

**AN ANNOTATED CHECKLIST OF THE AQUATIC
ANGIOSPERMS OF CHEATHAM COUNTY, TENNESSEE**

BY

PEGGY ANN WALLEN

AN ANNOTATED CHECKLIST OF THE AQUATIC ANGIOSPERMS
OF CHEATHAM COUNTY, TENNESSEE

A Research Paper
Presented to
the Graduate Council of
Austin Peay State University

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

by
Peggy Ann Wallen
September 8, 1973

To the Graduate Council:

I am submitting herewith a Research Paper written by Peggy Ann Wallen entitled "An Annotated Checklist of the Aquatic Angiosperms of Cheatham County, Tennessee." I recommend that it be accepted in partial fulfillment of the requirements for the degree of Master of Science.

William H. Ellis
Major Professor

Accepted for the Council:
Wayne E. Stamps

ACKNOWLEDGMENTS

I wish to gratefully acknowledge the assistance and continual encouragement of my major professor, Dr. William H. Ellis. Further acknowledgment is extended to Dr. Marvin M. Provo and Mr. Floyd L. Brown for the reading of this manuscript and assistance throughout this investigation. I also wish to thank Dr. Edward Wayne Chester for his assistance in the identification of some members of the families Graminae and Cyperaceae.

I particularly wish to thank Mrs. Mildred Perry for her assistance in the field work, and would like also to thank Mrs. Donald F. Harker, Mr. Michael Silvey, Mr. James Moroni, Miss Kathy Stefko, Mr. Norman DeWein and Miss Janie Wallen for their assistance in the field work.

I especially would like to thank my parents for their continued encouragement and financial support throughout my work.

Encouragement and assistance from other staff members of the Austin Peay State University Biology staff are deeply appreciated.

TABLE OF CONTENTS

CHAPTER	PAGE
I. INTRODUCTION	1
II. DESCRIPTION OF THE STUDY AREA.	2
III. PREVIOUS WORK ON AQUATIC PLANTS IN TENNESSEE	4
IV. LIMITATIONS OF THE STUDY	6
V. METHODS AND MATERIALS.	7
VI. ANNOTATED CHECKLIST	8
VII. DISCUSSION	13
VIII. SUMMARY.	15
LITERATURE CITED	16

LIST OF FIGURES

FIGURE	PAGE
1. Map of Cheatham County, Tennessee, Showing Location of Collection Sites	3

INTRODUCTION

The importance of aquatic plants can be viewed from several different aspects. They are essential to the ecological balance of their habitats in that they provide food, oxygen and cover for many different animals. In many instances, their presence can influence the physical nature of their environment. Butcher (1933) listed the following specific influences macrophytic vegetation can have on the environment: (1) swiftness of current and depth of streams are influenced by the amount and type of vegetation; (2) shelter is afforded the smaller animals; (3) a habitat is created by the plants in which certain species of fish and amphibians lay their eggs; (4) the rooted aquatics serve as structures to which algae may be attached; (5) the plants are a source, both direct and indirect, of food used by animals; (6) the process of photosynthesis releases free oxygen which affects the oxygen content of the water; (7) fertility of the water is increased by the trapping of silt and by the decomposition of plant parts; and (8) the rooted plants tend to stabilize the stream bed.

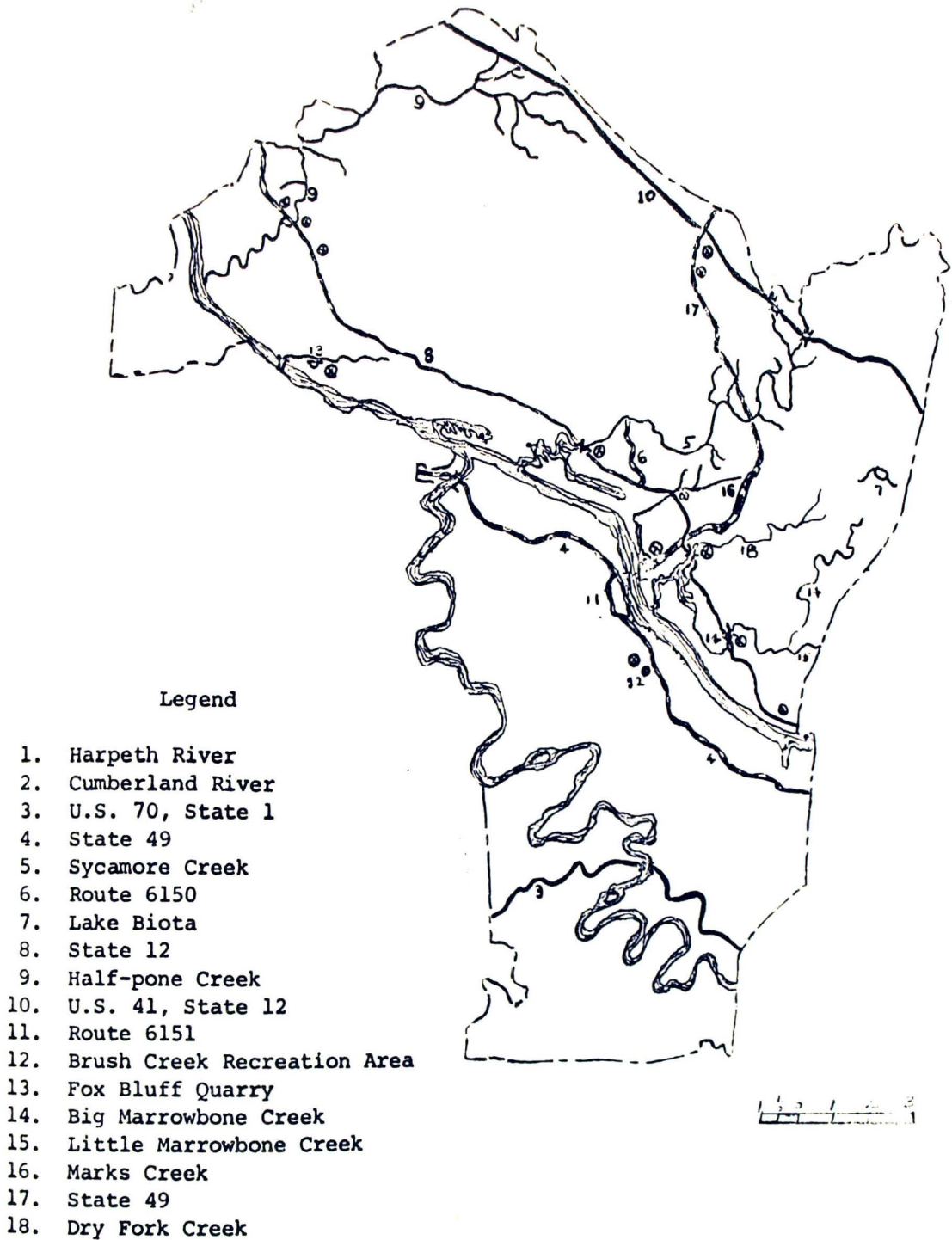
It must also be stated that the overabundance of some aquatic plants can be considered undesirable in that they can clog a stream or hamper navigation of small craft such as fishermen's boats. Hasler and Jones (1949) reported excessive sheltering of small fry of forage species of fish resulting in slow growth of carnivorous species of game fish.

This study is devised to show habitat distribution of the plants to be collected and to increase the knowledge of the flora of Cheatham County.

DESCRIPTION OF THE STUDY AREA

The study area was limited to the political boundaries of Cheatham County, Tennessee. The county lies in the northwestern portion of Middle Tennessee on both sides of the Cumberland River, and is located principally on the Highland Rim with the southeastern portion extending into the Central Basin. A map of the county with the collection sites identified is shown in Figure 1. The county contains 370 square miles or 236,800 acres. The average elevation is 535 feet, with most of the land considered hilly, and the soils on the uplands being both siliceous and calcareous (a Bulletin by the Louisville and Nashville Railroad, the Nashville, Chattanooga and St. Louis Railway, The Southern Railway, 1899).

Most of the collections were taken within five miles of either side of Highway 12 and Federal Highway 41-A which approximately longitudinally bisects the county, giving a variance in the habitats due to physiographic changes in the county from the north end to the south end.



■ indicates location sites

Fig. 1: MAP OF CHEATHAM COUNTY, TENNESSEE,
SHOWING LOCATION OF COLLECTION SITES

PREVIOUS WORK ON AQUATIC PLANTS IN TENNESSEE

Considerable work on floristics has been done in various areas of Middle Tennessee, but there has been little effort relative to the aquatic plants of Cheatham County. Much of the work on aquatic plants up until this time has consisted of their study in reference to use as food or in their control as pests. Much of the afore-mentioned work was done at Reelfoot Lake Biological Station in West Tennessee. The only comprehensive work done for the state of Tennessee was a Checklist of Vascular Aquatic Plants of Tennessee (Robinson and Shanks, 1959). In addition (Robinson, 1956), in an unpublished thesis entitled Survey of Vascular Aquatic Vegetation of the Cumberland Plateau in Tennessee has contributed significantly to the knowledge of Tennessee aquatics.

Manuals that include aquatic plants of the area and which were helpful in this study are as follows: A Guide and Key to the Aquatic Plants of the Southern United States (Eyles and Robertson, 1944), Manual of the Southeastern Flora (Small, 1933), New Britton and Brown Illustrated Flora of the Northern States and Adjacent Canada (Gleason, 1968), A Manual of Aquatic Plants (Fassett, 1957) and a Philosophy of Botany (Gattinger, 1901), Aquatic Plants of the United States (Muenscher, 1944) and Water Plants (Arber, 1919). Papers that were useful in this study are the following unpublished checklists (available from the Botany Department of the University of Tennessee): A Preliminary Checklist of Monocots in Tennessee (Sharp, et al, 1960) and

A Checklist of Dicots of Tennessee (Sharp, et al, 1960). The final classification used in this work, however, is according to Gray's Manual of Botany (Fernald, 1950).

LIMITATIONS OF THE STUDY

The study was begun in early June of 1969 and terminated in early September 1969. Possible collecting sites were chosen by using topographical maps of the county to locate ponds and springs. Specimens were taken from the following type habitats: ponds, streams, springs, river banks and sloughs. The species collected were taken from areas that were always at least damp, if not inundated, and directly from the water.

Since the collection was done through a period of only one summer, it can be seen that further study should be done to complete the checklist of aquatic plants of Cheatham County. This work represents only a preliminary survey and it is hoped by the investigator that it will make a contribution to the knowledge of the flora of Tennessee, particularly of Middle Tennessee and to the distributional data which were gathered by Eyles and Robertson (1944).

Voucher specimens were made and are stored in the herbarium of Austin Peay State University, Clarksville, Tennessee. The work consists of an annotated checklist in which the families and genera have been placed in alphabetical order.

METHODS AND MATERIALS

The specimens were collected taking care to include the root system. After their collection the plants were placed in polyethylene bags containing a small amount of water in order to prevent dehydration. If it was not possible to press the plants immediately after their collection, they were placed in a refrigerator for not longer than twenty-four hours. As the specimens were being collected, the field data were recorded in a label book containing dual labels and a collection number was given according to the number on the label. This number appears after the annotation for each specimen.

The plants were pressed in newspapers and dried in a plant dryer at the Austin Peay State University Biology Department. After drying, they were stored in newspapers until the time of their mounting on herbarium sheets.

An annotated checklist was compiled which contained the species, description of habitat, date collected, collectors and collection number.

ANNOTATED CHECKLIST

Acanthaceae

- (1) Justica americana (L.) Vahl. sandbars in stream beds.
William H. Ellis and Mildred Perry. July 5, 1969. 04196.

Aceraceae

- (2) Acer negundo L. wet soil. Peggy A. Wallen and Mildred Perry. April 29, 1969. 04104.
(3) A. saccharinum L. river banks and bottom lands. Peggy A. Wallen and Kay Harker. May 29, 1969. 03991.

Alismataceae

- (4) Alisma plantago aquatica Pursh. pond edges. Kay Harker and Mike Silvey. July 4, 1969. 04193.
(5) Echinodorus cordifolius (L.) Griseb. damp soil at pond edge. Peggy A. Wallen and Kay Harker. May 29, 1969. 04199.
(6) Lophotocarpus calycinus (Engelm.) J.6, Sm. 04200.
(7) Cham. and Schlect. damp soil at pond edge. Peggy A. Wallen and Kay Harker. June 8, 1969. 04200.

Balsaminaceae

- (8) Impatiens biflora Willd. damp ground around stream bank.
William H. Ellis and Mildred Perry. July 5, 1969. 04166.
(9) I. pallida Nutt. damp ground around stream bank. William H. Ellis and Mildred Perry. July 5, 1969. 04102.

Compositae

- (10) Senecio aureus L. damp bottoms and stream edges. Peggy A. Wallen and Kay Harker. May 29, 1969. 03988.

Cornaceae

- (11) Cornus amomum Mill. shores and thickets. William H. Ellis and Mildred Perry. July 5, 1969. 04117.
(12) Cornus foemina Mill. shores of streams. Peggy A. Wallen and Janie Wallen. June 7, 1969. 04160.

Corylaceae

- (13) Alnus serrulata (Ait) Willd. edge of stream. Peggy A. Wallen and Mildred Perry. June 6, 1969. 04000.

Cruciferae

- (14) Nasturtium officinale R. Brown. in cold spring. Peggy A. Wallen and Kay Harker. May 29, 1969. 03982.
- (15) Rorippa islandica (L.) Bess. in water at edge of stream. Peggy A. Wallen and Mildred Perry. April 29, 1969. 03959.

Cyperaceae

- (16) C. brachyglossa MacKenz. edge of farm pond. Peggy A. Wallen, James Moroni and Mildred Perry. 04175.
- (17) C. frankii Kunth. inundated land around stream bank. Peggy A. Wallen and Janie Wallen. June 7, 1969. 04181.
- (18) C. intumescens Rudge. edge of a farm pond. Peggy A. Wallen and Mildred Perry. June 5, 1969. 03998.
- (19) C. leptalea Wahl. inundated land at edge of a stream. Peggy A. Wallen, Norman DeWein and Kathy Stefko. May 18, 1969. 03966.
- (20) C. longii Mach. edge of a farm pond. Peggy A. Wallen, Mildred Perry and James Moroni. June 19, 1969. 04179.
- (21) C. lupulina Muhl. inundated land at edge of a stream. Peggy A. Wallen, Norman DeWein and Kathy Stefko. May 18, 1969. 03978.
- (22) C. lurida Wahl. inundated land around stream bank. Peggy A. Wallen, Mildred Perry and James Moroni. June 19, 1969. 04174.
- (23) C. tribuloides Wahl. inundated land around stream bank. Peggy A. Wallen, Kathy Stefko and Norman DeWein. May 18, 1969. 04178.
- (24) C. vulpinoidea Michx. inundated land at edge of a stream. Peggy A. Wallen and Janie Wallen. June 7, 1969. 03976.
- (25) Eleocharis engelmanni Steud. in water at edge of farm pond. Peggy A. Wallen and Mildred Perry. June 6, 1969. 03995.
- (26) E. intermedia (Muhl.) Schultes. in water at pond's edge. Peggy A. Wallen and Janie Wallen. June 7, 1969. 04159.

- (27) E. obtusa (Willd.) Schultes. in water at pond's edge.
Peggy A. Wallen and Kay Harker. May 29, 1969. 03992.
- (28) Scirpus atrovirens geogianus (Harper) Fernald. inundated
land at edge of a stream. Peggy A. Wallen, Norman DeWein
and Kathy Stefko. June 5, 1969. 03996.
- (29) S. lineatus Michx. inundated land at edge of a stream.
Peggy A. Wallen, Norman DeWein and Kathy Stefko. May 18,
1969. 03969.

Fagaceae

- (30) Fagus grandifolia Marsh. lowlands, shores of streams.
William H. Ellis and Mildred Perry. July 5, 1969. 04105.

Graminae

- (31) Arundinaria gigantea (Walt.) Chapm. river banks and sloughs.
Peggy A. Wallen and Mildred Perry. April 29, 1969. 04107.
- (32) Echinochloa occidentalis (Wieg.) Rydb. shallow water. Peggy
A. Wallen and Janis Wallen. June 7, 1969. 04165.
- (33) Hordeum pusillum Nutt. stream bank. Peggy A. Wallen, James
Moroni and Mildred Perry. June 11, 1969. 04171.
- (34) Hystrix patula Moench. shore of streams. William H. Ellis
and Mildred Perry. July 5, 1969. 04114.
- (35) Leersia aryzoides (L.) Swartz. stream banks. Peggy A.
Wallen and Mildred Perry. June 11, 1969. 04183.
- (36) Uniola latifolia Michx. stream banks. William H. Ellis and
Mildred Perry. July 5, 1969. 04115.

Juncaceae

- (37) Juncus acuminatus Michx. edge of farm pond. Peggy A. Wallen,
Kathy Stefko and Norman DeWein. May 18, 1969. 03967.
- (38) J. biflorus Ell. edge of farm pond. Peggy A. Wallen and
Mildred Perry. June 6, 1969. 03993.
- (39) J. effusus L. in water in a slough. Peggy A. Wallen, Norman
DeWein and Kathy Stefko. May 18, 1969. 03965.
- (40) J. tenuis Willd. pond edge. Peggy A. Wallen, Kathy Stefko
and Norman DeWein. May 18, 1969. 03999.

Lythraceae

- (41) Ammania auriculata Willd. pond borders, sloughs and ditches. William H. Ellis and Mildred Perry. July 5, 1969. 04197.

Malvaceae

- (42) Hibiscus militaris L. damp soil, around pond edge. Peggy A. Wallen and Kay Harker. May 29, 1969. 04198.

Oleaceae

- (43) Fraxinus pennsylvanica Marsh. inundated sloughs and bottoms. Peggy A. Wallen, James Moroni and Mildred Perry. June 11, 1969. 04182.

Polygonaceae

- (44) Polygonum coccineum Muhl. shores and margins of ponds. Peggy A. Wallen and Mildred Perry. June 6, 1969. 04152.
- (45) P. hydropiperiodes Michx. shallow water or wet shores. William H. Ellis and Mildred Perry. July 5, 1969. 04108.
- (46) P. punctatum Ell. ditches, low ground. William H. Ellis and Mildred Perry. July 5, 1969. 04116.
- (47) Rumex crispus L. damp soil or water's edge. Peggy A. Wallen and Mildred Perry. April 29, 1969. 03957.
- (48) R. verticillatus L. damp soil or water's edge. Peggy A. Wallen, James Moroni and Mildred Perry. June 19, 1969. 04173.

Primulaceae

- (49) Lysimachia ciliata L. low grounds and shores. William H. Ellis and Mildred Perry. July 5, 1969. 04113.
- (50) Samolus parviflorus L. shallow water and wet soils. Peggy A. Wallen and Kay Harker. May 29, 1969. 03990.

Rubiaceae

- (51) Cephalanthus occidentalis L. in pond at water's edge. William H. Ellis and Mildred Perry. July 5, 1969. 04190.

Salicaceae

- (52) Populus deltoides Marsh. bottom lands and stream borders. Peggy A. Wallen and Mildred Perry. April 29, 1969. 04106.

- (53) Salix nigra L. bottom lands and stream borders. Peggy A. Wallen and Kay Harker. May 29, 1969. 03981.

Saururaceae

- (54) Saururus cernuus L. sloughs and shallow water. Peggy A. Wallen and Mildred Perry. June 5, 1969. 04195.

Saxifragaceae

- (55) Hydrangea arborescens L. usually found around stream edges or in damp soil. Peggy A. Wallen and Mildred Perry and James Moroni. June 11, 1969. 04168.
- (56) Penthorum sedoides L. wet low grounds. William H. Ellis and Mildred Perry. July 5, 1969. 04111.

Schropulariaceae

- (57) Gratiola neglecta Terr. wet or muddy places. Peggy A. Wallen and Janie Wallen. June 7, 1969. 04163.
- (58) Mimulus alatus Air. sloughs and low grounds. William H. Ellis and Mildred Perry. July 5, 1969. 04112.

Solanaceae

- (59) Physalis longifolia Nutt. slough. Peggy A. Wallen, James Moroni and Mildred Perry. June 19, 1969. 04172.

Typhaceae

- (60) Typha latifolia L. in water at edge of pond. William H. Ellis and Mildred Perry. July 5, 1969. 04188.

Ulmaceae

- (61) Ulmus rubra Muhl. bottoms or streambanks. Peggy A. Wallen, James Moroni and Mildred Perry. June 11, 1969. 04167.

Umbelliferae

- (62) Conium maculatum L. damp soil, near river. Peggy A. Wallen and Eugene Wallen. June 13, 1969. 04019.

Verbenaceae

- (63) Lippia lanceolata Michx. wet sand around streams. Peggy A. Wallen and Mildred Perry. June 5, 1969. 04194.

Zosteraceae

- (64) Potamogeton natans L. in small farm pond; leaves floating on the surface. Peggy A. Wallen and Kay Harker. June 8, 1969.

DISCUSSION

From the preceding list, it can be seen that the large majority of this collection was taken from ponds or sloughs; in other words, non-flowing water. One half of the species collected were monocotyledonae with the predominant genus being Carex of the family Cyperaceae.

Ponds and sloughs proved to be the most prolific collecting sites in that they yielded more species than did streams or springs. The families Alismataceae, Typhaceae and Zosteraceae were limited to ponds only. The families Cyperaceae and Juncaceae were generally restricted to ponds or sloughs. Almost always seen around ponds were the species Salix nigra L. and Populus deltoides Marsh. The most prolific ponds were abandoned farm ponds.

Species collected from streams were usually collected from their shores, with the exception of Justica americana (L.) Vahl. which was collected from gravel or sandbars in the streams. Several species of trees were collected from stream banks: Acer saccharinum L., Ulmus rubra Muhl., Alnus serrulata (Ait.) Willd., Betula nigra L. and Cornus amomum Mill. The streams yielded a variety of Dicotyledonae, but no species other than Rumex crispus L. or Justica americana (L.) Vahl. could be anticipated at any one stream.

Sloughs exhibited a unique habitat in that they consisted mainly of Cyperaceae or Graminae. Populus deltoides Marsh. and Salix nigra L. could also be anticipated in this habitat.

Collections taken from the Cumberland and the Harpeth Rivers yielded few species other than Populus deltoides Marsh., Salix nigra L., Betula nigra L. and Alnus serrulata (Ait.) Willd.

SUMMARY

A study of the aquatic angiosperms of Cheatham County, Tennessee was made during the summer of 1969 between June and September. The purpose of the study was to further the taxonomic knowledge of the aquatic plants of Tennessee, as well as to provide habitat data concerning these plants. The checklist was annotated in alphabetical order according to families.

The study pointed out the habitat distribution of many of the families collected. The checklist added to the knowledge of the distribution of aquatic plants of Middle Tennessee which, for the most part, was not included in A Checklist of Dicots of Tennessee (Robinson and Shanks, 1959). It is hoped that this work will contribute to the knowledge of the flora of Tennessee as a whole.

LITERATURE CITED

- Arber, Agnes. 1919. Water plants. Wheldon and Wesley, Ltd. and Hafner Publishing Co. N.Y. 436p.
- Butcher, R.W. 1933. Studies on the biology of rivers. On the distribution of macrophytic vegetation in the rivers of Britain. Jour. Ecol. 21:58-91.
- Eyles, D.E. and J.L. Robertson, Jr. 1944. A guide and key to the aquatic plants of the Southeastern United States. U.S. Public Health Service Bull. No. 286. U.S. Government Printing Office. Washington, C.D. 151p.
- Fassett, N.C. 1957. A manual of aquatic plants. McGraw-Hill Book Co., Inc. New York, N.Y. 382p.
- Fernald, M.L. 1950. Gray's manual of botany. Eighth ed. American Book Co., Inc. New York, N.Y. 1632p.
- Gattinger, A. 1901. The flora of Tennessee and a philosophy of botany. Gospel Advocate Publishing Co. Nashville, Tenn. 296p.
- Gleason, N.A. 1963. New Britton and Brown illustrated flora of the Northeastern States and adjacent Canada. 3 vols. Hafner. New York.
- Hasler, A.D. and E. Jones. 1949. Demonstration of the antagonistic action of large aquatic plants on algae and rotifers. Ecol. 30 (3):359-364.
- Louisville and Nashville Railroad, the Nashville, Chattanooga and St. Louis Railway, The Southern Railway, 1899. Tennessee It's advantages, resources and possibilities. Bull.
- Muenschler, W.C. 1944. Aquatic plants of the United States. Constock Publishing Co., Inc. Ithica, N.Y. 374p.
- Robinson, F.D. 1956. An ecological survey of the vascular aquatic vegetation of the Cumberland Plateau in Tennessee. Unpublished Thesis. University of Tennessee. 44p.
- _____ and R.E. Shanks. 1959. Checklist of vascular plants of Tennessee. Jour. of Tenn. Acad. Sci. 34:58-65.

Sharp, A.J., R.E. Shanks, H.L. Sherman and D.N. Norris. 1960. A checklist of dicots of Tennessee. The University of Tennessee.

~~checklist~~ R.E. Shanks and J.K. Underwood. 1959. A preliminary checklist of monocots in Tennessee. The University of Tennessee.

Small, J.K. 1933. Manual of the Southeastern flora. Chapel Hill. The University of North Carolina Press.