



# Human livelihoods depend on wild flowers: Kew's Millennium Seed Bank Partnership explained



Robin Probert

Head Conservation & Technology



# STRUCTURE

- Importance of plants and threats
- The Millennium Seed Bank Partnership
  - Collecting & processing
  - Technology transfer
  - Science
  - The UK Native Seed Hub
  - The future

# ALL LIFE DEPENDS ON PLANTS

## Provisioning services

Food, medicine, fuel,  
construction, clothing, etc.

## Regulating services

Climate moderation, disease  
regulation, flood regulation

## Cultural services

Spiritual, recreational, aesthetic,  
inspirational, educational

## Supporting services

Soil formation, nutrient cycling, primary production.



Economic value \$30-40 trillion per annum.

# THE IMPORTANCE OF WILD PLANTS TO PEOPLE



In southern Africa wild plants account for **30%** of household livelihoods

In a study from Tanzania, **49%** of vegetables consumed were from wild sources

In most countries, livestock primarily eat wild forage species

*MSBP partners collecting Moringa oleifera in Burkina Faso*

# WILD PLANTS AS A SOURCE OF MEDICINE



Do we have all the medicines  
we need?

75% of the world's population  
relies on traditional  
medicines.

Traditional Chinese medicine  
uses 5000 plant species.  
7000 species are used for  
medicine in India.

# WILD PLANTS AS A SOURCE OF MEDICINE



Approximately 400 children  
in London with leukemia or  
lymphoma

Only 30% would have  
survived before vinblastine  
and vincristine from rosy  
periwinkle

Now 80% can be expected to  
survive

[http://www.nybg.org/images/flowering/Rosy\\_Periwinkle.jpg](http://www.nybg.org/images/flowering/Rosy_Periwinkle.jpg)

# WILD PLANTS AS A SOURCE OF MEDICINE



[http://farm1.static.flickr.com/107/314938626\\_bd7235b9ed.jpg](http://farm1.static.flickr.com/107/314938626_bd7235b9ed.jpg)

*Ginkgo biloba*

Treatment of cardiovascular  
disease

US\$ 360,000,000 per yr

<http://biology.missouristate.edu/Herbarium/TreesonCampus/images/ginkgo.jpg>



# SO WHAT'S THE PROBLEM ?

Plant diversity is  
under threat



# WHAT ARE THE THREATS TO PLANT DIVERSITY ?

## Direct:

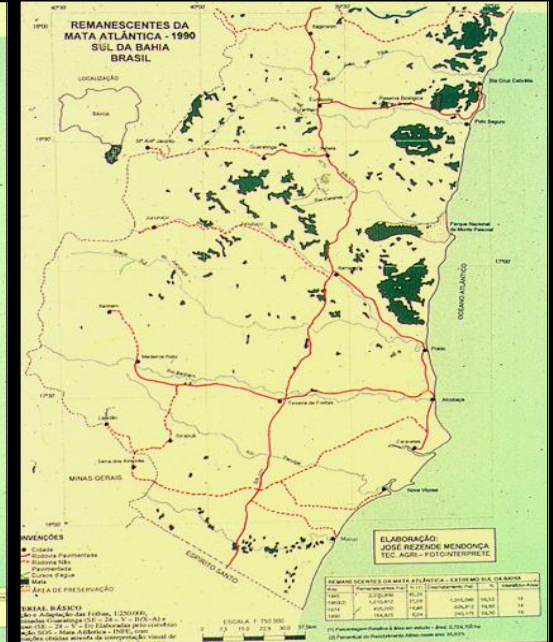
- Habitat conversion
- Climate change
- Over-exploitation
- Alien species

## Indirect:

- Human population expected to rise to nine billion by 2050



1945



1990

In last 300 yrs global forests have shrunk by 40%

# CLIMATE CHANGE (no laughing matter)



[http://news.bbc.co.uk/1/hi/in\\_pictures/6243320.stm](http://news.bbc.co.uk/1/hi/in_pictures/6243320.stm)

‘.....around 15-40% of species potentially facing extinction after only 2°C of warming.’

Stern Review: October 30<sup>th</sup> 2006

# WHAT ARE THE THREATS TO PLANT DIVERSITY ?



- 60,000 to 100,000 plant species are currently threatened with extinction
- The current extinction rate of biodiversity is 1000 times the background rate.

[www.millenniumassessment.org](http://www.millenniumassessment.org)

# WHAT CAN BE DONE ?

**Seed banks** provide an insurance policy against threats to plants in situ

**Seed banks** provide options for the future survival and use of plants



# SEED BANKS PROVIDE:

Options for the future: using seed collections



Sustainable utilisation -  
improving rural livelihoods



Habitat restoration



Species  
reintroductions

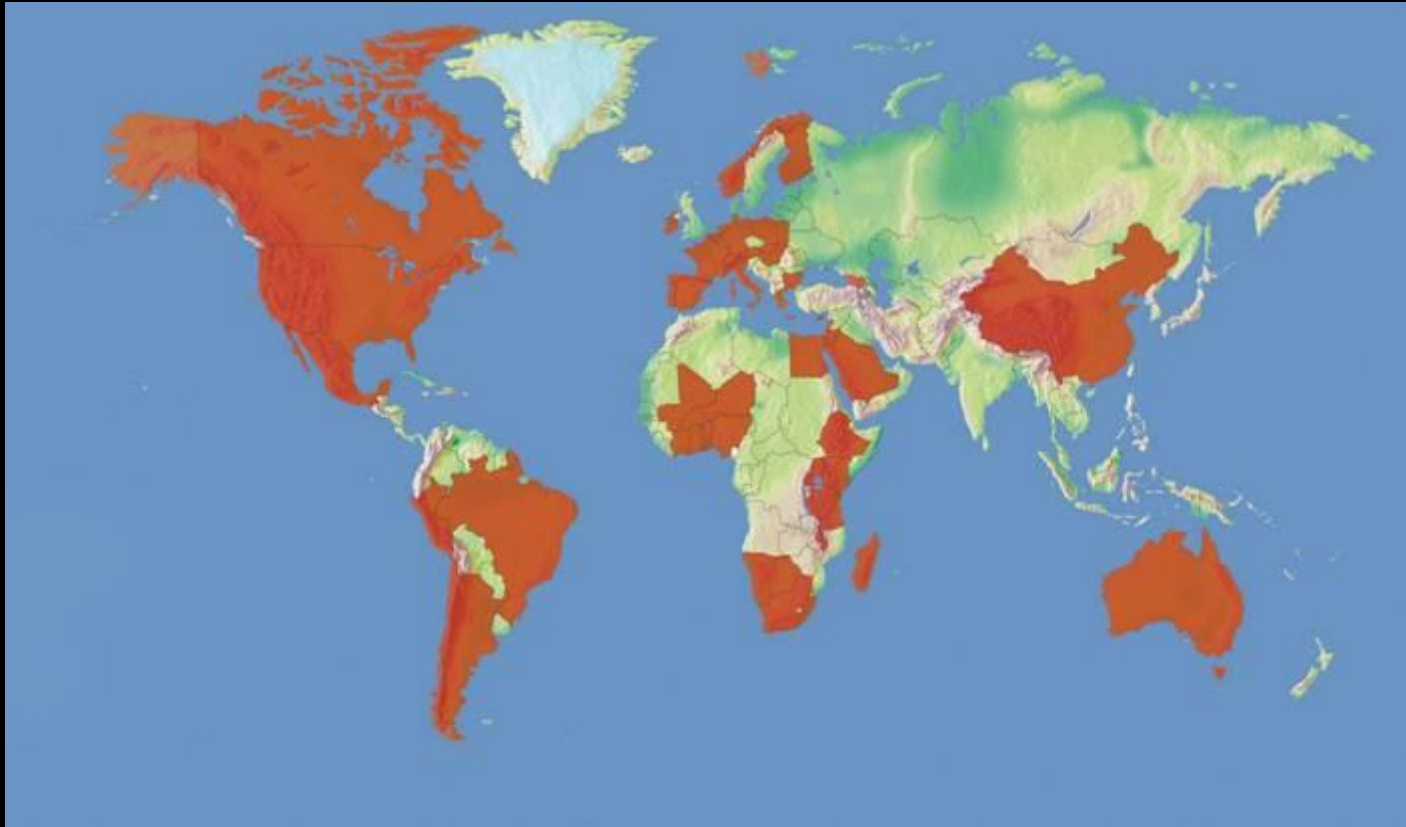
# THE MILLENNIUM SEED BANK PARTNERSHIP



Combating threats to human wellbeing by safeguarding wild plant diversity and enabling its sustainable use, through global partnership



# 120 PARTNER INSTITUTIONS IN 50 COUNTRIES



Australia, Botswana, Burkina Faso, Chile, China, Egypt, Jordan, Kenya,  
Lebanon, Madagascar, Malawi, Mali, Mexico, Namibia, Saudi Arabia,  
Tanzania, South Africa, USA

## COLLECTING AND CONSERVATION

---





# COLLECTIONS

- Endangered
- Endemic
- Economic



# COLLECTING AND CONSERVATION

Effective drying is the most important step



For every 1% reduction in seed moisture content, seed life span doubles.



# DRY SEEDS MUST BE SEALED IN A SUITABLE CONTAINER



# COOLING DRY SEEDS MAKES THEM LIVE LONGER



For every 5°C of  
cooling storage life  
doubles



# COLLECTING AND CONSERVATION



>10% world's flowering plants  
already banked

Collections held in country of  
origin and duplicated at MSB



# MILLENNIUM SEED BANK PARTNERSHIP

## TECHNOLOGY TRANSFER & SCIENCE

---



# TECHNOLOGY TRANSFER

Since 2001, the MSBP has:

- Provided £13.66 million to partner organisations to support and advance the seed conservation effort
- Trained > 1300 people in seed conservation via in-country and UK-based training courses - the equivalent of >7,000 trainee days
- Facilitated the adoption of new and improved seed conservation methods
- Provided advice on the design of seed bank facilities delivered to 19 institutes across 10 countries
- Provided technical information and training services to development organisations, including Bioversity International and Concern worldwide



# SEED SCIENCE

Germination tests  
monitor the viability  
of the collections





# BUT HOW LONG CAN SEEDS REMAIN ALIVE ?

# ANCIENT SEEDS



# ANCIENT SEEDS



© Tony Elphick

Two legumes and one species of *Leucospermum* alive after more than 200 years

## ENABLING USE

---



# SOLVING GERMINATION PROBLEMS

- **Germination protocols** are a vital output of the Millennium Seed Bank
- **>10,000** germination tests carried out each year. For most species, the methods are new.
- All germination protocols available on Kew's website:  
<http://www.kew.org./data/sid>



# Using native seeds for landscape-scale restoration

# Making Space for Nature (Lawton Review, 2010)

“To make space for nature we need *more, bigger, better and joined up* sites to create a sustainable, resilient and more effective ecological network for England.”





Only 3% of UK's species rich meadows remain since 1930s



# UK Native Seed Hub Aims

- To improve the quality, availability and appropriateness of UK native seed
- To support the native seed industry in responding to increased demand
- To support restoration, enhancement & reintroduction initiatives in the UK

# Support, Advice, Training

## Projects:

Initial focus lowland  
meadows

Weald meadows initiative

South Downs National  
Park NIA

Orchid Establishment  
Kent Wildlife Trust



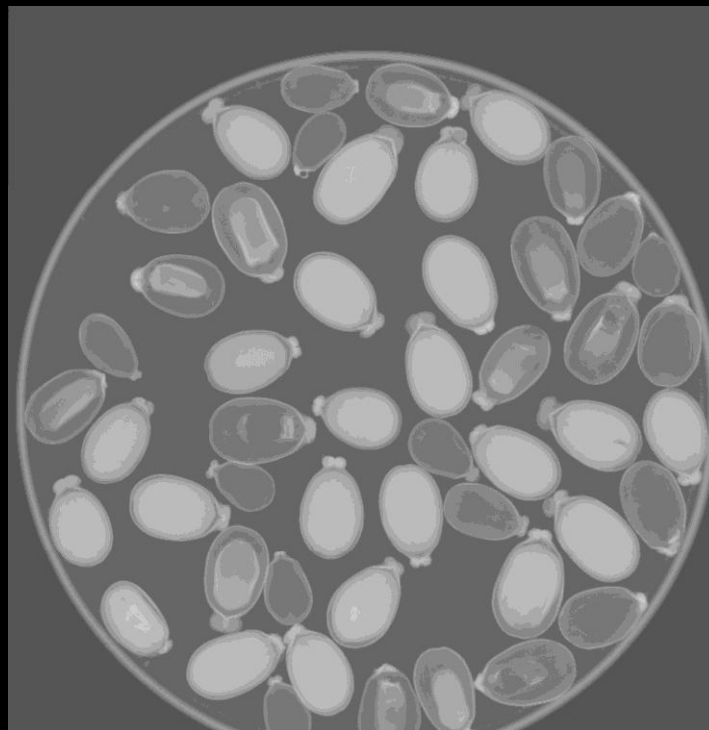
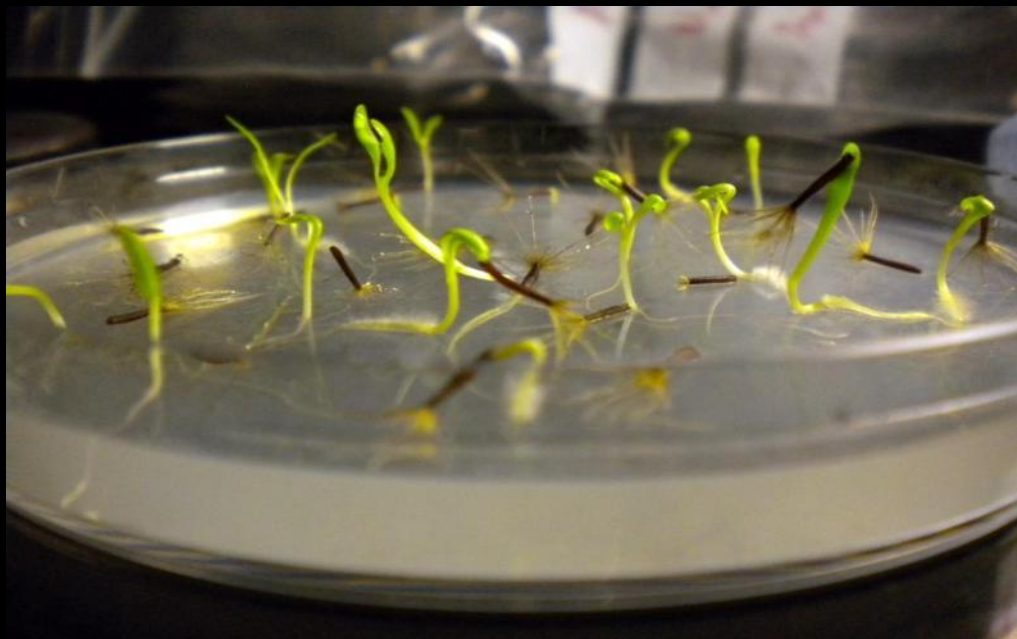
# Seed Production



- 2010-11 Temporary beds opened June 2011
- 2011-12 Permanent beds opening July 17th 2012
- Estimated harvest 2012 = 18kg of seed
- Species selected for species-rich grassland habitats, lowland meadows, forthcoming projects, seed industry demands

# Seed Services

- Quality assessment
- Viability testing
- Seed sales



# Research & Development

Horticultural & scientific expertise shared  
Seed priming experiments  
Dormancy breaking Techniques  
Improved nursery production methods



# Education

Raising awareness of UK  
native flora and habitats  
Species information  
boards



# Visitor Attraction



## WHERE DO WE GO FROM HERE ?

---





# Kew's Millennium Seed Bank Partnership 2010-2020



- Target 1:** Secure in safe storage **25%** (75,000) of the world's plant species by **2020**
- Target 2:** Enable **innovation**, **adaptation** and **resilience** in agriculture, horticulture, forestry and habitat restoration.
- Target 3:** To ensure the **long-term financial security** of the Millennium Seed Bank Partnership

# THE COST

- ~ £100,000,000
- ~ £2,000 per species
- ~ what Europe spends on toiletries and cosmetics .....

# EVERY SECOND !

# IN A NUTSHELL

- Human livelihoods depend on wild plant diversity
- Land conversion and climate change are its biggest threats
- Seed conservation and use is a very cost effective strategy for combating current threats



