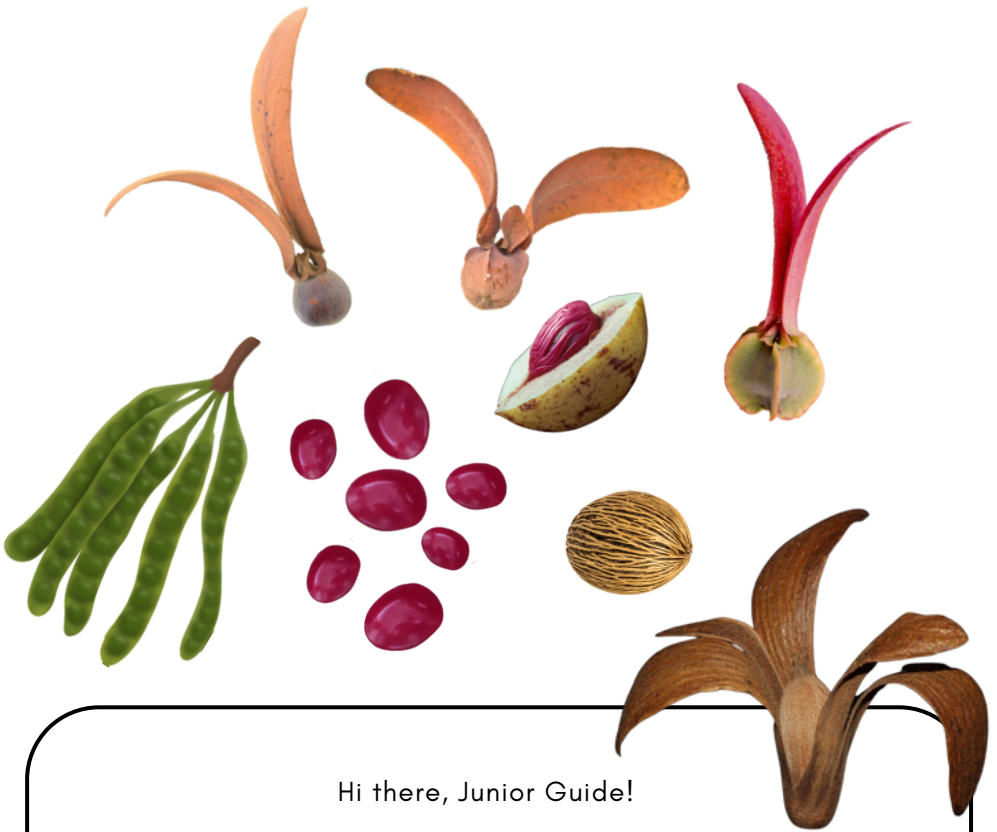


Let's explore the Singapore Botanic Gardens Seed Bank!



Hi there, Junior Guide!

What is your name?



Dear Junior Guides,

Seeds are important as they contain genetic material and nutrients essential for the first spark of life in most plants.

We noticed that some seeds are not commonly found in Singapore anymore due to habitat loss in the past and climate change.

Below is a seed sample from one of the last few remaining trees of a species in Singapore. As a junior guide, your task is to investigate and identify this species of seed and find out how we can save the plants from species extinction and regenerate them.

Good luck guides!

SEED SAMPLE



Let's start searching from the **Seed Dispersal Garden**, next to the Seed Bank. Maybe we'll find some answers there.

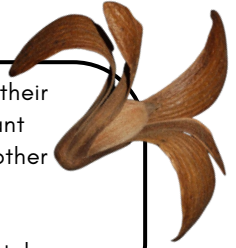


The flowers and leaves may look pretty, but please do not pluck them!

IDENTIFY THE DISPERSAL METHOD

Plants have developed various adaptations that help them disperse their seeds. Did you know that seed dispersal is important for keeping plant species alive? It helps plants to spread their progeny (offspring) to other suitable habitats to grow and establish there.

Take a look at the plants around the Seed Dispersal Garden and match the seeds to their method of dispersal.



Kempas

(*Koompassia malaccensis*)



Sea Pong Pong

(*Cerbera manghas*)



Saga

(*Adenanthera pavonina*)



Broad-leaf Bramble

(*Rubus moluccanus*)



By Water

By Animals

By Wind

By Self-dispersal
(splitting)

For more information on these plants, visit NParks Flora & Fauna Web at:

<https://www.nparks.gov.sg/florafauweb>

Photo credit: Ang Wee Foong (Sea Pong Pong, Broad-leaf Bramble), Ashley Ng (Kempas), Boo Chih Min (Saga)

IDENTIFY THE SEED

Nice work! Now you know that seeds can be dispersed by four methods: wind, water, animals and self-dispersal (splitting).

Look around the Seed Dispersal Garden. Can you identify what seed this is and how it is dispersed?



Name the plant that produces this seed: _____

Circle the method of dispersal:

By Water

By Animals

By Wind

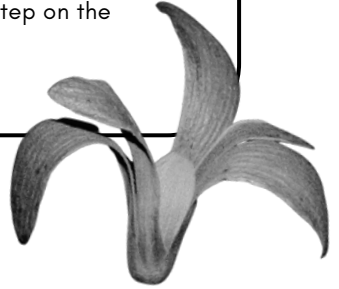
By Self-dispersal
(splitting)

Did you know that this species of seed is critically endangered in Singapore?

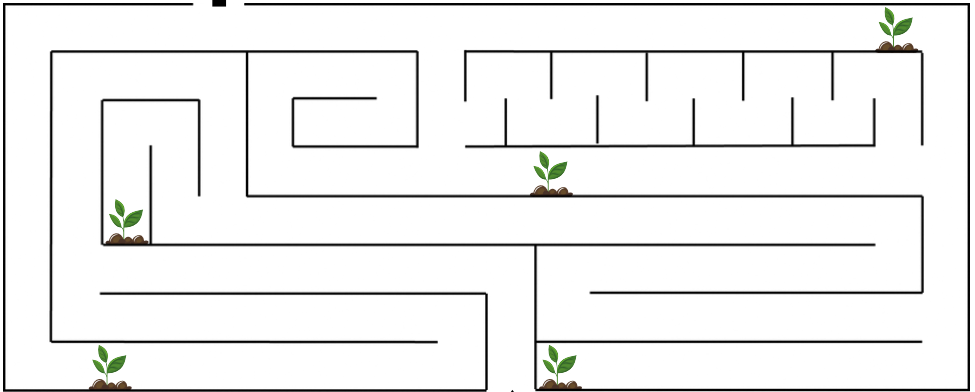
GET TO THE SEED BANK

Good job! This seed belongs to a large rainforest tree species in the family *Dipterocarpaceae* (pronounced as dip-te-ro-carp-pay-see).

Let's head into the Seed Bank to investigate further. Find your way to the Seed Bank through the maze, but be careful, don't step on the plants on your way there!



End



Start

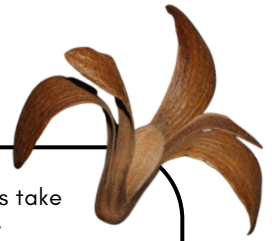
Find out more about what the Seed Bank does!



SCAN ME

Did you know that the Seed Bank can store 750 million seeds?

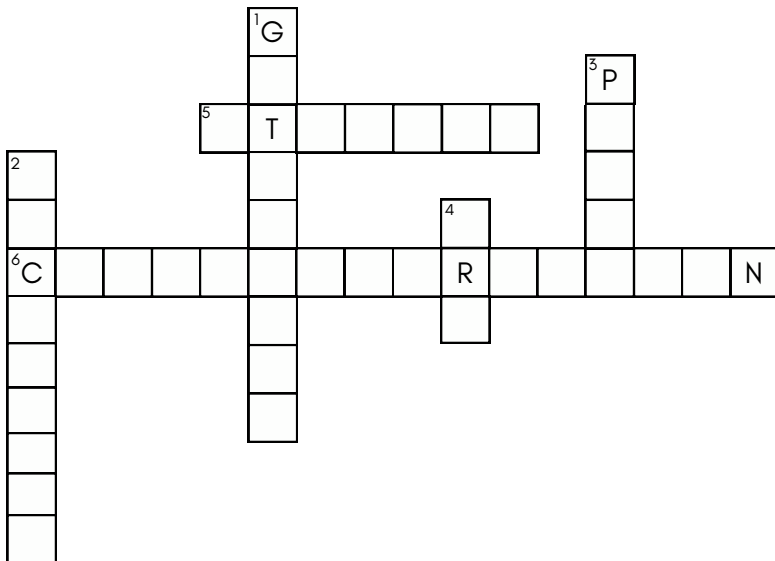
EXPLORE THE LABS



Welcome to the Seed Bank! After collecting seeds, researchers take the seeds through a detailed process to prepare the seeds for storage. The banking of critically endangered seeds helps to ensure a ready and diverse supply of the species' genetic matter.

Explore the labs on level one and fill up the crossword puzzle below, starting from the labs at the main entrance.

1. The first step of preserving seeds is Seed _____.
2. A pair of _____ are used by seed collectors to harvest seeds.
3. The seed cleaning process removes excess _____ bulk from the seed, minimising the risk of fungal growth.
4. After the seeds are cleaned, they are stored in the ____ room to be dried further, increasing their life span.
5. Some seeds cannot tolerate extreme drying or freezing for _____. These seeds are known as recalcitrant seeds.
6. To preserve the genetic matter of recalcitrant seeds, their embryos are extracted and stored in liquid nitrogen at $-196\text{ }^{\circ}\text{C}$ in a process known as _____.



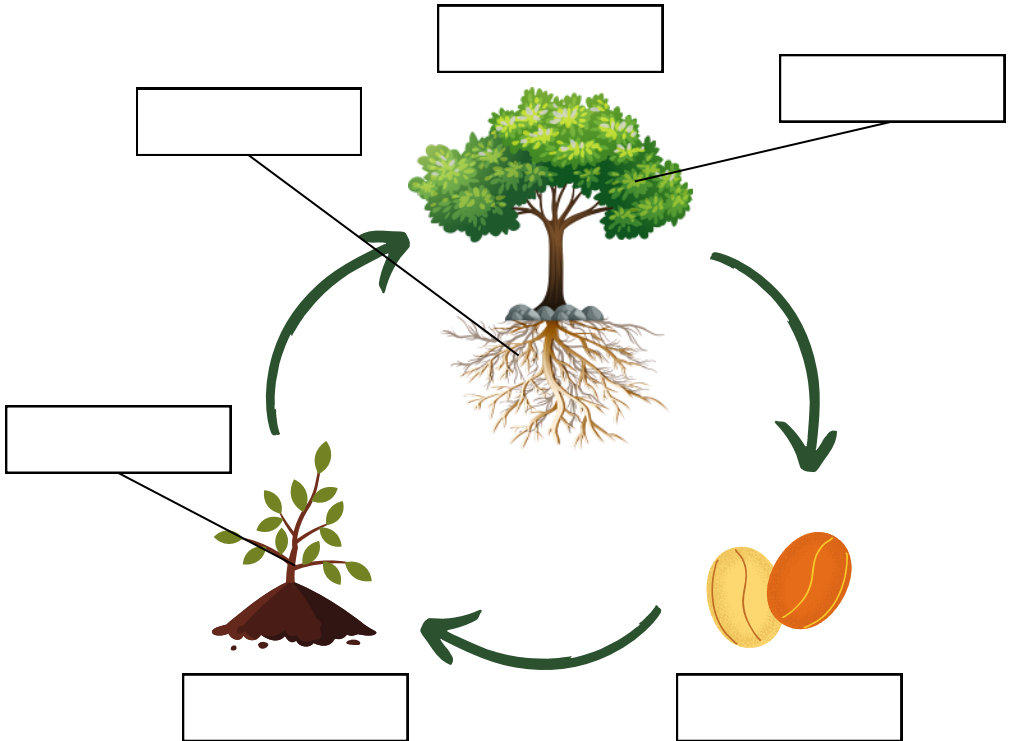
COMPLETE THE WORDS



Head up to level two of the Seed Bank and check out the germination lab.

In that lab, seeds are tested to see if they can grow into adult plants, before they are transplanted to nurseries where they grow into small trees. After which, they can be planted in our parks and nature reserves to fully develop.

Fill in the blanks below based on the life cycle and parts of a plant.



Seed	Seedling	Adult
Leaf	Stem	Roots

DISCOVER THE ADAPTATION

Now make your way to the seeds display on the next corridor of level two. Can you identify the specific adaptation of each seed in the four categories of dispersal?

Fill in the blanks below with the help of the word search!



1. Some seeds have oo that can cling onto animals' bodies.
2. Other seeds with fleshy coverings are eaten by i_a , which then disperse the seeds in their droppings.
3. Wind-dispersed seeds are small and light and have i_g or hairs to help them to float or glide in the wind.
4. Water-dispersed seeds may have thick ro coverings or air-filled pockets to help them float in water.
5. When the fruit od dry up and split open, the seeds within are released by i_e action or splitting.

E	X	P	L	O	S	I	V	E	Y
L	A	W	D	R	Z	B	N	H	P
A	F	K	T	D	A	S	D	W	O
N	S	I	M	P	M	G	Y	Q	D
I	E	D	B	W	H	O	O	K	S
M	Q	J	W	R	X	W	P	H	R
A	I	D	B	I	O	Q	O	W	Y
L	M	L	X	F	N	U	W	A	P
S	O	I	D	D	L	G	S	I	Q
C	U	I	G	T	E	A	S	L	T

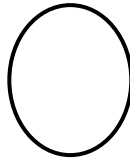
DISCOVER THE ADAPTATION

Watch the four videos on the respective dispersal methods and draw the adaptation of the seed!

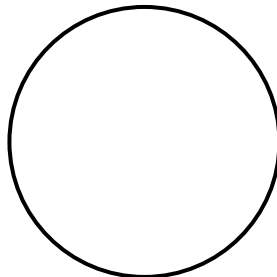
Do you see any similarities between these seeds and the ones on display?



Wind Dispersal: Draw the wings of the Chengal Pasir (*Hopea odorata*)



Animal Dispersal: Draw the hooks of the Bur mallow (*Urena lobata*)



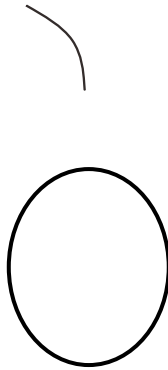
DISCOVER THE ADAPTATION

All these adaptations help the seed to be dispersed away from the parent plant, so that they do not have to compete for resources such as sunlight, nutrients, space and water.

Watch the four videos on the respective dispersal methods and draw the adaptation of the seed!



Water Dispersal: Draw the fibrous husk of the Fish Poison Tree (*Barringtonia asiatica*)



Self-dispersal: Draw the pods of the Saga (*Adenantha pavonina*)



Remember, seed banking ensures a supply of seeds to conserve plant and genetic diversity in Singapore's forests, which is very important for the conservation of plants.

Well done! Now we know how we can save the plants!

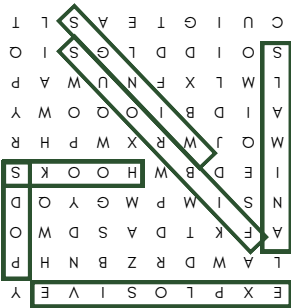


Congratulations Junior Guide, you've completed the mission!

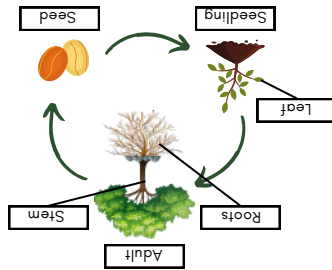
Watch the video below to learn more about this plant family and primary and secondary forests:



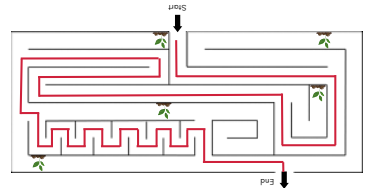
Answers



- Connect the dots**
1. hooks
 2. animals
 3. wings
 4. fibrous
 5. pods
 6. explosive



- Explore the labs**
1. gathering
 2. seateurs
 3. plant
 4. dry
 5. storage
 6. cryopreservation



By Wind
 Seraya Kuning (*Shorea Gibosa*)
Identify the Seeds

- Help disperse the seeds**
1. Kempas -> by wind
 2. Sea Fong-pong -> by water
 3. Saga -> by self-dispersal
 4. Broad-leaf Bramble -> by animals

SEED CONSERVATION

As a City in Nature, Singapore is home to a rich diversity of flora that needs to be conserved.

Seed banking is important to conserve seeds of threatened plant species and to advance research in seed preservation and storage. Not only that, the Singapore Botanic Gardens Seed Bank also enables visitors to learn about the importance of seed storage for species conservation, plant biodiversity, seed dispersal and germination through curated programmes at the interpretive gallery and outdoor garden.

To learn more about our City in Nature, scan here:



To learn more about the Seed Bank, scan here:

