



# Collecting and propagating native plant seeds

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# Restoration Ecology Lab @ VT

*How and where can we best restore biodiversity?*



Southeastern grasslands and woodlands



Tropical forests





# VT Ecological Restoration Major





# Caveat: This is not a science talk



Ian Caton

Wood Thrush Native Plant Nursery, Floyd



David Bellangue

Center for Urban Habitats, Charlottesville



# Native Plant Collection & Propagation



1. Why collect and propagate local plants?
2. How to collect native plant seed
3. How to store native plant seed
4. How to propagate native plant seeds



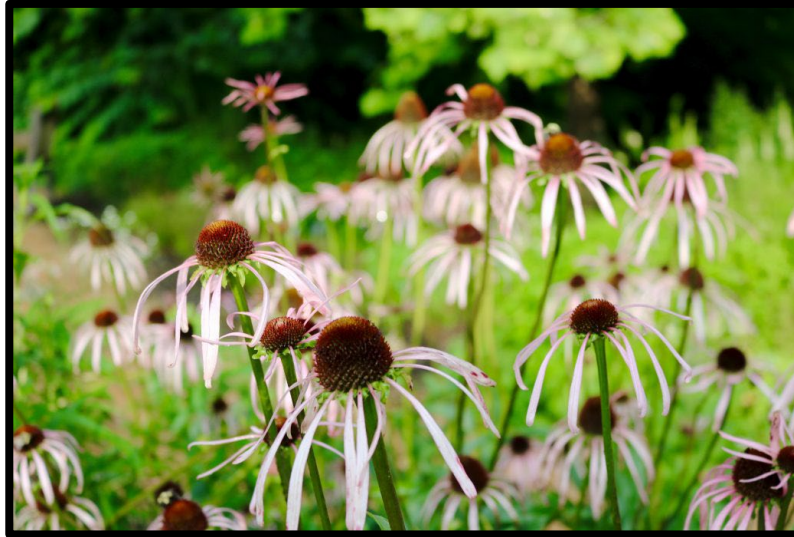
# Native Plant Collection & Propagation



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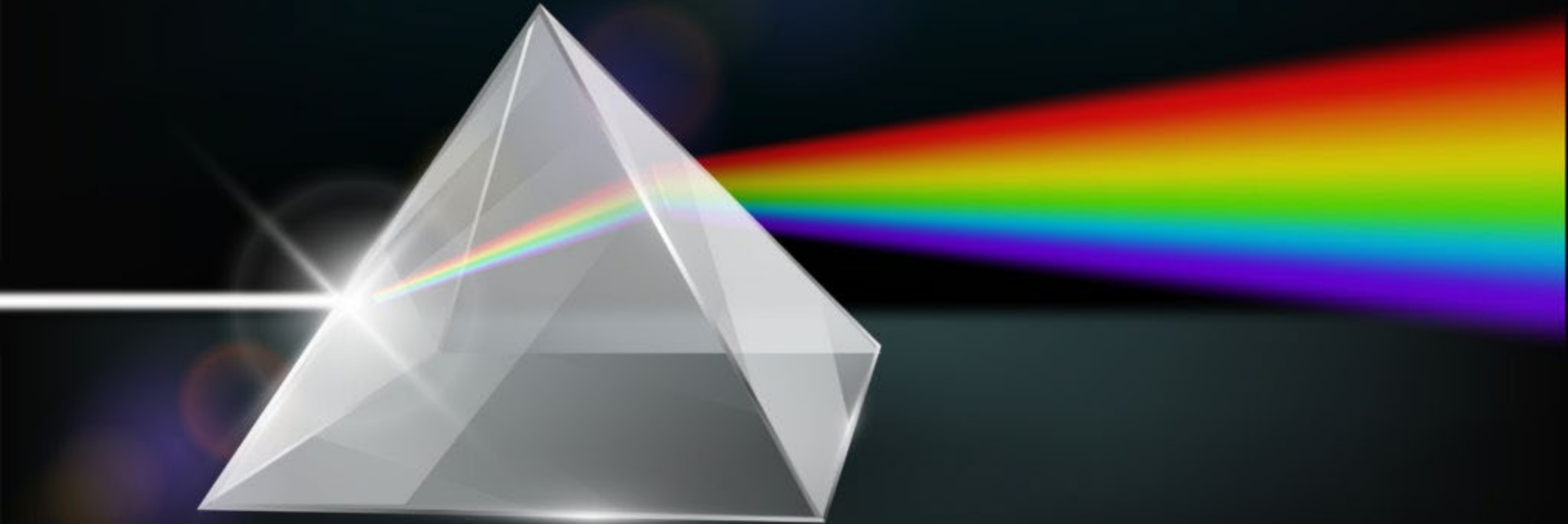
# Why collect and propagate native plants?





# 1. To conserve local biodiversity

1 million species of plants and animals threatened with extinction





Hairy Hedge-nettle (critically imperiled in Virginia)



American Bluehearts (imperiled in Virginia)



Stiff Goldenrod (imperiled in Virginia)



Purple Milkweed (imperiled in Virginia)



## 2. To combat biotic homogenization





### 3. To support wildlife





# Homegrown National Park

- 40 million acres of green lawns on private lands in the US
- If half of them were planted with native species it would be bigger than the biggest US national park





## 4. Because it is fun and inexpensive





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# Seed collection principles



# 1. Plan ahead

- Locate donor sites
- Learn species natural & cultural history
- Learn species conservation status
- Get permission
- Identify window of time for collecting mature seeds
- Learn how to store species to optimize *viability*





## 2. Choose an efficient method



Hand-stripping



Seed stripper



Vacuum seed collector



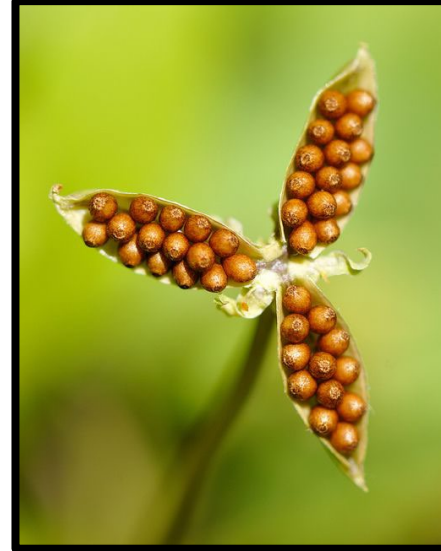
Clipping seed heads



UAVs



**Use fine mesh bags to collect seeds from plants that may lose seeds quickly**



### 3. Collect ripe seeds

- Seed coat turns golden, dark brown or black
- Fruits come off plant with little to no resistance and are soft
- Capsule holding seeds yellows, dries, and splits
- Test maturity by splitting open a few fruits and seeds



Blackhaw



Common milkweed



Scarlet beebalm



# 4. Do no harm to source population

- Get permission
- Collect  $\leq 10\%$  of an individual's reproductive output
- Collect  $\leq 10\%$  of population's reproductive output
- Leave only footprints
- Be aware of endangered species in the area



River oats



# 5. Collect ample genetic diversity

## Within site

- Collect from  $\geq 30$  plants
- Collect from large and small plants
- Collect from edge and interior of population
- Collect in multiple years
- Visit multiple times to get early- and late-seeders

## Among sites

- Sample  $\geq 5$  populations,  $\geq 0.5$  mi apart
- Local populations have local adaptations
- Distant populations have diverse genes.
- Populations from warmer areas may be more suitable for future climates.



American chestnut

# 6. Keep good records

## For each species at each site

- Collector name
- Collection date
- Species name
- Locality information (lat/lon)
- Site ownership
- Permit information
- Number of individuals sampled
- Consider taking a voucher specimen



Smooth coneflower



# Seed Collection Principles

- A. Plan ahead
- B. Choose an efficient method
- C. Collect ripe seed
- D. Do no harm to source population
- E. Get as much genetic diversity as possible
- F. Take good data
- G. *Store seeds properly*



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# How to store **Dry** (“orthodox”) Seeds

- Dry seed heads out for several day in paper bag
- Clean seed of chafe
- Store dry in a cool, dry location
- Don't remove wings from seeds like maples & clematis



Clematis



Sieve



Cleaning milkweed seeds



Medicine bottles are good for storing small amounts of seed



# Why dry seeds

- Makes them less susceptible to pathogens
- Triggers dormancy and slows metabolism
- Each 1% reduction in seed moisture doubles the life of the seeds
- Seed moisture between 3% and 10% is good



# How to store **Wet** (“recalcitrant”) Seeds

- Wet seeds are intolerant of dry storage – *Don't let them dry out*
- Berry often contains germination inhibitors, so remove flesh
- Soaking seeds can help loosen fruit skin
- Wash with a mild detergent solution
- Sow immediately or store in the refrigerator in damp soil, sand, or sphagnum moss
- Acorns and chestnuts are in this category



Spicebush

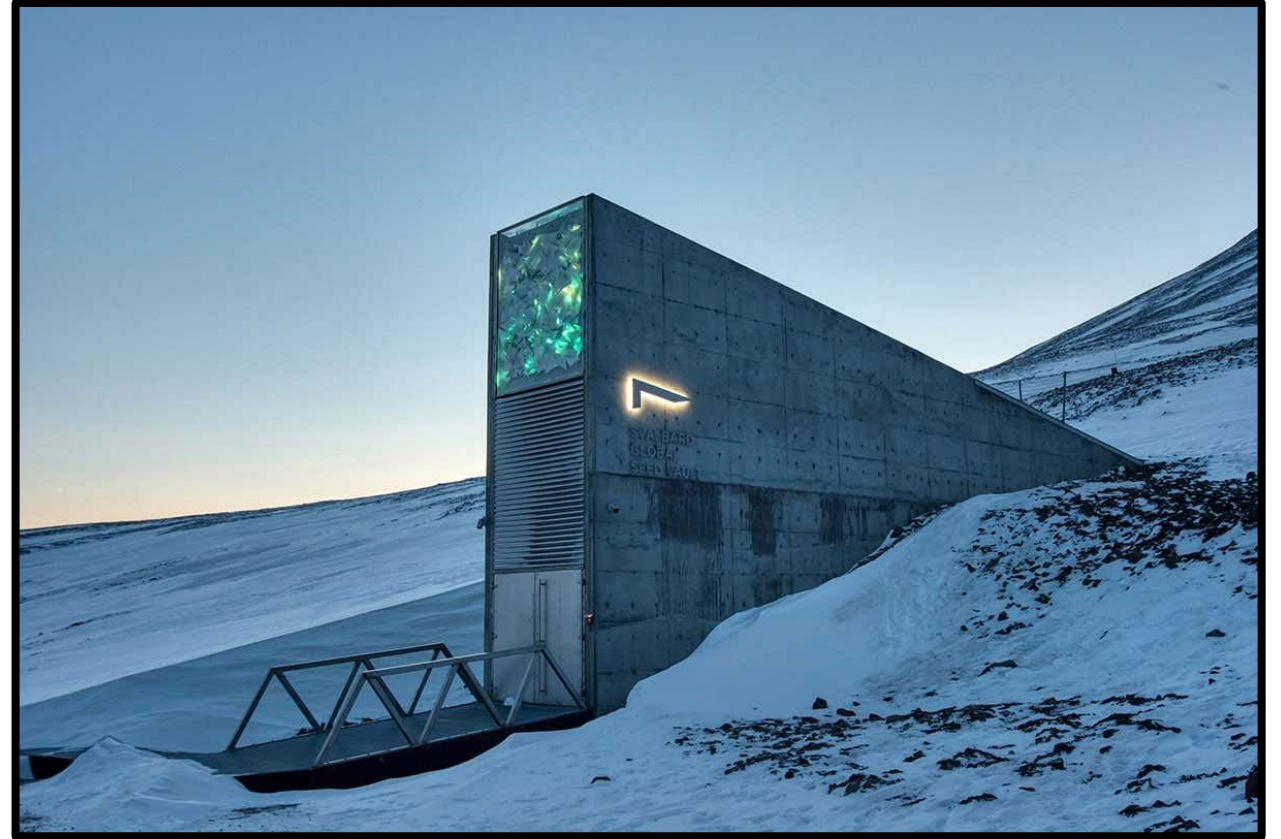


Ozark chinquapin



# Why store seeds cold?

- Seeds are alive and burning food reserves
- Cold temperatures slow down biological activity
- Lower bio activity will increase storage life of seed



Doomsday seed bank, Svalbard

# How long does stored seed last?

- Dry seeds *can* last a very long time
- I try to use seed within one year



2000-year old date palm seeds from Israel  
that germinated



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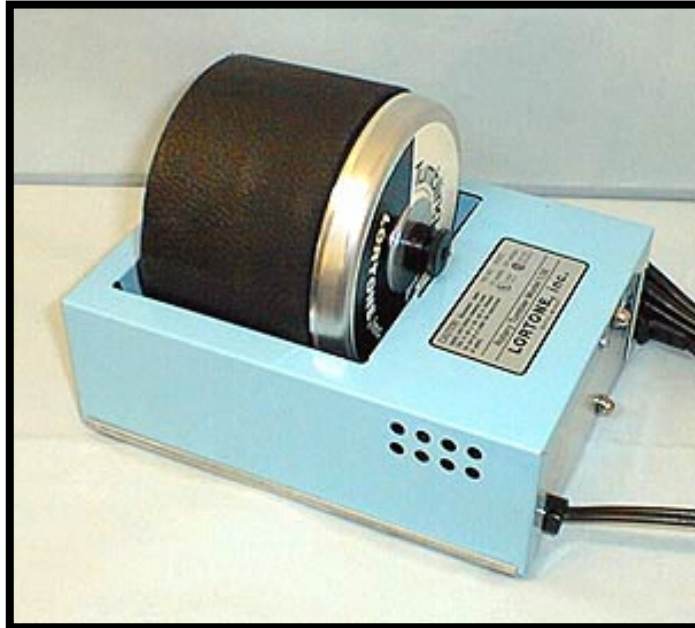
# Many seeds require special treatments to break dormancy and trigger germination



Singed pinecones



Smoke chemicals

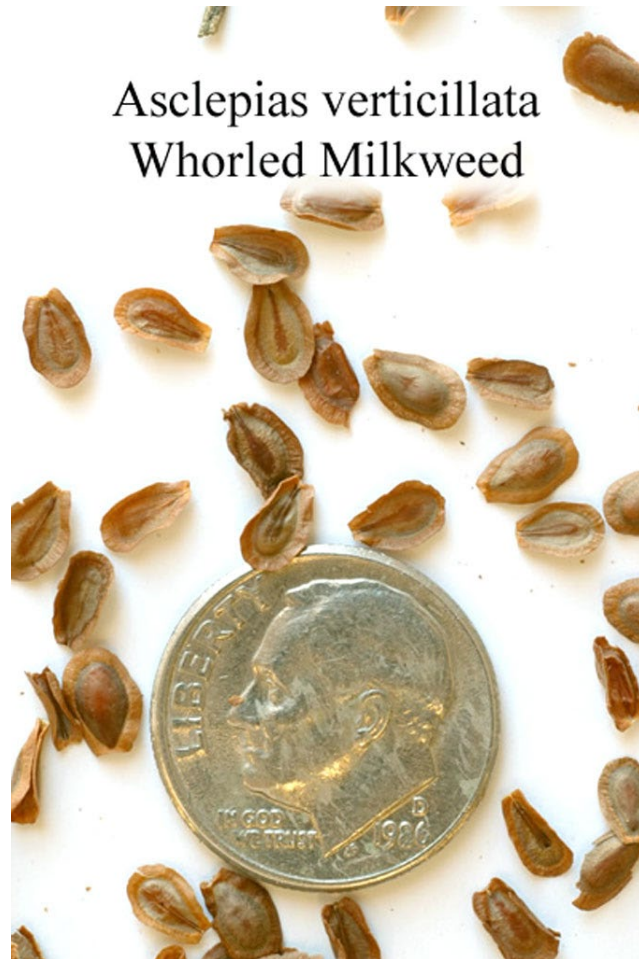


Seed scarification device (acid also used, or just a piece of sandpaper) – many legumes



Cold stratification – generally moist, sometimes dry, important for most native dry seeds

# Where to find information about germination requirements



- Prairie Moon Nursery ([prairiemoon.com](http://prairiemoon.com))
- [Growing and Propagating Native Wildflowers](#) by William Cullina (2000)
- Lady Bird Johnson Wildflower Center
- Missouri Botanical Garden
- ...Google.com...

C(30) – Seeds germinate after 30 days of cold, moist stratification



# Putting seeds outside for the winter is a common way to break dormancy



Milk jugs make easy DIY seed pots



Anderson propagation flat (\$\$\$)

- Check germination requirements to learn what time of year to sew
- Make sure containers are well drained but deep enough not to dry out too fast
- Don't bury seeds too deep

*I use flower pots and cover them with a mesh screen to keep out rodents and birds*

# You can also stratify seeds in the refrigerator

- Benefits
  - No pests
  - More control over environment
  - Seeds can be covered in plastic so they don't dry out
- Disadvantages
  - Natural cold/warm cycles can improve germination for some species
  - Can take up a lot of space!



Black cohosh seeds require multiple “winters” to germinate



# Pot up seedlings when they produce true leaves (not just cotyledons)

- Regular potting soil will work for most species (some have special soil or moisture requirements)
- Many plants started in spring can be planted in fall – some will do better with multiple growing seasons
- Use bigger pots to keep from having to do too much re-potting



Spicebush seedlings with bloodroot seeds mixed in – bloodroot seeds have the same habitat requirements but require multiple winters to germinate























# Other ways to grow native plants

## Salvaging – Digging up plants from doomed sites



Rare species salvaged from a mine site in Madagascar

# Other ways to grow native plants

**Cuttings** – Plant cells are pluripotent! You can grow many plants more easily from cuttings



Willow cuttings



Rooting hormone (auxin)



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# Private landowners can help protect biodiversity

- Learn to ID native plants
- Collect their seeds
- Grow native plants
- Plant them on your property
- Share them with your friends
- Spread the word







## NATURAL HISTORY OF ECOLOGICAL RESTORATION

A natural history notebook and joint project of the Missouri Botanical Garden, the EcoHealth Network, and the Restoration Ecology Lab at Virginia Tech.

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# Questions?



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# Photo credits

- Hairy hedge nettle – JBC Harris
- American bluehearts – JBC Harris
- Stiff goldenrod – JBC Harris
- Purple milkweed – JBC Harris
- Somme Prairie Grove – S Packard
- Giant green lawn – Rlawn Landscaping Services
- Microstegium – Mike Saxton
- Mesh bag - [www.pinterest.com/monarchgarden](http://www.pinterest.com/monarchgarden)
- Viola seeds – Anna Czaplinska
- Bloodroot seeds – nomadseed.com
- Milkweed seeds – Eliza Howell
- Blackhaw fruits – TJ Nagel
- Smooth coneflower seed head – NC Botanical Garden
- American chestnut – Amazon.com
- River oats – Awaytogarden.com
- Hand-stripping – USFS
- Vacuum seed stripper – South Dakota State University
- Clipping seed heads – USFS
- UAVS – Steve Elliott
- Seed stripper – Chris Helzer
- Spicebush – D Bellangue
- Ozark Chinquapin – J Rosen
- Screening sieve – Wildfoods4wildlife.com
- Burning milkweed – keen\_Jackson
- Medicine bottles – hometalk.com
- Milk jugs – joegardener.com
- Black cohosh seeds – White Oak Nursery