BLACK ASH SEED
COLLECTION PROTOCOL

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Acknowledgements

This protocol was developed by the Invasive Species Centre (ISC) in partnership with the Forest Gene Conservation Association (FGCA), National Tree Seed Centre (NTSC), and Ministry of Natural Resources (MNR), based on *Seeds of Ontario & Eastern Canada: A Manual for Tree and Shrub Forecasting and Collection*. 2nd Edition, (FGCA, 2024). Credit must be given to the above mentioned organizations for any use or distribution of this protocol.

Invasive Species Centre

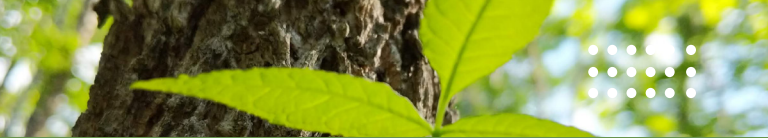
Canada

Forest Gene Conservation Association

This project has received funding support from the Government of Ontario. Such support does not indicate endorsement by the Government of Ontario of the contents of this material.

Ontario

DISCLAIMER: To participate in black ash seed collection as part of this initiative, you MUST be **registered as a volunteer with the ISC**. Black ash is a protected species under provincial legislation, and volunteer registration is required to collect seed in compliance with the *Species Conservation Act, 2025.* ISC cannot accept seed submissions from individuals or organizations that are not registered.



WELCOME!

On behalf of the FGCA, ISC, NTSC, and MNR, we want to sincerely thank you for registering as a volunteer seed collector. By doing so, you've taken a major step to help preserve the future of a species at risk in Ontario. The impact of your contributions may not be evident now, but future generations will benefit from the biodiversity, cultural heritage, and ecological resilience that your efforts help protect. Your role is vital in ensuring that this species has a fighting chance for recovery and survival.

BEFORE GETTING STARTED

The Black Ash Community Action Network (BACAN) is part of a broader effort to mitigate the impacts of the invasive emerald ash borer (EAB) on black ash – a species at risk in Ontario. Documenting black ash locations is a mandatory component of the BACAN initiative. Before getting started, please ensure that you have registered an **iNaturalist account**, and joined the **'Ontario Black Ash Inventory' iNaturalist project**.

Please remember: if scouting and collecting seeds on private land, it is your responsibility to obtain landowner permission before conducting any activities.

CONSERVATION THROUGH SEED COLLECTION – WHY COLLECT SEEDS?

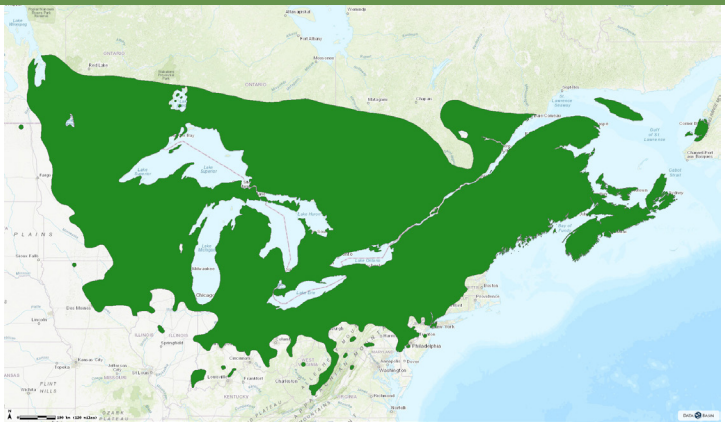
Seed collection is a conservation method with the specific goal of preserving both genetic diversity and regeneration of a target species. This ex-situ, or off-site, method allows for the storage of large quantities of genetically diverse seeds away from potential risks such as fire, disease, or invasive pests. Black ash (Fraxinus nigra; Ojibwe: baapaagimaak) is an at-risk species benefitting from seed collection and preservation, as natural populations rapidly decline due to the spread of the invasive emerald ash borer (EAB).

Collecting black ash seeds. Photo by Nate Siegert, USFS.

Not only does seed collection play a critical role in preserving the species' genetic diversity, it also helps safeguard the memories and traditional practices of many Indigenous communities who have historically relied on black ash for purposes such as basketmaking. Black ash remains an important cultural resource for many communities today.

Seed collection provides an opportunity to maintain hope—both ecological and cultural—for future generations of this endangered, North American keystone wetland species.

Basket made from black ash. Photo & basket by Angello Johnson, Akwesasne



Black ash range map. Source: Data Basin

DISTRIBUTION

Black ash has a native range that spans across eastern Canada and the northeastern to north-central United States. In Canada, it extends from western Newfoundland through Labrador and Quebec, including Ontario, New Brunswick, Nova Scotia, Prince Edward Island, and reaches its western limit in southeastern Manitoba. In the United States, the species is found from eastern North Dakota through the Great Lakes region, southward to Iowa, Illinois, northern Indiana and Ohio, southwestern Pennsylvania, West Virginia, northern Virginia, Delaware, and New Jersey. It typically thrives in cool, wet habitats—such as swamps, peat or muck soils in wetlands and riparian zones—and tolerates poorly drained, seasonally flooded soils.

DESCRIPTION

General: Black ash are medium sized deciduous trees, able to reach 27m in height.

Habitat: Wetland species, most often found along riverbanks or in swamps across Ontario where soils are consistently moist to wet.

Bark: Light to deep grey. Scaled, young bark is corky and spongey but as trees mature the bark fissures deepen and turn rough in texture. Bark of young twigs contain prominent raised lenticels (bumps).

Leaves: Opposite compound pinnate leaves. Leaves grow up to 45cm (18”) with 7 to 11 bright yellow-green leaflets per petiole; individual leaflets are typically no longer than 12cm (4.5”). Leaflets are oblong-lanceolate in shape and directly attached to the central stalk (sessile), bases with distinct tufts of hair.

Flowers: Polygamo-dioecious, meaning it can produce male flowers, female flowers and bisexual flowers on the same tree; however, some trees may have solely male or female flowers. Male flowers are in dense green to red clusters below terminal buds. Female flowers without petals; red branched clusters below terminal buds.

Seeds: Trees produce winged fruit called samaras, each containing a single seed. Samaras are oval, reminiscent of a canoe paddle, and hang in dense clusters. Colouration is green on trees, changing to a yellow brown at maturity.

Buds: When present, are dark brown in colour and sharply pointed (like a chocolate-chip). Unlike other ash species, the lateral buds do not touch the terminal buds and there is a visible gap.

Seed Harvest Season: Early September to late October.

BLACK ASH IDENTIFICATION

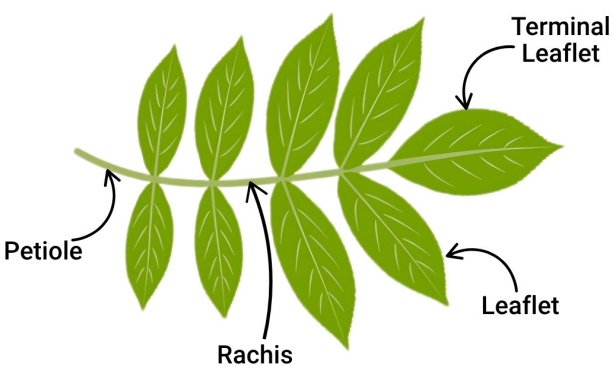


Diagram of black ash leaf parts. Compound leaf – consists of multiple leaflets attached to single central stalk (rachis).

BRANCH ARRANGEMENT

Ash trees grow in an opposite branching pattern. This feature is not unique to black ash or ash trees in general. Confirm tree ID using a combination of features below.

Tip to remember: ash branches match.

LEAF I.D.

Leaves are opposite & compound with 7-11 stakless, hairless leaflets which attach directly to the rachis. Dense, rusty hairs are present at the base of the leaflets. This is a key difference from other ash species.

Tip to remember: black stays stacked.

BARK I.D.

Bark is soft & corky on young trees with raised lenticels. When mature, scales become flaky & rub off easily, revealing a pale-orange underside.

Tip to remember: black flakes fast.

TWIG & BUD I.D.

Terminal bud is dark brown to black & sharply pointed (chocolate chip appearance); noticeable gap separates terminal bud from first pair of opposite lateral buds.

Tip to remember: black buds slack.

SEED I.D.

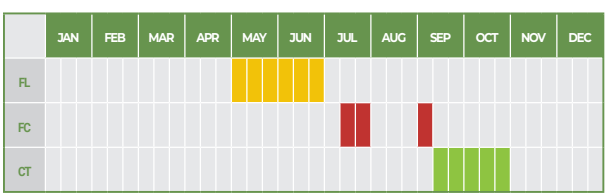
Samaras containing seed. Typically 2.5 – 4 cm long with flat thin wing extending to seed base, creating a blunt or rounded appearance at both ends.

Tip to remember: black wings cling.

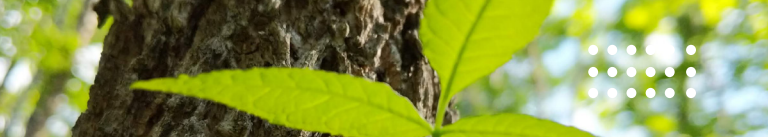
COLLECTION TIMING

The timing of seed maturity varies between ash species and stand locations with early season forecasting allowing a better estimate of seed yield for your specific location. Seeds should be collected at an optimum stage of maturity to maximize their longevity for long-term storage. Seeds reach optimum maturity shortly before natural dispersal occurs, with seeds collected before or after this period not as viable. Seed collection for black ash typically occurs from September through October. Look for:

- Colour change in samara from a pale green to yellow and finally a dark brown.
- Ripe clusters quickly turn from yellow to brown, not lasting as long as other ash species.
- Healthy embryos are white in colour and surrounded by a white to off-white endosperm, which fills the seed cavity when it is ready to collect. Exterior seed cases are dark brown.
- Perform a horizontal cut test through the seed (plump end of the samara, avoiding the thin wing) before collection to assess embryo maturity.



YELLOW: FLOWERING PERIOD
RED: CRITICAL FORECASTING TIMES
GREEN: COLLECTION TIMES



FORECASTING

Forecasting the estimated fruiting period is a crucial first step in collection. Black ash is a mid-season species, with prime forecasting periods occurring between late June to September (see chart on pg. 18). During this period, look for samara clusters in identified ash stands. Samara will be green and close to full size. Perform a cut test to assess the number of developing or damaged seeds and take note of signs of insect damage or seed abortion.

INSECTS AND DISEASE

Insects and disease interfere with a tree's ability to produce viable flowers and seeds. When selecting an area for collection, do a quick visual assessment, examining:

- Health of the crown
- Colour of foliage
- Signs of decay or wounds on the trunk and branches
- Shrunken or deformed samara
- Dark spots or holes on the samara caused by weevils (a type of insect)
- Empty or damaged seed cavities
- Signs of rot or fungus

Always complete a cut test before collection! Not all signs of damage are external. Information on cut tests can be found on page 28.

TO COLLECT OR NOT TO COLLECT

Before heading out to collect seed, it's important to consider factors such as genetic diversity, the potential for natural regeneration following collection, and site permissions. Always contact the appropriate individual(s) or organization to obtain access to a property prior to collecting seed.

Start by estimating how much seed is available. Mature black ash trees typically begin reproducing around 30–40 years of age, but they only produce large seed crops—known as mast years—about once every eight years. Cut tests can also help to estimate how much viable seed is available, and if there is enough viable seed to be worth collecting.

It's best to collect seed from areas with a higher number of naturally occurring black ash individuals. **Do not collect from planted trees** – such as those found in urban areas or nurseries – as they may not represent the genetic characteristics of local populations. In smaller or more scattered stands, aim to collect only if there are at least 15 healthy mature trees present – if a stand has been largely killed by EAB, and very few live seed-producing individuals remain, it is still encouraged to collect seed from these individuals, making note of this on the collection form.

As a general rule of thumb, set a target number of seed between 2500 and 5000 – this works out to about 4 to 6L of samaras per tree. Collecting from larger groups of individuals increases the genetic diversity of your sample and often results in a higher yield of viable seed per tree. As you identify healthy seed-producing

trees to collect from, assign each a sequential tree number (e.g., Tree 1, Tree 2, Tree 3) to track individual seed sources and ensure accurate documentation. Record this number on the collection labels provided in the kit. Seeds must be bagged and labelled separately for each healthy mother tree.

IMPORTANT: Only collect seeds directly from the tree—never from the ground. Seeds on the ground are more likely to be damaged, degraded, or non-viable and may have already been subjected to pests, disease, or rot.

EQUIPMENT

Standard equipment should include:

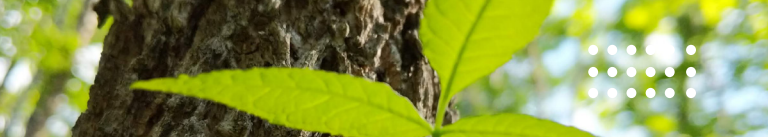
- Picking bags and/or tarps
- Burlap bags or plastic tubs
- Pole pruners
- Pruning shears
- Rope/throwline and throw-bag (if access to pole pruner is not possible)
- Gloves to safely handle brush
- Hand cleaner, water, paper towels
- Seed collection tags
- Clipboard and any record keeping forms
- Permanent ink markers
- PPE including hard hat and eye protection
- GPS unit or cell phone/tablet with GPS enabled

COLLECTION TECHNIQUES

Black ash trees often coexist with other common ash species, such as green ash (Fraxinus pennsylvanica) and white ash (Fraxinus americana), making proper species identification important prior to collection. Trees can be accessible from roads or paths, but black ash are usually limited to natural wetland forested areas where the ground may be uneven and upper branches difficult to reach. Trees can vary in height and lower branches bearing samaras may be as high as 6 to 24m. When scouting ash locations, consider your site's layout and obstacles to determine the most effective and safest method of seed collection. Tree climbing is a suitable method for seed collection provided you have professional training, equipment, and a safe location to do so. Take note that due to EAB damage to ash, affected and surrounding trees may be unsafe to climb. Before collecting ensure you have permission for collection and any tools used on-site.

PRIMARY METHOD: POLE PRUNERS

Pole pruners are a series of pole sections with a cutting head attachment and rope. Pole pruners are best used for seeded branches up to 9m above the ground, and on branches no more than 4cm in diameter (review specifications listed for individual pruner brands).



PLEASE NOTE: ISC has limited availability for pole pruners, which are reserved for specific circumstances. You are responsible for obtaining your own equipment. If you require support accessing equipment please reach out to ISC.

- A tarp should be spread beneath the lowest seed-bearing branches before pruning.
- Position yourself slightly offset from the target seed-bearing branch for cutting. Ensure stable footing and careful manoeuvring of the pole.
- Angle the cutting blade around the branch or seed cluster. Depending on height, pruning may be a 2-person job – one operating the pruner, the other holding the pole steady. A ladder may also be used provided it is set on even ground.
- When ready, pull the rope firmly and smoothly to cut. Ensure rope is clear of small branches prior to pulling.
- Let the branch or seed cluster fall to the tarp below. Never try to catch it. Cut branches may fall directly towards the operator(s) – care should be taken before any cuts are made.
- Reposition yourself and repeat for each additional branch or seed cluster.
- Minimize the amount of wood taken and cut branches near branch nodes, to reduce excessive damage to trees during collection.

Cutting black ash branch with pole pruner. Photo by Brad Neary, MNR.

IMPORTANT TIPS:

- Never use pole pruners near power lines.
- Use proper Personal Protective Equipment (PPE) including hard hat and eye protection.
- Always ensure proper communication between operators and crew.

Pruned seed-bearing branches on tarp. Photo by Brad Neary, MNR.

- Taller pole pruners are more difficult to control and require a higher level of upper body strength.
- If brush needs to be cleared for collection, ensure you have proper permission to collect and clear.
- Ensure proper footing on uneven ground and around fallen debris.

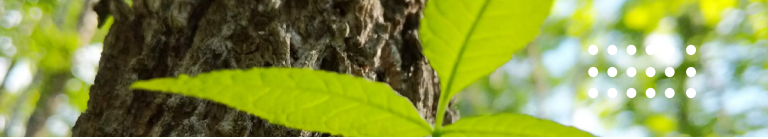
SECONDARY METHOD: ROPE/THROWLINE

◆ Using a strong, lengthy rope or throwline is another method to collect seed from tree branches by allowing the collector to shake the branches, causing the samaras to fall onto a tarp below. This method may not be as effective as using a pole pruner and requires more time, effort, and patience. Even a slight breeze can make this method difficult for collection seed. For this reason, it is strongly recommended that the pole pruner method be used instead.

◆ This method is better for seed that is higher in the crown ie. taller than the 9 m mentioned above

◆ Spread a tarp on the ground beneath the target branch with samaras.

◆ Attach a throw-bag/weight to one end of a rope/throwline by tying a secure knot.



- Position yourself underneath the target seed-bearing branch.

- Throw the rope-tied throw-bag over and around the branch and allow it to return to the ground.

- Using both ends of the rope, pull downward and shake the branch, causing the samaras to fall onto the tarp below. Stand slightly angled to minimize risk from falling seeds and branches—it is common for black ash branches to break.

- Remember to use proper PPE including hard hat and eye protection.

- Reposition yourself and repeat for each additional branch or seed cluster.

CUT TEST

Cut tests can help determine seed viability. In non-mast years, results may be very low, meaning that even if trees appear to have many seeds, few are worth collecting.

◆ Take at least 10 seed samples for the cut test from the tree you are collecting from. Samples should be taken from as many parts of trees as you are able to reach to determine the presence/absence of damage or insect activity. Limiting sample collection to the bottom of the crown or a single side of the tree may underrepresent negative impacts present.

◆ Use pruning shears, scissors, or a similar sharp blade to cut the seeds in half and observe the embryos. Early cut tests

Cutting mature seed with hand pruner. Photo by Angeline Castilloux, ISC.

conducted during forecasting help estimate seed yield and identify potential insect damage, while late-season cut tests assess embryo development to determine seed maturity, expected yield, and optimal collection timing.

- Use of a hand lens of 10x or 20x magnification may be helpful.
- Make a record of the number of empty, infested, or immature seeds observed during the test. This data should be submitted alongside the general field data if seed collection occurs. If many seeds are found to be empty or infested, the tree should be avoided, and the seed collector should move on to a different, healthy tree.

Cut mature seeds displaying white embryos. Photo by Brad Neary, MNR.

FIELD DOCUMENTATION

Field documentation of site details is an essential part of the seed collection process. Unless a seed collector provides the information, seed quality and source cannot be readily determined.

When collecting you should record:

- The name of the collector(s)
- Collection date
- Assigned tree number (Tree 1, Tree 2, Tree 3, etc.)
- Location (Area name)
- GPS co-ordinates in decimal degrees for each tree (Latitude and longitude)
- Eco district & seed zone (codes)
- Elevation
- Site description
- Crop condition (Maturity, damage, cut test)
- Cut test results (number cut and number good)

Make a copy for your own records and send the original datasheet in with the seeds.

If unsure, click each of the following to determine the correct area: **Eco District**; **Seed Zone**.

POST-HARVEST HANDLING & SHIPPING

After collection, gather seeds from the tarp and remove any twigs, leaves, or debris. Seeds must be bagged and labelled **separately for each healthy mother tree**. Labels should include the **stand location**, **collection date**, and **individual tree number**. Use the provided label cards from the volunteer kit or print/photocopy the collection documentation in the Appendix as needed.

To maintain seed **viability and vigour**, proper handling is essential throughout collection, temporary storage, and shipping. Seeds should be kept **cool**, **well-ventilated**, and **protected from moisture extremes and direct sun exposure**.

◆ Spread seeds on screens or trays in a cool, dry location protected from the sun, rain, snow and predation to dry thoroughly before bagging. Seeds can be shipped once they are dry to touch.

◆ Inspect seeds daily for signs of **pests**, **mould**, or **overheating**, and stir seeds regularly to promote even drying.

◆ Once dry enough, place seeds into paper bags for shipping. Seeds from each individual tree should be in a separate paper bag, appropriately labelled. If shipping several paper bags or if paper bags are flimsy, place in a **sturdy cardboard box**.

◆ If immediate shipping is not possible, store seeds in a cool, dry, well-ventilated area out of direct sunlight.

◆ Ship seeds early in the week to avoid delays in transit or storage over weekends.

◆ Note: Black ash seeds are more tolerant of drying due to their seed coat, but good handling practices are still necessary to ensure quality.

Collected seeds are to be shipped to the Invasive Species Centre at the following address:
1219 Queen St E, Sault Ste. Marie, ON P6A 2E5

Seeds will be sent by ISC to NTSC in New Brunswick for long-term storage.

HEALTH AND SAFETY

This list should be used as guidance only.

◆ Plan ahead: set up an emergency plan. Inform others of both your plans and location.

◆ Always carry a fully stocked first-aid kit, cell phone, and allergy medication.

◆ Dress for the weather. Monitor weather and prepare clothing for sun protection, rain, wind, cold, ticks, etc.

◆ Wear high visibility work clothing and be aware of seasonal hunting timelines in your area.

◆ Be aware of potential wildlife encounters and prepare accordingly.

◆ Watch footing and ladder use on uneven ground. Wear appropriate footwear.

◆ Maintain vehicle and road safety at all times.

◆ Be aware of your physical limitations.

◆ Due to EAB damage trees may be unsafe to climb, with surrounding trees also posing a hazard.

To learn more about collecting high-quality, source-identified seed and becoming a Certified Seed Collector through Ontario's Natural Selections program, please visit: https://fgca.net/seed-expertise/standards-for-seed-quality/

To learn more about seed collection and conservation at the NTSC, visit: https://natural-resources.canada.ca/science-data/science-research/research-centres/ntsc-seed-collection-conservation

LITERATURE CITED

- Knight, Kathleen S.; Karrfalt, Robert P.; Mason, Mary E. 2010. Methods for collecting ash (Fraxinus spp.) seeds. Gen. Tech. Rep. NRS-55. Newtown Square, PA: U.S. Department of Agriculture, Forest Service, Northern Research Station. 14 p.

- FGCA. 2024. Seeds of Ontario & Eastern Ontario: A Manual for Tree and Shrub Forecasting and Collection. 281 p.

- Ontario Government. 2024. Black Ash Government Response Statement. Ministry of the Environment, Conservation and Parks. 12 p.

APPENDIX: COLLECTION DOCUMENTATION

Collector's Name and Contact Information:

_____

Date Collected:

_____

Species Information:

_____

Latin Name:

_____

Common Name:

_____

Code(s):

_____

Eco District (code): _____ Seed Zone: _____

Stand Location (GPS Coordinates, Township, 911 address, etc):

_____

Latitude: _____ Longitude: _____

Elevation: _____

Assigned Tree Number: _____

Number of trees collected from: _____

Cut test crop condition: _____ /10

Notes (Maturity, damage, etc):

_____

_____