Fraxinus nigra Marsh. Black Ash

Oleaceae Olive family

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Black ash *(Fraxinus nigra)*, a slow-growing tree of northern swampy woodlands, is the only ash native to Newfoundland. Other common names, swamp ash, basket ash, brown ash, hoop ash, and water ash, indicate some of its characteristics and uses. Many aspects of this tree are unknown because it has never been commercially important. Black ash wood, easily split, has been much used for baskets. The seeds are an important food to game birds, songbirds, and small animals, and the twigs and leaves provide browse for deer and moose.

Habitat

Native Range

Black ash (figs. 1, 2) ranges from western Newfoundland west to southeastern Manitoba and eastern North Dakota; south to Iowa; east to southern Indiana, Ohio, and West Virginia; and north from northern Virginia to Delaware and New Jersey.

Climate

Black ash grows in a humid climate. Average annual precipitation ranges from 510 to 1140 mm (20 to 45 in), 380 to 640 mm (15 to 25 in) of which occurs during the warm season. Average January and July temperatures are from -18" to 0" C (0° to 32" F) and 18" to 21" C (65" to 70" F), respectively. Annual snowfall ranges from 76 to 254 cm (30 to 100 in), and the average frost-free season is from 80 to 180 days.

Soils and Topography

Black ash typically grows in bogs, along streams, or in poorly drained areas that often are seasonally flooded. It is most common on peat and muck soils but also grows on fine sands underlain by sandy till or on sands and loams underlain by lake-washed clayey till *(5,9)*. Although this species can tolerate semistagnant conditions, for best growth it is important that the water be moving so the soil will be aerated even though saturated. Soils suitable for black ash are common in Canada and the northern States. In Indiana, such soils are most common in glaciated areas and in the White River Valley *(4)* but in Pennsylvania, they most frequently occur south of the glaciated areas. These soils are most commonly found in the orders Histosols and Entisols. Black ash is tolerant of a wide range of pH conditions, from 4.4 to 8.2 **(7).**

In the northern part of its range, black ash is found from sea level to the highest elevations. In the southern part of its range, however, it grows only above 610 m (2,000 ft) in elevation.

Associated Forest Cover

Black ash is an important species of the forest cover type Black Ash-American Elm-Red Maple (Society of American Foresters Type 39). It is a common associate of Northern White-Cedar (Type 37) and a minor associate of Balsam Fir (Type 5), Black Spruce (Type 12), Hemlock-Yellow Birch (Type 24), and Tamarack (Type 38) (5).

Shrubs most commonly associated with black ash are speckled alder *(Alnus rugosa),* red-osier dogwood *(Cornus stolonifera),* bog-laurel *(Kalmia polifolia),* labrador-tea *(Ledum groenlandicum),* poison-sumac *(Toxicodendron vernix),* willows *(Salix* spp.), low sweet blueberry *(Vaccinum angustifolium),* highbush blueberry *(V. corymbosum),* small cranberry *(V.* oxycoccus), and common winterberry *(Ilex verticillata) (4,5).*

Life History

Reproduction and Early Growth

Flowering and Fruiting-Black ash is polygamous; its flowers are small and inconspicuous. They appear in May or June at about the same time as, or just before, the leaves. The fruit is an elongated, winged, single-seeded samara that is borne in terminal or axillary clusters. It ripens from June to September (12).

Seed Production and Dissemination-Seeds are dispersed from July to October. A 25-year seed crop survey of 19 tree species in northeastern Wisconsin showed that black ash produced good seed crops 28 percent of the years, medium seed crops 4 percent of the years, and poor seed crops 68 percent of the years. Of the 19 northern forest tree species investigated, black ash registered the longest period of poor seed crop, 7 years *(7,121.*

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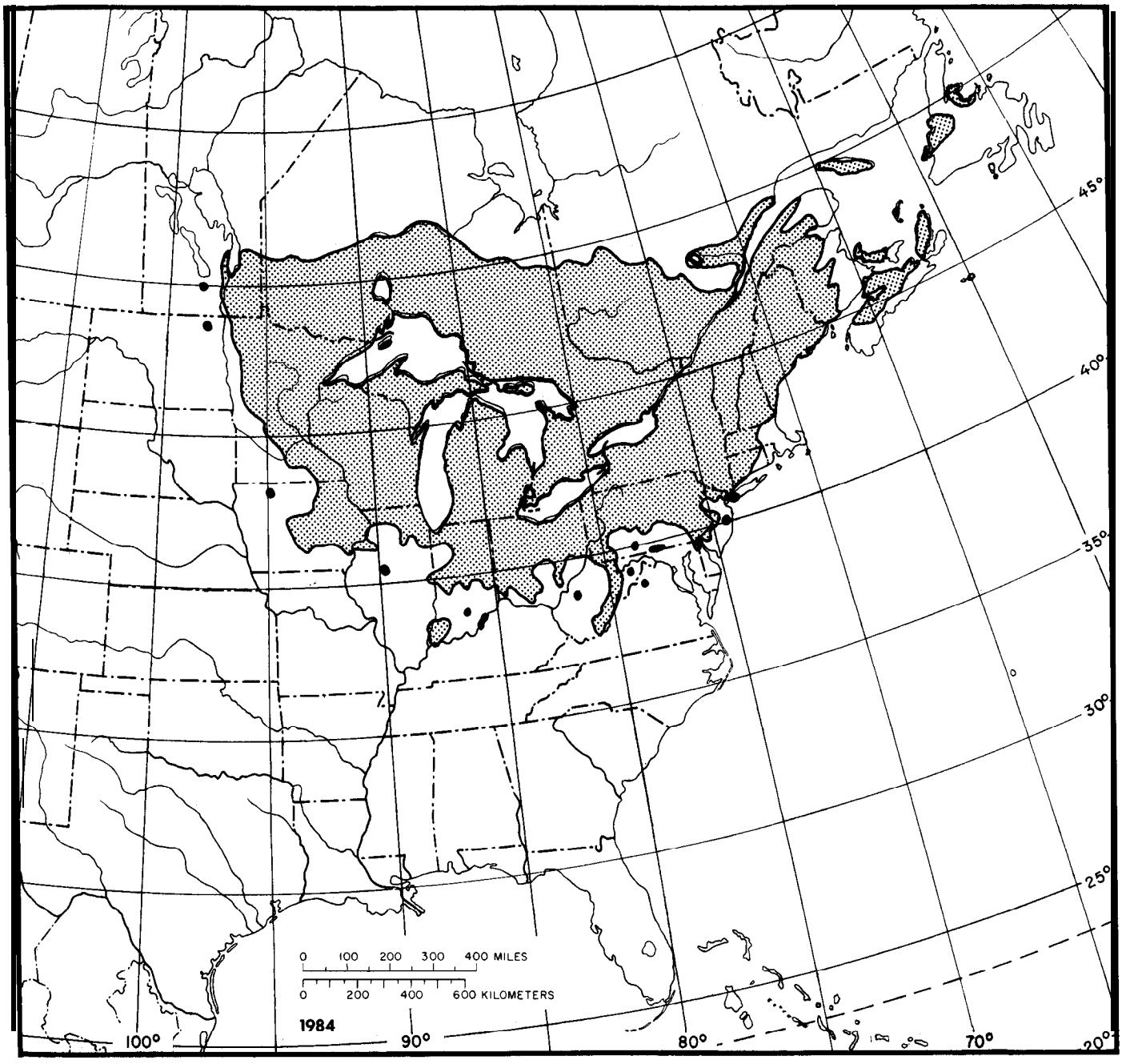

Figure *1-The native range of black ash.*

Among the ashes, black ash is about average in seed production. Seeds average between 27.7 and 36.3 kg/45.4 kg of fruit (61 and 80 lb 100/lb). When cleaned, there are 13,500 to 20,900 seeds per kilogram (6,100 to 9,500 lb) or an average of 17,900 kg (8,100 lb) (12).

Black ash seeds show dormancy because they have immature embryos, respiratory enzymes in the endosperm, and impermeable seedcoats. Dormancy can be overcome with moist stratification in sand for 2 to 3 months at room temperatures (20" C or 68" F) followed by stratification for 3 months at a temperature slightly above freezing (5" C or 41" F). The embryos mature and seedcoats become permeable during warm stratification and inhibitors disappear during cold stratification *(12,13)*.

Figure 2—*Black ash boles support small open crowns and are inclined to be poorly shaped.*

Seedling Development-Because of dormancy, black ash seed does not normally germinate under natural conditions until the second year. In the nursery, ash seeds may be planted in the fall soon after they are collected and then mulched with burlap or straw until spring, and covered with 6 to 20 mm (0.25 to 0.75 in) of soil. Standard practice is to broadcast or drill seeds to achieve a nursery bed density of about 110 to 160 seedlings per square meter (10 to 15 ft). Germination is epigeal and usually occurs during the second year. Seedlings usually are outplanted as 1-O stock, sometimes 2-O in North America *(12).* Black ash seeds may remain viable for 8 years or more under natural conditions.

In natural stands, black ash seedlings commonly grow more slowly than do those of associated species such as American elm *(Ulmus americana)* and red maple *(Acer rubrum).* Young black ash sprout readily from stumps.

Sapling and Pole Stages to Maturity

Growth and Yield-Black ash is a small tree. The largest one on record is growing in Bath, OH, and is 26.5 m (87 ft) tall and 148 cm (58.3 in) in d.b.h., with a crown spread of 18.3 m (60 ft) *(10).* More commonly, the largest trees reach a height of 18 to 21 m (60 to 70 ft) and a diameter of 30 to 61 cm (12 to 24 in). In many forests, the largest trees are only 20 to 25 cm (8 to 10 in) in d.b.h.

As would be expected of a species that grows in areas with a high water table, black ash has a relatively slow growth rate. Site index at base age 50 years ranges from 15 to 24 m (50 to 80 ft) in northern Wisconsin and Michigan (2). Forest survey data from 20 counties in northern Minnesota indicate that black ash is only about 80 percent as tall at age 50 as is balsam fir ***(Abies balsamea)*** on the same site (3). In many Michigan bogs, black ash-red maple stands grow only 9 to 11 m (30 to 35 ft) tall before they are replaced by northern white-cedar ***(Thuja occidentalis) (6).***

In a Minnesota study *(11),* freshly fallen black ash leaves were found to contain larger amounts of calcium, magnesium, nitrogen, and ash than other hardwoods. The phosphorus content of the foliage was similar to that of most other hardwoods.

Rooting Habit-Black ash has a shallow and fibrous root system *(8),* particularly well adapted to growth under conditions of high soil moisture.

Reaction to Competition-Black ash is classed as intolerant of shade (8).

Damaging Agents-A study based on an extensive survey of defects in Ontario forest trees concluded that black ash is the most defective of eight deciduous species. The fungi most frequently associated with trunk rot and butt rot of black ash were ***Stereum murrayi*** and ***Armillarea mellea,*** respectively ***(1).*** The oystershell scale ***(Lepidosaphes ulmi)*** occasionally kills reproduction and older trees. Leaf spot ***(Mycosphaerella effigurata),*** anthracnose ***(Gloeosporium aridum),*** rust ***(Puccinia peridermiospora),*** and canker *(Nectria* ***galligena)*** cause damage to black ash similar to that reported for white ash ***(Fraxinus americana). The*** spongy white (heartwood) rot caused by ***Polyporus hispidus*** enters through wounds and is usually found in the upper tree trunk. It is occasionally a serious problem; in one Minnesota stand, it caused degrade of lumber in 5 percent of the trees (14). Deer browse heavily on young black ash and if poplars are scarce, beaver will cut down ash between 25 and 51 cm (10 to 20 in) in stump diameter.

Genetics

There are no known races or hybrids of black ash.

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