1.2 In-country Report Belarus  
Safiya Dzmitryieva

Development and implementation of the concept of CWR conservation includes many successive stages. First is the inventory of CWR, which is basically completed. The number of CWR species is about 600 in Belarus, or 30% of the natural flora. The list has not yet been published as it is not final and could be extended. We have decided to include in the CWR list only those ornamental plants, which are rare in our country, as well as the most popular species, like Tulipa, Gladiolus and Iris. As for medicinal plants, we include in the list of CWR only those species which are used in official medicine, e.g., Valeriana officinalis, Leonurus cardiaca, etc. The second stage in CWR conservation planning is their classification in order of priority. The classification (ranking) of CWR species into five groups (ranks) is basis of their phylogenetic relatedness to the culturally and economically important cultivated plants. The most valuable are the species belonging to the ranks 1 and 2, as based on them and their individual share the cultivated varieties have been created, and they are characterized in this respect the high potential value. They should be the object of priority attention for conservation. The number of CWR species of the 1st and 2nd ranks is 150, or 25% of the total number of CWR species. Examples are species of Trifolium, Medicago, Festuca and others. Further stage of implementation of CWR conservation will involve analysis of representativeness (frequency of occurrence) of taxa / area. The frequency of CWR occurrence in the country i.e., species of the 1st and 2nd ranks are distributed as follows: 42.5% are common, 27.4% found occasionally, and 30.1% found rarely or very rarely. Species that occur frequently are not currently given conservation priority, the conservation focus is rare and very rare species. For example, the rare Gladiolus imbricatus showed that a moderate anthropogenic impact plays a positive role in species survival suggesting more detailed studies of the biological features of rare species to ensure their successful conservation. Ex situ conservation plays an important role in CWR conservation: 850 samples of seeds of economically useful plant species have been submitted for ex situ conservation; they belong to 405 species, 243 genera and 50 families.

3.1.3 In-country Report Bulgaria  
Katya Uzundzhalieva

CWR accessions with Bulgarian origin are 5 531. They belong to 176 plant species. The largest number of species belongs to the genera Trifolium, Vicia and Aegilops. The number of CWR, preserved in the National genebank counts about 18 621 accessions, from 26 plant families, 88 genera and 176 species. The biggest part of them is species from Poaceae, Fabaceae, Solanaceae, Linaceae, Cucurbitaceae, Asteraceae, Pedaliaceae and Brassicaceae. The main activity of the Botanical garden is creation and maintenance of scientifically organized and documented collection of plants with Bulgarian origin for the study of PGR their conservation and sustainable use. The in vivo collection comprises 443 species, divided thematically as follows:
Crop Wild Relatives – *Hordeum bulbosum, Secale rhodopaea, Vicia incisa, Silybum marianum, Chenopodium bonus-henricus*, etc.

- Demonstration collections, including old varieties, populations and forms from traditional and alternative crops – *Triticum spelta, Amygdalus nana, Vicia ervilia, Cynara scolymus*, etc.

- Rare, endemic and protected species – *Haberlea rhodopensis, Tulipa rhodopaea, Anemone blanda, Alissoides bulgaricum, Iris reinchenbachii, Paeonia tenuifolia*, etc.

Thanks to a project funded by the Ministry of Environment and Waters on "Inventory, summarize the information, conservation, use and future politics about Bulgarian CWR" about 600 Bulgarian CWR were prioritized and a database was created.

### 3.1.4 In-country Report Cyprus

The national strategy of Cyprus for the conservation of crop wild relatives was developed in 2012 and encompasses 178 priority taxa. The main recommendation concerning in situ conservation is the establishment of 10 priority sites containing the genetic diversity of the 75.47% priority taxa. This recommendation was forward to the competent authorities of Cyprus for in situ conservation and it was included to the proposed actions to the draft document for the implementation on the national strategy for the enforcement of the Convention of Biodiversity. The national strategy in expected to be finalized soon and hopefully the in situ conservation of CWR will be one of the selected actions for implementation. The main recommendations for ex situ conservation were (1) the collection of taxa without any accession and (2) the collection of additional accessions for the taxa that are not well represented to the ex situ collections. The competent authority for the implementation of the ex situ conservation is the Agricultural Research Institute. Major progress has been made since 2012. More than 1000 accessions have been collected filling, to large extent, the gaps that were identified in the national strategy. Germination and regeneration protocols have been developed. Future actions include the regeneration of the remaining accessions, targeted collecting missions to fill the remaining gaps, research activities for the characterization and evaluation of the collected material, and repetition of the gap analysis that consider the recent CWR related activities.

### 3.1.5 In-country Report Finland

The Finnish crop wild relative diversity comprises of 1905 wild relatives of food, forage, forestry, medicinal and ornamental crops. To help implement in situ and ex situ conservation of wild relatives, priority species were selected and ecogeographic and gap analysis carried out. The 209 priority taxa have distribution throughout Finland and are found mainly in rural biotopes, cultural areas and shorelines. The ex situ gap analysis found majority of the priority species missing from ex situ collections. During the last few years, a couple of species have been added to the collections, yet the conservation gaps are still large. The in situ gap analysis found several potential sites for genetic reserves, however there has not so far been action towards establishing them, but this will hopefully change soon.

### 3.1.6 In-country Report Germany

Conservation and use of wild plants for food and agriculture (WPFA) including crop wild relatives is an integral part of the agrobiodiversity strategies launched by the Ministry of Food and Agriculture (BMEL) as well as the national biodiversity strategy launched by Federal Ministry of Environment Nature Conservation, Building and Nuclear Safety (BMUB). Both Ministries provide funds for model- and demonstration projects. BMEL supported in situ conservation projects for wild apple, wild grapevine and currently funds a pasture plant species project as well as wild celery project. Experiences from these projects will contribute to the development of a concept with the draft title “Long-term conservation and sustainable use of wild plants with use potential for agriculture and food in Germany” which will be finalized in 2017. In parallel elements are being developed which will be required to implement the concept such as an online check list of WPFA
(2884 species), a draft WPFA priority list (545 species) as well as a website showing how the German network of crop specific genetic reserves will look like.

3.1.7 In-country Report Ireland

Tom Curtis

Using the standard methodology, an inventory of 171 CWRs was established in 2009. 57 species were considered Priority under half of which are Forage Crops. Subsequently, between 2010-2013 seeds of 48 species covering 223 accessions were collected and are now stored in the ex situ facilities at Back Weston Seed and Gene Bank of the Department of Agriculture, Food and the Marine. Ecogeographic data was then collated for these Priority taxa and gap analysis performed by the National Biodiversity Data Centre. Thus, core gap areas were identified and parts of South-west of Ireland are to be the focus for future work as well as parts of the North-west. The Strategy Report compiled in 2014 highlighted several areas which needed attention with respect to long term in situ measures a core one being the lack of liaison between the agency charged with managing Protected Areas and DAFM. A publication on CWRs in Ireland is currently being prepared to bring the topic to the attention of a wider public and especially farmers, foodies and foragers. It will appear in spring 2018.

3.1.8 In-country Report Lithuania

Juozas Labokas

The following authorities and stakeholders are involved in the CWR conservation activities in Lithuania: Ministry of Environment, Nature Research Centre, Plant Gene Bank, Lithuanian Research Centre for Agriculture and Forestry, protected areas authorities and some forestry enterprises. The initial prioritization of CWR, based on national flora methodology, has resulted in 180 species, 26 families and 78 genera (Labokas et al. 2016). The new approach focuses on CWR for food and agriculture by applying three categories of CWR priority regarding species occurrence and threat status: (1) Red Data Book species, (2) not protected, but not frequent species, and (3) widely distributed species. This results in the total number of up to 160 priority species with 2/3 of forage and 1/3 of food species. The National Landscape and Biodiversity Conservation Action Plan for 2015−2020 provides for 4 genetic reserves for CWR conservation to be established by 2020. Among the most prospective for the in situ conservation are considered naturally or otherwise protected sites, like riversides, islands, peninsulas, coastal areas as well as border zones. Some hotspots of forage species, wild garlics and wild strawberries are already identified as potential sites for genetic reserves.

3.1.9 In-country Report Portugal

Miguel Angelo Carvalho

The recently published concept “Europe Integrated Conservation Strategy” for CWR, proposes to integrate national conservation strategies (NCS) of the contributing countries into the European Regional Strategies. The NCS for CWR presupposes the existence of i) a national inventory of CWR diversity; ii) a plan targeting the priority CWR groups; iii) the development of a national conservation plan based on the gap analysis of CWR diversity and identification of most appropriated wild population(s) for conservation purposes; and finally, iv) the implementation of action program for its in situ and ex situ conservation. Despite the efforts made by several researchers and institutions aiming to solve specific concerns encountered at different NCS phases, the development of the Portuguese strategy for CWR conservation is warranted. The existence of different botanical realities in the main country regions, e.g. Azores, Madeira and the Portugal mainland, imposes the need to revisit the early CWR national survey published by Brehm (2008). Criteria for species’ classification as CWR need to be better defined and CWR prioritization should be based on national agriculture interests including food crops as well as other crops of economic importance (i.e. fibre, forages, etc.). Efforts need to be made towards elaboration of the national plan for conservation and use of the prioritized CWRs, along with monitoring of occurrence and diversity of the species. The coordination between Institutions and conservation bodies developing in situ and ex situ conservation programmes needed to be improved. Geographical localization of Portugal amongst the most reach European regions and
countries dictates the urgency for the development of a robust CWR NCS aiming to secure and improve the use of these genetic resources.


3.1.10 In-country Report Sweden  
Jens Weibull

The Swedish conservation of crop wild relatives, CWRs, operates within a multi-policy context: the FAO Global Plans of Action 1 & 2, the Aichi Biodiversity Target 13 (genetic diversity), and the EU Biodiversity Strategy. Notwithstanding, the issue of CWRs soars indecisively between agricultural and environmental sectors, as in most other countries. In 2013, a Government Bill commissioned “agency cooperation about the mapping and monitoring of genetic diversity in wild and domesticated plants and animals”. While such inter-agency cooperation has largely not been fulfilled, individual agencies have implemented certain actions aiming at conserving genetic diversity. The State Forestry Agency has developed a strategy for gene conservation in protected areas (PAs), incl. a database containing genetic information of such areas. The Swedish Environmental Protection Agency have developed guidelines for management of protected habitats, e.g. meadows and (semi)natural grasslands, and The Swedish Board of Agriculture currently supports c. 100,000 hectares of diversity-rich areas through agri-environmental measures in the Rural Development Programme. Recent analyses, however, show a continuing loss of these valuable areas. Despite this apparent lack of progress, Swedish is well-prepared through a set of powerful tools: the Swedish Species Observation System (c. 7.5 mill. observations of vascular plants), the Swedish Taxonomic Database DYNTAXA, and a well-developed citizen science network of flora guardians. A short-term, four-step strategy for increased overall action is proposed to include (1) a revision and update of the report Genetic variation in wild plants and animals (from 2008) with greater focus on genetic diversity for use, (2) true implementation of governmental decision (from 2012) regarding mapping and monitoring of genetic diversity, (3) an immediate launch of in situ conservation of valuable genetic resources in PAs, and (4) launching of a national gap analysis.

3.1.11 In-country Report Turkey  
Necla Taş, Shelagh Kell and Nigel Maxted

Turkey demonstrates high richness with respect to both plant genetic resources and crop wild relatives due to situated at the intersection of two important Vavilovian gene centres (Mediterranean and Near East) which have a key role in the emergence of cereals and horticultural plants as well as having five what J. Harlan named micro gene centres. Turkey CWR Check list with 9,046 taxa prepared by the PGR Forum CWR Catalogue was prioritized to select a limited number of taxa that can be conserved actively. Native status of CWR, the socio-economic value of the crop to which the wild species are related, the potential ease of use or known value of the wild species and the relative level of threat to the CWR were used for prioritization for CWR checklist. 36 crop gene pools/groups which belong to 64 genera based on economic value of crop and Annex I of the ITPGRFA were selected as priority crops. The next step for prioritization of CWR per potential or known use of CWR species taxa was concluded for 80 genera in 43 crop gene pools/groups. Red Data Book of Turkish Plants and IUCN Red List of Threatened Species were applied for threatened assessment of CWR taxa. At least 82.2 % (369) of the CWR species and 2.0% (5) of the CWR species are considered threatened respectively in national level and at the European level. Besides, only 14 of CWR species were assessed as Least Concern at global level.

3.1.12 In-country Report UK  
Hannah Fielder, Julian Hosking and Nigel Maxted

Despite the UK’s commitments to improve the conservation of agricultural genetic diversity outlined in international policy documents such as the Aichi targets of the CBD Strategic Plan for Biodiversity, there is currently little active, long term in situ measures and only partial ex situ conservation of these valuable
resources. Using the standard methodology, an inventory of 223 priority CWR was established. Ecogeographic data was collated for these priority taxa and gap analysis performed. The *in situ* gap analysis reveal key sites both within the current protected area network and outside, and the first formal UK genetic reserve has been established on the Lizard peninsular in SW England. *Ex situ* gap analysis identifies large gaps in the completeness of current collections of UK CWR that will need to be filled. Finally, recommendations were outlined for the *in situ* management of CWR populations on the Lizard peninsular by establishing active and long term conservation of CWR within the UK, these resources and their associated genetic diversity can be secured and utilised in the future.

### 3.1.13 National CWR conservation strategies and action plans status in Europe

Juozas Labokas

The responses have been received from 30 countries of those 39 addressed by the questionnaire. There are several countries which have published and approved their national CWR conservation strategies. Among the leaders are the UK, Finland, Denmark, and Azerbaijan. Published, but not yet fully approved strategies are in Cyprus, Israel and Russia. There is a group of well-advanced countries in the development of their national CWR strategies, just to mention Portugal, Spain, Italy, Armenia, Czech Republic, Norway, Ireland, Romania and Bulgaria. As for the structure of the strategy, nine countries (BG, CY, FI, DE, IL, LT, NL, NO, UK) have all six main elements included in their strategies, i.e., creation of national CWR checklist, its prioritization, diversity analysis of priority CWR, gap analysis and statement of priority conservation actions required, implementation of *in situ/*ex situ CWR conservation priorities by appropriate agencies, increased awareness of CWR value, need of conservation and use of CWR diversity by various user communities. There exist different approaches as for the occurrence status (autochthony) of the priority CWR included in the strategy, from only native species (AM, BY, BG, CY, GR, IT, TR) to the native, archaeophyte and neophyte species included (CZ, DK, IE, IL, NL, NO, PL, PT, RO, RU, UK, SE) with different datum lines for the archaeophytes and neophytes. Regarding the categories of crop use to be selected to prioritize the nation’s CWR, three countries, Portugal, Norway and Sweden, responded that all crop use categories – human food, animal food, forestry species, cultivated medicinal and aromatic plants, industrial crops, cultivated ornamental plants and others – are to be selected. Diverse criteria have been applied in prioritization of CWR with the most common being relative level of threat (23 countries), economic value of the related crop (21 countries), and utilization potential of the CWR (based on degree of relatedness to crop and/or known potential for conferring useful traits) (20 countries). Various types of CWR conservation actions are proposed by the countries, however, only very few genetic reserves are formally established – one in UK and one under the process in Norway. There are very varying data for the percentage of CWR taxa with >5 accessions of priority CWR conserved *ex situ* as seed accessions in genebanks – from less than 1 % in Romania to 77 and 82 % in Israel and Cyprus, respectively. Among the limitations found in the generation of national strategies the highest impact was assessed for the lack of an EU agency for genetic resources – 4.5 points of 5 on average, as well as the lack of political interest at the EU level – 4.1 points.

### 3.2 Opening session and policy context (Nordic and ECPGR groups)

#### 3.2.1 Welcome to the workshop

Vincas Būda and Juozas Labokas

It is our pleasure to welcome you in this joint workshop here in Vilnius, a capital city of Lithuania. It is a second international meeting of plant genetic resources (PGR) experts hosted by the Nature Research Centre over the last six years. The first one, a Joint PGR Secure/ECPGR workshop took place in Palanga in 2011 and was attended by 101 participants from 38 European countries and one from the United States of America ([http://www.pgrsecure.bham.ac.uk/palanga_workshop](http://www.pgrsecure.bham.ac.uk/palanga_workshop)) and was quite successful. Some of you were organizers and participants of Palanga workshop and some of you are first time in Lithuania now. We hope you will like this place and our people, who are doing their best in order to facilitate the achievement of our common goals and objectives – to safeguard crop wild relatives and promote their sustainable use.
We wish you fruitful discussions and overall success for the workshop as well as having a nice time during your stay here in Vilnius Old Town and on your excursion to Trakai Historical National Park. The Nature Research Centre is open for the cooperation with all of you now and in the future.

3.2.2 Introduction to the ECPGR project  
Nigel Maxted

The need to establish a network of experts working on the in situ and on-farm of PGRFA was recognized by the ECPGR Steering Committee recommended establishing of In situ and On-farm Network to promote this relative new form of conservation (1999). ECPGR established the Network with two Task Forces working on in situ conservation of CWR diversity and on-farm conservation of landraces and the 1st meeting was held on Isola Polvese, Italy, in May 2000 to discuss the functions of the network, the 2nd Meeting of On-Farm Task Force was held in June 2006 in Stegelitz, Germany, and the 3rd Meeting of On-Farm Task Force was held in October 2007 in Ljubliana, Slovenia and focused on home gardens conservation. In situ / On-farm conservation was given priority status by the ECPGR Steering Committee in ECPGR Phase VIII and IX and subsequently the two Task Forces were made Working Groups and held a joint meeting in Madeira, Portugal in Sept 2010. The Wild Species Conservation WG held a joint conference with EUCARPIA in June 2014, NIAB Innovation Farm, Cambridge, UK focusing on Enhanced Genepool Utilization. The WG was also recently involved in two ECPGR Activity Grant Scheme, partnering with the Forage and Beta applications.

Also in 2015 ECPGR Steering Committee asked the Wild Species Conservation WG to establish a Task Force to develop an ECPGR ‘Concept’ for ‘In situ Conservation of crop wild relatives in Europe’ http://www.ecpgr.cgiar.org/fileadmin/templates/ecpgr.org/upload/WG_UP LOADS_PHASE_IX/WILD_SPECIES/Concept_for_in_situ_conservation_of_CWR_in_Europe.pdf. The ‘Concept’ provides a guide to European regional and national policy development which can be used as a blueprint to drive concerted actions throughout the region. The development of the science of in situ CWR are also reflected in the WG Newsletter ’Crop Wild Relative' Issues 1-10 (http://www.pgrsecure.bham.ac.uk/). The 1st Meeting of Wild Species Conservation WG was held in Vilnius, Lithuania, and is reported here.

The major achievements of the Wild Species Conservation WG are raising professional and public awareness of the value of CWR and their conservation in situ with ex situ backup. Much of the work of the WG has been taken forward through three EC funded projects: PGR Forum, AEGRO and PGR Secure. These generated a series of publication of methodologies and established a vibrant community of experts focusing on cataloguing, conserving and using CWR diversity. Looking forward, the WG is currently preparing a Horizon 2020 coordination and support action for the Work Programme 2016-2017 – Farmer’s Pride – which calls for the building of new partnerships and tools to enhance European capacities for in situ conservation.

3.2.3 Introduction to the Nordic project  
Anna Palmé

The Nordic project “Ecosystem services: Genetic resources and crop wild relatives” was initiated with the long-term aim to assure conservation and sustainable use of the genetic resources that can play a role in assuring future food security. There is an increasing threat to crop wild relatives (CWRs) in nature and actions are needed to safeguard these important resources. The national efforts on CWR conservation planning are at different stages in the Nordic region but in general progress has been slow and implementation of conservation actions on CWRs has been limited. The goals of the project are to increase Nordic cooperation and networking in this field, exchange knowledge on in situ and ex situ conservation, facilitate interactions between in situ and ex situ conservation actors and influence CWR policy in the Nordic countries. We anticipate that this will stimulate the national processes and make national conservation actions more efficient by achieving Nordic synergy. The outputs of the projects include two workshops with Nordic stakeholders and international experts (Stockholm 2015, Vilnius 2016), the first common Nordic conservation approach for CWRs, policy recommendations on CWR conservation and facilitated use, and a Nordic webpage dedicated to CWRs. The project is funded by Nordic Council of ministers.
3.2.4 The Nagoya protocol
Katileena Lohtander

The Nagoya Protocol (NP) under the Convention on Biological Diversity (CBD) is an international, legally binding treaty, which entered into force in 2014. The objective of the Protocol is to provide clear access framework to genetic resources and ensure fair and equitable sharing of benefits arising from their utilisation. The Protocol, countries have sovereign rights over the genetic resources found on their territory and users must apply for Prior Informed Consent (PIC) before the resources (from countries regulating access) are acquired and utilised for research and development activities. The Protocol may have an impact for collections and seed banks as well. The impact of the NP is likely to be minimal for in situ conservation as such. However, there might be implications for both in situ and ex situ conservation in case material from countries regulating access of genetic resources is sent to researches.

3.2.5 CWR [in]and the EU Biodiversity strategy
Jens Weibull

The EU biodiversity strategy – launched in 2011 and involving six targets – aims at increasing the contribution of agriculture and forestry to biodiversity. Genetic resources (GR) are mentioned explicitly as a central component of biodiversity. One means to achieve the target included making more use of agri-environmental measures. Five years later both the Council and the European Parliament (EP) have been reviewing the (relatively lack of) progress made. In a parallel exercise during 2013-2015, the EP initiated the so-called Preparatory Action on Plant and Animal Genetic Resources. Outcomes of this action comprised recommendations that included incorporating GR in the value chain and creating supporting policies and legislation. The CWR community is encouraged to make use of a momentum currently at hand. Firstly, the FAO Commission on GR for Food and Agriculture will meet early 2017 to dwell on central issues such as the first State of the World’s Biodiversity, a proposal for a global network on in situ conservation and on-farm management of PGR, and draft guidelines for national level conservation of CWRs. Secondly, active lobbying both nationally and towards the EP is considered an underestimated activity that may very well pay off.

3.3 CWR conservation planning

3.3.1 National and regional conservation strategies
Heli Fitzgerald, Nigel Maxted

Methodologies developed for crop wild relative conservation planning have been widely used in creating national conservation strategies. Regional conservation strategies are in development for example in Europe. In situ conservation aims to ensure the conservation of maximum genetic diversity actively and long term. It starts from individual sites or populations forming a national conservation network. Ideally national, regional and global conservation networks will be planned to complement each other in future.

3.3.2 Prioritisation of CWR species for action
Shelagh Kell

Prioritization is a fundamental step in the CWR conservation strategy planning process. A pragmatic and systematic approach for prioritizing CWR can be applied nationally, regionally and globally based on three main criteria: 1) priority crops; 2) utilization potential; and 3) relative level of threat. When selecting priority crops, approaches vary using the geographic scope of conservation planning (global, regional, national). At regional and national levels, the choice of priority crops is governed by the intrinsic floristic diversity of the area (i.e., wild relatives of priority crops are present) and food supply and/or economic values. Due to their importance for food security, human food crops are always assigned high priority—although other crops of high economic importance (e.g., forage/fodder, ornamental, medicinal) may also be afforded high priority status. Examples of the selection of priority crops and CWR were provided and an evaluation of the different methods of applying the three main prioritization criteria made. A proposal for the most pragmatic approach
to applying the three criteria was given that reduces the likelihood of missing priority taxa in the conservation planning process. Finally, some online resources fundamental to the prioritization process were highlighted.

3.3.3 Climate change and conservation planning  
Jade Philips

Climate change is likely to be one of the most important factors affecting our future food security. To mitigate this, we will require our crops to more genetically diverse, with such diversity available in crop wild relatives (CWR). Conservation of such genetic resources resides within the nation where they are found; therefore national level conservation recommendations are fundamental to global food security. We investigate the potential impact of climate change on CWR richness in Norway. The results indicate a pattern of shifting CWR richness from the south to the north, with increasing taxa turnover as well as an increase in the number of threatened taxa. On the basis of these predictions conservation needs include ensuring the protected area network facilitates movement of species from the south to the north, targeting the ‘core’ of populations within reserves and incorporating corridors at the landscape level to enable migration. For ex situ conservation, the collecting of seeds from the trailing edge of populations with those that are predicted to be severely threatened are the highest priority to conserve. We acknowledge the limits of our climate change models but stress the need for this long-term conservation planning. We will experience the effects of a 1.5°C temperature rise and complementary conservation actions at both the in situ and ex situ levels will be more necessary than ever.

3.3.4 Proposed standards for CWR genetic reserve  
Joana Magos Brehm, José M. Iriondo, Shelagh Kell, Brian V. Ford-Lloyd, Carlos Lara-Romero, Juozas Labokas, Hannah Fielder and Nigel Maxted

The adoption of quality standards is crucial when implementing CWR genetic reserves. They are a management tool as they facilitate the adoption of protocols considered as ‘good practice’ by the CWR conservation community, they facilitate the improvement of conservation measures and they make the process of decision-making more transparent. They also facilitate the evaluation of management efficacy leading to an efficient CWR conservation in genetic reserves. And finally, they tend to generate greater credibility in the institutions in charge of executing conservation actions and to improve public awareness of the relevance of CWR conservation. Quality standards for CWR genetic reserve conservation can be used by managers interested in conserving CWR in their conservation areas and may be used when selecting sites for a network of genetic reserves when multiple alternatives exist. The quality standards are divided into three categories: (i) for genetic reserves within existing protected areas, (ii) for the protected areas that were selected for the establishment of genetic reserves, and (iii) for genetic reserves to be implemented outside protected areas. Each of these categories has a set of minimum and optimal standards and are generally related to location, protection, spatial structure, target species to be actively conserved, populations of target species and management.

3.3.5 Draft conclusions from the Nordic CWR project  
Jens Weibull

The two-year Nordic project, that will close at the end of 2016, has sparked several activities and yielded concrete outputs. Firstly, there is now a higher level of understanding among the project participants of CWR and in situ conservation, as well as a higher commitment and determination to get things going in the Nordic countries. Secondly, a common Nordic taxon list included a draft priority list of 137 species and subspecies have been compiled on the basis of economic value, relatedness, estimated breeders’ value criteria. A set of draft recommendations of how to further pursue Nordic CWR conservation have been presented, including national and regional conservation planning and management, and integration of ex situ and in situ
conservation. It is proposed to present these recommendations at the upcoming meeting this autumn of the Senior Officials of the Nordic Council of Ministers (Environment as well as Aquaculture, Agriculture, Food and Forestry).

3.4 National and regional CWR conservation strategies (Nordic and ECPGR groups)

3.4.1 Protected areas in Lithuania

Algirdas Klimavičius

Actual share of protected areas (PA) in the country is 17.57 % (terrestrial area), while it was only 5 % in 1990. There are four categories (conservation priority, recuperation priority, ecological protection priority and integrated) and 15 types of PA in Lithuania. Of them, two categories deal with plant genetic resources: PAs of recuperation priority with recuperative and genetic sites as well as PAs of conservation priority with genetic reserves. The purpose of former is restoration of specific natural resources (e.g., the resources of berries, medicinal plants, animals, peat, underground water and other renewable resources) and preservation of genetic resources. The purpose of genetic reserves is preservation of species, their habitats and populations of wild plants, animals and mushrooms valuable as genetic resources. The other types of PAs encompass broad concept of conservation and sustainable use of natural resources. The objects of plant genetic resources are often registered in strict nature reserves, state parks or other types of nature reserves. In total there are 96 state forest genetic reserves with total area of 1753 ha, 35 genetic reserve zones in other types of PAs with total area of 1612 ha, and 21 seed (genetic) sites of medicinal and aromatic plants with total area of 123 ha. According to the Law on National Plant Genetic Resources, in situ conservation without granting the status of PA is also possible (seed sites, forest seed stands, tree groups or individual trees).

3.4.2 ECPGR Concept for in situ conservation of CWR

Nigel Maxted

There was an imperative to develop and implement a comprehensive strategy for in situ conservation of the valuable CWR genetic resources native to Europe because historically these taxa have fallen between the conservation priorities of both the agricultural and conservation communities. These wild plant resources, which are related to the many socio-economically important crops cultivated in the region (food, forage, fodder, beverage, food additive, oil, medicinal, ornamental and forestry crops), contain a wide pool of genetic diversity that is of value for crop improvement. CWR are therefore an important resource for the maintenance of food security and for safeguarding the substantial economic gains to Europe through crop production in the region. However, despite their recognized value, the conservation of CWR has been largely neglected, in part due to the disconnection between the agencies responsible for the conservation of plant genetic resources for food and agriculture and those responsible for the conservation of wild plant populations in general or the habitats in which they grow.

Recent advances in our understanding of CWR diversity in the region, as well as in planning for their complementary conservation (i.e., both in situ and ex situ), provide us a solid foundation for the development of a strategic approach to their conservation in Europe based on a range of commonly agreed and widely tested scientific concepts and techniques. However, achieving effective conservation and utilization of European CWR diversity to promote food and economic security in the region will require a coherent, regionally coordinated policy and the appropriate resources to fund their conservation, characterization and evaluation. To achieve sustainable conservation of CWR and maximize their sustainable exploitation in Europe, there is an imperative to develop an EU - led policy to harmonize their conservation, characterization, evaluation and use with existing biodiversity conservation and agricultural initiatives, and to develop new initiatives where necessary.

The concept for in situ conservation of CWR will act as a guide to EU and national policy development which can be used as a blueprint to drive concerted actions throughout the region. The objective was to agree and adopt the Concept with a view to offering it to the European Commission for its consideration.
when formulating future European policy on in situ conservation of CWR diversity. This policy would substantially aid and secure the implementation of the wider EU strategy for the conservation of genetic resources in food, agriculture and forestry in Europe.

The Concept is presented in seven sections: (1) an outline of the Concept and its key elements; (2) a proposal for the designation of Most Appropriate Wild Populations — a new paradigm for CWR conservation; (3) a description of the two core levels of CWR conservation strategy planning needed for the development of a comprehensive pan-European conservation strategy; (4) a vision of how an integrated CWR conservation strategy for Europe can be established and administered; (5) rationale for new policy required to establish and support the ongoing operation of the integrated strategy; (6) proposals for enhancing the utilization of conserved CWR resources in Europe; and (7) options to promote awareness and raise additional funding for in situ CWR conservation with complementary management of ex situ germplasm samples. Specific recommendations for taking forward the in situ conservation strategy for CWR in Europe are also included. The Concept has been endorsed by the members of the ECPGR in situ and On-farm Conservation Network and represents the Network’s vision of how in situ conservation of CWR diversity can be achieved in Europe, as well as forming the basis of an action plan for the Network’s activities on CWR conservation over the next ten years.

### 3.4.3 European CWR strategy

Shelagh Kell

Europe is an important centre of diversity of many crops and their wild relatives and these CWR are potential genetic resources for crop improvement and food security, as well as for safeguarding the substantial economic gains to Europe through crop production in the region. Recent advances in our understanding of CWR diversity in the region, as well as in planning for their complementary conservation, provides a solid foundation for the development of a strategic approach to their conservation in Europe based on a range of commonly agreed and widely tested scientific concepts and techniques. In this presentation, a concept for conservation of Europe’s CWR diversity integrating two core levels of conservation planning—national and regional—was presented, as well as a proposal for the selection of regional priority species and Most Appropriate Wild Populations (MAWPs) for complementary (in situ and ex situ) conservation. The fundamental requirement for the integrated strategy to meet the interests of the user community was stressed, and the need for a coherent, regionally coordinated policy and the appropriate resources to fund the conservation, characterization, evaluation and dissemination of Europe’s CWR diversity was emphasized.

### 3.4.4 Common Nordic conservation action plan

Heli Fitzgerald

Conservation of Nordic crop wild relative diversity is planned within a project ‘Ecosystem services – genetic resources and crop wild relatives’. A common CWR checklist and priority list were created for the five Nordic countries: Denmark, Finland, Iceland, Norway and Sweden. The priorities were established by considering the value and use of each CWR species in the region. The next phase of the study is to continue by finding the potential in situ conservation sites, considering ecogeographic land characteristic maps, and giving recommendations for future conservation of CWR in the Nordic region.

### 3.4.5 Regional strategy for the SADC region

Joana Magos Brehm, Shelagh Kell, Hannes Gaisberger, Eve Allen, Imke Thormann, Ehsan Dulloo and Nigel Maxted

As part of an EU-ACP funded project, conservation planning for CWR diversity of the SADC region is currently being undertaken. Among the more than 1900 CWR species found, 102 have been prioritized for immediate conservation action based on the regional and global food security and economic value of the crops to which they are related; and their potential for utilization in crop improvement programmes. CWR of regionally and/or globally important crops, such as coffee (Coffeea), cottonseed (Gossypium), cowpea (Vigna), eggplant (Solanum), millets (Echinochloa, Eleusine, Eragrostis, Panicum, and Pennisetum), rice (Oryza), sorghum (Sorghum), watermelon (Citrullus) and yam (Dioscorea) are amongst those prioritized. The preliminary
results of diversity and conservation gap analyses for these regional priority CWR, as well as the main conservation recommendations were presented. In addition, questions about how to integrate national and regional conservation priorities were raised, and conservation planning tools that were developed during the project were presented, namely: a checklist and inventory tool, an occurrence data collation template, a national strategic action plan and background document templates, and the Interactive Toolkit for CWR Conservation Planning.

3.4.6 Swedish challenges and how to possibly solve them Jens Weibull and Mora Aronsson

The Swedish conservation of crop wild relatives, CWRs, operates within a multi-policy context: the FAO Global Plans of Action 1 & 2, the Aichi Biodiversity Target 13 (genetic diversity), and the EU Biodiversity Strategy. Notwithstanding, the issue of CWRs soars indecisively between agricultural and environmental sectors, as in most other countries. In 2013, a Government Bill commissioned “agency cooperation about the mapping and monitoring of genetic diversity in wild and domesticated plants and animals”. While such inter-agency cooperation has not been fulfilled, individual agencies have implemented certain actions aiming at conserving genetic diversity. The State Forestry Agency has developed a strategy for gene conservation in protected areas (PAs), incl. a database containing genetic information of such areas. The Swedish Environmental Protection Agency have developed guidelines for management of protected habitats, e.g. meadows and (semi)natural grasslands, and The Swedish Board of Agriculture currently supports c. 100 000 hectares of diversity-rich areas through agri-environmental measures in the Rural Development Programme. Recent analyses, however, show a continuing loss of these valuable areas. Despite this apparent lack of progress, Swedish is well-prepared through a set of powerful tools: the Swedish Species Observation System (c. 7,5 mill. observations of vascular plants), the Swedish Taxonomic Database DYNTAXA, and a well-developed citizen science network of flora guardians. A short-term, four-step strategy for increased overall action is proposed to include (1) a revision and update of the report Genetic variation in wild plants and animals (from 2008) with greater focus on genetic diversity for use, (2) true implementation of governmental decision (from 2012) regarding mapping and monitoring of genetic diversity, (3) an immediate launch of in situ conservation of valuable genetic resources in PAs, and (4) launching of a national gap analysis.

3.4.7 Obtaining and digitizing georeferenced data Necla Taş

Georeferencing is to translate a locality description into a map-able representation of a feature. Occurrence data of plant species have been compiled from multiple sources, namely genebank databases, herbaria, researcher’s archives, national programs, international agricultural research centres, online databases, scientific literature and individual scientists. But all passport data which do not include geographical coordinates but do available locality can be georeferenced using either gazetteers or automated online gazetteers such as GeoNames (www.geonames.org) and BioGeomancer (http://www.biogeomancer.org) as well as Google Earth. This process is called as Georeferencing which assigns geographical coordinates to collection records or observation data missing such coordinates. BioGeomancer is a Web-based automated georeferencing toolkit that allows the submission of locality descriptions, either singly or in batch mode and passes the data through a number of validation tests to check for possible errors in already georeferenced data. Google Geocoding API (https://developers.google.com/maps/documentation/geocoding) is also used to assign coordinates to locality description of plant species, but no coordinates. The free DIVA-GIS software (http://www.diva-gis.org/) consists many useful tools such as export/import of grid and shape file data, conversion of latitude/longitude data to other projections, geo-positioning of unreferenced base map images, GPS data import (as points, lines, or polygons). Thanks to technological advance it is possible to easily share and download the spatial data of plant species via internet. One of the key resources is Global Biodiversity Information Facility (GBIF) (www.gbif.org) which provides free and open access taxon and accession distribution, conservation and environmental data is the biggest biodiversity database on the Internet. The other important database available via the internet is Bioversity International Collecting
Missions (http://bioversity.github.io/geosite/) which provide to access to original passport data of more than 220,000 samples collected around the world during Bioversity International supported missions.

3.4.8 Working with biodiversity / non-PGR stakeholders
Vojtech Holubec

PGR including CWR in the Czech Republic are in charge of crop curators working in 12 co-operating institutions within National Programme for PGR conservation. The institutions comprise public and private research institutes, universities and private companies. Conservation of wild biodiversity is managed by Agency of Nature and Landscape Protection under Ministry of Environment. Other biodiversity stakeholders are NGO conservationists, farmers, breeders, companies engaged in bioproducts, botanists, horticulturists, botanical gardens and experienced hobby gardeners. National Programme partners invite those stakeholders to workshops and attempt to educate them and other interested general public on conservation issues and conservation strategy in agricultural and horticultural shows, workshops, TV, radio, web sites etc.

3.4.9 From planning to implementation
Lothar Frese and Maria Bönisch

The project “Genetic reserves for wild celeriac species (Apium and Helosciadium) as component of a network of genetic reserves in Germany” was planned on request of the Ministry of Food and Agriculture (BMEL) and started in 2015. The task is to establish genetic reserves for Apium graveolens, Helosciadium inundatum, H. nodiflorum and H. repens in 2018. The work started with the acquisition, compilation and harmonization of occurrences data. Using this inventory and with the assistance of local experts 350 potential genetic reserve sites have been selected in Germany. The experts travelled to the sites to verify the existence of the species. Feasibility studies were produced for each site and used to plan the next step, i.e. sampling of leaf probes of 100 occurrences for genetic studies. Based on the genetic and the feasibility studies an average of 9 occurrences per species will be chosen and recommended as genetic reserves. Semi-structured interviews were conducted in 2016 to understand to which extent nature conservation agencies and land owners would welcome and support the establishment of genetic reserves. The ECPGR Concept for in situ conservation of crop wild relatives in Europe (Maxted et al., 2015) should be underpinned by a communication and funding strategy. This conclusion is to be made from the interviews.


3.4.10 European governance structure
Nigel Maxted

The text of this presentation is an extended summary as it addresses critical issues for the development of a European or Nordic regional in situ network and it has thus far not been addressed in other publications.

Before we address specifically the issues of providing a governance structure for a European network of in situ sites to conserve CWR populations, the point must be explained why we cannot just rely on ex situ conservation of CWR diversity alone. It is well established that both the application of in situ and ex situ techniques have advantages, see summarising table below:

<table>
<thead>
<tr>
<th><strong>In situ advantages</strong></th>
<th><strong>Ex situ advantages</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Appropriate for all organisms</td>
<td>1. Efficient and reproducible for many species</td>
</tr>
<tr>
<td>2. Dynamic conservation in relation to environmental changes</td>
<td>2. Medium and long-term storage is feasible</td>
</tr>
<tr>
<td>3. Permits species/pathogen interactions, so continuing dynamic evolution possible</td>
<td>3. Easy access for evaluation for resistance to pests and diseases</td>
</tr>
</tbody>
</table>

CWR Workshop Summary 14 Maxted, Labokas & Palmé
especially concerning resistance to pests and diseases
4. Provides easy evolutionary and genetic study
5. Best for "recalcitrant" species
6. Possibility of multiple target taxa reserves

4. Easy access to breeding and other form of utilisation
5. Little maintenance once material is conserved (seed at 10US$ / year)

And the reasons why we cannot just rely on *ex situ* conservation of CWR diversity alone can be summarised as follows:

- *In situ* conservation allows continued evolution in the environment, *ex situ* literally freezes evolutionary adaptation (including climate change adaptation);
- *Ex situ* conservation involves sampling populations in the sense of numbers of population and within populations, but with *in situ* you are concerning whole populations. It is impossible to maximise CWR *ex situ* because of the sampling process;
- Collections for *ex situ* are often targeted to short term goals, whereas *in situ* concerning whole populations and so conserves more overall diversity;
- Genetic diversity is lost when regenerating *ex situ* accessions and we would need to go back to the wild to collect more;
- *If ex situ only* and material is lost or used *ex situ* may not be able to recollect if not conserved *in situ*.

Therefore, complementary conservation is needed as both techniques have advantages and disadvantages!

Given the requirement for complementary conservation and therefore, the need for a network of site to conserve *in situ* CWR populations there appear to be three alternative options:

Option 1 National network(s) alone:

- Advantages:
  - Strong national commitment and support for the network;
  - Good linkage to the national user community;
- Disadvantage:
  - Multiple national networks taken together may not provide sufficient regional coverage of CWR diversity and that element of CWR regional diversity not represented in the network would be left vulnerable to extinction or erosion;
  - Multiple national networks alone may also lack regional support and resources to maintain purely nationally designated sites.

Option 2 Regional network(s) alone:

- Advantages:
  - Good regional coverage of CWR diversity;
  - Good linked to regional user community (notably European commercial and governmental breeders);
  - Relatively easily linked to regional policy instruments (e.g. CAP, Natura 2000);
- Disadvantages:
  - Lack of commitment from national authorities to establishing sites which may not be a national priority;
  - Likely to require regional funding to maintain regionally important sites if they are not a national priority;
  - Some countries with regional important CWR diversity may not wish to be involved in the integrated regional network, undermining the regional network itself.
Option 3 Integrated national and regional network:

- **Advantages:**
  - Good national and regional commitment and support,
  - Good national and regional coverage of CWR diversity,
  - Good mixture of national and regional funding to resource site management,
  - Good links to the regional and national user community
  - Good links to regional policy instruments (e.g. CAP, Natura 2000)

- **Disadvantages**
  - Some countries containing regionally important CWR diversity may not wish to be involved in the integrated regional network.

The conclusion being that scientifically establishing an integrated national and regional network would be the best holistic model and would provide the maximum CWR diversity coverage, such a network of networks could be said to be bottom-up, inclusive, decentralized and individual site would be locally owned, but the final decision would need to made collectively by the nations involved. Such an integrated national and regional network was proposed in the ECPGR ‘Concept’ for ‘In situ Conservation of crop wild relatives in Europe’ (Maxted et al., 2015).

Rather than each site working independently they would be integrated to enhance their overall function, they work effectively form a meta-network, and the key functions of such a European integrated regional CWR *in situ* network might include:

- Facilitating the coordination of the many ongoing initiatives dealing with *in situ* conservation and management of CWR populations in Europe;
- Fostering stronger partnerships (funding) at national and regional levels, as well as providing a means of integration with the global network (the so-called Vavilov Network) being developed by FAO (2013, 2014);
- Impacting positively on activities at country-level and demonstrate benefits that directly support the ultimate custodians of CWR diversity, the local communities that may be found in and around protected areas/reserves and/or farmers and farming communities who are involved in day-to-day management of CWR populations;
- Achieving the desired fundamental outcome of *in situ* conservation: the safeguarding in perpetuity of important wild genetic resources for use either directly by famers or by plant breeders and other scientists in crop improvement. Thus, another important function of the network(s) is to catalyse better linkages between conservation and sustainable use of CWR diversity for the benefits of current and future generations.

To be sustainable the integrated national and regional European CWR network would require some form of network governance. Governance is defined by Wikipedia (Sept. 2016) as “the way the rules, norms and actions are structured, sustained, regulated and held accountable”. In the context of the European CWR network this would require which European body has appropriate geopolitical and administrative stature to provide the necessary oversight? At the European level, organization such as ECPGR, EEA, EU Environment (who manage the existing Natura 2000 network), EUROSITE or EUROPARK might be considered. However, if linked to the global Vavilov Network then international options might also be considered such as: FAO Globally Important Agricultural Heritage Systems, FAO IT, CG Centres, UNESCO Man and Biosphere
Programme, UNESCO World Heritage Sites, CBD Programme of Work on Protected Areas and IUCN Key Biodiversity Areas. Other issues that require resolution would be whether the European CWR network was managed by the organization providing the governance structure directly or was a virtual network where individual sites were managed locally / nationally but chose to affiliate themselves with the European CWR network because of the associated benefits. Further whether the sites have to be formally established protected areas or whether they include formally established protected areas and less formally designated site that were still managed to maintain CWR diversity. Again, these decisions would need to made collectively by the counties involved. However, it would be important, in line with the CB and ITPGRFA, to maintain national sovereignty over the CWR genetic resources located in Network sites that are located in a country and so fall under national legislation. Therefore, sites included in the European CWR network would need to follow three precepts: all sites are nominated by national PGRFA coordinators, all sites remain under the jurisdiction of national agencies, and access to CWR material held in sites is controlled by national authorities using ITPGRFA accepted SMTAs.

The agency supplying network governance would in turn accept management and coordination responsibilities for the network, setting and maintaining minimum criteria for inclusion in global network, establishing that:

- The CWR population is native at that location or if introduced has existed at that location for at least fifteen generations.
- The population contains distinct or complementary genetic diversity (ecogeographic diversity may be used as a proxy for genetic diversity) or specific traits of interest that enhances the overall value of the network.
- The population is actively and sustainably managed according to the minimum quality standards for genetic reserve conservation (Iriondo et al., 2012).
- The population is routinely sampled and held in a backup ex situ facility every fifteen generations.
- The population is ‘healthy’ with a good chance of long term survival (normally thought to mean 100 years) and so threats from development or climate change are minimal.
- The population is accessible for research or utilisation in accordance with the International Treaty via the appropriate national agencies and samples must be available on request from a specified ex situ facility as part of the multilateral system.
- The population is nominated by the appropriate national PGR authority for inclusion in the Network.

The governing agency would need to assess whether individual sites meet the minimum criteria for inclusion in the network and once included, periodically to review whether individual sites continue to meet the minimum criteria for inclusion in network and fulfil reporting obligations. Further they should:

- Promote access to in situ conserved CWR populations so linking conservation to sustainable utilization and benefit sharing;
- Increase awareness of value of CWR for agriculture and the environment among governments, commercial entities, institutions, decision-makers and the general public;
- Ensure and promote dynamic in situ conservation of CWR populations;
- Coordinate and provide expertise on in situ conservation CWR management (tools, protocols, exemplars, evidence-base, etc.);
- Assist with provision of grants from European and international funders, in-kind assistance and co-financing to support the network;
• Develop effective strategies for gathering, documenting and disseminating baseline information on CWR populations in Europe;
• Recommend research projects to countries and to make proposals for the organization of regional or national cooperation;
• Coordinate regional cooperation between European States participating in the network, establish a European and national policy and legislative framework e.g. EU Directive on PGRFA;
• Coordinate European scientific programmes, inclusion of CWR in EU Habitat Directive, promotion of nature and CWR diversity conservation collaboration;
• Consult with European non-governmental organizations on scientific or technical questions and helpdesk provision;
• Integrate European regional and European national in situ CWR conservation with the developing global network.

Finally, to get the European CWR network started would be a good idea to have some ‘ball park’ estimate of the level of costs involved in establishing the network, Table 1 provides such a ‘ball park’ estimate. The estimate cost of €6M would enable the establishment of the network and its financing for the first ten years of its life. €600K per year may seem initially like a high price tag but given the costs of maintaining Europe’s 170K CWR seed accessions (FAO 2010) at 10 USD per accession (Schreinemachers et al., 2014) is 1.7M USD or €1.6M and that figure does not include the initial collection and processing costs, then regeneration costs; the in situ conservation is not so high. Specifically, it is a very small fraction of the utilisation value of $115-120 billion worldwide annually for use of these conserved resources (Pimentel et al., 1997; PwC, 2013); then the figure become very reasonable. The point being that potential costs should not be a deterrent to establishing the European CWR network, especially when there are many European foundations, commercial breeding companies and the EU itself that might provide potential sources of funding.

Table 1. ‘Ball park’ estimate for establishing European CWR network.

<table>
<thead>
<tr>
<th>Scale</th>
<th>Activity</th>
<th>Cost €(x000)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Regional</td>
<td>Research European priority sites to establish CWR genetic reserves for IT Annex 1 CWR taxa</td>
<td>375</td>
</tr>
<tr>
<td>costs</td>
<td>Initial set of 25 CWR genetic reserves for CWR taxa established within 10 years of global network(s) @ €100,000 per CWR genetic reserve</td>
<td>2,500</td>
</tr>
<tr>
<td></td>
<td>Network Secretariat staff and a Managerial Committee for first 10 years of global network @ €150,000 per annum</td>
<td>1,500</td>
</tr>
<tr>
<td></td>
<td>Total international costs</td>
<td>4,375</td>
</tr>
<tr>
<td>National</td>
<td>Production of national CWR conservation strategies for 10 key countries in Europe @ €100,000 per national CWR conservation strategy</td>
<td>1,000</td>
</tr>
<tr>
<td>costs</td>
<td>Running costs of 25 national genetic reserves @ €25,000 per CWR genetic reserve for 10 years</td>
<td>625</td>
</tr>
<tr>
<td></td>
<td>Total national costs</td>
<td>1,625</td>
</tr>
<tr>
<td></td>
<td>Total costs of global European network(s)</td>
<td>6,000</td>
</tr>
</tbody>
</table>

3.4.11 Linking CWR conservation to use

A strong link between conservation and use exists as evidenced by numerous examples of crop wild relatives used in plant breeding (e.g. Kole, 2011) but not all uses are sustainable (Cowling, 2012). Any human use of natural resources depletes the resource unless a system is being organized that allows the sustainable use of the resource. In addition, if we do not check whether use is indeed sustainable (Dempfle, 2015), the concept of sustainable use of plant genetic resources may go astray. This would not be in the interest of the plant genetic resources conservation community. Use systems are fully sustainable if they comply with the criteria for ecologically, socially and economically sustainability. Examples of uses of crop wild relatives at the habitat level (ecosystems service), species level (harvesting of medicinal plants in the natural habitat) and intraspecific level were presented and discussed to what extend these uses can be considered sustainable.


3.5 *Ex situ and in situ* conservation integration (Nordic and ECPGR groups)

3.5.1 *Ex situ* conservation of CWR in the Nordic region


The Nordic region has a strong history regarding cooperation on \textit{ex situ} conservation of plant genetic resources. The responsibility is divided between NordGen (the Nordic regional gene bank) and the Nordic National programmes. So far NordGen has been the major actor for \textit{ex situ} conservation of CWRs, but the new gene banks for threatened species in Finland and Norway might play an increasingly important role in the future. Also, botanic gardens have an important role, especially regarding communication on CWRs.

NordGen store a wide range of genetic resources and the mandate includes cultivars, landraces, breeding and research material, as well as wild accessions. About 20\% of the collection consists of wild or semi-wild accessions, and this part is dominated by an international collection of barley CWRs and collections of local Nordic forage grasses and legumes. In total, NordGen store wild accessions from about 360 different taxa, but for most of these taxa the number of accessions conserved are low. However, a few high priority taxa have a dense geographic sampling that covers their Nordic distribution area. When comparing the taxa at NordGen with those prioritised in national strategies, only a small proportion is conserved at NordGen (8 of 209 priority taxa in Finland and 24 of 204 in Norway).

To what extent \textit{ex situ} conservation should be applied to CWR species is still undecided in the Nordic region. In general, \textit{in situ} conservation should be regarded as the main conservation approach for most CWR species. However, to be able to assure long-term conservation, \textit{in situ} conservation of important CWR populations should be backed-up with \textit{ex situ} conservation. In addition, \textit{ex situ} conservation could play a role in facilitating access to CWR accessions.

3.5.2 \textit{Ex situ} conservation and reinforcement work

Kristina Bjureke

Natural History Museum, University of Oslo, started with \textit{ex situ} conservation of threatened native Norwegian plants in 2007. According GSPC (Global Strategy for Plant Conservation) the goal is for 2010 Target 8: At least 75\% of threatened plant species in \textit{ex situ} collections, preferably in the country of origin, and at least 20\% available for recovery and restoration programs. Now in 2016 we have 50\% of the threatened plant species on the Norwegian Red List 2015 in our National Norwegian Seed Bank, and appr. 50 species in living conservation plantations. Our aim is to have, if possible, seeds from 5 geographically separated populations. We have to work hard to obtain the international goal. Natural History Museum works actively with reinforcement and reintroduction programs on 6 threatened plant species. Some of the plant species in our seed bank are also CWR.

3.5.3 Botanic gardens and CWR conservation

Hjörtur Þorbjörnsson

The activities of botanic gardens include acquisition, conservation, research, education, communication and exhibition of vascular plants. Conservation forms the backbone of these activities and many botanic gardens play an active role in both \textit{in situ} and \textit{ex situ} conservation. With limited resources, however, conservation activities are easily overshadowed by exhibition and education work. Thus, it is crucial not only to have international or regional understanding of the importance of conservation of plants, but also to anchor the importance within the local community itself and especially the funding bodies of the garden. Museums in general, and thus botanic gardens, can be thought as a collaborative process for translating knowledges that reside in and between the garden and the community. Conservation of CWR’s offer the garden a good opportunity for a discussion with the society on conservation issues and promote an understanding on conservation of other groups of plants. By working on socio-economically important plants, such as the CWR’s, the botanic gardens increase the relevance of the garden within the communities they work within.

3.5.4 \textit{In situ} and \textit{ex situ} conservation of \textit{Beta patula} \quad Miguel A. A. Pinheiro de Carvalho, Emanuel Silva, Gregorio Freitas, Humberto Nobrega

One of the recommendations of the AEGRO project, grant 057 AGRI Gen Res 817/2004 was to develop a plan and guidelines to create a genetic reserve for endemic beet CWR, \textit{Beta patula} Aiton. This plan presupposes the evaluation of ecogeographic and genetic baseline of species and the implementation of a management
program aiming to monitoring and maintain in situ and ex situ genetic diversity of this species. In the framework of the Life Recover project, LIFE12.NAT.PT.000195, actions A6, C8 and D11, implementation of this plan commenced in 2014. The survey of plant biodiversity on Ilheu do Desembarcadouro, Madeira, where main population of B. patula was identified, revealed that other 12 CWR, including 8 endemism share the same location. This feature makes B. patula genetic reserve a potential most appropriated wild population (MAWP) for in situ conservation of several priority CWRs. The ecogeographic data include the gather of data on the habitat, soil and climatic conditions and its variations. Species population census and species richness and diversity indexes were determined, using 15 quadrates, with an area of 16 m² each. B. patula population size and effectives will be surveyed on a regular basis until the end of project in 2017. Species richness and diversity allowed us to determine the most suitable and best population’s spots to be included in the genetic reserve boundaries. The preliminary results show that B. patula population has higher number of plants and is more resilient to fluctuations dictated by environmental conditions than was expected. The seed soil bank sizes have on average 2,272 seeds per m², but contribute only 1 to 10% for yearly plant recruitment. The analysis of population genetic diversity and its spatial display is currently underway based on the screening of 150 plant samples, using 14 polymorphic SSRs, from which 7 are linked with the traits of interest. A backup collection of plant germplasm, with 19 accessions was created and stored in the ISOPlexis Genebank.

Acknowledgement: This work has funded by LIFE+ program of European Union, though LIFE RECOVER NATURA project, LIFE12 NAT/PT/000195.

3.5.5 Future European and national in situ CWR conservation

Lorenzo Maggioni

As part of the new mode of operation of ECPGR during Phase IX, the Working Group (WG) on Wild Species Conservation in Genetic Reserves operates with a list of 82 experts from 37 countries and is chaired by Nigel Maxted, UK. Wild species, mainly related to forages, vegetables and medicinal or aromatic plants, have started to be included in the European Collection established by AEGIS (A European Genebank Integration System), reaching 5881 accessions by September 2016, that is 20% of the European Collection. On the other hand, the EURISCO catalogue is documenting ca. 233,700 wild/weedy accessions conserved in European genebanks (13% of EURISCO accessions). Following the approval of the ECPGR Concept for in situ conservation of crop wild relatives (CWR) in Europe, several related activities were funded through the ECPGR Grant Scheme. In particular, these concern a survey of genus Patellifolia (GeDiPa), the establishment of a workplan on in situ conservation of forage crops (Forages 2020), an inventory of wild Vitis vinifera and standards for ex situ/in situ conservation (InWiGrape), consequences of climate change for conserving leafy vegetables CWRs in Europe (CCLEAFY), as well as ‘CWR Conservation strategies’. The recent 14th ECPGR Steering Committee meeting held in Bosnia and Herzegovina took note that the Chair of the Wild species Working Group received from its members the highest score of appreciation. National Coordinators and WG members were encouraged to promote in situ activities at country level, while the ECPGR Concepts for in situ conservation of crop wild relatives in Europe and for on-farm conservation and management of PGRFA were planned to be offered to the European Commission for consideration. A specific recommendation was also made to include in EURISCO data of in situ CWR conserved in genetic reserves. To such effect, representatives from the Wild Species Conservation in Genetic Reserves WG, the Doc&Info WG and selected Crop WGs should develop an agreed minimum data exchange format based on existing in situ descriptor lists. Finally, ECPGR member countries were recommended to use the Standard Material Transfer Agreement (SMTA) for distribution of both Annex I and non-Annex I PGRFA, independently whether material was conserved ex situ or held in situ.

4. Summary of workshop discussions

4.1 Discussion session 1 National planning/implementation
Below is a text summarising the discussions in the two Nordic discussion groups. A large part of the discussion is centred on policy recommendations that will be presented to stakeholders in the Nordic countries. The content and phrasing of the recommendations was discussed and the texts listed below are compromises combining feedback from both groups.

**General comments:** In general it is important to keep the policy recommendations short and concise if we expect them to be read by politicians/policy makers. More details can instead be included in the project report. To give background and put the recommendations into context, some additional text is required. In addition to the policy recommendations listed below, we should in the final policy brief include a paragraph explaining what a CWR is and why they are important. The policy brief should be regarded as way to kick-start activities on CWR conservation in the Nordic countries.

**Policy recommendation 1 (text updated after discussions at the workshop)**

*Each Nordic country should develop a national strategy for in situ and ex situ CWR conservation and sustainable use in line with relevant FAO guidelines. The work done at the Nordic level can be used as a framework, or supporting information, for this. The Nordic and national work should be complementary to each other and also to European and global strategies.*

**Comments:** No specific country recommendations should be added to this point. This is a national matter and does not need to be addressed in detail in this document. In general the policy recommendations should be kept as short, clear and as specific as possible. At a later stage, action plans will be needed for the implementation of the strategies.

**Policy recommendation 2 (text updated after discussions at the workshop)**

*Each Nordic country should develop the policy instruments needed to facilitate conservation and sustainable use of crop wild relatives, involving all relevant sectors in this process. Suggested measures include evaluating what policy actions that are needed for efficient implementation of conservation and use of crop wild relatives and/or analysing obstacles that hinder such effective conservation and use.*

**Comments:** It is important to point out that both the agricultural and environmental sectors are essential for this work and that also other sectors, such as information and education, can play important roles in CWR conservation. On the national level, there is a need to clearly define the division of responsibility between the environmental and agricultural actors. Policy instruments or other actions that facilitate cooperation are essential (including specific funding).

**Policy recommendation 3 (text updated after discussions at the workshop)**

*As a first step, implement in situ conservation, in accordance with relevant international guidelines, in at least one site in each of the Nordic countries. The long-term aim should be to establish several complementary sites in each country representing different types of habitats.*

**Comments:** There is no need to specify specific criteria regarding the establishment of in situ conservation of CWRs in the policy recommendations. International guidelines should be followed but it should be a national or local responsibility to define detailed criteria for establishment of genetic reserves. To implement in situ conservation, it is important to have strong links to habitat management and look into how the CWRs could be included into local management plans and local support schemes. Communication and meetings between local management people at both the National and Nordic level can facilitate the process. Parts of the rural development programs could potentially be used to support in situ conservation. Support schemes could be adjusted to include this type of areas, for example recommendations on grazing.
Discussion question 4

Are there other policy recommendations that you would like to add regarding the national level? For example, other steps/actions needed on the national level to achieve progress on conservation and use of PGR.

Comments: No additional policy recommendations were suggested.

4.1.2  ECPGR Discussion

4.1.2.1  ECPGR Discussion Group 1  
Shelagh Kell, Matthias Ziegler and Dainis Rungis

NB: Questions/tasks in italics are taken from the discussion guidelines document. Not all questions/tasks were addressed, therefore, only those questions debated are included in this report.

Feasibility and scope. Establishing and managing CWR genetic reserves is complex but feasible if authorities (agricultural and environmental ministries and agencies) would work closer together. Also, the forestry authorities should be involved if CWR are growing in forests. In this respect, it is very important for CWR to gain recognition. The ITPGRFA and FAO CGRFA are the driving forces for the process. CWR data for international information systems (e.g., the ITPGRFA’s Global Information System) and monitoring procedures (2nd GPA with indicators for CWR) are relevant processes in this regard. To make data available for these processes, the role of National Inventories and National Focal Points should be strengthened. The documentation of in situ CWR populations within genetic reserves would add value for the use of PGR already complementarily conserved ex situ. National Inventories should therefore combine in situ and ex situ conservation data, as well as characterization and evaluation data for accessions or populations of CWR. An important consideration for the establishment and management of genetic reserves could be the development of a programme or a mechanism which will allow the generation of income for landowners. This is feasible in the framework of voluntary participation. There must be a special discussion for the conservation of CWR outside of protected areas. Some countries have established protected areas only on public land. Complementary bottom-up solutions and top-down solutions should be combined. National genetic reserves seem feasible if there is an action or obligation foreseen from the top (e.g., action plans for CWR). The participation of many stakeholders in making priority lists may generate more interest in further actions. The involvement of a wider range of stakeholders at the initial stages of planning will increase the sense of ownership and responsibility felt by them, rather than have a finalized plan presented to them.

Technical skill required and available. Most technical skills are available, but seed science remains an important task for further scientific work. For some CWR, there is a need to establish germination protocols.

An overview of Germany’s national funding activities of the Ministry of Agriculture (BMEL) and the Federal Office for Agriculture and Food (BLE) for establishing genetic reserves for CWR (Apium, wild grape, grassland) is provided at the BLE website: www.genres.de/3/cultivated-and-wild-plants/conservation/in-situ-conservation/ (German only). Germany is aiming to realize genetic reserves in NATURA 2000 sites through agreements signed by all relevant stakeholders. These projects aim to fulfil the actions of the German national programme for PGR and are based on the experiences of the AEGRO project (http://aegro.jki.bund.de/aegro/) which are extremely valuable for the establishment of genetic reserves.

Tools required and available (including methods). Predictive characterization can be used to link conservation and use. However, to reveal useful traits in CWR, phenotyping and genotyping should be carried out. Agricultural stakeholders have expertise in observing infra-specific variation, traits for the use in breeding, or for direct use of the CWR (e.g., as wild food plants). There is a need to interest breeders at an early stage to support CWR conservation to overcome the gap between CWR conservation and use. Funding is needed to facilitate characterization as well as in situ conservation management and monitoring of CWR populations.

Major limitations. In some countries a national system may not be feasible because of regional (sub-national) differences; therefore a bottom-up approach needs to be taken. However, in this case it could be difficult to
identify/motivate responsible stakeholders. There is a requirement for pre-breeding programmes to make traits in CWR available for use in breeding and to demonstrate the value of CWR to breeders and other stakeholders. The gap between CWR and users (breeders) cannot be bridged over the timescale of typical project funding (demonstrating the value of long-term public–private partnerships for pre-breeding).

**Policy implications.** Countries are interdependent in supporting conservation and use of CWR. A main constraint is the lack of funding for implementing the process at national and European levels. The frameworks of international treaties such as the ITPGRFA, CBD and Habitats Directive, as well as the ECPGR Concept for In situ CWR Conservation provide the international and European frameworks for in situ CWR conservation and use. In this respect, a European agency for genetic resources (including PGR, AnGR and FGR) and an EU Directive could give strong support for the ongoing process. National GR councils can be used to advise ministries (e.g., by inviting experts to present proposals/projects) or by raising awareness for the actions foreseen in the National Programmes or in FAO’s Second Global Plan of Action. Consideration should be given to provision of technical support and funding to other regions as these may have important CWR for use in Europe (breeding and other uses). In some cases, e.g., cereals, CWR from other regions may be of more interest to breeders than European CWR (e.g., Germany is funding a capacity development project for seeds in Ethiopia (CD seed) – [www.giz.de/en/worldwide/18920.html](http://www.giz.de/en/worldwide/18920.html).

**Other issues.** There is a need to emphasize the potential value of CWR or to add value to currently protected species (i.e., use examples of already protected species with the added value that they are also CWR). Environmental protection plans can also benefit (by showing added value) from having CWR under their protection.

4.1.2.2 ECPGR Discussion Group 2

**Vojtech Holubec**

**Feasibility and scope.** All countries considered National conservation planning feasible but in the future. Some countries have already developed (UK, CZE to be published), others are in the first steps (LAT, BGR). Most of the countries have already identified priority CWR. Communication among countries and methodological help is needed. There is lack of interest in CWR by ministries may be related to lack of breeder’s interests or breeding programmes (Bulgaria, Portugal…). In Germany where there’s large breeding companies and (pre-) breeders do understand CWR value. Important to raise public awareness on the importance of native CWR for crop improvement.

**Technical skills availability.** Some countries still miss technical skills but collaboration between countries or sending an expert within a project could help. Or appropriate funding is needed to hire GIS experts/analysts.

**Tools required and available.** The basic tools are quality databases, methodology and software. There are databases available in most of the countries but in various quality. Needed both agriculture and botanical / environmental databases. Usually each country has agriculture database but not always available botanical data.

**Major limitations.** The limitations are: lack of communication between sectors (Environment and Agriculture, Forestry and other stakeholders) – need to mainstream across all stockholders; lack of staff and skills; lack of national coordination and interest in ministries.

**Policy implications / what is the national policy concerning CWR?** The mainstreaming of CWRs into policy is missing. CWR awareness got to the policy late / recently. It is desirable to communicate to Ministries about the need to implement CWR issues. Some countries do have policies related to CWR mainly within the Ministry of Environment.
4.2 Discussion session 2: Regional conservation planning and implementation

4.2.1 Nordic Discussion  
Anna Palmé and Ulrika Carlson-Nilsson

Policy recommendation 5 (text updated after discussions at the workshop):

*Further develop a common Nordic approach on CWR conservation based on international guidelines and strategies. This approach should address future challenges on climate change and food security. The aim would be to facilitate the national process and identify areas where joint planning and/or cooperation would be more effective and efficient than independent national efforts.*

Comments: The original version of this policy recommendation was too long. The details presented in bullet points in the earlier version should be included in the project report. It would also be important to consider communication in a future Nordic approach/strategy.

Policy recommendation 6 (text updated after discussions at the workshop):

*Encourage research, infrastructure development and Nordic cooperation to further CWR conservation and sustainable use, aiming at ensuring high efficiency and quality in conservation planning and implementation. Research fields include, but are not limited to, conservation biology, trait evaluation, pre-breeding research using CWRs, socio-economy value, diversity analysis, evolutionary ecology, taxonomy, habitat classification and ecosystem services.*

Comments: Like recommendation no 5, this recommendation is too long and the details in the bullet points can instead be presented in the report. One bullet point should be added. “Promote cooperation on common standards on taxonomy, habitat classification, inventory protocols and initiate common Nordic presentation tools. The results should be presented in a common Nordic portal.” It is important to encourage research but also other actions that can facilitate high quality conservation.

Policy recommendation 7:

*Suggested text: “Develop an overview a roadmap/manual for easy access conditions to genetic resources conserved in situ in the Nordic countries (including assembling data on legislation, access procedures, contact info, decision trees, etc.”)*

Comments: One group wanted to keep this recommendation and the other suggested that this policy recommendation should not be included in the final version of policy recommendations. There are many other more important issues to focus on and it is a bit premature to develop a roadmap. At the current time, the legal issues concerning access are not clear and clear national policies need to be developed before such a roadmap can be made. There can be multiple ways to facilitate use and the individual Nordic countries may use different approaches. However, this is an important issue and in the future, it would be good to clarify the rules and procedures for access of Nordic plant genetic resources. In the future, a roadmap would be useful.

Policy recommendation 8:

*Suggested text: “Consider broadening the Nordic PPP project on pre-breeding by increasing the number of, or exchanging, the current target crops and encourage the use of CWRs. Any such changes would, however, need full support from the breeders’ community.”*

Comments: It is suggested that also this recommendation is deleted. There are more important recommendations to focus on. This action is dependent on national funding that is not available now and on the interest of the breeders. It is instead suggested to add pre-breeding research into recommendation 6.
Discussion question 9:

Are there other policy recommendations that you would like to add regarding the regional level?

Comments: One additional recommendation was suggested: “Promote cooperation on common standards on taxonomy, habitat classification, inventory protocols and initiate common Nordic presentation tools. The results should be presented in a common Nordic portal.”

4.2.2 ECPGR Discussion

4.2.2.1 ECPGR Discussion Group 1

Shelagh Kell, Matthias Ziegler and Dainis Rungis

List specific activities that have arisen out of the discussion here in Vilnius, with lead responsibility and completion dates. Validation of the regional priority list of CWR (lead: SK by end of the year). Need to work out a mechanism for obtaining endorsement from the user community: ECPGR WG members, National PGR committees, Breeders’ associations, other ECPGR WGs (crop-specific). It was recommended that this might be implemented in stages (e.g., get feedback from In situ WG members first before circulating more widely). SK to draft document detailing the prioritization process, list of species and related information (regional CWR inventory) and specific feedback required from stakeholders. Suggestions for how to promote and implement integrated European In situ structure and associated funding once completed. Promotion. Publish policy briefs (as was done for the Preparatory Action on GR: [http://www.geneticresources.eu/](http://www.geneticresources.eu/)) with links to relevant global and regional policy. Lobby EC and EU Parliament – actions need to come from member countries using the ECPGR ‘concepts’ developed for the purpose. Improve content of Wild Species WG web page (lead: NM/SK in liaison with Lorenzo and Lidwina). Undertake a survey of projects (past/present/future) supporting CWR conservation and use and publish results online. Encourage the development of CWR National Inventories by providing training and a central repository for access (e.g., via EURISCO, ITPGRFA GLIS, GBIF, cwrdiversity.org?). This repository would also provide access to C&E data and conservation management protocols (e.g., genebank management standards). [SK note: the ITPGRFA Toolbox on Sustainable Use of PGRFA will be relevant in this latter context] Convene national workshops on CWR to involve all relevant sectors (with a developed and standardized structure). Could be under the ECPGR Activity Grants Scheme? Provide a central repository to provide access to relevant information and tools to support CWR conservation planning and implementation (NB: this is effectively already provided the CWR Global Portal – create a link from the ECPGR In situ WG web page).

Implementation. The ECPGR ‘concept’ developed by the In situ WG should form the basis of discussions with the EC concerning funding but at present the community is in response mode responding to calls like for H2020 projects (e.g., SFS-04 [2017]) and projects arising from the EU Preparatory Action on Genetic Resources (NB: only short term). With long-term funding under the umbrella of an EU Directive on PGRFA conservation and sustainable use. Potential sources of additional project funding and future ECPGR funded meetings might potentially come from other EC sources such as LIFE+

Development of a communication strategy for use with other stakeholders. Improve content of Wild Species WG web page (lead: NM/SK in liaison with Lorenzo and Lidwina). Publish policy briefs with links to relevant global and regional policy. Emphasize links between the objectives of the WG and the 2nd GPA, ITPGRFA, CBD etc. How are we helping to meet the Aichi Targets, etc.? Include this information in WG web page. It can be used to feed into the FAO’s Third Report on the State of the World’s PGRFA and could also be used as an argument for the value of/need for the establishment of a global In situ CWR conservation network. List any interactions that are required for collaboration with other crop WGs Presentation on ECPGR WG activities at the Montpellier conference ECPGR side meeting? Endorsement of regional priority CWR list. Suggestions for targeting additional members. As noted above, encourage membership of the WG from the PA community. Can get suggestions from existing members and NCs [Note that NCs have to formally propose members to the ECPGR Secretariat].
Discussion topic 2 is similar to 1 with some specifications and/or generalisation. Some countries have historical relationships/links or form phytogeographic regions (Danube basin, Baltic phytogeographic region) and so conservation of CWR can be planned at such regional/sub-regional level. Many transboundary projects on conservation have been solved (e.g. National parks on both or 3 sides of border) and sub-regional cooperation is subject of projects such as INTERREG. Do we first start with the national programmes and then combine them at regional level? It is very important to raise awareness about the need of sub-regional cooperation in conservation planning, because the plants do not follow political borders. Another issue is political: for small countries, it would be highly desirable to start at EU level and if governments get the conservation issues as necessary from EU, then national coordinators will have much better position to promote conservation strategy on national levels.

4.3 Discussion session 3: Integrated CWR conservation strategies

4.3.1 Nordic Discussion

Discussion question 10: Is there a role of ex situ conservation in the conservation of CWR species?

Comments: Yes, there is role for ex situ conservation for CWRs. This role can be: 1) to facilitate use, 2) to act as back-up of in situ conservation, 3) to facilitate evaluation or 4) to be the main conservation approach. However, the main conservation approach for the majority of CWR species should be in situ conservation, while ex situ acts as backup. To have an ex situ back up is especially important when a population is small and/or threatened. Ideally, all in situ conserved population should have an ex situ backup. By conserving the CWRs in situ, problems with for example genetic drift during regeneration in gene banks are avoided. In addition, the populations conserved in situ will continue to adapt to the local environment and thus also to changes in the climate. Decisions on the best conservation approach need to be made for each individual species separately as they have different properties and demands. Ideally, species conservation action plans should be made for all prioritised CWR species. The conservation and use of threatened species was discussed. If threatened species are conserved ex situ, access from the ex situ collection might lessen the threat to the natural site in some cases. On the other hand, a concern was expressed that free access to this material might be misused. Some types of ex situ conservation, such as conservation in Botanical gardens, are also important for communicating the role and importance of CWRs. If ex situ conservation serves as back-up of in situ conservation, the best approach to renew the samples when the germination level decrease over time will be to re-sample the in situ population if that population is still thriving. This will save money since sampling is cheaper that regeneration, and at the same time avoid some problems that can occur during regeneration (loss of genetic diversity, adaptation to cultivation, gene flow from other populations). Breeders are also likely to want populations adapting to a changing climate.

Policy recommendation 11 (text updated after discussions at the workshop):

Develop the Nordic networking and integration of in situ and ex situ conservation. Establish a framework for cooperation between stakeholders working with in situ and ex situ conservation of CWR. The network created during the current project should be used as a basis and it should be linked to European networks.

Comments: There is a need for a meeting point and for cooperation on this topic. To have regular workshops where relevant stakeholders are invited would be useful. However, it is too early to formalise this cooperation. There is a need for informal networks to further evaluate the national needs in order to implement in situ conservation. There is also a need to address scientific questions on CWR conservation. When formalising a network later it is important to remember that there are existing formal and informal networks on for example nature conservation and ex situ conservation that should be linked to the new structure. In the Nordic council of ministers there is cooperation between the agricultural and environmental side. This could perhaps be something to build on. A proposal could be presented to NMR for funds. NordGen
could act as coordinator. The model presented in Figure 1 is a good basis but needs to be slightly modified before it can act as model for CWR conservation in the Nordic region. For example, regeneration should not be performed for most CWR species since in situ conservation should be the main conservation approach and ex situ conservation should act as backup.
Figure 1. Integration of *in situ* and *ex situ* CWR conservation. (Figure from presentation by Nigel Maxted and Anna Palmé at the workshop “The impact of climate change on the conservation and utilisation of crop wild relatives in Europe, Barcelona, December 2015). PA=protected area.
Discussion question 12:
How and to whom should the Nordic policy recommendations be presented?
Comments: They should be presented to the Nordic Council of Ministers for the Environment (MR-M) and the Nordic Fisheries and Aquaculture, Agriculture, Food and Forestry (MR-FJLS) as well as agricultural and environmental national authorities and stakeholders/forums on genetic resources.

Discussion question 13:
Are there other policy recommendations that you would like to add regarding integrated strategies and ex situ conservation?
Comments: None of the groups suggested additional policy recommendations on this topic.

Discussion question 14:
What should be the next steps on the Nordic level to further CWR conservation and use? How should we continue the work in the current project?
Comments: The first step should be to finalise the current project and deliver the recommendations to the appropriate authorities. Not much time was left to discuss this final question.

4.3.2 ECPGR Discussion
Vojtech Holubec

The ECPGR Group stayed as one whole group for this discussion.

Feasibility and scope. Who will be responsible for managing and monitoring MAWPs? Taking into account available human resources, can all MAWPs be effectively managed and monitored? Ministries of Environment (also Depts. of Forestry in some cases) should take overall responsibility because they are responsible for national PA designation and management. However, the MAWP network will require the involvement of Ministries of Agriculture for funding and using/disseminating results (e.g., reporting to the FAO CGRFA under the Second GPA and contributing to national databases such as FloraWeb in Germany). Research institutes will also be involved but most likely only in specific projects. The situation regarding responsibility for management and monitoring of MAWPs outside PAs (‘extra-PA’ sites) is more complicated but should be specified in the site establishment documentation. Effective management and monitoring of MAWPs will depend on the current PA network in place, how many species are already captured and whether they are being actively managed and monitored. PA managers may be open to including additional species in their monitoring programmes but it will be very costly to monitor to the GR quality standards for all priority species. It may therefore be necessary to rank them according to their threat status/rarity/commonness etc. and initially focus efforts of the highest priority populations. The question of whether the nomination of MAWPs / GRs should be limited only to those that can be managed/monitored to a high standard or whether to include a large number of MAWPs in the network even if they do not meet minimum standards was discussed. It was agreed that it is better to be inclusive (i.e., nominate priority MAWPs for inclusion in the network even if they cannot all be managed and monitored to high standards) to ensure important populations are not excluded and to meet breeders’ needs for maximum diversity.

Technical skills required and available. Are any specialist skills required to manage and monitor MAWPs above and beyond existing PA management and wild plant species population monitoring? Are the required skills already available? It cannot be assumed that current PA managers have the required skills to manage and monitor MAWPs, especially because many PAs involve passive conservation, therefore populations may not be actively monitored and managed. New skills (e.g., demographic and/or genetic monitoring) may therefore be needed by PA managers and additional funding will be required to provide the necessary
training. This training could be provided by the research institutes involved in identifying and designating MAWPs. It will be necessary to justify the value of putting money into management and monitoring of MAWPs in order to obtain appropriate resources for training and to support their long-term management.

**Tools required and available.** What methods and tools are required to manage and monitor MAWPs (e.g., field data collection and management software; germplasm collection protocols; genetic diversity analysis protocols? Are these tools already available? Descriptors and tools for managing data associated with CWR conservation have been under development in the context of a number of specific projects, most recently the SADC CWR project (www.cropwildrelatives.org/sadc-cwr-project/). These resources will be freely available for use by the end of 2016. The experiences of the AEGRO project (http://aegro.jki.bund.de/aegro/) are extremely valuable for the establishment of genetic reserves. Germany is aiming to realize genetic reserves in NATURA 2000 sites through agreements signed by all relevant stakeholders. These projects aim to fulfil the actions of the German national programme for PGR and are based on the experiences of the AEGRO project. Dissemination and use of data resulting from population monitoring It will be critical to make data (and material) visible to potential users to justify the existence of the MAWP network and ensure its ongoing funding. Data will need to be shared with Ministries of Agriculture to facilitate reporting to international agreements (e.g., the Second GPA) and for inclusion in national databases (e.g., FloraWeb in Germany). It was noted that regular evaluation of the effectiveness of management plans and interventions would also be vital.

**Major limitations.** What are the major limitations to effective management and monitoring of MAWPs (e.g., human resources; skills; time; long-term funding)? The current lack of a legal framework is the most critical limiting factor. An EU Directive on conservation and sustainable use of PGRFA in Europe is essential. This will need to make specific provision for the integrated CWR MAWP network. It will be necessary to raise awareness of the importance of in situ CWR conservation before putting a mechanism in place. However, the lack of existing case studies and experiences is a limiting factor. Good examples are needed to present to ministries. Insufficient funding is also a major limiting factor, as well as the complexity of actors involved (in particular the ongoing issue of which ministry should take responsibility for CWR conservation) and the need for skills transfer to PA managers.

**Policy implications.** What policy(-ies) need to be in place to guide and govern effective management and monitoring of the European integrated MAWP network? What needs to be done to get these policies in place? Who will be responsible for governing the management and monitoring of the MAWP network? It was stressed again that a legal framework is needed but there is an urgent requirement to convince authorities of the importance and value of in situ conservation and the need for a clear structure and funding for in situ conservation. DG Agriculture would be responsible for an EU Directive on PGRFA conservation and sustainable use. The question of whether to wait for an EU Directive or implement an equivalent system to AEGIS under the umbrella of ECPGR for in situ CWR conservation was considered. The ethos is already established for ex situ conservation and it was suggested that the ECPGR’s AEGIS model could be used as a basis for the MAWP network, especially as its establishment, management and governance will involve many different players. Such a model would involve the establishment of memorandums of understanding (MOUs) between national actors.

**Top 5 scientific priorities for ECPGR In situ WG action to be achieved by the end of next ECPGR Phase**

The first issue discussed was the top 5 scientific priorities for ECPGR In situ WG action, with lead responsibility and completion dates. Note it was assuming a sixth priority will be in situ documentation that will be a joint initiative with the Doc & Info WG, this is already in hand.
1. Development of national strategies for each country in Europe
   National coordinator (Chair of the WG should contact to national coordinators to ask for action)
   - letter: by end of Oct 2016 - completion of strategies: Dec 2018

2. Estimate/investigate impact of climate change on GR conservation planning
   Depends on funding, projects
   -

3. Implementation of the European GR network
   ECPGR WG
   End of next Phase

4. Implementation of national GR networks
   National coordinator

5. Linking conservation to use
   Data documentation WG to provide tools

Further a list of specific activities that will aid WG activities

Development of communication strategy:

- CHE member prepares an email and send to national coordinators to request them to get the appropriate person from the environment/nature conservation to be involved in the WG, deadline of max. 2 months to appoint that person.
- UoB to produce a general talk on CWR and share with the countries so they can use in their countries.
- UoB to produce three factsheets (general public, technical, policy-makers)
- Creation of Facebook page, Twitter, etc.
- There are three levels that should be addressed: Communication with the decision makers (see first point) Participatory project planning leading to the establishment of the GR General public

How to promote and implement integrated European In situ structure and associated funding once completed?

Promotion done via the communication strategy. EUFORGEN has a good communication strategy that we could probably use as an example, ECPGR Steering Committee strategy are developing a communication strategy. How to include new sites? How to manage the GR? In the end, we will have scientifically important sites but also sites that were chose due to political reasons. Development of ‘green papers’ which should outline how to implement the European GR sites (step by step). The driving force is the reporting for the GPA. Kell and Maxted to develop the ‘green paper’

Potential sources of additional project funding and future ECPGR funded meetings?

Horizon 2020 – more effective lobbying to get what we want in the call ECPGR funding – to write a grant application National funding (e.g. Federal Office for Nature Conservation) – each of us could look for alternatives at national level

Suggestions for what we can do about inactive In situ WG European members to stimulate activity

Booklet about “Who’s who in the WG”.

Development of a communication strategy for use with other stakeholders

See previous points.

List any interactions that are required for collaboration with crop WGs

Large meeting together with the other WG to be funded by the ECPGR (next call?) (Lothar + team to lead).
Side meeting at the Montpellier meeting next May involving ECPGR and EUCARPIA.

Suggestion ways to improve modus operandi of ECPGR In situ WG, how can we make more dynamic?
Within the group: ask Lorenzo about the WG ECPGR webpage For outside the group: social networking (Facebook, Twitter, LinkedIn, blog...)

Suggestions for target additional members

Include members from other stakeholder groups: Policy-makers: Ministries of Environment, Agriculture National conservation sector - see point 2 Breeding sector ...

Ideas for next ECPGR call

Large meeting together with the other WG to find ways of closer collaboration to be funded by the ECPGR (next ECPGR call?) (Lothar + team to lead).
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