

**Scientific Name:** *Populus tremuloides* Michx

**Family:** *Salicaceae*

**Common Names:** trembling aspen, quaking aspen, aspen poplar, white poplar

### Plant Description

Small to mid-height deciduous tree in stands and clumps due to proliferous spread of suckers from roots; bark greenish to white darker near base; buds non resinous or fragrant; leaf obovate and sharp tipped, 3 to 7.5 cm long finely round toothed flattened stalks; flowers form drooping catkins (Moss 1983). Plants live to 80 years (Government of the Northwest Territories n.d.).

**Fruit:** 3 to 5 mm long capsules.

**Seed:** Light brown to cream coloured, small somewhat obovate seed (~1 mm long) with tuft of hair.

### Habitat and Distribution

Forests and parklands (Moss 1983). Grows along forest edges and waterways – shade intolerant (Rose et al. 1998). Occurs in pure stands, especially as a young tree (Wilkinson 1990).

**Seral Stage:** Early.

**Soil:** Adapted to a wide range of soil textures and can tolerate soil pH range 4.3 to 9 (USDA NRCS n.d.). Optimal moisture regime is submesic to subhydric (Beckingham and Archibald 1996).

**Distribution:** Forest and parkland; Alaska, Yukon, southern District of Mackenzie, to James Bay, Newfoundland south to California, New Mexico, Missouri, Tennessee, New Jersey (Moss 1983).

### Phenology

Female plants mature at 8 to 10 years (Government of the Northwest Territories n.d.). Aspen flowers in mid-April to early May, with seeds ripening within 4 to 6 weeks of flowering. Good seed crops occur every 4 to 5 years (Farrar 1995, Government of the Northwest Territories n.d.), though, this may be cyclical for a clone rather than a population. Blooming date has advanced by two weeks since

1936 due to climate change, increasing the species' susceptibility to frost damage (Beaubien and Hamann 2011).



*Populus tremuloides* cloned stand

### Pollination

Wind pollinated (Cox 1988).

### Seed Dispersal

Dispersed soon after ripening up to several kilometres in high winds (Rook 2002).

### Genetics

n=38 (Moss 1983).

### Symbiosis

Ectomycorrhizal associations can increase hydraulic conductance of aspen, especially in colder climates



(Landhausser et al. 2002). Dual associations with arbuscular mycorrhizae and ectomycorrhizae where arbuscular mycorrhizae are more beneficial and likely to colonize in areas with low organic matter and ectomycorrhizae are more likely to colonize in areas with high organic matter and low pH, or nearer the surface where decomposition is taking place (Neville et al. 2002).

### Seed Processing

**Collection:** Pole-pruners may be used to harvest individual branches from shorter trees, or entire trees can be felled. Branches may be stored in tubs of water for after-ripening (3 days to 1 week) which can extend the harvest period tremendously (Moench 1999). As soon as the first capsules crack, begin harvesting to prevent loss when felling branches or whole trees. Also, because different clones will ripen at different times, it is possible to stagger collection somewhat.

Catkins may be stripped into buckets or bags as long as they are stored in small containers and quickly moved to refrigerated conditions to prevent further ripening. To ensure complete cooling, capsules should be packed lightly, spread out in a single layer if possible (Smreciu et al. 2013). If immediately drying seed, cover with screening material, such as burlap, to prevent seed loss by air movement. Kept cool (4°C), capsules may be stored up to two weeks before cleaning (Smreciu et al. 2013).

**Seed Weight:** 0.1 g/1,000 seeds (Royal Botanic Gardens Kew 2008).

**Harvest Dates:** Varies, usually in late April or early May. Collect May 15 to May 31 (Formaniuk 2013).

**Cleaning:** Seeds with pappus attached can be placed in a sieve with openings large enough for seed to fall through (between 10 and 20-mesh) (Smreciu et al. 2013).

**Storage Behaviour:** Orthodox (Royal Botanic Gardens Kew 2008).

**Storage:** Cleaned seeds must be planted as soon as possible or stored frozen (Smreciu et al. 2013). Optimum air humidity for storage appears to be 15% to 25% relative humidity; 70% germination after

2 years storage at -5°C with 10% relative humidity; 97% germination following 1 year air-dry hermetic storage at 5°C; no loss in viability after 16 months hermetic storage at -10°C with 6% to 10% moisture content (Royal Botanic Gardens Kew 2008).

**Longevity:** Seeds can remain viable for one year of storage at 5°C with 5% to 8% moisture (Rose et al. 1998).

Seeds retain viability for up to six years at -18°C (Palamarek pers. comm.).



Green catkins

### Propagation

**Natural Regeneration:** Regenerates from seed and by sprouting from the roots to form clones (Howard 1996, Wilkinson 1990).

**Germination:** Viability of fresh seed is good; germination of 80% to 95% is reported under laboratory conditions (Howard 1996).

Viability lasts 2 to 4 weeks under favorable conditions of low temperature and humidity, but seed loses viability rapidly under less than optimum conditions (Howard 1996).

**Pre-treatment:** No pre-treatments required (Formaniuk 2013, Wood pers. comm.).



**Direct Seeding:** No literature found.

**Planting Density:** 741 to 2,965 trees per hectare (USDA NRCS n.d.).

**Seed Rate:** No literature found.

**Vegetative Propagation:** Propagated by root cuttings and stem cuttings (Wood 2011).

**Micro-propagation:** No literature found.

**Greenhouse Timeline:** 16 weeks in the greenhouse prior to out-plant. Seedlings can be stored frozen over winter for out-planting in the following spring (Wood pers. comm.). Grow for 100 days before harvest (Formaniuk 2013).

### Aboriginal/Food Uses

**Food:** Strips of raw pulp material under bark consumed as a sweet treat and are a very nourishing survival food (Gray 2011, Marles et al. 2000). Regarded as *famine food* (Wilkinson 1990). Catkins are high in Vitamin C and can be eaten raw or added to soup or stew (Gray 2011).

**Medicinal:** Bark contains salicin which is believed to decompose to a salicylic acid-like compound (the main ingredient in aspirin) in humans (Gray 2011, Wilkinson 1990). Buds, inner bark, and leaves used as medicine, tea from inner bark made for treatment of rheumatism, diarrhoea, liver and kidney problems. White powder on bark used to clot blood and as a sunscreen (Gray 2011, Tannas 2003). Seeds chewed to increase chances of abortion.

**Other:** Wood used to make dugout canoes, canoe paddles and tent poles (Marles et al. 2000, Wilkinson 1990).

### Wildlife/Forage Usage

**Wildlife:** Older trees provide shelter and protection for many types of animals including deer, moose, beaver and birds. Younger trees provide browse for porcupine, rodents and rabbits (Howard 1996). The preferred food of beaver (Eaton et al. 2013).

**Livestock:** Palatable for livestock (Hardy BBT Limited 1989).

**Grazing Response:** Increaser. High intensity grazing can be used to control spread (Tannas 2003).

### Reclamation Potential

Survival of trembling aspen on amended tailings sand in northern Alberta was variable. Greatest survival was recorded on plots where grass and legume cover was least. This suggests that during early establishment, trembling aspen cannot compete with grasses for moisture, particularly during dry years. Plantings on amended tailing sand had low survival after 7 years, however this may be attributable to poor planting stock. In operational plantings trembling aspen third year survival was 85% with a sparse ground cover but annual growth was relatively poor (10 cm vs. 35 cm for "Northwest" balsam poplar)(Hardy BBT Limited 1989).

In a review of Syncrude and Suncor plot data, Geographic Dynamics Corp. (2006) found that aspen was the only tree species that invaded and persisted on reclaimed sites.

Research has been done into using *P. tremuloides* as a keystone species in reclamation due to its ability to grow quickly and its high genetic variability as well as its value as a commercial resource (Landhausser 2013).

Aspen has been used in the reclamation of riparian habitats for erosion reduction (USDA NRCS n.d.). Grows in areas where soils have been disturbed by logging and by fire (Rose et al. 1998).

Wide spreading roots and accompanying communities provide good soil stabilizing conditions and potential.

Leaves decay relatively rapidly, returning nutrients to the soil (Rook 2002).

### Commercial Resources

**Availability:** Can buy seedlings from nurseries across Alberta.

**Cultivars:** No literature found.

**Uses:** High grades of aspen are used for lumber, veneer, furniture, lumber, boxes and wooden matches. Aspen makes particularly good sauna benches and playground structures because the wood surface does not splinter. Most aspen wood goes into pulp and particleboard, however (Borealforest.org n.d., Farrar 1995).





## Notes

Trembling aspen is the most widely distributed tree in North America (Borealforest.org n.d.).

*Populus tremuloides* is listed as 92% intact (less occurrences than expected) in the Alberta oil sands region (Alberta Biodiversity Monitoring Institute 2014).

Subject to attack by the large aspen tortrix (*Choristoneura conflictana* (Walker))(Cerezke 1992).

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