CWR conservation in the SADC region

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GERMINIATION seminar

Villa Delisle, S Pierre, Reunion, 18th –22th May 2015

Overview

Crop wild relatives – importance, definition, challenges

SADC Crop Wild Relatives project

- **Regional training workshops**
- **Key outputs and collaborations**

Wild *Asparagus*

Wild *Coffea*

Wild *Sorghum*

Global importance

CBD Strategic Plan for Biodiversity 2011 – 2020 (20 Aichi targets)

Target 13

By 2020, the genetic diversity of cultivated plants and farmed and domesticated animals and of wild relatives, including other socio-economically as well as culturally valuable species, is maintained, and strategies have been developed and implemented for minimizing genetic erosion and safeguarding their genetic diversity.

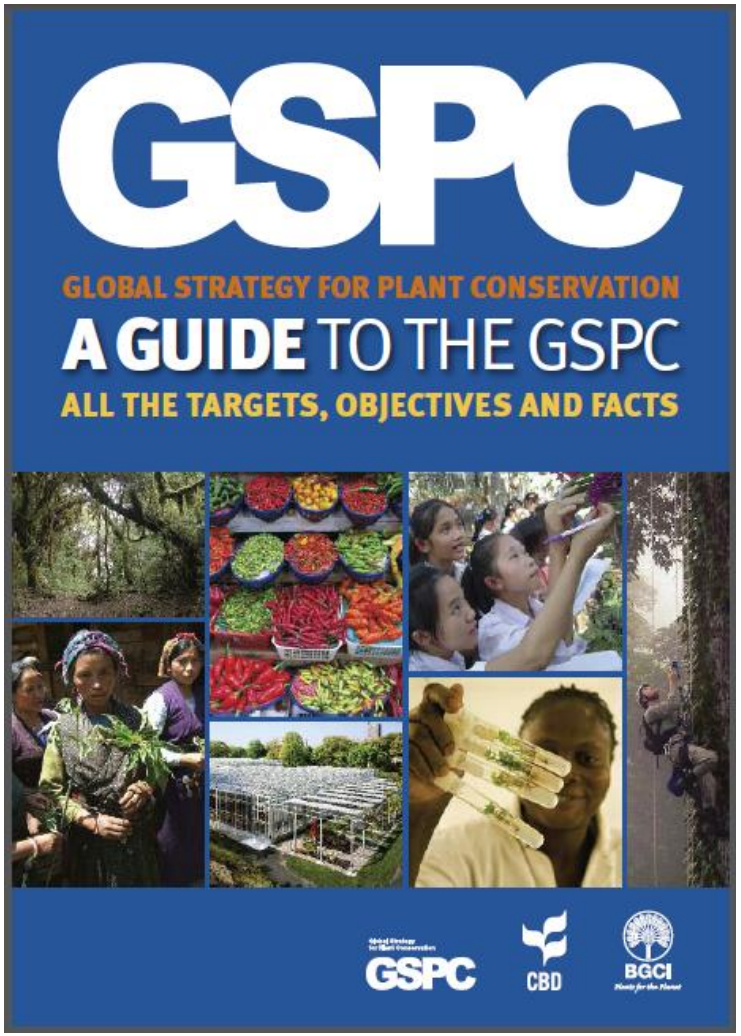
Global importance

Global Strategy for Plant Conservation 2011 – 2020 (16 targets)

Target 9: 70 % of the genetic diversity of crops including their wild relatives and other socio-economically valuable plant species conserved

Target 1: An online flora of all known plants = inventory of CWR

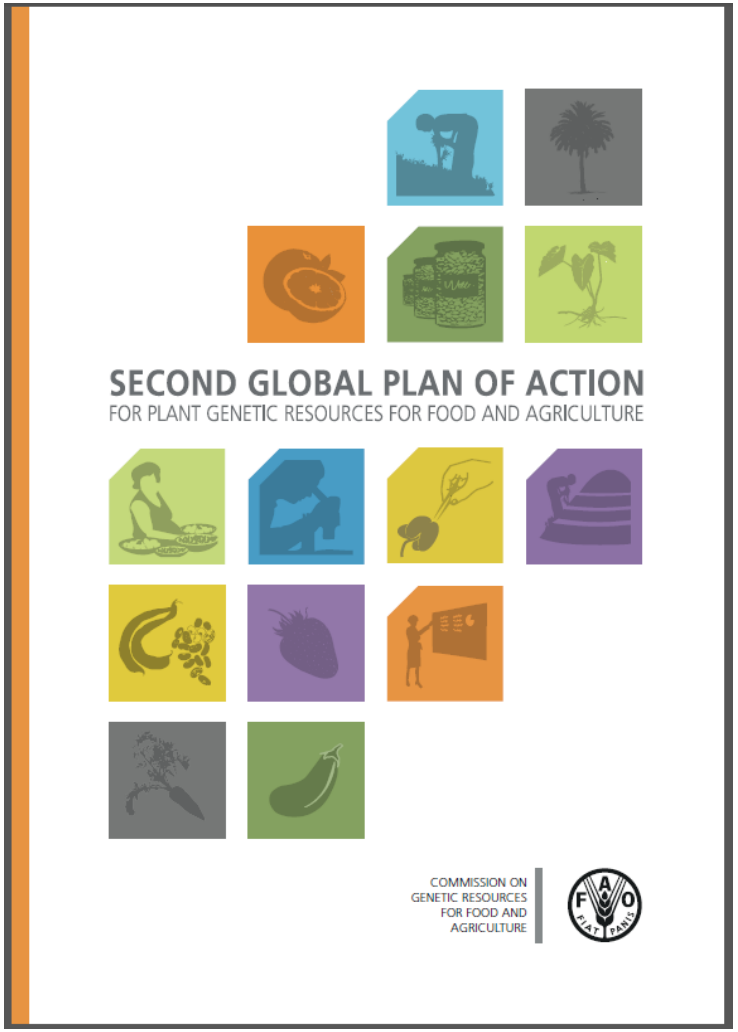
Target 2: An assessment of the conservation status of all known plant species as guide conservation action = conservation status of CWR



Global importance

Second Global Plan of Action for PGRFA 2011 (18 activities)

Activity 4: Promoting *in situ* conservation and management of crop wild relatives and wild food plants

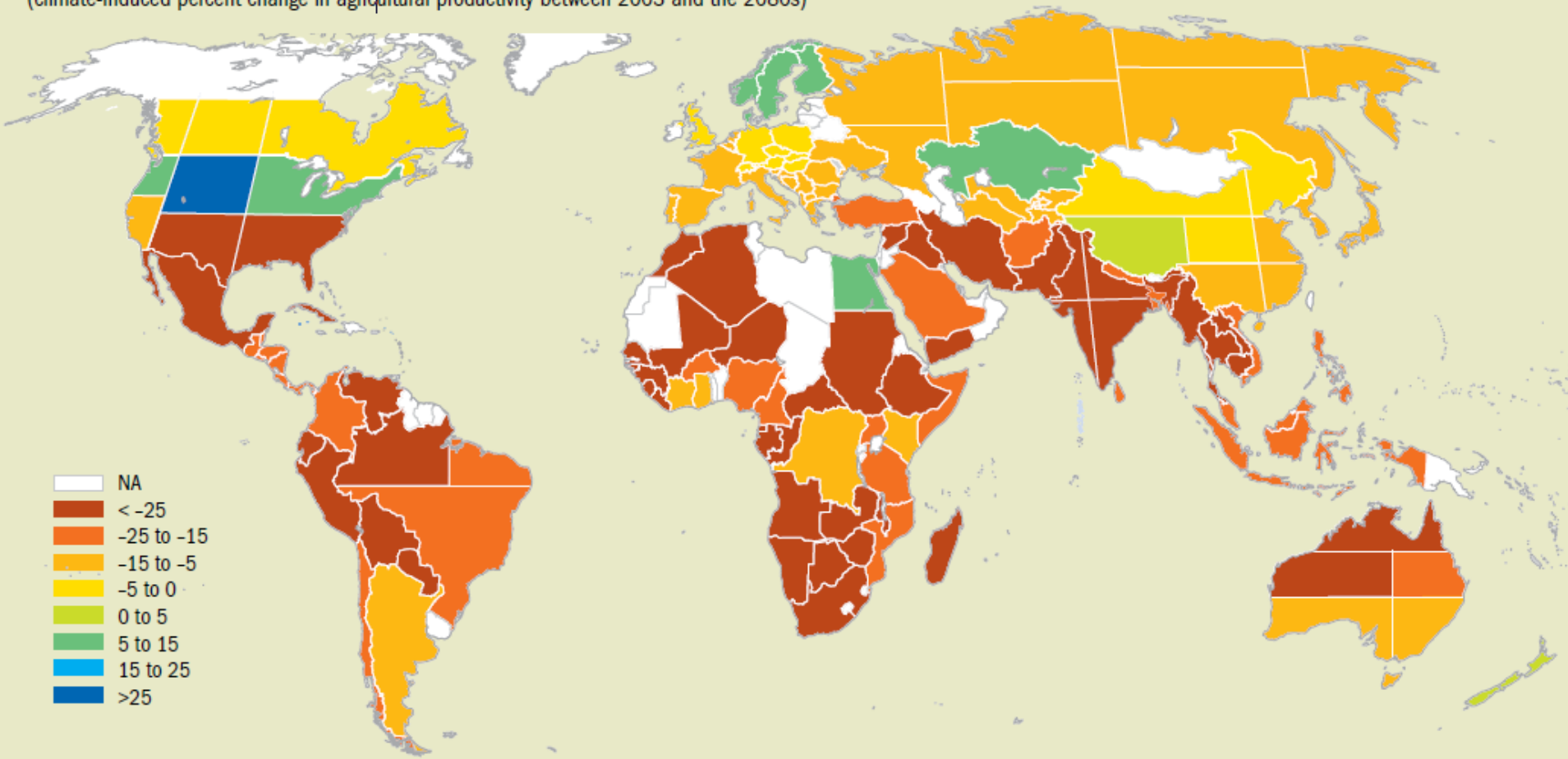


Map 1

Without carbon fertilization

If there are no beneficial effects from increased carbon dioxide, agricultural output declines almost everywhere and catastrophically closer to the equator.

(climate-induced percent change in agricultural productivity between 2003 and the 2080s)



Source: Cline (2007).

Note: NA refers to "not applicable" for Alaska and northern Canada, and to "not available" elsewhere.

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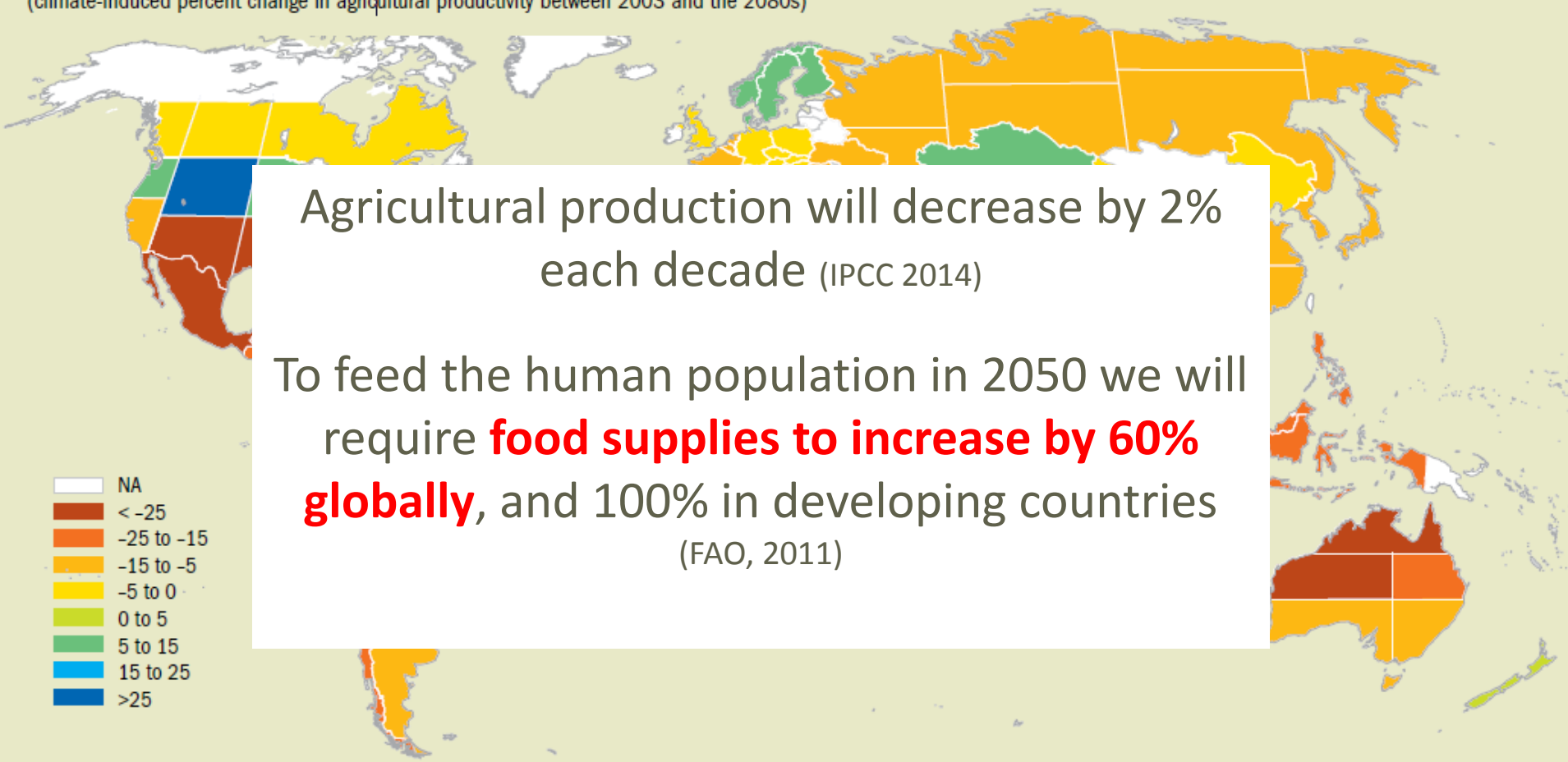

Agricultural production will decrease by 2% each decade (IPCC 2014)

To feed the human population in 2050 we will require **food supplies to increase by 60% globally**, and 100% in developing countries (FAO, 2011)

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WE NEED CROPS

with higher yields

with higher nutritional value

adapted to degraded lands

adapted to changing environments

CROP WILD RELATIVES

Source: Cline (2007).

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Crop wild relatives (CWR)

Wild plant species closely related to crops, including wild ancestors

Broad definition

CWR = all taxa within the same genus as a crop

Narrow definition

wild plant taxon that has an indirect use derived from its relatively close genetic relationship to a crop;
this relationship is defined in terms of the CWR belonging to gene pools 1 or 2, or taxon groups 1 to 4 of the crop

http://www.cwrdiversity.org/checklist/

Beta maritima

Beta vulgaris (sugar beet)

Crop wild relatives (CWR)

Account for about 21% of the world's flora
(Maxted and Kell 2009)

Wide genetic diversity of adaptive traits

Indirect use as gene donors for crop improvement due to their relatively close genetic relationship to crops

Important socio-economic resource that offers novel genetic diversity required to maintain future food security

Beta maritima

Beta vulgaris (sugar beet)

Crop	CWR	Application(s)
Barley (*Hordeum vulgare*)	*H. spontaneum*	Drought and temperature tolerance
Sweet potato (*Ipomoea batatas*)	*I. trifida*	Root knot nematode and root lesion nematode resistance
Lettuce (*Lactuca sativa*)	*L. serriola*	Downy mildew resistance
	L. virosa	Leaf aphid resistance
Tomato (*Lycopersicon esculentum*)	*L. cheesma peruvianu*	f resistance, drought and salinity le solids, insect resistance
	L. chilense	leaf curl virus
	L. chmielev	
	L. hirsutum	ssing ability
	L. pimpinellifolium	Wilt causing fungus
		Quality control characters
	L. pimpinellifolium	Fruit size and shape
	L. pimpinellifolium	Disease resistance, early maturity, determinate growth habit, parthenocarpy, soluble solids
Cassava (*Manihot esculenta*)	*M. aesculifolia*	Robustness
	M. angustiloba	Drought tolerance

$115 billions toward increased crop yields per year (Pimentel *et al.* 1997)

(Maxted and Kell 2009)

CWR - challenges

CWR are each expected to be affected by climate change and their agro-environment

CWR like other wild species are threatened by the loss, degradation and fragmentation of their natural habitats and competition from alien species

CWR are often located in disturbed habitats (e.g. field margins, forest edges and roadsides), that are not being conserved by ecosystem conservation agencies

Sesamum alatum

CWR - challenges

Found in existing PA but not monitored and actively managed

Very few examples of active *in situ* CWR conservation:
Triticum spp. in Israel, *Aegilops* spp. in Turkey, *Zea perennis* in Mexico, *Solanum* spp. in Peru, *Phaseolus* spp. in Costa Rica, *Beta patula* in Madeira

2 out of 10 CWR in Europe are threatened by extinction in the wild
(Kell *et al.* 2012)

Sesamum alatum

CWR - challenges

CWR are largely uncharacterized, unevaluated and undervalued

Underrepresented in *ex situ* collections (< 10%; Maxted and Kell 2009)

Not taken into account in environmental policy planning

Lack of partnership between environment and agriculture which is key to address challenges

Sesamum alatum

SADC Crop Wild Relatives project

Full name: *In situ* conservation and use of crop wild relatives in three ACP countries of SADC Region

'In situ conservation and use of crop wild relatives in three ACP countries of the SADC region' (short name - SADC Crop Wild Relatives) is a three-year project (2014-2016) co-funded by the European Union and implemented through the ACP-EU Co-operation Programme in Science and Technology (S&T II) by the ACP Group of States. Grant agreement no. FED/2013/330-210.

Project objectives

Overall objective

Enhance link between conservation and use of CWR in three ACP countries within the SADC region, as a means of underpinning regional food security and mitigating the predicted adverse impact of climate change

Specific objectives

Enhance the scientific capacities within the partner countries to conserve CWR and identify useful potential traits for use to adapt to climate change.

Develop exemplar National Strategic Action Plans for the conservation and use of CWR in the face of the challenges of climate change across the SADC region

Work packages

1: **Improving national capacities** in the three ACP countries of SADC region on conservation and use of CWR

2: **Science, technology and innovation tools** for *in situ* conservation and use of CWR are deployed and tested in three ACP countries of SADC

3: **National Strategic Action Plans**, supported by information systems, for on in situ conservation and use of priority CWR

4: **Awareness raising** among national policymakers

5: **Project management** and governance

Regional training workshop on *in situ* conservation of CWR and diversity assessment techniques

Mauritius, November 2014

Topics

Creation of CWR checklists and inventories

Prioritization of CWR for conservation

Conservation status and diversity assessment of priority CWR

Plans for implementation of conservation priorities

Relevant policy for the conservation of CWR

Regional training workshop on predictive characterization and pre-breeding

Pretoria, South Africa, April 2015

Topics

Application of eco-geography in PGR

Predictive characterization of a selected CWR for a specific trait

Use of CAPFITGEN tools

Definition and application of pre-breeding

Genebank operations critical to pre-breeding programmes

Principles for parental selection and the generation and management of variation

➔ outline actions that promote the use of CWR diversity for inclusion into National Strategic Plan for the conservation and use of CWR

SADC CROP WILD RELATIVES

Capacity Building

Improving national capacities in the three ACP countries of SADC region on conservation and use of CWR

Lead partner:Bioversity International

Expected results: National capacities in the three ACP countries on conservation and use of CWR of SADC region are improved

Content: This work package will first involve a study to assess the existing capacities of different stakeholders including ministries of agriculture, environment, land use planning and forestry, national and regional universities, protected area agencies, nature conservation organizations, breeders, farmer communities and other stakeholders to conserve and use CWRs at local, national and regional levels. This action will enable the identification of specific capacity-building needs of the stakeholders and will help develop the training curriculum necessary to strengthen the capacities of the target groups.

Based on the findings of the needs assessment exercise, two tailor-made thematic regional training workshops will be carried out. The first regional training workshop will focus on in situ conservation of crop wild relatives and will take place in Mauritius in November 2014. The second regional training workshop will take place in South Africa in April 2015 and focus on predictive characterization and pre-breeding.

After the regional training has taken place, the project will support the three partner countries to put into practice the knowledge gained from the training courses through on-the-job training in the teams' home countries, for greater cost efficiency and impact on national crop improvement programmes.

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Regional training workshops
STI tools
National SAP
Awareness
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CWR Portal

Activities

1.1: Conduct a needs assessment of the capacity of stakeholders in the conservation and use of CWR

1.2: Conduct two thematic regional training workshops on *in situ* conservation and use of CWR, based on identified capacity building needs

1.3: Support on-the-job training in the three ACP countries

http://www.cropwildrelatives.org/sadc-cwr-project/

Key outputs

Capacity of at least 30 people from SADC Member States in *in situ* conservation and use of CWR has improved by the end of project

An interactive toolkit for conservation of CWR published and shared

Detailed checklist and inventory of CWR in each of the three partner countries

Regional assessment of CWR within SADC region

Three National Strategic Actions plans (NSAP) for CWR conservation and use

Collaborations and synergies

GERMINATION project:

- Supported the participation of two members at workshop in Mauritius

FAO: Interactive toolkit and NSAP development based on resources developed by FAO

- Resource Book for the Preparation of National Plans for Conservation of Crop Wild Relatives and Landraces
- Guidelines for the developing a national strategy for PGRFA

SADC Plant Genetic Resources Centre

NSAP: will feed into NBSAPs, GSPC, FAO country reports, GPA reporting

Thank you

www.bioversityinternational.org

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CGIAR
Science for a food secure future