

THE GENUS FRAXINUS IN OHIO.

LILLIAN E. HUMPHREY.

Recent investigations of the genus *Fraxinus* show a diversity of opinion in regard to the limits of certain species. A study was made of Ohio forms and comparison made with specimens from other regions in order to determine a suitable disposition of local species.

In *Fraxinus lanceolata* a very great diversity in the size and shape of the leaflets was apparent. Some of the leaflets from Ohio specimens measured 3 to 7½ inches in length and ½ to 2½ inches in width. Specimens ranging westward to western Kansas have smaller leaves and fruit, the leaflets of those from Kansas measuring 3 to 4½ inches in length and ¾ to 1 5-8 inches in width. The samaras of those from Ohio varied from 1¼ to 2¼ inches in length, while the Kansas type bore fruit measuring 7-8 to 1 5-8 inches in length; both were of about the same width. There is an uninterrupted gradation of sizes and shapes from the larger eastern specimens to the smallest western types. Specimens from Decatur County, Kansas, had the shortest samaras of any examined.

Closely resembling *Fraxinus lanceolata* in general appearance is *Fraxinus pennsylvanica*, which differs chiefly in having velvety pubescent twigs and more or less velvety pubescent petioles and under sides of the leaflets. The leaflets are generally broader than those of *Fraxinus lanceolata*, but of about the same length, the average measurements being ¾ to 6 inches long and 1 1-8 to 2½ inches wide. In both species both sides of the leaflets are a decided green and the wing of the samara is decurrent 1-3 to ½ the length of the body. Practically the only essential difference between the two forms is the velvety pubescence of the twigs and a usually greater pubescence of the leaves of *Fraxinus pennsylvanica*.

Parallel with these two forms are *Fraxinus americana* and *Fraxinus biltmoreana*, which also seem to be separated mainly by the degree of pubescence. The *Fraxinus americana* specimens had leaflets measuring 3 to 6½ inches by 1 to 2½ inches. *Fraxinus biltmoreana* had leaflets of about the same size. The samaras of *Fraxinus biltmoreana* are 1½ to 1¾ inches long, while those of *Fraxinus americana* vary from 1 1-8 to 1 7-16 inches. Both have plump, terete bodies and terminal wings. The leaflets of both species are prevailingly whitish underneath. As stated, we have the same conditions as between *Fraxinus lanceolata* and *Fraxinus pennsylvanica*. The velvety pubescence of the twigs may be used to segregate the two types, but even this character is not very sharply limited. Often specimens of *Fraxinus americana* have quite pubescent leaves.

Synopsis.

- I. Flowers bisporangiate, imperfectly bisporangiate, or imperfectly monosporangiate; calyx none or very minute.
1. Flowers bisporangiate; twigs 4-sided, sometimes sharply four-angled; wing of fruit extending around the body; leaflets green on both sides, not entirely sessile; calyx a minute ring.
F. quadrangulata.
 2. Flowers imperfectly bisporangiate or imperfectly monosporangiate; twigs terete or nearly so; leaflets sessile; calyx none.
 - (1) Leaflets oblong-lanceolate tapering to a long point. *F. nigra.*
 - (2) Leaflets oblong to ovate-lanceolate, short pointed.
F. excelsior.
- II. Flowers monosporangiate; calyx evident; leaflets with petiolules.
1. Fruit with a flattish body passing perceptibly into the wing; leaves and twigs velvety pubescent. *F. profunda.*
 2. Fruit with a terete or nearly terete body.
 - a. Wing of the samara extending somewhat down the sides of the body.
 - (a) Twigs pubescent. *F. pennsylvanica.*
 - (b) Twigs smooth or nearly so. *F. lanceolata.*
 - b. Wing of the samara almost entirely terminal.
 - (a) Twigs pubescent. *F. biltmoreana.*
 - (b) Twigs smooth or nearly so. *F. americana.*

Key to the Species.

1. Leaflets more or less petiolulate. 3.
1. Leaflets sessile. 2.
2. Leaflets 7—11, long, gradually tapering to a point, oblong lanceolate.
F. nigra.
2. Leaflets short pointed, ovate to obovate. *F. excelsior.*
3. Twigs not quadrangular. 4.
3. Twigs quadrangular; stems sometimes sharply four-angled; leaflets 7—11, green on both sides, upper ones usually sessile, lower ones short petiolulate. *F. quadrangulata.*
4. Twigs pubescent, often velvety. 5.
4. Twigs smooth or nearly so. 7.
5. Leaflets ovate to ovate lanceolate; base usually truncate or rounded, unsymmetrical; upper surface dark yellow green, soft pubescent beneath, calyx large. *F. profunda.*
5. Leaflets ovate, ovate-lanceolate, or lanceolate, usually acute at the base; calyx minute. 6.
6. Leaflets pale beneath, ovate to ovate lanceolate, 7—11; wing of samara terminal or nearly so. *F. biltmoreana.*
6. Leaflets green or greenish beneath, ovate-lanceolate to lanceolate, 5—9; samara with a decurrent wing. *F. pennsylvanica.*
7. Leaflets pale beneath, ovate to ovate-lanceolate, entire or indefinitely serrate, abruptly acute or acuminate, glabrous or somewhat pubescent; wing of samara terminal. *F. americana.*
7. Leaflets green on both sides, glabrous or somewhat pubescent, usually serrate, lanceolate to ovate-lanceolate, acuminate; wing of samara decurrent on the sides of the slender body. *F. lanceolata.*

Fraxinus L. Ash.

Deciduous trees usually with a furrowed bark; light, tough wood; large, light-colored, round pith and large terminal buds. Lateral buds obtuse, somewhat flattened; bundle scars crowded in a curved line; leaves opposite, usually odd-pinnate; flowers inconspicuous, perfectly or imperfectly monosporangiate, some-

times bisporangiate, usually diecious, in bractless pannicles, isobilateral, usually apetalous and dicyclic, but some of the primitive forms with a corolla; cycles usually tetramerous or dimerous; calyx when present usually campanulate, persistent or deciduous, sometimes much reduced; stamens united with the base of the corolla when present; pollination usually anemophilous; ovulary biocular, ovules two in each cavity; fruit a one seeded samara; seed pendulous.

1. ***Fraxinus quadrangulata*** Mx. Blue Ash. Twigs glabrous or very slightly pubescent when young, 4 sided, sometimes sharply 4-angled leaflets 7-11, ovate to oblanceolate, green on both sides, sharply serrate or serrulate, long acuminate, upper leaflets usually sessile, lower ones short petioled; flowers bisporangiate; corolla wanting, calyx reduced to an obscure ring; samara linear oblong, $1\frac{1}{4}$ to 2 inches long, 3-8 to $\frac{1}{2}$ inches wide, blunt, body extending half way to the apex. On rich limestone hills and sometimes in fertile valleys. Ottawa, Hancock, Auglaize, Franklin, Licking, Montgomery, Highland, Ross, Brown, Adams.

2. ***Fraxinus nigra*** Marsh. Black Ash. Twigs and usually the leaves glabrous; leaflets 7-11, sessile, green on both sides, sometimes quite pubescent along the mid-rib, serrate or serrulate, $2\frac{1}{2}$ to 6 inches long, 1 to $1\frac{1}{2}$ inches wide, ovate-lanceolate, with a long, tapering acuminate apex and a narrow or rounded base; flowers imperfectly bisporangiate; samara oblong to linear-oblong, 1 to $1\frac{5}{8}$ inches long, $\frac{1}{4}$ to $\frac{3}{8}$ inches wide; calyx wanting; wing all around the flat body which extends to beyond the middle. In swamps and wet woods. General in northern part of the state, south to Preble, Green, Franklin and Harrison.

3. ***Fraxinus pennsylvanica*** Marsh. Red Ash. Twigs, petioles, rachis and lower surface of leaflets velvety pubescent; leaflets 5-9, green on both sides, ovate to oblong, margin varying from entire to serrate, apex acute or acuminate, $3\frac{1}{4}$ to 6 inches long, $1\frac{1}{4}$ to 2 inches wide; calyx in the staminate flower obscurely toothed, that of the carpellate flower deeply divided; samara 1 to 2 inches long, 1-8 to 3-16 inches wide, wing decurrent, linear to spatulate, about the same length as the body. Low, rich, moist soil. General.

4. ***Fraxinus lanceolata*** Borck. Green Ash. Twigs and usually the leaves glabrous; leaflets 5-9, green on both sides, lanceolate to oblanceolate, entire to denticulate, 3 to $7\frac{1}{2}$ inches long, $\frac{1}{2}$ to $2\frac{1}{2}$ inches wide, often pubescent on the veins beneath, apex acute to long tapering; samara $1\frac{1}{4}$ to $2\frac{1}{4}$ inches long, 1-8 to $\frac{1}{4}$ inches wide; wing somewhat decurrent, spatulate; body terete. Moist soil. General.

5. ***Fraxinus biltmoreana*** Beadle. Biltmore Ash. Young twigs very pubescent; leaflets 7-9, pale beneath, more or less pubescent, especially along the veins beneath, ovate to ovate lanceolate, margin entire or sometimes obscurely serrate, rachis

slightly pubescent; samara $1\frac{1}{2}$ to 2 inches long; wing almost entirely terminal, linear, two or three times as long as the short, stout, terete body. Upper part of river banks and woods. Erie, Hardin, Franklin, Montgomery, Morgan, Hamilton, Brown, Lawrence, Meigs.

6. **Fraxinus americana** L. White Ash. Twigs and petioles glabrous; leaflets 5-9, pale beneath, glabrous or somewhat pubescent along the veins, ovate to oblanceolate; margin more or less entire or sparsely toothed; samara 1 to 1 7-16 inches long, 1-8 to 5-16 inches wide; wing entirely terminal; body terete. Rich woods. General.
