

Core descriptors for *in situ* conservation of crop wild relatives v. 1

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Bioversity International is a research-for-development organization working with partners worldwide to use and conserve agricultural and forest biodiversity for improved livelihoods, nutrition, sustainability and productive and resilient ecosystems. Bioversity International is working towards a world in which smallholder farming communities in developing countries of Africa, Asia and the Americas are thriving and sustainable. Bioversity International focuses on rain-fed farming systems, primarily managed by smallholder farmers, in areas where large-scale agriculture is not a viable option. Its research influences policy decisions and investment in agricultural research, from the local level to the global level.

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PREFACE

This publication is based on the results achieved by the global multi-country project “*In situ* Conservation of Crop Wild Relatives through Enhanced Information Management and Field Application” (CWR project), supported by the Global Environmental Facility (GEF). The project was implemented by the United Nations Environmental Programme (UNEP) and coordinated by Bioversity International in collaboration with the governments of Armenia, Bolivia, Madagascar, Sri Lanka and Uzbekistan, several international organizations including Botanic Gardens Conservation International (BGCI), Food and Agriculture Organization of the United Nations (FAO), International Union for Conservation of Nature (IUCN) and the World Conservation Monitoring Centre (WCMC), and the German Federal Office for Agriculture and Food (BLE). The outcomes of this project include the safe and effective conservation of crop wild relatives (CWR) and their increased availability for crop improvement in the project partner countries, and national and international information systems that can support conservation and utilization of CWR throughout the world.

The CWR project developed comprehensive working lists of descriptors to support project partner countries in the digitization and compilation of relevant information about CWR considered necessary for their management and conservation at a national level. The comprehensive lists provided a framework to describe in detail a CWR population, accession and herbarium specimen; the taxon to which this unit belongs; the site in which it is monitored or was collected; the respective institute or individual monitoring or conserving the unit; additional information sources of relevance. These lists were used to develop national CWR information systems.

As CWR data should be gathered in a systematic and standardized way, descriptor development was coordinated with other international projects such as the ‘European crop wild relative diversity assessment and conservation forum’ (PGR-Forum), which has developed a Crop Wild Relative Markup Language (CWRML) (Moore et al. 2008).

The CWR descriptors proposed here as the core descriptors for *in situ* conservation have been derived from the comprehensive lists of CWR descriptors and are the result of consultations with national and international project partners and international experts as reported in the ‘Contributors’ section. This list does not preclude the addition of further descriptors, should they become necessary.

These core CWR descriptors are designed to facilitate the compilation and exchange of *in situ* conservation data, which are needed to develop and implement *in situ* conservation activities. They are compatible with Bioversity’s crop descriptor lists, the ‘FAO/Bioversity List of Multi-Crop Passport Descriptors V.2’ (Alercia et al. 2012) and IUCN red listing categories and criteria (IUCN 2012b).

We hope that this document will facilitate and streamline the collection of data needed for documenting *in situ* conservation of CWR in a consistent way. We also hope it will stimulate additional documentation of CWR and will promote information sharing, with the ultimate outcome of more efficient management and conservation of CWR resources.

Any suggestions for improvement on this version (v.1) of the core descriptors for *in situ* conservation of crop wild relatives will be highly appreciated by Bioversity¹.

1 Contact: pgr-descriptors@cgiar.org

INTRODUCTION

Crop wild relatives are wild plant species that are more or less closely related to our food, fodder and forage crops, and to other species of socio-economic importance such as forestry species, medicinal and aromatic plants, condiments, and ornamentals. They include crop progenitors and are a potential source of traits beneficial to our crops (Maxted et al. 2008).

CWR have been used to improve the yields and nutritional quality of crops since the dawn of agriculture, with farmers often planting CWR alongside domesticated crops to promote natural crossing of beneficial traits. Genes from wild plants have also provided cultivars with resistance against pests and diseases, and improved tolerance to abiotic stresses. The genetic transfer of beneficial traits from wild varieties has been so widespread that most modern cultivars of crops contain some genes derived from a wild relative (Hajjar and Hodgkin 2007).

Given their importance for agricultural research and development, their conservation is of utmost importance (Hunter and Heywood 2011). In particular the *in situ* conservation of CWR can counter genetic erosion and allow the continued evolution of new adaptive traits as well as the maintenance of the breadth of genetic diversity present in the many CWR species, which is the basis for enhancing the adaptation of crops to new and changing agro-environments.

The crop wild relative descriptors are intended to capture key data on *in situ* conservation status and threats. The basic unit at which CWR *in situ* activities take place is the population. Population refers here to a group of individuals of the same taxon living within a sufficiently restricted geographical area that any member can potentially mate with any other member (Hartl and Clark 1997).

For each CWR descriptor, a brief explanation of content and coding scheme is provided to assist in the computerized compilation and exchange of this type of data. Although the suggested coding should not be regarded as the definitive scheme, this format represents an important tool for a standardized information system and is promoted by Bioversity International throughout the world.

Descriptors that correspond to multi-crop passport descriptors (Alercia et al. 2012) are marked in the text as [MCPD] to provide consistent coding schemes for common passport descriptors across crops. Owing to their generic nature, not all descriptor states for a particular descriptor might be relevant to a specific crop wild relative.

All three sections contain a descriptor named 'remarks', which can be used to capture any further data considered relevant for the specific section, for example, if species associated with a population shall be recorded.

Those descriptors which are considered as the minimum, mandatory data to be provided when exchanging data are highlighted in the text and summarized in Annex I.

1. Taxon

Details about the taxon to which the CWR population belongs.

1.1 Scientific name

1.1.1 Genus [MCPD]

Genus name for taxon. Initial uppercase letter required.

1.1.2 Species [MCPD]

Specific epithet portion of the scientific name in lowercase letters. Only the following abbreviation is allowed: 'sp.'

1.1.3 Species authority [MCPD]

Provide the authority for the species name.

1.1.4 Subtaxon [MCPD]

Subtaxon can be used to store any additional taxonomic identifier. The following abbreviations are allowed: 'subsp.' (for subspecies); 'convar.' (for convariety); 'var.' (for variety); 'f.' (for form); 'Group' (for 'cultivar group').

1.1.5 Subtaxon authority [MCPD]

Provide the subtaxon authority at the most detailed taxonomic level.

1.1.6 Taxonomical reference

Taxonomical reference to make the taxonomic concept explicit. Example: *Frodin's guide to Standard Floras of the World ed.2; Mansfeld's World Database of Agricultural and Horticultural Crop*.

1.2 Common name

Name of the taxon in colloquial language. Prefix this descriptor with the field name they refer to and a colon (e.g. Common name: tomate de árbol). Multiple values are separated by a semicolon without space.

1.2.1 Language of common name

Provide the language of the common name (Standard: *ISO 639-2*).

1.3 Endangerment status according to IUCN criteria

Provide endangerment status according to IUCN criteria.

1.3.1 IUCN red list category

IUCN red list category of the taxon.

- | | | |
|----|----|-----------------------|
| 1 | EX | Extinct |
| 2 | EW | Extinct in the wild |
| 3 | CR | Critically endangered |
| 4 | EN | Endangered |
| 5 | VU | Vulnerable |
| 6 | NT | Near threatened |
| 8 | LC | Least concern |
| 9 | DD | Data deficient |
| 10 | NE | Not evaluated |

1.3.1.1 IUCN red list criteria

For the categories CR, EN and VU, for which criteria and subcriteria are an integral part of the red list assessment, provide the IUCN criteria and subcriteria that apply to the taxon as result of the red listing process in the standard format for citing the red list criteria, e.g. B2ab(iii) (IUCN 2012b).

1.3.2 Red list assessment level

Indicate level of red list assessment.

- | | |
|---|----------|
| 1 | Global |
| 2 | Regional |

1.3.2.1 Region of assessment

Provide region of assessment if level is 2 = regional. A region indicates any subglobal geographically defined area, such as a continent, country, state, or province (IUCN 2012a).

1.3.3 Year of IUCN red list assessment [YYYY]

Provide the year in which IUCN red list assessment was carried out.

1.4 Endangerment status according to national criteria

Provide endangerment status according to national criteria when IUCN red list status is not available or in addition to IUCN status.

1.4.1 Country code

Use the three-letter ISO code (*Standard ISO 3166-1*).

1.4.1.1 National unit code

1.4.1.2 National unit description

1.4.1.3 National unit authority

1.4.2 Year of national red list assessment [YYYY]

Provide the year in which national red list assessment was carried out.

1.5 Use of taxon

Common uses of taxon according to IUCN use categories; multiple values allowed. They follow the IUCN Utilization Authority File (available from <http://data.iucn.org/Themes/ssc/sis/authority.htm>. Date accessed 19 March 2013). IUCN numbering is used except for descriptor states 'unknown' and 'other'.

- 1 Food – human (Food and beverages for human consumption/ nutrition)
- 2 Food – animal (Food and liquids for consumption by domestic/ captive animals)
- 3 Medicine – human and veterinary (Materials administered specifically to treat or prevent a specific illness or injury. Items administered as vitamins, tonics etc., should be included under food.)
- 4 Poisons (e.g. pesticides, herbicides, fish poisons)
- 5 Manufacturing chemicals (e.g. solvents, dyes, adhesives, resins, etc. whether for domestic or commercial/industrial use)
- 6 Other chemicals (e.g. incense, perfumes, cosmetics)
- 7 Fuel (including wood and charcoal production from wood, grasses, etc.)
- 8 Fibre (e.g. for weaving, sewing, rope, paper, thatch, etc.)
- 9 Construction/structural materials (e.g. supports, timber, fencing, etc.)
- 10 Wearing apparel, accessories (e.g. clothing, footwear, belts, bags, trimmings)
- 11 Other household goods (e.g. containers, furnishings, etc. with primarily utilitarian functions, though potentially highly decorated)
- 12 Handicrafts, jewellery, decorations, curios, etc. (Finished goods with primarily ornamental/decorative rather than utilitarian functions)
- 13 Pets/display animals, horticulture (Includes animals used as pets and for display (e.g. in zoos, circuses); plants used for re-planting for ornamental purposes, including in private gardens and public display (e.g. in botanical gardens))
- 14 Research (Includes specimens used in or as the subject of any type of research (e.g. behavioural, medicine, propagation, disease resistance, etc.))
- 15 Sport hunting/specimen collecting (Includes collection and preservation of dead specimens for personal pleasure, e.g. not for research; collection of live specimens should be included under pets/display animals, horticulture)
- 16 Unknown
- 99 Other (specify in the Remarks field)

1.6 Remarks

Specify here any additional information about the taxon or elaborate on taxon descriptors with value “other”. Prefix remarks with the field name they refer to and a colon (e.g. Purpose/Use: Utilitarian functions). Remarks referring to different fields are separated by semicolons without space.

2. Site

Details about the site in which the population is observed and/or the sample/specimen collected.

2.1 Site location

2.1.1 Country code [MCPD]

3-letter ISO 3166-1 code of the country where the site is located.

2.1.2 Location of site [MCPD]

Location information below the country level that describes the site, preferably in English. This might include the distance in kilometres and direction from the nearest town, village or map grid reference point, (e.g. 7 km south of Curitiba in the state of Parana).

2.1.3 Geographical coordinates

Two alternative formats are proposed for latitude and longitude, but the one reported by the monitoring/collecting mission should be used.

2.1.3.1 Latitude (Decimal degrees format) [MCPD]

Latitude of the site expressed in decimal degrees. Positive values are North of the Equator; negative values are South of the Equator (e.g. -44.6975).

2.1.3.1a Latitude (Degrees, Minutes, Seconds format) [MCPD]

Degrees (2 digits), minutes (2 digits) and seconds (2 digits) followed by N (North) or S (South) (e.g. 103020S). Every missing digit (minutes or seconds) should be indicated with a hyphen. Leading zeros are required (e.g. 10---S; 011530N; 4531--S).

2.1.3.2 Longitude (Decimal degrees format) [MCPD]

Longitude of the site expressed in decimal degrees. Positive values are East of Greenwich Meridian; negative values are West of the Greenwich Meridian (e.g. +120.9123).

2.1.3.2a Latitude (Degrees, Minutes, Seconds format) [MCPD]

Degrees (3 digits), minutes (2 digits) and seconds (2 digits) followed by E (East) or W (West) (e.g. 0762510W). Every missing digit (minutes or seconds) should be indicated with a hyphen. Leading zeros are required (e.g. 076---W).

2.1.3.3 Coordinate uncertainty [m] [MCPD]

Uncertainty associated with the coordinates in metres. Leave the value empty if the uncertainty is unknown.

2.1.3.4 Coordinate datum [MCPD]

The geodetic datum or spatial reference system in which the coordinates given in decimal latitude and decimal longitude are based (e.g. WGS84, ETRS89, NAD83). The GPS uses the WGS84 datum.

2.1.3.5 Georeferencing method [MCPD]

The georeferencing method used (GPS, determined from map, gazetteer, or estimated using software). Leave the value empty if georeferencing method is unknown.

2.1.4 Elevation of site [masl] [MCPD]

Elevation of site expressed in meters above sea level. Negative values are allowed.

2.2 Land use

Information about the usage of the land. Multiples values are allowed separated with a semicolon without space (adapted from FAO 2006).

- 10 Crop agriculture (cropping)
 - 11 Annual field cropping
 - 12 Perennial field cropping
 - 13 Tree and shrub cropping
- 20 Mixed farming
 - 21 Agroforestry
 - 22 Agropastoralism
- 30 Animal husbandry
 - 31 Extensive grazing
 - 32 Intensive grazing
- 40 Forestry
 - 41 Natural forest and woodland
 - 42 Plantation forestry
- 50 Nature protection
 - 51 Nature and game preservation (i.e. Reserves, Parks, Wildlife management)
 - 52 Degradation control

- 60 Settlement, industry
 - 61 Residential use
 - 62 Industrial use
 - 63 Transport
 - 64 Recreational use
 - 65 Excavations
 - 66 Disposal sites
- 70 Not used and not managed
- 99 Other (specify in the “Remarks” section)

2.3 IUCN habitat classification

Only the main IUCN habitat types are listed here. It is recommended to provide the appropriate sub-categories from the IUCN Habitats Classification Scheme available from <http://www.iucnredlist.org/technical-documents/classification-schemes/habitats-classification-scheme-ver3> (date accessed: 19 March 2013). Multiple values are allowed, separated with a semicolon without space. IUCN numbering is used except for descriptor states ‘unknown’ and ‘other’.

- 1 Forest
- 2 Savanna
- 3 Shrubland
- 4 Grassland
- 5 Wetlands (inland)
- 6 Rocky Areas (e.g. inland cliffs, mountain peaks)
- 7 Caves and Subterranean Habitats (non-aquatic)
- 8 Desert
- 9 Marine – Neritic (submergent nearshore continental shelf or oceanic island)
- 10 Marine – Oceanic
- 11 Marine – Deep Ocean Floor (Benthic and demersal)
- 12 Marine – Intertidal
- 13 Marine – Coastal/Supratidal
- 14 Artificial – Terrestrial
- 15 Artificial – Aquatic
- 16 Introduced Vegetation
- 17 Unknown
- 99 Other (specify on the “Remarks” field)

2.3.1 IUCN habitat type scoring

Provide the appropriate score for the habitat in which the species is found. (See <http://intranet.iucn.org/webfiles/doc/SSC/RedList/AuthorityF/habitats.rtf>).

- 1 Suitable (main or preferred habitat/s, habitat/s containing major subpopulations, habitat/s with high population densities)
- 2 Moderately suitable (secondary habitat/s, habitat/s containing minor subpopulations, habitat/s with low population densities)
- 3 Unsuitable (unsuitability expressly known or easily inferred from the ecology of the taxon)
- 9 Undefined (data deficient, possibly suitable or moderately suitable as inferred from ecology of the taxon)

2.4 Site protection

- 0 Not protected, no conservation measures
- 1 Protected area
- 99 Other conserved area, not protected by legislation

2.4.1 WDPA site code for protected area

Provide the World Database of Protected Area (WDPA) unique site ID. The WDPA ID is available online from the WDPA website (<http://www.wdpa.org/Default.aspx>) in the specific WDPA site details.

2.4.2 Site legislation

Indicate the level of site protection.

- 1 International
- 2 National

2.5 Remarks

Specify here any additional information about the site or elaborate on site descriptors with value "other". Prefix remarks with the field name they refer to and a colon (e.g. Land use:Military area. Remarks referring to different fields are separated by semicolons without space).

3. Population

Details about the population monitored in the site.

3.1 Monitoring data

3.1.1 Monitoring date [YYYYMMDD]

Date when population was monitored where YYYY is the year, MM is the month and DD is the day. Missing data (MM or DD) should be indicated with hyphens or '00' [double zero].

3.1.2 Population identifier

The identification of each population is guaranteed by the unique identifier, assigned by the monitoring institute or the monitoring person.

3.1.3 Monitoring institute code

FAO WIEWS² code of the institute that monitored the population in the field. If the monitoring institute has collected material, the collecting institute code should be the same as the monitoring institute. The FAO WIEWS codes consist of the 3-letter ISO 3166 country code of the country where the institute is located plus a number (e.g. COL001). The current set of institute codes is available from <http://apps3.fao.org/wiews/wiews.jsp> (date accessed: 19 March 2013).

3.1.3.1 Monitoring institute name

Name of the institute monitoring the population. This descriptor should be used only if Monitoring institute code cannot be filled because the FAO WIEWS code for this institute is not available.

3.1.3.2 Monitoring institute address

Address of the institute monitoring the sample (specimen). This descriptor should be used only if Monitoring institute code cannot be filled since the FAO WIEWS code for this institute is not available. Multiple values are separated by a semicolon without space.

3.1.4 Monitoring mission identifier

Identifier of the monitoring mission/event used by the Monitoring Institute.

3.2 Collecting data

3.2.1 Collecting date [YYYYMMDD] [MCPD]

Date when the sample/specimen was collected, where YYYY is the year, MM is the month and DD is the day. Missing data (MM or DD) should be indicated with hyphens or '00' [double zero].

3.2.2 Collecting institute code [MCPD]

FAO WIEWS code of the institute collecting the sample/specimen. If the holding institute has collected the material, the collecting institute code should be the same as the holding institute code.

3.2.2.1 Collecting institute name [MCPD]

Name of the institute collecting the sample. This descriptor should be used only if Collecting institute code cannot be filled because the FAO WIEWS code for this institute is not available.

3.2.2.2 Collecting institute address [MCPD]

Address of the institute collecting the sample. This descriptor should be used only if Collecting institute code cannot be filled since the FAO WIEWS code for this institute is not available.

3.2.3 Collecting number [MCPD]

Original identifier assigned by the collector(s) of the sample/specimen normally composed of the name or initials of the collector(s) followed by a number (e.g. 'FM9909'). This identifier is essential for identifying duplicates held in different collections. It should be unique and always accompany subsamples wherever they are sent.

3.2.4 Collecting source [MCPD]

Information describing the source of the collection of the accession/specimen. The coding scheme proposed can be used at 2 different levels of detail: either by using the general codes (in **boldface**) such as 10, 20, 30, 40, etc., or by using the more specific codes, such as 11, 12, etc.

10 Wild habitat

- 11 Forest or woodland
- 12 Shrubland
- 13 Grassland
- 14 Desert or tundra
- 15 Aquatic habitat

20 Farm or cultivated area

- 21 Field
- 22 Orchard
- 23 Backyard, kitchen or home garden (urban, periurban or rural)
- 24 Fallow land
- 25 Pasture
- 26 Farm store
- 27 Threshing floor
- 28 Park

30 Market or shop**40 Institute, Experimental station, Research organization, Genebank****50 Seed company****60 Weedy, disturbed or ruderal habitat**

- 61 Roadside
- 62 Field margin

99 Other (specify in the "Remarks" section)

3.2.5 *Ex situ* conservation data

3.2.5.1 Accession/specimen number

This is the unique identifier for accessions/specimens within a collection (e.g. genebank, herbarium, etc.) and is assigned when a sample/specimen is entered into the collection.

3.2.5.2 Holding institute code

FAO WIEWS code or Index Herbariorum code of the institute where the accession/specimen is maintained. The Index Herbariorum codes are 4 – 8 letter codes. The current set can be found at <http://sciweb.nybg.org/science2/IndexHerbariorum.asp> (date accessed: 19 March 2013).

3.2.5.3 Voucher specimen

Specimen used for taxonomical verification/identification.

0 No

1 Yes

3.3 Population size

3.3.1 Population area [km²]

Approximate area occupied by the population in square km.

3.3.2 Total number of individuals in the population

Provide the total number of individuals in the population.

3.3.3 Total number of mature individuals in the population

Provide the total number of mature individuals in the population.

3.3.4 Total number of juvenile individuals in the population

Provide the total number of juvenile individuals in the population.

3.3.5 Presence or absence of seedlings of the taxon in the population

Indicate the presence or absence of seedlings in the population.

0 Absent

1 Present

3.4 IUCN threat classification

Below only the major threat types are listed. It is recommended to select appropriate sub-classes from the full list available from <http://www.iucnredlist.org/technical-documents/classification-schemes/threats-classification-scheme> (date accessed: 19 March 2013). IUCN numbering is followed here except type = other options. Multiple values are allowed, separated with a semicolon without space.

- 1 Residential & commercial development
- 2 Agriculture & aquaculture
- 3 Energy production & mining
- 4 Transportation & service corridors
- 5 Biological resource use
- 6 Human intrusion & disturbance
- 7 Natural systems modifications
- 8 Invasive & other problematic species, genes & diseases
- 9 Pollution
- 10 Geological events
- 11 Climate change & severe weather
- 99 Other options (Specify in the Remarks descriptor)

3.5 Conservation actions in place

Indication whether conservation actions related to the population are in place.

- 0 No
- 1 Yes

3.5.1 Conservation action classification

Type of conservation action of the population in place. Use the IUCN classification scheme for conservation actions in place (available from http://www.iucnredlist.org/documents/June_2012_Guidance_Conservation_Actions_In_Place_Classification_Scheme.pdf. Date accessed: 19 March 2013). Provide details about specific conservation actions in the Remarks field (e.g. 4:Included in international legislation).

- 0 No conservation actions
- 1 Monitoring & Planning
- 2 Land/Water Protection & Management
- 3 Species Management
- 4 Education & Legislation
- 99 Other (specify in the "Remarks" section)

3.6 Remarks

Specify here any additional information about the population or elaborate on population descriptors with value "other". Prefix remarks with the field name they refer to and a colon (e.g. Collecting source:Riverside). Remarks referring to different fields are separated by semicolons without space.

4. Notes

This field is used to add notes or to elaborate on additional descriptors not listed in the previous sections.

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CONTRIBUTORS

The following scientists and organizations have participated in and contributed to the development of the descriptors:

Collective contributions from:

UNEP/GEF national project partners:

- Armenia (Ministry of Nature Protection)
- Bolivia (Viceministerio de Biodiversidad, Recursos Forestale y Medio Ambiente, Ministerio de Desarrollo Rural, Agropecuario y Medio Ambiente)
- Madagascar (Centre National de la Recherche Appliquée au Développement Rural (FOFIFA))
- Sri Lanka (Ministry of Environment and Natural Resources)
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- BGCI (Botanic Gardens Conservation International)
- BLE (German Federal Office for Agriculture and Food)
- FAO (Food and Agriculture Organization of the United Nations)
- IUCN (International Union for Conservation of Nature)
- UNEP-WCMC (United Nations Environmental Program World Conservation Monitoring Centre)

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ANNEX I. Minimum descriptors for data exchange

- 1.1.1 Genus
- 1.1.2 Species
- 1.1.3 Species authority
- 2.1.1 Country code
- 2.1.3.1 Latitude
- 2.1.3.2 Longitude
- 2.1.4 Elevation of site
- 3.1.1 Monitoring date [YYYYMMDD]
- 3.1.2 Population identifier
- 3.1.3 Monitoring institute code
- 3.3.2 Total number of individuals in the population
- 3.4. IUCN threat classification
- 3.5 Conservation actions in place



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