THE GENUS BAPTISIA (FABACEAE) IN ALABAMA

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ABSTRACT

The primary objectives of this project were to determine which species of Baptisia (Fabaceae) occur in Alabama and to report the county distribution of each. Baptisia, known commonly as wild or false indigo, is recognized as consisting of seven species in Alabama. The most common species are Baptisia alba, B. bracteata, and B. megacarpa. The less common species are B. lanceolata and B. albescens. The least common species are B. australis and B. perfoliata. The dichotomous key and descriptions we present are modifications from earlier authors; however, all measurements are based on morphological features of the vegetative and reproductive structures of the more than 200 specimens studied during this project. Data for the county-level distribution maps were compiled entirely from herbarium vouchers.

Baptisia, commonly known as wild or false indigo, consists of 18 species, 7 infraspecific taxa, and 6 hybrids confined to the eastern USA and Canada (NatureServe 2013). Of these, 15 species have been reported from the southeastern USA (Isely 1990) and eight species and one infraspecific taxon have been reported from Alabama (Kral et al. 2011).

The genus Baptisia Vent. is a member of the legume family Fabaceae (Leguminosae), tribe Thermopsideae, which includes six genera and approximately 45 species scattered through the Mediterranean and eastern North America (Turner 1981). More recently, results based on nuclear ribosomal DNA internal transcribed space (ITS) sequences suggest the Thermopsideae could be reduced to four core genera, Anagyris, Baptisia, Pipithanthus, and Thermopsis, which are clustered to form a strong clade (Wang et al 2006).

Two taxa of Baptisia, B. australis (L.) R. Br. and B. megacarpa, have received a state and global rank of G5T2S1, G2S2, respectively (Alabama Natural Heritage Program 2013). Baptisia perfoliata (L.) R. Br. ex Ait. f., although it has no state or global rank, is the rarest Baptisia in the state, known from only Sumter County, which is the westernmost county in the state. The closest population is Laurens County, Georgia, some 500 km to the east (USDA, NRCS 2013).

The primary objectives of this study were to determine which species of Baptisia occur in Alabama and report the county-level distribution of each. Additional goals included providing a dichotomous key, species descriptions, and illustrations for the taxa of Baptisia found to occur in Alabama.

Material and methods

Data for the distribution maps were gathered from more than 200 plant specimens deposited in the herbaria of Troy University (TROY), Alabama Natural History Survey (ALNHS), J.D. Freeman (AUA), The University of Alabama (UNA), The University of South Alabama (USAM), The University of West Alabama (UWAL), Jacksonville State University (JSU), Anniston Museum
of Natural History (AMAL), University of North Alabama (UNAF), and Vanderbilt University (VDB), which is housed at the Botanical Research Institute of Texas in Fort Worth.

The dichotomous key is a modification of Isely (1990) and Weakley (2012); however, all measurements are based on morphological features of the vegetative and reproductive structures of the plants examined during this project. Descriptions for each taxon are based on those of Larisey (1940) and Isely (1990), with modifications incorporating measurements taken from the specimens studied. The lists of specimens examined are limited to one record from each county.

Herbarium specimens were initially divided into groups based on overall morphological similarity and the species concept established by Larisey (1940), Isely (1990), and Weakley (2012). Morphological measurements were then made from selected specimens of each group. Field studies were also conducted to observe the species in their natural habitats and make personal collections.

**Results**

Seven species of *Baptisia* occur in Alabama. The most common species in the state is *Baptisia alba* (L.) Vent., represented in 25 counties. *Baptisia bracteata* Muhl. ex Ell. is represented in 13 counties and *B. megacarpa* Chapm. ex Torr. & Gray is represented in 10 counties. *Baptisia lanceolata* (Walt.) Ell. is represented in six counties and *B. albescens* Small is represented in 5 counties. The least common species are *B. australis* (L.) R. Br. (1 county) and *B. perfoliata* (L.) R. Br. ex Ait. f. (1 county).

**TAXONOMIC TREATMENT OF BAPTISIA IN ALABAMA**


*Sophora* L., Gen. Pl., ed. 1, 125. 1737, in part.
*Podalyria* Lam., Illust. 2: 454. pl. 327, fig. 3, 4. 1793, in part.
*Crotalopsis* Michx. ex DC., Prodr. 2: 100. 1825, in syn.
*Eaplosia* Raf., New Fl. 2: 51. 1837 ("1836").
*Lasinia* Raf., New Fl. 2: 48. 1837 ("1836").
*Pericaulon* Raf., New Fl. 2: 50. 1837 ("1836").
*Ripasia* Raf., New Fl. 2: 48. 1837 ("1836").

Perennial herbs. **Stems** ascending or erect, branched, glabrous or pubescent. **Leaves** alternate, palmately trifoliate (upper ones bifoliolate or unifoliolate) or all unifoliolate, sessile or petiolate; leaflets entire, elliptic, elliptic-lanceolate, ovate-elliptic, ovate-lanceolate, oblanceolate to orbicular, stipules absent, caducous or persistent. **Inflorescence** terminal racemes, erect, ascending to arching or flowers 1–2 in leaf axis, bracts small, caducous or subfoliaceous and persistent, bracteoles absent. **Calyces** campanulate 4–8 mm long, lobes 4, subequal, shorter or exceeding tube, pedicels 2–30 mm long; corolla papilionaceous, 13–30 mm long, white, cream, yellow, or violet to blue; androecium monadelphous, stamens 10; style longer than ovary, distally glabrous. **Fruits** stipitate, inflated, lanceolate to globose, coriaceous to woody.

**KEY TO THE ALABAMA SPECIES OF BAPTISIA**

1. Leaves unifoliolate, perfoliate ................................................................. 1. *Baptisia perfoliata*
1. Leaves trifoliolate, sessile or petiolate.

2. Flowers lavender or blue ................................................................. 2. *Baptisia australis*
2. Flowers white, cream, or yellow.
3. Bracts persistent; pedicels 15–30 mm long; mature racemes arching.  3. Baptisia bracteata
3. Bracts caducous; pedicels 2–10 mm long; mature racemes ascending or erect.

4. Flowers yellow.

5. Legumes woody, pubescent, 10–25 mm long, 8–12 mm wide; petioles 0.4–12 mm long
   4. Baptisia lanceolata
5. Legumes thinly-coriaceous, glabrous, 30–40 mm long; petioles 15–20 mm long
   5. Baptisia megacarpa

4. Flowers white.

6. Calyces 4.5–6.5 mm long; corollas 13–18 mm long; legumes yellow-brown at maturity
   6. Baptisia albescens
6. Calyces 7–8 mm long; corollas 20–25 mm long; legumes black at maturity
   7. Baptisia alba

   Sophora perfoliata Walt., Fl. Car. 135. 1788.
   Podalyria perfoliata Michx., Fl. Bor. Amer. 1: 263. 1803.

   Perennial herbs.  Stems arching, branched, glabrous, somewhat glaucous.  Leaves simple, perfoliolate, leathery, orbicular to ovate-elliptic, 5–10 cm long, 3–8 cm wide, stipules absent.  Flowers axillary, solitary.  Calyces 6–7 mm long, peduncles 4–7 mm long; corolla 13–15 mm long, bright yellow.  Fruits ovoid to globose, coriaceous, glabrous, brown, 1–1.5 cm long.  Figure 1.

   Native of Florida, Georgia, and South Carolina.  Habitat and distribution in Alabama: dry soil at edge of longleaf pine woods; west-central Alabama.


   Sophora caerulea Trew, Pl. Rar. 6, pl. 14. 1779.
   Ripasia cerulea Raf., New. Fl. N. Amer. 2: 48. 1837 ("1836").

   Perennial herbs.  Stems erect, branched, glabrous, somewhat glaucous.  Leaves trifoliolate, petioles 0.2–1.2 cm long; leaflets obovate to obovate-lanceolate, 4–8 cm long, 1.5–3 cm wide, stipules persistent.  Inflorescence terminal, arching, loosely flowered, 2–5 cm long, bracts caducous.  Calyces 9–12 mm long, pedicels 5–10 mm long; corolla 25–30 mm long, lavender or blue.  Fruits ovoid to globose, coriaceous, glabrous, brown, 1–1.5 cm long.  Figure 2.
Native of central and eastern USA. Habitat and distribution in Alabama: river banks and gravel bars; central Alabama.


   *Podalyria bracteata* Muhl., Cat. Pl. Amer. Sept. 42. 1815, nomen subnudum.
   *Lasinia bracteata* Raf., New. Fl. N. Amer. 2: 50. 1837 ("1836").

Perennial herbs. **Stems** erect, branched, glabrous to pubescent. **Leaves** trifoliate, petioles 0.3–1.2 cm long; leaflets oblanceolate to obovate or elliptic-obovate, 5–10 cm long, 2–3.5 cm wide; stipules persistent with those of medial leaves foliaceous. **Inflorescence** axillary, arching, secund, 10–20 cm long, bracts persistent.

**Calyces** 7–10 mm long, pedicels 15–30 mm long; corolla 18–25 mm long, cream or yellow. **Fruits** elliptic, woody, subappressed-pubescent, brown, 3–5 cm long. Figure 3.

Native of southeastern USA. Habitat and distribution in Alabama: dry pine and oak woods, roadsides; central and northeastern Alabama.


   *Sophora lanceolata* Walt., Fl. Car. 135. 1788.
   *Podalyria uniflora* Michx., Fl. Bor. Amer. 1: 263. 1803.
   *Baptisia elliptica* Small, Fl. S.E. U.S., 559, 1331. 1903.

Perennial herbs. **Stems** erect, branched, glabrous to appressed pubescent. **Leaves** trifoliate, petioles 0.4–1.2 cm long; leaflets obovate, elliptic, lanceolate or oblanceolate, 5–13 cm long, 2–3.5 cm wide, stipules caducous. **Inflorescence** axillary or terminal, erect, 3–6 cm long; bracts persistent. **Calyces** 8–10 mm long, pedicels 2–10 mm long; corolla 20–25 mm long, yellow. **Fruits** suborbicular to lanceolate, woody, glabrous or with remnants of pubescence, black, 1–2.5 cm long. Figure 4.

Native of southeast USA. Habitat and distribution in Alabama: dry pine and oak woods, roadsides; extreme southern Alabama.


   Perennial herbs. **Stems** erect, branched, glabrous. **Leaves** trifoliate, petioles 1.5–2 cm long; leaflets broadly elliptic, 4–8 cm long, 1.5–4 cm wide, stipules caducous. **Inflorescence** terminal and axillary, erect, 7–15 cm long, bracts caducous. **Calyces** 8–10 mm long, pedicels 12–15 mm long; corolla 17–22 mm long, yellow. **Fruits** ellipsoid to ovoid, bladdery-inflated, thinly-coriaceous, glabrous, tan to brown, 3.5–5 cm long. Figure 5.

   Native of southeastern USA. Habitat and distribution in Alabama: dry pine and oak woods, moist ravines, stream edges and roadsides; south central and southeastern Alabama.


   Perennial herbs. **Stems** erect, branched, sparsely pubescent when young, becoming glabrous. **Leaves** trifoliate, petioles 0.5–1.8 cm long; leaflets elliptic-lanceolate to obovate, 2–6 cm long, 0.5–1.5 cm wide, stipules caducous. **Inflorescence** terminal, erect, 15–40 cm long, bracts caducous. **Calyces** 5–8 mm long, pedicels 6–10 mm long; corolla 13–17 mm long, white. **Fruits** cylindrical to oblanceolate, coriaceous, glabrous, yellow-brown, 2–3.5 cm long. Figure 6.

   Native of southeast USA. Habitat and distribution in Alabama: dry pine woods, sandy areas and roadsides; southeastern Alabama.


   *Baptisia albiflora* Raf., New Fl. N. Amer. 2: 47. 1836 [1837].

   Perennial herbs. **Stems** erect, branched, glabrous, glaucous. **Leaves** trifoliate, petioles 1–2 cm long; leaflets elliptic-obovate to oblanceolate, 2–6 cm long, 0.8–2.5 cm wide, stipules caducous. **Inflorescence** terminal, erect, 25–50 cm long, bracts caducous. **Calyces** 7–8 mm long, pedicels 3–10 mm long; corolla 20–25 mm long, white. **Fruits** cylindrical to ellipsoid to ellipsoid-cylindric, coriaceous, glabrous, black, 2–5 cm long. Figure 7.

   Native of central and southeastern USA. Habitat and distribution in Alabama: dry pine and woods, open fields, floodplains and roadsides; throughout Alabama.

DISCUSSION

In Alabama, Baptisia is a conspicuous taxon of open pine or oak woodlands, sandhills, slopes, cedar glades, barrens, pastures, and roadides (Isely 1990). The state and global ranked taxon B. austalis has a more restricted habitat, occurring only on river banks and gravel bars. The entire plant in all species of Baptisia contains toxic properties, which include various alkaloids and glycosides (Gibbons et al. 1990).

A combination of morphological characteristics can be used to differentiate the seven species of Baptisia in Alabama. Baptisia perfoliata and B. austalis are the most easily recognized taxa. Baptisia perfoliata has simple, perfoliate leaves, whereas, the remaining taxa have trifoliate leaves. Baptisia austalis has lavender or blue flowers and the remaining taxa have white or cream colored to yellow flowers. Baptisia bracteata is unique in having large and persistent stipules, 15–40 mm long, bracts 5–30 mm long and pedicels 15–30 mm long. The remaining four taxa have stipules less than 5 mm long or caducous, persistent bracts, 2–5 mm long and pedicels 2–10 mm long. The foliage of B. megacarpa and B. alba are similar, but B. megacarpa differs in having yellow flowers and fruits that dry tan, whereas, B. alba has white flowers and fruits that dry black. The only other species of Baptisia in Alabama to have white flowers is B. albescens. It differs by having shorter calyces (4.5–6.5 mm long) and smaller flowers (13–18 mm long) compared to 7–8 mm and 20–25 mm long, respectively, for B. alba. The dried fruits of B. albescens are yellow-brown. Baptisia lanceolata is unique in having a short terminal raceme (2–6 flowers) and 1–2 flowers in the leaf axis.

The only two Baptisia taxa with a state and global rank, B. austalis (G5T2S1) and B. megacarpa (G2S2), appear to be in no imminent danger of extirpation. Baptisia megacarpa occurs in nine counties in the southern half of the state and is found in several different habitats (dry woods, mixed hardwoods, densely shaded hardwoods, pine woods, clear cuts, stream edges, and roadides). Baptisia austalis occurs only on gravel bars and rocky-river banks of the Little Cahaba River in Bibb County but appears to be well protected. In 1996, The Nature Conservancy purchased land to create the Bibb County Glades Preserve, which protects the section of the river where this taxon is known to occur. Additionally, in 2003, the U.S. Fish and Wildlife Service purchased land adjacent to Bibb County Glades Preserve and created the Cahaba River National Wildlife Refuge. The Nature Conservancy and the U.S. Fish and Wildlife Service both are continuing efforts to expand the refuge, and B. austalis, along with several other rare taxa, should be protected for future generations.

Baptisia perfoliata, although it has no state or global rank, is the rarest Baptisia in the state. It is known from only Sumter County in Alabama, which is the westernmost county in the state. The closest population is Laurens County, Georgia, some 500 km to the east. In 2013, this population consisted of approximately 30 plants. The taxon occurs on land owned by American Legion and is
not considered native to Alabama. It is thought to have been introduced in the 1950’s when Auburn University planted longleaf pine brought from Georgia.

Figure 1. *Baptisia perfoliata*, distribution.
Figure 2. *Baptisia australis*, distribution.

Figure 3. *Baptisia bracteata*, distribution.
Figure 4. *Baptisia lanceolata*, distribution.

Figure 5. *Baptisia megacarpa*, distribution.
Figure 6. *Baptisia albescens*, distribution.

Figure 7. *Baptisia alba*, distribution.
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LITERATURE CITED
Alabama Natural Heritage Program. 2013. Alabama Inventory List: The Rare, Threatened and Endangered Plants and Animals of Alabama. Privately printed by the Alabama Natural Heritage Program, Auburn University.


