

Direct Deposit

The Seed Bank Provides More Than Just Storage; It Safeguards Biodiversity for the Future.



Invasive species, climate change, and human interference are some of the threats affecting ecosystems around the world. To supplement its on-site plant conservation locally and globally, last year the Missouri Botanical Garden expanded its efforts with a new Seed Bank, located at Shaw Nature Reserve. By the end of 2013, the facility secured 276 wild-sourced accessions; 127 of those represented Missouri plants, supporting the Seed Bank's mission to collect and store the entire Missouri eco-regional flora.

While crop plants and their wild relatives have been the focus of seed banking for a long time due to concerns about food security, it is only in the past few decades that organizations have begun to focus on banking the full diversity of wild plants. This means that while there is plenty of information about crop plants and protocols for their seed collection, storage, and propagation, much work still needs to be done to understand the similarities and differences between seed banking crops and wild plants. Preserving the latter continues to be an important part of ecological conservation.

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What is seed banking?

Seed banking is a valuable conservation tool that enables the long-term storage of genetic diversity of a large number of plant species. It involves collecting, cleaning, drying, recording, and storing seeds at low temperatures for future conservation and restoration uses. This highly meticulous process slows down a seed's metabolic process to keep it viable for future use. The goal is to collect from a robust plant population to capture a wide diversity of genetic material. That, however, may not be possible with endangered species, so the challenge is to ensure the collection and storage of its limited, fragile population will allow propagation and reintroduction to its native habitat in the future.

What types of seeds can be stored?

There are three storage behaviors for seeds: orthodox, intermediate, and recalcitrant. Seed storage behavior is determined by the seed's ability to withstand the dry and freezing conditions of traditional seed banking. Orthodox seeds usually come from temperate regions and can survive in low moisture levels and low temperatures. Recalcitrant seeds, including those of oaks and orchids, are mostly from the tropical regions and are very sensitive to drying and freezing. These seeds need alternate storage methods, such as propagation in the Garden's living collections. Intermediate seeds can be sensitive to either condition, but most seeds tend to fall in one of the two previous categories.

How does the Seed Bank choose the plant species for seed collections?

Seed Bank Manager Dr. Ginger Allington and her staff and volunteers use three factors to prioritize their seed collections:

- **Conservation concern:** The Garden's commitment to plant conservation is by far the top reason for collecting and preserving a plant's seeds. The Garden not only helps identify and collect threatened plant specimens but also assists in the propagation and reintroduction of these species (see page 11).
- **High fidelity to a certain habitat:** Even if the plant is not considered endangered, it may be crucial to the survival or the restoration of a fragile habitat.
- **Display and educational value:** The display gardens are carefully planned and maintained by the Garden's horticulturists. A wild-sourced plant can spark conversations and encourage people to learn more about plants.

What are some of the challenges of seed banking?

Because the Seed Bank only stores wild-sourced seed, determining where and when to collect is challenging. Establishing the location for a seed collecting trip is difficult due to the limited amount of information regarding a plant population's size and location. The recently completed *Flora of Missouri* is helpful to determine locality, but there are not many botanical surveys available to know if a wild plant population is sizeable enough to justify a collection.

Deciding when to collect seeds is even more difficult. For a specimen to be considered prime for seed banking, the seed has to be collected when it is mature. Timing is everything, and the Seed Bank staff relies on a network of people around the state to help establish the best times and places to collect.

You can help! Support the Garden's Seed Bank and its conservation and restoration efforts. Learn more and donate at www.mobot.org/seedbank.



Seed banking: Step by Step

- 1) **Collecting:** Staff aims to collect no more than 20% of the seed available in a plant population to avoid impacting it negatively by collecting too much. They also record important data that include a detailed description, photographs, location, phenology, and habitat.
- 2) **Drying:** In addition to keeping seeds dry in breathable containers during the collection process, the staff later places collections in desiccation chambers to fully dry the seed before storage.

- 3) **Cleaning:** The cleaning method will depend on the species. Different sizes and shapes call for different approaches to separate the seed from the rest of the plant material collected. It can range from using perforated trays and vibrating paper to grating against rubber.



- 4) **Testing viability:** Assessing a seed's baseline viability will provide valuable information for future propagation, such as breaking dormancy and best environmental conditions for growth. The most straightforward method is a germination trial, which can take months, simulating the seed's original environment conditions.

- 5) **Storage:** Once the seed has been dried, it is stored in freezers in four-ply foil bags, where they will stay for as little as a few decades to hundreds of years.

