

# THE VERBENACEAE OF TENNESSEE



MARJORIE C. EDWARDS

THE VERBENACEAE OF TENNESSEE

---

An Abstract  
Presented to  
the Graduate Council of  
Austin Peay State University

---

In Partial Fulfillment  
of the Requirements for the Degree  
Master of Science

---

by  
Marjorie C. Edwards  
August 1976

## ABSTRACT

A study was made to determine the taxa of the family Verbenaceae known to occur in Tennessee. A literature search provided several previously published lists of Tennessee taxa; in addition, 384 specimens were examined in three state herbaria. Results indicated there are three genera with 11 species, one variety and two hybrids found in the Tennessee flora. Several additional species are cultivated.

Keys were constructed for the identification of genera and species; a description is given for each species with additional notes on general distribution and ecology.

Distribution maps were made for all species; little or no correlation was found between these distribution patterns and the physiographic regions of the state. Specific habitat affinities were noted for several species.

Verbena urticifolia var. leiocarpa, which has not been widely recognized before as part of the Tennessee flora, appears to be well-established; a number of specimens of this variety were identified among the herbaria collections of Verbena urticifolia.

Gaps in the distribution patterns of most species probably indicate a need for further collecting.

THE VERBENACEAE OF TENNESSEE

---

A Thesis  
Presented to  
the Graduate Council of  
Austin Peay State University

---

In Partial Fulfillment  
of the Requirements for the Degree  
Master of Science

---

by  
Marjorie C. Edwards  
August 1976



To the Graduate Council:

I am submitting herewith a Thesis written by Marjorie C. Edwards entitled "The Verbenaceae of Tennessee." I recommend that it be accepted in partial fulfillment of the requirements for the degree of Master of Science, with a major in Biology.

Edward W. Chester  
Major Professor

We have read this thesis and  
recommend its acceptance:

Hubert C. Phillips  
Second Committee Member

Floyd M. Ford  
Third Committee Member

Accepted for the Council:

Way E. Shiner  
Dean of the Graduate School

## ACKNOWLEDGEMENTS

I wish to thank my major adviser, Dr. E. Wayne Chester, for teaching me an appreciation for plants through field work and classroom and then patiently helping me with this study.

Appreciation is also extended to committee members, Dr. Haskell C. Phillips and Dr. Floyd M. Ford, Austin Peay State University, and to Dr. Harold N. Moldenke, co-editor of *Phytologia*, for their encouragement and assistance.

I am grateful to the herbarium curators of Austin Peay State University, Vanderbilt University, and the University of Tennessee for the use of their specimens of Verbenaceae in this study.

# TABLE OF CONTENTS

CHAPTER	PAGE
I. INTRODUCTION .....	1
Objectives of the Study .....	1
Review of the Literature .....	2
II. METHODS AND MATERIALS .....	3
III. RESULTS .....	4
Artificial Key to Tennessee Genera .....	4
Taxonomic Treatment of Taxa .....	4
Hybrids .....	15
Cultivated Taxa .....	16
Questionable Taxa .....	17
IV. DISCUSSION .....	19
V. SUMMARY .....	22
LITERATURE CITED .....	24
APPENDIX I: DISTRIBUTION MAPS .....	26
APPENDIX II: PHYSIOGRAPHIC MAPS .....	33
APPENDIX III: SPECIMENS EXAMINED .....	36

## CHAPTER I

### INTRODUCTION

The vascular family Verbenaceae is a large group of herbaceous and woody plants containing about 74 genera and over 3400 specific and infraspecific taxa (Moldenke, 1971), distributed world-wide but most abundant in tropical and subtropical areas. Verbena, the type-genus of the family, is predominantly American (Perry, 1933).

The name Verbena was the classical Roman name for altar-plants in general, and most authors agree that the name has been passed down as representing certain herbs used in ancient sacred rites. The common name, vervain, is derived from the Celtic "fer", to drive away, and "faen", a stone, as the plant was believed to have medicinal value in the treatment of bladder stones (Grieve, 1967).

Economically, members of the family are of some importance. Tectona grandis L., teak, a large verbenaceous tree from India and Malaysia, provides a hard, resinous wood valuable for shipbuilding and for furniture. The leaves of Aloysia triphylla (L' Her.) Britton, from Chile and Peru, contain an oil which is used in perfumes as lemon verbena scent (Grieve, 1967). Seeds for some varieties of Verbena are commercially packaged and can be purchased for ornamental use in gardens. The species representing the family in Tennessee have no economic importance but some are grown for ornamental purposes.

#### Objectives of the Study

The primary objectives of this work were to determine the taxa of Verbenaceae now known to occur in Tennessee, to compile descrip-



tions and to construct keys to aid in their identification, and to indicate their distributional patterns and ecological relationships across the state.

### Review of the Literature

The earliest comprehensive flora of Tennessee was published by Gattinger (1901). In this account, the family Verbenaceae included three genera with a total of ten species. Five of these species, all Verbena, had been described by Gattinger (1894) in a previous listing of plants in Tennessee having medicinal value.

Sharp, et al., (1960), in a preliminary checklist of Tennessee dicots, lists three genera and ten species. Various other papers and notes on the Tennessee flora do not deal with the family or are mentioned elsewhere.

In a revision of the genus Verbena in North America, Perry (1933) includes descriptions of seven Tennessee species with distributional data gathered from herbarium specimens. A list of specimens is provided citing date, collector, location and herbarium.

After forty-two years of research and writing on the family Verbenaceae, Moldenke (1971) published a taxonomic and distributional summary of the members of the family found throughout the world. This is the most authoritative work published to date and in it are listed three genera for Tennessee with a total of fourteen species and two varieties. Distribution is given by counties; an annotated list of specimens is not given, but necessary references have been provided through correspondence with the author.

## CHAPTER II

### METHODS AND MATERIALS

In addition to recording distributions published in the literature, a total of 384 specimens were examined from three Tennessee herbaria: Austin Peay State University (APSU), University of Tennessee, Knoxville (TENN), and Vanderbilt University (VDB). An annotated list of these specimens is provided in Appendix III.

Keys to the genera, species, and varieties are given with descriptions of each. Following the scientific name will be found the common name, if any, and those synonyms found to be in use on herbarium sheets or in previously published lists of Tennessee taxa. A general statement is given for each species concerning distribution in the state with a list of counties in which it has been collected and notes on habitat. Except where noted, each species is supported by a specimen seen by the writer.

Sources for technical descriptions are those manuals most widely accepted and used for this section of the country: Fernald (1950), Gleason (1952), and Radford, Ahles, and Bell (1964).

## CHAPTER III

### RESULTS

The flowering plant classification system of Cronquist (1968) places the family Verbenaceae, along with families Boraginaceae, Calitrichaceae, Phrymaceae, and Labiatae, in the order Lamiales, subclass Asteridae, class Magnoliatae (Dicotyledonae).

The family of herbs, shrubs, and trees is characterized by: Stems tetragonal or terete. Leaves simple or palmately compound, mostly opposite or whorled, rarely alternate. Inflorescence of cymes, spikes, or racemes. Calyx gamosepalous, campanulate, tubular, or salverform, persistent, 2-5 lobed. Corolla gamopetalous, salverform or funnelform, 4-5 lobed, somewhat 2-lipped or irregular. Stamens mostly 4, didynamous and inserted on corolla tube. Stigma 2-lobed or parted; ovary superior, mostly compound, somewhat 4-lobed. Fruit a drupe or dry schizocarp, 2-4 celled, usually splitting when ripe into as many 1-seeded indehiscent nutlets.

#### Artificial Key to Tennessee Genera

- Shrubs; flowers in axillary cymes; fruit a drupe ..... 1. Callicarpa  
Herbs; flowers in spikes or heads; fruit a schizocarp.  
    Calyx campanulate, 3-4 cleft; corolla 4-lobed,  
        usually plainly 2-lipped; mericarps 2 ..... 2. Lippia  
    Calyx tubular, 5-toothed; corolla 5-lobed,  
        usually slightly irregular; mericarps  
        1 or 4 ..... 3. Verbena

#### Taxonomic Treatment of Taxa

1. Callicarpa L., Act. Soc. Ups. 80. 1741.

Callicarpa americana L., Sp. Pl. 111. 1753.

French mulberry; Beauty-berry.



Shrub, 0.5-3 m. high; branches densely stellate-scurfy or tomentose. Leaves simple, opposite, ovate to ovate-elliptic, acuminate, with tapering base, crenate to serrate, scurfy beneath, 7-23 cm. long, 3-13 cm. wide. Petioles 0.5-3.8 cm. long, scurfy-stellate. Cymes many-flowered, 1-3.5 cm. long and wide, usually shorter than subtending petiole; peduncles 1-5 mm. long. Calyx campanulate, 4-toothed. Corolla bluish, pink, reddish, to 1 mm. wide; tube to 2.9 mm. long, lobes to 1.5 mm. long. Drupe 3-6 mm. in diameter, pink to violet, densely clustered.

This species is generally spread across the southern two-thirds of the state, most commonly found in moist woods and thickets near streams and rivers, in bottomlands and on bluffs above rivers. The 31 counties in which it has been collected are: Anderson, Bedford, Benton, Blount, Bradley, Carroll, Coffee, Decatur, Franklin, Giles, Grundy, Hamilton, Hardin, Knox, Lauderdale, Lawrence, Loudon, Madison, Marion, McNairy, Monroe, Morgan, Rhea, Rutherford, Sevier, Shelby, Tipton, Van Buren, Warren, Wayne, and White. (Appendix I, Figure 1).

2. Lippia Houst. ex Linn., Gen. ed. I 347. 1737.

Lippia lanceolata Michx., Fl. Bor. Am. 2:15. 1803.

Fog-fruit; Phyla lanceolata (Michx.) Greene.

Perennial herb, decumbent or procumbent, often rooting at the nodes, flowering branches ascending. Leaves lanceolate to ovate, acuminate to tip and base, to 3 cm. wide, serrate to below the middle. Peduncles elongate, usually from middle or upper nodes and surpassing subtending leaf. Inflorescence a bracteate head, densely-flowered, at first globose, later elongating. Bractlets imbricate, 3 mm. long,



acute. Corolla irregular, white to bluish-white or purplish, tube scarcely longer than calyx. Fruit a schizocarp included by calyx, 2 mericarps.

A general pattern of distribution is not discernible from the specimens thus far collected. Notes on habitat, however, indicate in almost every case that the plant was collected from wet areas - along lakes and creeks, swampy fields, marshes and shallow water - or from areas periodically flooded such as creek beds, drainage ditches, and low bottomland. Two herbarium specimens were found to be labelled Lippia lanceolata var. recognita. However, upon re-examination, the plants did not resemble the brief description of the variety provided by Fernald (1950). The variety is not recognized by Gleason (1952) or by Radford, Ahles, and Bell (1964).

Collections have been made from the following 24 counties: Anderson, Clay, Coffee, Davidson, Dyer, Giles, Grainger, Hamilton, Hardin, Henry, Knox, Lake, Lauderdale, Loudon, Maury, Montgomery, Obion, Roane, Rutherford, Shelby, Stewart, Weakley, Williamson, Wilson. (Appendix I, Figure 1).

### 3. Verbena L., Gen. Pl. 12. 1754.

Annual or perennial herbs with quadrangular stems, erect or prostrate to ascending. Leaves simple, opposite. Inflorescence spicate-bracteate, terminal or rarely axillary; spikes usually cymose, paniculate or solitary, densely flowered. Calyx unequally 5-toothed, tubular. Corolla salverform or funnelform, sometimes curved, zygomorphic, the lobes 5, obtuse or emarginate. Stamens 4, didynamous, included, inserted in upper corolla tube; stigmas 2, style 1, locules 4. Fruit

a schizocarp, usually enclosed by mature calyx, separating into 4 nutlets, mostly oblong.

Leaves deeply lobed or dissected.

Corolla 10 mm. or more broad; calyx 8-10 mm. long.

Leaves finely dissected, divisions 1 mm. or less wide ..... 8. V. tenuisecta

Leaves coarsely dissected or lobed, divisions more than 1 mm. wide ..... 3. V. canadensis

Corolla 6 mm. or less broad; calyx 2-3 mm. long.

Subtending bracts much longer than calyx .. 1. V. bracteata

Subtending bracts two-thirds or less than calyx length ..... 5. V. officinalis

Leaves not lobed or dissected, except occasional lower leaves.

Leaves linear, narrowly lanceolate, prominently veined beneath ..... 6. V. simplex

Leaves lanceolate to oblong-ovate.

Spikes solitary or several, long, thick, blunt at end; leaves thick, villous beneath

..... 7. V. stricta

Spikes usually numerous, disposed in a panicle, leaves hirtellous or glabrous beneath.

Corolla blue or blue-violet.

Leaves petiolate, lower ones sometimes hastate ..... 4. V. hastata

Leaves semi-amplexicaul, sharply serrate except toward base ..... 2. V. bonariensis

Corolla white.

Mature calyx 2-2.3 mm. long; nutlets 2 mm. long; leaves strigose beneath with hairs to 1.3 mm. long, or glabrate ..... 9. V. urticifolia

Mature calyx 1.7-2 mm. long; nutlets 1.5 mm. long; leaves velutinous beneath with hairs less than 0.3 mm. long ..... 9a. V. urticifolia var. leiocarpa

1. V. bracteata Lag. and Rodr., Anal. Cienc. Nat. 4:260. 1801.

V. bracteosa Michx.

Annual or perennial. Stems 1-5 dm. long, several from common base, freely branched, decumbent or ascending, hirsute. Leaves 1-6.5 cm. long, pinnately lobed or dissected, hirsute, narrowed to a short-margined petiole. Spikes terminal, thick, elongate, closely-flowered.

Calyx 3-4 mm. long, hirsute, lobes connivent over schizocarp. Bracts linear to lanceolate, hirsute, much longer than calyx, recurved in age. Corolla blue to purple, pubescent, protruding only slightly beyond calyx, limb 2-3 mm. wide. Nutlets 2-2.5 mm. long, reticulate above or muricate.

Current collections of this introduced species are from southeast Tennessee, upper Middle Tennessee and the extreme western counties. Notes on habitat indicate it is most commonly found in open, dry fields and roadsides, vacant lots and other waste areas. The 12 counties where collections have been made are: Benton, Blount, Cheatham, Chester, Decatur, Franklin, Hamilton, Humphreys, Montgomery, Obion, Shelby, Tipton. (Appendix I, Figure 2).

2. V. bonariensis L., Sp. Pl. 20. 1753.

Annual. Stems stout, sharply 4-angled, scabrous. Leaves opposite, lanceolate, sessile with clasping bases, sharply serrate except toward the base, rugose and hirtellous above, pubescent beneath. Spikes usually short, compact, in crowded cymes. Calyx about 3 mm. long, pubescent. Bracts lanceolate, acuminate, pubescent, equaling or slightly exceeding calyx. Corolla blue to violet or purple, tube barely twice calyx length, pubescent. Nutlets trigonous, about 2 mm. long, mostly striate.

Introduced from South America, this is primarily a coastal plain species. The collection from Haywood County is reported by Moldenke (1962, 1971). (Appendix I, Figure 2).

3. V. canadensis (L.) Britton, Mem. Torr. Bot. Club, 5:276. 1894.

Rose Vervain; Glandularia canadensis (L.) Small.



Perennial. Stems decumbent, rooting at lower nodes, branched, diffuse, hirsute or glabrous. Leaves variable, ovate to triangular-ovate, 3-9 cm. long, pinnately dissected or lobed, acute, base cuneate to truncate, glabrous or appressed-pubescent, with a margined petiole. Spikes solitary, at first corymbose, later elongating. Calyx 7-13 mm. long, hirsute, lobes slender, 3-4 mm. long, unequal. Bracts shorter than or occasionally as long as calyx. Corolla pink to purple, rarely white, 2-3 times as long as calyx, limb 10-15 mm. wide, lobes emarginate. Mature schizocarp constricted along lines of cleavage; nutlets 3-3.5 mm. long, muricate on inner face.

This species has been collected from scattered counties in West Tennessee, but the majority of specimens examined were from Rutherford County and the immediately surrounding areas in Middle Tennessee. Most of the habitat notes specifically mention open red cedar glades or wooded limestone slopes and outcrops. The 15 counties where this species has been collected are: Bedford, Davidson, Haywood, Henry, Humphreys, Marshall, Maury, McNairy, Montgomery, Rutherford, Smith, Trousdale, Weakley, Williamson, Wilson. (Appendix I, Figure 3).

4. V. hastata L., Sp. Pl. 20. 1753.

Blue Vervain, Simpler's Joy.

Perennial. Stems erect, branched above, pubescent. Leaves lanceolate to ovate-lanceolate, acuminate, petiolate, coarsely serrate, lower ones sometimes hastate. Spikes erect, usually numerous in a terminal panicle, flowers and fruits imbricate. Calyx 2.5-3 mm. long, lobes incurved over schizocarp, often connivent. Bracts usually shorter than calyx. Corolla blue to violet, tube longer than calyx, limb to 4.5 mm. wide. Calyx, bracts and corolla tube pubescent. Nutlets



1.5-2 mm. long, smooth or faintly striate.

Gattinger (1894) includes V. hastata in his list of medicinal plants, the herb with root being collected. Krochmal (1973) gives a more complete description of its collection and use: the roots are harvested at any time, the above-ground parts at full bloom. Indians made a tea from boiled leaves to treat stomach ache; doctors used the plant during the time of the American Revolution to induce vomiting and to clear the respiratory tract of mucus. It increases perspiration in persons with a low fever.

This species has been collected in a few widely separated places across the state, in each case from moist soil, either roadside ditch, pond edge, or swampy ground. Collections are known from the following 10 counties: Carroll, Chester, Coffee, Henry, Johnson, McNairy, Montgomery, Morgan, Obion, and Sullivan. (Appendix I, Figure 3).

##### 5. V. officinalis L., Sp. Pl. 20. 1753.

European Vervain.

Annual. Stems slender, diffusely branched, to 1 m. tall. Leaves ovate to oblong, pinnately dissected or 3-5 cleft, attenuate to base, upper leaves smaller and less divided. Spikes slender, solitary or loosely arranged in 3's or a panicle, flowers imbricate but becoming remotely fruited in maturity. Calyx 2-2.5 mm. long, subtruncate, teeth minute. Bracts  $2/3$  or less length of calyx. Corolla white to blue to purple, tube longer than calyx, limb about 4 mm. wide. Calyx, bracts, and corolla tube pubescent. Schizocarp broadly ellipsoid, nutlets nearly 2 mm. long, striate or rugose below, reticulate above.

This species, introduced from Europe, is included on Gattinger's

list of medicinal plants (1894), the herb in flower being collected. It is infrequent in waste areas and roadsides and is not found in the present collections of the Tennessee herbaria visited. Perry (1933) and Moldenke (1971) cite collections from 3 counties: Carroll, Carter, and Knox. (Appendix I, Figure 4).

6. V. simplex Lehm., Ind. Sem. Hort. Hamb. 17. 1825.

Narrow-leaved Vervain; V. angustifolia Michx.

Perennial. Stems erect, glabrous or sparsely strigose, to 6 dm. tall, simple or sparingly branched, branches ascending. Leaves linear to narrowly oblanceolate, 3-10 cm. long, tapering to subsessile base, serrate, reticulate, glabrous or strigose on both surfaces, prominently veined beneath. Spikes solitary or few, strict, flowers usually imbricate. Mature calyx 4-5 mm. long, longer than bract, lobes erect, acuminate. Corolla lavender to purple, tube barely longer than calyx, limb 5-6 mm. broad, lobes mostly emarginate, sometimes obtuse. Nutlets linear about 2.5 mm. long, rugose-reticulate above.

This is perhaps the most widely-occurring species of the family Verbenaceae in the state. Gattinger (1894) reported it on his list of medicinal plants as it was believed useful in infusion as a remedy for chronic dysentery. Present collections show a wide distribution covering all general areas except the extreme western counties. It is most often found along dry, gravelly roadsides but is also common as a weed in open pasture, dry abandoned fields and waste areas. Specimens are known from the following 47 counties: Anderson, Bedford, Benton, Bledsoe, Blount, Carroll, Carter, Cheatham, Claiborne, Coffee, Cumberland, Davidson, Decatur, Dickson, Fayette, Fentress, Franklin, Grainger, Greene, Grundy, Hamilton, Hawkins, Henry, Humphreys, Jeffer-

son, Knox, Lawrence, Lewis, Loudon, Marshall, Maury, McMinn, Meigs, Montgomery, Perry, Polk, Rhea, Roane, Rutherford, Stewart, Trousdale, Van Buren, Warren, Wayne, White, Williamson, Wilson. (Appendix I, Figure 4).

7. V. stricta Vent., Jard. Cels. 53, pl. 53. 1800.

Hoary Vervain.

Perennial. Stems erect, to 12 dm. tall, subterete, little branched or simple, densely pubescent or hirsute. Leaves thick, ovate to elliptic, acute to obtuse, usually doubly serrate, base rounded, sessile or nearly so, hirsute and rugose above, densely hirsute below. Spikes solitary or several, stiffly erect, long, blunt, flowers and fruits densely imbricate. Calyx 3-5 mm. long, acuminate lobes erect to divergent, densely hirsute. Bract hirsute, equal to or slightly shorter than calyx. Corolla blue to violet, tube slightly longer than calyx, pubescent, limb 8-9 mm. wide. Nutlets ellipsoid, 2.5-3 mm. long, reticulate above, trigonous.

This species occurs infrequently along roadsides or pastures and fence rows. Gattinger (1894) records that the whole plant was collected for medicinal use from sandy soils in counties along the Mississippi River. Collections from Tennessee include several specimens from the northwestern counties and a few others from widely scattered counties. These 8 counties are: Campbell, Chester, Henderson, Henry, Hickman, obion, Smith, Weakley. (Appendix I, Figure 5).

8. V. tenuisecta Briq., Ann. Conserv. and Jard. Bot. Geneve, 7-8:294.

1904.

Moss Verbena.



Perennial. Stems prostrate to decumbent, 1-3 dm. tall, rooting at nodes. Branches divergent, ascending, sparsely pilose. Leaves deltoid, pinnatifid, the lobes narrowly linear, acute to obtuse at apices. Spikes solitary, terminal, dense and short during anthesis, elongating in fruit. Calyx to 9 mm. long, canescent, at first imbricate and ascending, later spreading, lobes curved inward, often twisted together. Bracts  $1/3$ - $1/2$  length of calyx, canescent. Corolla blue, purple, lilac to pink or white, tube glabrous and exserted well beyond calyx, limb about 10 mm. wide, lobes obcordate, emarginate. Nutlets oblong-linear, 3-3.5 mm. long, gray to tan to yellowish, muricate on inner face.

A single specimen of V. tenuisecta is present in the University of Tennessee Herbarium, having been collected on a dam in Henderson County. At present, it is the only record of this introduced species in Tennessee and has been reported by Moldenke (1971) and Sharp and Baker (1964). (Appendix I, Figure 5).

9. V. urticifolia L., Sp. Pl. 20. 1753.

White Vervain, Nettle-leaved Vervain; V. urticaefolia L.

Annual or perennial. Stems erect, hirtellous to glabrate, freely branched, branches spreading. Leaves oblong-ovate to broadly lanceolate, acute to acuminate, serrate or doubly serrate, base rounded, petiolate; both leaf surfaces glabrate or hirsute, hairs on lower surface to 1.3 mm. long, whitish, on veins. Spikes slender, usually stiffly ascending, loose-paniculate, strigose, flowers imbricate or sparse, fruits sparse. Mature calyx 2-2.3 mm. long, strigose, lobes not connivent, about equal to mature schizocarp. Bracts  $1/2$  to  $3/4$



length of calyx. Corolla white, tube barely exerted, limb 2 mm. wide. Mature schizocarp exposed at distal end, nutlets ellipsoid, 2 mm. long, corrugated or ribbed on back.

This species has been collected from all areas of the state, primarily from moist woods along roads and creeks or from gravelly creek banks and river bottoms. Gattinger (1894) records that the root of the plant was collected for its medicinal value. The 43 counties where it has been found are: Anderson, Bedford, Benton, Blount, Carter, Cheatham, Cocke, Coffee, Crockett, Cumberland, Davidson, Dickson, Grainger, Grundy, Hamilton, Hawkins, Henry, Houston, Jackson, Johnson, Knox, Lake, Lauderdale, Lewis, Marion, McMinn, Monroe, Montgomery, Obion, Perry, Polk, Rhea, Roane, Rutherford, Sevier, Shelby, Stewart, Tipton, Unicoi, Wayne, White, Williamson, Wilson. (Appendix I, Figure 6).

9a. V. urticifolia var. leiocarpa Perry and Fernald, *Rhodora* 38:441. 1936.

This variety resembles V. urticifolia in habitat but differs in several distinguishable characters. The thin leaves are velutinous or subvelutinous beneath with hairs only to 0.3 mm. long. The filiform branches are puberulent and loosely ascending to divergent. The mature calyx is 1.7-2 mm. long, puberulent, its bract only 0.5-1 mm. long. The nutlets are 1.5 mm. long and smooth on back.

One identified specimen of this variety was found in the University of Tennessee Herbarium. From the collections of V. urticifolia of the three herbaria visited, 16 additional specimens of var. leiocarpa were identified and annotated. The distribution of these, along with several collections noted by Moldenke (1971), includes 16 coun-

ties: Blount, Carter, Cocke, Greene, Grundy, Knox, Montgomery, Obion, Polk, Roane, Sevier, Stewart, Unicoi, Union, Van Buren, White. (Appendix I, Figure 6).

### Hybrids

A number of specimens of Verbena were reported by Perry (1933) to exhibit variations or combinations of traits of two or more species; these were assumed to be hybrids but were not described or discussed further at that time. Moldenke has since identified and named some of these, using binomials preceded by the letter "x" for all "proved or suspected hybrids and for all the progeny of such crosses that have not reverted to one or the other of the parents in their total morphological characters." (Moldenke, 1971).

In a discussion of hybridity in the Verbenaceae, Moldenke (1958) states that some of the specimens which cause us to describe a species as variable may actually represent hybrids. He believes that there are many more natural hybrids in the group than have yet been described and that it is to be expected in this group of insect-pollinated plants that hybridization may be observed between species with overlapping ranges, similar habitats, and simultaneous flowering.

The following hybrids are reported by Moldenke (1971) as occurring in one Tennessee county each:

xVerbena engelmannii Moldenke, a hybrid between V. urticifolia and V. hastata, is reported from Carroll County; this specimen was previously cited by Perry (1933) as V. hastata. The plant is intermediate in characteristics, resembling V. urticifolia in habit, but the spikes are denser, not greatly elongate after anthesis, and very sparsely and

irregularly fruited. The corollas are small and purplish and the toothing of the leaves is coarser, often double. The stems, branches, inflorescences, and leaves are subglabrous or sparsely strigillose.

xVerbena moechina Moldenke, a hybrid between V. simplex and V. stricta, is reported for Knox County. The plant resembles V. simplex in habit, but with broader leaves which are often elliptic and short-pubescent or velutinous beneath. The stems and branches are usually densely pubescent and the spikes poorly and irregularly fruited. It differs from V. stricta in its slender poorly fruited spikes, smaller flowers, and narrower leaves.

These hybrids have not been identified in the state since their initial report; identified specimens are not found in the present collections of the Tennessee herbaria visited.

#### Cultivated Taxa

The extent and amount of cultivation is unknown but the following taxa are represented by specimens in the University of Tennessee Herbarium, having been collected in Knox County in a cultivated state:

Callicarpa dichotoma (Lour,) K. Koch., Dendr. 2:336. 1872.

Beauty-berry.

This shrub was found cultivated on the University farm. It differs from C. americana in that the leaves are smaller, sharply dentate only above the middle, and punctate, glabrous or subglabrous beneath. Cymes numerous, 2 or 3 times dichotomous, longer than subtending petioles. Corolla pink to purple, tube about 1.8 mm. long, lobes about 1 mm. long and wide, rounded. Drupe 3-4 mm. long, red at first becoming purple to violet. Widely cultivated, it is a native of China.



Verbena bonariensis var. conglomerata Briq., Arkiv. Bot. 2, no. 10:11,  
pl.3, B. 1904.

Descriptions of V. bonariensis, a species introduced from South America, are given by Gleason (1958) and Radford, Ahles, and Bell (1964), but var. conglomerata is not included in any of the manuals for the area. The herbarium specimen was identified by Moldenke who includes it on his list of naturally-occurring species in Tennessee (1971). However, it was collected in the backyard of a residence and as such is being considered cultivated by this writer.

Vitex agnus-castus L., Sp. Pl. 638. 1753.

Common Chaste Tree; Wild Lavender; Monk's Peppertree.

Shrub to 5 m. tall with canescent branches. Leaves opposite, palmately compound, usually 5-7 leaflets. Leaflets narrow-elliptic to lanceolate, acute to acuminate, entire, unequal with the central one largest, tomentose beneath. Inflorescence pyramidal, terminal, composed of paired cymules, often with 2 lateral branches. Calyx densely puberulent, shortly 5-toothed. Corolla blue to purplish, tube puberulent, stamens exserted. Fruit a utricle, globose, 3-4 mm. in diameter. Widely cultivated, the species is native to southern Europe and the Orient. The herbarium specimen examined was collected on the University campus.

#### Questionable Taxa

A single specimen of Verbena rigida Sprengel, attributed to Davidson County, is found in the Vanderbilt University Herbarium. Collected by a student, it was incompletely labelled when mounted, the reported location vague. Primarily a coastal plain species, it has



not been reported in Tennessee again and its current status within the state is unknown.

Verbena ciliata Benth. is reported by Moldenke (1971) for Davidson County. This species is not found in the collections of the Tennessee herbaria visited for this study and it is not described by manuals for the region. Perry (1933) describes its range as New Mexico, Arizona to southern Mexico. It has not been collected in the state since its initial report and its status as a valid Tennessee species is questionable.

## CHAPTER IV

## DISCUSSION

Based on present known collections, the family Verbenaceae is represented in Tennessee by three naturally-occurring genera with a total of 11 species and one variety. In addition, hybridization is well known in the family, especially in Verbena. Two hybrids have been reported from Tennessee but both are apparently rare.

Comparing the distribution maps of these species (Appendix I, Figures 1-6) with the physiographic regions of Tennessee (Appendix II, Figure 1), there appears to be little, if any, correlation. V. simplex and V. urticifolia are generally spread across the state. Callicarpa americana is found across the southern two-thirds of all regions. Lippia lanceolata has been collected from all regions except the extreme eastern counties. V. bracteata was described by Sharp and Baker (1964) as restricted to the western tier of counties; however, the present known distribution includes scattered counties in Middle and East Tennessee as well. The distribution of V. canadensis shows scattered collections from the western counties, but most of the herbarium specimens examined were from the Central Basin area.

Referring to the map which shows the position of Tennessee within the physiographic regions of the Southeast United States (Appendix II, Figure 2), a few comments can be made about the ranges of several Tennessee species of Verbenaceae. Callicarpa americana is described by the manuals as occurring from the Carolinas and Florida to Texas and north to Arkansas, Oklahoma and Tennessee. Its distribution pattern (Appendix I, Figure 1) suggests that the northernmost edge of the

range occurs in Tennessee. V. bonariensis and V. tenuisecta are described in manuals with a coastal plain distribution to Texas and southern California; their collection from western Tennessee counties coincides with the northward extension of the coastal plain along the Mississippi River into Tennessee.

Tennessee is well within the ranges described for the remaining species attributed to the state, several of which extend from northeastern Canada to western United States.

There appears to be a high degree of constancy for several species with regard to preferred habitat. This is especially true for those species inhabiting moist areas - V. hastata and V. urticifolia - or swampy ground - Lippia lanceolata. Collections of V. canadensis show a strong association with limestone soils and open cedar glades.

Several limitations of this study should be mentioned here. First, since specimen collection is recorded by counties, the pattern of distribution is somewhat shaped by the arbitrary political boundaries dividing the state into counties. Second, the distribution maps do not accurately indicate the abundance of a given species; the maps merely show the collection of a species from an area rather than its relative importance with regard to a random sampling of all plants in the area. Third, and most important, this study is limited by the extent of present collections. Many of the herbarium specimens examined were part of student collections which have naturally come from areas near the universities. Other areas of the state have been visited less frequently, and many of the gaps in distribution are probably actually gaps in collection.

A need for further collecting is indicated; emphasis should be

placed on collecting in areas away from the major university locations, in the southwestern, north-central, and northeastern counties. In addition, there is a need for investigation into the nature and extent of hybridization among the Tennessee taxa of Verbenaceae.



## CHAPTER V

## SUMMARY

A literature search was made to determine the taxa of the family Verbenaceae previously reported for Tennessee. Based on this information and a subsequent examination of specimens in three Tennessee herbaria, the family appears to be represented within the state by three genera with 11 species and one variety and at least two naturally-occurring hybrids. Also, several ornamental genera and species are known.

Keys were constructed for the identification of genera and species. Descriptions for all species were compiled from manuals used for the region and are given with additional notes on general distribution and ecology.

Distribution maps were made for all species; comparison with the physiographic regions of the state showed little or no correlation. The distribution of Verbena canadensis shows some affinity for the Central Basin area. Verbena simplex, Verbena urticifolia, Lippia lanceolata, and Callicarpa americana were found to be generally spread across all or most regions. Two species with Coastal Plain ranges, Verbena bonariensis and Verbena tenuisecta, were reported in one county each where the West Gulf Coastal Plain extends northward into West Tennessee. Other distributions were scattered or sparse and seemingly random with regard to physiographic regions.

According to ecology notes accompanying herbarium specimens, specific habitat seemed to be constant for several species, especially

those found in moist or swampy areas. Verbena canadensis showed a strong association with cedar glades and limestone soils.

Sixteen specimens of Verbena urticifolia var. leiocarpa were identified and set apart from the present collections of V. urticifolia in the herbaria visited. The scattered distribution suggests that this variety is well-established in the state.

Three cultivated species were examined as herbarium specimens and are described in a separate category. Two species of Verbena reported for Tennessee were excluded from the key to species and are treated separately with explanation as questionable taxa.

This study is limited by the extent of present collections and gaps in the distribution of several species may actually represent gaps in collection. A need for further collecting is indicated.

## LITERATURE CITED

- Cronquist, Arthur. 1968. The Evolution and Classification of Flowering Plants. Houghton Mifflin Company, Boston. pp. 290-293.
- Duncan, W. H. and L. E. Foote. 1975. Wildflowers of the Southeastern United States. University of Georgia Press, Athens, Ga.
- Fernald, M. L. 1950. Gray's Manual of Botany (eighth ed.). American Book Co., N. Y. pp. 1208-1212.
- Gattinger, Augustin. 1894. Medicinal Plants of Tennessee. Nashville, Tenn. pp. 63-64.
- \_\_\_\_\_. 1901. The Flora of Tennessee and A Philosophy of Botany. Gospel Advocate Publishing Co., Nashville, Tenn. p. 143.
- Gleason, Henry A. 1958. The New Britton and Brown Illustrated Flora of the Northeastern United States and Adjacent Canada. vol. 3. New York Botanical Garden. Lancaster Press, Lancaster, Pa. pp. 125-139.
- Grieve, M. 1967. A Modern Herbal. vol. II. Hafner Publishing Co., N. Y. pp. 830-832.
- Krochmal, Arnold and Connie. 1973. A Guide to the Medicinal Plants of the United States. The New York Times Book Co., N. Y. pp. 229-230.
- Mahler, William F. 1970. Manual of the Legumes of Tennessee. J. Tenn. Acad. Sci. 45(3):67.
- Moldenke, Harold N. 1958. Hybridity in the Verbenaceae. Am. Midl. Nat. 59(2):333-370.
- \_\_\_\_\_. 1962. Materials toward a monograph of the genus Verbena IV. Phytologia 8:259.
- \_\_\_\_\_. 1971. A Fifth Summary of the Verbenaceae, Avicenniaceae, Stilbaceae, Dicrostylidaceae, Symphoremaceae, Nyctanthaceae, and Eriocaulaceae of the World as to Valid Taxa, Geographic Distribution, and Synonymy. 2 vols. 974p. Braun-Brumfield, Inc., Ann Arbor, Michigan.
- \_\_\_\_\_. 1973. A Fifth Summary of the Verbenaceae, Avicenniaceae, Stilbaceae, Dicrostylidaceae, Symphoremaceae, Nyctanthaceae, and Eriocaulaceae of the World as to Valid Taxa, Geographic Distribution, and Synonymy. Supplement 2. Phytologia 25(4):226.

- Perry, Lily M. 1933. A Revision of the North American Species of Verbena. Annals of the Missouri Botanical Garden 20(2):239-356.
- Radford, A. E., H. E. Ahles, and C. R. Bell. 1964. Manual of the Vascular Flora of the Carolinas. University of North Carolina Press. Chapel Hill, N. C. pp. 887-894.
- Sharp, A. J. and Ailsie Baker. 1964. First and Interesting Reports of Flowering Plants in Tennessee. Castanea 29:183.
- \_\_\_\_\_, R. E. Shanks, H. L. Sherman, and D. H. Norris. 1960. A Preliminary Checklist of Dicots of Tennessee. Ms.



## APPENDIX I

## DISTRIBUTION MAPS

The following maps, Figures 1-6, indicate the sources of the present known collections of plants of the family Verbenaceae in Tennessee. The following symbols are used:

- \* = collection reported by Moldenke (1971 and 1973).
- o = collection reported by Perry (1933).
- = herbarium specimen examined in one or more of the three Tennessee herbaria visited; annotations provided in Appendix III.

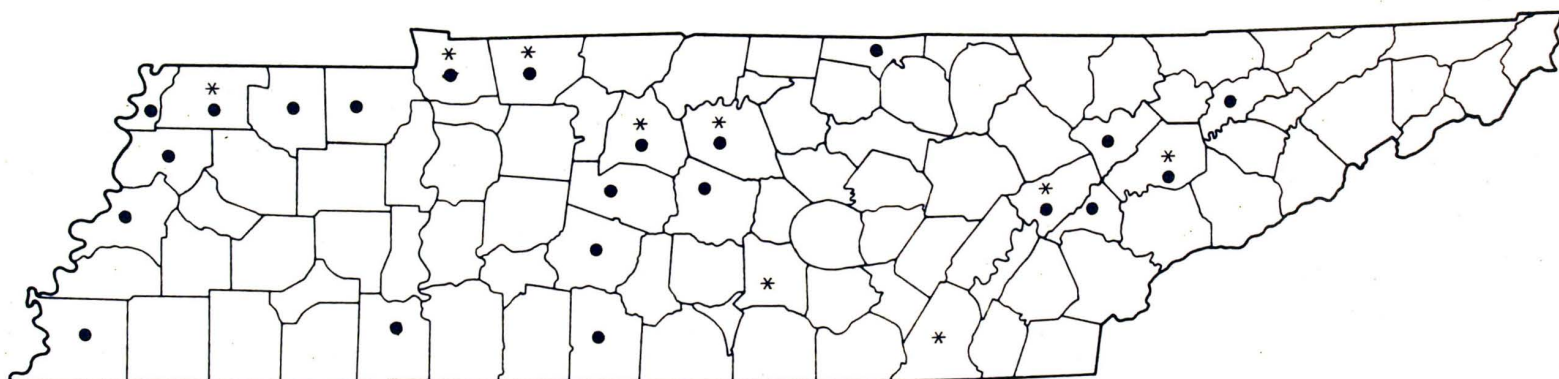
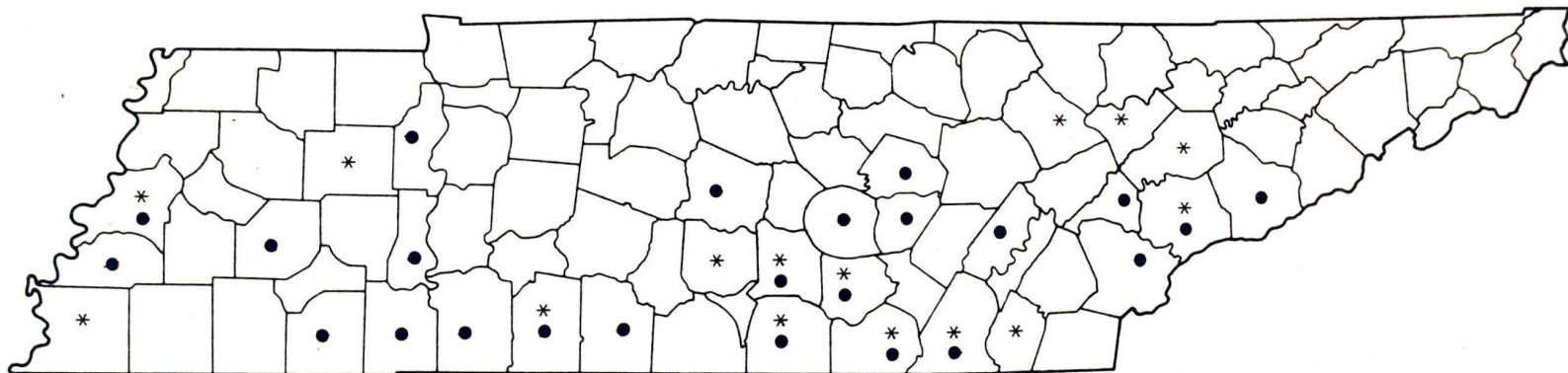


Figure 1. The distribution of *Callicarpa americana* L. (top) and *Lippia lanceolata* Michx. (bottom).

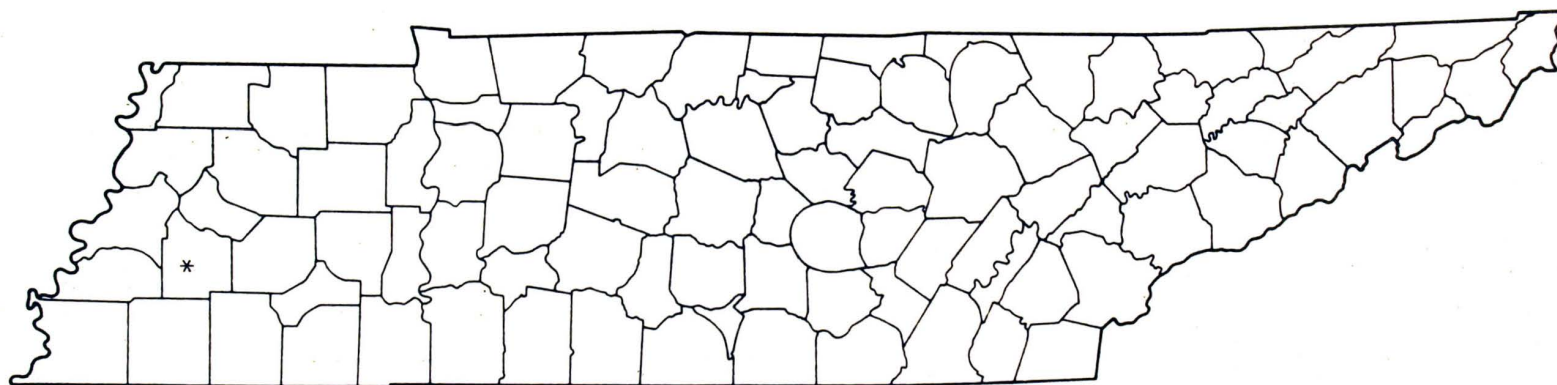
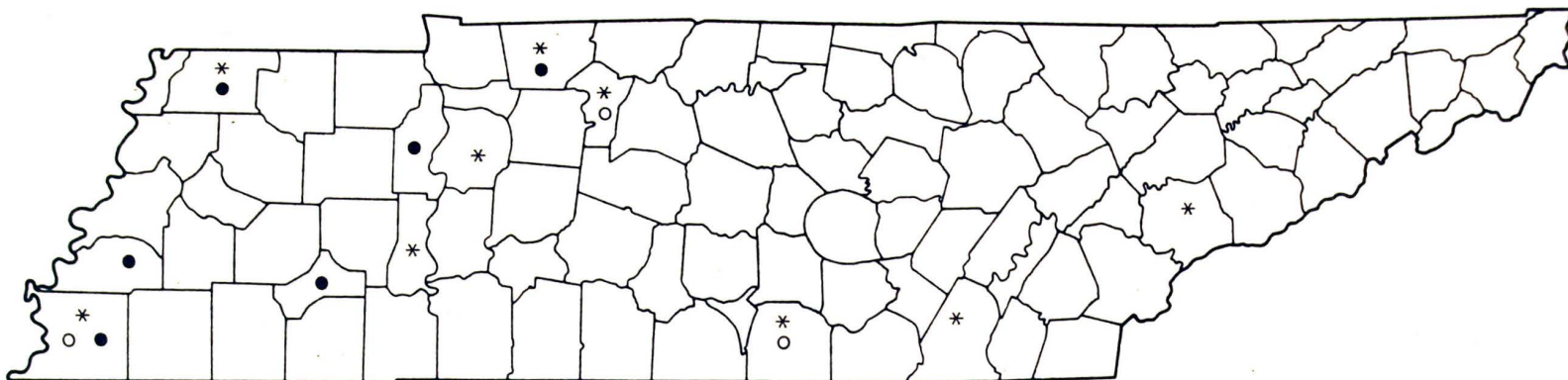


Figure 2. The distribution of *Verbena bracteata* Lag. and Rodr. (top) and *Verbena bonariensis* L. (bottom).

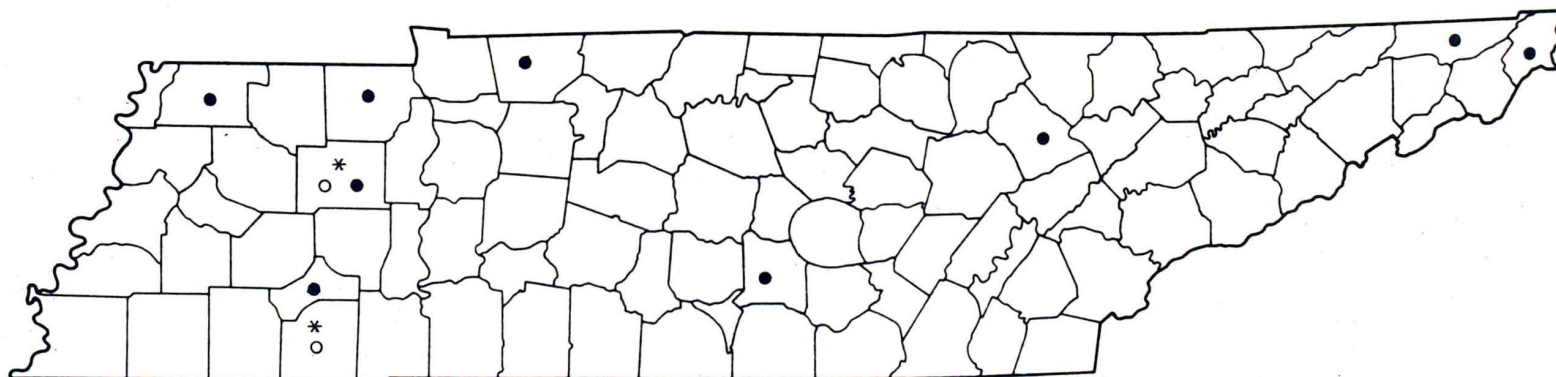
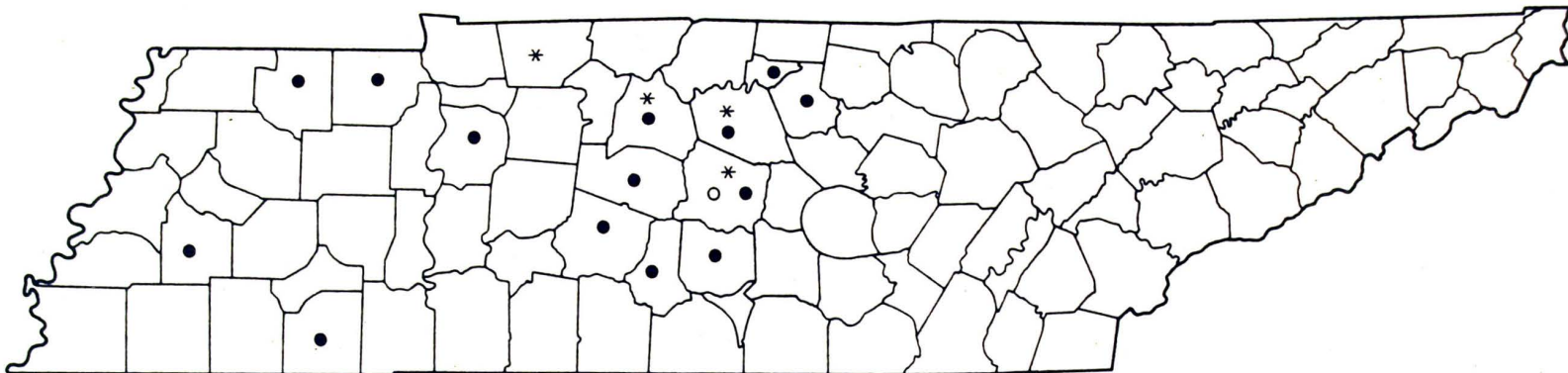


Figure 3. The distribution of Verbena canadensis (L.) Britton (top) and Verbena hastata L. (bottom).



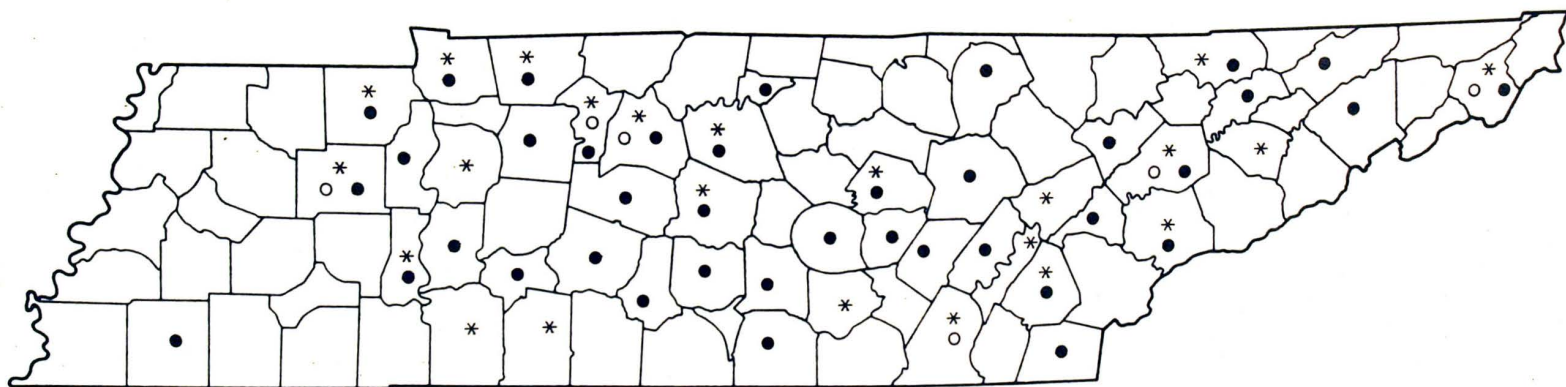
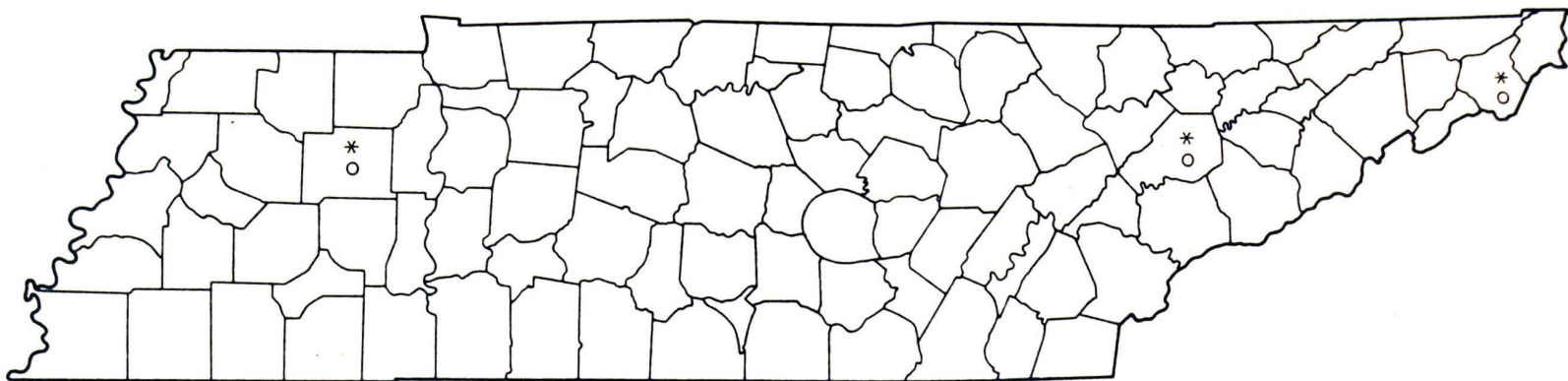


Figure 4. The distribution of Verbena officinalis L. (top) and Verbena simplex Lehm. (bottom).

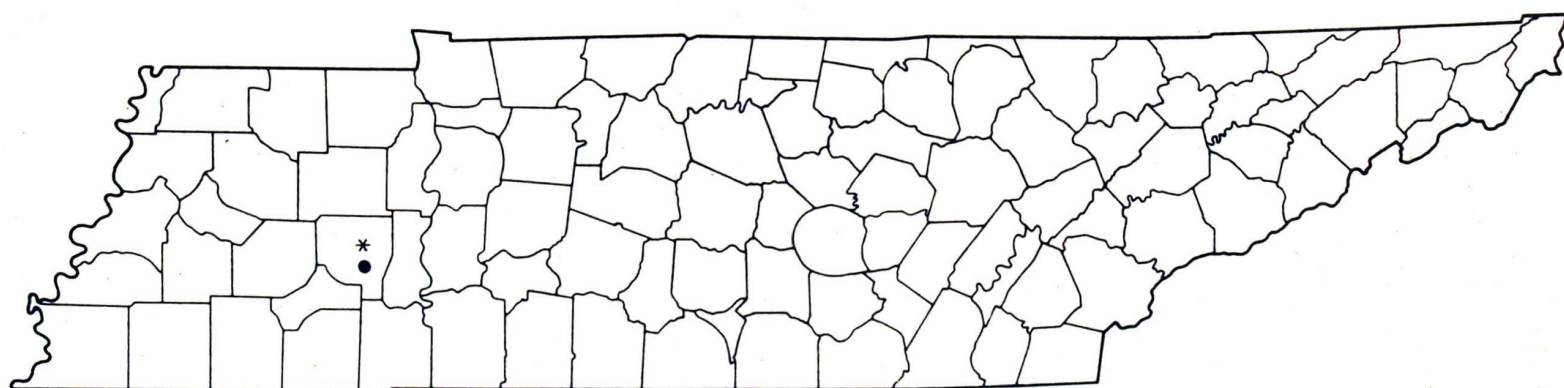
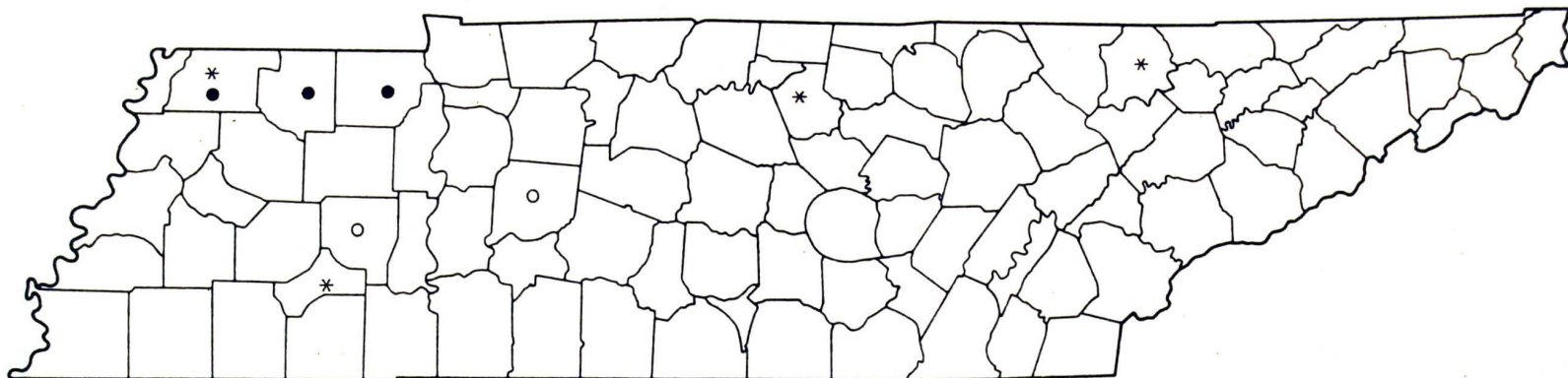


Figure 5. The distribution of *Verbena stricta* Vent. (top) and *Verbena tenuisecta* Briq. (bottom).

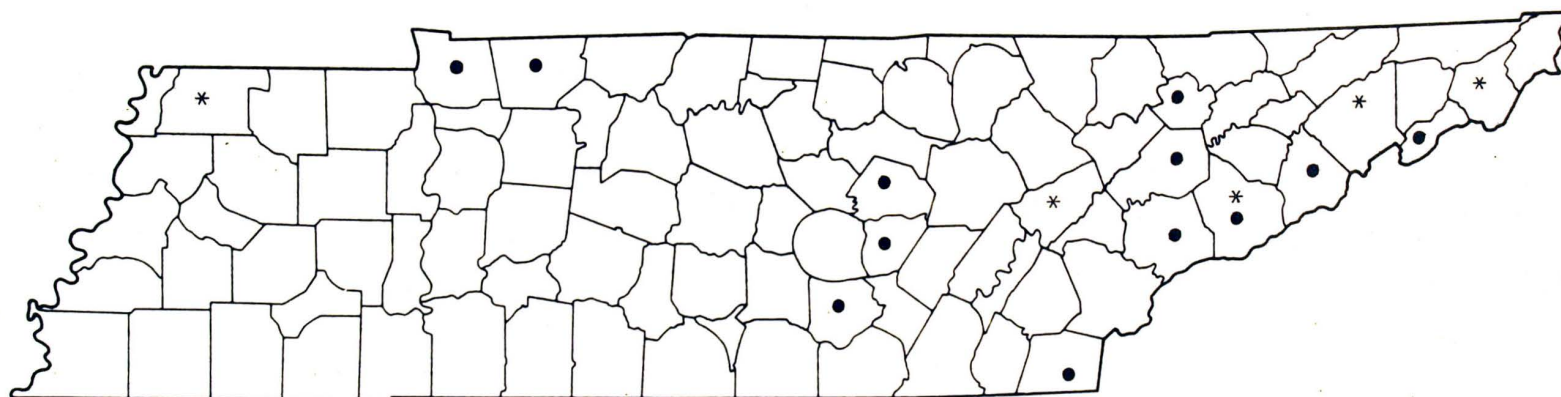
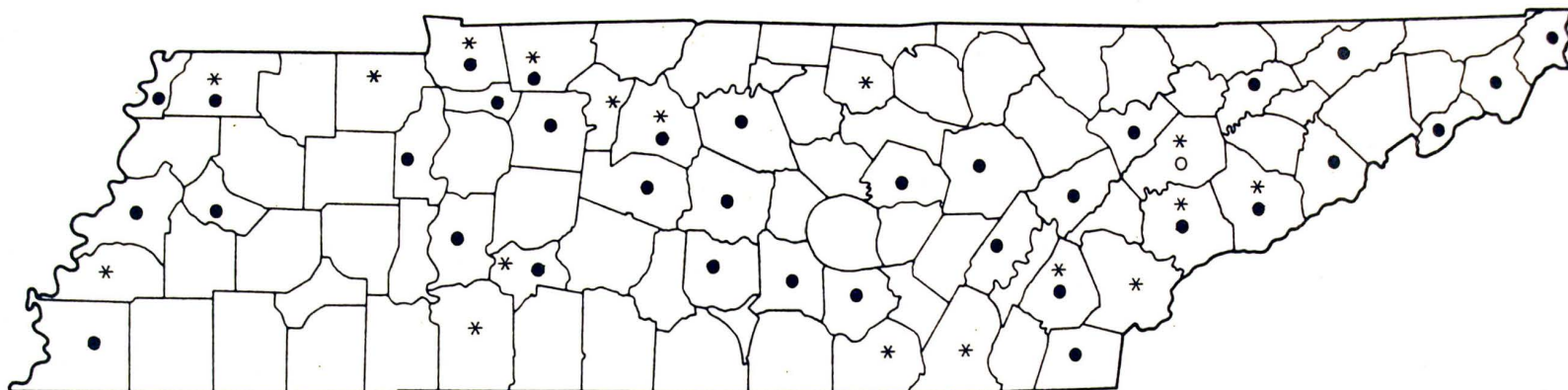


Figure 6. The distribution of *Verbena urticifolia* L. (top) and *Verbena urticifolia* var. *leiocarpa* Perry and Fernald (bottom).

## APPENDIX II

## PHYSIOGRAPHIC MAPS





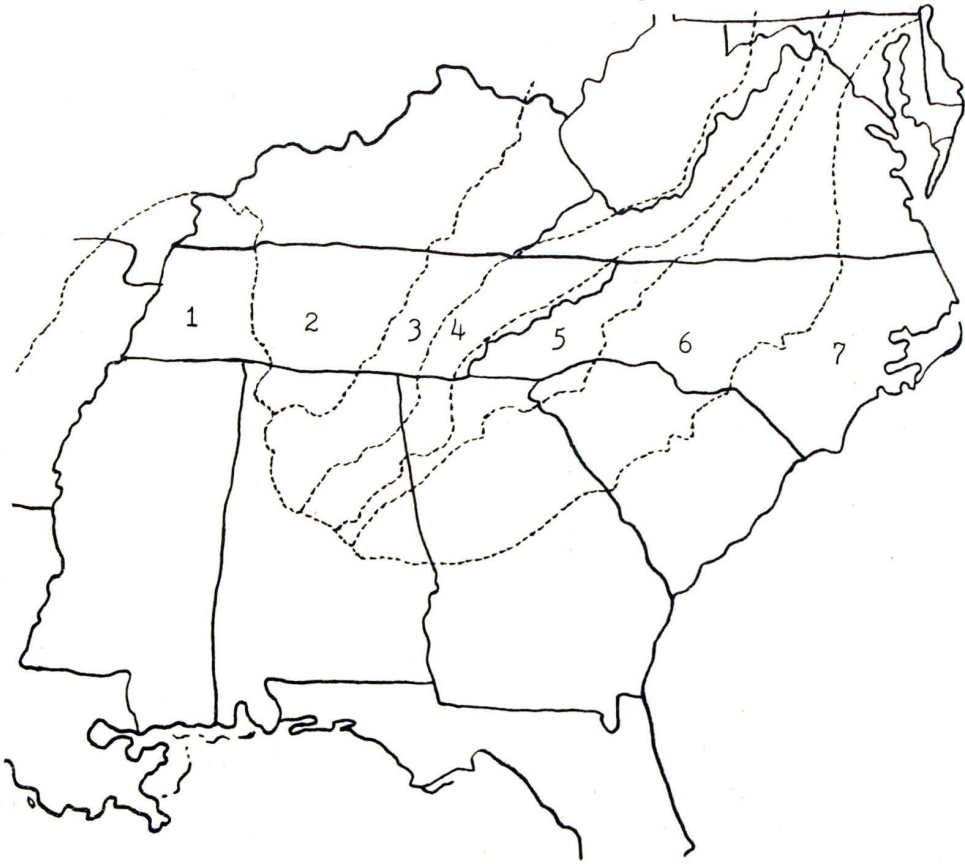


FIGURE 2.  
GENERALIZED PHYSIOGRAPHIC PROVINCES OF SOUTHEASTERN UNITED STATES;  
(from Duncan and Foote, 1975).

1. West Gulf Coastal Plain
2. Interior Low Plateau
3. Cumberland Plateau
4. Ridge and Valley
5. Blue Ridge
6. Piedmont
7. Coastal Plain

APPENDIX III  
SPECIMENS EXAMINED

The following specimens were examined in the three herbaria visited; county, date of collection, collector, and herbarium is stated for each specimen. The herbaria are designated by the following abbreviations: Austin Peay State University (APSU); Vanderbilt University (VDB); University of Tennessee, Knoxville (TENN).

- Benton Co.: 12 Oct. 1949, Shanks 14800 (TENN).
- Blount Co.: 25 Oct. 1935, Jennison 37 (TENN); 22 July 1935, Jennison 503 (TENN); 7 Oct. 1973, Phillippe 2477 (TENN); 7 Oct. 1956, Sharp and Sierk 20900 (TENN); 28 Aug. 1930, Cain (TENN); 31 Dec. 1956, Sharp 21813 (TENN).
- Coffee Co.: 24 Sept. 1972, Clark (TENN).
- Decatur Co.: 14 Oct. 1949, Shanks 14551 (TENN).
- Franklin Co.: 20 Mar. 1948, Webb (TENN); 7 Aug. 1947, Shanks, Clebsch, Sharp 5727 (TENN); 15 July 1948, Fairchild, Clebsch, Sharp 9936 (TENN); 8 July 1949, Webb 307 (TENN).
- Giles Co.: 12 Sept. 1949, Shanks 9172 (TENN); 13 July 1948, Sharp, Fairchild, Clebsch 9809 (TENN); 14 July 1948, Sharp, Fairchild, Clebsch 9843 (TENN).
- Grundy Co.: 1 July 1944, Shaver 8401 (VDB); 17 June 1948, Sharp, Fairchild, Clebsch 48-136 (TENN).
- Hamilton Co.: 14 July 1934, Sharp and Underwood 1061 (TENN).
- Hardin Co.: 15 Oct. 1949, Shanks 14605 (TENN).
- Lauderdale Co.: 29 Apr. 1949, Sharp, Felix, Adams 12246 (TENN); 26 June 1948, Sharp, Clebsch, Fairchild 7954 (TENN).
- Lawrence Co.: 6 July 1947, Sharp and Clebsch 20 (TENN).
- Loudon Co.: 15 Oct. 1966, Campbell (TENN).
- Madison Co.: 24 Aug. 1947, Underwood, Clebsch, Sharp 6837 (TENN).
- Marion Co.: 7 Oct. 1969, Kral 37604 (VDB); 1 Oct. 1966, Sharp and Jay 41453 (TENN); 6 Nov. 1966, Sharp 41504 (TENN); Oct. 1955, DeSelm 965 (TENN); 18 Sept. 1946, Ford and Russell 2219 (TENN); 16 June 1948, Fairchild, Clebsch, Sharp 48-86 (TENN); 20 Oct. 1956, Shanks, Brown, Sherman 21670 (TENN); 5 Apr. 1959, Sherman and Houk 25332 (TENN); 21 Oct. 1956, Shanks, Brown, Sherman 21691 (TENN).
- McNairy Co.: 8 July 1947, Sharp and Clebsch 209 (TENN).
- Monroe Co.: 8 Oct. 1961, Sharp, Pringle, Drumke, Ellis, Ramsey 29669 (TENN).
- Rhea Co.: 25 Sept. 1949, Sharp, Fairchild, Case 2580 (TENN).
- Rutherford Co.: 30 June 1957, DeSelm 1569 (TENN); 11 Oct. 1958,



Sharp and Pursell 25484 (TENN).

Sevier Co.: 7 July 1942, Stupka (TENN).

Tipton Co.: 28 Apr. 1949, Sharp and Adams 12160 (TENN); 19 Aug. 1947, Sharp and Clebsch 6483 (TENN).

Van Buren Co.: 10 July 1948, Parnell 125 (VDB).

Warren Co.: 24 Sept. 1972, Gonsoulin 1877 (VDB).

Wayne Co.: 8 June 1958, DeSelm 1775 (TENN); 11 July 1948, Fairchild, Sharp, Clebsch 9665 (TENN).

White Co.: 31 July 1947, Shanks, Clebsch, Sharp 5594 (TENN); 9 July 1972, Kral 47521 (VDB).

Callicarpa dichotoma (Lour.) K. Koch.

Knox Co.: 21 Oct. 1936, Underwood (TENN)(cultivated).

Lippia lanceolata Michx.

Anderson Co.: 10 July 1940, A. and M. Cole 795 (TENN); 7 July 1933, Sharp and Underwood 177 (TENN); 12 July 1940, Cole (TENN).

Clay Co.: 31 July, 1971, Bowers 46101 (VDB)(TENN).

Davidson Co.: 22 June 1968, Rogers 41843 (TENN); 10 July 1934, Charlesworth (TENN); 19 July 1962, Franklin, Freeman, Sullivan 233 (VDB); 19 July 1935, Shaver (VDB).

Dyer Co.: 3 July 1948, Fairchild, Clebsch, Sharp 8268 (TENN).

Giles Co.: 17 Sept. 1969, Kral 36953 (VDB); 12 July 1948, Fairchild, Clebsch, Sharp 9824 (TENN).

Grainger Co.: 29 June 1936, Morrison 58 (TENN); 20 Aug. 1936, Morrison (TENN).

Hardin Co.: 7 July 1947, Sharp and Clebsch 47-69 (TENN).

Henry Co.: 23 July 1974, Webb (TENN); 6 June 1976, Edwards (APSU).

Knox Co.: 8 Aug. 1934, Hesler and Woods 3028 (TENN); 23 July 1971, Bowers 46220 (TENN); 6 June 1950, Dow, Clarke, Norris, Sharp 13459 (TENN); 25 July 1951, Ellis 28982 (TENN).

Lake Co.: 15 June 1975, Webb and Hainley (TENN); 15 Sept. 1946, Shanks 3561 (TENN); 1924, O. and G. Jennings (TENN).

Lauderdale Co.: 17 Sept. 1949, Shanks 13564 (TENN).

Loudon Co.: 22 July 1972, Magee (TENN).

Maury Co.: 14 Aug. 1971, Kral 43582 (VDB); 1891, Shimek (TENN);

27 July 1957, Chappell (TENN).

Montgomery Co.: 11 Aug. 1946, Shanks 3561 (TENN); 17 Aug. 1943, Shanks (APSU); 21 Aug. 1948, Clebsch (APSU); 27 Aug. 1966, Scott and Wallen (APSU); 4 July 1968, W. and B. Chester 2123 (APSU)(TENN); 20 July 1971, Chester 2411 (APSU); 10 Aug. 1967, Chester and Wofford 1780 (APSU).

Obion Co.: 13 Aug. 1947, Clebsch and Sharp 6127 (TENN); 24 June 1948, Clebsch, Fairchild, Sharp 7892 (TENN); 6 July 1947, Clebsch and Sharp 8371 (TENN); 14 July 1941, D. and M. Eyles (TENN).

Roane Co.: 7 July 1970, Bowers (TENN); 26 July 1951, Nease 519 (TENN); 5 Aug. 1957, DeSelm and McGinnis 29951 (TENN).

Rutherford Co.: 23 June 1955, DeSelm 665 (TENN); 15 July 1969, Blum 3848 (VDB); 20 June 1950, Quarterman (VDB).

Shelby Co.: 28 Aug. 1965, Rogers 34469 (TENN); 29 June 1948, E. and A. Clebsch and Sharp 8129 (TENN); 20 Aug. 1951, Norris and Sharp 16343 (TENN).

Stewart Co.: 21 July 1965, Ellis (APSU); 1 Sept. 1966, Wofford (APSU).

Weakley Co.: 14 Aug. 1947, Sharp and Clebsch 6229 (TENN).

Williamson Co.: 22 Aug. 1967, Kral 28988 (VDB).

Wilson Co.: 8 Aug. 1968, Blum 2855 (VDB); 16 Aug. 1969, Rogers 44310 (VDB)(TENN).

Verbena bonariensis var. conglomerata Briq.

Knox Co.: 29 June 1954, Hoss 18323 (TENN)(cultivated).

Verbena bracteata Lag. and Rodr.

Benton Co.: 21 May 1934, Harger 7900 (TENN).

Chester Co.: 29 May 1972, Rogers 8140 (TENN).

Montgomery Co.: 16 May 1974, Chester 2710 (APSU); 14 July 1974, Chester 2797 (APSU).

Obion Co.: 3 June 1943, Iltis 1747 (TENN).

Shelby Co.: 18 June 1965, Rogers 33496 (TENN); 31 May 1970, Bowers and Rogers 45217 (TENN).

Tipton Co.: 2 July 1948, Fairchild, Clebsch, Sharp 8261 (TENN).

Verbena canadensis (L.) Britt.

- Bedford Co.: 11 Apr. 1949, Sharp, Felix, Adams 11246 (TENN).
- Davidson Co.: 29 Apr. 1973, Gonsoulin 2056 (VDB); 21 Apr. 1972, Kral 45667 (VDB); 14 May 1960, Yates (VDB); 29 Apr. 1959, Dermon 12 (VDB); 5 May 1959, Caudill 20 (VDB); 12 Apr. 1963, Scott 24 (VDB); 22 Apr. 1961, Elikan 630 (VDB); 4 May 1961, Norton 44 (VDB); 16 May 1961, Itzig 69 (VDB); 7 May 1964, Pinson 118 (VDB); 2 May 1959, Bernard 32 (VDB); 2 May 1963, Cibulka 125 (VDB); 29 Apr. 1932, Freeman 9051 (VDB); 29 Apr. 1962, Earheart 54 (VDB).
- Haywood Co.: 4 May 1949, Sharp, Felix, Adams 12440 (TENN).
- Henry Co.: 12 May 1974, Edwards (APSU).
- Humphreys Co.: 24 Apr. 1972, Kral 45708 (VDB).
- Marshall Co.: 18 May 1951, Quarterman (VDB); 30 Apr. 1955, Quarterman 5240 (VDB); 9 July 1962, Franklin, Freeman, Sullivan 146 (VDB); 25 Apr. 1964, Quarterman, Baskin, Oakland 64-29 (VDB).
- Maury Co.: 9 Apr. 1949, Sharp, Felix, Adams 11097 (TENN); 17 Apr. 1966, Baskin and Caudle 107 (VDB); 1 June 1966, Kral 26696 (VDB); 1 June 1966, Kral 26723 (VDB); 19 Apr. 1968, Kral 30204 (VDB).
- McNairy Co.: 26 July 1950, Sharp 15309 (TENN).
- Rutherford Co.: 9 May 1970, Sullivan (APSU); 20 Apr. 1940, Sharp and Shanks 439 (TENN); 20 Sept. 1959, DeSelm 1991 (TENN); 19 Apr. 1949, Sharp, Felix, Adams 11485 (TENN); 21 Apr. 1957, Hoskinson (TENN); 17 May 1959, A. and E. Sharp 25895 (TENN); 2 May 1963, Gerst 45 (TENN); 13 Apr. 1955, DeSelm 330 (TENN); 11 May 1963, Demaree 47565 (VDB); 23 Apr. 1963, Quarterman 63-1 (VDB); 17 May 1947, Quarterman 2057 (VDB); 27 Apr. 1946, Quarterman 1638 (VDB); 27 Apr. 1949, Ju-chien Tseng 95 (VDB); 16 Apr. 1951, White 40 (VDB); 26 Apr. 1964, Quarterman, Baskin, Oakland 64-70 (VDB); 6 May 1961, Abel 74 (VDB); 2 May 1963, Williams 125 (VDB); 2 May 1962, Lewis 65 (VDB).



Smith Co.: 13 May 1969, Blum 3422 (TENN)(VDB).

Trousdale Co.: 8 May 1969, Blum 3359 (TENN)(VDB).

Weakley Co.: 3 May 1949, Sharp, Felix, Adams 12426 (TENN).

Williamson Co.: 19 Apr. 1968, Kral 30221 (VDB).

Wilson Co.: 13 May 1970, Kral 34084 (VDB); 9 Apr. 1966, Rogers 44564 (TENN); 5 May 1941, Shanks 1579 (TENN); 8 Apr. 1956, DeSelm 1059 (TENN).

Verbena hastata L.

Carroll Co.: 11 Aug. 1947, Sharp, Shanks, Clebsch 6008 (TENN).

Chester Co.: 9 July 1948, Sharp, Fairchild, Clebsch 9434 (TENN).

Coffee Co.: 3 Aug. 1947, Sharp, Shanks, Clebsch 5234 (TENN).

Henry Co.: 12 Aug. 1947, Sharp and Clebsch 6110 (TENN); 22 June 1948, Sharp, Fairchild, Clebsch 7737 (TENN).

Johnson Co.: 10 July 1951, Barclay 68 (TENN).

Montgomery Co.: 11 July 1942, Oliver 85 (TENN); 30 July 1949, Brown and Clebsch (APSU); 15 Sept. 1974, Chester 2913 (APSU).

Morgan Co.: 29 Sept. 1961, Sharp and Pringle 28445 (TENN).

Obion Co.: 13 Aug. 1947, Sharp and Clebsch 6166 (TENN).

Sullivan Co.: 7 Aug. 1953, James 18210 (TENN).

Verbena rigida Spreng

Davidson Co.: 30 May 1934, Hughes (VDB).

Verbena simplex Lehm.

Anderson Co.: 6 June 1962, Ramsey and Holt 30253 (TENN); 26 June 1961, Ellis 28806 (TENN); 7 July 1940, Cole (TENN); 5 June 1940, Sharp 1040 (TENN); 21 June 1956, Gale 30 (TENN); 15 May 1940, Varnell (TENN).

Bedford Co.: 16 May 1959, A. and E. Sharp 25861 (TENN).

Benton Co.: 15 July 1950, Walker 16031 (TENN).

Bledsoe Co.: 5 July 1969, Sharp, Morton, Rogers, Bowers 43719 (TENN).

Blount Co.: 12 Aug. 1964, Thomas (TENN).

Carter Co.: 10 June 1955, Pearman (TENN).

Carroll Co.: 16 June 1951, Demaree 30781 (TENN).



- Cheatham Co.: 24 June 1970, Gonsoulin 1412 (VDB).
- Claiborne Co.: 10 June 1962, Sharp, Ramsey, Varner, Holt 30311 (TENN).
- Coffee Co.: 25 May 1969, Blum 3536 (TENN)(VDB); 12 Aug. 1969, Kral 36284 (VDB).
- Cumberland Co.: 8 July 1934, Sharp and Underwood 1178 (TENN).
- Davidson Co.: 16 May 1959, Dermon 33 (VDB); 12 May 1963, Morris 103 (VDB); 14 May 1964, Robison 74 (VDB); 5 July 1930, Freeman 203 (VDB); 12 May 1965, Kral 23958 (VDB); 14 May 1963, Payne 137 (VDB); 30 Apr. 1963, Payne 106 (VDB); 10 July 1962, Franklin, Freeman, Sullivan 159 (VDB); 11 May 1963, Felkel 138 (VDB); 20 May 1944, Quarterman 82 (VDB); 17 June 1968, Kral 31527 (VDB)(TENN); 22 May 1966, Kral 26615 (VDB); 19 June 1937, Woodruff (TENN); 17 May 1941, Shanks 1534 (TENN).
- Decatur Co.: 10 May 1949, Sharp, Adams, Felix 12926 (TENN).
- Dickson Co.: 2 Aug. 1969, Kral 35924 (VDB); 24 Apr. 1972, Kral 46622 (VDB).
- Fayette Co.: 13 June 1947, Hebb 22131 (TENN).
- Fentress Co.: 31 July 1971, Bowers 46106 (TENN)(VDB).
- Franklin Co.: 20 June 1962, Ratledge and DeSelm 30763 (TENN).
- Grainger Co.: 19 June 1934, Sharp and Hesler 1608 (TENN); 10 July 1936, Kamper (TENN).
- Greene Co.: 8 Aug. 1967, Nichols 8919 (TENN).
- Hawkins Co.: 16 July 1954, Wolfe (TENN).
- Henry Co.: 2 June 1952, Brown (TENN).
- Knox Co.: 15 May 1964, Chester 205 (APSU); 19 May 1955, Hoss 19461 (TENN); 11 July 1951, Cloyd (TENN); 22 May 1931, Wilson (TENN); 24 May 1936, Underwood 4513 (TENN); 15 Sept. 1946, Russell 3086 (TENN); 14 May 1938, Morrison 187 (TENN); May 1899, Harrill 1 (TENN).
- Lewis Co.: 21 May 1945, King 94 (VDB).
- Loudon Co.: 26 May 1934, Hesler and Sharp 1084 (TENN); 19 Sept. 1952, Sharp, Norris, MacLaughlin, Woods, Dietz 16989 (TENN).

- Marshall Co.: 8 July 1967, Kral 28513 (VDB); 18 May 1951, Quarterman (VDB).
- Maury Co.: 1891, Shimek (TENN).
- McMinn Co.: 20 May 1960, Stephens 29 (TENN).
- Montgomery Co.: 17 June 1969, Blum 3811 (TENN)(VDB); 12 June 1966, Scott and Scherer (APSU); 21 May 1966, Riggins (APSU); 7 May 1967, Chester (APSU); 21 May 1966, Phillips (APSU); 22 May 1948, Clebsch (APSU); 23 May 1942, Shanks 2055 (APSU); 11 July 1967, Chester (APSU); 6 July 1972, Dodson (APSU); 14 June 1966, Yarbrough (APSU); 19 May 1969, Buckner (APSU); 14 May 1942, Shanks 1996 (APSU); 22 May 1948, Clebsch (APSU); 20 May 1967, Plummer (APSU).
- Perry Co.: 24 May 1972, Kral 46566 (VDB).
- Polk Co.: 20 July 1969, Rogers 44075 (TENN); 21 May 1961, Sharp and Pringle 29560 (TENN); 8 June 1958, Sharp, Russell, Norris 23592 (TENN).
- Rhea Co.: 27 May 1934, Sharp and Hesler 1048 (TENN).
- Rutherford Co.: 15 July 1969, Blum 3840 (VDB); 24 June 1962, Demaree 45755 (VDB)(TENN); 8 June 1966, Kral 26887 (VDB); 28 June 1962, Franklin, Freeman, Sullivan 50 (VDB); 31 July 1962, Franklin, Freeman, Channell 300 (VDB); 8 June 1966, Kral 26922 (VDB)(TENN); 11 May 1956, DeSelm 1334 (TENN); 2 May 1955, DeSelm 437 (TENN); 2 May 1963, Francis 86 (VDB); 2 May 1963, Armstrong 152 (VDB); 2 May 1963, Barnes 60 (VDB).
- Stewart Co.: 8 June 1967, Riggins 123 (APSU); 20 June 1968, Brock (APSU).
- Trousdale Co.: 25 Aug. 1972, Skorepa 6678 (TENN).
- Van Buren Co.: 9 July 1972, Kral 47516 (VDB).
- Warren Co.: 3 July 1958, Channell 7334 (VDB); 30 May 1951, Shanks, Woods, Hardin 15794 (TENN).
- White Co.: 13 May 1933, C. and U. Weatherby 6276 (TENN); 14 Aug. 1970, Kral 40566 (VDB).
- Williamson Co.: 29 June 1962, Franklin, Freeman, Sullivan 63 (VDB); 17 June 1969, Gonsoulin 1055 (VDB); 17 July 1950,

Quarterman 4210 (VDB); 22 Aug. 1967, Kral 28999 (VDB);  
6 July 1954, Quarterman 5096 (VDB); 6 Aug. 1968, Kral  
and Blum 32143 (VDB).

Wilson Co.: 22 June 1962, Lebanon (VDB); 20 May 1966, Baskin and  
Caudle 171 (VDB); 15 June 1966, Kral 26944 (VDB); 13  
May 1970, Kral 39065 (VDB); 8 May 1953, Quarterman  
4592 (VDB).

Verbena stricta Vent.

Henry Co.: 22 June 1948, Sharp, Fairchild, Clebsch 7724 (TENN).  
Obion Co.: 6 July 1948, Fairchild, Clebsch, Sharp 8401 (TENN)(VDB).  
Weakley Co.: 23 June 1948, Fairchild and Clebsch 7779 (TENN).

Verbena tenuisecta Briq.

Henderson Co.: 8 July 1948, Sharp, Fairchild, Clebsch 9298 (TENN).

Verbena urticifolia L.

Anderson Co.: 29 June 1956, Gale 74 (TENN).  
Bedford Co.: 3 July 1947, Clebsch and Sharp 3675 (TENN).  
Benton Co.: 20 July 1950, Walker 16067 (TENN).  
Blount Co.: 7 Oct. 1956, Sharp and Sierk 21503 (TENN); 22 Sept.  
1962, Underwood and Hoffman (TENN).  
Carter Co.: 15 July 1955, Grindstaff (TENN).  
Cocke Co.: 12 Oct. 1963, Sohmer 32471 (TENN).  
Coffee Co.: 14 Aug. 1968, Kral 32268 (VDB).  
Crockett Co.: 3 July 1948, Fairchild, Clebsch, Sharp 8291 (TENN).  
Cumberland Co.: 8 July 1934, Sharp and Underwood 2073 (TENN).  
Davidson Co.: 7 July 1962, Franklin 114 (VDB).  
Dickson Co.: 2 Aug. 1969, Kral 35933 (VDB).  
Grainger Co.: 30 July 1936, Morrison (TENN); 13 July 1936, Morri-  
son (TENN).  
Grundy Co.: 4 July 1947, Sharp, Shanks, Clebsch 5307 (TENN).  
Hawkins Co.: 24 Aug. 1954, Wolfe 18410 (TENN); 27 July 1935, Sharp  
and Underwood 4175 (TENN).  
Houston Co.: 2 Aug. 1969, Kral 35869 (VDB).  
Johnson Co.: 28 Sept. 1952, Barclay 67 (TENN).



- Lauderdale Co.: 27 June 1948, Clebsch 8026 (TENN).  
 Lake Co.: 1924, O. and G. Jennings (TENN).  
 Lewis Co.: 7 July 1945, King 176 (VDB).  
 McMinn Co.: 20 July 1969, Rogers 44007 (TENN); 5 July 1960, Stephens 12 (TENN).  
 Montgomery Co.: 22 Aug. 1943, Shanks 2334 (TENN); 13 July 1972, Dodson (APSU); 10 Sept. 1968, Chester 2186 (APSU); 11 July 1942, Oliver 85 (APSU); 20 June 1942, Oliver 62 (APSU); 19 June 1970, Chester 2349 (APSU); 20 July 1971, Chester 2433 (APSU); 6 July 1975, Chester 3021 (APSU).  
 Obion Co.: 24 June 1948, Sharp, Fairchild, Clebsch 7895 (TENN).  
 Perry Co.: 4 Aug. 1969, Kral 36045 (VDB).  
 Polk Co.: 20 July 1969, Rogers 44044 (TENN).  
 Rhea Co.: 9 Sept. 1949, Shanks and Woods 8967 (TENN).  
 Roane Co.: 6 July 1961, Ellis 28764 (TENN); 6 Sept. 1951, Nease and Hodgson 516 (TENN); Aug. 1957, DeSelm and McGinnis 29950 (TENN).  
 Rutherford Co.: 15 July 1969, Blum 3825 (VDB); 19 June 1955, DeSelm 638 (TENN).  
 Sevier Co.: 17 Sept. 1964, Thomas (TENN); 31 July 1937, Jennison 3903 (TENN); 20 July 1965, Thomas (TENN); 4 Sept. 193\_, Elder 16 (TENN).  
 Shelby Co.: 28 Aug. 1965, Rogers 34445 (TENN).  
 Stewart Co.: 3 Aug. 1969, Kral 36022 (VDB).  
 Unicoi Co.: 14 July 1955, Lyle 19643 (TENN).  
 White Co.: 31 July 1947, Sharp, Shanks, Clebsch 5066 (TENN).  
 Williamson Co.: 6 Aug. 1968, Kral and Blum 32142 (VDB); 14 July 1954, Quarterman 5104 (VDB).  
 Wilson Co.: 8 Aug. 1968, Blum 2850 (VDB).

Verbena urticifolia var. leiocarpa Perry and Fernald

- Blount Co.: 12 Aug. 1964, Thomas (TENN).  
 Cocke Co.: 13 June 1956, Chapman (TENN).  
 Grundy Co.: 17 June 1948, Fairchild, Clebsch, Sharp 48-121 (TENN).  
 Knox Co.: 25 Oct. 1961, Galyon and Sharp 29827 (TENN).



Montgomery Co.: 9 Oct. 1949, Clebsch, Shanks, Woods 14401 (TENN)  
(APSU).

Polk Co.: 15 July 1969, Rogers and Bowers 43924 (TENN).

Sevier Co.: 27 Aug. 1973, Coleman (TENN); 2 July 1933, Underwood  
(TENN); 18 Sept. 1934, Sharp 5446 (TENN); 19 July  
1954, Hoss 18606 (TENN).

Stewart Co.: 21 June 1948, Sharp, Fairchild, Clebsch 7705 (TENN).

Unicoi Co.: 12 July 1964, Norris and Frodin 33074 (TENN).

Union Co.: 11 Aug. 1936, Kalter (TENN).

Van Buren Co.: 5 July 1969, Sharp and Rogers 43573 (TENN)(VDB).

White Co.: 16 July 1948, Fairchild, Shafer, Clebsch, Sharp 11539  
(TENN).

Vitex agnus-castus L.

Knox Co.: 22 June 1965, Morton 319 (TENN)(cultivated).