

Keys to the Flora of Florida -- 1, Introduction

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Perhaps 3,500 species of vascular plant are native, adventive, or naturalized from cultivation in the state of Florida. This flora is not equalled in richness by that of any other area in the eastern United States and is exceeded north of Mexico only by California and Texas. It is further distinguished by the presence of many tropical species that nowhere else reach the United States, and by a large number -- about 10% of the entire flora -- of endemics, plants that are found only within the limits of the state.

One long-standing objective of the Herbarium of the University of Florida has been the preparation of a single treatment that will bring together the information that presently exists on the vascular plants of Florida. Part of this information has been published, but is scattered and often in obscure and relatively inaccessible journals. Far more information exists in the form of herbarium materials and their accompanying data, and as communications from botanical investigators with expertise in some facet of the Florida flora; these sources are even less accessible.

The magnitude of this objective requires that a significant period of time passes before the task is completed. It is desirable that portions be made available in advance of completion of the entire study. A series of papers in the journal *CASTANEA*, under the title "Contributions to the Flora of Florida," was begun in 1963 and is being continued on an accelerated schedule; the format of these papers permits extended discussion of nomenclature and distribution (including Florida county-record maps), as well as morphology, but because of its inherent limits must be restricted to genera of exceptional interest or complexity. An additional interim outlet is needed, and will be met by a series of concise articles in *PHYTOLOGIA* under the above title, "Keys to the Flora of Florida,"

Amplified Key Format

The format to be used in the present series of articles is that sometimes known as the "amplified key" in which the basic morphological framework of a conventional dichotomous key is supplemented by data on habitat, frequency, and range. Exemplary floras that have utilized this format are G. N. Jones' Flora of Illinois (Univ. of Notre Dame Press, 3rd ed. 1963) and C. A.

Backer's compendious Flora of Java (Noordhoff, 1963, '65, '68). With the embellishment of illustrations, this is the structure of C. L. Hitchcock & A. Cronquist's Flora of the Pacific Northwest (Univ. of Washington Press, 1973).

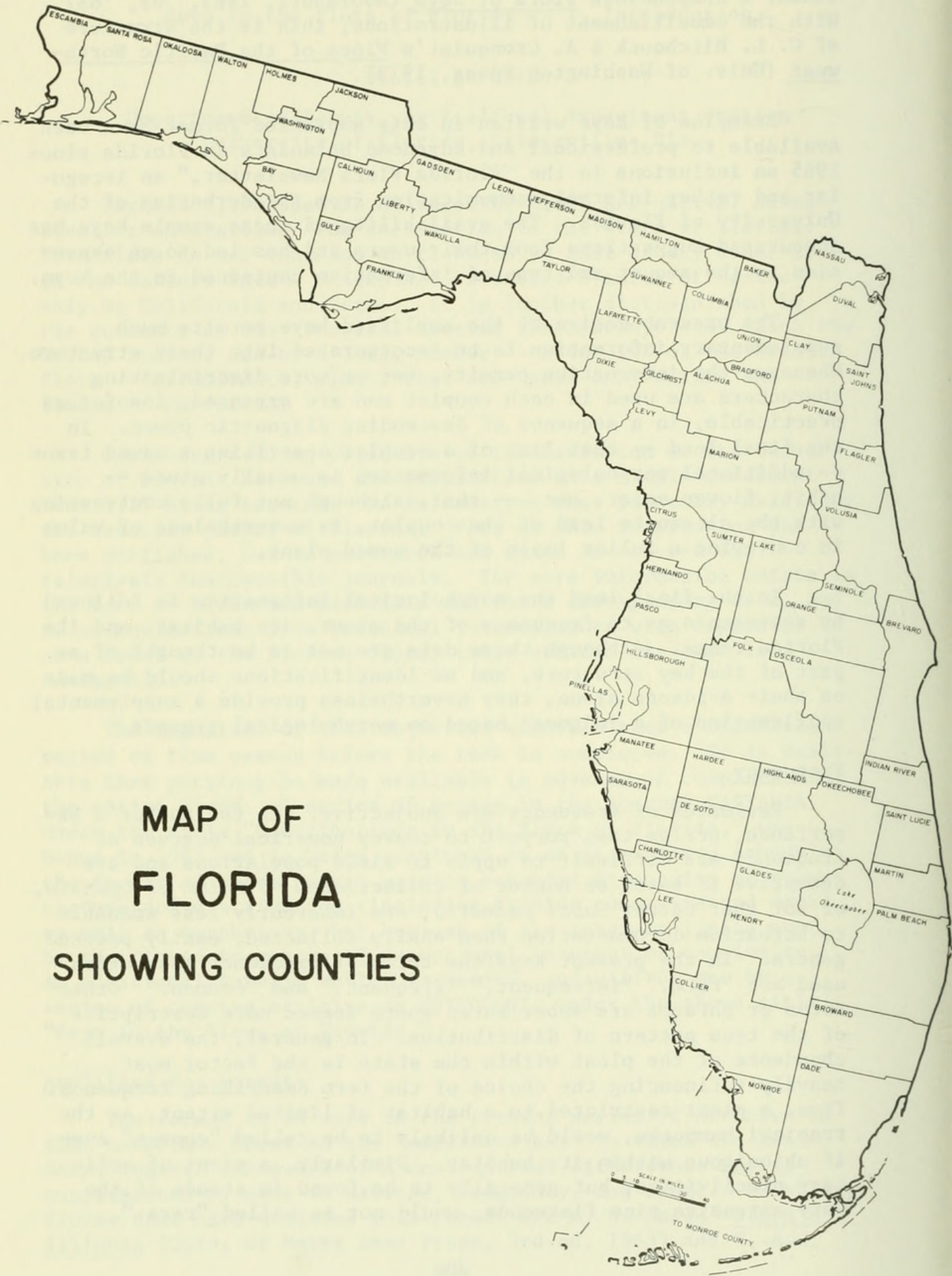
Examples of keys written in this amplified format have been available to professional and advanced botanists in Florida since 1965 as inclusions in the "Florida Flora Newsletter," an irregular and rather informal communication from the Herbarium of the University of Florida. The availability of these sample keys has encouraged suggestions from their users and has led to an expansion in the amount and type of information contained in the keys.

The present design of the amplified keys permits much supplementary information to be incorporated into their structure. Whenever the information permits, two or more discriminating characters are used in each couplet and are arranged, insofar as practicable, in a sequence of descending diagnostic power. In the final lead -- that line of a couplet describing a named taxon -- additional morphological information is usually given -- habit, flower color, etc. -- that, although not fully contrasting with the alternate lead of the couplet, is nevertheless of value in conveying a fuller image of the named plant.

In the final lead the morphological information is followed by statements as to frequency of the plant, its habitat, and its Florida range. Although these data are not to be thought of as part of the key structure, and no identifications should be made on their evidence alone, they nevertheless provide a supplemental confirmation of a judgment based on morphological grounds.

Frequency

Estimates of frequency are subjective. In the author's experience, scales that purport to convey numerical degrees of frequency are difficult to apply to field populations and are deceptive if based on number of collections. *Cirsium* or *Opuntia*, or for that matter *Sabal palmetto*, are inherently less amenable to herbarium documentation than easily collected, easily pressed genera. In the present keys the terms of frequency most often used are "rare," "infrequent," "frequent," and "common." Other terms or phrases are substituted where deemed more descriptive of the true pattern of distribution. In general, the overall abundance of the plant within the state is the factor most heavily influencing the choice of the term describing frequency. Thus, a plant restricted to a habitat of limited extent, as the tropical hammocks, would be unlikely to be called "common" even if ubiquitous within its habitat. Similarly, a plant of solitary proclivities, but generally to be found in stands of the very extensive pine flatwoods, would not be called "rare."



MAP OF
FLORIDA
SHOWING COUNTIES

Distribution

Except in unusual circumstances, distribution given within these keys will be restricted to the known range in Florida. No acknowledgment will be made of a broader range, although except in the case of endemics, such may be presumed to occur. Queries as to extraterritorial distribution are believed better addressed to other literature.

Within Florida, common use will be made of county-record distributional information, although often supplemental data will be provided as to towns, lakes, and other physical features. This information will usually be generalized by reference to the Panhandle or the Peninsula, the two major areas into which the state may be divided. The 67 Florida counties are portrayed on the accompanying figure.

Endemics

A special fascination exists for the plants known as endemics, those species restricted to a particular and usually narrow range. Florida is remarkable in being a state with an unusually large percentage of such plants. Perhaps as many as 10% of the vascular plants found in Florida are to be found only within the confines of the state, or with minor extensions beyond its political perimeter. No other state east of the Mississippi River appears to have more than 1 or 2% endemism, and in the West only California clearly exceeds the Florida figure.

Three studies are outstanding in the analysis of Florida endemics: R. M. Harper, A preliminary list of the endemic flowering plants of Florida. Quart. Jour. Florida Acad. Sci. 11:25-35, 39-57. 1949. 12:1-19. 1950; W. T. Neill, Historical biogeography of present-day Florida. Bull. Florida State Mus. 2:175-220. 1957; C. W. James, Endemism in Florida. Brittonia 13:225-244. 1961.

Notwithstanding these pioneer compilational and analytical efforts, the endemics of Florida are yet inadequately known as to their distribution and origin. Indeed, one of the major distributional patterns of Florida plant endemism was not recognized by the above authors. This is the proliferation of species within *Chrysopsis*, *Hypericum*, *Pinguicula*, among other genera, in the low country of the Florida panhandle coast. Endemism on the Apalachicola River bluffs, with *Torreya*, *Taxus*, *Croomia*, and other relics of great age, and endemism of species confined to or spreading from the "Orange Island" archipelago of south-central peninsula Florida, a Pleistocene interglacial-flooding refugium, are relatively better understood.

In the present keys, a taxon endemic to Florida (or with inconsequential range extensions beyond) will be so marked, with

the purpose of aiding the study and the preservation of these unique plants.

Plant Association

The wealth of permutations of soil and moisture and other edaphic factors, together with the stressful climatic conditions produced by the freeze line falling within the state, has yielded in Florida a large number of environmental situations characterized by particular combinations of plants. From the earliest days, when "hammock" became an accepted term for the partly evergreen but broadleaf Florida forests, to more recent intensive investigations of the energetics of the bountiful Florida springs, many of the plant associations of this state have attracted admiration and close study. The recognition of these associations is a critical part of Florida taxonomy, for the distribution and even the evolution of species is intimately involved with the other plants with which they grow. The names of these associations thus become much used in these keys, as a means of better characterizing the species described.

Yet the plant associations of Florida have not been placed in a stable and widely accepted hierarchical system. Terms such as "scrub," properly restricted to associations on wind-blown sands, usually with *Pinus clausa*, *Ceratiola ericoides*, *Quercus myrtifolia*, etc., are loosely applied to cut-over *Quercus laevis* stands. These latter, with the *Pinus palustris* which dominates them unless removed by cutting, are better known as "high pine" or "sand hill communities" and are on slightly heavier water-deposited sandy soils of greater age. "Bay heads," "spring heads," "galls" and "hells" of one form or another are widely recognized by the older residents of Florida, but their parameters are as variable as their observers.

Although other local analyses of vegetation types are available, three widely separated studies perhaps deserve mention: F. C. Craighead, The Trees of South Florida, Univ. of Miami Press. 1971; A. M. Laessle, The communities of the Welaka area. Univ. of Fla. Biol. Sci. Ser. vol. 4, no. 1. 1942; D. B. Ward (assisted by R. R. Smith), Ecological records on Eglin AFB Reservation, the second year. Air Force Armament Lab. Tech. Rep. AFATL-TR-68-147. 1968. A most excellent descriptive account of the state, written largely before the heavy impact of recent development, is provided by R. M. Harper: Geography and Vegetation of Northern Florida. Florida Geol. Survey, 6th ann. rep't. 1915. 289 pp.; Geography of Central Florida. Florida Geol. Survey, 13th ann. rep't. 1921. 237 pp.; Natural Resources of Southern Florida. Florida Geol. Survey, 18th ann. rep't. 1927. 180 pp.

But the only approach to comprehensive coverage of the state's plant associations has been by Dr. J. H. Davis. The following enumeration is a useful summation, as modified from Davis's General Map of Natural Vegetation of Florida (Florida Agric. Exp. Sta. Circ. S-178. 1967). Each association is ranked in the descending order of its geographic extent in Florida, with the percent coverage as mapped by Davis, without regard for the often significant modifications induced by man.

1. Pine Flatwoods (34.3%). Extensive level ancient sea bottoms, poorly drained and seasonally very wet, usually dominated by slash pine (*Pinus elliottii*), with a dense understory of saw palmetto (*Serenoa repens*), shrubs, small trees, and numerous herbs.
2. High Pine (19.3%). The longleaf pine - turkey oak (*Pinus palustris* - *Quercus laevis*) stands of well drained uplands, usually open and with a ground cover of wiregrass (*Aristida stricta*) and other fire-tolerant herbaceous species.
3. Saw Grass Marshes (8.0%). Extensive stands of sawgrass (*Cladium jamaicense*) with other herbs and occasional islands of shrubs and small trees, on seasonally flooded marl soils.
4. Hardwood Swamp Forests (7.4%). Bays, gums, and other trees in wet soil of stream and river banks and small depressions.
5. Grasslands (5.9%). Wet prairies on seasonally flooded lowlands, or dry prairies if seldom flooded.
6. Mixed Hardwoods and Pine Forests (5.5%). Mostly on uplands of clay soils in northwestern Florida.
7. Hardwood Hammocks (4.5%). Broadleaf and largely evergreen forests on rich upland soils.
8. Sand Pine Scrub (2.8%). Excessively drained deep sands of wind deposit, with sand pine (*Pinus clausa*), rosemary (*Ceratiola ericoides*), several scrub oaks, and many endemics.
9. Lakes and Ponds (2.3%). Non-saline bodies of water, varying greatly in size, the largest being Lake Okeechobee, with abundant aquatic plants.
10. Coastal Strand (1.8%). A zoned vegetation on sand dunes or rock, composed of salt-tolerant pioneer herbs and shrubs near the shore, with scrub and forest zones more to the interior.
11. Mangrove Swamp Forests (1.7%). Coastal areas in southern Florida dominated by red mangrove (*Rhizophora mangle*), black mangrove (*Avicennia germinans*), and buttonwood (*Conocarpus erectus*).

12. Scrub Cypress (1.3%). Open stands of stunted cypress on rock or marl soils in southern Florida.

13. Coastal Marshes (1.2%). Periodically flooded stands predominately of black rush (*Juncus roemerianus*), on sea shores and at river mouths.

14. Freshwater Marshes (1.1%). Mixed marshes with many kinds of herbs and shrubs, along streams, on lake shores, and in shallow depressions.

15. Southern Slash Pine Forests (1.1%). Open woodlands of the South Florida variety of slash pine, mostly on rocklands, with an understory containing species of tropical origin.

16. Cypress Swamps (1.1%). Depressions and lake and stream margins dominated by often majestic bald cypress (*Taxodium distichum*).

17. Cabbage Palm Groves. Forests of abundant cabbage palms (*Sabal palmetto*) either inland or coastal.

18. Tropical Hammocks. Dense evergreen forests composed largely of tropical species, bearing many epiphytes.

19. Springs and Spring Runs. Clear constant-flowing springs, the bottoms of the runs densely covered with eelgrass (*Vallisneria neo-tropicalis*), tape-grass (*Sagittaria kurziana*), and other aquatic species.

Dates of Flowering

Florida, with an average frost-risk season of 0 days in the southern Peninsula and 118 days in the northern Panhandle, is exceptionally varied with respect to climate. The dates when a species is in anthesis often differ significantly in different parts of its range, and the limits of this flowering date are frequently broader in more southern populations. Commonly in Florida species of tropical origin, flowering is continuous throughout the year, with flushes of bloom correlated more closely with rainfall than with mean temperature. Such traits greatly reduce the utility of statements as to dates of flowering, at least relative to a climatically homogeneous northern area.

Yet flowering seasons in Florida are not to be thought of as absent. In the Panhandle and northern Peninsula species follow one upon the other in a predictable seasonal pattern. Even in the southern Peninsula, the probability that a given species will be found flowering abundantly in a particular season is greater than in another season, and collections as well as observations reflect this periodicity. It thus seems worthwhile to record in the present key the months when flowering is commonly observed, with the understanding that a degree of

judgment and possible error is involved in the exclusion of flowering dates that are believed atypical or otherwise outside the main season of bloom.

Common Names

Vernacular names will be provided for each species where such names are available and appropriate. This is an area where whimsy is of greater importance than logic, and where efforts at standardization come into conflict with stubborn non-botanist users of plant common names. There clearly are many more plants of interest or utility than there are distinct common names, and many common names are used in more than one context. Although it is unsettling to the professional botanist to hear the iridescent *Sphenostigma coelestinum* referred to by Florida country folk as "violets" or "morning-glories," *Hypericum fasciculatum* called "golden-rod," or the red-and-black-seeded leguminous *Abrus precatorius* termed "black-eyed-susans," it is perhaps worth remembering that common names are, or should be, of "common" origin, and that consistency, lack of homonymy, and even good taste are merely goals to be striven for, not dogma to be achieved by imposition of autocratic common-name rules. To that end, the common names used in the present keys are selected to be appropriate and distinctive if possible, and to be intelligible to non-professional Florida users, insofar as those two often-conflicting objectives will allow.

Prefatory Comments

Each key of this series is accompanied, to whatever extent seems appropriate, by a prefatory discussion designed to include material that even the flexible format of these keys cannot encompass. Such matters as nomenclatural commentaries, ancillary historical details, and justifications for the taxonomic judgments employed in the accompanying keys, are placed here. New names and new combinations are given formal treatment here, providing them with nomenclatural legitimacy.

Standardization of the rank to which taxa are assigned will be attempted. Taxa treated as species will show, insofar as seems practical, a greater degree of difference from one another than those seen as subspecies; those taxa assigned to the status of variety will be yet less well defined. Such a goal is recognized to be a will-o'-the-wisp, but the objective appears worthy even though full implementation is unattainable. Accordingly, depending on the judgment of the author or authors, and tempered by experience in other Florida genera and species, frequent recourse will be made to unfamiliar taxonomic ranks employing pre-existing and, where other authors have not yet spoken, new combinations. The purported advantage of deleting one or another of these ranks is wholly rejected.

Supporting Herbaria

Any proper floristic treatment is buttressed and documented by specimens deposited in herbaria. Such specimens and their accompanying data make available the knowledge and energies of many collectors over many years and in many geographic area; they permit achievement that far surpasses what could be attained by any individual's personal experience. The present series of keys is very largely dependent upon the resources of the Herbarium of the Agricultural Experiment Station, University of Florida, Gainesville, Florida. In size and thoroughness of coverage this herbarium has provided an excellent substrate from which information could be drawn. Two other Florida herbaria, those of Florida State University, Tallahassee, and the University of South Florida, Tampa, have been used to a lesser extent, yet have provided substantial support in many critical instances. Other herbaria, mostly outside of Florida, have been consulted frequently, particularly where their resources were essential to the solution of a Florida-based problem.

For reasons of brevity, herbaria are conventionally referred to in this work by internationally-employed acronyms (F. A. Stafleu, ed. Index Herbariorum. Utrecht. 1974. pp. 303-354). Those cited most frequently are listed below.

BM	British Museum
BUS	University of Miami, Coral Gables, Florida
F	Field Museum of Natural History, Illinois
FLAS	Agricultural Experiment Station, University of Florida, Gainesville, Florida
FSU	Florida State University, Tallahassee, Florida
GA	University of Georgia, Athens, Georgia
GH	Gray Herbarium, Harvard University, Cambridge, Massachusetts
K	Royal Botanic Gardens, Kew, Great Britain
MO	Missouri Botanical Gardens, St. Louis, Missouri
NY	New York Botanical Gardens, Bronx, New York
US	National Herbarium, Smithsonian Institution, Washington, D.C.
USF	University of South Florida, Tampa, Florida

It should be understood without saying, that a herbarium is not only the product of the many persons who have contributed to its building, but is especially a reflection of its curators. The men and women who curate and staff the herbaria listed above

have contributed immeasurably to each facet of this project, in the ready loan of their specimens, in their generous response by providing answers to innumerable queries, and in their constant and wholehearted support of this work.

Authorship

In a series such as this, dependent upon the support and knowledge of many persons, the authorship of the separate units will vary. Where ever possible, the actual participation of the outside author will be enlisted in writing the unit or in adapting his previous work to the present format. Where this is not feasible, adaptations may be prepared by the staff of the Herbarium of the University of Florida, with appropriate acknowledgments. Authorship of and responsibility for the entire series, however, resides with the writer of the present unit, and sponsorship is retained by the Florida Agricultural Experiment Station, Gainesville.

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