

ISTA Seed Storage Technical Committee

Annual Activity Report 2025

Jayanthi Nadarajan

The New Zealand Institute for Bioeconomy Science

Chair Seed Storage Committee



Seed Storage Committee (STO TCOM) Membership

		Country	Active since
1	Chair: Jayanthi Nadarajan	New Zealand	2019
2	Vice-Chair: Steven Groot	Netherlands	2016
3	Andreas Börner	Germany	2010
4	Sershen Naidoo*	RSA	2011
5	Christina Walters*	USA	2011
6	Xiang-Yun Yang*	China	2011
7	G V Jagadish	India	2019
8	Nelson Barbosa Machado-Neto	Brazil	2022
9	Umarani Sinniah	Malaysia	2022
10	Louise Colville		2022
11	Elisa Monteze Bicalho		2022
12	Irfan Afzal		2022
13	Karen Sommerville		2024
14	Peterson W. Wambugu		2024
15	Filippo Guzzon		2024
ECOM Liaison Officers: Claid Mujaju & Sergio Pasquini			

* Have now withdrawn their memberships

- We have 3 vacancies – EOs welcomed, advertised in ISTA Weekly Newsletter 10 June 2026 edition. Thanks to Nadine and Andreea.

Seed Storage Technical Committee Call for Members

ISTA invites applications from professionals with interest in seed storage biology, seed testing, seed science and technology related to seed storage.

- 🌱 Contribute to the ISTA International Rules for Seed Testing and Handbooks
- 🌱 Participate in technical committee activities
- 🌱 Priority given to African & Asian countries working in seed testing laboratories, genebanks, seed banks, seed storage research, or community seed banks

Jayanthi.Nadarajan@plantandfood.co.nz



Seed Storage Committee Aims and Relevance

Aims:

- To quantify seed storage responses (particularly desiccation tolerance) in species previously under-researched
- To assess the long-term storage stability of orthodox seeds, including aspects of seed health
- To develop innovative methods for storage recalcitrant seeds including cryopreservation
- To collate, interpret and present information on seed storage under 'guidelines', of value to ISTA members and others

Relevance:

- The purpose of seed storage is to maintain the seed in good physical and physiological condition from the time seeds are harvested until the time they are used



[Seed Storage Committee - Technical Committees - International Seed Testing Association](#)

Activity Report of STO TCOM's Work Programme for 2025



Development
of New
Scientific
Knowledge
and
Technology



Publications



Seminars



Workshops
and Trainings



Special
Project

STO TCOM Activities

Knowledge and Technology Development – orthodox / under-researched seed species

Activity	Contributing STO TCOM members	External collaboration
Seed dormancy breaking in wild millets (genera <i>Cenchrus</i> , <i>Digitaria</i> , <i>Setaria</i> , <i>Urochloa</i>). As dormancy in orthodox seeds impacts seed longevity, long-term storage for up to 40 years at MSB was also tested on these accessions.	Filippo Guzzon at the KEW Millennium Seed Bank (MSB)	
Defining seed longevity of onion accessions stored at IPK and the University of Pavia Germplasm Bank.	Andreas Börner (IPK) & Filippo Guzzon (MSB)	University of Pavia (Graziano Rossi)
Investigating the effects of plasma treatments on dormancy, germination, seed storage and surface disinfection of six UK native tree species was completed.	The project led by Louise Colville (RBG Kew, UK)	Elsoms Seeds, Leibniz Institute for Plasma Science and Technology and phenoLytics and UK Forestry Commission



Dehulling the secret of the germination of crop wild relatives of *Cenchrus*, *Digitaria*, *Echinochloa*, *Setaria* and *Urochloa*

Authors: Guzzon, Filippo; Hernandez, Elena Fouce; Castillo-Lorenzo, Elena

Source: *Seed Science and Technology*, Volume 54, Number 1, April 2026, pp. 65-79(15)

Publisher: International Seed Testing Association

DOI: <https://doi.org/10.15258/sst.2026.54.1.07>

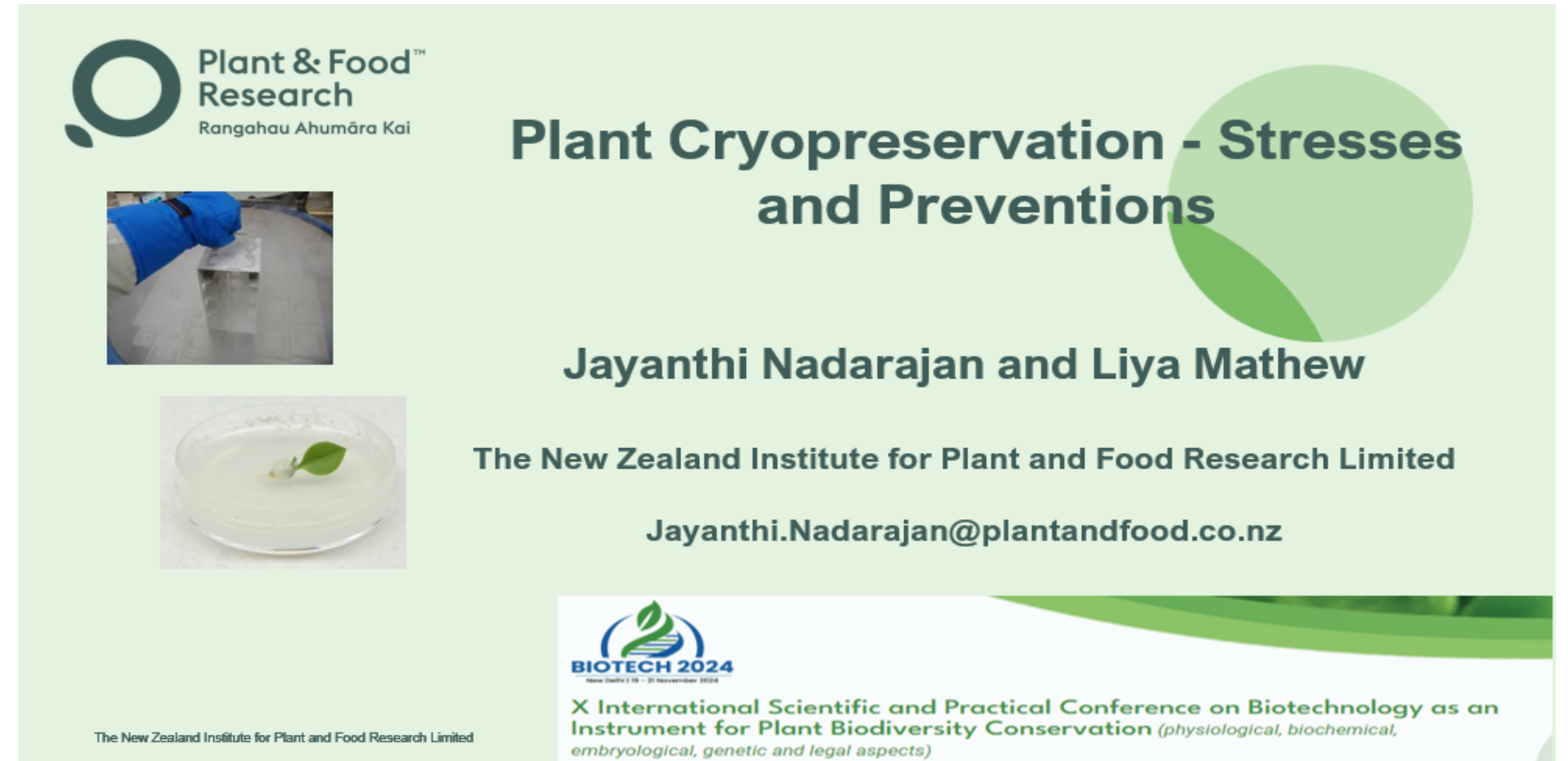
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Seeds being treated with plasma at Leibniz Institute for Plasma Science and Technology

Knowledge and Technology Development – recalcitrant, difficult to store seed species

- Invited talk by Jayanthi Nadarajan at the BIOTECH 2024 conference, 19-21 Nov 2024, New Delhi, India.
 - oxidative-, wounding-, osmotic-, temperature-, physical- and physiological- stresses faced by tissues during cryopreservation.
 - how understanding the nature and mechanisms of these stresses will help in developing mitigation strategies to optimise post-cryopreservation recovery.
 - International Society for Horticultural Science (ISHS) Conference
 - Publication - in press in Acta Horticulturae



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Plant Cryopreservation - Stresses and Preventions

Jayanthi Nadarajan and Liya Mathew

The New Zealand Institute for Plant and Food Research Limited

Jayanthi.Nadarajan@plantandfood.co.nz

BIOTECH 2024
New Zealand 2024 - 21 November 2024

X International Scientific and Practical Conference on Biotechnology as an Instrument for Plant Biodiversity Conservation (physiological, biochemical, embryological, genetic and legal aspects)

The New Zealand Institute for Plant and Food Research Limited

The slide features a green background with a large green leaf graphic on the right. It includes two small images: one showing a person in a blue glove handling a container, and another showing a petri dish with a small plant specimen.



Publication – Update on Seed Storage Handbook Writing

Chapter	Heading	Progress (June 2026)
1	Seed storage biology (Introduction Chapter)	15%
2	Seed moisture content and storage	Full 1 st draft completed
3	Seed storage temperature	Full 1 st draft completed
4	Seed storage environments	Full 1 st draft completed
5	Seed packaging	Full 1 st draft completed
6	Cryostorage of seeds and axis	Sent for editing to Vanessa (ISTA Editor) in April 2026
7	Prediction of seed storage behaviour	60% completion
8	Estimation of seed longevity	60% completion
9	Seed pest, pathogens and beneficial microbiomes and storage	60% completion
10	Oxidative modifications during seed storage	Sent for editing to Vanessa (ISTA Editor) in April 2026
Appendix	Known seed storage behaviour – from RBG Kew SID	Completed (Sent for editing to Vanessa (ISTA Editor) in April 2026)

**Target for completion
December 2026**

Scientific Publications

A total of 58 scientific publications cumulatively for 2023 – 2025 (including book chapters and journal articles) relevant seed storage

Contributing STO TCOM Members	Publication details
Nadarajan J	Asymbiotic <i>in vitro</i> germination and viability assessment of three threatened neotropical epiphytic orchids of the <i>Lycaste</i> genus. <i>Seed Science and Technology</i> , 53 , 3, 391-405. https://doi.org/10.15258/sst.2025.53.3.04
Nadarajan J	Establishment of ex situ conservation technologies for Aotearoa New Zealand's <i>Actinidia</i> sp. Genetic resources. Acta Horticulturae 1431. ISHS 2025. DOI 10.17660/ActaHortic.2025.1431.49 Proc. XI International Symposium on Kiwifruit. Eds.: S.M. Pilkington, J. Burdon and S. Nardoza.
Sommerville K	Thermal behaviour of lipids in short-lived seeds of Australian rainforest species. <i>Annals of Botany</i> 00: 1–18, 2025 https://doi.org/10.1093/aob/mcaf181 .
Guzzon F	Effects of covering structures and gibberellic acid in promoting the seed germination of <i>Urochloa</i> . <i>Genetic Resources and Crop Evolution</i> , 72: 6221-6230.
Guzzon F	A proposal for genebank metrics to enhance collection management. <i>Plant Genetic Resources: Characterization and Utilization</i> (in press).
Afzal I	Evaluation of cotton (<i>Gossypium hirsutum</i> L.) seed longevity and deterioration: Physiological and biochemical aspects in relation to moisture contents during storage in different module systems. <i>Journal of Stored Products Research</i> . 111: 102553.
Groot SPC	Effect of drying conditions on quality of primed cabbage seeds and ethanol degradation as promising quality parameter. <i>Drying Technology, Published online: 03 Feb 2025</i> , 1–18. https://doi.org/10.1080/07373937.2025.2458139
Groot SPC	Modelling the quantitative effect of oxygen on the ageing of primed celery seeds. <i>The Plant Journal</i> , 122(1), e70066. https://doi.org/10.1111/tpj.70066
Groot SPC	<i>Training material on the production of healthy, high-quality organic seed</i> . Retrieved from https://orgprints.org/id/eprint/56462/
Groot SPC	E-learning "Module 12: Seed maturity and harvest." (2025). EU LiveSeeding project. https://itab.bio/en/elearningseedproduction/Module12
Groot SPC	E-learning "Module 13: Seed drying and storage" (2025). EU LiveSeeding project. https://itab.bio/en/elearningseedproduction/Module13
Machado-Neto NB	Banking on pollen: storing germplasm to preserve genetic diversity and support <i>ex situ</i> conservation of two <i>Cattleya</i> species. <i>Biodiversity and Conservation</i> , v.35, p.1, 2025.
Machado-Neto NB	Seed Storage and Germination of Three Grass Species: Effect of Spikelet Weight and Dormancy. <i>Brazilian Archives of Biology and Technology (Online)</i> . v.68, p.e25241009, 2025.
Börner A	Application of machine learning models for non-invasive seed quality detection. <i>Curr. Plant Biol.</i> 44 (2025) 100557. https://doi.org/10.1016/j.cpb.2025.100557
Börner A	Comprehensive profiling of the miRNome and degradome reveals regulatory signatures of seed aging and germination. <i>Int. J. Mol. Sci.</i> 26 (2025) 9292. https://dx.doi.org/10.3390/ijms26199292
Börner A	Book of abstracts. Scientific Seed Symposium One century of ISTA - a milestone for seed technology and research", Meeting of the Working Group Seed Science and Certification (GPZ/GPW) & Section IV Seeds (VDLUFA), 11-13 March 2025." (2025) 36 pp.

Workshops - Technology Transfer



A training course on plant cryopreservation was delivered at Royal Botanic Gardens, Kew, UK, 4-12 Nov 2025, with 11 participants from 10 countries (Canada, Fiji, Finland, Germany, Mexico, Philippines, Poland, Spain, UK and USA) trained – Louise Colville



19th Scientific Seed Symposium of the Working Group Seed Science and Certification of the German Society of Plant Breeding and the German Society of Plant Cultivation Research. 11-13 March 2025, Leibniz Institute of Plant Genetics and Crop Plant Research (IPK), Gatersleben - Andreas Börner

Trainings and Workshops - Technology Transfer



Hands-on training courses on seed drying and storage for national genebanks in **Uganda** (1st -30th August), **Tanzania** (1st – 30th September), **Benin** (1st – 30th October) and **Ghana** (1st – 30th November 2025) facilitated by Peterson Wambugu from the STO TCOM

Trainings – Technology Transfer

1. Training in methods for processing and assessing dormancy and storage behaviour in seeds of *Coprosma* spp. Provided for Theo Brook (PhD candidate, Imperial College of London), Mar 2025 by Karen Sommerville.
2. Training in methods for germinating and assessing storage behaviour of rainforest species provided to Dr Gibson Sosanika (lecturer, School of Forestry, Papua New Guinea University of Technology), by Karen Sommerville. October 2025.



Theo Brook and Mel Odonovan processing *Coprosma* seeds
(credit K. Sommerville)



G Sosanika – performing seed cut test
(credit K. Sommerville)

Education - Capacity Building

1. MSc students co-supervised by Louise Colville were trained and successfully completed their projects at RBG Kew:
 - Identifying and characterising short-lived tree seeds
 - The impact of cryoprotection on the germination of *Aesculus hippocastanum* L. embryonic axes using two infiltration methods
2. Training in biophysical and biochemical techniques for assessing lipid changes during ageing of *Populus nigra* and *Fagus sylvatica* seeds provided to Magdalena Trusiak (PhD student, University of Warmia and Mazury in Olsztyn) by Louise Colville. November-December 2025



In vitro germination of *Aesculus hippocastanum* embryonic axis (part of MSc project: The impact of cryoprotection on the germination of *Aesculus hippocastanum* L. embryonic axes using two infiltration methods)



ISTA Workshop in Morocco



ISTA Secretariat

Richtiarkade 18, 8304 Wallisellen, Switzerland
Phone: +41 44 838 60 00 | Fax: +41 44 838 60 01
Email: ista.office@ista.ch
www.seedtest.org

Workshop title: ISTA Workshop on Seed Quality Maintenance during Storage

In planning stage

Date: December 07-10, 2026

Location: ICARDA Genebank, Rabat, Morocco

Aim of the workshop:

This workshop aims to present and discuss practical knowledge on innovative seed storage technologies to maintain seed quality across diverse African environments. It will address the unique needs of researchers, seed companies, and genebanks in Africa, supporting efforts to reduce postharvest losses, enhance seed longevity, and ensure seed security throughout the region.

Local Organiser

Institution: African Sustainable Agriculture Research Institute (ASARI), UM6P, Morocco
Address: ASARI, Mohammed VI Polytechnic University (UM6P), Foug Eloued-70000, Laayoune, Morocco



Strategic Initiative Fund – Seed storage project

- After testing a seed sample for an ISTA Certificate, the remainder must be stored for at least one year (ISTA Rules 2.5.3, 2.5.4.7; Accreditation Standard 6.2.4). Storage should preserve quality “to be able to repeat the original tests“, yet current guidance (“cool and dry”) is not well defined.

- Questions on adequacy of storage frequently arise during accreditation audits

- A project proposal has been developed by the STO (Steven Groot). Will include the following activities:
 - **To make an inventory of current practices with sample storage and retesting**
 - **To involve testing labs from temperate and tropical regions**
 - **To organise five common crop seed samples and perform storage tests**
 - **To test two improved storage methods in comparison to current methods**

Strategic Initiative Fund – Seed storage project - Aims

- Recommend storage methods that prevent significant sample quality change for at least one year
- Propose an ISTA rule on controlled sample storage after initial testing
- When for some crops seed quality traits change within one year, recommendations should be provided for a shorter period during which retesting can be requested.

Collaboration

- Various ISTA committees have been invited to participate:
 - Bulking and Sampling Committee (BSC)
 - Germination Committee (GER)
 - Vigour Committee (VIG)
 - Variety Committee (VAR)
 - Seed Health Committee (SHC)
 - Tetrazolium Committee (TEZ)

Awaiting funding decision

Acknowledgements

- All STO TCOM members
- Liaison officers – Claid Mujaju and Sergio Pasquini
- ISTA secretariat
- Other ISTA TCOMs
- Various external contributors for the handbook writing and research collaborations, workshops/seminars organisations

Jayanthi.Nadarajan@plantandfood.co.nz

STO.chair@ista.ch

Thank You

