Trans. Ky. Acad. Sci., 50(1–2), 1989, 75–78

Castanea and *Fagus* (Fagaceae) in Kentucky

George P. Johnson

Biology Department, Lindsey Wilson College,
Columbia, Kentucky 42728

Abstract

Documented county distributions, descriptions, notes, and keys are presented for the taxa of *Castanea* and *Fagus* that occur in Kentucky. *Castanea* is represented by 2 species, *C. dentata* (49 counties) and *C. pumila* (8 counties), while *Fagus* is represented by a single species, *F. grandifolia* (73 counties). A key to the genera of the Kentucky Fagaceae is also included.

Introduction

The Fagaceae includes approximately 800 species in 8 genera and is widely distributed in both hemispheres, excluding tropical and southern Africa (1). As treated by Cronquist, the Fagaceae belongs to the Fagales of the Hamamelidae, and our taxa can be recognized by the following suite of characters: trees or shrubs; leaves alternate, stipulate, simple, margin entire, toothed, or lobed, our species deciduous; flowers anemophilous and inconspicuous, plants monecious; staminate flowers in catkins or small globose heads, pistillate solitary or clustered, subtended by an involucre; fruit a nut that is subtended by an involucre of bracts (*Quercus*) or enclosed within a spiny cupule (*Castanea* and *Fagus*).

Elias (2) has treated the Fagaceae in the Generic Flora of the Southeastern United States, which included generic and family descriptions, distributional and taxonomic data, information on reproductive biology, and an extensive bibliography. Although treatments of the Fagaceae in Kentucky have been prepared by Braun (3), Garmon (4), Meijer (5), and Wharton and Barbour (6), these are out of date and/or have not included county distributions based on herbarium specimens. This study updates these previous treatments, and is a contribution toward the knowledge of the flora of Kentucky.

Materials and Methods

This study is based on personal collections and on the examination of over 6,000 herbarium specimens from 47 herbaria. Specimens from 40 herbaria were examined in a previous study of *Castanea* (7), and an additional 222 specimens from 11 herbaria were examined for this study. Collections from DHL were unavailable for examination, although some DHL data were available from the Kentucky Nature Preserves Commission's Natural Heritage Database and some from duplicate specimens. Literature records and non-naturalized species have been excluded from the distribution maps, but have been discusssed where relevant. Nomenclature for *Castanea* follows Johnson (7), while the nomenclature for *Fagus* follows Kartesz and Kartesz (8).

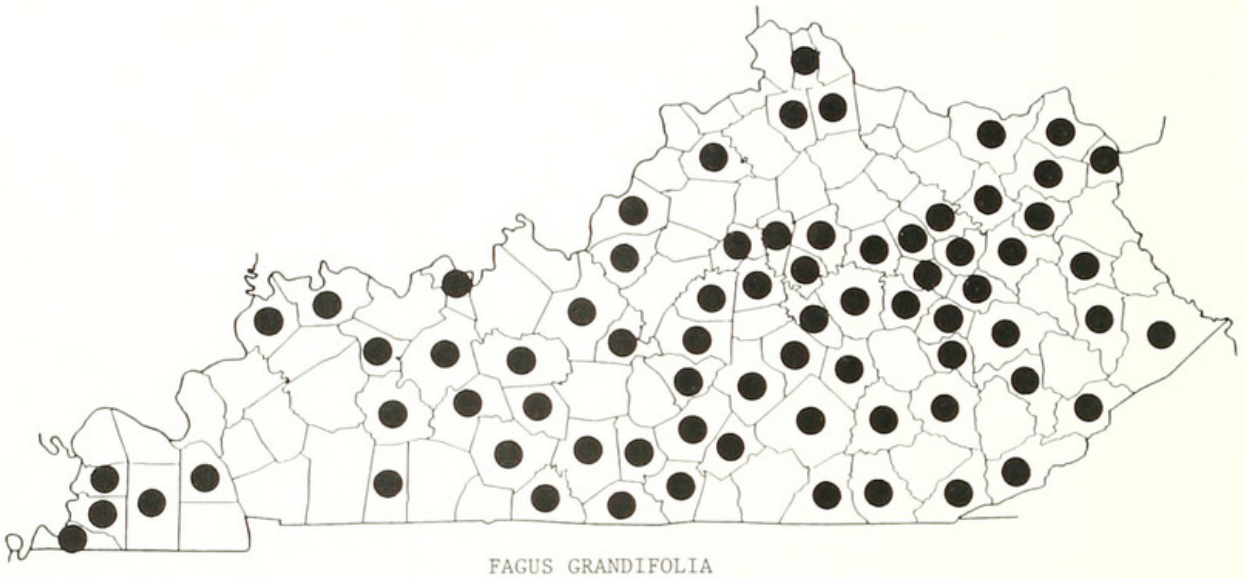
Results

In Kentucky, the Fagaceae includes 3 genera, *Castanea*, *Fagus*, and *Quercus* (to be treated elsewhere). *Castanea* includes 2 native species: *C. dentata* occurs in 49 counties; and *C. pumila* occurs in 8 counties (Fig. 1). *Fagus* includes only 1 native species, *F. grandifolia*, which occurs in 73 counties (Fig. 1). Non-native species that are widely cultivated and which may be confused with our native species are the Chinese chestnut, *C. mollissima*, and the European beech, *F. sylvatica*.

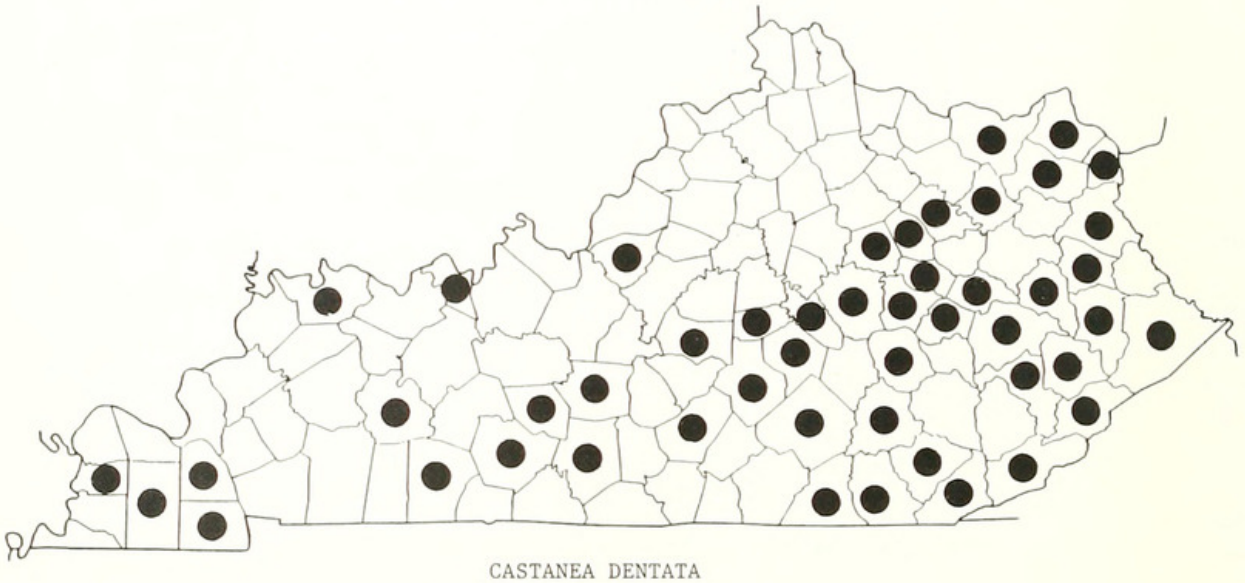
Key to Genera and Taxa

1) Bark of mature trunk smooth, gray or gray-blue; twigs slender, round, pith <5-angled; buds lanceolate and sharp pointed, >1 cm in length; fruit triangular in cross-section; staminate flowers borne in globose heads, pistillate borne in pairs ..... *F. grandifolia*

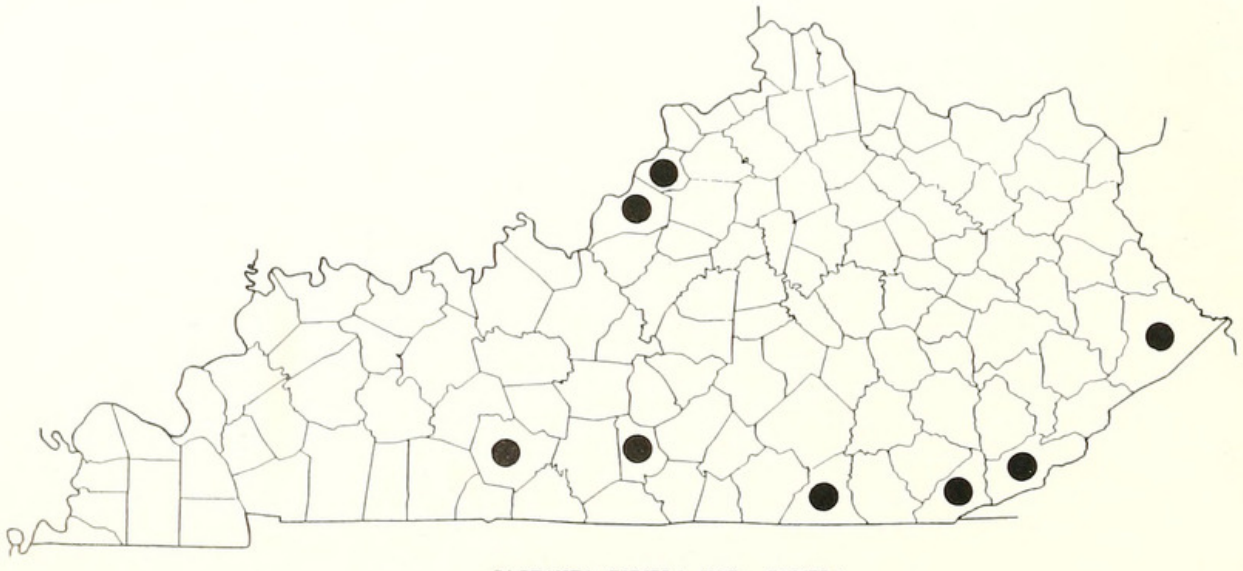
1) Bark of mature trunk scaly or furrowed, brown or gray-brown; twigs moderate to stout, often angled, pith 5-angled; buds ovoid and acute, <1 cm in length; fruit round or flattened on 1–2 sides in cross-section; staminate flowers borne in catkins, pistillate borne singly or in 3s 2
   2) Buds clustered near tips of twigs, terminal bud present; buds with >4 visible scales; fruit partially enclosed within an



FAGUS GRANDIFOLIA



CASTANEA DENTATA



CASTANEA PUMILA VAR. PUMILA

FIG. 1. Documented county distributions of *Castanea* and *Fagus* in Kentucky.

involucre of imbricate scales, spines lacking ..... *Quercus*

2) Buds evenly spaced on twigs, terminal bud usually absent; buds with 2–4 visible scales; fruit enclosed within an involucre of bracts, spines present 3

3) Twigs, buds, and abaxial leaf surfaces puberulent to tomentose; pistillate flowers borne singly; fruit circular in cross-section; cupule 2-valved ..... *Castanea pumila*

3) Twigs, buds, and abaxial leaf surfaces glabrous; pistillate flowers borne in 3s; fruit flattened on 1–2 sides in cross-section; cupule 4-valved ..... *Castanea dentata*

DISCUSSION

1) *Castanea dentata* (Marsh.) Borkh.; American Chestnut, Chestnut.

The American chestnut is widely distributed throughout the eastern United States and adjacent Canada (7) and was once a major forest tree, especially in the Appalachian region. The chestnut provided edible nuts, tannin, and many types of wood products before the introduction of the chestnut blight, *Cryphonectria parasitica* (Murr.) Barr, in 1904. Although reduced to stump sprouts over its entire range within a few years, the chestnut persists. Efforts to combat the blight have so far been unproductive. Thorough reviews of the chestnut blight have been prepared by Anagnostakis (9) and Burnham (10), the latter including a model by which blight-resistant American chestnuts could be produced.

The chestnut occurs throughout Kentucky except for the Bluegrass region, and has been collected in 49 counties (Fig. 1). Braun (3) lists 2 counties for the species and Garmon (4) lists an additional 40 that have not been documented by specimens. The chestnut grows best in acid, well-drained soils, and at one time was a major component of several communities (11). The chestnut is quite distinctive and is usually not confused with other species, except possibly *Castanea pumila* (see below), or the cultivated Chinese chestnut, *C. mollissima* Blume. The American chestnut is distinguished by its large, thin, lanceolate or lance-elliptic leaves that are glabrous on the undersurfaces, and by its glabrous twigs. The sprouts often occur at the base of dead trunks or stumps, and seldom produce flowers or fruits.

2) *Castanea pumila* (L.) Miller; Chinquapin, Chinkapin, Chincapin.

The chinquapin occurs throughout the southeastern United States, with Kentucky's plants belonging to variety *pumila* (7). Because of its small size, growth form, and small nuts, this species has been unimportant from an economic standpoint, although it is important to wildlife. The blight also affects the chinquapin, but not to the same extent as the chestnut. Rapid sprouting and suckering soon replace blight-stricken stems.

The chinquapin has been collected from 8 Kentucky counties, mostly in the southeastern part of the state (Fig. 1). It grows best in dry, open woodlands, often under pines. The chinquapin also does well in disturbed areas along roads and powerline clearings where competition is reduced. Because of its limited distribution and rarity in Kentucky, Warren et al. (12) listed *Castanea pumila* as an endangered species in this state. Garmon (4) listed 13 counties for the chinquapin that have not been substantiated by herbarium specimens, although most of these would be likely locations for the species, given its known distribution. The chinquapin can be easily overlooked unless it is in flower, and then the plant is quite odorous and showy.

Vegetatively, the chinquapin can be distinguished from the American chestnut on the basis of its pubescent leaf undersurfaces and twigs, although these cannot be used to distinguish it from the widely cultivated Chinese chestnut. The Chinese chestnut grows much larger than the chinquapin, and has leaves that are usually much larger, thicker, and glossier than are those of the chinquapin. Additionally, the twigs of the Chinese chestnut are thicker and their lenticels are more prominent than are those of *C. pumila*. The cupules of the chinquapin (sect. Balanocastanon) easily distinguish it from either the American or Chinese chestnuts (sect. Castanea). Chinquapin cupules have a single flower or nut, 2 valves, and are approximately 3 cm in diameter. The cupules of the American and Chinese chestnuts have 3 flowers or nuts (sometimes more in the Chinese), 4 valves, and are approximately 6–11 cm in diameter.

Although no specimens exist, a rare hybrid, *C.* × *neglecta* Dode (*C. dentata* × *C. pumila*), might also occur in Kentucky (7). This taxon has leaves which are similar in size and shape to those of the American chestnut, but the undersurfaces are pubescent, as are the twigs.

3) *Fagus grandifolia* Ehrh.; American Beech, Beech.

The beech occurs throughout the eastern United States and adjacent Canada (13), with a disjunct variety, var. *mexicana* (Martinez) Little, occurring in Mexico (14). Numerous products have been produced from the wood, and the species serves as a valuable resource for wildlife.

The beech can be found throughout Kentucky (73 counties) (Fig. 1), although at one time it was uncommon in the Bluegrass (4) and was apparently absent from the Inner Bluegrass (3). Braun (3) listed 6 counties and Garmon (4) listed an additional 37 for the species that have not been verified by herbarium specimens. The species grows in a variety of habitats, but reaches its maximum size in the rich, moist soils of stream valleys. Huge specimens can be found in the Big Woods area of Mammoth Cave National Park and in the coves of Kentucky's Appalachian Mountains.

The beech is not often confused with other native species. The smooth, gray bark of the trunk (often with initials), elongated buds, triangular-shaped nuts, and the glossy, leathery, serrate-margined leaves are all distinctive characters of the American beech. Occasionally, the widely cultivated European beech is confused with our native species in an urban setting. The European species can be distinguished by its leaves that have 5–9 pairs of veins, whereas our species has 9–14 pairs. There are numerous cultivars of the European beech.

ACKNOWLEDGMENTS

I would like to thank the curators of the following herbaria who provided information, access to their collections, or lent specimens: Asbury College, BEREA, Cumberland College, EKY, KNK, KY, Lindsey Wilson College, MEM, MOKY, MUR, and WKU. Special thanks are due to Marc Evans of the Kentucky Nature Preserves Commission, who provided data from the Commission's Natural Heritage Database.

LITERATURE CITED

1. Cronquist, A. 1981. An integrated system of classification of flowering plants. Columbia Univ. Press, New York.

2. Elias, T. S. 1971. The genera of Fagaceae in the southeastern United States. J. Arnold Arbor. 52:159–195.

3. Braun, E. L. 1943. An annotated catalog of spermatophytes of Kentucky. John S. Swift Co., Cincinnati, Ohio.

4. Garmon, H. 1913. The woody plants of Kentucky. Bull. Ky. Agric. Exp. Sta. 169:3–62.

5. Meijer, W. 1972. Tree flora of Kentucky. Univ. Press Ky., Lexington, Kentucky.

6. Wharton, M. E. and R. W. Barbour. 1973. Trees and shrubs of Kentucky. Univ. Press Ky., Lexington, Kentucky.

7. Johnson, G. P. 1988. Revision of *Castanea* sect. Balanocastanon (Fagaceae). J. Arnold Arbor. 69:25–49.

8. Kartesz, J. T. and R. Kartesz. 1980. A synonymized checklist of the vascular flora of the U.S., Canada, and Greenland, Vol. 2. Univ. of North Carolina Press, Chapel Hill, North Carolina.

9. Anagnostakis, S. L. 1987. Chestnut blight: the classical problem of an introduced pathogen. Mycologia 79: 23–37.

10. Burnham, C. R. 1988. The restoration of the American chestnut. Amer. Sci. 76(5):478–487.

11. Braun, E. L. 1950. Deciduous forests of eastern North America. The Blakiston Co., Philadelphia.

12. Warren, M. L., Jr., et al. 1986. Endangered, threatened, and rare plants and animals of Kentucky. Trans. Ky. Acad. Sci. 47:83–98.

13. Little, E. L., Jr. 1971. Atlas of United States trees, Vol. 1. Conifers and important hardwoods. U.S. Dept. Agric. Misc. Publ. No. 1146, Washington, D.C.

14. Little, E. L., Jr. 1965. Mexican beech, a variety of *Fagus grandifolia*. Castanea 30:167–170.