Enhancing Access to the Global Public Goods held by CGIAR Centers' Genebanks

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Bioversity, CIAT, CIMMYT, CIP,

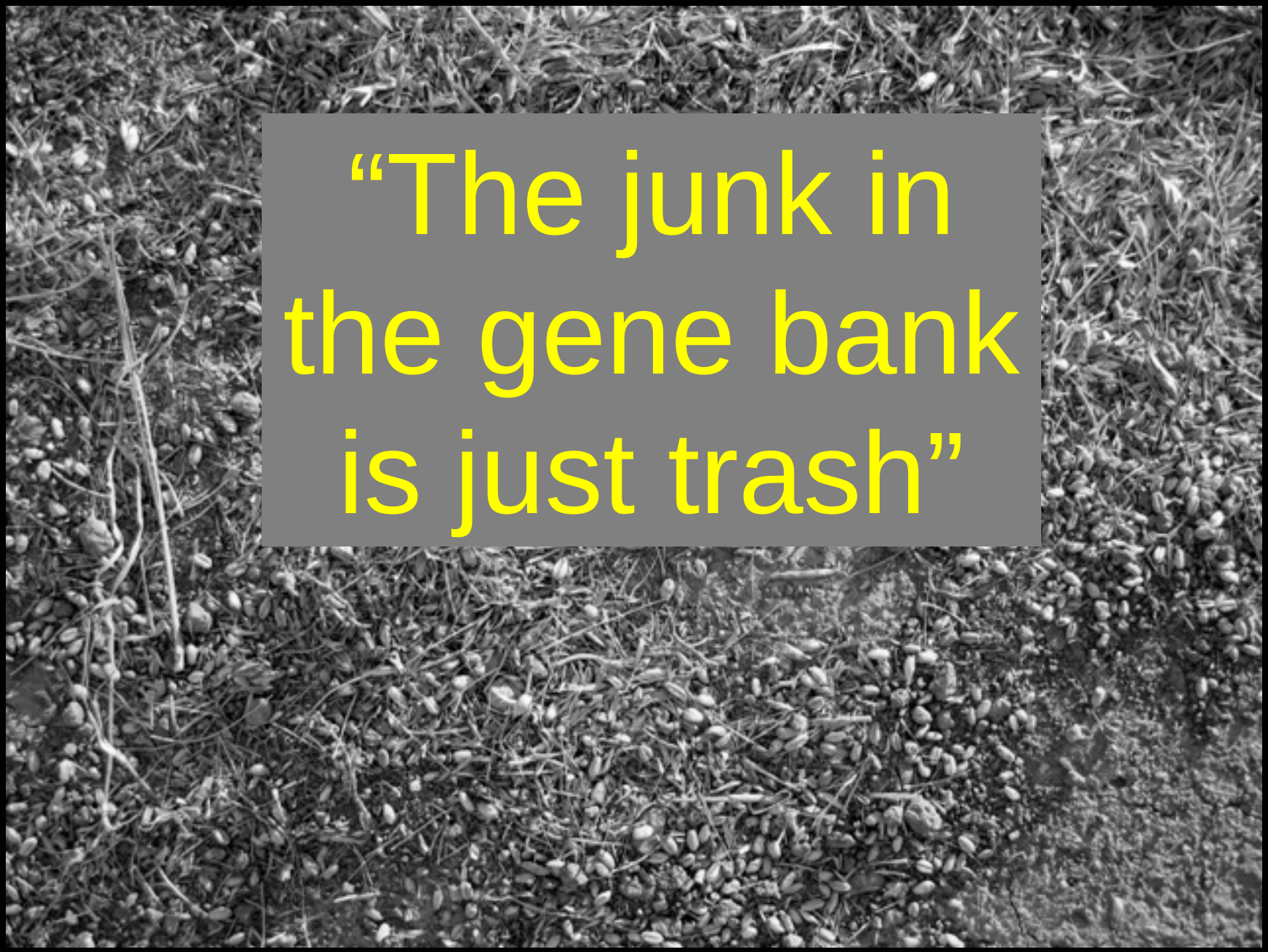
ICARDA, ICISAT, ICRAF, IITA,ILRI,

IRRI, WARDA

CIMMYT MR


“Genetic Resources are …


…our most valued resource!!!”


“The junk in the gene bank is just trash”

Genetic Resources
¿¿Critical Questions??

- To what extent is a crop's **global genepool** adequately conserved today?
- Is the genetic **variability needed for the future** adequately conserved today?
- Is the conserved germplasm **useful and accessible** for breeders/researchers **to use** today?

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The CGIAR In-Trust Collections

Centre	Scope of Collections	Accessions
CIAT	Beans, cassava, forages, rice	65 290
CIMMYT	Maize, wheat, rye, triticale	168 103
CIP	Potato, sweet potato, Andean roots and tubers	13 623
ICARDA	Barley, wheat, chickpea, faba bean, lentil, forages	125 506
ICRAF	*Sesbania*	25
ICRISAT	Sorghum, pearl millet, chickpea, groundnut, pigeon pea, small millets,	113 830
IITA	Cowpea, cassava, soybean, Bambara groundnut, yam	25 402
ILRI	Forages	18 661
Bioversity	Banana and plantain	989
IRRI	Rice	102 652
WARDA	Rice	21 527
	TOTAL	**655 608**

Why don’t breeders use materials from genebanks?

- Germplasm not well enough characterized or evaluated.
- Germplasm characterized for meaningless traits.
- Too wild. Difficult to breed with.
- Traits/genes are more easily found elsewhere.
- Lack of easily accessible information.
- IP and Freedom-to-Operate constraints.

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Three key limiting factors

- So many accessions, so little information!
  - Limited phenotypic data
  - Little/low-resolution molecular-marker data
  - Cross-referencing with environmental data
- Insufficient tools to mine information.
  - Outdated data storage & management
  - Limited search and data-retrieval capabilities
  - Who are a genebank's users?
- Exotic germplasm, is often too exotic!
  - Don't disturb adapted genome backgrounds

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Three key solutions

- So many accessions, so little information!
  - Enhanced internet data availability via **GeneSys**
- Insufficient tools to mine information.
  - **GCP** Molecular Breeding Platform
- Exotic germplasm, is often too exotic!
  - Don’t disturb adapted genome backgrounds
  - **Genomic Selection** for pre-breeding

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A genebank's "users"

Breeders *CGIAR Breeders* ***NARS*** *Breeders* ***universities*** *Breeders small/medium* ***companies*** *Breeders large* ***multi-nationals*** *Plant classical & molecular* ***biologists*** *Genetic Resource* ***researchers & students*** ***Agronomists*** *Genebank and CGIAR* ***managers*** *Global Crop Diversity* ***Trust*** *ITPGRFA* ***Treaty*** *Governing Body & Stakeholders* ***Civil society***

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Future (is today's) users

*"We are currently studying drought tolerance in wheat and we are investigating the **PIP2 gene expressing the aquaporin water channel**.*

I was wondering if you had any information to help point us in the right direction to help research this topic.

If you could that would be awesome and we would greatly appreciate this."

-- Request received 1 March 2010

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GeneSys (www.global-alis.org)

Global Accession Level Information System

The overall goal of the joint project is to **provide users** with **improved access** to the millions of accessions held in genebanks **worldwide**.

The global portal currently contains information on **1.2 million accessions** of **22 crops** and includes more than **three million observation**/phenotypic records on a variety of traits.

Demonstration

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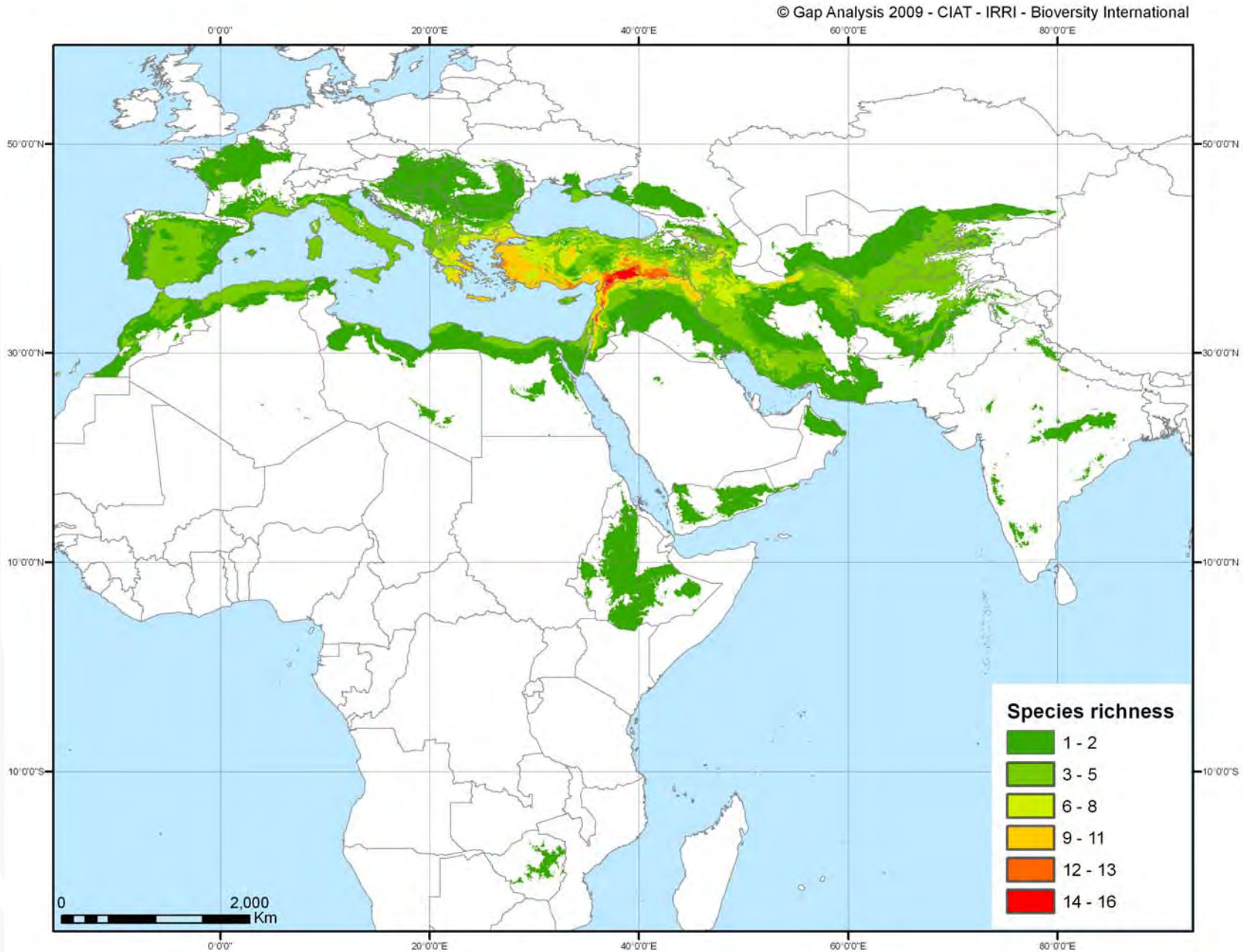
Keys to the Gene Bank

A treasure trove of yield-enhancing traits await crop breeders in the world‘s gene banks, but gaining access will require unprecedented ingenuity and collaboration among curators, geneticists, biotechnologists and breeders

ACIAR Partners, October 2009



Predicted species richness under current climatic conditions

Year Current

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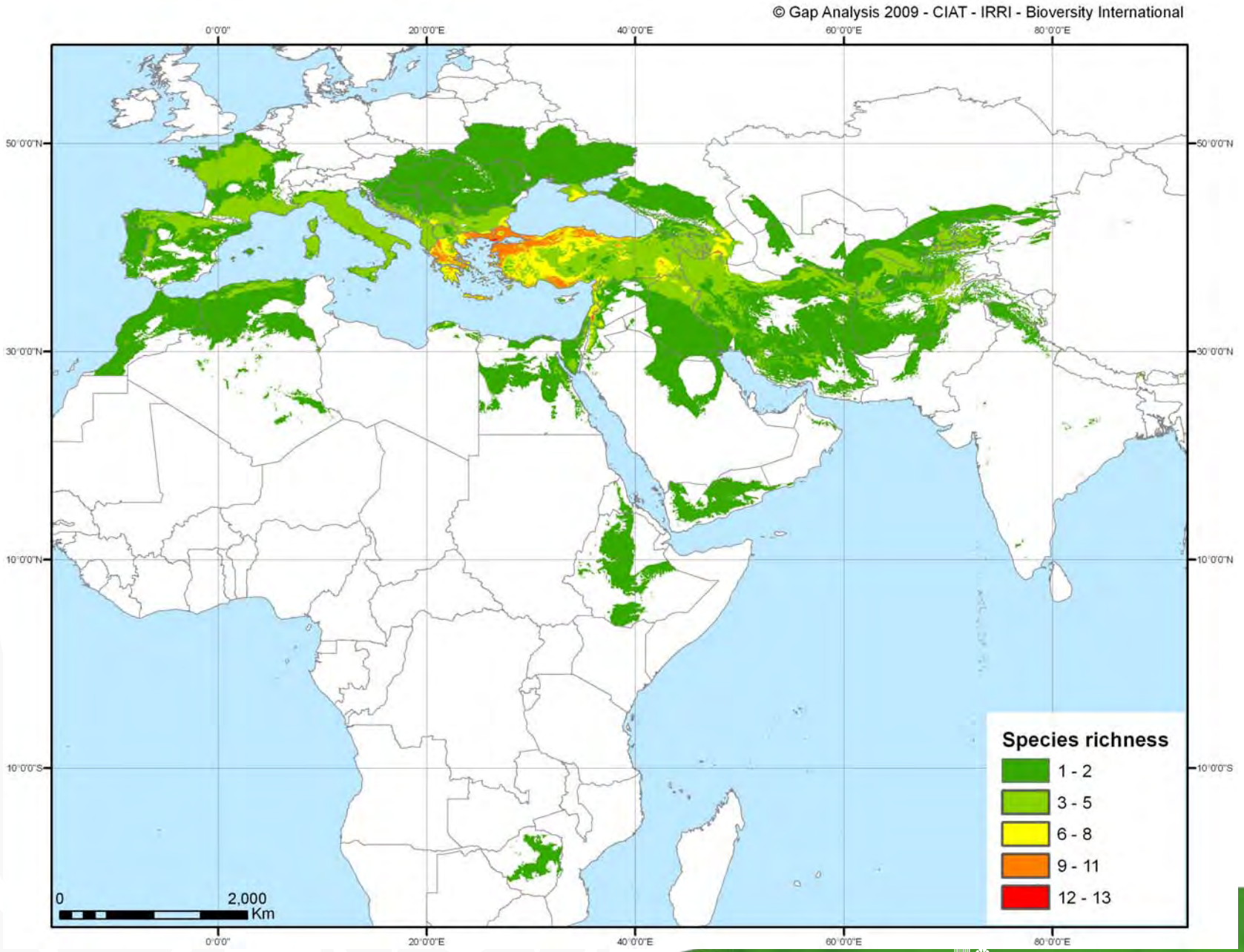

Predicted species richness under future climatic conditions

Year 2050 – Scenario SRES-A2a

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Genetic Resources
¿¿How can you help??

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- Is the conserved germplasm **useful and accessible**?

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