Item 11 of the Provisional Agenda

NINTH SESSION OF THE GOVERNING BODY

New Delhi, India, 19–24 September 2022

Towards a More Strategic Approach to the Documentation of Crop Wild Relatives

Executive Summary

This information document summarises the status of data and information on crop wild relatives (CWR) resulting from the desk studies carried out by the Secretariat in 11 countries of four regions, namely, sub-Saharan Africa, Asia, Europe, and Latin America and the Caribbean.

It presents information on CWR documentation in the target countries assessed, obtained from the national focal points of the International Treaty, other national authorities, and experts on CWR. The document, which is an output of the project “Development of a globally agreed list of descriptors for in situ crop wild relatives”, analyses the status of national CWR databases and on the available CWR networks in the target countries.

One of the priorities identified is the adoption of a universal language to document and convert CWR data into information for the benefit of partners and stakeholders.

The paper enumerates the major gaps and limitations to document and exchange CWR data, including lack of dedicated policies and adequate funding, low quality and availability of CWR data, lack of staff training, and a low level of public awareness related to the high value of CWR, among others.

It further reflects valuable inputs and suggestions collected at the virtual “Expert Workshop − Documentation of CWR in situ” held on 7 September 2021. Finally, it outlines some options for supporting countries with the development of national databases of CWR material.

Documentation of CWR fosters the implementation of Article 5 and the Programme of Work of the Global Information System on Plant Genetic Resources for Food and Agriculture (PoW-GLIS) related to Article 17 of the International Treaty.
I. INTRODUCTION

1. This information paper outlines the status of data and information on crop wild relatives (CWR) resulting from the desk studies carried out by the documentation project “Development of a globally agreed list of descriptors for in situ crop wild relatives” in 11 countries of Latin America and the Caribbean (Cuba, Guatemala), sub-Saharan Africa (Benin, Malawi, Zambia), Europe (Germany, Norway, Spain), and Asia (Bhutan, India, Indonesia). The paper also reflects information obtained from national focal points of FAO’s International Treaty on Plant Genetic Resources for Food and Agriculture (ITPGRFA or International Treaty), other national authorities, and experts on CWRs in the targeted countries of the four regions assessed. This paper is not intended to be prescriptive, but aims to provide data and technical analysis that may help to identify limitations, problems and opportunities for the future development of CWR databases and the improvement of CWR documentation. It also incorporates valuable inputs and suggestions collected at the “Expert Workshop – Documentation of CWR in situ” held on 7 September 2021. In addition, the paper provides some options for supporting countries with the development of national databases of CWR material.1

2. The objectives of the International Treaty are the conservation and sustainable use of plant genetic resources for food and agriculture (PGRFA), including crop wild relatives, and the fair and equitable sharing of the benefits arising out of their use, in harmony with the Convention on Biological Diversity (CBD), to promote sustainable agriculture and food security and contribute to the achievement of the Sustainable Development Goals.

3. The immense value of CWR is not in question. Crop varieties have always needed improvement to sustain food supply and thereby contribute to food security. Due to the challenging climatic conditions that affect agricultural production systems, breeders investigate new sources of plant material that can provide new characteristics to mitigate environmental disasters and sustain food and nutrition security. It has already been proved that the wild plants found in situ represent an important source of genetic diversity, as they provide new traits that confer host-plant resistance to emerging plant diseases and introduced pests, as well as high-value product qualities needed to improve crop varieties that currently face the challenges of the adversity of climate change.

4. The International Treaty stresses the importance of in situ conservation as part of an integrated approach to the sustainable use and conservation of PGRFA and the need to collect and make publicly available related information. Article 5.1. states that “Each Contracting Party shall, subject to national legislation, and in cooperation with other Contracting Parties where appropriate, promote an integrated approach to the exploration, conservation and sustainable use of plant genetic resources for food and agriculture”. Contracting Parties shall, in particular, “Promote in situ conservation of wild crop relatives and wild plants for food production, including in protected areas, by supporting, inter alia, the efforts of indigenous and local communities” (Art 5.1.d).

5. An analysis carried out in 2013 by PricewaterhouseCoopers (PwC), UK and commissioned by Kew’s Millennium Seed Bank Partnership, evaluated the economic benefit of the use of CWR of some priority crops.2 The analysis estimated their value at USD 42 billion for current crop varieties, rising to USD 120 billion for future crop varieties. Nevertheless, CWR genetic resources lacking adequate descriptive information can be more difficult to use in crop production and improvement, and more complicated to conserve in genebanks, or in situ.

---

1 The term ‘national inventories of CWR in situ’ (or ‘CWR inventory’) refers to systematized databases that contain data about the location of CWR populations. The term ‘CWR inventory’ and ‘CWR database’ are used interchangeably, the term ‘CWR material’ presents a broader scope than CWR populations in this paper.

2 The research was based on an analysis of how the productivity and resilience, especially for pest and disease resistance, of four staple crops: wheat, rice, potato and cassava could be improved through the collection and use of their CWRs’ genetic traits. See https://pwc.blogs.com/press_room/2013/07/family-values-pwc-estimates-wild-cousins-of-key-global-crops-could-be-worth-up-to-120bn-by-improving.html
6. The Eighth Session of Governing Body adopted Resolution 3/2019, Implementation of the Updated Funding Strategy of the International Treaty 2020–2025, which refers to funding from the Global Environment Facility (GEF). It indicated that “the main multilateral channel through which support flows specifically to in situ conservation efforts of crop diversity and crop wild relatives is the Global Environment Facility (GEF). There are other actors that contribute to this Treaty area, such as IFAD and the CGIAR in the area of research for in situ conservation, but that the main global player is GEF”.

7. Additionally, through Resolution 11/2019, Cooperation with the CBD, the Governing Body invited the GEF – one of the key international mechanisms that supports implementation of the ITPGRFA – “to continue giving priority through the GEF-8 to support programs, projects and initiatives that conserve and sustainably use PGRFA, in relation to in situ conservation of CWRs and on-farm management and farmers’ sustainable use of agricultural biodiversity”.


9. One of the main factors affecting the conservation and use of information on PGRFA is the lack of access to data and the scarce or absent exchange of information. This is due, in part, to different approaches to data management and documentation by the plant genetic resources (PGR) community, and the lack of a universal metadata language for sharing information, despite the many attempts made so far, particularly since 2002.

**CWR DOCUMENTATION IN THE CONTEXT OF THE INTERNATIONAL TREATY**

10. The need for greater protection and conservation of CWR has been recognized by the International Treaty, the Convention on Biological Diversity (CBD), and the Second Global Plan of Action for Plant Genetic Resources for Food and Agriculture (Second GPA), among other important plans and instruments.

11. The International Treaty acknowledges that the conservation, exploration, collection, characterization, evaluation and documentation of PGRFA are essential to meeting the goals of the United Nations Food Systems Summit and for sustainable agricultural development for this and future generations. It also recognizes that the capacity of developing countries and countries with economies in transition to undertake such tasks requires urgent strengthening.

12. FAO’s Global Plan of Action for the Conservation and Sustainable Use of Plant Genetic Resources for Food and Agriculture is fully acknowledged by the International Treaty in Article 14. Priority activity 4 of the Second GPA, negotiated in the Commission on Genetic Resources for Food and Agriculture (CGRFA), invites governments to promote “in situ conservation and management of crop wild relatives and wild food plants”. In particular, section k) puts emphasis on the need to “collate information on CWR and wild food plants and make the information available through National Information Sharing Mechanisms (NISMs) and specialized global information systems”.

13. As requested by the Seventh Session of the Governing Body, the Secretariat of the International Treaty has collaborated with the CGRFA “in supporting the Voluntary Guidelines for the Conservation and Sustainable Use of Crop Wild Relatives and Wild Food Plants” and the

---

6 [https://doi.org/10.4060/cb3256en](https://doi.org/10.4060/cb3256en)
Voluntary Technical Guidelines for Farmers’ Varieties/Landraces”. The invitation to collaborate also extended to “promoting global networking on in situ conservation and on-farm management of PGRFA, global targets and indicators, and in the preparation of the Third Report on the State of the World’s Plant Genetic Resources for Food and Agriculture”.

14. At the same session, the Governing Body welcomed “the Secretary's invitation to the Secretariat of the CBD to become key partners in joint research on Aichi Targets related to sustainability in agriculture, and the linkages between in situ conservation/on-farm management and community-based initiatives and programmes for the sustainable use of crop wild relatives, landraces and underutilized species”.

15. Notwithstanding the global calls for action, the lack of a lingua franca to communicate represents a barrier to the sharing of information among conservationists, breeders and other stakeholders for the development of value-added services and products. It is fundamental to bring CWR information into an accessible, standardized format to secure consistent data compilation and exchange.

16. With financial support provided by the Government of Germany, the Secretariat of the International Treaty addressed the lack of coherence in documentation methods for PGRFA, in particular for CWR conserved in situ, by developing a globally agreed list of Descriptors for CWR conserved in situ (CWRI v.1). This document, published in February 2021, contains an international standard for data exchange, developed and validated worldwide through the project. Its use facilitates the compilation and exchange of data produced and held by different national and international organizations.

CWR DESCRIPTORS AND THE GLOBAL INFORMATION SYSTEM

17. Article 17.1 of the International Treaty states that “The Contracting Parties shall cooperate to develop and strengthen a global information system to facilitate the exchange of information, based on existing information systems, on scientific, technical and environmental matters related to PGRFA, with the expectation that such exchange of information will contribute to the sharing of benefits by making information on PGRFA available to all Contracting Parties”.

18. The Governing Body has adopted the Programme of Work on the Global Information System (PoW-GLIS) on PGRFA. Objective 3 of the PoW-GLIS promotes and facilitates “interoperability among existing systems by providing clear principles, technical standards and appropriate tools to support their operations in accordance with the principles and rules of the Treaty”. It further supports its component ‘C’: “To recommend common standards for data and metadata and develop further standards (e.g. for phenotypic data) based on existing experiences in other sectors”.

19. The adoption of a universal language to document, collect and convert data into information for the benefit of its partners and stakeholders has been identified as a priority in order to foster implementation of Article 5 and the PoW-GLIS of Article 17 of the International Treaty. It is widely recognized that CWR material is increasingly used by plant breeders to develop new varieties resistant to biotic stresses that could be exacerbated by rapid climate change and that, in general, use of this material helps to increase and improve the food supply. However, the lack of relevant and standardized documentation is a severe constraint for utilization of CWR. Even in those cases where the data exist in the four regions studied, they cannot be easily shared, are not accessible, or are poorly documented. In most cases, there is a lack of policy and financial emphasis on activities related to the documentation, conservation and use of CWR.
II. STATUS OF CWR DOCUMENTATION IN THE TARGETED COUNTRIES

20. The following sections describe the major findings of the project in 11 countries in the four target regions where validation of the global descriptors for crop wild relatives has been undertaken. The information has been gathered through desk studies and direct communications with experts, national focal points and other national authorities. While the target was the identification of national databases of CWR, the team has also documented the availability of national and regional checklists and specialized inventories of PGRFA, as well as projects and initiatives with a focus on CWR documentation. This information can be found in Annex I.

NATIONAL CWR DATABASES IN THE TARGETED COUNTRIES

21. In the Latin America and the Caribbean region, some isolated and discontinuous initiatives on CWR have been reported during the past 15 years. In general, coordinated actions on CWR have been scarce because the national PGRFA priority agendas in the region have not paid much attention to them. Most experts considered this to be a paradox, since CWR should be considered essential in a region with high levels of biodiversity. At the national level, some of the obstacles identified during the desk study conducted by the project include: lack of dedicated policies, lack of adequate funding, low quality and availability of CWR data, limited technical expertise, lack of training opportunities, lack or incomplete national CWR databases in most of the countries, and a low level of public awareness of the high value of CWR.

22. Most European countries have reported the development of national inventories of CWR, but only a few of these have been officially published. Some of the national CWR inventories in Europe have been used as models for other regions. In general terms, they are considered to be at a more advanced stage of development.

23. With the exception of a few countries, the existence of national databases of CWR populations has not been documented in either sub-Saharan Africa (SSA) or Asia. On the other hand, the development of CWR checklists is more advanced in these regions, especially in SSA.

24. At the regional level, CWR diversity studies (including the development of CWR checklists and national databases of CWR populations), with the main objective of identifying sites for in situ CWR conservation of regional priority have been carried out in the Southern Africa Development Community (SADC) region (Magos Brehm et al., 2016; Allen et al., 2019; Magos Brehm et al., submitted), in West Africa (Nduche et al., submitted), and in the northeast African Ethiopian Vavilov Centre of Diversity (comprising Eritrea, Ethiopia, Djibouti, Somalia, and Sudan) (A. Aldow, personal communication, 2020). In Asia, aside from an attempt to obtain a Darwin Initiative funding grant (J. Magos Brehm, personal communication, 2021), there are no current efforts under way regarding the documentation and conservation of CWR at regional level.

25. At national level, the development of CWR checklists and databases of CWR populations has moved faster in sub-Saharan Africa than in Asia. Most of these advances were made possible by implementation of two projects in the SADC region: the ACP-EU Co-operation Programme “In situ conservation and use of crop wild relatives in three ACP countries of the SADC region” (abbreviated to SADC CWR) and the Darwin Initiative project “Bridging agriculture and environment: Southern African Crop-Wild-Relative Regional Network” (SADC CWR Network). Eighteen of SSA’s 49...
countries have developed (or are currently developing) national CWR checklists (either comprehensive or partial)\(^\text{11}\) in the context of both projects.\(^\text{12}\)

26. National databases of priority CWR have been compiled in Malawi, Mauritius, South Africa, Tanzania and Zambia to identify gaps in their conservation and priority sites for their active conservation (Bissessur et al., 2019; Holness et al., 2019; Ng’uni et al., 2019; Mponya et al., 2020a; W. Hamisy, personal communication, 2021).

27. The identification of checklists was not part of the project scope. In some cases, they have been developed by academic institutions rather than by the national authorities, but they may be of help in the planning and development of national databases of CWR. In Asia, for example, the project found comprehensive or partial checklists in Bhutan, India, Indonesia, Nepal, Sri Lanka and Tajikistan.

**CWR NETWORKS AND EXPERIENCES**

28. A total of 29 CWR genetic reserve network initiatives, nine potential genetic reserve networks and 17 networks associated with projects were identified worldwide.

29. Over the years, European networks of CWR genetic reserves and people and institutions have been promoted through regional projects, and in some cases these are still operating. During the last quarter of 2021, the Secretariat of the European Cooperative Programme for Plant Genetic Resources (ECPGR) reported initial discussions regarding the proposal of a concept for a possible extension of the European Search Catalogue for Plant Genetic Resources (EURISCO) for CWR *in situ* data. The extension is expected to adopt the publication by the International Treaty Secretariat in 2021 of the Descriptors for Crop Wild Relatives. The project would implement the *in situ* CWR extension for EURISCO with a small group of countries during a pilot phase.\(^\text{13}\) There is also a subregional network making concerted efforts for the conservation of CWR in the European Nordic countries.\(^\text{14}\)

30. With regards to the Group of Latin America and Caribbean Countries (GRULAC) region, there is only one subregional Darwin Initiative project recently finalized, from which potential networks could be built for future actions. The title of the project was “Safeguarding Mesoamerican crop wild relatives” and included some Mesoamerican countries. Some other networks associated with two projects funded by the Global Environment Facility (GEF) have been reported for the GRULAC region, involving national stakeholders. In the first project, “*In-situ conservation of Andean crops and their wild relatives in the Humahuaca Valley, the southernmost extension of the Central Andes*”, developed in 2005, the only participant country was Argentina, while in the second GEF project, *in-situ conservation of crop wild relatives through enhanced information management and field application*, the lead country was Bolivia, in collaboration with Armenia, Madagascar, Sri Lanka and Uzbekistan.

31. In contrast with the number of checklists and national databases, the number of CWR-related network initiatives in Asia is greater than in SSA, where the literature identifies one CWR genetic reserve network in Mauritius. Additionally, Malawi has recently implemented a genetic reserve in the Zomba Forest Reserve for the conservation of nationally prioritized CWR. The literature extensively refers to the SADC CWR\(^\text{15}\) and the SADC CWR Network\(^\text{16}\) projects, which were implemented at

---

\(^{11}\) Partial CWR checklists are lists of wild relatives of selected crop genera in a defined geographic unit, whereas comprehensive CWR checklists are lists of wild relatives of all crop genera in that geographic unit (Magos Brehm et al., 2017a).

\(^{12}\) The main references in this section come from Álvarez-Muñiz et al., 2021.


\(^{15}\) [www.cropwildrelatives.org/sadc-cwr-project/](http://www.cropwildrelatives.org/sadc-cwr-project/)

\(^{16}\) [www.cropwildrelatives.org/sadc-cwr-net/](http://www.cropwildrelatives.org/sadc-cwr-net/)
regional level, but also in India, Indonesia, Malaysia, Malawi, Mauritius, South Africa, Thailand, the United Republic of Tanzania and Zambia.

32. In Asia, six CWR genetic reserve networks have been identified in the following countries India, Kyrgyzstan, Sri Lanka, Uzbekistan and Viet Nam.

III. GAPS AND LIMITATIONS

33. Some of the gaps and limitations identified in the GRULAC region were related to data quality, as errors were found in the occurrence data, i.e., wrong coordinates, observation dates outside a reasonable time frame, duplicated identifiers, and no free access to national CWR data sources. With regards to the international data sources consulted, they are structured in dissimilar formats, which makes it difficult to extract and downscale information at national level. Besides, they do not offer complete data sets. Moreover, in many countries, CWR data are not accessible, even for national stakeholders. Despite international projects and other efforts to gather CWR data, these remain largely unknown to national institutions.

34. There is a lack of public awareness activities related to information publicly available on CWR knowledge and documentation in the region, and there are legal or administrative limitations to data sharing at national level.

35. Although some countries, such as Mexico, have drawn up CWR national inventories and a few others are in the process of listing species, most of them show limited expertise and capacity to do this work at a larger scale.

36. The project team found CWR checklists and inventories in the European region, but it was difficult to find public access to relevant CWR databases, and most of the CWR national checklists at population level were not accessible. In addition, isolated efforts on CWR in situ conservation in different countries produced information with different standards and formats. When the structures of the data sets were compared, an important percentage of mismatches was revealed.

37. In Europe, heterogeneity exists between countries regarding lists of prioritized taxa and national CWR strategy development. In general, data quality is not a major issue, although there is room for improvement.

38. Regional databases, such as Natura 2000, include many types of protected areas, although it is challenging to determine which of them provides effective in situ conservation of CWR populations. Besides, the national CWR databases are not yet considered part of the National Strategies and Plans of Action towards effective CWR conservation and utilization.

39. Notably, reviews of official CWR inventories and prioritized lists have postponed the official publication of national strategies for CWR conservation and utilization; and in some cases, key information is only available in languages other than English.

40. Also, in the European region, the global COVID-19 pandemic has delayed the research process in this area. Nevertheless, human and financial resources, along with continued capacity development, are still required to maintain the knowledge developed in this region over the past 20 years.

41. All six countries from SSA and Asia that participated in the desk study were very positive in considering the development and maintenance of a national database of CWR populations. The following gaps and limitations were identified:

17 The work in Mexico was conducted partially in conjunction with the overall North American CWR efforts.
42. In some countries, there was limited knowledge about what taxa a particular CWR belongs to. Regional checklists of CWR exist for southern, western and eastern Africa. Additionally, several SSA countries have comprehensive checklists of CWR, or are currently preparing them; on the other hand, only a handful of Asian countries have CWR checklists.

43. In this region, databases of CWR populations do exist, but are generally related to incomplete *ex situ* collections or come from old herbarium collections, thus not fully reflecting the distribution of the species in the wild. Both sets of data need review and mapping, especially in the wake of climate change, deforestation and other threats affecting the wild material. More recent data of CWR wild populations are therefore required.

44. In general, the **amounts and quality of CWR data are very poor** (records without coordinates or with a low level of geographic accuracy; old records), and distribution maps are lacking. In some countries (e.g. Bhutan, India, South Africa), there are many CWR observations from citizen scientists, for which taxonomic identification needs to be confirmed.

45. In some cases, also in Asia, there are **CWR checklists and databases that have not been developed or recognized** by national authorities. Most of these checklists were prepared and published within the academic context (for example, in Indonesia, Rahman *et al.*, 2019; 2021). This also seems to be a common problem for countries in other parts of the world.

46. Compiling a national database of CWR populations implies sharing information among the institutions that hold CWR occurrence data (genebanks, herbaria, protected areas, research institutes, individual researchers, among others). Links among the organizations involved in managing plant genetic resources, including CWR, are generally weak. Integrating large amounts of data that lie with these different institutions still represents a significant challenge. Experts consulted in Malawi indicated that **data-sharing policies** should be set in place to facilitate and promote transparency when data are exchanged. Experts in other countries expressed the need to support similar policies.

47. Probably the most important limitation in the view of the experts is the **lack of awareness of the value of CWR**, since this results in a need to galvanize financial, policy and political support for CWR conservation, documentation and sustainable utilization.

48. The institutional dimension of this issue results in insufficient staff numbers allocated to work on CWR conservation and documentation, as well as the absence of a focused and nationally coordinated approach by relevant organizations – often, CWR-related work is not included in national programmes or is not an institutional or national priority. In the SADC region, this is likely to change as the establishment of the SADC Network has been approved, which marks a step towards national implementation of the network.

49. **Insufficient funding for CWR documentation** is a common limitation identified. This includes means and materials to collect new data from the wild, information technology equipment and skills to perform CWR-related analysis and studies.

50. Experts also emphasized that protected area managers should be involved in CWR conservation and documentation, as natural populations of CWR also occur within protected areas, and genetic reserves should be implemented within existing protected areas in order to actively conserve CWR. Indeed, protected area managers may hold additional information about these resources.

51. There is a need to develop the capacity of technical staff in developing CWR checklists, identification of CWR in the wild (taxonomic expertise), identifying sites for active conservation, and managing and documenting CWR data. Although not an issue in some of the countries studied (such as Benin, India and most of the SADC countries), it is still a gap in many SSA and Asian countries.
52. Regarding implementation of the global CWRI descriptors, a few constraints are related to the definition of some concepts used in these (e.g. population identifier, managing institute, addition of taxon identifier, and source of data). To facilitate wider adoption, experts recommended developing relevant guidelines on use of the descriptors.

IV. TOWARDS A STRATEGIC APPROACH TO CWR DOCUMENTATION

SUPPORTING NATIONAL AND REGIONAL ACTIONS

53. The primary need identified in most GRULAC countries consulted was capacity development in use of the globally validated “Descriptors for CWR conserved in situ (CWRI)” in order to help create CWR national inventories and build CWR databases. Capacity development activities should include the transfer of technology, training technical personnel, promoting regional networks, and providing minimum computational capacities to support/maintain CWR databases.

54. Since CWR data in GRULAC are scarce or unavailable, efforts to improve the quality of accessible data and facilitate access to restricted data and the generation of knowledge through exploration projects are desirable. Specific areas where assistance is required include support for technicians currently working on CWR species in the use of lists of standardized descriptors (including Multi-Crop Passport Descriptors and the new CWRI), as well as for the management and documentation of PGR data, implementation of database software, elaboration of CWR checklists, and the development of national strategies for protecting CWR species, focusing on the in situ approach.

55. The main activities that can support the development of national inventories in the GRULAC region, are as follows:

(i) provide guidance and support for the development process of a national database on CWR material;

(ii) develop capacity in use of the global CWRI descriptors, and develop relevant technical guidelines;

(iii) raise awareness of the importance of CWR through meetings, webinars, factsheets, etc.;

(iv) provide legal support regarding data-sharing agreements and institutional linkages;

(v) survey potential international and national data sources for the development and maintenance of national databases of CWR material; and

(vi) develop strategies to mobilize data and make them accessible to enrich the national databases of CWR material.

53. With regard to the European region, and in addition to the above activities, the following could be considered: i) promote greater recognition of the technical achievements by official policies on CWR conservation and documentation; and (ii) support the engagement of policy-makers by promoting the value of official initiatives for the conservation of CWR.

54. The project also identified a list of possible recommendations related to CWR documentation in support of conservation and utilization in sub-Saharan Africa and in Asia. These include:

1. The provision of guidance, training and support for the development of national databases of CWR material. That support would include, where necessary, the preparation of CWR
checklists and their updates as a preliminary step, the identification of national and international potential sources of CWR occurrence data, and the promotion of good practices for CWR documentation.  

2. Further development of capacity for CWR conservation planning (i.e. prioritization for conservation actions, identification of sites for in situ and ex situ conservation), as well as for in situ (genetic reserves and sites outside existing protected areas) and ex situ actions (in gene banks), taxonomic identification of CWR in the wild, and the identification of populations with unique genetic diversity/traits that are relevant for crop improvement.

3. The development of awareness-raising activities regarding the value of CWR material among relevant stakeholders (e.g. meetings, seminars, workshops, webinars, factsheets). These could include an invitation from an international policy body, such as the Governing Body of the International Treaty, for governments to include and prioritize the conservation of CWR materials, their use and documentation in national programmes.

55. Encouraging systematic missions to collect and connect fresh occurrence data or ground-truthing of CWR populations (including from old ex situ collections and herbaria) was also identified as a priority. Soo too was the development of technical guidelines on how to use the global CWRI descriptors, what they can be used for, the scope of a national database for CWR material, and the terminology used. This would need to include support for harmonizing the CWRI with national institutions that hold CWR population data.

56. In addition, experts prioritized the assignation of Digital Object Identifiers to CWR material that is actively managed or conserved, as this would facilitate its visibility and its connection with relevant data sets. In general terms, there is recognition of the need to support information technology capacity for documentation (including skills, infrastructures and equipment).  

57. International projects such as “Adapting agriculture to climate change: Collecting, protecting and preparing crop wild relatives” have gathered a significant amount of CWR information from varied sources. One suggestion to emerge from the review is to identify all those sources, access their published and unpublished CWR data, process them to improve their quality, and deliver them according to the country institution’s mandate.

OPTIONS FOR A MORE STRATEGIC APPROACH TO CWR DOCUMENTATION

58. In addition to support for the activities described in the GRULAC region, financial support is needed and should be focused on developing national CWR databases, national strategies on the conservation and utilization of CWR and, also on the promotion of active in situ conservation. At the national level, it is important to develop capacity in CWR documentation and to increase public awareness in national institutions responsible for biodiversity conservation about the key value and role of CWR material.

59. In some European countries, it is advisable to encourage and strengthen links between researchers supporting national and international CWR projects and the agriculture and environment protection authorities. Those linkages could facilitate the official adoption of national strategies for CWR conservation and utilization and the development and subsequent publication of CWR databases.

---

18 The Interactive Toolkit for CWR Conservation Planning (Magos Brehm et al., 2017a) can be used for this purpose.

19 National stakeholders should include the PGR community, the nature conservation community, end users and policy-makers. These may include farmers’ associations, gene bank managers, herbarium managers, pre-breeders, public breeding institutes, private breeding companies, NGOs, academic institutes, ministries of agriculture and environment/conservation of nature etc.


21 [www.cwrdiversity.org/](http://www.cwrdiversity.org/)
60. One of the recurrent recommendations found in the review of the literature and captured through the interactions with experts and national stakeholders is the focus on strengthening the linkages between *in situ* and *ex situ* data at national and global levels.

V. CONCLUSION

53. The research shows that there are few national databases for CWR in the 11 countries of the four regions that were the focus of this work. The information and the analysis conducted have revealed the weaknesses that constrain the development of national CWR databases and, more generally, the documentation of CWR. Among the limitations, lack of technical expertise and institutional support was extensively discussed by the experts. Although some regional efforts were identified, the incipient networks demand a more robust policy response at national and global levels, and an increased awareness of the critical value and role of CWR for plant breeding and food security.
VI. ANNEXES

- Annex I: National, regional checklists and specialized inventories of PGRFA identified
- Annex II: Diagrams
REFERENCES

- **ASIA**


http://pgrinformatics.nbpgr.ernet.in/cwr/Index.aspx


**Thormann, I., Kell, S., Magos Brehm, J., Dulloo, E. & Maxted, N.** 2017. *CWR checklist and inventory data template v.1*, Harvard Dataverse, V4. ([https://doi.org/10.7910/DVN/B8YOQL](https://doi.org/10.7910/DVN/B8YOQL)).


---

**EUROPE**


Additional information on Europe:


Enhancing crop gene pool use: capturing wild relative and landrace diversity for crop improvement. https://books.google.it/books?hl=en&lr=&id=purDAAQAQBAJ&oi=fnd&pg=PA199&dq=national+inventories+cwr+in+situ&ots=RBmZzxNu5v&sig=UyvacFaZa8hPlS4pceck_IVUqSU#v=onepage&q=national%20inventories%20cwr%20in%20situ&f=false
EUROPE – Integrated strategy for CWR conservation.  
[webpage](https://www.nordgen.org/ngdoc/NordicCWR_2016/2016-09-20/ConservationStrategies/S3_European_strategy.pdf)

[webpage](https://cordis.europa.eu/project/id/EVK2-CT-2002-20010/it)


National Inventories focal points. [website](http://www.ecpgr.cgiar.org/contacts-in-ecpgr/ecpgr-contacts/eurisco-national-inventory-focal-points#Belgium)

➢ GRULAC


Additional information on GRULAC:


Crop wild relatives collected by the CWR Project. www.genesys-pgr.org/subsets/9032bc20-291b-4d34-920b-30c0a590aef3

Online training resources for CWR: Freely available from GRIN-U. [https://grin-u.org/category/cwr/](https://grin-u.org/category/cwr/)

Protected areas. [www.protectedplanet.net/en](http://www.protectedplanet.net/en)


➢ SUB-SAHARAN AFRICA


Ng’uni, D. & Munkombwe, G. 2017. CWR checklist and priority CWR of Zambia. (https://doi.org/10.7910/DVN/8YXCFR, Harvard Dataverse, V2, UNF:6:aFKZSXpgw9x2vz4irs3vDg== [fileUNF])


SANBI (South African National Biodiversity Institute, ARC (Agricultural Research Council), DAFF (Department of Agriculture, Forestry and Fisheries). 2017. CWR checklist and priority taxa of South Africa. (https://doi.org/10.7910/DVN/LJWKBH), Harvard Dataverse, V2, UNF:6:AaRevDT41mmGUQTyDR1pCw== [fileUNF].

Additional information on sub-Saharan Africa:

“In situ conservation and use of crop wild relatives in three ACP countries of the SADC region (SADC crop wild relatives)”. www.cropwildrelatives.org/sadc-cwr-project/

### Table 1. Status of development of checklists, priority lists of CWR and occurrence data collation in targeted countries of Asia

<table>
<thead>
<tr>
<th>COUNTRY</th>
<th>CHECKLIST</th>
<th>PRIORITY CWR</th>
<th>DATABASE (CWR occurrence data)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bhutan</td>
<td>There are two CWR checklists. According to Tamang (2004), there are over 230 species (belonging to 120 genera in 51 families) related mostly to food crops. According to Tshering and Thomas (2017), there are 79 species (80 taxa) belonging to 30 genera and 19 families.</td>
<td>Tamang’s checklist (2004) was scored for various criteria and priorities 1, 2 and 3 were defined; 25 priority 1 CWR were identified as national priorities.</td>
<td>Occurrence data for the 25 priority 1 CWR taxa were compiled and stored in an Access database (Tamang, 2004).</td>
</tr>
</tbody>
</table>
• 958 species of wild relatives of cultivated plants in India (cereals, grain legumes, oilseeds, fibre crops, forage crops, vegetables, fruits and nuts, spices and condiments, commercial crops, medicinal and aromatic plants, floriculture crops, agroforestry, cottage industry crops and others) (Singh, 2017). 
• Wild relatives (native and introduced) of about 2 000 cultivated plant species (belonging to 1 258 genera) such as forages, ornamentals, medicinal and aromatic plants, plantation crops and agroforestry trees (Pradheep et al., 2014). 
• 817 taxa (730 species) of wild relatives of 142 crop taxa (Pradheep et al., 2015). | Not identified | • Distribution of CWR is described in Pradheep et al. (2014). 
• Not readily available as such, but can be queried from India Biodiversity Portal (IBP) (https://indiabiodiversity.org/). |
| Nepal   | No, but crop genera with some wild relatives available from Gautam (2008). | No | No |
| Philippines (the) | No | No | No |
| Sri Lanka | 400 CWR have been reported by the National Herbarium, but a formal checklist has not been found. There is a partial checklist, with wild relatives of five priority crop gene pools (Cinnamomum, Musa, Oryza, Piper, Vigna). | Priority crop gene pools for active in situ conservation have been identified (Cinnamomum, Musa, Oryza, Piper, Vigna) (https://doa.gov.lk/crop-wild-relatives-project/#1577353069766-5c306132-8913 t). | Some from priority crop gene pools. |
Table 2. Status of development of checklists, priority lists of CWR and occurrence data collation in selected European countries.

<table>
<thead>
<tr>
<th>Spain</th>
<th>Norway</th>
<th>Germany</th>
</tr>
</thead>
<tbody>
<tr>
<td>A national CWR database at population level is developed (not yet available to the public).</td>
<td>There is no database at population level for CWR species occurring within the country.</td>
<td>The National Inventory of Plant Genetic Resources in Germany is a complete database, including CWR data at population level and a new version will be released.</td>
</tr>
<tr>
<td>A national CWR inventory (list of species) has been developed and published in different papers and reports (without format).</td>
<td>A national CWR inventory (list of species) has been developed and published in GBIF (using Darwin Core format).</td>
<td>A national CWR inventory (list of species) has been developed and is available from the PGRDEU portal, along with the rest of the PGRFA species.</td>
</tr>
<tr>
<td>Checklists and prioritized list of CWR species have been reviewed and a second version will be published soon, along with the national strategy.</td>
<td>Checklists and prioritized list of CWR species are under a new review.</td>
<td>Prioritized list of CWR species was developed, but apparently it has not been published.</td>
</tr>
<tr>
<td>CWR technical advances depend on national researchers and support.</td>
<td>CWR technical advances depend on subregional initiatives and projects/programmes (NordGen).</td>
<td>CWR technical advances depend on national researchers and support.</td>
</tr>
<tr>
<td>Initial pilot projects on CWR active in situ conservation have been implemented.</td>
<td>Active CWR in situ conservation activities are currently being considered in some national parks, but no activity has officially started.</td>
<td>Germany has launched the German Network of Genetic Reserves, with subnetworks for priority CWR. Recently, a network for wild celery genetic reserves was announced.</td>
</tr>
<tr>
<td>National CWR Conservation Strategy has been adopted by the Spanish Ministry of Agriculture and will soon be officially published.</td>
<td>There was a draft in 2018 and advances were made in 2019 at the Nordic level on the path to establish a National CWR Conservation Strategy, but it has not yet been officially adopted.</td>
<td>National CWR Conservation Strategy has been reported as ‘in preparation’ in 2018, but all elements required to build the national strategy would have already been obtained.</td>
</tr>
</tbody>
</table>
GRULAC

Table 3. Status of development of checklists, priority lists of CWR and occurrence data collation in pre-selected GRULAC countries from different sources

<table>
<thead>
<tr>
<th>Region/Country</th>
<th>CWR diversity (GBIF)</th>
<th>CWR diversity (Genesys)</th>
<th>Atlas CWR</th>
<th>Total</th>
<th>Total w/o duplicates</th>
</tr>
</thead>
<tbody>
<tr>
<td>GRULAC</td>
<td>135 792</td>
<td>435</td>
<td>2 594</td>
<td>138 821</td>
<td>138 400</td>
</tr>
<tr>
<td>Cuba</td>
<td>1 424</td>
<td>0</td>
<td>0</td>
<td>1 424</td>
<td>1 424</td>
</tr>
<tr>
<td>Guatemala</td>
<td>5 104</td>
<td>0</td>
<td>2 594</td>
<td>7 698</td>
<td>7 277</td>
</tr>
</tbody>
</table>

Further information on GRULAC:

Argentina: a GEF granted project “In-situ conservation of Andean crops and their wild relatives in the Humahuaca Valley, the southernmost extension of the Central Andes”. No associated products could be found or tracked.

Bolivia: a GEF granted project “In situ conservation of crop wild relatives through enhanced information management and field application” produced two outputs: The Red Book of CWR in Bolivia and georeferenced maps containing the locations where species were collected during the project. The book provides threat assessments of 152 CWR species, using IUCN Red Listing criteria.

Venezuela: A study of a national inventory of CWR was published in 2012. A database of CWR was built as a prior step to establishing this inventory (not accessible).

Costa Rica: The country has implemented the National System on Conservation Areas, and there are ongoing efforts on documentation of CWR, but no national inventory.

Brazil: The country does not have a national inventory of CWRs conserved in situ.
### SUB-SAHARAN AFRICA

**Table 4. Status of development of checklists, priority lists of CWR and occurrence data collation in pre-selected sub-Saharan countries**

<table>
<thead>
<tr>
<th>REGION</th>
<th>CHECKLIST</th>
<th>PRIORITY CWR</th>
<th>INVENTORY (occurrence data)</th>
</tr>
</thead>
<tbody>
<tr>
<td>North-East African Ethiopian Vavilov Centre of Diversity (Sudan, Ethiopia, Eritrea, Djibouti, and Somalia)</td>
<td>Human and animal food CWR checklist (Aldow, pers. comm., 2021).</td>
<td>Initiating</td>
<td>-</td>
</tr>
<tr>
<td>SADC</td>
<td>Partial food and beverage CWR checklist (Allen et al., 2019).</td>
<td>113 taxa closely related to human food and beverage crops or that show potential or confirmed used in crop improvement (Allen et al., 2017, 2019).</td>
<td>Occurrence data for priority CWR in the SADC region (Magos Brehm et al., 2016, <a href="https://dataverse.harvard.edu/dataset.xhtml?persistentId=doi:10.7910/DVN/QUOPCB">https://dataverse.harvard.edu/dataset.xhtml?persistentId=doi:10.7910/DVN/QUOPCB</a>).</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>COUNTRY</th>
<th>CHECKLIST</th>
<th>PRIORITY CWR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Angola</td>
<td>Finalized</td>
<td>Under way</td>
</tr>
<tr>
<td>Benin</td>
<td>266 species related to a list of 59 crops used for food, medicines and materials (from 34 different genera); of these, 204 taxa are related to food crops (Idohou et al., 2013).</td>
<td>20 priority taxa obtained using 8 different criteria (Idohou et al. 2013).</td>
</tr>
<tr>
<td>Botswana</td>
<td>Under way (Mothlaodi, pers. comm., 2020).</td>
<td>Under way</td>
</tr>
<tr>
<td>Democratic Republic of the Congo</td>
<td>Finalized (Bambala, pers. comm., 2020).</td>
<td>Under way</td>
</tr>
<tr>
<td>REGION</td>
<td>CHECKLIST</td>
<td>PRIORITY CWR</td>
</tr>
<tr>
<td>--------------------</td>
<td>-----------------------------------------</td>
<td>--------------------------------------------------</td>
</tr>
<tr>
<td>Comoros</td>
<td>Under way (Maoulana, pers. comm., 2020)</td>
<td>Under way</td>
</tr>
<tr>
<td>Eswatini</td>
<td>Finalized (Mbingo, pers. comm., 2020)</td>
<td>Under way</td>
</tr>
<tr>
<td>Lesotho</td>
<td>Under way (Ntho, pers. comm., 2020)</td>
<td>Under way</td>
</tr>
<tr>
<td>Madagascar</td>
<td>Finalized (Andriamampanihy, pers. comm. 2020)</td>
<td>Under way</td>
</tr>
<tr>
<td>Malawi</td>
<td>446 taxa related to all types of crops (not just human food-related) (Mponya et al., 2020).</td>
<td>277 taxa identified based on socio-economic importance of the related crop, potential use of the wild relative in crop improvement and threat status (Mponya et al., 2020).</td>
</tr>
<tr>
<td>Mauritius (including Rodrigues)</td>
<td>Mauritius (MU): 528 species related to all types of crops; Rodrigues (RO): 4 142 species related to all types of crops (not just human food-related) and about 10 species related to food crops. Human food CWR=41 (MU+RO). Fodder and forage CWR=3 species (MU+RO). (Bissessur et al., 2019).</td>
<td>22 taxa (MU: 13 species; RO: 9 species) (Bissessur et al., 2019).</td>
</tr>
<tr>
<td>Seychelles</td>
<td>Under way (Sinon, pers. comm., 2020)</td>
<td>Under way</td>
</tr>
<tr>
<td>United Republic of Tanzania</td>
<td>Finalized (Hamisy, pers. comm., 2020).</td>
<td>Finalized</td>
</tr>
<tr>
<td>Zambia</td>
<td>Comprehensive checklist of 3 671 wild relatives of all crops cultivated in the country, partial checklist of 459 CWR based on 59 priority</td>
<td>The 459 CWR related to the 59 priority crops were further prioritized and generated 30 priority CWR (Ng'Uni et al., 2016, [<a href="https://dataverse.harvard.edu/dataset.xhtml?persistentId=doi:10.7910/DVN/UFFGSY">https://dataverse.harvard.edu/dataset.xhtml?persistentId=doi:10.7910/DVN/UFFGSY</a>]).</td>
</tr>
<tr>
<td>REGION</td>
<td>CHECKLIST</td>
<td>PRIORITY CWR</td>
</tr>
<tr>
<td>-----------</td>
<td>----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
<td>--------------</td>
</tr>
</tbody>
</table>
Annex II. Diagrams

1. Implementation strategy for the project – workflow

(Adriana Alercia and Francisco Lopez)

2. Workflow at different scales

(Mauricio Parra Quijano)

*Genbank für Wildpflanzen für Ernährung und Landwirtschaft – WEL (German Genebank for crop wild relatives)
3. Workflow for testing descriptors

(Adriana Alercia and Francisco Lopez)

4. Pilot testing in the second phase of the project

(Joana Magos Brehm)
5. Proposed structure of CWR National Database based on standardized descriptors

(Mauricio Parra Quijano)

[Diagram showing the proposed structure of the CWR National Database]

What do users need?

- **Legal and Institutional support** (Data sharing agreements, instruments and mechanisms; link between protected areas and CWR conservation, global mechanisms and instruments, host, repositories, etc.).

- **Capacity building** (Data quality; guidelines on CWR descriptors documentation; DOIs; tools; how to develop a national population database).

- **Public awareness** (promote CWR’s value and knowledge, promotion of CWRI descriptors, and support the development of national inventories).

- **Strengthen collaboration and links** (GBIF, CGRFA, CBD, ECPGR, SADC-CWR Network).

- **Human & financial resources**