

The Distribution of the Genus *Quercus* in Illinois: An Update

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ABSTRACT

This paper updates the distribution of members of the black oak [section *Lobatae*] and white oak [section *Quercus*] groups native to Illinois. In addition a brief discussion of Illinois' spontaneously occurring hybrid oaks is presented. The findings reported are based on personal collections, herbarium specimens, and published documents.

INTRODUCTION

The genus *Quercus* is well known in Illinois. Although some taxa are widespread, a few have a limited distribution. Three species are of "special concern" and are listed as either threatened (*Quercus phellos* L., willow oak; *Quercus montana* Willd., rock chestnut oak) or endangered (*Quercus texana* Buckl., Nuttall's oak) [Illinois Endangered Species Protection Board 1999]. The Illinois Natural History Survey has dedicated a portion of its website [www.INHS.uiuc.edu] to the species of *Quercus* in Illinois. A discussion of all oaks from North America is available online from the Flora of North America Association [http://hua.huh.harvard.edu/FNA/] and in print [Jensen 1997, Nixon 1997, Nixon and Muller 1997]. The National Plant Data Center maintains an extensive online database [http://plants.usda.gov] documenting information on plants in the United States and its territories. Extensive oak data are available there [U.S.D.A. 2001].

During the last 40 years the number of native oak species recognized for Illinois by various floristic authors has varied little [Tables 1 & 2]. Mohlenbrock and Ladd [1978], Mohlenbrock [1986], Mohlenbrock and Thomson [1987], and Robertson [1994] identified the same 20 species [with some variations in taxonomy] in Illinois. Elias [1989] and Little [1953] recognized 19 species in Illinois. The latter two [1] omitted *Quercus texana* Buckl. [syn. = *Q. nuttallii* Palmer] from Illinois; [2] merged *Q. pagoda* Raf. with *Q. falcata* Michx. from which two varieties were recognized, *Q. falcata* Michx. var. *falcata* and *Q. falcata* var. *pagodifolia* (Ell.) Ashe; and [3] believed *Q. prinoides* Willd. [dwarf chinquapin oak] to be in Illinois. Later, Little [1971, 1977, 1979] omitted the species *Q. prinoides* from the atlases and checklist of trees of the United States, apparently because it is a "clump-forming shrub, usually low but rarely treelike." Thus, he recognized 18

species of oaks in Illinois. Jones and Fuller [1955] documented 18 oak species by omitting *Quercus texana* and considering *Quercus pagoda* a synonym of *Quercus falcata*. Additionally, Jones and Fuller [1955] acknowledged the report by Kibbe [1952] of *Q. ilicifolia* Wang. [bear oak] from Hancock County, Illinois, but continued to state they “have no evidence that the bear oak occurs west of the Appalachian Mountains.”

In the Flora of North America [Jensen 1997, Nixon 1997, Nixon and Muller 1997] 21 species of *Quercus* are recognized within the state. Jensen [1997], who treated the black oak group [section *Lobatae*] for the Flora of North America recognized and mapped 12 species. Nixon and Muller [1997] treated the white oak group [section *Quercus*] for the Flora of North America and distinguished nine species from the state. The disparity of 20 species accepted by state botanists versus 21 species documented in the Flora of North America is based upon the recognition by Nixon and Muller [1997] of *Quercus prinoides* [dwarf chinquapin oak] as distinct from *Q. muehlenbergii* [chinquapin oak]. Mohlenbrock and Thomson [1987] considered *Q. prinoides* and *Q. muehlenbergii* to be varieties of *Q. prinoides* [*Quercus prinoides* Willd. var. *prinoides* and *Quercus prinoides* Willd. var. *acuminata* (Michx.) Gleason, respectively]. They stated that dwarf chinquapin oak “does not occur in Illinois.” In this paper we recognize 20 oak species in Illinois and agree that the dwarf chinquapin oak does not seem to occur in the state [Tables 1 & 2].

Jones and Fuller [1955], Mohlenbrock [1986], Mohlenbrock and Thomson [1987], and Robertson [1994] recognized 15 - 19 hybrids within the genus, 13 of which are common to all four publications. Little [1953] documented 12 hybrids from Illinois, nine of which are recognized in all four of the above publications [Tables 5 & 6]. Few publications dealing with *Quercus* focused on hybrids.

Three of four project goals are reported herein. 1.) Assemble a complete set of vegetative and reproductive voucher specimens of the genus *Quercus*. 2.) Update the distribution maps for the oaks of Illinois through field collections, studies in herbaria in Illinois, and distribution notes documented in recent publications. 3.) Report on the known oak hybrids in Illinois. 4.) An improved key to the oaks of Illinois will be developed for future publication.

METHODS AND MATERIALS

We began collecting specimens for this study in the fall of 1991. In order to obtain mature vegetative and reproductive material, in good condition, our collections were made during the autumn months. Only full-sun leaves were collected whenever possible. To date, about 790 of our personal collections including nearly 4600 duplicates have been catalogued. All specimens are housed at MOR. Duplicates are being distributed to ND, ILLS, ISM, and BRIT [Holmgren et al. 1990].

Specimens of *Quercus* from Eastern Illinois University [EIU], the Field Museum of Natural History [F], the University of Illinois [ILL], the Illinois Natural History Survey [ILLS], Illinois State Museum [ISM], The Morton Arboretum [MOR], Southern Illinois University [SIU], and Western Illinois University [MWI] were examined for this study. From these herbaria approximately 1900 herbarium specimens were verified by one or both authors, annotated as needed, and catalogued. In order to avoid the generation of a

cumbersome data base, label data were recorded for the first specimen or two of each taxon per county.

Oak hybrids for Illinois listed by Kartesz [1994] with valid binomials or their purported parentage were recorded. All comments regarding hybrids in this paper are restricted to the combinations presented in Tables 3 and 4.

Phytologia, Castanea, Erigenia, Transactions of the Illinois Academy of Science, SIDA, and American Midland Naturalist volumes published after Mohlenbrock and Ladd's Illinois atlas [1978] were examined for oak distribution data. References therein, as they pertain to this project, were recorded to supplement the voucher data.

The collection records were compiled in a Paradox for Windows database [Borland International 1994]. Distribution maps were generated using Maptitude [Caliper Corp. 1997]. For all maps a "●" denotes the presence within the county of a taxon for which we have seen a voucher specimen. An "*" denotes the presence within the county of a taxon for which we have seen only a literature citation other than Mohlenbrock and Ladd [1978]. An "○" denotes the presence within the county of a taxon for which we have seen only a reference in Mohlenbrock and Ladd [1978].

As indicated, the actual number of species recognized from Illinois has varied little over the years, but their taxonomy and plotted distribution have not been as constant. We have followed the nomenclature in the Flora of North America [Jensen 1997, Nixon and Muller 1997]. *Quercus prinoides* [dwarf chinquapin oak] has been omitted, because we have neither found any herbarium specimens, nor located it in the field in Illinois. Certain oaks may no longer exist in some Illinois counties, because of intensive and extensive agricultural development. Some authors of regional floras [Swink & Wilhelm 1994, Voss 1985] have included *Q. ellipsoidalis* E. J. Hill [Hill's oak] in *Q. coccinea* Muenchh. [scarlet oak] following the work of Overlease [1977], whereas we have segregated the two. Nuttall's oak, known in many earlier works as *Q. nuttallii* Palmer is now considered to be *Q. texana* Buckl. [Dorr and Nixon 1985].

RESULTS – THE WHITE OAK GROUP [QUERCUS SECTION QUERCUS]

White Oak [*Quercus alba* L.]

Our collections and herbarium work confirm the presence of this tree in all counties of Illinois [Fig. 1a] as shown by Mohlenbrock and Ladd [1978]. *Quercus alba* in Illinois falls in the northwestern quarter of the plant's distribution in North America [Nixon and Muller 1997]. Kartesz [1994] lists seven oak hybrids for Illinois in which *Q. alba* is a putative parent. We have cataloged all seven of these hybrids [Tables 3 & 5] from Illinois. The hybrids catalogued are *Q. x jackiana* Schneid., *Q. x bebbiana* Schneid., *Q. x beadlei* Trel. ex Palmer, *Q. x saulii* Schneid., *Q. x bimundorum* Palmer, *Q. x fernowii* Trel., and *Q. alba* x *Q. muehlenbergii*.

Quercus x bimundorum Palmer is unique in that *Q. alba* hybridizes with the non-native English oak [*Q. robur* L.]. Jones and Fuller [1955] report the hybrid *Q. alba* x *Q. muehlenbergii* in Illinois. Apparently no binomial for this plant has been published, con-

sequently Kartesz [1994] and Kartesz and Meachum [1999] omitted it from their publications. We cannot confirm its existence in the state.

Swamp White Oak [*Quercus bicolor* Willd.]

The habitat of swamp white oak is generally low wet woods, consequently it is much more occasional than might be surmised from its fairly wide distribution [Fig. 1b]. Illinois falls well within this plant's North American distribution [Nixon and Muller 1997]. Four hybrids of this taxon are reported by Kartesz [1994]. Three hybrids [*Q. x jackiana* Schneid., *Q. x humidicola* Palmer, *Q. x schuettei* Trel.] are reported from Illinois and we have seen vouchers for all three [Tables 3 & 5].

Overcup Oak [*Quercus lyrata* Walt.]

The farthest northwest distribution of overcup oak occurs in the southern half of Illinois [Nixon and Muller 1997]. Trees documented by Evers [#306 at ILL] near Quincy [Adams County] have been destroyed by flood and only a few struggling specimens of *Quercus palustris* remain at that locality. The only Menard county voucher is from a tree in Lincoln's New Salem State Historical site, perhaps indicating a cultivated origin. *Quercus lyrata* is an uncommon bottomland tree within the state; found most often in the far southern counties [Fig. 1c]. Kartesz [1994] includes four *Q. lyrata* hybrids, two of which [*Q. x humidicola* Palmer, *Q. x megaleia* Laughlin] are reported from Illinois [Tables 3 & 5].

Bur Oak [*Quercus macrocarpa* Muenchh.]

Bur oak occurs in a variety of habitats in Illinois, but it is best known as a tree of the prairies. Even though we did not see it in all counties, Mohlenbrock and Ladd [1978] are likely correct in recording it from every county in the state [Fig. 1d]. It occurs from southeastern Montana to far south-central Texas then northeastward to central Tennessee and on north to New Brunswick [Nixon and Muller 1997]. Of the six *Q. macrocarpa* hybrids listed by Kartesz [1994] five [*Q. x bebbiana* Schneid., *Q. x schuettei* Trel., *Q. x megaleia* Laughlin, *Q. x byarsii* Sudworth, *Q. x deamii* Trel.] are recorded from Illinois [Tables 3 & 5].

There has been some confusion regarding the name of the hybrid *Quercus x deamii*. Trelease [1924] proposed this name for a plant that he considered to be a *Q. alba* x *Q. muehlenbergii* cross. Palmer [1948] indicated the parentage of the type tree of *Q. x deamii* could be either *Q. alba* x *Q. muehlenbergii* or *Q. alba* x *Q. bicolor*. He proposed the name *Q. x fallax* as the binomial for *Q. macrocarpa* x *Q. muehlenbergii*. Bartlett [1951] showed that the parentage of the type tree of *Q. x deamii* was most likely *Q. macrocarpa* x *Q. muehlenbergii*. Based on Bartlett's evidence *Q. x deamii* has generally been accepted as the correct name and *Q. x fallax* has been considered a synonym. Hardin [1975] presented a concise discussion of the confusion over the name *Quercus x deamii*. For Illinois we have seen this hybrid reported only as a literature citation and only from Sangamon county [Illinois Dept. of Natural Resources 2001].

Basket Oak [*Quercus michauxii* Nutt.]

This tree ranges from east Texas to southern Illinois and southern Indiana, then southeast through all of South Carolina. Additionally it extends northward along the eastern seaboard from South Carolina to northern New Jersey [Nixon and Muller 1997]. The report

from Cass county [Mohlenbrock and Ladd 1978] is out of range, based upon the maps presented by Steyermark [1963] for Missouri and Deam [1940] for Indiana. We have been unable to confirm the Cass county collection and consider basket oak to be relegated to the southern third of Illinois [Fig. 1e]. It is a bottomland species like *Quercus lyrata* and *Q. bicolor*, and we have not found it to be abundant at any location. Of the three named hybrids involving *Q. michauxii*, two [*Q. x beadlei* Trel. ex Palmer, *Q. x byarsii* Sudworth] are reported from Illinois [Tables 3 & 5].

Rock Chestnut Oak [*Quercus montana* Willd.]

Quercus montana is the sole member of the white oak group to be listed as threatened in Illinois [Illinois Endangered Species Protection Board 1999]. It has been recorded in Alexander, Hardin, Saline, and Union counties in southern Illinois [Herkert 1991, Fig. 1f] and we have verified all but the Hardin county record. Collections from St. Clair, Pope, and Mason counties have been recorded, but have not been verified by us. The range of *Q. montana* extends from extreme southern Illinois through south-central United States and north to southern New England [Little 1971, Nixon and Muller 1997]. In all locations it is isolated on poor, rocky, upland soils [Nixon and Muller 1997]. *Quercus prinus* has been another name for rock chestnut oak, but Hardin [1979] explained the controversy of the binomials. He accepted *Q. montana* as the correct name and we concur. Three hybrids are listed for this taxon by Kartesz [1994], however only *Q. x saulii* is recorded from Illinois [Tables 3 & 5]. This is a hybrid with *Q. alba*, a common upland woods associate with *Q. montana* in southern Illinois.

Chinquapin Oak [*Quercus muehlenbergii* Engelm.]

Quercus muehlenbergii is widespread in Illinois [Fig. 1g], commonly found where limestone is at or very near the soil surface [pers. obs.]. Nixon and Muller [Nixon and Muller 1997] showed this taxon in most of the eastern half of the United States. Mohlenbrock and Thomson [1987] mapped this taxon from every county in Illinois.

Kartesz [1994] listed *Quercus x deamii* as the only hybrid involving *Q. muehlenbergii* [see *Q. macrocarpa* discussion]. Little [1953] and Jones and Fuller [1955] indicated a hybrid between *Q. alba* and *Q. muehlenbergii* [unnamed by Kartesz (1994)] in Illinois. Mohlenbrock [1986] misapplied *Q. x deamii* to the hybrid between *Q. alba* and *Q. prinoides* var. *acuminata* [= *Q. muehlenbergii*] in Illinois. Mohlenbrock and Thomson [1987] indicated the white oak/chinquapin oak hybrid is present and accepted the name *Q. x faxonii* for it. We were unable to confirm the existence of *Q. alba x Q. muehlenbergii* in Illinois [Table 3 & 5].

Post Oak [*Quercus stellata* Wangenh.]

Post oak is a tree of dry, exposed, upland sites in the southern half of Illinois [Fig. 1h] and is often quite abundant in these localities. This species occurs in the south-central to southeastern sections of the United States as far north as Massachusetts [Nixon and Muller 1997]. Of the five possible *Q. stellata* hybrids listed by Kartesz [1994] only the cross between this taxon and *Quercus alba* [*Q. x fernowii*] is recorded from Illinois [Tables 3 & 5].

RESULTS – THE BLACK AND RED OAKS [*QUERCUS* SECTION *LOBATAE*]

Scarlet Oak [*Quercus coccinea* Muenchh.] and Hill's Oak [*Quercus ellipsoidalis* E. J. Hill]

We address these taxa together, because not all students of oaks agree on their taxonomy. Jensen [1985] stated, *Quercus ellipsoidalis* “is easily confused with *Q. coccinea* in northern Indiana, where their ranges overlap, it is difficult to distinguish the two.” This very circumstance occurs as well in northern Illinois and it is particularly problematic for vegetative specimens. Overlease [1977] suggested that Hill's oak populations would be best considered a “northern small-fruited expressions of Scarlet Oak.”

Jensen [1985, 1997], Mohlenbrock [1986], Mohlenbrock and Ladd [1978], and Mohlenbrock and Thomson [1987] treat *Quercus ellipsoidalis* and *Q. coccinea* as separate species. Others such as Overlease [1977], Voss [1985], and Swink and Wilhelm [1994] considered them as one species, in which case *Q. coccinea* has priority.

Scarlet oak [*sensu strictu*], according to Mohlenbrock and Ladd [1978] and Mohlenbrock and Thomson [1987], is found only in southern Illinois and is completely segregated from Hill's Oak to the north. We follow Jensen's treatment in considering [1] scarlet oak to be at or very near its northwestern limit of distribution in northern Illinois; [2] scarlet oak to be distinct from Hill's oak; and [3] Hill's oak to be at or near its southern limit in northern Illinois [Jensen 1997]. The distributions of *Quercus coccinea* and *Q. ellipsoidalis* are presented in Figures 2a and 2b, respectively. According to Kartesz [1994] two hybrids exist where *Q. coccinea* is one of the parents and a third hybrid where *Q. ellipsoidalis* is a parent. We have been able to locate vouchers for: *Q. x benderi* Baenitz and *Q. x palaeolithicola* Trel. [Tables 4 & 6].

Southern Red Oak [*Quercus falcata* Michx.]

This oak is found only in southern Illinois. In North America southern red oak is distributed from northern Florida to east Texas and as far north as southern Missouri in the west and Long Island, New York in the east [Jensen 1997]. Southern red oak is a tree of drier upland sites in 18 southern Illinois counties [Fig. 2c]. A herbarium voucher that represents an outlier from Christian county exists and needs further investigation prior to acceptance. Six of Kartesz's [1994] *Quercus falcata* hybrids are possible in Illinois. We have seen vouchers for *Q. x palmeriana* A. Camus, *Q. x incomita* Palmer and *Q. x willdenowiana* (Dippel) Beissner, Schelle & Zabel [Tables 4 & 6].

Shingle Oak [*Quercus imbricaria* Michx.]

Shingle oak is widespread in Illinois [Fig. 2d]. It is most frequent on drier sites in the southern half of the state. There it sometimes forms small dense stands and may even become a common fence row tree. Little [1977], Jensen [1997], Mohlenbrock & Ladd [1978], and Mohlenbrock & Thomson [1987] mapped *Q. imbricaria* from most counties in northern Illinois. We have seen few county vouchers from this area and it may be that the taxon has been eliminated from or made scarce in some of these northern counties. Its general North American distribution is from Maryland to southern Michigan and southern Iowa south to eastern Kansas, Arkansas, Tennessee, and western North Carolina [Jensen 1997]. The six shingle oak hybrids listed by Kartesz [1994] that are represented in the

Illinois flora include: *Q. x palmeriana* A. Camus, *Q. x tridentata* (A. DC.) Trel., *Q. x exacta* Trel., *Q. x runcinata* (A. DC.) Engelm., *Q. x egglestonii* Trel., and *Q. x leana* Nutt. [Tables 4 & 6].

Blackjack oak [*Quercus marilandica* Muenchh.]

Blackjack oak occurs in southern Illinois [Fig. 2e] and shares with *Quercus stellata* dry, exposed, upland sites. Its distribution in the United States is nearly an exact overlay with that of *Q. stellata*. Of the hybrids listed by Kartesz [1994] with *Q. marilandica* as one putative parent, six are possible in Illinois. We have located vouchers for three hybrids [Tables 4 & 6]: *Q. x incomita* Palmer, *Q. x tridentata* (A. DC.) Trel., and *Q. x bushii* Sarg.

Water oak [*Quercus nigra* L.]

The presence of *Quercus nigra* is documented by herbarium specimens from five counties in southern Illinois. Vouchers from four of the counties appear to be of cultivated origin. The voucher specimen from the fifth county [Wabash] is dated September, 1919. To date, we have been unable to locate either the tree[s] of provenance for the Wabash county site or any other extant native population of water oak in Illinois. The nearest known native populations are found in the “boot-heel” region of Missouri [G. Yatskevich, pers. comm.] and western Kentucky [Jensen 1997]. The natural distribution of *Q. nigra* extends from the aforementioned region to east Texas, across southeastern United States to Florida, and as far north as Delaware [Jensen 1997]. Future collecting in the bottomlands of Alexander County near Cairo and/or in the Wabash County location may confirm the presence of native specimens of water oak in Illinois.

Cherrybark Oak [*Quercus pagoda* Raf.]

Cherrybark oak is primarily a bottomland tree found in thirteen counties of southern Illinois [Fig. 2f]. Its distribution extends from southern Indiana and Illinois to east Texas and follows the coastal plain eastward to southeastern Virginia [Jensen 1997]. It has been reported from Tazewell county, but this report is probably erroneous as that locality is far outside the normal range for this taxon. We have not found this species to be abundant in areas where it does occur.

Kartesz [1994] listed *Quercus phellos* as hybridizing only with *Q. pagoda* [= *Quercus x ludoviciana*]. This hybrid was reported from Illinois by Robertson [1994]. Mohlenbrock [1986] and Mohlenbrock and Thomson [1987] also report *Q. x ludoviciana* from Illinois, but misapply it to the cross between *Q. falcata* and *Q. phellos*. They do not indicate *Q. pagoda x Q. phellos* as being in the state. We have seen no voucher specimens of this hybrid from Illinois [Tables 4 & 6]. In all likelihood, the hybrid would be rare since the distribution of the putative parents is limited.

Pin Oak [*Quercus palustris* Muenchh.]

Pin oak is scattered throughout the state [Fig. 2g]. It has an east-central distribution in the United States similar to that of *Quercus imbricaria* [Jensen 1997]. Despite distribution similarities in North America, shingle oak is a tree of drier sites, while pin oak often inhabits mesic to hydric localities. Five of the hybrids listed by Kartesz [1994] involving this species are possible from Illinois. They are *Q. x exacta* Trel., *Q. x columnaris*

Laughlin, *Q. x schochiana* Deick ex Palmer, *Q. x mutabilis* Palmer & Steyermark, and *Q. x vaga* Palmer & Steyermark [Tables 4 & 6].

Willow Oak [*Quercus phellos* L.]

Willow oak, a tree of wet, poorly drained bottomlands, is native to southeastern United States and northward along the eastern seaboard to New York [Jensen 1997]. In Illinois it is restricted to five counties in the southern tip of the state [Herkert 1991, Fig. 2h] and is considered a threatened species [Illinois Endangered Species Protection Board 1999]. Of the eight possible hybrids involving this taxon in Illinois [Kartesz 1994], *Q. x ludoviciana* Sarg., *Q. x schochiana* Deick ex Palmer, *Q. x heterophylla* Michx., and *Q. x filialis* Little are recorded [Tables 4 & 6].

Northern Red Oak [*Quercus rubra* L.]

Northern red oak is native to most of the eastern half of the United States [Jensen 1997]. We have seen voucher specimens of northern red oak from 99 counties in Illinois and Mohlenbrock and Thomson [1987] are undoubtedly correct in suggesting this taxon is present in every Illinois county [Fig. 2i]. Six red oak hybrids are possible from Illinois [Kartesz 1994] and five [*Q. x benderi* Baenitz, *Q. x runcinata* (A. DC.) Engelm., *Q. x columnaris* Laughlin, *Q. x heterophylla* Michx., and *Q. x hawkinsiae* Sudworth] have been confirmed [Tables 4 & 6].

Shumard Oak [*Quercus shumardii* Buckley]

Three varieties of this taxon have been reported from Illinois - *Quercus shumardii* Buckl. var. *shumardii*, *Q. shumardii* var. *schneckii* (Britt.) Sarg., *Q. shumardii* var. *stenocarpa* Laughlin. The purported varieties are distinguished according to the depth of the cupule, the degree to which the cupule covers the nut, and the shape of the nut [Jensen 1997, Laughlin 1969]. We do not recognize the varieties and consider them synonyms of *Q. shumardii* [Hess & Stoyhoff 1998].

Quercus shumardii is confined to the southern third of Illinois [Fig. 2j]. Literature reports [Jones and Bell 1974, Mohlenbrock 1986, Mohlenbrock and Thomson 1987] indicate this taxon occurs in the Sangamon River basin of McLean County, but its presence there remains unconfirmed by us. *Quercus shumardii* is primarily a member of the flora of southeastern United States, with scattered reports from southern Ontario, Michigan, Pennsylvania, Virginia, and Maryland [Jensen 1997]. Eight hybrids involving this taxon are listed as possibilities in Illinois [Kartesz 1994], of which two [*Q. x egglestonii* Trel., *Q. x mutabilis* Palmer & Steyermark] have been reported [Tables 4 & 6].

Nuttall's Oak [*Quercus texana* Buckley]

Nuttall's oak, a bottomland tree of the lower Mississippi River valley, reaches its most northern range in southern Illinois [Jensen 1997]. It is extant in only Alexander and Pulaski counties of Illinois and occurs there only rarely. The tree has been reported from, but may no longer exist in, Massac county [Herkert 1991]. We have been unable to confirm its presence there [Fig. 2k]. This plant is listed among the endangered species of Illinois [Illinois Endangered Species Protection Board 1999]. No hybrids for this oak are recorded from the state.

In 1860 Buckley published a description of an oak, presumably from east Texas [Dorr & Nixon 1985], which he named *Quercus texana*. During the ensuing years he altered [confused?] his own description such that the binomial *Q. texana* was primarily applied by botanists to an oak tree of the Edwards Plateau of central Texas. Palmer [1927] described an oak based upon specimens from bottomlands in Arkansas, Louisiana, Mississippi, and Texas, which he named *Q. nuttallii*. After studying the collections and correspondence of Buckley, Dorr & Nixon [1985] were able to clarify the nomenclatural confusion surrounding these two oaks. They concluded that the original oak described by Buckley was the same taxon described by Palmer. Accordingly the name *Quercus texana*, designated by Buckley for the bottomland tree of eastern Texas, has priority over the name *Q. nuttallii* proposed by Palmer. The more western tree of the Edwards Plateau of central Texas now was nameless and became *Quercus buckleyi* Nixon & Dorr.

Black Oak [*Quercus velutina* Lam.]

Like northern red oak this taxon is distributed throughout the eastern half of the United States [Jensen 1997] and it is found within every county of Illinois [Fig. 2]. Unlike *Quercus rubra*, which is found in mesic woods, *Q. velutina* is found more commonly on drier, often sandy, upland sites. Ten black oak hybrids are possible in Illinois according to Kartesz [1994], seven of which are reported from the state [Tables 4 & 6]. They are *Q. x palaeolithicola* Trel., *Q. x willdenowiana* (Dippel) Beissner, Schelle & Zabel, *Q. x leana* Nutt., *Q. x bushii* Sarg., *Q. x vaga* Palmer & Steyermark, *Q. x filialis* Little, and *Q. x hawkinsiae* Sudworth. This large number of oak hybrids involving *Q. velutina* is probably in part a function of the widespread distribution of black oak.

RESULTS – OAK HYBRIDS IN ILLINOIS

According to Kartesz [1994] 32 named black oak hybrids [*Quercus* section *Lobatae*] and 17 named white oak hybrids [*Quercus* section *Quercus*] are possible in Illinois. To date, 18 hybrids from section *Lobatae* and 12 hybrids from section *Quercus* [one unnamed] are recorded from Illinois. Of the 31 hybrids reported from Illinois, we have seen voucher specimens for 24 - of which, 15 are black oak and nine white oak hybrids [Tables 3 - 6].

Considering the relatively high frequency of oak hybridization often reported [Little 1979, Jensen 1985, Palmer 1948], our herbarium studies and field collecting found comparatively few hybrid oak specimens. Oak hybrids commonly occur as scarce single individuals that go unnoticed and uncollected. Recognition of an oak hybrid is often difficult and identification commonly uncertain. Collectors frequently do not understand the normal variation within each species of *Quercus* and/or the impact of the environment on the morphology of the species. Determination of parentage is commonly at best conjecture, especially when a collection is incomplete [e.g. vegetative only] and/or involves a cross between species with similar forms and structure. The historical difficulties of recognizing hybrid individuals and determining their lineage is well documented [Palmer 1948; Jensen & Eshbaugh 1976a, 1976b].

Recently, Tucker and Ebinger [2001] reviewed the status of *Q. x leana* [*Q. imbricaria* x *Q. velutina*] and *Q. runcinata* [*Q. imbricaria* x *Q. rubra*] in Illinois. They used principal components analysis to show there is little introgression of the hybrid populations with

the purported parents. They documented the presence of *Q. x leana* in 31 counties and the presence of *Q. runcinata* in eleven counties.

Of the 170 vouchered hybrid specimens we examined, 35 came from the white oak group [section *Quercus*]. Five of nine vouchered hybrids from Illinois had *Quercus alba* as one parent [Table 3]. This was not astonishing given that *Q. alba* is present in all Illinois counties, grows in a variety of habitats, and is found in close proximity to many other members of section *Quercus*. *Quercus x bebbiana* was the most common hybrid in section *Quercus*. Its parents [*Q. alba* and *Q. macrocarpa*] are two of the most common and widespread oaks in Illinois.

There were 135 vouchered putative hybrid specimens from the black oak group [section *Lobatae*] examined. *Quercus imbricaria* and *Q. velutina* were the most common parents among the collected putative hybrids in Illinois. Fifty-seven of the vouchered hybrid specimens examined had *Q. imbricaria* as one parent and one hundred six had *Q. velutina* as a parent. *Quercus x leana* was the most common hybrid found [37 of 135 specimens]. Its putative parents, not coincidentally, are *Q. imbricaria* and *Q. velutina*. This illustrates two important points regarding hybrid recognition. [1.] Easily recognized hybrids like *Q. x leana* are more frequently collected and reported, because they are very peculiar and more often draw the attention of field workers. [2.] Other hybrids are encountered and recognized more frequently, because they are the progeny of common, widely distributed, and relatively easily recognized taxa like *Q. velutina*.

Certainly the occurrence of hybrid oaks in Illinois is under-reported, either because they are scarce and/or overlooked and/or difficult to identify. Even so, it is reasonable to expect the number of hybrids discovered to increase in: [1] the southern section of the state where the incidence and diversity of the genus *Quercus* is greatest, [2] other areas where the woody flora is heavily botanized.

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Table 1. Published Oak Species from Illinois by various authors. Black/Red Oak Group [Section *Lobatae*].

Taxon	Published Work							
	Elias 1989	Jensen 1997	Mohlenbrock 1986	Mohlenbrock & Thomson 1987	Jones & Fuller 1955	Robertson 1994	Little 1953 & 1979	Stoyhoff & Hess
<i>Quercus coccinea</i>	X	X	X	X	X	X	X	X
<i>Quercus ellipsoidalis</i>	X	X	X	X	X	X	X	X
<i>Quercus falcata</i>	X	X	X	X	X	X	X	X
<i>Quercus falcata</i> var. <i>pagoda</i>								
<i>Quercus falcata</i> var. <i>pagodaefolia</i>	X						X	
<i>Quercus pagoda</i>		X	X	X		X		X
<i>Quercus imbricaria</i>	X	X	X	X	X	X	X	X
<i>Quercus marilandica</i>	X	X	X	X	X	X	X	X
<i>Quercus nigra</i>								
<i>Quercus nuttallii</i>			X	X		X		
<i>Quercus palustris</i>	X	X	X	X	X	X	X	X
<i>Quercus phellos</i>	X	X	X	X	X	X	X	X
<i>Quercus rubra</i>	X	X	X	X	X	X	X	X
<i>Quercus shumardii</i> var. <i>shumardii</i>	X	X	X	X	X	X	X	X
<i>Quercus shumardii</i> var. <i>schneckii</i>			X	X				
<i>Quercus texana</i>		X						X
<i>Quercus velutina</i>	X	X	X	X	X	X	X	X

Table 2. Published Oak Species from Illinois by various authors. White Oak Group [Section *Quercus*].

Taxon	Published Work							
	Elias 1989	Nixon & Muller 1997	Mohlenbrock 1986	Mohlenbrock & Thomson 1987	Jones & Fuller 1955	Robertson 1994	Little 1953 & 1970	Stoyhoff & Hess
<i>Quercus alba</i>	X	X	X	X	X	X	X	X
<i>Quercus bicolor</i>	X	X	X	X	X	X	X	X
<i>Quercus lyrata</i>	X	X	X	X	X	X	X	X
<i>Quercus macrocarpa</i>	X	X	X	X	X	X	X	X
<i>Quercus michauxii</i>	X	X	X	X	X	X	X	X
<i>Quercus montana</i>		X		X				X
<i>Quercus muehlenbergii</i>	X	X			X		X	X
<i>Quercus prinoides</i>	X	X					X	
<i>Quercus prinoides</i> var. <i>acuminata</i>			X	X		X		
<i>Quercus prinus</i>	X		X		X	X	X	
<i>Quercus stellata</i>	X	X	X	X	X	X	X	X

Table 3. Possible spontaneous hybrids from the white oak group [section *Quercus*] of Illinois following Kartesz [1994].

	<i>Q. alba</i>	<i>Q. bicolor</i>	<i>Q. lyrata</i>	<i>Q. macrocarpa</i>	<i>Q. michauxii</i>	<i>Q. montana</i>
<i>Q. bicolor</i>	<u><i>jackiana</i></u> Schneid.	xxxxxxx	xxxxxxx	xxxxxxx	xxxxxxx	xxxxxxx
<i>Q. lyrata</i>		<u><i>humidicola</i></u> Palmer	xxxxxxx	xxxxxxx	xxxxxxx	xxxxxxx
<i>Q. macrocarpa</i>	<u><i>bebbiana</i></u> Schneid.	<u><i>schuettei</i></u> Trel.	<u><i>megaleia</i></u> Laughlin	xxxxxxx	xxxxxxx	xxxxxxx
<i>Q. michauxii</i>	<i>beadlei</i> Trel. ex Palmer ***		<i>tottenii</i> Melvin	<u><i>byarsii</i></u> Sudworth	xxxxxxx	xxxxxxx
<i>Q. montana</i>	<u><i>saulii</i></u> Schneid.					xxxxxxx
<i>Q. muehlenbergii</i>	***			<i>deamii</i> Trel. ***		
<i>Q. robur</i>	<u><i>bimundorum</i></u> Palmer					<i>sargentii</i> Rehd.
<i>Q. stellata</i>	<u><i>fernowii</i></u> Trel.	<i>substellata</i> Trel.	<i>sterretii</i> Trel.	<i>guadalupensis</i> Sarg.		<i>bernardiensis</i> W. Wolf

Underlined hybrids are those for which we examined a herbarium specimen from the Illinois flora.

Hybrids followed by *** are those reported in the literature as being present in Illinois, but we have seen no voucher specimen.

No name for *Quercus alba* x *Quercus muehlenbergii* appears in Kartesz [1994].

Blank spaces represent hybrids not reported in Kartesz [1994].

Table 4. Possible spontaneous hybrids from the black oak group [Section *Lobatae*] of Illinois following Kartesz [1994].

	<i>Q. coccinea</i>	<i>Q. ellipsoidalis</i>	<i>Q. falcata</i>	<i>Q. imbricaria</i>	<i>Q. marilandica</i>	<i>Q. nigra</i>
<i>Q. imbricaria</i>			<u>palmeriana</u> A. Camus	xxx	xxx	xxx
<i>Q. marilandica</i>			<u>incomita</u> Palmer	<u>tridentata</u> (A. DC.) Trel.	xxx	xxx
<i>Q. nigra</i>			<i>garlandensis</i> Palmer		<i>sterilis</i> Trel. ex Palmer	xxx
<i>Q. palustris</i>				<u>exacta</u> Trel.		
<i>Q. phellos</i>			<i>subfalcata</i> Trel.		<i>rudkinii</i> Britt.	<i>capessii</i> W. Wolf
<i>Q. rubra</i>	<u>benderi</u> Baenitz			<u>runcinata</u> (A. DC.) Engelm.		
<i>Q. shumardii</i>			<i>joorii</i> Trel.	<u>egglestonii</u> Trel.	<i>hastingsii</i> Sarg.	<i>neopalmeri</i> Sudworth ex Palmer
<i>Q. velutina</i>	<i>fontana</i> Laughlin	<u>palaeolithicola</u> Trel.	<u>willdenowiana</u> (Dippel) Beissner, Schelle & Zabel	<u>leana</u> Nutt.	<u>bushii</u> Sarg.	<i>demareei</i> Ashe

Underlined hybrids are those for which we examined a herbarium specimen from the Illinois flora.

Hybrids followed by *** are those reported in the literature as being present in Illinois, but we have seen no voucher specimen.

Blank spaces represent hybrids not reported in Kartesz [1994].

Table 4 [continued]. Possible spontaneous hybrids from the black oak group [Section *Lobatae*] of Illinois following Kartesz [1994].

	<i>Q. pagoda</i>	<i>Q. palustris</i>	<i>Q. phellos</i>	<i>Q. rubra</i>	<i>Q. shumardii</i>
<i>Q. imbricaria</i>	xxx	xxx	xxx	xxx	xxx
<i>Q. marilandica</i>	xxx	xxx	xxx	xxx	xxx
<i>Q. nigra</i>	xxx	xxx	xxx	xxx	xxx
<i>Q. palustris</i>		xxx	xxx	xxx	xxx
<i>Q. phellos</i>	<i>ludoviciana</i> Sarg. ***	<u><i>schochiana</i></u> Dieck ex Palmer	xxx	xxx	xxx
<i>Q. rubra</i>		<i>columnaris</i> Laughlin ***	<u><i>heterophylla</i></u> Michx.	xxx	xxx
<i>Q. shumardii</i>		<u><i>mutabilis</i></u> Palmer & Steyermark	<i>moultonensis</i> Ashe	<i>riparia</i> Laughlin	xxx
<i>Q. velutina</i>		<u><i>vaga</i></u> Palmer & Steyermark	<i>filialis</i> Little ***	<u><i>hawkinsiae</i></u> Sudworth	<i>discreta</i> Laughlin

Underlined hybrids are those for which we examined a herbarium specimen from the Illinois flora.

Hybrids followed by *** are those reported in the literature as being present in Illinois, but we have seen no voucher specimen.

Blank spaces represent hybrids not reported in Kartesz [1994].

Table 5. Published oak hybrid records for Illinois in the white oak group [Section *Quercus*].

Hybrid	Published Work				
	Mohlenbrock 1986	Mohlenbrock & Thomson 1987	Jones & Fuller 1955	Robertson 1994	Little 1953
<i>Q. x beadlei</i> = <i>alba x michauxii</i>		X			
<i>Q. x bebbiana</i> = <i>alba x macrocarpa</i>	X	X	X	X	X
<i>Q. x deamii</i> = <i>macrocarpa x muehlenbergii</i>	X	X	X	X	
<i>Q. x fernowii</i> = <i>alba x stellata</i>	X	X		X	X
<i>Q. x humidicola</i> = <i>bicolor x lyrata</i>	X	X	X	X	X
<i>Q. x jackiana</i> = <i>alba x bicolor</i>	X	X	X	X	X
<i>Q. x saulii</i> = <i>alba x prinus</i>		X		X	
<i>Q. x schuettei</i> = <i>bicolor x macrocarpa</i>	X	X	X	X	
<i>alba x muehlenbergii</i>	1	1	1		1

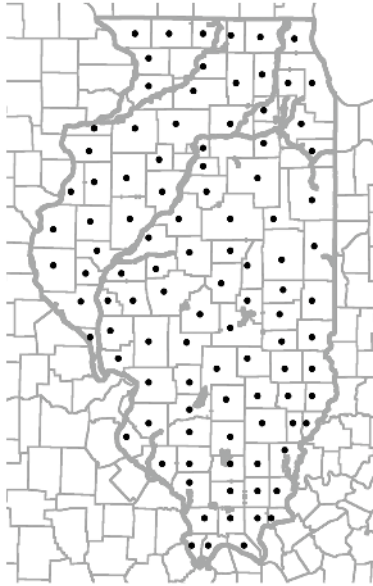
[1] See discussion of *Q. muehlenbergii* for a clarification regarding the nomenclature surrounding this taxon.

Table 6. Published oak hybrid records for Illinois in the black/red oak group [Section *Lobatae*].

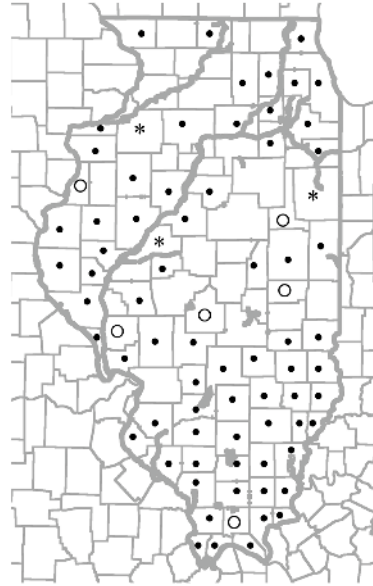
Hybrid	Published Work				
	Mohlenbrock 1986	Mohlenbrock & Thomson 1987	Jones & Fuller 1955	Robertson 1994	Little 1953
<i>Q. x bushii</i> = <i>marilandica x velutina</i>	X	X	X	X	X
<i>Q. x exacta</i> = <i>imbricaria x palustris</i>	X	X	X	X	X
<i>Q. x filialis</i> = <i>phellos x velutina</i>	X	X	X	X	
<i>Q. x leana</i> = <i>imbricaria x velutina</i>	X	X	X		X
<i>Q. x ludoviciana</i> = <i>pagoda x phellos</i>	X	X	X	X	
<i>Q. x palmeriana</i> = <i>falcata x imbricaria</i>	X	X	X	X	X
<i>Q. x runcinata</i> = <i>imbricaria x rubra</i>	X	X	X	X	X
<i>Q. x schochiana</i> = <i>palustris x phellos</i>	X	X	X	X	X
<i>Q. x tridendata</i> = <i>imbricaria x marilandica</i>	X	X	X	X	X

Figure 1. [a – d] Distribution of *Quercus*, section *Quercus* [white oak group] in Illinois.
 ● = voucher specimen seen by authors. * = taxon documented only in publication other than Mohlenbrock and Ladd [1978]. ○ = taxon documented only in Mohlenbrock and Ladd [1978].

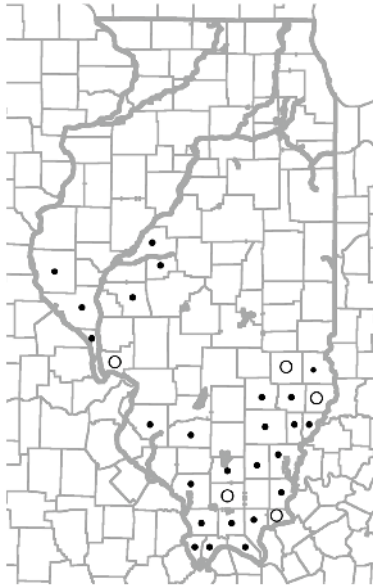
a. *Quercus alba*



b. *Quercus bicolor*



c. *Quercus lyrata*



d. *Quercus macrocarpa*

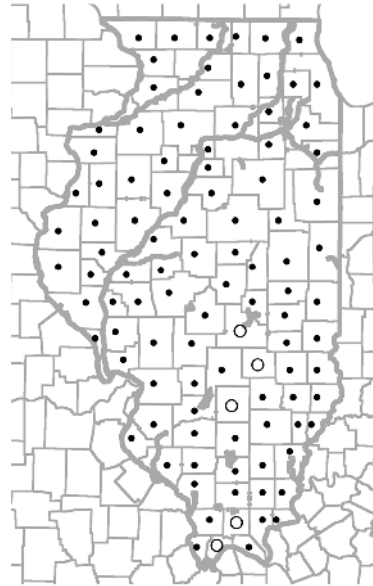
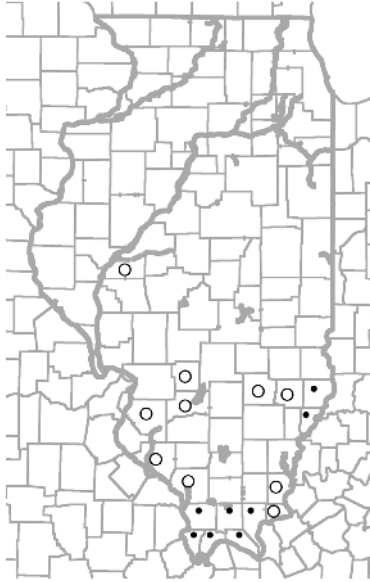


Figure 1. [e – h] Distribution of *Quercus*, section *Quercus* [white oak group] in Illinois.
 ● = voucher specimen seen by authors. * = taxon documented only in publication other than Mohlenbrock and Ladd [1978]. ○ = taxon documented only in Mohlenbrock and Ladd [1978].

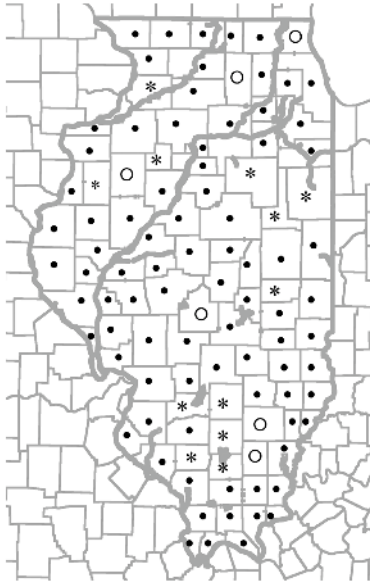
e. *Quercus michauxii*



f. *Quercus montana*



g. *Quercus muehlenbergii*



h. *Quercus stellata*

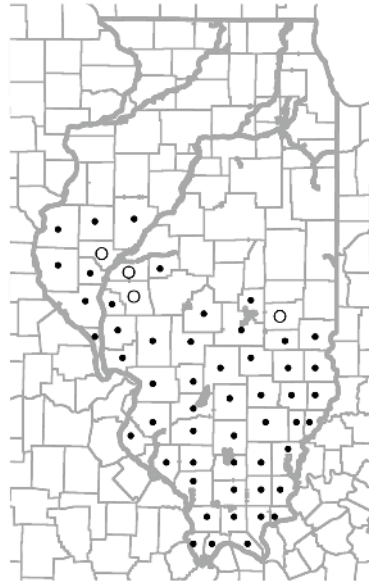
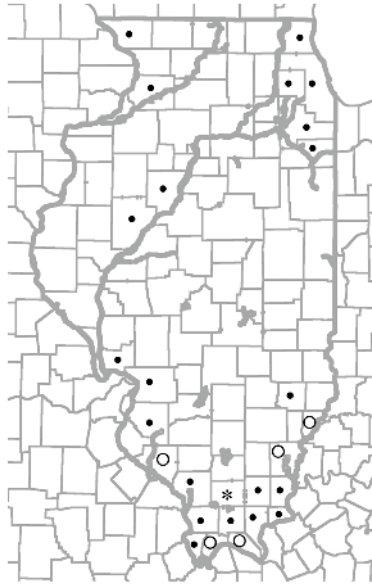
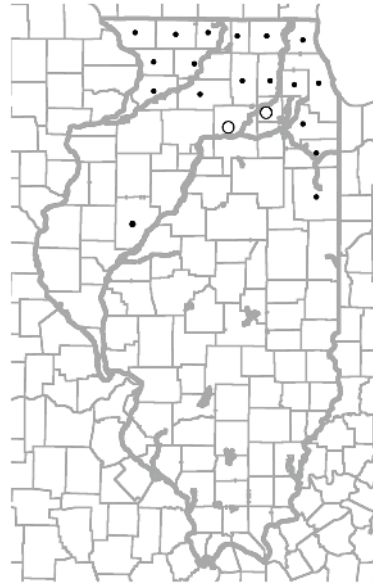


Figure 2. [a – d] Distribution of *Quercus*, section *Lobatae* [black oak group] in Illinois.
 ● = voucher specimen seen by authors. * = taxon documented only in publication other than Mohlenbrock and Ladd [1978]. ○ = taxon documented only in Mohlenbrock and Ladd [1978].

a. *Quercus coccinea*



b. *Quercus ellipsoidalis*



c. *Quercus falcata*



d. *Quercus imbricaria*

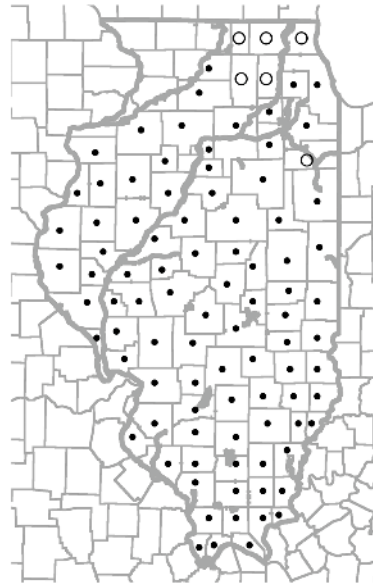
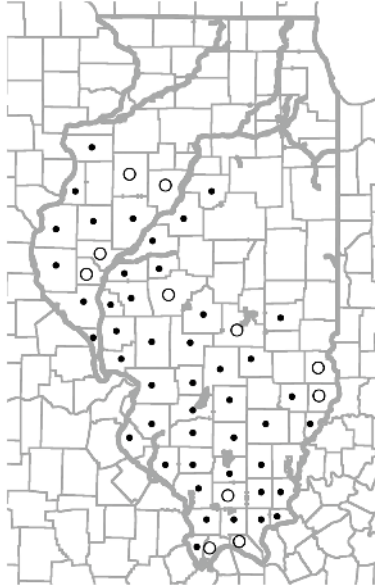


Figure 2. [e – h] Distribution of *Quercus*, section *Lobatae* [black oak group] in Illinois.
 ● = voucher specimen seen by authors. * = taxon documented only in publication other than Mohlenbrock and Ladd [1978]. ○ = taxon documented only in Mohlenbrock and Ladd [1978].

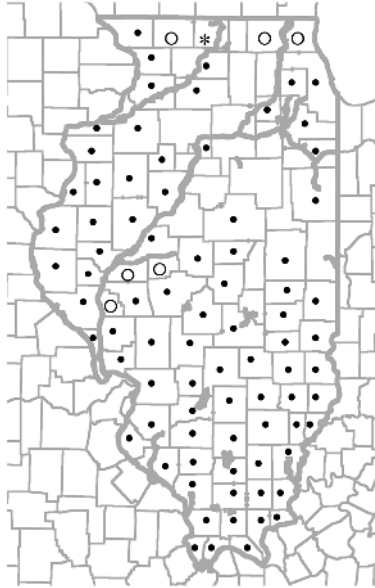
e. *Quercus marilandica*



f. *Quercus pagoda*



g. *Quercus palustris*

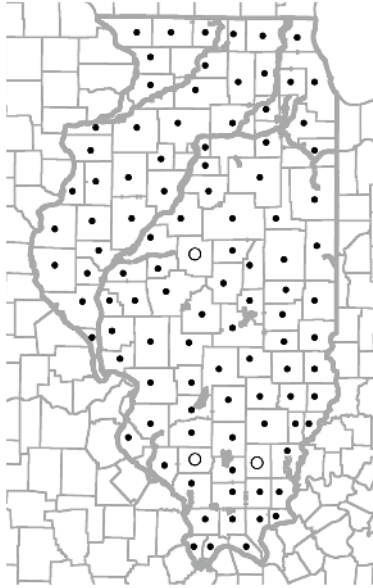


h. *Quercus phellos*

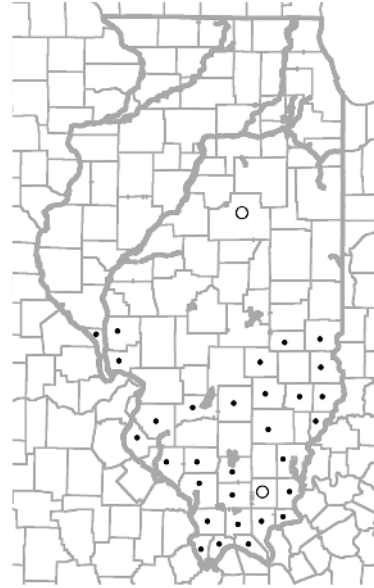


Figure 2. [i – l] Distribution of *Quercus*, section *Lobatae* [black oak group] in Illinois.
 ● = voucher specimen seen by authors. * = taxon documented only in publication other than Mohlenbrock and Ladd [1978]. ○ = taxon documented only in Mohlenbrock and Ladd [1978].

i. *Quercus rubra*



j. *Quercus shumardii*



k. *Quercus texana*



l. *Quercus velutina*

