A Computerized Flora of Indiana: Its Scope, Value and Feasibility[1]

THEODORE J. CROVELLO
Department of Biology
University of Notre Dame, Notre Dame, Indiana 46556

Abstract

The scope, value and feasibility of a Flora Indiana Program is explored, along with the role that electronic computers might play to make the program more valuable and efficient. Deam's *Flora of Indiana* would serve as the foundation on which we would build. The scope of the flora, be it a mere checklist or detailed account of each species (including weeds), will depend on the level of human and monetary resources available. A Flora Indiana Program would provide an updated inventory of the plants of the State which would be of use to many people, not just taxonomists. Direction would be by a committee of interested and capable systematists and others. Official sponsorship might best be given by the Indiana Academy of Sciences. Funding should be sought from sources at different levels of government and from the private sector.

This paper considers several aspects of a Flora Indiana Program. Deam's (2) *Flora of Indiana* provides an excellent foundation for our current needs. Since such a program will require significant amounts of human and monetary resources, we must evaluate it carefully, first to determine its optimal scope and value, and then to ascertain if it is feasible. The technology of electronic computing will also be considered as a means to enhance the value and efficiency of a Flora Indiana Program.

History of Floras

Floristic work dates back to the earliest beginnings of botany in Greece. Theophrastus, a student of Aristotle, classified and described about 480 kinds of plants in his *Historia Plantarum.* But, even today vast areas, especially in the tropics, have not been adequately treated. It is only within the last decade that a Flora of the Soviet Union has been completed. The Flora Europaea Program is still under way with completion scheduled in the next few years. There is no very *active* program to inventory and to describe adequately the more than 25,000 species of vascular plants that grow in North America north of Mexico. After years of careful planning and of pilot feasibility studies, funding of the Flora North America Program was terminated in 1973 by the federal government.

Floras vary in their content. A flora may be a mere checklist of the species of plants growing in a region. To this can be added a key to determine to which species a new plant belongs, together with flowering dates of each species, the type of environment in which each grow, etc. Deam's *Flora of Indiana* contains keys to the families, genera and species he knew to grow in the area, distribution maps and some habitat information.

[1] Project supported by the National Science foundation, Office of Science Information Service, Grant GN-878.

Recently, several projects have used the speed and efficiency of computers to aid in the production of floras. Most have concerned themselves with the production of distribution maps. These include Perring and Walter's (4) *Illustrated Flora of the British Isles*, and the *Flora Warwickshire* (1). Other botanists have used the computer to summarize the differences in flowering time for each species in various parts of a state (3). The now inactive Flora North America Program would have created a computerized plant data bank containing for each species its common names, key characters, habitat and distribution data.

Scope of a Flora Indiana Program

What species should be included? All should be, but the problem is to determine which ones realistically can be included. For example, fungal parasites causing diseases of trees and of economic or horticultural plants ought to be included. Deam only treated the vascular plants. Given current resources, it would be easiest to build our floristic program on Deam's foundation.

The next step would be to add all additional records of new plant occurrences that have appeared in the literature or have been added to herbarium collections in the State. These would not be added until their identification was verified by a trained taxonomist. Information on agricultural and horticultural plants growing within the State could also be included. A computerized data bank containing vital information on such plants would permit botanists at the State's universities, and agricultural and farm agents, to answer some of the questions that they now cannot answer.

Value of a Flora Indiana Program

A current floristic project, able to retrieve data quickly would be of use to many people. These include plant and animal taxonomists engaged in basic and applied research. They would know what species to expect in an area, when to find them, and in what habitats. They also would know what counties have not been studied well, and what taxa to try to find in each area. Ecologists would profit from the analyses that would provide summaries of distributions by plant families or other categories. For example, if each plant family has a different distribution pattern in the state, this information could be used to pose new questions of evolutionary and ecological importance. Natural resource workers such as wildlife managers, foresters and park rangers might be more interested in only segments of the total flora of the State. For example, a park naturalist may wish a listing and description of only those spring flowering plants that grow in the county in which the park is located. Others may wish a list of species associated with a particular soil type or bedrock geology.

An updated flora, particularly local geographic subsets of it, would be useful to high school teachers desiring to teach their students more about the quality of the plant life immediately about them. Such local or county floras could be produced easily by computer as customized

subsets of an overall State flora. Also, these local floras would have keys to just the species growing in the county. The computer can produce such truncated keys very efficiently, once the large key for the entire flora (such as from Deam) has been captured. Citizens of the State who are members of garden clubs, and other nature groups, would also welcome more localized floras. It should also be useful to physicians in local Poison Control centers at hospitals.

Feasibility of a Flora Indiana Program

To assess the feasibility of such a program requires consideration of several different aspects. These include its organization and governance; the people working on it; its sponsorship; its funding; and its physical housing.

Organization could follow that of the Flora North America Program. It had an Executive Committee consisting of well-known systematists. We also could add State Natural Resource workers, *ex officio*, etc. They voted on major policy issues of the program. To complement them, the State could be divided into geographic regions, each with a regional floristic center. Most often it would be a college or university with a resident taxonomist interested in the program and an herbarium of some size. It would serve as the focal point for all floristic activity in that region, including the search for species that should be in the counties, but have not yet been found. Such activities would be helped by computer printouts of selected data. These regional centers would communicate among themselves and with one central office. This is only one of the possible forms of organization.

The human resource is the most essential for a successful program. The most likely people are the college and university teachers throughout the state with an interest in floristics and plants in general. They themselves may rarely be able to get into the field. But they are in a position to encourage many eager students and to involve high school biology clubs and teachers in the many activities associated with floras. Ways of involving the State's Natural Resource personnel should also be explored, especially if we can demonstrate that the State and its various activities might benefit directly from a Flora Indiana Program.

Sponsorship does not necessarily mean funding. Thus the American Institute of Biological Sciences sponsored Flora North America but did not provide funds. Since individuals are not permanent, some established, not for profit organization should be its sponsor. Among the botanists who discussed this matter, we all concluded that the Indiana Academy of Science is the logical sponsor. Its Plant Taxonomy Section is the logical unit in the Academy to which responsibility for its monitoring should be assigned.

Funding of the Flora Indiana Program may be from one source or from many. The National Science Foundation could be approached, either through its Systematic Biology Program or one of its educational divisions. Similarly, since the flora is an integral and dominant part of the environment, one of the environmental education programs spon-

sored by congressmen, such as Indiana's John Brademas, could be investigated. Possibly some State money would be made available if sufficient value could be demonstrated. Private foundations could also be contacted. Costs need not be astronomical. For example we could generate county checklists for all counties for $10,000 to $20,000.

Given the existence of the many herbaria in the State, physical facilities would require little that is not already present. Computing facilities would probably be those that exist at several college campuses. Dissemination of the result could include a printed flora of the State, subsets for a given county, and computer printouts to answer special requests.

Conclusions

Considering the history of floras, the current needs of society, and the possible scope of a Flora Indiana Program it seems to be a valuable project. After discussion of these and other points at the Plant Taxonomy Section of the Indiana Academy of Sciences meeting (October 1973), the following agreed to consider the matter further: Doctors Charles Heiser (Indiana University, Bloomington), Joseph Hennen (Purdue University), Thomas Mertens (Ball State University) and Theodore Crovello, Chairman (University of Notre Dame). Please direct your comments and suggestions to any of the above.

Literature Cited

1. CADBURY, D. A., J. G. HAWKES, and R. C. READETT. 1971. A computer mapped flora. Academic Press, New York, N.Y. 788 p.
2. DEAM, C. C. 1940. Flora of Indiana. Indiana Dep. Conserv., Indianapolis. 1,236 p.
3. LIETH, H., and J. S. RADFORD. 1971. Phenology, resource management, and synagraphic computer mapping. BioScience 21:62-69.
4. PERRING, F. H., and S. M. WALTERS. 1962. Atlas of the British flora. Thomas Nelson and Sons, London, Eng. 437 p.