



**Fleming College  
Arboretum**



**School of Environmental &  
Natural Resource Sciences**  
Frost Campus | Fleming College

# Saving Seeds for the Future

Fleming College Arboretum Workshop

# *Indigenous Acknowledgment*

Fleming College respectfully acknowledges that we are situated on Michi Saagiig Anishinaabeg lands and territory. G'chi miigwech to the Michi Saagiig peoples for allowing us to continue our work in your territory.



# *Agenda*



In-Class Session



15-min Break



Outdoor Activities: Arboretum Tour & Seed Collection



15-min Break



Indoor Activities: Seed Banking and Preparation for Germination



Workshop Wrap-Up

A row of glass jars filled with dried plant material, likely seeds, in a laboratory setting. The jars are arranged in a line on a table, and the background shows a ceiling with pipes and lights.

# *Introduction to Seed Banks*



# What is a Seed Bank?

- Store a variety of vegetation seeds in a safe, controlled area where environmental conditions can be regulated (i.e. – moisture and temperature)
- Seeds will be preserved until they are needed to plant crops or restore ecosystems

# Seed Saving Process

- 1. Initial seed collection
- 2. Seed preparations
  - I.e. – sorting, cleaning, drying, assessing viability and packaging
- 3. Storing of the seeds
- 4. Periodic germination tests
  - Assess if seeds are still viable and if it is necessary to transplant them



# What is in a Seed Bank?

- Store a wide variety of seed specimens; ex – may primarily focus on agricultural species or conserving the regional biodiversity of native species

## Interspecific Diversity:

- Refers to different species of seeds.
  - Northern catalpa, Red pine, White spruce

## Intraspecific Diversity:

- Genetic variety within a single species e.g. – Subspecies
  - Jack pine, Red pine, White pine



Interspecific Diversity



Intraspecific Diversity

# *Seed Types*

## *Angiosperms*

- Flowering plants: store/develop seeds within fruit

## *Gymnosperms*

- Conifers: store/develop seeds within cones

### Fruit and cones can be:

- Dry or fleshy
- Dehiscent (open to release mature seeds)
- Indehiscent (stay closed)





*Seed Saving in Ontario*



# *Seed Zones*

## *What are Seed Zones?*

- Seed Zones are regions where trees have adapted to survive in the environmental conditions within the area they originate
  - Ex – Kawartha Lakes is found within Seed Zone 34

## *Why do They Matter?*

- Trees that are acclimated to certain conditions may not perform as well in different climates, even if it is within their distribution range
- Ex: A red oak sourced from Toronto may suffer from Spring or Fall frosts and experience damage from colder temperatures if planted here in the Kawarthas



# *Why Seed Banking Matters*

*Protecting Our North American Wilderness*

# *Climate Change in Ontario*



In between 1948-2012, annual rainfall has increased by 9.7%, with predictions to increase by another 6.6% by 2050



Between 1948 and 2016, the average annual temperature in Ontario has increased by 1.3°C and is predicted to increase by 1°C by 2050



Since 2000, the frequency of 24-hour and 7-day extreme rainfall events have increased in Ontario

# *Ramifications for Seeds*



Prolonged exposure to elevated temperatures and increased rainfall could alter soil moisture.



Could impact seed persistence in soil (longevity, dormancy release, and germination period)



Could alter geographical distribution of native species while propagating invasive species.



Impact population dynamics in forest stands



*Benefits of Seed Banks*



# *Resilient Seeds*

- Seed banks provide the opportunity to preserve and propagate resilient seeds through the collection of seeds originating from disease and climate resistant specimens
- Builds food and seed security should natural disaster occur
- This would be beneficial in repopulating Ontario with desirable tree species

Ex – Breeding Blue Ash with hybridized genetic resistance to climate change using genes of northern populations/subspecies

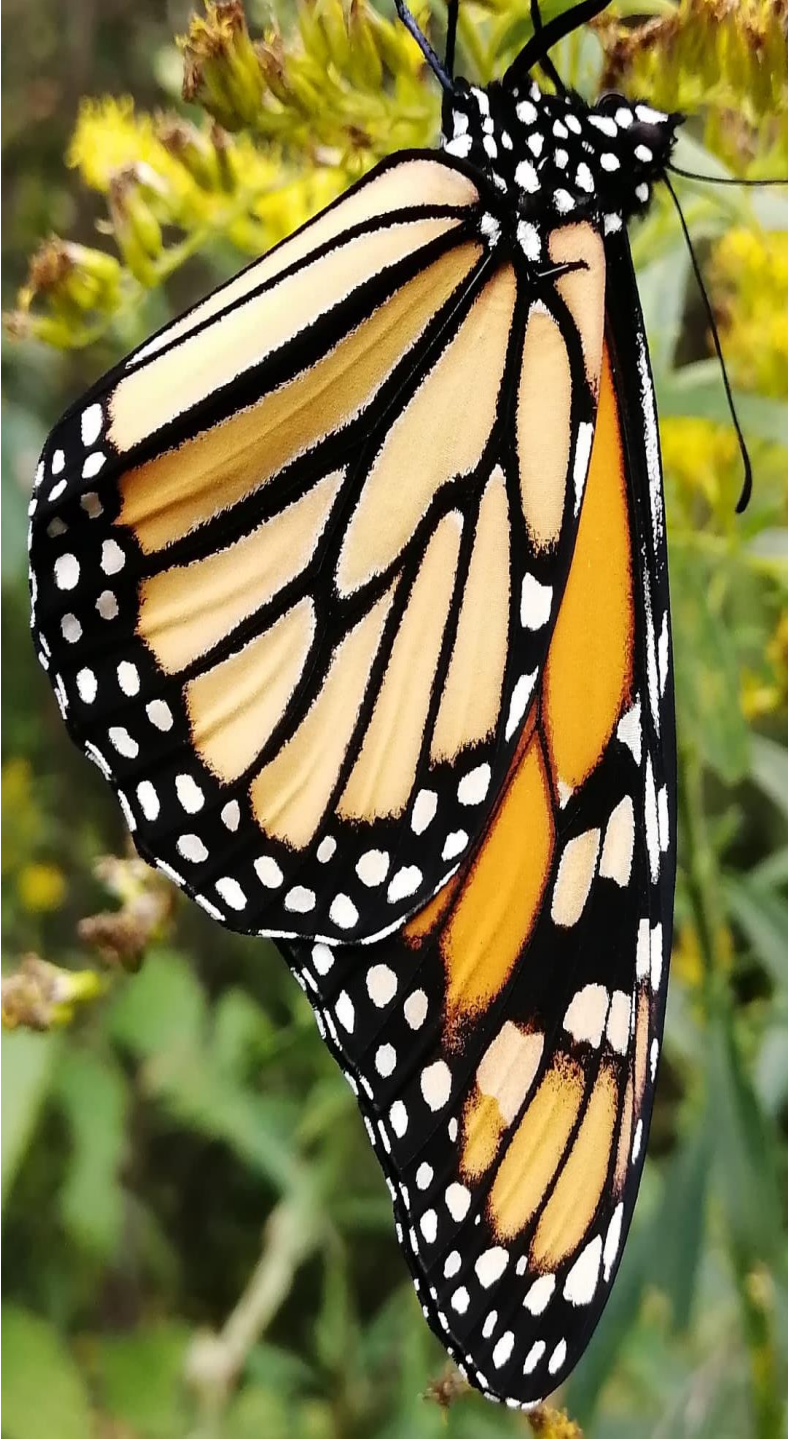


# *Protection of Species At Risk (SAR)*

## *American Chestnut*

- Historically was an important commercial species since its valuable wood was used to manufacture furniture
- Due to Chestnut Blight, by 1950 virtually all mature Chestnuts in North America were killed
- However, there is a small population in Ontario not affected by the blight
- By collecting and preserving their seeds, it may be possible to repopulate the species in Ontario's Carolinian forests





## *Significant Wildlife: Species At Risk (SAR)*

- Can be selective in terms of their habitat conditions
  - Ex. Monarchs gather in Red Cedar for protection and to rest during migration
- Seed saving could help restore habitat lost to development and contribute to restoration efforts

# *Locally Sourced Seeds*



Seeds collected within a community stay in the community



Adapted to the local climate



Knowledge of where produce comes from



Encourages growth of locally sourced plants



# *The Frost Campus Seed Bank*

*Fleming College's Contribution to Seed Saving*



# *The Frost Seed Bank Grassroots Initiative*

- Aims to grow into a small grass roots operation with a regional focus

## *Research Opportunities*

- Applied research opportunities for students and staff
  - MNR Species at Risk funding studies
    - Ex. Red Mulberry.



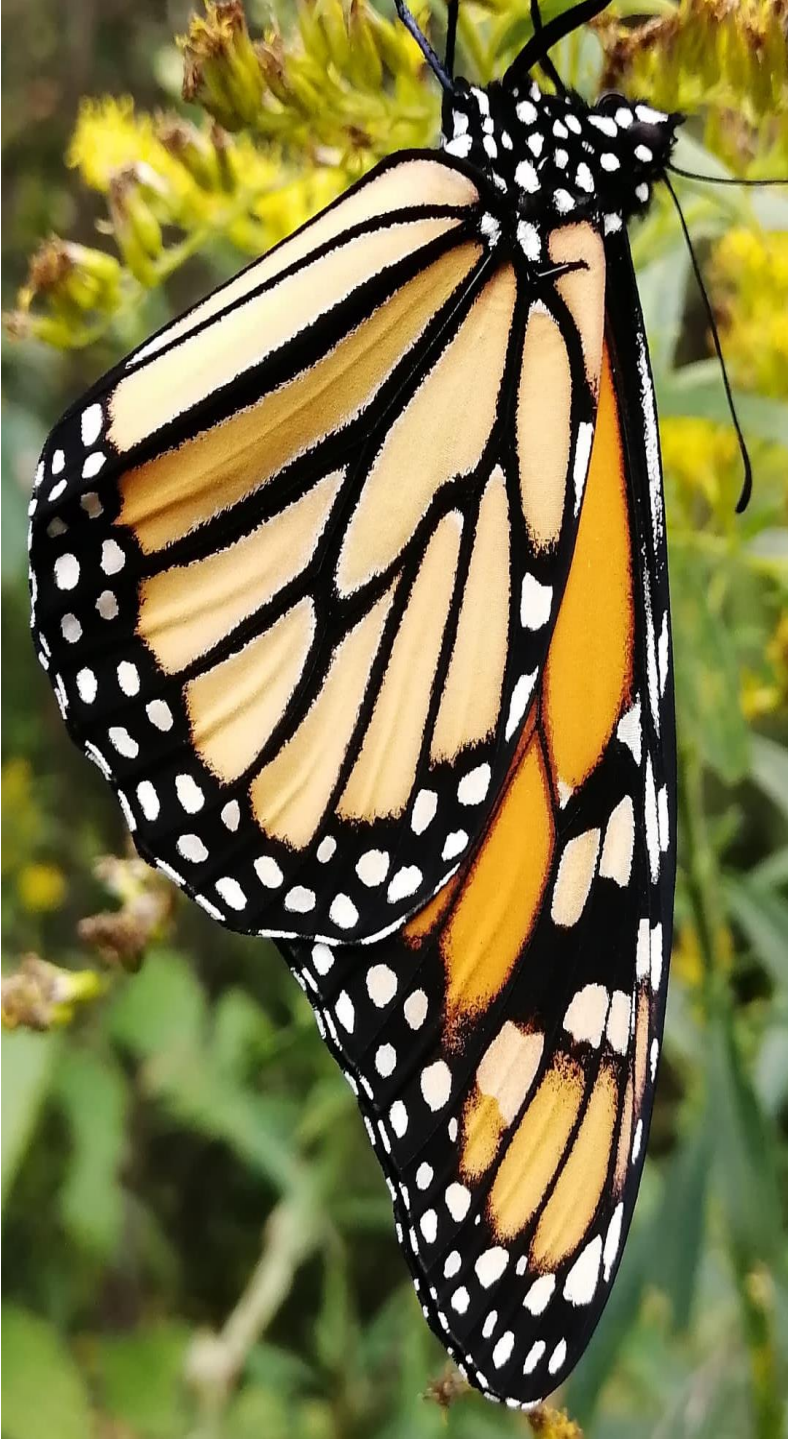
# *Collaboration with the Arboretum*

## *Self Sourced, Fleming Grown Trees*

- Growing trees from the seeds stored and germinated within the Frost Seed Bank
- Once seeds are ready for planting, they can progress towards the Arboretum

## *Research Collaboration*

- Both organizations share a focus on Species at Risk, preserving genetic diversity and propagating native species




# *15-Minute Break*

- Reconvene back in the classroom

## *Outdoor Activity*

- We are going to tour the Arboretum and collect a variety of different seed types and learn proper field storage techniques



# *Germinating Your Backyard*

*Seed banking and preparation for Germination*



*How to Test Seed Viability*



# Water Test

- Add the seeds you would like assess into a container of water for 15 minutes
  - If seeds float, they are likely not to sprout
  - If seeds sink, they are likely viable
- Best performed on larger seeds (ex – the size of corn) since smaller seeds (ex – carrot and lettuce seeds) will want to float regardless



# *Poke Test*




- This test involves poking the seed with a sharp object (ex: safety pin)
- If the needle easily passes through, the seed is likely old and rotten on the inside
- However, if some resistance is encountered, the seed is probably healthy
- Useful to perform after a germination test to further assess the viability of ungerminated seeds

# *Cut Test*



- This method presents an indirect test for seed viability
- It assesses the health of a seed by cutting it open with a knife and examining its contents
- Seeds containing milky, soft, mouldy, decayed, shrivelled or rancid-smelling innards can easily be identified as non-viable specimens

A glass jar with a textured surface is filled with dark, possibly cleaned, seeds. To the right of the jar is a piece of white paper and a piece of dark, charred wood. The background shows other jars containing various dried herbs or seeds. The text "How to Clean Seeds" is overlaid in a white, italicized font within a white-bordered rounded rectangle.

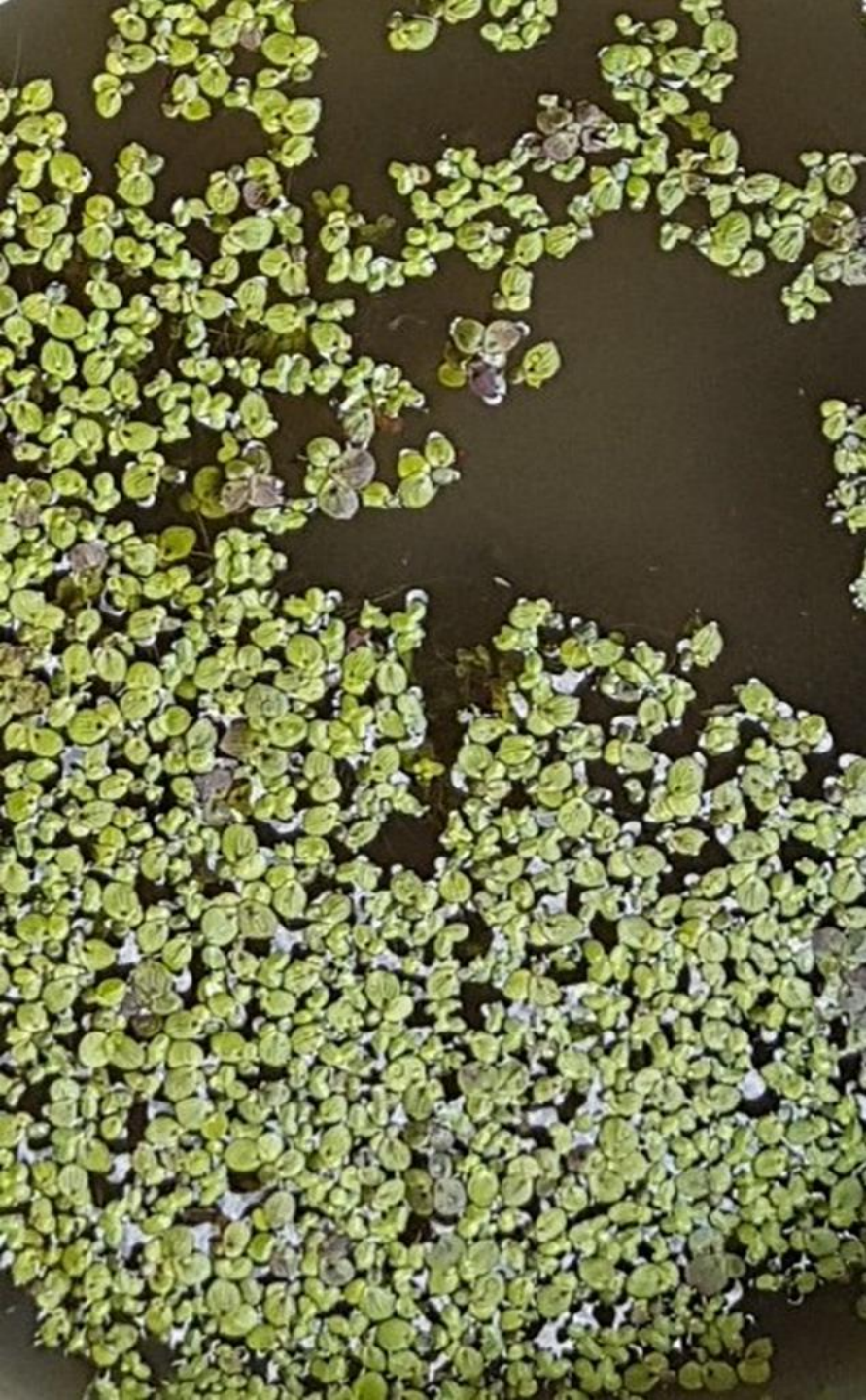
*How to Clean Seeds*

# How to Clean Dry Seeds

- Pick plant and leave to dry (hang to dry or on drying rack)
- Clip flower ends off and shake – seeds that are dried should fall out
- Leave seeds to dry for an additional few hours of day
- Once the seed pod is dry it will be easy to crumble the husk to release seed
- Tweezers can also be used to remove seed husk



Cleaned Seed-jars needing labels



# How to Clean Wet Seeds

- Scoop out both seed and pulp into a bucket filled with water
  - Healthy seeds will sink to bottom, take these for collection
- Continue a rinsing and draining process to remove all dead seeds and pulp



# How to Clean Seeds: Fermentation

- Squeeze or scoop the seeds together with the pulp that surrounds them into a jar with a little water
- Store in warm place
- Once evidence of mold is present or seeds start to “bubble” pore into new clean jar and begin the process of cleaning wet seeds

A top-down photograph of several pine cones and their seeds on a light-colored wooden surface. The pine cones are in various stages of maturity, with some appearing dark and others lighter. Numerous dark, winged seeds are scattered around the cones. A white, rounded rectangular text box is overlaid in the center of the image.

# Seed Germination and Planting





# *What is Germination?*

- Seed germination is an essential process in the life cycle of vegetation and involves causing a seed to sprout and develop into a new plant
- Germination is triggered by specific environmental conditions
  - Seeds require proper temperature, moisture, oxygen, and darkness
  - All the above-mentioned factors are species specific



# *Stratification*

- Stratification recreates necessary conditions needed to break dormancy and promote seed germination
- Stratification method depends on the species of seeds
- Most plants native to Ontario require cold stratification to simulate winter conditions



# Cold Stratification

## *Late Summer/Early Fall*

- Place seeds in pot of soil and dig it into the ground

## *Early Season (Spring)*

- Soak seeds for 12-24 hours
- Seal them within a plastic bag containing equal amounts sand and peat and place it in a refrigerator or freezer
- Inspect the seeds for evidence of sprouting or development of roots every 10 days



# *Tray Planting for Germination*

- Plant seeds in trays filled with soil wait 1-2 weeks. Seeds the sprout are viable
- Place seeds in a container moist towel/paper with lid. Place in sunny room. Seeds the sprout are viable

A wire shelving unit with four shelves, each filled with numerous clear plastic jars containing seeds. The jars are organized and labeled. A white card on the top shelf lists 'Cleared', 'Labeled', and 'Documented'. A label on a jar in the second shelf reads 'New England Aster' and '2018 Zone 2'. The background is a plain, light-colored wall.

# *How to Store Seeds*

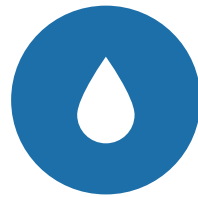
*Four factors  
must be  
controlled to  
maintain  
viability:*



Temperature



Ventilation



Moisture

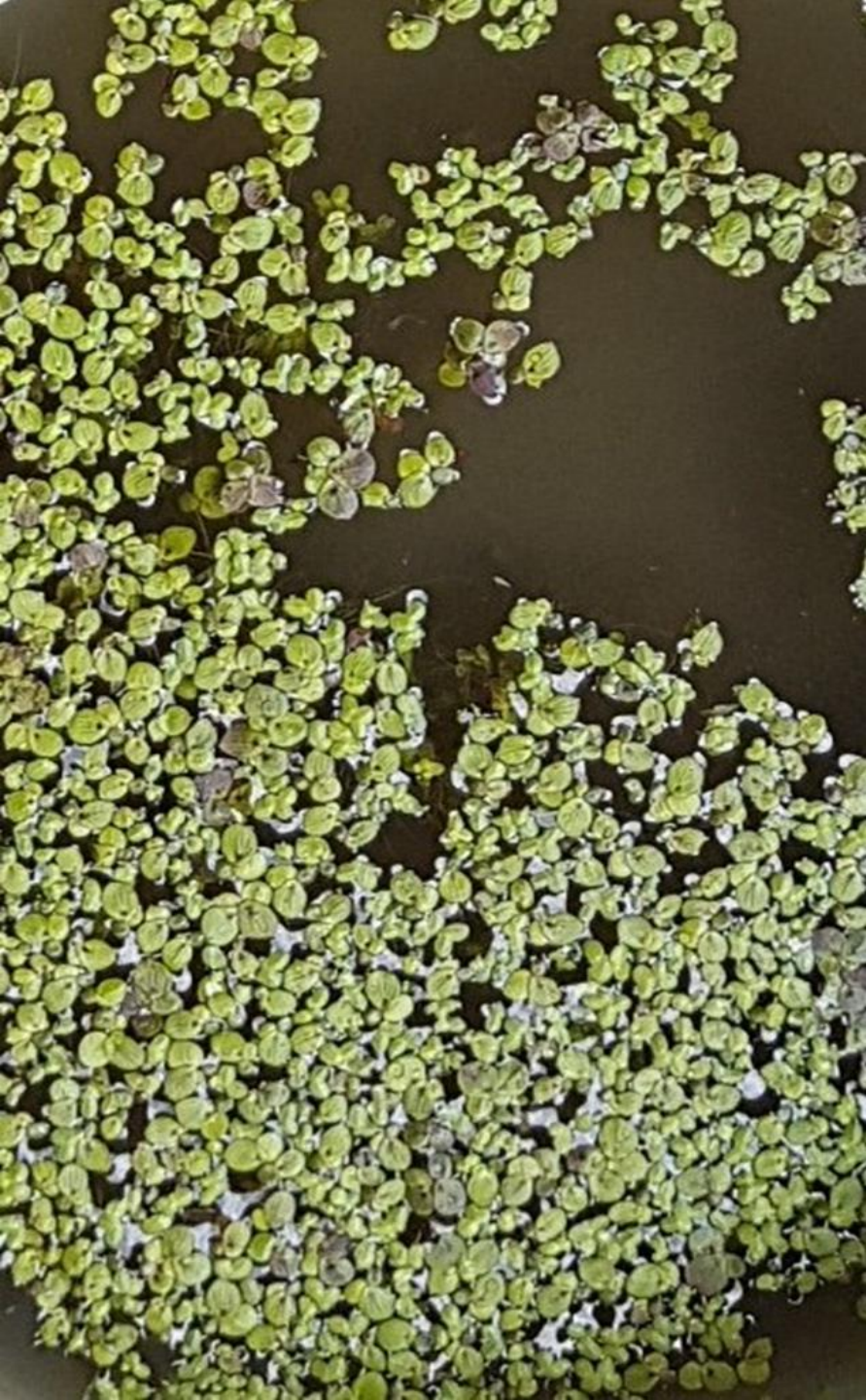


Source Identity



## *Desiccation-Tolerant & Intolerant Seeds*

- Desiccation is “the act or process of drying something through the removal or loss of moisture”
- Intolerant seeds are typically wet/aquatic seeds. They must be kept moist and refrigerated to maintain seed vitality
- Tolerant seeds typically originate from terrestrial species. Most tolerant seeds prefer to be stored in drier conditions
  - Depending on the species, seeds can also be stored in moist conditions



# *Storing Desiccation-Intolerant Seeds*

- Can be stored for a short period—sometimes months—if they are kept moist and cool
- Store in a container that has airflow with excess to moisture (moist paper, moist soil)
- If the seeds are left too long or are too moist, they will rot





# *Storing Desiccation- Tolerant Seeds*

- Store seeds at  $< 8\%$  moisture content for optimal storing vitality (Drier the better)
- Place a cheesecloth bag of dry powdered milk at the bottom of the jar
- Place jar in the refrigerator for long term seed storage. Label the contents clearly with date they were stored
- For seeds that will be stored for only a season, place the container in a cool, dark location

A photograph of a purple and green flower, possibly a species of orchid, growing in a forest. The flower has a prominent purple lip and green sepals. The background is a dense forest with green foliage and a tree trunk on the left. A white text box with rounded corners is overlaid on the image, containing the title.

*How to Get Involved in Seed Saving*



*Benefits of  
Seed Saving  
Going  
Forward:*



Become more self sufficient



Gain knowledge



Obtain Good quality seeds



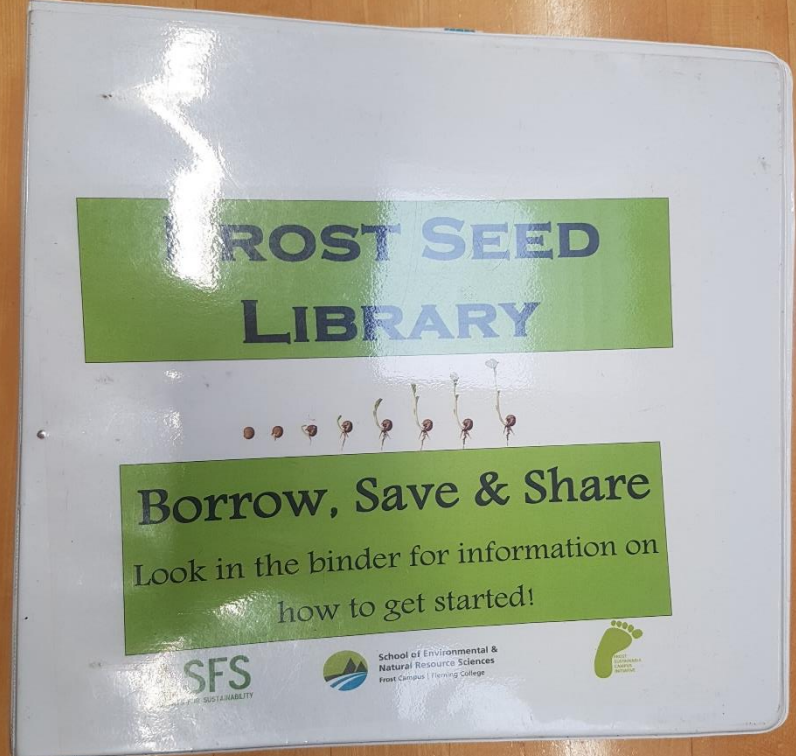
Monetary savings

# Workshop Debrief

- You can save and grow native species on your own now!
- Remember, storage conditions, germination and cleaning methods are seed specific! Know your seeds well.
- Share your seed saving knowledge with friends and family.

## Want to learn more?

- The Seeds of Ontario Trees and Shrubs Field Manual
  - Available at the Fleming College Book Store





*Thanks for Attending the  
Workshop!*