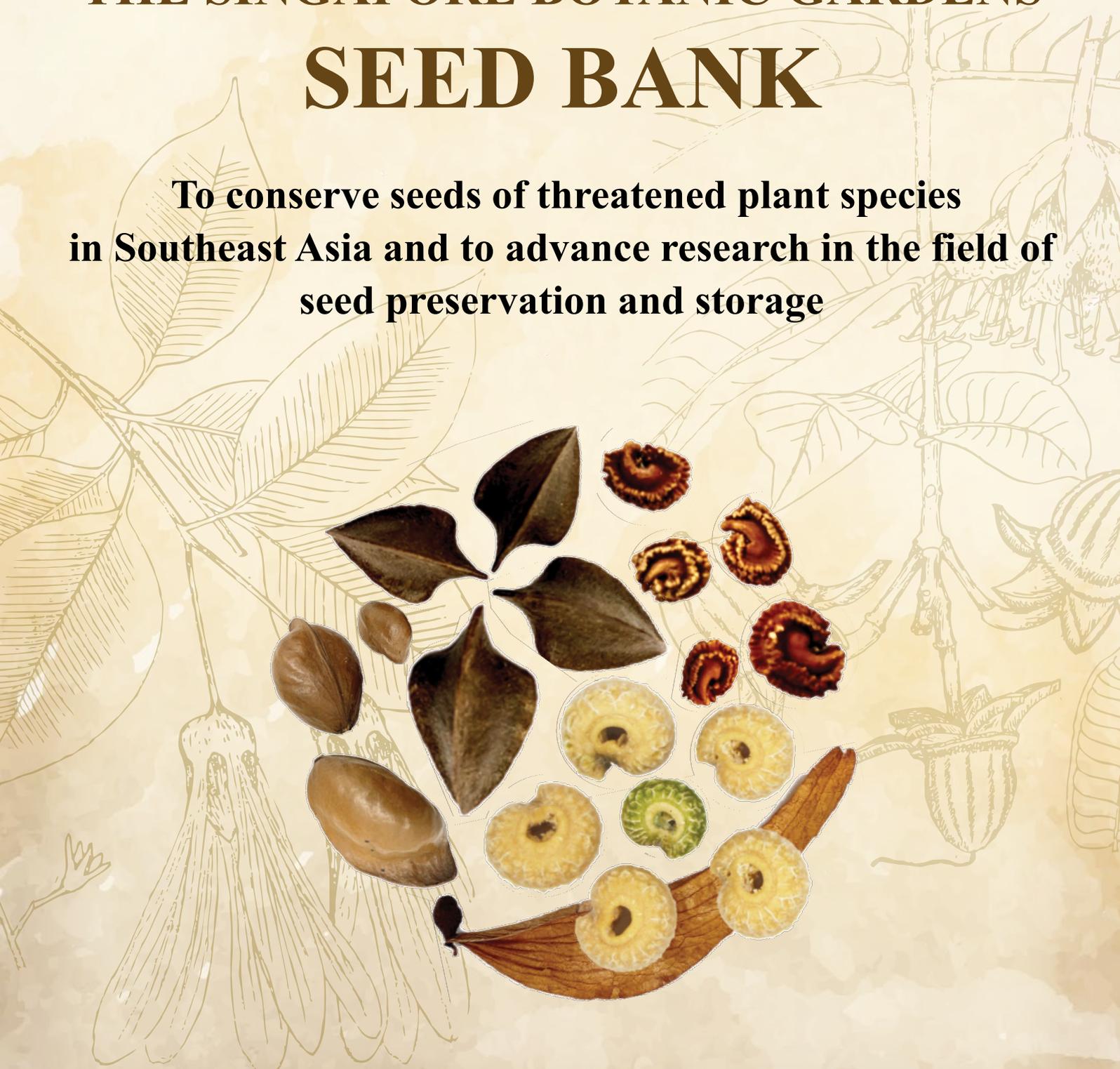


# THE SINGAPORE BOTANIC GARDENS SEED BANK

**To conserve seeds of threatened plant species  
in Southeast Asia and to advance research in the field of  
seed preservation and storage**



# Visitor Information

Operating Hours:

**Singapore Botanic Gardens: 5am – midnight daily**

**Seed Bank: 9am – 6pm daily**

Closed every last Friday of the month

*(Should this fall on a Public Holiday, the Seed Bank will be closed the following Monday)*

**Free Admission**

Access points:

Main entrance with vehicle drop-off point and parking via Cluny Road (with accessible ramp)

Seed Dispersal Garden entrance, 10 min walk from Botanic Gardens MRT station (accessible entrance)



**Singapore Botanic Gardens  
Seed Bank**

**1D Cluny Road  
Singapore 259600**

For more information,  
please visit

[www.nparks.gov.sg/sbg](http://www.nparks.gov.sg/sbg)

[www.facebook.com/singaporebotanicgardens](https://www.facebook.com/singaporebotanicgardens)

# ABOUT THE SEED BANK

Plants are essential to support life on Earth. The Singapore Botanic Gardens (SBG) Seed Bank aims to conserve Southeast Asia's rich botanical diversity, which faces the threats of habitat degradation, over-exploitation, pollution, disease and climate change.

While the conservation of vulnerable plant species in their native habitat is ideal, it is not always possible. The cultivation of such plants in the Botanic Gardens and the storage of their seeds in the Seed Bank are thus important additional components of an integrated conservation strategy.



# ABOUT THE SEED BANK

Seeds are compact packets of genetic information and every seed is genetically different. The storage of seeds allows us to conserve genetic diversity in a smaller space and grow plants from seeds when needed.

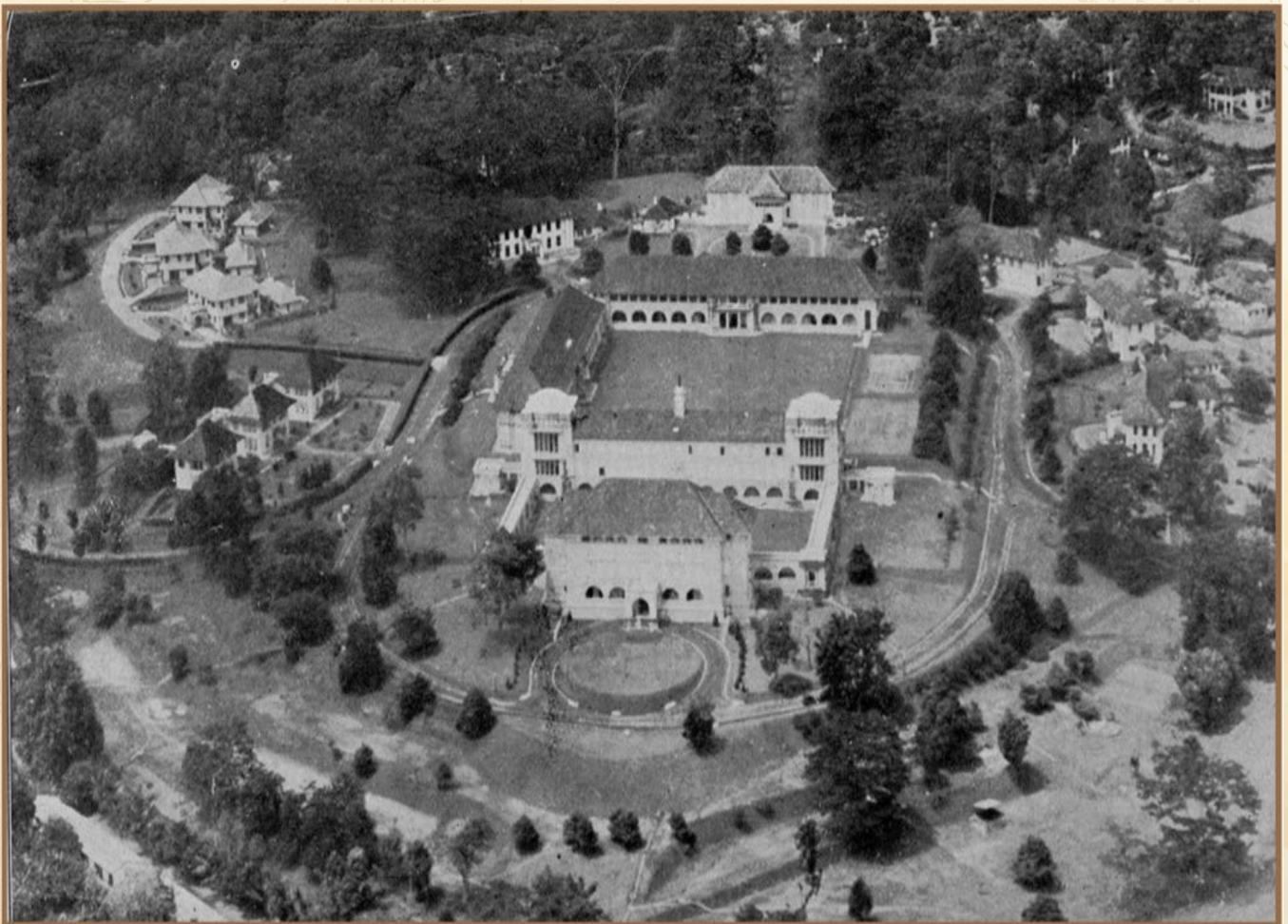
The Seed Bank can store the seeds of up to 25,000 plant species, nearly three times the current 9,000 plant species in the Botanic Gardens' living collection.



## *Did you know...*

The Singapore Botanic Gardens Seed Bank at 1D Cluny Road is one of five conserved buildings built in the 1920s for the teaching staff of the Former Raffles College.

As the largest house, it was originally intended for the college principal who eventually decided to take residence elsewhere.



# ABOUT THE SEED BANK

The Interpretive Gallery provides detailed information about the role of the Seed Bank, the seed banking process and the types of seeds stored in the facility.



Visitors can also get a glimpse into the different seed processing rooms through glass panels to view the actual work of scientists in the Seed Bank.

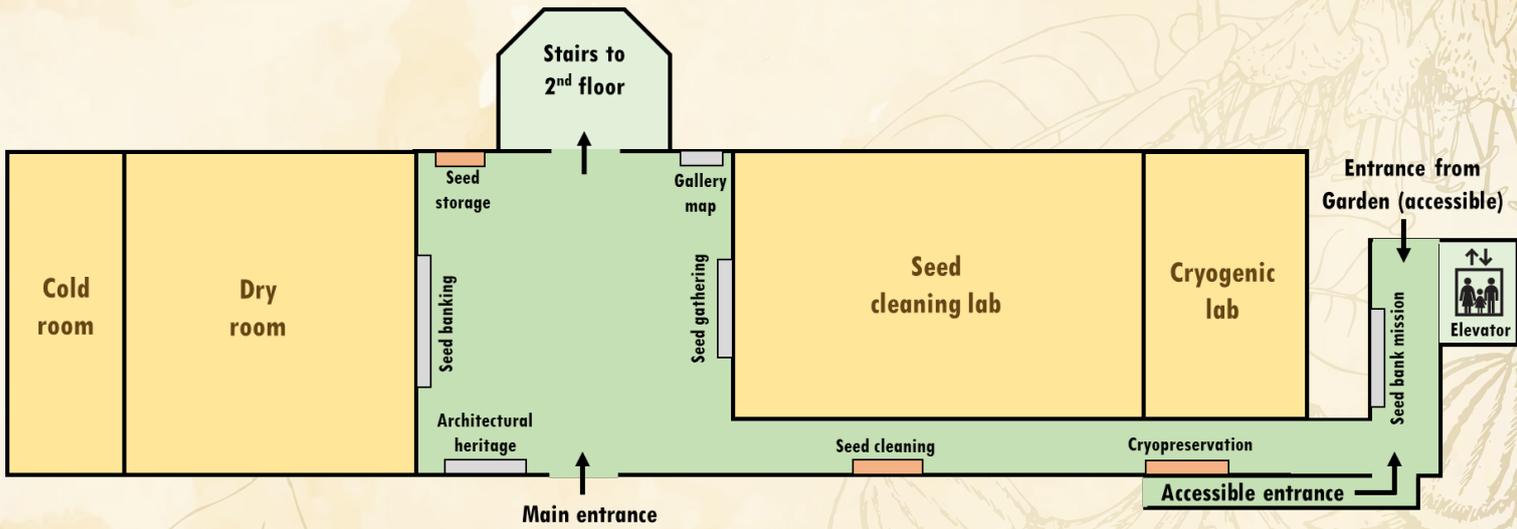


# ABOUT THE SEED BANK

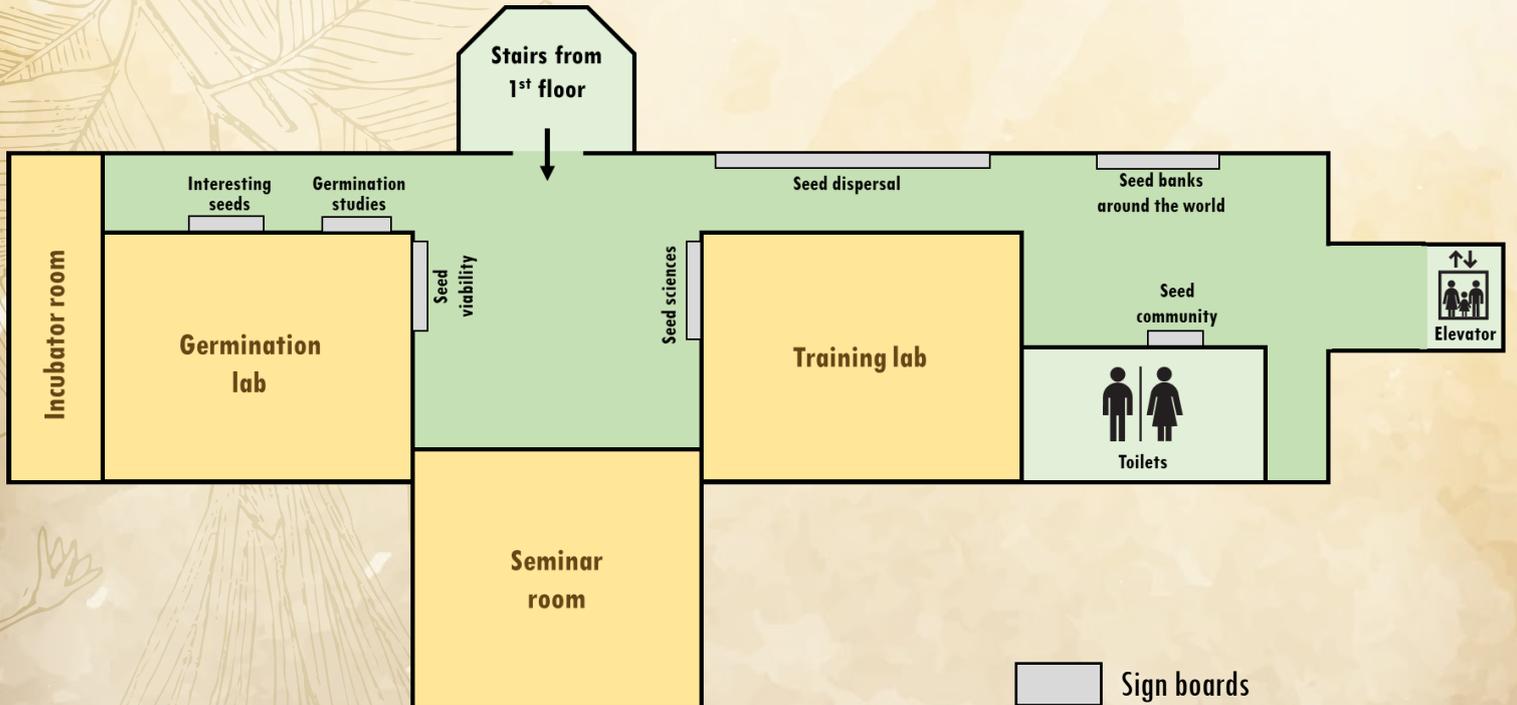
Landsaped according to the various dispersal mechanisms, wind, water, animal and self-dispersal, the Seed Dispersal Garden features many native plants and four sculptures which are creative interpretations of seeds.



# Gallery Map (1<sup>st</sup> Floor)



# Gallery Map (2<sup>nd</sup> Floor)



-  Sign boards
-  Interactive panels
-  Areas accessible to public
-  Areas inaccessible to public

# THE PROCESS OF SEED BANKING

## Step 1: Seed Gathering

A great deal of care is taken during seed collection so as to not adversely affect the survival of the natural population.

Seed collectors first make a preliminary trip to the site where the target plant species is found. Several more trips are made thereafter to estimate the optimum period to harvest the seeds.

In remote areas where repeated visits are not possible, seed collectors must assess whether collection will adversely affect natural dispersal on a single visit.



# THE PROCESS OF SEED BANKING

## Step 2: Seed Cleaning

Cleaning of the seeds removes excessive plant bulk and minimizes the risk of fungal growth during seed storage.

At the lab, seeds are inspected for insect, fungal and physical damage. They are sorted, selected and cleaned by hand.



Tools used for hand cleaning:  
Brushes, tweezers, scalpel

# THE PROCESS OF SEED BANKING

## Step 2: Seed Cleaning

Fleshy fruits with many small embedded seeds are often strained through metal sieves. Non-fleshy fruits and seeds that come with a lot of debris and unwanted materials are cleaned with an aspirator.



Sieves of different mesh sizes for cleaning fleshy fruits

# THE PROCESS OF SEED BANKING

## Step 2: Seed Cleaning

Aspirators make use of air currents and gravity to separate seeds from unwanted debris. An air stream blowing upwards carries lighter material, such as chaff, into a container above, while the heavier material, usually seeds, falls back down the column into a seed collecting container.



Aspirator

# THE PROCESS OF SEED BANKING

## Step 3: Seed Drying

After cleaning, seeds are dried to 15% relative humidity, in a dry room maintained at around 20°C.

Drying of seeds is crucial to prolong storage life, prevent germination and reduce the risk of pathogenic attack. A seed's lifespan doubles for every 1% reduction in its moisture content.

A hygrometer is used to measure the relative humidity of the seed collection.

A datalogger to measure the humidity and temperature of a seed sample



# THE PROCESS OF SEED BANKING

## Step 3: Seed Drying

The seeds are counted manually or by using a seed counter, and sealed in tri-laminate foil pouches which have very low permeability to oxygen and water. The foil pouches are then labelled with the collection's accession number.



Trilaminar foil pouches  
of various sizes

# THE PROCESS OF SEED BANKING

## Step 4: Seed Storage & Cryopreservation

Seeds can be classified based on their ability to tolerate dehydration and freezing. Orthodox seeds can tolerate the extreme drying and freezing needed for storage in a seed bank. Recalcitrant seeds, however, cannot tolerate extreme drying and freezing and die when their moisture content drops below 40%. Hence, they cannot be easily stored.



# THE PROCESS OF SEED BANKING

## Step 4: Seed Storage & Cryopreservation

Once dried, orthodox seeds are stored at  $-20^{\circ}\text{C}$  in the cold room. The storage life of such seeds doubles with every  $5^{\circ}\text{C}$  reduction in storage temperature.

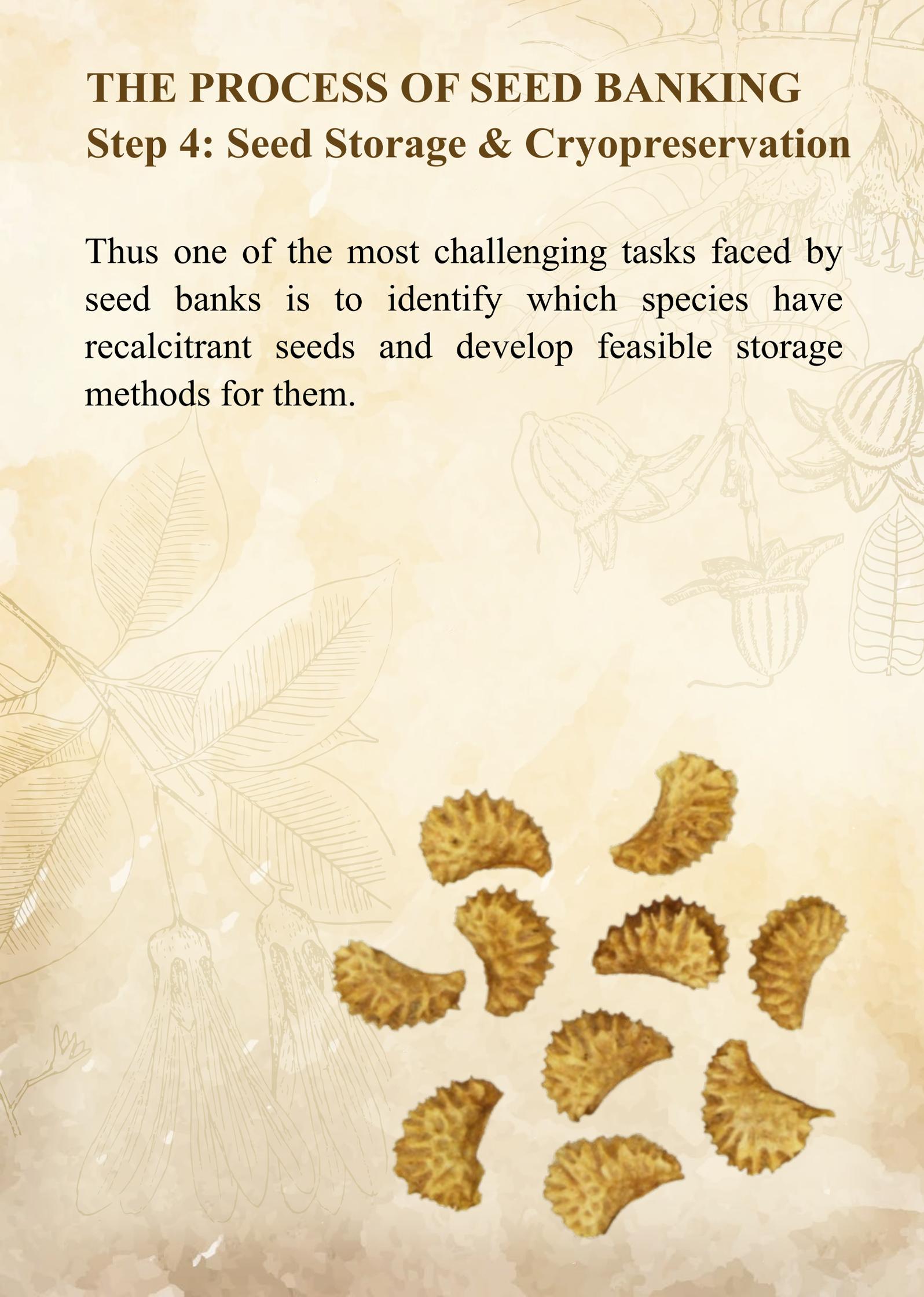
Since recalcitrant seeds do not tolerate being dried and frozen, their embryos can be extracted and stored in vats of liquid nitrogen at  $-196^{\circ}\text{C}$ . This is known as cryopreservation. While this extends the lifespan of the embryos, they still lose their viability more quickly than orthodox seeds stored at  $-20^{\circ}\text{C}$ .



# THE PROCESS OF SEED BANKING

## Step 4: Seed Storage & Cryopreservation

Thus one of the most challenging tasks faced by seed banks is to identify which species have recalcitrant seeds and develop feasible storage methods for them.



# THE PROCESS OF SEED BANKING

## Step 5: Viability Testing

Inside each seed is a tiny embryo. During germination, the embryo develops into a seedling. A seed bank is valuable for conservation only if the seeds can germinate and grow into mature plants. Hence seeds are tested for viability both before storage and at regular intervals after storage.



# THE PROCESS OF SEED BANKING

## Step 5: Viability Testing

The percentage of viable seeds in a collection is determined by sowing a subset of seeds and counting the number of seeds that germinate and produce healthy seedlings.

Seeds that do not germinate may be cut to check for viability. Healthy seeds are usually firm and white inside while non-viable seeds are empty, shriveled or dark.



# THE PROCESS OF SEED BANKING

## Step 5: Viability Testing

A quick way to detect seed viability is to use X-rays. Alternatively, a Tetrazolium viability test may be used to determine if ungerminated seeds are dead or alive. Only living cells that are actively respiring will stain red when this test is conducted.

### *Tetrazolium viability test results*



viable mustard seeds  
(stain red)



non-viable mustard seeds  
(do not take up the stain)

# SEED COMMUNITY

## Volunteer Programmes

Our volunteers play an important role in helping us achieve our mission of conserving threatened plant species in the region. Be part of a dynamic community and choose from a wide range of opportunities such as conducting guided walks, outreach programmes and many more!

Find out more about our volunteer programmes at:  
[www.nparks.gov.sg/partner-us/volunteer](http://www.nparks.gov.sg/partner-us/volunteer)

Or contact us at:

[nparks\\_sbg\\_visitor\\_services@nparks.gov.sg](mailto:nparks_sbg_visitor_services@nparks.gov.sg)



# SEED COMMUNITY

## Support Us

The future of many plants threatened with extinction depends on conservation efforts by individuals, organisations, institutions and governments. By donating to the Singapore Botanic Gardens Seed Bank, you can help improve our understanding of seed biology and ensure the survival of many plant species.

Support us through the Garden City Fund, a registered charity and IPC, established by the National Parks Board.

Contribute via [www.giving.sg/garden-city-fund/seedbank](http://www.giving.sg/garden-city-fund/seedbank)



# LOCATION MAP



**BUKIT TIMAH VISITOR SERVICES COUNTER**  
 i AED ?

**THE GARAGE**  
 AED ?

**VISITOR CENTRE & NPARKS HQ**  
 F i AED ?

**SEED BANK**

**JACOB BALLAS CHILDREN'S GARDEN**  
 i AED ?

**RAFFLES BUILDING**  
 i AED ?

**LEGEND**

	Visitor Services Counter		F&B Outlet		Taxi Stand		Coach/Car Parking		Boardwalk
	Automated External Defibrillator		Gardens Shop		Bus Stop		Drop-off Point		Steps
	Toilet		Shelter		MRT		Vehicular Access		Gated Gardens
	Diaper Changing Station		Carpark		Gate		Eco-Garden		Singapore Botanic Gardens' World Heritage Site