

Carya general

Juglandaceae



The word *Carya* comes from the Ancient Greek word "Kary" meaning "Nut". The word *Hickory* comes from the Algonquin, 'pawcoHICCORA' species identification is complicated and highly variable and with self-hybridization, specimen selection is regarded as being worth while. The actual number of species is variously reported as being from 16 to 22, of these, 8 have ranges which extend into Canada, of these six Canadian species Bitternut hickory belongs in the pecan hickory group (and is used as mother plant for grafting), the remaining 4 species are true hickories.

Hickories

	Latin	Français	Anglais	rusticité
1	<i>Carya glabra</i>	Caryer à cochon	Pig nut Hickory	5
2	<i>Carya Ovata</i>	Caryer à noix douce	Shagbark Hickory	3b
3	<i>Carya Laciniosa</i>	Caryer Lacinié	Kingnut Shellbark Hickory	4b
5	<i>Carya cordiformis</i>	Caryer à noix amer	Bitternut hickory	3
6	<i>Carya illinoensis</i>	Pacannier du nord	Northern Pecan	5
7	<i>Carya illinoensis</i> X <i>Carya Ovata</i>	Hican	Hican	5
8	<i>Carya Tometosa</i>		Mockernut	5

These represent the 8 varieties used for nut production in Ontario, which can grow in Quebec. *Carya Ovata* (2) and *Carya cordiformis* (5) grow naturally in our forests and are on trial in certain plantations. No research on other varieties is been done in Quebec except for Hicans.

Some have been successfully grafted to increase size and crackability of nuts.

Habitat: Native Shagbark Hickory is found in the deciduous forest region and St-Lawrence forest region where it occupies same type of soil as the bitternut Hickory. It grows on rich deep moist soils in valleys where seasonal flooding occur, on hillside and at the edges of some swamps. Even though the other species are not natural to our northern forests, they are rustic and can be planted in southern Quebec although 2700 to 2800 Heat Unit is required for seed to be viable.

Plantation: Considerations of air circulation and frost pockets are important if you want to cultivate these varieties. Consider planting grafted specimens for trial in your geographic area.

Loam with a pH of 5.5 to 7.5 is ideal. Quebec sources of native hickories are the most Nordic of all North America and based on this the most adapted to short season. Most require a 6m X 6m spacing and can be interplanted with hazelnuts.

Transplantation: If seeded in field, the root system will develop a long heavy taproot, which makes it difficult to transplant. It is common to see 1m.

taproot for a 30 cm tree, so it becomes important to have at least 60cm taproot when moving hickories. Consider seeding in pots or root prune often.

Fertility: Important in the establishment years. The respond well to both organic and inorganic forms of potash and phosphorous as long as placement is considered. Aiming for a neutral PH may require amending the soil. Note that the pH of the leaves is basic and therefore easily degradable, Zinc deficiency is most common.

Nuts: Extremely variable in size. Starts to bear in 4 to 6 years for grafted trees and 12 to 16 years as a tended tree. The less known species and hybrids proposed to us by Ontario growers have usually bigger nuts than the Quebec varieties. Some are the same size as walnuts and others like the northern Pecan are smaller, but in all they are bred for better crackability, taste, and meat properties.

Harvest: When ripe, fruit start to fall in late August and September with or without the husk and are picked off the ground. On the contrary, the northern Pecan has a thin husk.

Weeds, pest, and disease control: As for all trees grown in an orchard setting, ground covers are important to prevent undesirable weeds, helps in harvesting, soil water percolation, fertilizer placement etc.

Note: all plant tissue of the hickories also contains juglone, at much less concentration than Black Walnut. This is a chemical compound that inhibits certain vegetation growing in proximity of the tree.

Varieties:

***Carya ovata*:** Wilcox, Neilson, Weschcke (2800 HU), Yoder 1, Porter, Granger

***Carya laciniosa*:** Keystone, Neiman, Ross Stephens, Totem and Fayette

***Carya illinoensis*:** NC4 Campbell, Snap, Carlson #3, Lucas, Campbell NC14

Hican: Gibfot, Worthex, Abbot, Burton

King Nut, shagbark, shellbark and Pecans can be inter-grafted.

Seedlings do not necessarily grow true to name. Results are more predictable if desirable material are grafted unto established rootstock.

Carya ovata (Mill.) K. Koch



Hickory is a genus of trees in the walnut (*Juglans*) family that is native to North America, the rest are found in Indochina. The shagbark hickory is at its northernmost distribution area and grows naturally in our wood lots. Other species like the Shellbark and hybridized varieties such as the Hicans should not be overlooked for cultivation. Species identification is complicated and highly variable. Self-hybridization specimen selection is regarded as being worth while.

Shagbark Hickory

Family: Juglandaceae

Cultural zone: 4 (hardy to -40 °C)

Heat units: 1900 H.O. – 120 days

Height: Medium to large size tree up to 25 meters

Form: Columnar in shape the branches develops high on the stem.

Roots: Deep taproot must develop before top growth accelerates. Side roots will develop when taproot is cut. It requires a deep upland well-drained moist fertile soil.

Leaf: Composed of 5 leaflets (rarely 7), alternate, pubescent is found at the base of the leaflets

Habitat: Shagbark Hickory is found in the northernmost range of the deciduous forest region and St-Lawrence forest region where it occupies the same type of soil as the bitternut Hickory. It grows on rich deep moist soils in valleys where seasonal flooding occurs and on hillside and at the edges of some swamps.

Plantation: Loam with a ph of 5.5 to 7.5 is ideal. Zinc deficiency is most common. Quebec sources of native hickories are the most Northern of all North America and based on this the most adapted to short season.

Flowers: flowers at the end of may to mid june, Tiny, green, unisexual flowers with male and female on the same tree. Male flowers are hanging catkin 10 – 13 cm long; female flowers form small erect clusters at the end of twig, flowering as the leaves expand. The Quebec genotypes usually flower in mid June and as



Photo: Bernard Contré



such do not suffer from late spring frost.

Nuts: Extremely variable in size. Starts to bear in 4 to 6 years for grafted trees and 12 to 16 years as a tended tree. The nut is small, ovoid, white, thin shelled up to 4 cm in a thick green husk, turning black as fruit ripens, splitting in four at the base. Nutmeat is difficult to remove due to internal ridges, which are not found in other hickories. Dried hickory nuts are a good source of Manganese, monounsaturated fat and Zinc. A good source of fiber, it contains 14 % Iron, 7 % Calcium, 4 % Vitamin C and 3 % Vitamin A per 120 gr serving.

Harvest: Fruit fall in September with husk which break opens and are picked off the ground.

Yield: When trees are mature, bears up to 800-lbs/acre (200 trees)

Varieties: The only know variety tested is “Weshcke” but requires 2800 H.U. to produce nuts

Hover, Wilcox, Neilson, Weschcke, Yoder, Grainger, Porter

Castanea dentata (Marsh.)



American chestnut was one of the largest growing and most important tree in eastern North America. But, by 1904, the Chestnut blight, introduced from the Orient, eliminated 99 % of the trees. The Chinese and European chestnuts are largely blight resistant and are being planted to fill the void. The American hybrids have the greater hardiness. Earl Douglass of New York and J.U. Gellatly of British Columbia are responsible for producing some of the best American hybrids known for, blight resistance, hardiness, vigour and nut quality.

American chestnut

Family: Fagaceae

Cultural zone: 4 – 5

Heat unit: 2300

Form: Once very tall, the chestnut is now found mostly as stump sprouts, less than 20 feet tall. Larger stems are often deformed by blight and sprouting below cankers.

Bark: Smooth and chestnut-brown in color when young later fissured. Older trees develop distinctive large, interlacing ridges.

Blight infested bark is sunken and split, often with orange fungal fruiting bodies.

Leaf: Alternate, simple, oblong to lanceolate, 5 to 8 inches long, pinnately veined, sharply and coarsely serrated with each serration.

Buds: Chestnut to orange-brown in colour, 1/4 inch long, covered with 2 or 3 scales forming semicircular leaf scar, numerous light lenticels on twigs.

Drainage: Well-drained soil

PH: Slightly acid pH 5.5 to 6.5

Flower: Monoecious; many small, pale green (nearly white) male flowers found tightly occurring along 6 to 8 inch catkins; females flowers found near base of catkins (near twig), appearing in late spring to early summer.

Pollination: Trees are self-infertile. That means that they must have another chestnut tree nearby with viable pollen to produce nuts. For commercial plantings must be established permanent pollinators.



Photo : Giulio Neri

Nuts: Large, round spiny husk, 2 to 2 1/2 inch in diameter, enclosing 1 to 3 (depending on cultivars) shiny, chestnut brown nuts, mostly round but flattened on 1 or 2 sides that ripen in early fall. Susceptible to mildew.

Chestnuts have a bland, starchy flavour (about 50 % water). As they dry, in a process called "curing", they become softer and some of the starch converts to sugar. At about 30 % moisture, they are sweet, soft, and at the best stage to eat. Unfortunately, such cured chestnuts are very susceptible to mould, and should be refrigerated or promptly consumed.

Storage: Chestnuts will keep longer in a crisp, high-moisture condition, than if they are stored in a cured condition. Another method for long-term storage is to quickly dry the chestnuts down to 15 % or less of moisture. Dried chestnuts can be stored at room temperature until used.

Chinese (*C. mollissima*), Japanese (*C. crenata*) and European chestnut (*C. sativa*) trees have since been introduced to take the place of the orchard type American chestnut trees. They are only partially successful as they often lacked the hardiness of the American chestnut. Hybrids were developed crossing American and European trees and have a fairly high degree of resistance to the blight fungus. These complex hybrids are the trees that are currently being used by growers in Ontario.

European hazelnut



Three species have been introduced to us from Europe. Its history date back to 5000 years ago. Chinese, Greeks, Roman and French empires have consumed hazelnuts. These three species have been cross-pollinated with the American counterparts and are now cultivated in Canada. Turkey being now globally recognize as a major hazelnut producer, Canada ranks second in US importing. This production comes from the more than 300 hectares planted in British-Columbia. All hazelnut can be intercropped with other types of nut trees. 97 % of the world production goes in transformation.

Corylus avellana L. Avelines
Corylus colurna L. Turkish filibert

Family: Betulaceae

Cultural zone: Zone 4 for Corylus Avellana
Zone 5 for Corylus Colurna

Heat units: 2000 for Corylus Avellana
2500 for Corylus Colurna

Exposition: Full sun. Tolerates shade but is much less productive.

Leaf: Simple, alternate, oval, with double serrated margins, 7 to 10 cm.

Buds: Large and covered with scales, Deers are attracted to them.

Roots and soil: Hazelnuts is general grown in well drained, slightly acidic soil. It does not do well in compacted soils. Ideal Ph is between 5.5 to 6.5. Ideal soil should allow the hazelnuts to develop active root systems, which extend as deep as possible in depth and 3m in circumference.

We have noticed better growth when wood mulch and herbaceous weed control is used to cover roots.

Growth and form: Contrary to all other types of hazelnut, the Corylus colurna grows as a tree form, which rarely exceeds 5m in Quebec. The Corylus avellana is a true shrub form that seems to demonstrate better winter hardiness. They do not tolerate dry windy conditions. For better results in a cultural setting, plant hazelnuts in sheltered sunny location.

Fertility and pruning: Nitrogen, potassium, magnesium and boron are elements most needed. Boron will increase nut set. These shrubs have a relatively short life span. Encourage new growth by pruning out older wood at the point of origin. This will improve nut yield and keep your shrub healthy. An irrigation system for dry season watering will be necessary.

Diseases and insects: Watch out for bacterial blight and eastern filbert blight, which attacks the shrubs and the filbert worm in nuts.

Flowers: Hazelnuts are self-infertile. Male flowers appear late fall (October) and will be ready to pollinate female flowers which appear separately in April/May before leaves. The monoecious flowers can be cross-pollinated with European hazelnuts. Differently located pollinator avoids crop failures. Watch for late spring frosts.

Nut: Corylus avellana nuts are borne in-group of 2 or 3 at the end of the current year twigs found at the exterior of the shrub, and the Corylus colurna nuts are packed in group of 5 to 7 small but flavourful nuts. Hazelnuts in general have anti-inflammatory proprieties, are low in cholesterol, and contain non-saturated fats. They are a good source of magnesium, copper, potassium, Vitamins E and B6. They contain 12 % vitamin C and 30 % iron, 14.95gr of protein and 9.7gr of fibre in 100gr of nutmeat.

Storing: After having picked and clean the nuts, dry slowly at 37 degree celsius. They can then be stored in cold storage at around 60 % relative humidity.

Varieties: With all the hybridization and cross-pollinisation done between American and European hazels, it becomes hard to standardize and choose cultivars that would do well in Quebec. You can ask your regular suppliers for early season, mid-season or late season cultivars. These three criterias should help you select the best yielding hazelnut for your climatic zone.

North American hazelnut



The North American hazels are native to Quebec. In fact we find these species in most of Canada. The beaked hazelnut is found and produces nuts up to climatic zone 3. The commercial value has already been proven. Grown as shrubs, careful observation, good cultural techniques and improved varieties could make of these hazelnuts potential winners in multicultural setting. They also are the perfect size for intercropping with larger nut trees.

Corylus Americana Walt **American Hazel**
Corylus cornuta Marsh **Long beaked Hazel**

Family: Betulaceae

Hardiness zone: Zone 4 Corylus Americana
Zone 3 Corylus cornuta Marsh

Heat units: 2200 for Corylus Americana
1900 for Corylus cornuta Marsh

Exposition: Full sun. Tolerates shade but is much less productive.

Leaf: Simple, alternate, oval, with double serrated margins, 7 to 10 cm.

Buds: Large and covered with scales, Deers are attracted to them.

Roots and soil: Hazelnuts in general grow in all well drained, slightly acidic soil. It does not do well in compacted soils. Ideal Ph is between 5.5 to 6.5. Ideal soil should allow the hazelnuts to develop active root systems, which extend as deep as possible in depth in 3m in circumference.

We have noticed better growth when wood mulch and herbaceous weed control is used to cover roots.

Growth and form: Both grow in shrub form. Slightly smaller than the American hazelnut, the beaked hazelnut grows up to 3.6 m tall. Twigs are brown slender, zigzagged and hairy (current year). Naturally we find hazelnuts in wooded understory or around woodlots in sheltered area. They do not tolerate dry windy conditions. For better results in a cultural setting, plant hazelnuts in sheltered sunny location.

Fertility and pruning: Nitrogen, potassium, magnesium and boron are elements most needed. Boron will increase nut set. These shrubs have a relatively short life span. Encourage new growth by pruning out older wood at the point of origin. This will improve nut yield and keep your shrub healthy. An irrigation system for dry season watering will be necessary.

Diseases and insects: Watch out for bacterial blight and eastern filbert blight, which attacks the shrubs and the filbert worm in nuts.

Flowers: Hazelnuts are self-infertile. Male flowers appear late fall (October) and will be ready to pollinate female flowers which appear separately in April/May before leaves. The monoecious flowers can be cross-pollinated with European hazelnuts. Differently located pollinator avoids crop failures. Watch for late spring frosts.

Nut: Nuts are borne singular or in-group of 2 or 4 at the end of the current year twigs found at the exterior of the shrub. The beaked hazelnut is grown in tube type involucre, which have bristly hairs that acts like tiny irritating splinters in fingers. Native people buried nuts in wet mud for 10 days to rot away prickles. The American hazelnut is usually bigger (up to 12 mm) and hard-shell. Native people preferred young nuts to the harder, oilier, mature nuts. Roasting reduces bitterness. Hazelnuts in general have anti-inflammatory properties, are low in cholesterol, and contain non-saturated fats. They are a good source of magnesium, copper, potassium, Vitamins E and B6. They contain 12 % vitamin C and 30 % iron, 14.95gr of protein and 9.7gr of fibre in 100gr of nutmeat.

Storing: After having picked and clean the nuts, dry slowly at 37 degree celsius. They can then be stored in cold storage at around 60 % relative humidity.

Varieties: With all the hybridization and cross-pollinisation done between American and European hazels, it becomes hard to standardize and choose cultivars that would do well in Quebec. You can ask your regular suppliers for early season, mid-season or late season cultivars. These three criterias should help you select the best yielding hazelnut for your climatic zone.

Fagus grandifolia Ehrh.



The beechnut is one sweetest nut produced by a native tree of the northern forest and until not very long ago where available in country groceries. Eight other species exist throughout the world and in France, the European Beech (*Fagus sylvatica*) fruit is still used to create beechnut oil, which is compared to that of olive oil.

American beech Fagus Grandifolia Ehrh.

Family: Fagacées

Cultural zone: 3b

Heat units: 1900

Growth: A slow growing tree, with a thin blue-greyish trunk.

Height: 25 m. Very shade tolerant.

Form: Crown is globular but in the open can be wide spreading up to 18 m.

Roots: Roots are wide spreading and superficial

Leaf: Alternate, waxy slightly acid leaf, which often stays on tree throughout winter.



Habitat: Found on moist, well-drained slopes and rich bottomlands often associated with sugar and red maples, yellow birches and eastern hemlock. Beech can also be used as an ornamental and in shelterbelt settings. Tend a few forest specimen may furnish a yield high enough to warrant yearly maintenance and harvesting. Tree is shade tolerant.

Plantation: A light, slightly acid soil (4 to 6 ph) is ideal. Planting an orchard type setting is not ideal for this beech. But selections or crosses with European beech may tolerate these open areas. Pruning will be necessary. Trees can be transplanted from wooded area successfully in the fall, but is better in spring.

Flowers: Tiny yellowish-green, unisexual with male and female flowers on the same tree. Flowers appear before the leaves. Wind pollinated

Nut: Small burs with pairs of sharply, 3 angled 1.8 to 2.2 cm long shelled nuts. Burs split open in late summer (September) to autumn. Large seed crop start at about 30 years and then at approximately every 3 years. 7 gr water, 6 gr protein, 50 gr Fat = 75 % of unsaturated acids, 34 gr carbohydrates, 4 gr fibre per 100 gr of nuts.

Storage: Tightly sealed container in cool dry dark place

Notes: Can be grounded in to flour, or used as a coffee substitute, or as an extended beer flavouring, the nut is a natural feed for North America wild game animals (birds, bears, wild turkey, etc) and warrants tending practices. Helps in the biodiversity of our existing woodlots.

A fungus canker "Nectria coccinea" is present and has started to cause a decline of the American Beech.

Cultural research is still needed to create varieties of beeches that will produce annually like the ornamental european beech (*Fagus sylvatica*) which are grown in southern Ontario.

Ginkgo biloba L.



Existing in North America before the great ice age the Ginkgo, as we now know, comes from China. Its name is derived from the Japanese word Ginkyo meaning "silver apricot" referring to the fruit and biloba meaning "two-lobed" referring to its leaf. It was re-introduced to the Montreal region in the nineteen fifties. It is the only known conifer that produces a nut and not a cone, as seed. The Ginkgo is one of the best known examples of a living fossil and can be identified over 100 million years ago. It can also live easily for more than 300 years, has no known diseases or specific insects and there are easily over 300 published studies on the virtues of the Ginkgo. No plantation of Ginkgo exists in Quebec.

Ginkgo biloba. Maidenhair tree

Family: Ginkgoaceae

Cultural zone: 4

Heat unit: 1900

Growth: Slow to moderate

PH: 5.5 to 7

Height: 30 m.

Wide: 20 m.

Leaf: Alternate, simple, fan-shaped, tender green in colour turning bright yellow in the fall. Leaves fall early in fall, and usually within 2 days of turning yellow.

Form: Oval to globular in form, the male tree has branches, which have more of a horizontal tendency than the female. Central branching has to be trained and watch out for low branching.

Roots: Very shallow root system, which can tolerate clay soil, but requires to be well drained soil.



Habitat: A protected site with good air circulation is desirable. It adapts very well in all kinds of soil conditions except very acidic or very dry. It also tolerates pollution and urban conditions.

Plantation: Take into consideration that trees are male or female and only female tree produce nuts and male trees are required for pollination. Seeding is not recommended, since progenies will not produce female flowers before 20 to 30 years. Female grafted trees should start producing around the 6th year of growth. 6 m by 6 m final spacing for orchard setting

Flowers: The male flower pendulous catkin is found on the stem at the base of annual growth and female flowers are found at the end of a 5 cm stock.

Nut: Resembling a plum or an apricot of about 3 cm, this nut is covered by an orange to yellow coloured flesh. As it ripens the flesh emits a strong foul smell. Pick fruit with gloves since irritation can occur. Once peeled, the nut is protected by a thin shell, which can be easily peeled when placed for 5 minutes in boiling water. Store in the fridge or enjoy roasted. It is a delicacy in Asian countries. Warning, some literature indicates toxicity to young children if nut is ingested in high quantities (30 or more) for long periods of time. Nevertheless, this nut is undeniably a good source of Vitamin A 5 %, Vitamin C 14 %, iron 2 % and protein, it is also low in fat, sodium and cholesterol.

Available varieties:

Ginkgo biloba McFarland (female) Ginkgo biloba Autumn Gold (male)

Juglans ailantifolia

Var. Cordiformis maxim.



The heartnut is an introduced hybrid of the Japanese walnut. Having been planted in and around the Montreal region since the nineteen fifties, the heartnut has been proven up to zones 4. There are numbers of cultivars which have increased frost hardiness and disease resistance. Prolific bearer of nuts it can produce up to 20 nuts per cluster, giving possible yields of 1000 kg per hectare. For these reasons as well as good crackability and taste, heartnuts are gaining ground as a potential crop in Quebec.

Heartnut Japanese walnut

Family: Juglandacea

Cultural zone: 4

Heat unit: 1900

Growth: A moderately fast growing tree

PH: 5.5 to 7

Height: 20 m.

Wide: 20 m.

Leaf: Alternate with 11 to 17 leaflets, which are more elongated than the black walnut.



Photo: Giulio Neri



Photo: Imprimerie Elite



Photo: Andr e Dumouchel

Form: Oval to globular form. The branches have a horizontal tendency and spreading giving the tree a natural wide look. Central branching has to be trained.

Roots: Shallow root system, it does not tolerate clay-loam but requires well drained soil.

Habitat/Use: A protected site with good air circulation is desirable. Regardless if soil has a high water table and/or hardpan bedrock, the surface soil must be aerated, rich and easily fed with leaf mold manure or broad cast fertilizer. A pH of 5.5 to 7 (slightly acid) is ideal.

Plantation: Seedlings are not recommended, as progenies are not always true to parents. Grafted seedlings or F2 generation seedling are recommended.

Because of its width, intercropping can be difficult.

Flowers: Tree are not self fertile, flowers appear early spring. This renders them susceptible to late frost. It can easily cross pollinate with butternut (*Juglans cinerea*).

Nut: The nut measures about four centimetres in diameter, with a thin husk. The husk is not dirty like black walnuts and can be peeled off by hand when dry. The nuts have smooth shells with kernels that are easy to remove by hand. The flavour is mild. Even though it has good cracking characteristics, ordinary nutcrackers does not do justice to the shape of the nut. A specialised nutcracker has to be put on the market to open up a full, sweet, heart shape kernel. A grafted tree can start bearing fruit in its 5th year. The nut can be stored at 0 degree Celsius and a relative humidity of 65 %. Good source of omega 3.

A cross pollination between the heartnut *Juglans ailantifolia* and butternut *Juglans cinerea* have produced an interesting hybrid which now can be propagated. This hybrid called Buartnut (butternut x heartnut) has the rusticity of the butternut with a bigger, harder to crack nut.

Different varieties exist, but the Mitchell buartnut seem to adapt well in our growing conditions and most important seems resistant to butternut canker.

Grafted heartnut: Early season, Campbell CW1 et CWW, Etter, Imshu, Rhodes.

Mid-season: Campbell CW3, Brock, Wright, Stealth, Locket and Simcoe 8-2.

Juglans cinerea L.



Of the walnut species, the butternut is the only species that is native to Quebec. The nut, nut oil and sap were all used by the native north American Indians. Butternuts are disappearing rapidly as trees succumb to the lethal canker fungus (*Sirococcus Clavigigninti*), introduced from Europe. Buartnut, a cross between butternut and heartnuts seem to have captured the attention of nut growers and as demonstrated resistance to disease. The Buartnut is used as a footstock for grafted butternut.

Butternut

Family: Juglandaceae

Cultural zone: 3b

Heat unit: 1900

Height: 21 m

Wide: 14 m

Leaf: Leaf is composed of 11 to 17 leaflet

Buds: Pale yellow soft buds, 12 to 18 mm de long

Growth: Moderately fast growing seldom more than 21 m in height and 90 centimetres in diameter. Short lived species living no more than 75 years.



Noyer cendré



Buartnut

Form: The smaller branches of the butternut bend downward and turn upward at the end. When growing in the open areas butternut trees have short trunks with broad open spreading crowns. These large crowned trees produce the most nuts.

Roots: The root system is composed of wide spreading laterals that grow to quite a depth usually a tap root develops in deep soils

Habitat: Trees grow best in moist well drained soil of fine to medium texture but will grow in shallow rocky sites especially those of limestone origin. They thrive in open areas where they get full sun light.

Plantation: Seeds are best planted in the fall. Transplanting spacing can be less then 15 m Intercropping is recommended

Flower: Male catkins can have 8 – 12 stamens 6 – 14 cm long. Seed flowers have erect clusters of 4 to 7 monoïques wich are not self pollinating.

Nut: About twice as long as they are broad, pointed, and about 7 cm long. Husk has dense sticky hairs. Surface of the nut cut into irregular jagged grooves. Nut is difficult to crack. Food very low in cholesterol, good source of manganese, omega 3 and 6, contains 6 % vitamine C and 27 % iron. Produces nuts every year but larger crops are produced every two or three years. 14 % to 22 % kernel per nut.

Storage: Can be stored with husk. Ripens from late from late Sept to mid October

Varieties: Craxeazy, Chemberlin, Beckwith, Devan, Iroquois, X Kenworthy

Note:* Buartnut (J. Cinerea x J. Ailantifolia) The Buartnut is a hybrid cross of the butternut and the heartnut. Trees exhibit disease resistance hybrid vigour and bears large crops. Some nuts a very unusual. Because characteristics of the seedling are highly variable it is highly recommended that producers chooses grafted stock rather than seedling. Cultivar: Mitchell, Fioka and Corsan

Juglans Nigra L.



Black Walnut is one of the most venerable hardwood species native to North America. The native black walnut fruits are edible but have a small kernel and an extremely tough shell. It is one of the most successful edible nut tree in Ontario. It is also used as a roostock plant for grafting.

Black Walnut

Family: Juglandacées

Cultural zone: 4b

If protected the tree can be grown considerably North of it's range. Strains of black walnuts adapted to various soil types and areas have been naturalized and can be found up to and including Quebec city.

Heat unit: 1900

Growth: Moderate to fast

Height: 25 m

Wide: 20 m

Leaf: Large leaf composed of 13 to 23 pointed oval leaflets. Very dense.



Form: Develops along clear trunk with little taper and a small rounded crown. In the open or in orchard type plantation the trunk forks low down into large limbs with a few ascending and spreading coarse branches. Black walnuts does not grow in pure stands.

Root: Usually includes a deep tap root and several wide spreading and deeply set lateral roots. Once cut (during transplantation) taproot does not regrow.

Habitat: Requires deep rich well drained loam. A slope is preferable to allow cold air to chift away. Wind breaks protect from north winds. A PH reading of 6 to 7 is ideal

Plantation: Seeds are planted in site in fall or spring. Transplanting at 15 m spacing. Intercropping is recommended

Flower: Green, tiny unisexual with male and female flower on the same tree. Male flowers in hanging catkins 5 to 10 cm long. Female flowers in erect clusters of 1 to 4 appears in spring (at same time as leaves).

Nut: Round yellow / green to brown aromatic husk. Nuts 3-6 cm across with a hard ridge shell hanging in clusters of 1 to 3. Oily seed kernels inside shell has 2 irregular lobes (cotyledons): nuts mature and drops in autumn. Mature walnut will yield from 25 to 50 kg of nuts.

Most nuts have a pronounced flavour different from all other walnut. This food is low in cholesterol and a good source of copper, magnanese, omega 3 and 6 oil, contains 22 % iron, 8 % calcium and vitamine A and C. 23 % to 33 % Kernel in nut

Husks are used as black dyes. Shells are used as ornamental mulch and fine abrasives.

Storage: Dehusk nuts immediately and store in dry cool well ventilated area. Use rubber gloves when handling wet or fresh nuts.

Varieties: Though the black walnut industry is based on wild trees in North America many selections have been found that offer larger nut meats in easier cracking shells. A few of the cultivars that do well are Emma K Thomas, Weshcke and Bicentennial. There are others varieties and cultivars as X Thomas, X Fonhill and X Makemmak

Good roostock for butternut walnut and Japanese walnut (heartnut).

Pine Nuts General



Pine nuts, or Pignoli (Italian) or Pinón (Spanish) describes pine species that produce seeds (nuts) the size of sunflowers seeds. These nuts are edible. There are about 12 species of the nearly 100 pines where the nuts can be used as food. Of the twelve species 4 could have commercial importance in Quebec. They are identified below.



Photo: Imprimerie Élite



Photo: Giulio Neri



Photo: Imprimerie Élite

Family: Pinaceae

Cultural zone: from 2 to 4

Heat units required: 1900

Growth: Except for Swiss stone pine, these varieties are very similar to the eastern White pine. 30-90 cm/year

High: 12 m to 45 m.

Wide: Can reach up to 10 m from trunk if not sheared.

Form: Similar to our eastern White pine.

Roots: The roots are spreading and superficial. They are very adaptable to soils that are well drained

Leaves: Needles grouped in 5 or 2 which persists from 3 to 5 Years

Flowers: Self fertile – male and female cones on same tree

Habitat: Pines require deep, acid, sandy well drained soil, but varieties can grow in well drained heavy clay. Growing sites should have mycorrhizal inoculum. Do not plant them near roadway as they are very susceptible to salt damage.

Nuts: Pine cones of this subsection start producing from 12 to 15 years. The Pine cone takes 2 years to mature on tree. The nut (seed) can be wingless or winged. See list of varieties for description. A single cone can contain 1/2 kg of seed. A good stand can produce up to 500 kg per hectare.

Nutritional information: The nuts contain 18 gr of protein, 38 gr of fat, 10.7 grams of carbohydrates, 10.7 gr of fibres and 390 calories for 75 gr of the dried nut

Uses: Traditionally the seed is used in gourmet cooking, salads, and pesto sauces. Recent discoveries show that extracted vegetable oil from the seed is tasty, healthy and even remedial.

Value: A recent estimate put the North American market at \$100 million with 80 % being imported.

Species and cultivars :

Korean Pine (*Pinus korienensis*):

Cone 8 – 17 cm, seed 14 – 18 mm - 650 nuts/lb
Most widely traded

Siberian Pine (*Pinus siberica*):

cone 5 – 9 cm, seed 9 – 12 mm - 675 nuts/lb
Very easy seed coat to crack

Swiss stone Pine or *Pinus cembra* zone 3

Pinus edulis or mountain pine,

Cones 4 – 8 cm, seed 8 – 12 cm - 975 nuts/lb

Quercus sp. General

Fagacea



The word *Quercus* originates from Celtic origins and means the “tree by excellence”. Over 200 varieties exist in the world, 10 in Canada and of that four are indigenous to Quebec. Tree produce edible acorns. Bur Oak (*Quercus macrocarpa*), the White oak (*Quercus alba*), and the swamp White Oak (*Quercus bicolor*).

In the wild, these three species resemble each other, although, growth habitat can be different. Time should be spent identifying and differentiating between the 3 edible species since acorn sweetness can vary. Mostly prized for its wood and wildlife qualities, use gender specific books to identify them

OAKS sp.

Latin	Français	Anglais	Zone
1 Quercus alba	Chêne blanc	White oak	4a
2 Quercus bicolor	Chêne bleu	Swamp white oak	3b
3 Quercus macrocarpa	Chêne à gros fruits	Bur Oak	3a

These represents the 3 varieties used for nut production in Quebec. They all grow naturally in our forests. Bur oak and Swamp white oak trees, can be obtained freely by the Ministry of natural resources (Quebec) for forest plantation. No research has been done in Quebec on nut production on these species. Acorn flour was very important for making bread for the American Indians. Some have been successfully grafted or cross-pollinated to increase size, and crackability, and taste of nuts in northern New York state.

Habitat: Indigenous Oaks are found in the deciduous forest region and St-Lawrence forest region where it occupies the same types of soil as other nut trees. White oak are now rare to find and should be identified. It grows on rich deep moist soils in valleys where seasonal flooding exists or on hillside, in loam to sandy soils.

Plantation: Consider planting grafted specimens for trial in your geographic area. Loam with pH 5 to 7 is ideal. The nut needs 1900 heat unit to maturity. Site preparation and mulching will give better results. These are large trees, but can be intercropped with hazelnuts shrubs.

Transplanting: Due to a long heavy taproot it is considered difficult to transplant but, in general, are easily transplantable in spring before bud break. Fall transplants are susceptible to cold, thus resulting in twig dieback. It is important to have at least 60cm taproot when moving one. Grow seeds in plugs or pot before setting in ground.

Fertility: Considered as slow to medium growing speed, fertility is important in the establishment years. Respond well to both organic and inorganic forms of fertilizers, and will grow faster if water and fertility and mulching are added.

Nuts: Called acorn, it is a nut that contains a single seed enclosed in shell, born in a cup-shaped cupule. Variable in size, they start to bear in 4 to 6 years for grafted trees and 8 to 12 years as a tended tree. It is one of the few nuts that do not have a husk. Not much is known on its nutritional value, but it does contain Vitamin A, Calcium and Iron at 1 %, is low in Cholesterol and Sodium and is a good source of Magnesium.

Harvest: Usually dispersed by birds or rodents in the wild, nuts will start falling in September and are picked off the ground. In a plantation setting it is suspected that acorns will stay on tree longer. Thus picking might be involved. Cracking qualities are similar to Hazelnut.

Usage: If sweet, It is not necessary to dry them before eating the nut meal. But if tannin levels are high the taste is bitter and somewhat astringent when raw. Acorns lose there propertied by being leached. Leach acorns by shelling nuts and boiling them whole. Repeat as needed discarding yellow water (tannin). Can then be eaten whole, roasted, or ground to make flour. Acorn bread is a cheap and wholesome food. A taste to be discovered.

Note: The acorns of the red oak (*Quercus rubra*) are inedible.

Varieties: *Quercus bicolor* Fall creek, *Quercus macrocarpa* X *bicolor*, *Quercus alba* X *prince*

References

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Sites internet :

Northern Nut Growers Association, inc.
<http://www.nutgrowing.org>

The Eastern Chapter of the Society of Ontario Nut Growers:
<http://ecsong.ca>

Grimo Nut Nursery:
www.grimonut.com

Ministère de l'Agriculture et de l'Alimentation de l'Ontario
<http://www.gov.on.ca/OMAFRA/french>

Cobjon Nutculture Services
<http://www.cobjon.com/news.html>

Nutrition Data. com Nutrient-Balance-indicator
<http://www.gouv.on.ca/omafra>

Farrar, John Laird. *Trees in Canada*. Publié par Fitzhenry & Whiteside Limited et le service canadien des forêts. 2003. 502pp.

Hosie, R.C., *Arbres indigènes du Canada*. Service canadien des forêts. 1969. 372pp.

Lupien, Patrick. *Des feuillus nobles en Basse-Mauricie: guide de mise en valeur. Fonds d'information, de recherche et de développement de la forêt privée mauricienne (FIRDFPM)*. Syndicat des producteurs de bois de la Mauricie. Shawinigan. 248 p.

Petite flore forestière du Québec. Ministère des Terres et Forêts. Québec, 21 mai 1974. 216 pp.

Phillips, R. *Trees of North America and Europe*. Publié par Random House en 1978. 224 pp.

Alexandre Wilson. *Nouvelle – Écosse Nut Culture in Nova Scotia*, .

John Vivian, Cornell University. *Selecting, planting, tending and harvesting the perfect homestead crop*.

Frère Marie-Victorin, *Flore Laurentienne 3e édition 1995*, Les Presses de l'université de Montréal (Qc) 1083P.

Roger Phillips, *Trees of North America Équipe 1973* Random House inc, New York 224P

J.O. Gardener, Ministry of Agriculture and food Ontario, *Nut culture in Ontario – Culture des Noix en Ontario, 1992* Publication 494 31P Imprimeur de la Reine pour l'Ontario

Soulange Monette, *The Visual Food encyclopedia, 1996* Les Éditions Québec/Amérique inc., Montréal 684P

Bernard Contré, *Noix, Noisette et glands pour le Québec*. Non publié, Saint-Charles Barronné Lafeuillée @pandore. qc. ca

Kansas State Extension Forestry - improving black Walnut Stands

L-718 Revised. *tree Planting guide, L596 Revised* Todd Leuti, OMAFRA Agroforestry Advisor

Fruit and Tree Nuts situation & Outlook Yearbook Fts-2004/Economic Research Services/USDA, 2004 128P



Wood of economic value



Plantation



Windbreak or Shelterbelts



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Oils and recipes



Wildlife

