CENTRE FOR BOREAL RESEARCH
TECHNICAL NOTE #35
PLANT AND SEED TECHNOLOGIES - AUGUST 2020

Populus balsamifera

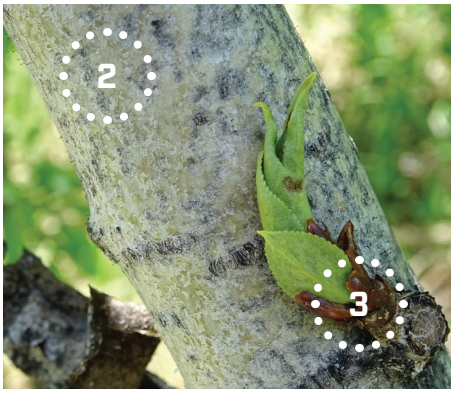
COMMON NAMES: Balsam poplar, Poplar
FAMILY: Salicaceae (Willow)

SPECIES IDENTIFICATION

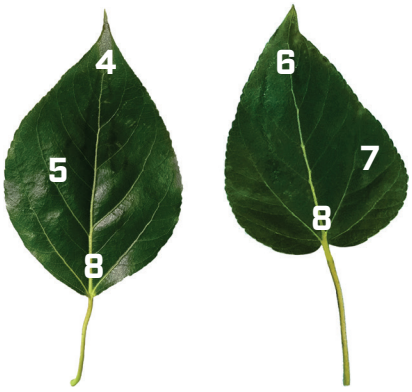
GENERAL ID

A deciduous tree that is typically up to 25 m tall. Bark is greyish-green when young and darkens to a greyish-brown with deep furrows as it matures.[1] Twigs are pale brown and often speckled with orange. The buds are large and produce a sticky resin with a strong aroma.

1 Mature Balsam Poplar



2 Young Balsam Poplar Bark
3 Resinous Bud



4 Narrow pointed tip
5 Dark green and glossy
6 Ovate to lance shaped
7 Margins smooth to shallowly toothed
8 Oval to heart shaped base

LEAVES

Alternate (single leaf attached to branch node), large (5 cm to 15 cm), and ovate to lance-shaped. Base is heart-shaped to oval; the tip is narrow and pointed. Margins are smooth or shallowly toothed. Leaf is dark green and glossy. Stalks are long and rounded.

HABITAT

Common in all Alberta ecoregions. Tends to grow near shores, floodplains, coulee slopes, and riverbanks. Often found growing on upland sites in areas of high moisture and is very shade intolerant.[2,3] Associated species include *Picea glauca, Alnus incana, Cornus sericea, Rubus idaeus*, and *Rosa acicularis*.

LOOKS LIKE

- ***Populus balsamifera L. ssp. trichocarpa* (Black cottonwood)** - largest North American species in the willow (Salicaceae) family.[4] Leaves have fine teeth. Black cottonwood often hybridizes with Balsam poplar.

FLOWERING

This species is dioecious. Balsam poplar flowers April-May before leaves are out, with pollen dispersing in spring. Seed dispersal can occur from June to July and lasts 2-4 weeks.

MALE CATKINS

Male catkins develop first, appearing before leaf flush. 12-30 stamen are attached to a stalked bract, with numerous bracts tiered to form the catkin.[1,5] Red to brown in colour and 7-10 cm long when mature, catkins will dry and fall off after pollen dispersal.

FEMALE CATKINS

2 stigmas per flower, with 15-30 flowers tiering to form the inflorescence. Yellowish-white in colour when immature, becoming green and elongated after pollination and reaching 8-15 cm long when mature.[1,5] Capsules are yellow-green when ripe. During seed dispersal, cotton-like fluff (pappus) is released giving catkins a white-grey appearance. Catkins dry and drop off after seed is dispersed.


Male catkins on branch


Fertilized female catkins on branch


Fully opened catkin exposing seed in pappus

Cleaned poplar seed

SEED

Capsules are typically spherical, 2 or 3-valved and 6 to 10 mm long.4 There can be variation in capsule appearance, especially if the individual is hybridized. Numerous seeds are released with tufts of white hair (pappus).

VEGETATIVE REPRODUCTION

Balsam poplar has a high potential for vegetative reproduction, capable of producing new shoots from roots, broken branches, stumps and from the base of a parent tree,[6,7] although suckering potential is less than that of aspen (*Populus tremuloides*).

STEM CUTTINGS

As a hardwood tree, balsam poplar may be propagated from stem cuttings taken during dormancy and planted the following spring.

Note: For more information on collection, storage and deployment of cuttings, refer to "Technical Note #25 and #26 (Handling of Poplar and Willow Cuttings Part 1 and Part 2)" by the NAIT Centre for Boreal Research.

SEED COLLECTION AND PROCESSING

SCOUTING

Balsam poplar catkins are quite large and start to develop prior to leaves, making scouting quick and easy. It is suggested to scout early in the season, use GPS to track the location of the patch, and flag trees to improve efficiency when seed is ready for collection.

POPLAR (*P. BALSAMIFERA*): WAIT OR HARVEST? A VISUAL GUIDE

Wait, or harvest and ripen at facility

Harvest

Harvest carefully

*Note variation in capsule size

SEED COLLECTING

Harvest female catkins when the capsules are starting to open, typically early June. Harvest branches with pole pruners, or fell the tree with a chainsaw, remove catkins and place in paper bags for transport back to the seed cleaning facility.

There are two good ways to store seed for transport:

1. Place catkins into a small paper bag, leaving some air space. Fold the bag top over to close and place into a larger paper bag. Continue until large bag is full of smaller bags, taking care to maintain air spaces. Do not compress the bags.
2. Place a thin layer of catkins into an onion bag. Lay the bag flat on the ground, lift the one side and sprinkle an even layer into the onion bag. Fold the onion bag in half and place into a large paper bag. Continue stacking onion bags until the bag is full, layering cardboard or extra bags between the onion bags will maintain air spaces and prevent compaction.

Note: Regardless of which method is used, it is crucial that the catkins remain cool and well ventilated to preserve the viability of the seed. For this reason, storage in buckets or similar closed containers is not recommended.

INTERIM STORAGE

Loose catkins can be stored in a 4˚C cooler or in a fridge for up to a week before spreading out to dry and "fluff up." Catkins on cut branches can be stored for 2 weeks in a 4˚C cooler or fridge.

SEED RIPENING

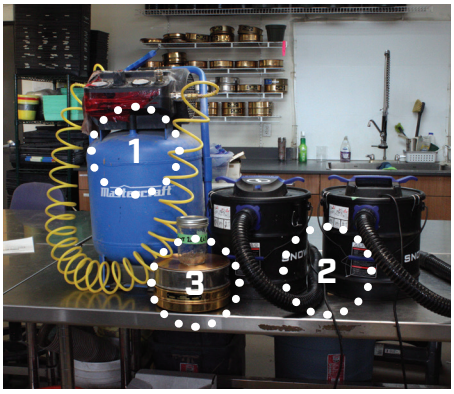
Spread catkins out in a thin layer in a container or shelf topped with mesh screening to allow air circulation. A thick layer will inhibit the "fluffing out." Simple, stackable racks built with screen on the bottom and top allows the most airflow and will speed up the ripening process. Keep air moving with a fan set to low to further speed the process. When catkins appear to have opened fully, and much of the pappus has loosened, seed is ready for the extraction process.

Catkins before fluffing

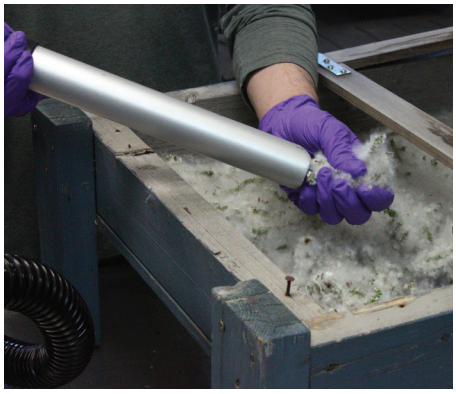
Catkins after fluffing

SEED EXTRACTION

This method uses 2 vacuums (one ash vacuum, one "Shop-Vac"), and ideally an air compressor, a selection of soil sieves, and a column blower.



1 Air compressor
2 Ash vacuums
3 Soil sieves



Using ash vacuum to collect loose seed and pappus

Vacuum empty pappus with second vac

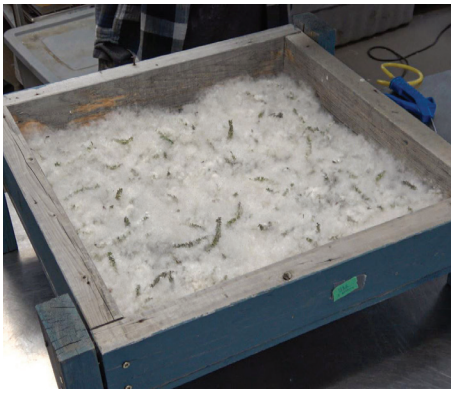
Carefully remove the screen from the top of the container/rack and gently vacuum up the loose seed and pappus from the catkins using the ash vacuum. The empty pappus will accumulate around the air filter and seed will fall to the bottom of the ash vacuum canister. Every few minutes, turn off the ash vacuum and turn on the "Shop-Vac." Unlock the lid to the ash vacuum and open it just enough to fit the "Shop-Vac" hose. Vacuum up the empty pappus. Remove the lid of the ash vacuum and pour the accumulated seed into a bowl or jar for temporary storage.

Note: It is important to pause vacuuming periodically and remove the empty pappus, as continuous vacuuming will cause the cannister to overfill and the seed to wrap around the filter and mix with the pappus again. The size of the ash vacuum used will determine the time between emptying the canister to maintain seed separation from pappus during this step.

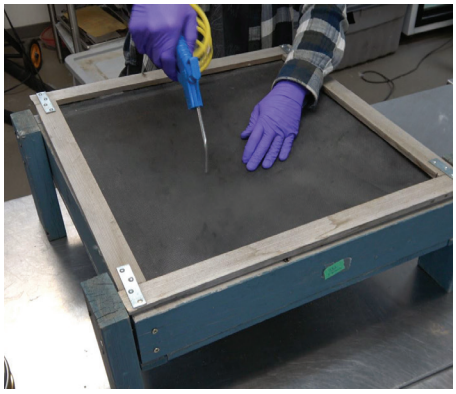
When finished vacuuming up loose seed and pappus, there are two options:

1. Flip over catkins, gently agitate, and wait overnight for the catkins to continue to open. Repeat the process until catkins no longer "fluff-up".
2. Use an air compressor, or a clean "Shop-Vac" set to blow, and blast catkins with air. This will agitate the catkins and release additional seed and pappus. Repeat the process until no more seed and pappus is released.

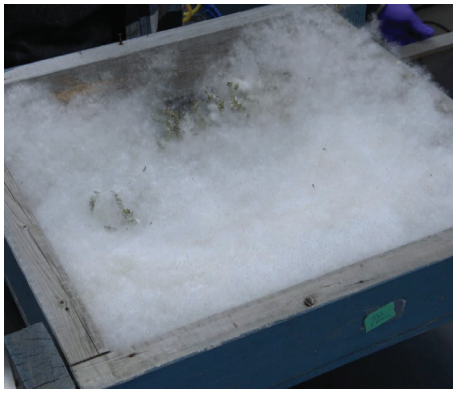
Note: this technique will not work on a shelf as the catkins will blow away. This is best suited for catkins in a rack or in a bin with a screen placed on top.



Catkins before air compressor



Using air compressor and covered rack to loosen seed and pappus



Catkins after air compressor

To remove any chaff or pappus remaining in your extracted seed, use various sizes of soil sieves or a column blower.

Note: be careful if using a column blower as seeds are very small and can easily be blown away with the chaff.

STORAGE

Dry cleaned seeds to 15-25% Equilibrium Related Humidity (% ERH) at 20-30˚C or 4-8% moisture content and store in an airtight container or sealable bag at -20˚C for best seed longevity. Depending on the local climate (Relative Humidity in particular), drying may be possible on a bench top. If located in a humid area, the use of desiccant or a dry room/chamber may be necessary.

FIELD EXTRACTION

If catkins are completely open and fluff is flying everywhere, field extraction can be considered. The process remains the same (see Seed Extraction), with the additional need of a generator or deep cycle battery with a power inverter to run the vacuums.

BRANCH COLLECTIONS

If target catkins are underripe and later collection in the area is not possible, branch collection may also be done. The process is similar (see Seed Collection), however catkins are left on their branches and wrapped in a large "Silvi-Cool" tree planting tarp for transport.

Once at the seed cleaning facility, branches are treated like cut flowers. Trim ends down to a manageable size and place the cut ends into buckets or bins of water. Every few days, trim the bottom of each branch to ensure proper uptake of water. This will keep the branches alive while catkins continue to develop. When catkins are mature and starting to open, remove from branches, allow to "fluff up" completely and extract as normal.

For more information on best practices for collection and seed registration, refer to "Technical Note #15: Seed Collection, Processing and Storage" by the NAIT Centre for Boreal Research.

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