



Seed Storage Committee

Summary of Activities

2004 - 2007

Committee members

- Prof T Aveling – SA
- Dr M Bennett - USA
- Prof P Berjak – SA
- Dr R Blanco – Spain
- Dr C de la Cuadra – Spain
- Dr O Elbagoury – Egypt
- Mr D Erdey – SA
- Dr E González-Benito – Spain
- Dr P León-Lobos – Chile
- Dr I Martin - Spain
- Prof M McDonald – USA
- Dr H Msanga – Tanzania
- Prof D Mycock - SA
- Prof H Pritchard - UK
- Dr M Sacandé – Burkino Faso
- Dr C Wood - UK

Structure of Committee



Orthodox Seeds

- **Micro-organisms**
- **Cryostorage and genebanking**
- **Invigoration**
- **Development of methodologies**
- **Other aspects**

Non Orthodox Seeds

- **Micro-organisms**
- **Storage**
- **Responses to manipulation**
- **Development of methodologies**

Orthodox Seeds – Micro-organisms

Aveling

Fungi associated with seed stored by subsistence farmers – cowpea and maize

Impact of specific fungicides

Berjak

Fungal infection pattern during development of *Welwitschia mirabilis*

Orthodox Seeds – Cryostorage and genebanking

de la Cuadra, Blanco & Martin

**Tested viability of active and base
collections of a wide variety of
agricultural species after 10 and 20
years in storage**

**Spreading of disease/ pathogens with the
dissemination of germplasm**

Orthodox Seeds – Cryostorage and genebanking

González-Benito

**Tested viability of Brassica accessions
(+75) after 40 years in storage**

**Developing storage regimes (including
ultra dry) for several species**

Dormancy aspects



Orthodox Seeds – Cryostorage and genebanking

Pritchard, Wood, Sacandé

**Assessment of germination of 14 tropical
tree species after long storage (up to 18
years)**

Orthodox Seeds – Invigoration

de la Cuadra

**Effects of hydration/dehydration
treatments on stored barley, lentil and
oat**

Orthodox Seeds – other aspects

de la Cuadra

Scarification treatments for *Trifolium glomeratum*

Non Orthodox Seeds – Micro-organisms

Berjak & Erdey

The fungi associated with several Amaryllid spp do not infect the embryonic axes

***Strelitzia reginae* both external and internal fungi can be controlled by the use of hot water therapy**

Non Orthodox Seeds - Wet Storage

Berjak

Seeds of *Syzygium cordatum* can be stored for up to 10 weeks at 16 °C

Isolated axes of Amaryllid spp can be wet stored (encapsulated) at 6 °C for up to 4 months

Non Orthodox Seeds - Crystorage

Berjak

**Investigating the cryostorability of
several indigenous plants e.g.
Amaryllid spp, *Ekebergia capensis*,
Syzygium cordatum and *Trichilia* spp**

Non Orthodox Seeds – Responses to manipulation

Berjak

**Mild dehydration stress stimulates
germination in several indigenous spp**

Pritchard, Wood, Sacandé

**Screened for desiccation tolerance in 9
palm species**

Non Orthodox Seeds – Development of Methodologies

Mycock

Development of cryostorage protocols for *in vitro* tissues of *Eucalyptus* spp and hybrids

Development of conservation strategies for endangered *Protea* spp includes seed storage and cryopreservation

Non Orthodox Seeds – Development of Methodologies

Berjak

Development of cryostorage procedures for the *in vitro* tissues of several spp that produce recalcitrant seeds e.g. *Garcinia livingstonei* and *Theobroma cacao*

Seed Storage Handbook



- **Several members of the committee are willing to contribute**
- **Editor required to drive the process**

Proposed Structure

Prof H Pritchard

Chapter 1 - Introduction to seed storage behaviour

Chapter 2 - Methodologies and case histories

- **Seed desiccation and the identification of critical moisture contents:**
 - Drying protocols in relation to seed numbers used: e.g. IPGRI protocol and 100-seed test
 - Quantification of desiccation curves in relation to chemical composition of the seed
 - Patterns of seed germination change on drying, including the dual response of seeds
 - Drying protocols for seed parts (axes, of relevance to recalcitrant seed storage)

Proposed Structure

Chapter 3 Seed storage in the dry state:

- Optimum moisture contents and temperatures, including cryopreservation

Chapter 4 Large and smaller scale seed storage for sustainable use:

- Tree seed centre
- ISTA seed testing laboratory
- Crop genebank
- Wild species genebank

Proposed Structure

Chapter 5 - Seed storage in the wet state:

- Optimum moisture contents and temperatures, including cryopreservation
- Changes in the sub-imbibed state
- Differences between recalcitrant and orthodox seeds

Chapter 6 - Seed Biology

- Features of seeds that relate to storage responses:
 - Maturity
 - Size and other physical attributes
 - Germination rate

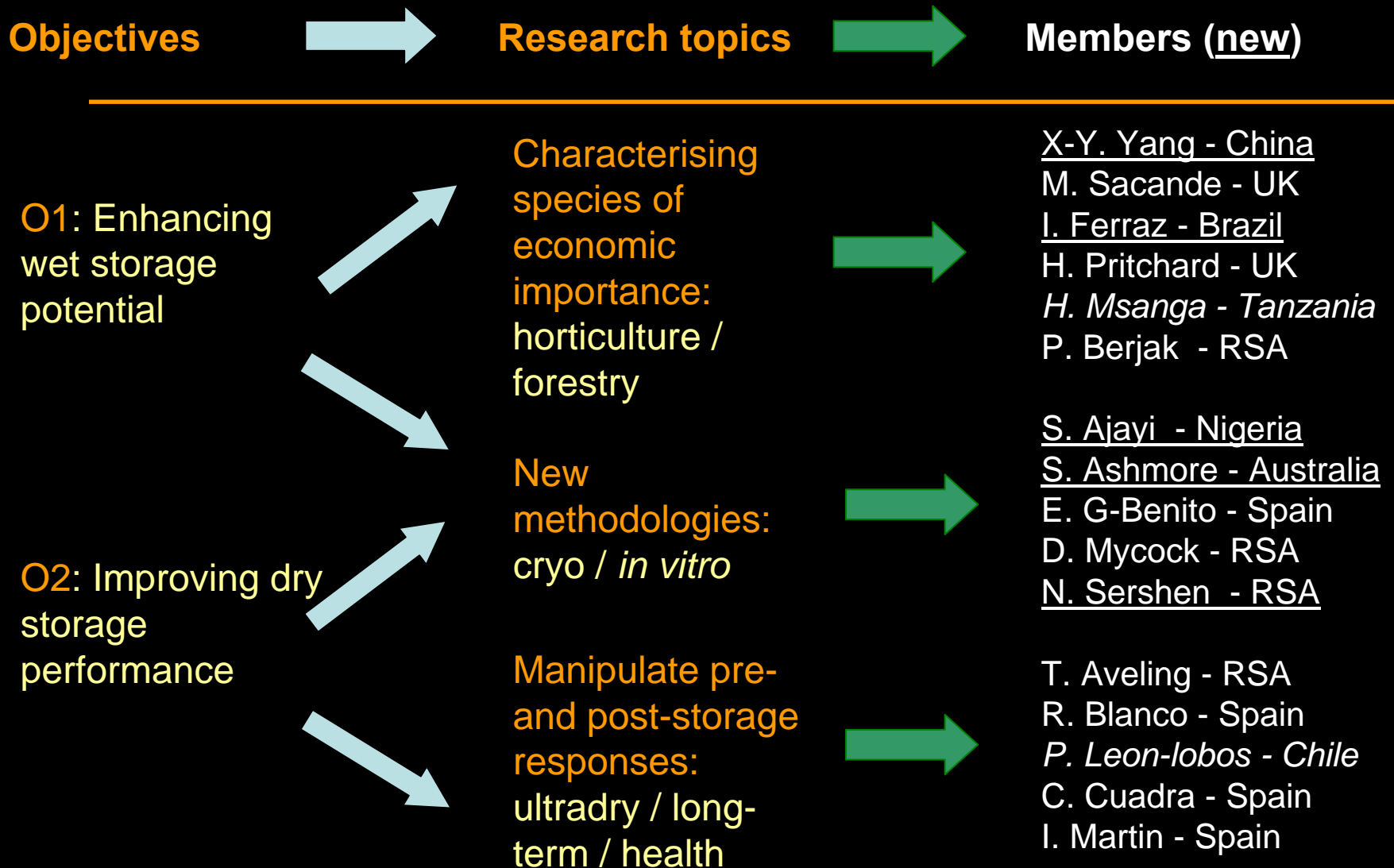
Proposed Structure

Chapter 7- Fungal pathogens and seed storage, in the wet and dry state

Annex

- Checklist of seed storage behaviour for ISTA-listed species (c. 500)

SSC: 2007-10



Research topics and targets 2007-10

- **Species characterisation:**
 - > 100 economic species characterised as orthodox or non-orthodox (seed physiology)
- **New methods**
 - > 5 species cryopreservation methods produced (seed cryobiology)
 - Somatic embryogenesis resolved for 2 species (seed biotechnology)
- **Manipulate storage:**
 - > 70 species long-term storage data reviewed (seed 'banking')
 - Risks of ultradrying assessed on 10 species (seed biophysics)
 - Thermotherapy applied to 5 species (seed health)

SSC Workplan 2007-10

- **Research topics:**
 - **Species characterisation / new methods / manipulate storage**
- **Workshops:**
 - **Sponsor session of Seed Desiccation Workshop in RSA in early 2010**
 - **Co-sponsor with IUFRO 'Tree seeds in a changing climate' (UK 2008)**
 - **Any others?**
- **Towards seed storage recommendations:**
 - **Write book on seed viability (30 years since 'Viability of Seeds' by E. Roberts)**
 - **Questionnaire to ISTA labs on storage needs, capacity, capability**
 - **Guidelines drawn up**

Need for guidelines: current rules

2.8 Storage of samples

2.8.1 Before sampling

If delay [in testing] is avoidable, **the sample shall be stored in a cool well-ventilated room** in such a way that changes in the quality of the seed are minimised

2.8.2 After sampling

To provide for re-testing..., submitted samples on which...Certificates have been issued shall be stored for one year.... **Storage** of the sample shall be done **in conditions calculated to minimise any change in quality**.

International Rules for Seed Testing Effective from 1st January 2004