Seed Collection: The Process and the Value

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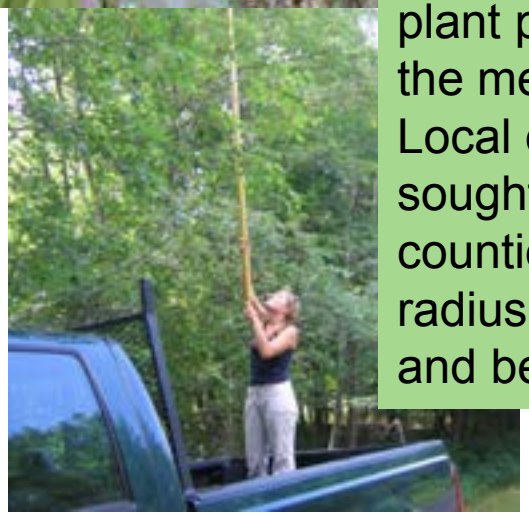
Greenbelt Native Plant Center, NYC Parks

Greenbelt Native Plant Center

Our mission is to provide native plants and seeds from local plant populations in support of the restoration and management of many of the City's most valuable natural areas.

Drone Photo Credit: Garrett Ray, 9.11.17

Seed Collection

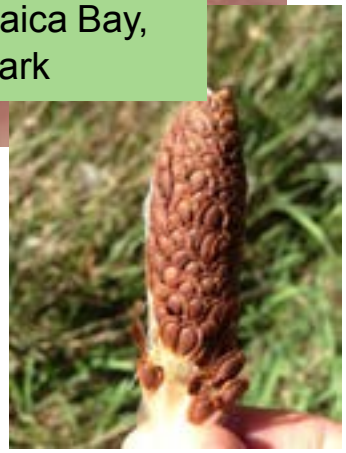


We collect and store seed only from native plant populations within the metropolitan region. Local ecotypes are sought from 25 counties in a 100 mile radius from within NYC and beyond.

Seed Banking

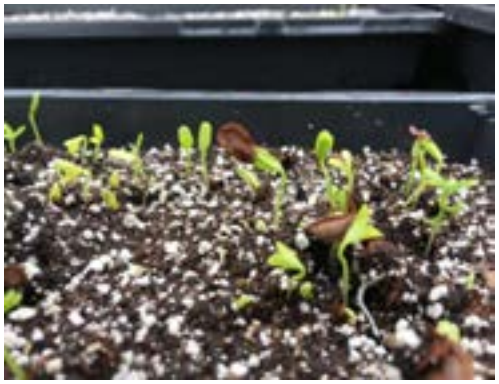
Short to Mid-term storage seed banking=
Cool dry storage (50-60 degrees F, 20% RH)
Holds over 600 native species
Represented by 3000+ active collections.
Special collections stored by other institutions

Brooklyn Botanic Garden, National Parks Service-Jamaica Bay, Long Island Native Plant Initiative, NY DEP, Highline Park



Propagation & Greenhouse Production



2 walk-in refrigerated units for stratification

18,000 square feet of Greenhouse bench space

Up to 500,000 plants produced annually

Between 130- 350 plant species produced in a growing season depending on projects

Nursery Yard Management




62 Quonsets in 4 acres of an irrigated nursery yard

Largest woody material is sold in 1 gallon containers

Deer fence erected around 13 acre property

Founder/Bulk Seed Production

68 different species that are currently, previously, or planning to be in production

8 seed mixes: General Meadow Mix, Wet Meadow Mix, Mesic Meadow Mix, Dry Meadow Mix, Urban Restoration Mix, General Woodland Mix, Maritime Grassland Mix, Beach/Dune Mix

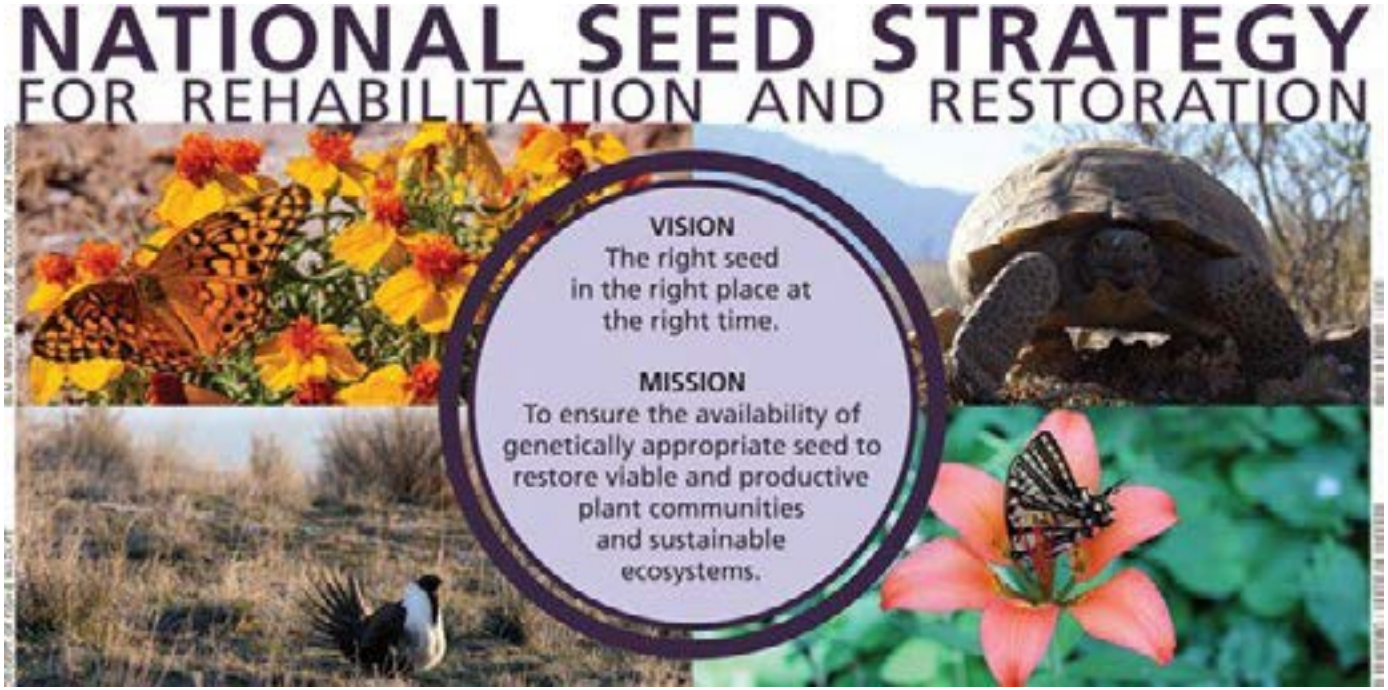
Why Genetic Diversity Matters

Genetic Variation and Adaptive Potential

- Greater establishment success
- Greater resistance to pests and pathogens
- Better recovery after disturbance or climatic event
- More potential to adapt
- Greater productivity
- More diverse and abundant animal associations

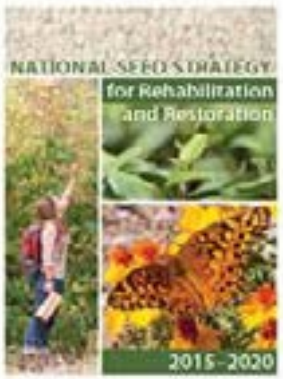
MARSB: Mid-Atlantic Regional Seed Bank

MARSB aims to increase the availability of genetically appropriate native seed across the Mid-Atlantic through targeted seed collection and active seed banking. We are also building a network of diverse partners to collaboratively meet the seed needs for region-wide, landscape-scale restorations.



pca
plant conservation alliance

NATIONAL SYSTEM OF PUBLIC LANDS
U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT



www.blm.gov/seedstrategy
Released August, 2015
Creating a national network of federal, tribal, state, local and private facilities

Why collect and bank seed?

- Seed is a critical natural resource
- Seed provides insurance against threats to plants in situ
- Banked seed offers an option for future conservation
- Seed banks can act as a source of plant material for research
- Seed banks are a repository for cultural, economic, and ecological resources
- Skills, knowledge, and data from collected seed supports plant conservation
- The benefits are long term and relatively inexpensive
- Seed banks contribute to education and raising public awareness about plant conservation

Can all seed be banked?

Orthodox Seed

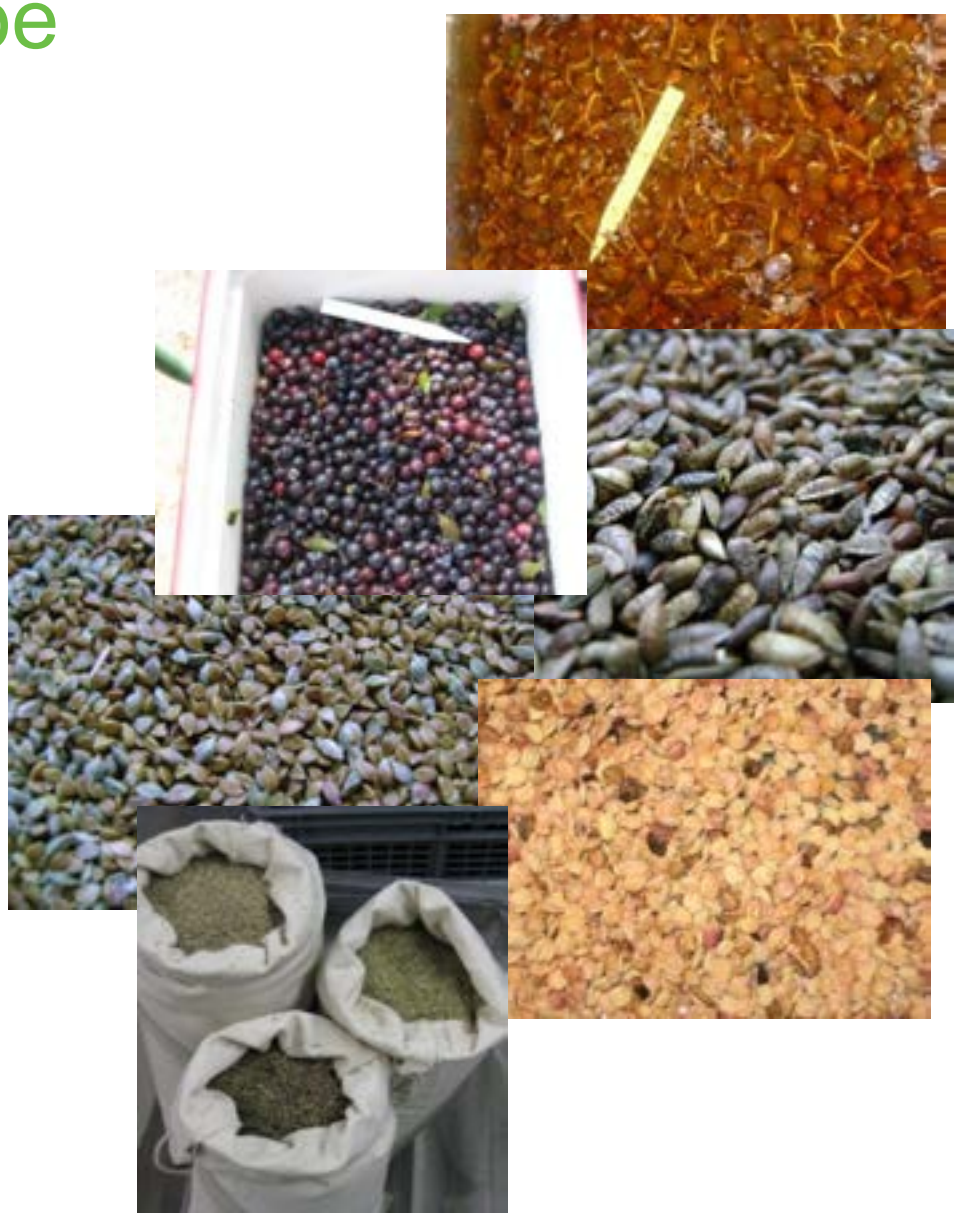
Can be desiccated

~80% of plant species

Recalcitrant

Can not be desiccated or frozen

~20% of species



Types of Seed Banking

Short term – ‘Active’

50-60ºF and ~15-20% RH

Greenbelt Native Plant Center

Viability – a few decades

Long Term – ‘Conservation’

-4ºF and 15%RH

Millennium Seed Bank, National Center for Resources Preservation

Viability – indeterminate – several hundred years

The Process

Seed Collection and Management

Seed Collection/Sampling: Capturing diversity and field data collection

Seed Processing: Creation of an accession, preparing and cleaning the seed

Seed Drying: After ripening and moisture removal

Seed Cleaning: removal of all extra plant parts

Seed Storage: Cool dry storage

Regeneration: Propagation

Seed Collection

Seed Sampling Strategy

- **To maximize genetic diversity in a collection, randomly collect from 30 individuals of an out-breeding spp. and 59 individuals of a self-fertilizing species (general rule: randomly collect from at least 50 individuals.)**

- **Collect no more than 20% of available seed present on the day of collection. This rule ensures that a target population is not endangered by seed collection.**

- **Field Data Collection- the passport or pedigree papers**

  Data- date, collection number, county/State,

  locality, altitude, habitat, associated spp., land form, slope, aspect, land-use, geology, soil info., drainage, plant name (family, Genus, species, etc.), area sampled, number of plants sampled, number of plants found,etc.

When do we collect?

MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB

Preparing for Seed Collection

Making Seed Collections

Cleaning Collections

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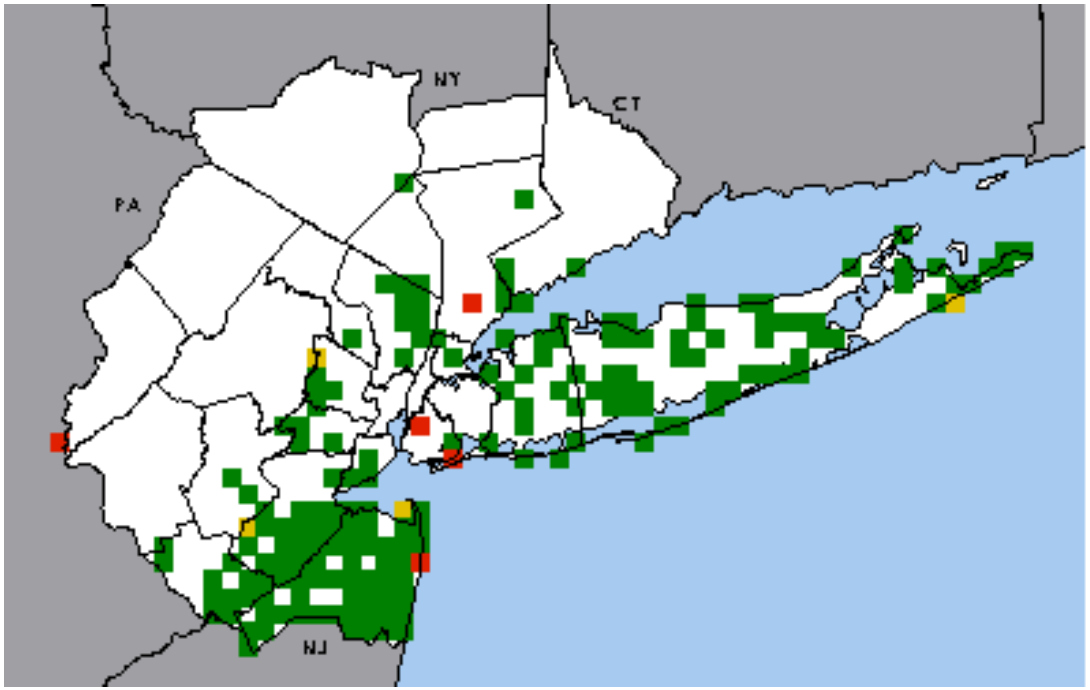
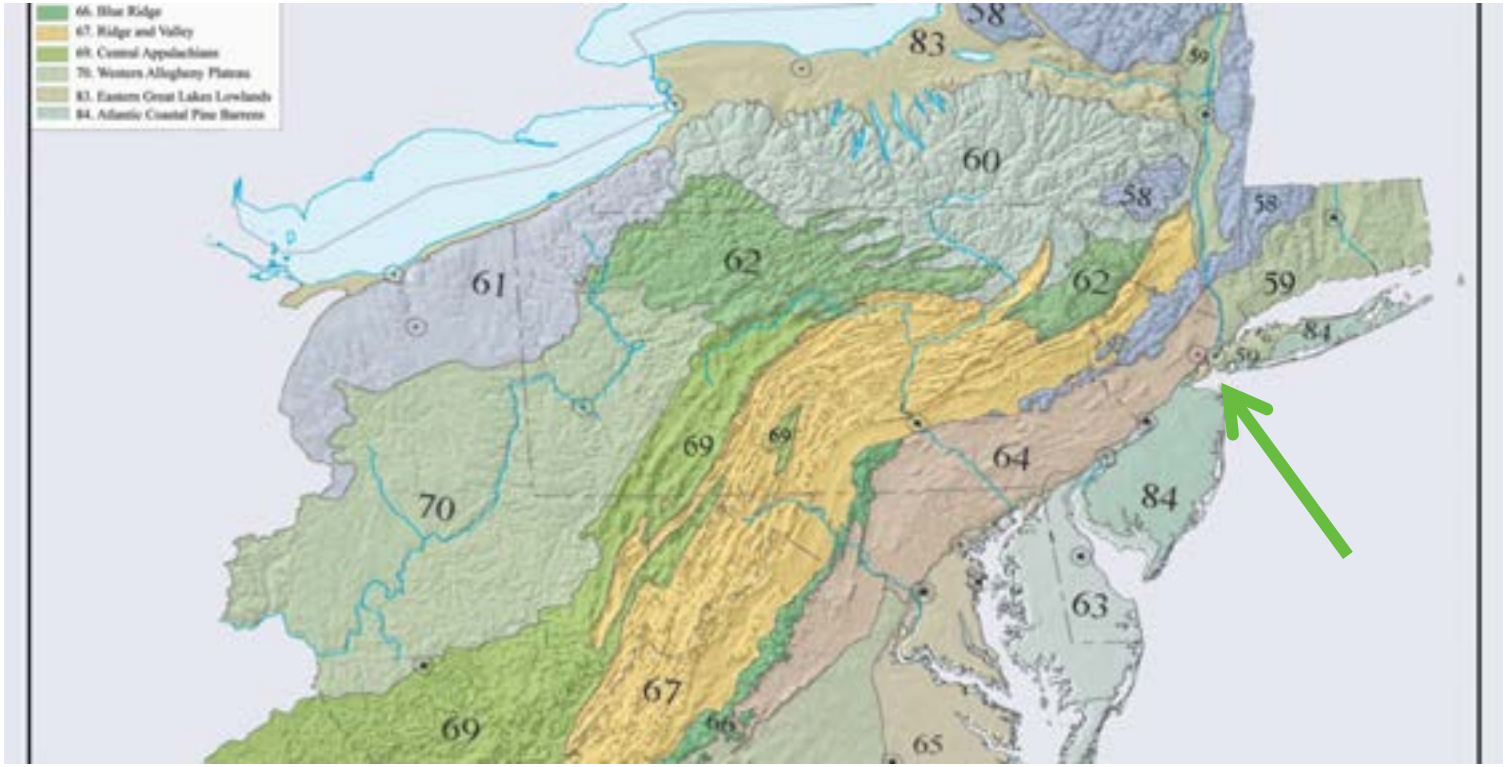
GNPC Collection Range
The Metropolitan Region



Brooklyn Botanic Gardens' New York Metropolitan Flora Project (NYMF) informs our collection range within 25 counties throughout New York, New Jersey, and Connecticut within 50-100 miles of Columbus Circle in Manhattan

Level III Ecoregion Map of the Mid-Atlantic



The five boroughs are represented in 3 Ecoregions: **The NE Coastal Zone, The Atlantic Coastal Pine Barrens, and the Northern Piedmont.** Ecoregions are defined by the compostion of geology, physiography, vegetation, climate, soils, land use, wildlife, and hydrology.

Evaluating Potential Collections

- Determine your priorities
- Identify Target Species
- Locate and assess populations to collect from
- Track phenology

Identification of Target Species

- Field guides with images
- Plant manuals and floras
- Herbaria
- Consult local experts

Population assessment

Who owns this land?

What is the extent of the population?

Number of individuals?

Is the population disturbed or damaged?

How long is the reproductive range?

Is this a naturally occurring population?

Can we make a large enough collection to meet our goal?

What other species could we make a return trip for?

When to collect seed?

Track phenology

Mature seed near or at natural dispersal

- Changes in fruit color
- Changes in seed coat color
- Fruits breaking open
- Seed rattling
- Hard and dry seeds
- Dispersal of some seeds

Changes in fruit color

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Changes in seed coat color

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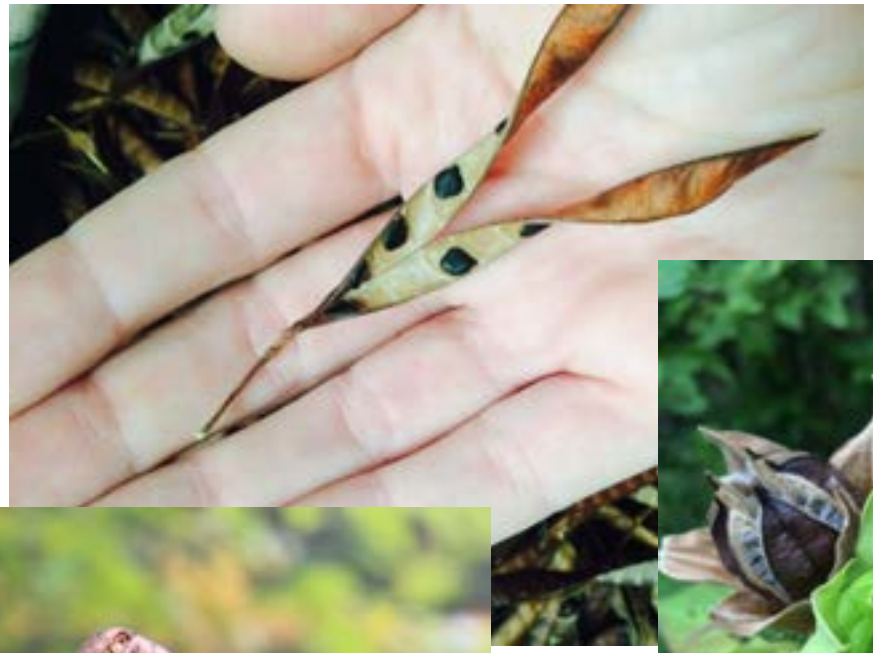
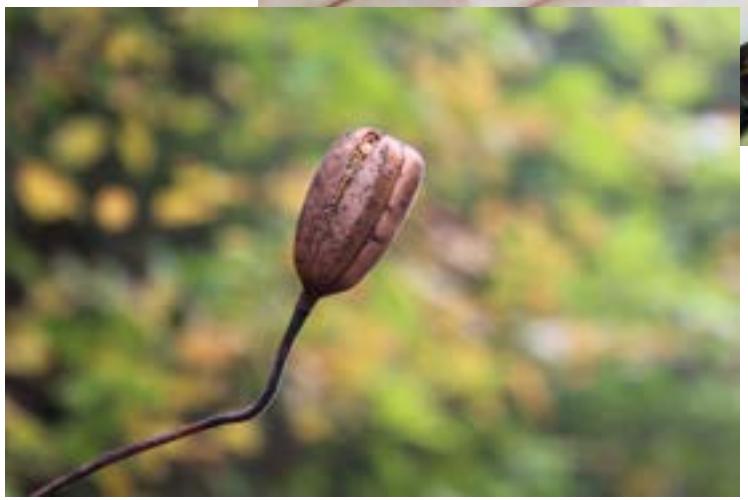
Fruits breaking open





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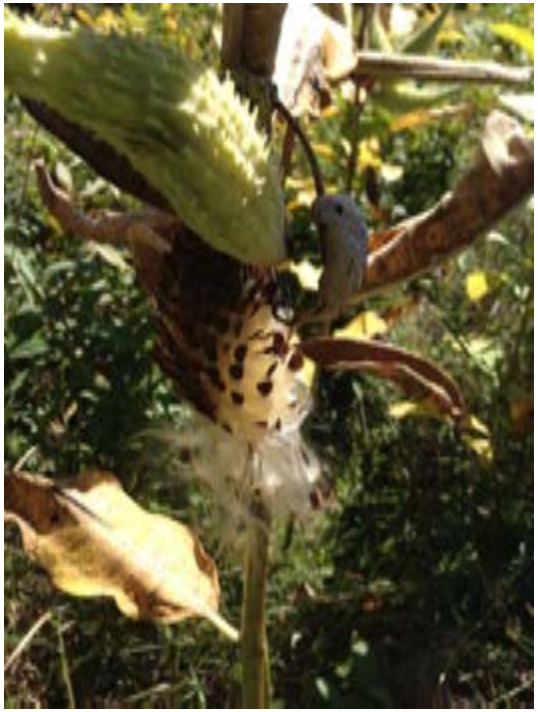
Natural dispersal of some seed



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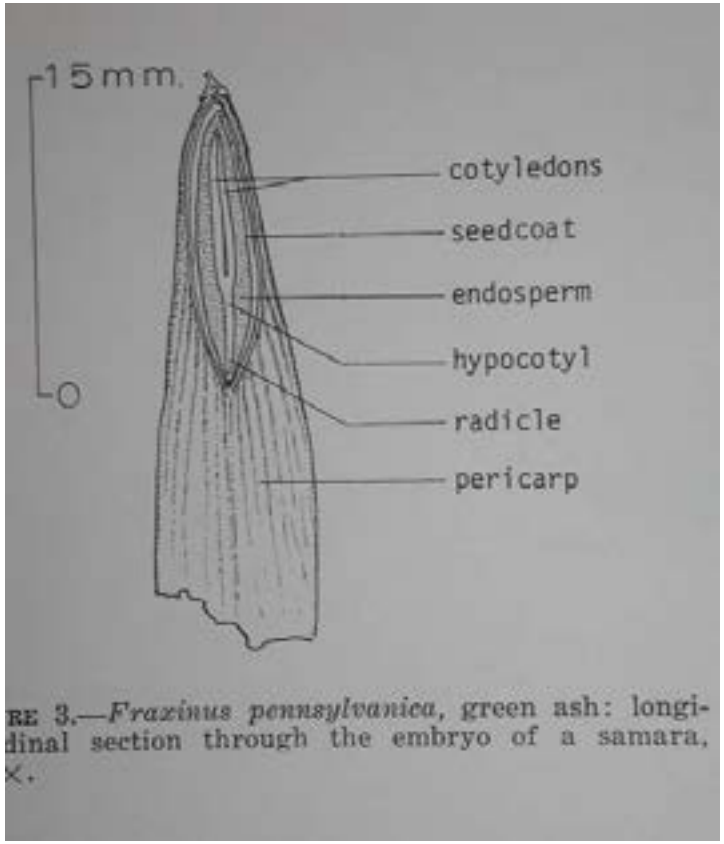
Using a cut test

- Determined % viable seed
- % empty
- % eaten or damaged



RE 3.—*Fraxinus pennsylvanica*, green ash: longi-dinal section through the embryo of a samara, ×.

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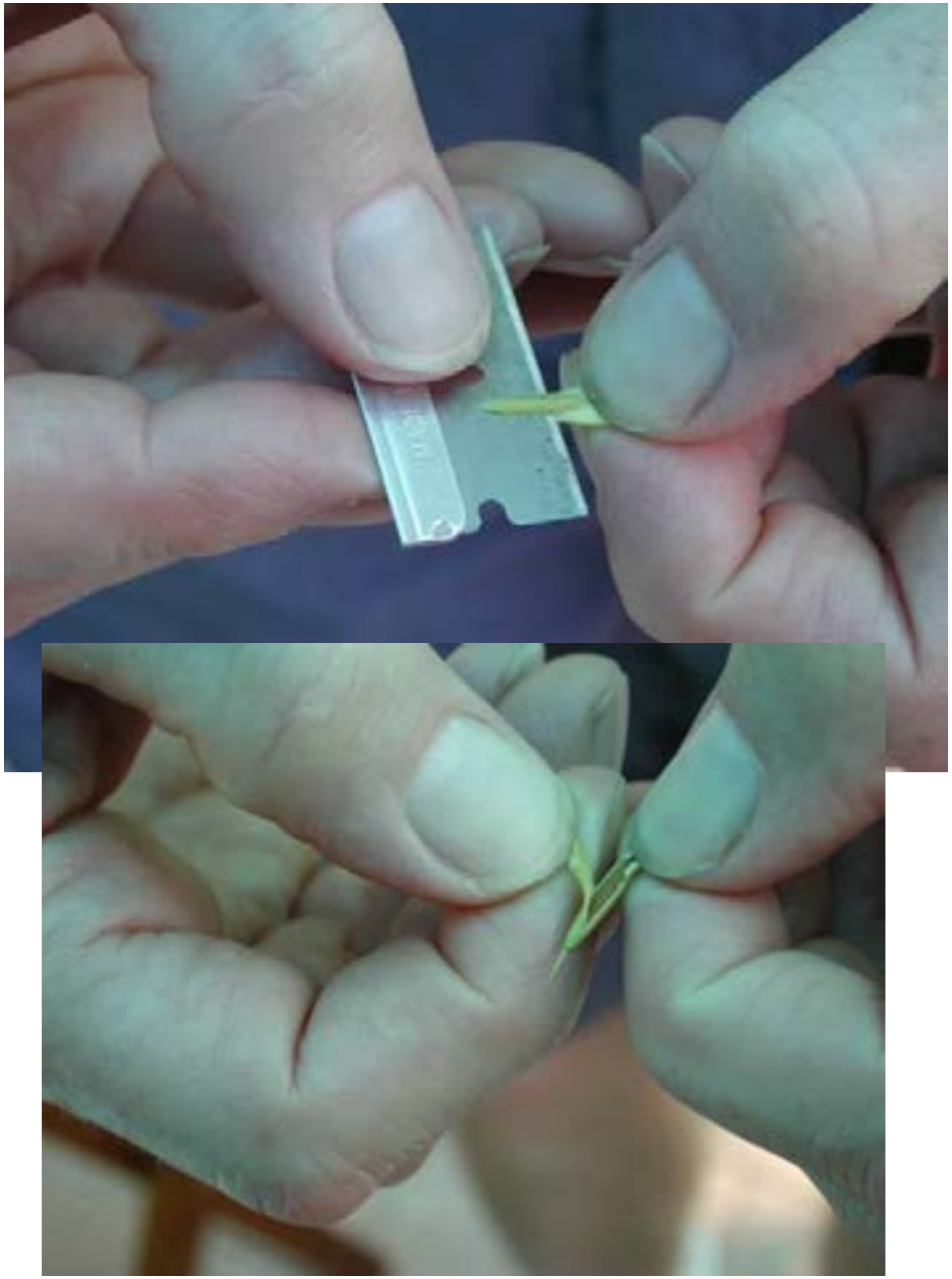
Fruits can be cut longitudinally with a razor blade to make a clean cut to make it easier to see more detail.

Take a representative sample of seed (~20 seeds)



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Cut Tests

Longitudinal cut showing the developing seed.

Half of its mature size.

Longitudinal cut showing the developing seed.
Almost mature size.
The seed coat is still green in color.

Longitudinal cuts on green ash seeds showing that the seed coats have matured and turned tan colored. These seeds are ready for harvest.

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Insect Damage

These fruits have been attacked by a seed bug.

General Rules on Seed Ripening

- Most annual and herbaceous perennials ready for seed collecting 2-6 weeks after bloom
- Most perennials have longer “window of opportunity” for seed collection
- Indeterminate inflorescence will have both ripe and immature seeds
- Populations north of NYC mature later in the Spring and earlier in the Fall
- Regional rainfall, temperature, and aspect affect seed population and ripening periods

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Quantity of Seed that a Species Produces

- Each species is unique
- Seed production can be cyclical
- The Poor Seeders
- Weather dependent (rainfall, late frosts)
- Disturbance can increase seed production
- Predation can decrease seed production

Collection Tools

- Collection Bags: paper, cloth, plastic
- Hand Pruners
- Pocket knife or razor blades
- Field Guide and/or Plant manuals or floras
- Hand lens
- GPS
- Pole saw or hook with extended pole
- Buckets or saddle bags

Sampling Methods

- Simple Random and Even
- Systematic
- Stratified random sampling

  division of population into smaller groups

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Collection Techniques

Plucking

Stripping

Shaking

Pruning

Collecting Fern Spores

Caring for collections in the Field

- Keep seed cool and away from excessive heat - heat kills seed embryos
- Open windows just a crack to cool regulate vehicle temperature
- If you must park in the sun, place bags under your vehicle (remember to take them with you when you leave)
- Keep seed ventilated

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Seed Collection Form

Scientific Name:		Seed Accession Number (SAN)
Date:		Collectors Name:
Location (be specific: County, State, directions, roads, and /or landmarks):		
Land use:	Owner :	Permit required Y / N
GPS Coordinates: Elevation:		
Species frequency/distribution: Common ___ Scattered ___ Rare____ Population estimate (numbers of individuals): Sample size: Area of Population (meters x meters))		
Habitat: __Forest __Woodland __Swamp Forest __ Shrubland ___Meadow/grassland ___Marsh/pond shore __ Aquatic		
Habitat type:		
Associated species:		
Soil texture ___Clay ___Clay loam ___Loam ____Loamy sand ___Sand Clay ___ Sand loam ___Silt loam ___Silt clay ___ Silt clay loam ____ Rock outcropping ___ Urban rubble ___ Sand ___ Silt Sand ___NA		
Slope: ___Flat ___Undulating ___ Moderately inclined __ Steep ___ Very steep __ Cliffs		
Aspect: __N __NW __NE __S __SW __SE __E __W		
Exposure: __ Full sun __Partial Shade __ Full Shade		
Moisture: __Seasonally wet/moist ___Wet ___Moist ___Dry	__ Poorly drained ___Well drained	
Seed quality: ___Good(65 –100%) ___Average (35-64%) ___Poor (0-34%) Estimate percentages or give the most frequently occurring: % healthy seed % damaged seed Seed maturation: ___Early ___Middle ___Late ___Indeterminate		
Seeds collected from: ___Ground ___Plant ___Both		
Additional notes:		

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At Homebase

Lay seeds out in a cool, dry place to allow surface moisture to dry

Clean excessive plant material from the collection or strip seed from stems, if possible

Collections should be stored in a cool, dry place in a cloth or paper bags until ready to be planted

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Label, Label, Label

All collections must be labeled (inside of bag and outside of bag)

Include: Species name, location, date, and unique number

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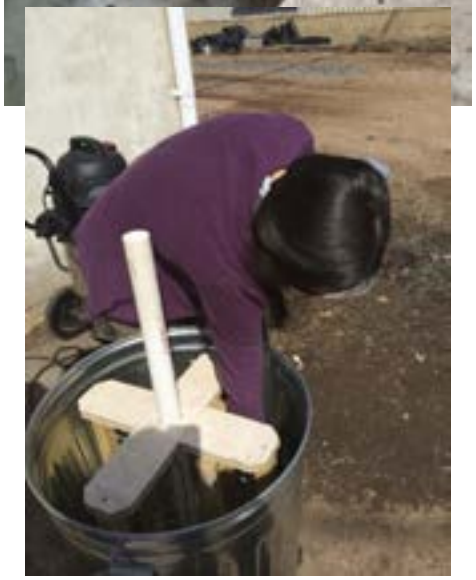
Seed Processing/ Cleaning

Labor intensive

Done mostly by hand

Use a rubber mat, screens, sieves, or blender



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Seed Collection: The Process and the Value

Regeneration

Resources:

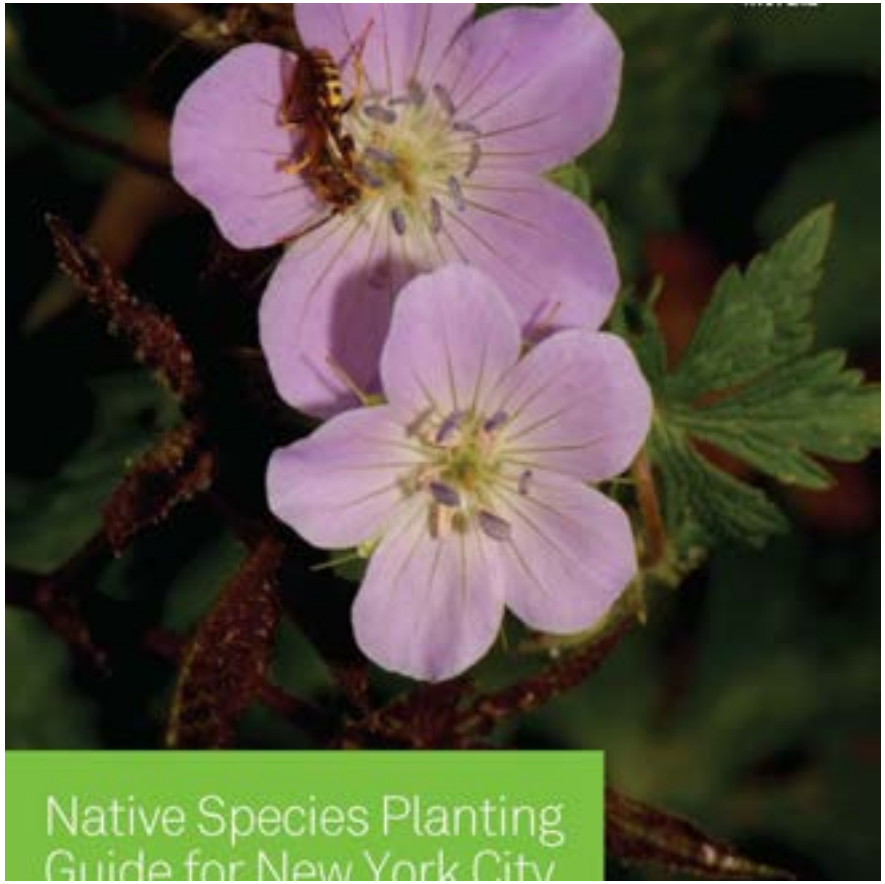
- Native Plant Network- propagation protocol database
- Prairie Moon Nursery- “Learning” section
- Lady Bird Johnson Wildflower Center- Native Plant Database
- USDA & US Forest Service- Woody Plant Seed Manual

NYC Parks

Native Species Planting Guide for New York City

Revision of Native Species Planting Guide for New York City and Vicinity, 1993.

This manual is an information resource written to provide support for increasing biodiversity in our natural ecosystems



- 300+ pages of guidance
- 420+ common native species
- Right plant for the right place
- Plant community based
- Native alternatives to common invasive plants
- Can be sourced at the Greenbelt Native Plant Center
- Available online as a PDF

Native Species Planting Guide 2019 3rd Edition

Revision of Native Species Planting Guide for New York City and Vicinity, 1993, 2015.

- Species additions and removals
- Clickable hyperlinks
- Revision of spelling errors
- Revision of wetland designations
- Revision of Storm Water Tolerant Plants
- State rankings added
- Species Least Preferred by Deer

Questions?