

BOTANICAL GARDENS, ARBORETA AND RELATED
INSTITUTIONS IN THE UNITED STATES AND
CANADA: A STUDY OF CHARACTERISTICS AND
SELECTED PROGRAMS

Thesis for the Degree of M. S.
MICHIGAN STATE UNIVERSITY
MARVIN CHARLES ELLENBECKER
1975

THESIS



3 1293 10479 5269

L

... ..
... ..

|

~~Nov 15 '77~~ 319

MAY 21 2006 5

~~Jul 26 '78~~ 207

~~Jul 07 '85~~ 097

SEP 01 2008
093009

MAY 21 '89
#69 K142

~~Jul 07 '85~~
XOX D152

AUG 16 1992
238

LEES 05 1992
085

BOTANICAL GARDENS, ARBORETA AND RELATED INSTITUTIONS
IN THE UNITED STATES AND CANADA: A STUDY OF
CHARACTERISTICS AND SELECTED PROGRAMS

By

Marvin Charles Ellenbecker

This study delves into the characteristics and select programs of botanical gardens, arboreta, and other related institutions. It looks at these institutions from the viewpoint of the social scientist rather than the natural scientist because the study involves people not plants. The relationship that exists between the general public and these institutions is an important one. The majority of the institutions studied are located in urban areas and often their programs are supported by public monies. These institutions are unique in that they include green islands of plant materials within areas that are often devoid of plants.

An internal glance into the functions of the institutions gives some interesting results. Despite the differences in institution classification, the research data indicates that the social functions of the institutions are similar. The terms arboretum and botanical garden deal with the plant collections and not the social interactions in which the institutions are involved. The institutions offer courses to the general public that go beyond the natural science disciplines.

The study had four basic objectives: (1) to obtain data on the programs offered by the institutions; (2) to plot institution growth and geographical distribution; (3) to determine institution purpose; and (4) to gain an insight into the background and experience of those who are the key administrators at the institutions.

The research centers on a questionnaire that was developed and mailed to 301 institutions in the United States and Canada. Seventy-three variables were utilized in obtaining data on the respondents.

Although related studies have been undertaken on smaller scales, a study of this scope has not been previously conducted. The data presented here are primarily objective but several variables are totally subjective and were designed that way purposely.

The response from the institutions queried was gratifying. The sample populations represented were felt to be valid and indicative of the United States and Canadian populations.

Frequently the data are presented in tabular form which makes it easy to compare and comprehend. The appendices contain the mensural tools and those data that pertain to the whole study.

The information given in the study should be of interest to the administrators of the institutions researched because the emphasis of the study centers on an integral part of the institution's purpose: to serve people in their quest for knowledge, recreation and public good.

BOTANICAL GARDENS, ARBORETA AND RELATED INSTITUTIONS
IN THE UNITED STATES AND CANADA: A STUDY OF
CHARACTERISTICS AND SELECTED PROGRAMS

By

Marvin Charles Ellenbecker

A THESIS

IN

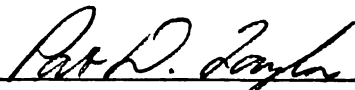
PARK ADMINISTRATION

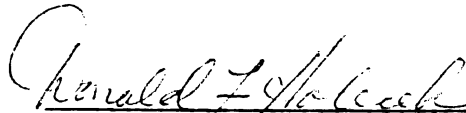
Submitted to the Graduate Faculty
of Michigan State University
in partial fulfillment of the requirements
for the degree of

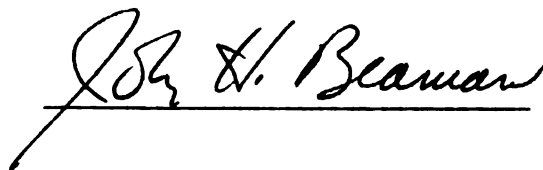
MASTER OF SCIENCE

Department of Park and
Recreation Resources

Approved


Chairman of the Committee





June, 1975

Copyright by

MARVIN CHARLES ELLENBECKER
1975

This thesis is dedicated to Dr. Gerald J. Petrucelli, Carlisle, Pennsylvania, who encouraged me to earn the Master's degree in Park Administration. He has supported my interest in botanical gardens, arboreta, and related institutions and personally assisted in the overall study that has been conducted on these institutions in the United States and Canada.

ACKNOWLEDGMENTS

I wish to thank Mr. Pat D. Taylor, my advisor in the Department of Park and Recreation Resources, for his advice and direction on this thesis. In addition, I have had a rewarding association with him as his teaching assistant in the Park and Recreation Area Design course offered in the department. I would also like to thank the other members of my committee, Dr. Donald Holecek, Department of Park and Recreation Resources, and Dr. John Beaman, Department of Botany and Plant Pathology, Michigan State University, for their assistance. I am indebted to Dr. Holecek for his assistance in procuring subsidized computer time for this research and to Dan Stynes for his assistance in developing the computer program used in this study.

TABLE OF CONTENTS

	Page
LIST OF TABLES	v
LIST OF FIGURES	vii
LIST OF APPENDICES	viii
Chapter	
I. INTRODUCTION	1
II. METHODOLOGY	12
III. ANALYSIS OF THE GENERAL RESEARCH DATA	17
IV. ANALYSIS OF DATA DIRECTLY RELATED TO THE OBJECTIVES	45
V. CONCLUSION	63
SOURCES CONSULTED	69
APPENDICES	72

LIST OF TABLES

Table	Page
1.--Distribution of Responding Institutions by State and Province.....	20
2.--Responding Institutions by Regions.*.....	21
3.--Number of Responding Institutions Located in the Twelve Major SMSA's by Population (United States).....	22
4.--Number of Responding Institutions Located in the Five Major CMA's by Population (Canada).....	23
5.--Responding Institution Type by Country.....	24
6.--Type of Park System to Which Responding Institutions Belong.....	25
7.--Size of Responding Institution Membership Organizations.	26
8.--Membership Number and Dues Rate--Canada.....	27
9.--Size of Responding Institution (in Acres).....	29
10.--Publication Information for Responding Institutions.....	31
11.--Organization Purpose.....	32
12.--Number of Visitors to Responding Institutions.....	38
13.--Peak Visitor Season of Responding Institutions.....	38
14.--Visitors to Responding Institutions (United States) Ranked by Age Group.....	39
15.--Visitors to Responding Institutions (Canada) Ranked by Age Group.....	40
16. Sources of Responding Institution Funding (United States).....	41
17.--Sources of Responding Institution Funding (Canada).....	42
18.--1974 Responding Institution Budgets.....	43
19.--Responding Institution's Annual Expenditures for Education, Research and Publications--United States and Canada.....	44

LIST OF TABLES (CONT'D.)

Table	Page
20.--Season when Studen Program is Offered.....	46
21.--Number of Students in Programs.....	47
22.--Responding Institution Program Ratings--United States...	48
23.--Responding Institution Program Ratings--Canada.....	49
24.--Special Facilities.....	51
25.--Type of Research Program.....	52
26.--Special Libraries.....	53
27.--Prime Function of Institution--Canada.....	58
28.--Prime Function of Institution--United States.....	59
29.--Administrator Information.....	61
30.--Dates Responding Institutions were Established-- United States.....	117
31.--Dates Responding Institutions were Opened to the General Public--United States.....	118
32.--Dates Responding Institutions were Established--Canada..	119
33.--Dates Responding Institutions were Opened to the General Public--Canada.....	120
34.--Dates Responding Institutions were Established by Region--United States.....	121
35.--Dates Responding Institutions were Opened to the General Public by Region--United States.....	122
36.--Dates Responding Institutions were Established by Region--Canada.....	123
37.--Dates Responding Institutions were Opened to the General Public--Canada.....	124
38.--Type of Responding Institution by Institution Function-- United States.....	125
39.--Type of Responding Institution by Institution Function-- Canada.....	128
40.--Responding Institution Involvement by Institution Function--United States.....	129
41.--Responding Institution Involvement by Institution Function--Canada.....	132
42.--Responding Institution Administrator's Degree by Field of Study--United States.....	133
43.--Responding Institution Administrator's Degree by Field of Study--Canada.....	134

LIST OF FIGURES

Figure	Page
1. Geographical Data--United States.....	112
2. Urban Regions in the United States: Year 2000.....	114
3. Geographical Data--Canada.....	115

LIST OF APPENDICES

Appendix	Page
A. List of questionnaire respondents; questionnaire cover letter; follow-up post card; and codebook	73
B. New courses; and special courses offered at institutions	103
C. Figures 1-3	111
D. Tables 30-43	116

CHAPTER I

INTRODUCTION

Botanical gardens and arboreta are historic yet dynamic institutions in contemporary society. How have botanical gardens, arboreta, and related institutions in the United States and Canada been able to remain vital without losing their traditional heritage with the past? What part of the current popular success experienced by these institutions can be attributed to their programs and activities? What programs and activities are these institutions currently involved in and how significant are these programs and activities?

History

Botanical gardens and arboreta have been a part of society since the dawn of civilization. In the ancient Babylonian and Greek cultures, sacred groves of trees were established that had religious significance as well as aesthetic qualities. Historical records of Western civilization attest to the fact that royalty and the wealthier classes cultivated herbs and exotic plants. This practice was probably as much a measure of social status as it was for any botanical or aesthetic endeavors.

No actual date can be documented for the first botanical garden or arboretum. Those who take the Bible literally would credit the Garden of Eden as being the first botanical garden. However,

this claim would be challenged by researchers in several scientific disciplines. Contenau mentions botanical gardens and arboreta in his account of ancient civilization. He says,

. . . besides cultivating gardens for purely utilitarian purposes, the kings of Assyria enjoyed creating botanical gardens, containing collections of non-indigenous species-- notably the plants and trees of the Amanus mountains. In much the same way, the Egyptian kings instructed their expeditions to collect and bring back the rarest species.¹

The famed Hanging Gardens of Babylon were considered one of the Seven Wonders of the Ancient World.

In Colonial America, John Bartram, an early American plant explorer, established the first botanical garden in 1728. Bartram's Garden was located in Philadelphia on the Schuylkill River and featured many of the native plants of the new colonies, including the rare and mysterious Franklinia alatamaha. This garden is now a part of Philadelphia's Fairmount Park. Other early gardens of this period have been lost.² Many botanical gardens and arboreta had their origins as hobbies or as recreation for individuals or families. Later, these gardens were transferred, partially or entirely, to tax supported institutions such as universities, segments of the state

¹ Georges Contenau, Everyday Life in Babylon and Assyria (London: Edward Arnold, 1954), p. 109.

² Christopher Wright, ed., The Prospective Role of an Arboretum, The Institute for the Study of Science in Human Affairs, Columbia University, ISHA Bulletin No. 10 (Mentor, Ohio: The Holden Arboretum, 1972), p. 2.

or federal government, or as additions to municipal park and recreation departments.³

In Canada, the Montreal Botanical Garden, which is publicly owned by the City of Montreal, owes its existence to the efforts of Brother Marie-Victorin, E.C. and others.⁴

Botanical gardens, arboreta and special gardens have become areas of passive recreation in modern society.

Today the public sector provides for many of our constructive spare time activities and museums, art galleries, zoological gardens, arboretums [sic] and similarly specialized institutions are important adjuncts of recreation.⁵

However, the private sector still provides an important contribution to society through each of the above-mentioned institutions. Thus botanical gardens, arboreta and special gardens, both public and private, offer many hours of pleasure and learning to young and old people alike in the United States and Canada.

Definition of Terms

Institution refers to those establishments that are being analyzed in this study. Specifically, they include arboreta, botanical gardens, and related institutions in the United States and Canada. The related institutions are special types: historical gardens,

³Fred B. Widmoyer, "Size and Funding Characteristics of American Arboreta and Botanical Gardens," The Longwood Program Seminars, 1970, II (Newark, Delaware: University of Delaware, 1970), p. 2.

⁴Montreal Botanical Garden, reprinted ed. (n.p., 1974).

⁵C. Frank Brockman, et al., Recreation Use of Wild Lands McGraw-Hill Series in Forest Resources (New York: McGraw-Hill Book Company, 1973), p. 5.

specialized plant material areas, cultural centers. They also include environmental and natural recreational areas. Related institutions share a common purpose with botanical gardens and arboreta but their differences are great enough to warrant a special category for them as they are neither botanical gardens nor arboreta per se.

Programs are formal plans that have been developed by the institutions such as facilities to accommodate the blind and handicapped, to conduct and to initiate research and plant exploration.

No response refers to those respondents who did not answer that particular question on the questionnaire.

SMSA (Standard Metropolitan Statistical Area) is an integrated economic and social unit with a large population nucleus. Current criteria require one city with 50,000 or more inhabitants or a city having a population of at least 25,000 which, with the addition of the population of contiguous places, incorporated or unincorporated, has a population density of at least 1,000 persons per square mile. This population, as a whole, constitutes, for general social and economic purposes, a single community with a combined population of at least 50,000 inhabitants. The county or counties in which the city and contiguous places are located is also required to have a total population of at least 75,000. In New England, cities must have a minimum population of 75,000 inhabitants to qualify as an SMSA. In addition, the SMSA includes the county in which the central city is located and adjacent counties that are

determined to be metropolitan in character and economically and socially integrated with the county of the central city.⁶

Census Metropolitan Area (CMA) constitutes a metropolitan area that represents the main labor market of a continuous built-up area having a population of 100,000 or more.⁷ The Canadian CMA is the equivalent of the SMSA in the United States.

Botanical garden and arboretum are terms that are difficult to define. A precise definition is probably impossible. A few definitions by several professional individuals and organizations in this field follow:

Botanic garden--a collection of growing plants the primary purpose of which is the advancement and diffusion of botanical knowledge . . . It is one of the marks of greatness and sound judgment of Sir William Hooker, that he aimed definitely to make Kew Gardens not only a scientific institution of the first rank, but to make them beautiful--attractive to the general public. This latter aim has been too often neglected or minimized, on the theory that a botanical garden is a scientific institution, and should, therefore, be developed with little regard for the non-scientific public. This is an unfortunate and unfair attitude, unfair to the general public, especially in those gardens which are supported in part by public money, and unfortunate for botanical science because it not only neglects a very important aspect of botany--applied botany--but loses the opportunity of enlisting the intelligent sympathy of the community with botanical endeavor. Many persons who might otherwise remain quite indifferent to botanical work in general, or even to the work of a given garden in particular, may, through being attracted primarily by the beauty of the collections and grounds, be led to give generous support to such work, or even to

⁶U.S. Department of Commerce, Statistical Abstract of the United States, 1974 (95th Annual Edition; Washington, D.C.: Government Printing Office, 1974), p. 863.

⁷Canada Year Book 1973 (Ottawa: Information Canada, 1973), p. 185.

discover that their own main interest is botany, and ultimately to advance the science by their own studies . . .⁸

A botanic garden is an institution organized to maintain plant collections. It usually includes a large number of genera and species and is arranged to serve educational, aesthetic, scientific, or economic purposes. Botanical gardens also serve as places of recreation.⁹

An arboretum or botanic garden is an ample area set aside for the growing and effective display of all the different kinds of worthy ornamental trees, shrubs, vines and other plants which can be grown in a given area, their maintenance, proper labeling and study . . . An arboretum differs from a botanic garden in that the emphasis is placed on the growing of woody plants in the arboretum, whereas in the botanical garden emphasis is not placed on the growing of any particular kind of plant, but all types are grown . . . Both differ from a park in that in the former a serious effort has been made to plant an extensive collection of many kinds of labeled plants, not only for the purpose of display but also for critical examination and scientific study . . . Both a park and an arboretum or botanical garden can be used for recreational purposes; but the arboretum or botanical garden go beyond the park in that they become highly educational to many of their visitors . . . The purpose of any arboretum, be it large or small, is to grow (and to keep labeled) the best of the ornamental woody plants which will thrive in a given locality . . . Botanical gardens may have even wider functions for their aims are wider, including as they do representatives from the Tropics to the Arctic, grown outside or under glass . . .¹⁰

Arboretum--A collection of hardy trees whether planted with a view to enhance the beauty of a landscape or for

⁸C. Stuart Gager, "Botanic Garden," Vol. I of The Standard Cyclopedia of Horticulture, ed. by L. H. Bailey (3 vols.; New York: The MacMillan Company, 1947), pp. 526, 532.

⁹Fred B. Widmoyer, "Botanic Garden," Encyclopedia Americana, 1973, IV, p. 314.

¹⁰Donald Wyman, Wyman's Gardening Encyclopedia (New York: The MacMillan Company, 1971), p. 69.

study: for the latter purpose often arranged in closely related groups.¹¹

Nearly all arboretums [sic] attempt to specialize in some group or groups of plants. Ideally the plant collection should be meaningful; there should be some plan and design behind the selection of the plant materials to be grown. To fill the task completely an arboretum should not only attract visitors because of the information it provides but also because of its beauty and its display of showy ornamentals.¹²

However, when it comes to distinguishing between a botanical garden and arboretum, it is difficult to define clearly the two institutions. To quote Donald Wyman,

It is very difficult to draw a clear line between a garden, a park, and an arboretum or botanical garden . . . A garden is usually for the personal enjoyment and recreation of the owners and their friends. A park is established primarily for recreation of the public. An arboretum or botanical garden, although it may be used for public enjoyment and recreation, usually is established specifically for the education of the public; its plants are labeled or recorded properly and its functions include a certain amount of research concerning the plants, their culture and use.¹³

This dichotomy is also emphasized by Bunce et al.,

Some arboreta and botanical gardens are primarily recreational in nature with heavy emphasis on horticultural plantings and related developments; a few restrict plantings and activities to one or more species; many are affiliated with colleges and universities primarily for study purposes, and a few even with elementary and high schools; some are privately operated with public admission restrictions; several

¹¹The Royal Horticultural Society, "Arboretum," Vol. I of Dictionary of Gardening, ed. by Fred J. Chittenden (3 vols.; Oxford: Clarendon Press, 1951), p. 163.

¹²Frank H. Bunce et al., Arboreta, Botanical Gardens, Special Gardens, NRPA Management Aids Bulletin No. 90 (Washington, D.C.: National Recreation and Park Association, 1971), p. 6.

¹³Donald Wyman, The Arboretums [sic] and Botanical Gardens of North America (Jamaica Plain, Mass.: Arnold Arboretum of Harvard University, 1959), p. 1.

specialize in research studies, and ecological studies of plant associations. Like people, they come in all shapes and sizes; and as with parks, there are many differences.¹⁴

Objectives

This study has the following objectives: (1) To determine the scope and extent of programs and other activities being conducted at botanical gardens, arboreta and related institutions in the United States and Canada; (2) To trace the growth of these institutions to determine whether they are increasing in number and if so, in which geographical regions of the United States and Canada this increase is occurring; (3) To show that botanical gardens, arboreta and related institutions perform similar functions, making it difficult to differentiate one type from another; (4) To ascertain the professional training and experience of those who administer the overall programs and activities of botanical gardens, arboreta and related institutions in the United States and Canada.

Literature Review

Data relating to the programs, activities and other information pertaining to botanical gardens, arboreta and related institutions are collected and published by a number of organizations. The American Association of Botanical Gardens and Arboreta publishes The Bulletin, a quarterly journal which deals with current issues and problems that are encountered by its member organizations. Articles in each issue are often on a particular theme: education programs,

¹⁴Bunce et al., Arboreta, Botanical Gardens, Special Gardens, p. 6.

propagation techniques, a guide to institutional membership. The American Association of Botanical Gardens and Arboreta, usually referred to as the AABGA, has a current membership of approximately 81 institutions according to the organization membership list (1974); this figure is difficult to determine precisely because many institutions are listed in the individual membership section in conjunction with the name of the director or principal officer.

The American Horticultural Society publishes the Directory of American Horticulture. This handbook provides a comprehensive guide to the most important functions in horticulture that are currently being performed in the United States and Canada. One section of this handbook includes a list of botanical gardens, arboreta and related institutions by states and provinces. This list provided the primary sample population that was used for this study. The AABGA membership list was used to obtain the names and locations of those institutions that were not in the state and province listing. The Directory of American Horticulture and the American Association of Botanical Gardens and Arboreta, Inc. Membership List, 1974 furnished the names and locations of 266 and 33 institutions respectively for a total sample population of 301 institutions* (see Appendix A-1). No doubt there are institutions that could have been included in the study, but which are not active members of either the AABGA or American Horticultural Society.

*Two institutions, Fenner Arboretum and Riveredge Nature Center were included because the author had prior knowledge of their existence, even though they were not on either of the above-mentioned lists.

Several other sources provided valuable information for this study. The Prosepective Role of an Arboretum, a report prepared under the auspices of The Institute for the Study of Science in Human Affairs, Columbia University, and published in cooperation with the Holden Arboretum is an in-depth study of the involvement of arboreta and botanical gardens in today's society and focuses on the role these institutions should play in the future. The appendices of this bulletin provided valuable data which have been incorporated into the data reported in this research paper.

The Brooklyn Botanic Garden in a special issue of its publication Plants and Gardens entitled "American Gardens--A Traveler's Guide" offers information on travel, major plant materials, history, admission fees, and the administrative agency for 200 gardens in the United States and Canada. The gardens included in this guide are arranged by geographical region.

The National Recreation and Park Association published Management Aides Bulletin No. 90, Arboreta, Botanical Gardens, Special Gardens that deals with the differences of these institutions. Appendix A of this publication is a list of arboreta, botanical gardens and special gardens in the United States and Canada.

The Arboretums [sic] and Botanical Gardens of North America lists 99 botanic gardens and arboreta in the United States and 7 in Canada. It includes information on plant materials, ownership, key personnel, operating budgets, publications and the date founded for those institutions named in this directory.

The Longwood Program offers a seminar series to its graduates that features key personnel from botanical gardens, arboreta and related institutions. These speakers discuss topics of current interest in this field.

Steven A. Frowine in his unpublished Master's thesis, "An Educator's Guide to Arboreta and Botanical Gardens in the Northeastern United States and Nearby Canada" includes 76 arboreta and botanical gardens that offer education programs. This guide is of special interest to those in the field of education.

The International Directory of Botanical Gardens II is devoted to botanical gardens throughout the world. The institutions are categorized by city rather than by state or province. This directory includes 115 institutions in the United States and 9 in Canada. The institution information includes: status, area, rainfall, temperature, taxa, hours of operation, facilities (herbaria, greenhouses), publications, and the names of the director and other staff members.

CHAPTER II

METHODOLOGY

A questionnaire was developed to generate the data required to satisfy the objectives stated in Chapter I. This questionnaire served as the statistical tool for all primary research that was conducted in this study. The questionnaire (Appendix A-2) had as its primary function: (1) to determine the extent of programs that are being conducted at the present time by institutions; (2) to obtain general information on the institutions regarding size, location, prime function, when established; (3) to determine how institutions are funded, their status and priorities; (4) to gather visitor information, age group data, peak visitor season data and to project trends in the role of these institutions; and (5) to ascertain the experience and academic training of those who direct the operations and make decisions that relate to the implementation of programs and activities of these institutions.

The questionnaire was developed with as many close-ended questions as possible to provide uniformity and ease in processing the data. Where only partially close-ended questions could be devised, multiple choice questions were used with one choice labeled "other" and space was provided for the respondent to fill in the appropriate response.

The right hand column of the questionnaire was delineated and pre-coded; however, several errors in the pre-coding made it unusable and it was necessary to code the responses directly from the questionnaire to a summary sheet. The four page questionnaire was electro-stated and was constructed in a folding arrangement that prevented any one page from being removed or lost. The color of the questionnaire was sulfide green, as was the mailer envelope. It was hoped that the color would attract special attention to the questionnaire. A cover letter (Appendix A-2) accompanied the questionnaire. A self-addressed postage paid envelope was included with the questionnaire and cover letter. It was not possible for the respondents in Canada to use the postage paid envelope.

Pre-test

A pre-test sampling was conducted prior to the total sample population mailing. The pre-test which included forty-nine questions was conducted for three reasons: (1) to test the validity of the questions; (2) to seek input from the respondents; and (3) to determine what rate of return might be expected. This pre-test was conducted in the spring of 1974 and involved eleven institutions. The pre-test was limited to the state of Michigan. Nine of the pre-tests were completed and returned. This response was encouraging because the spring months are normally the busiest period at these institutions (winter cleanup and preparation for the new visitor season). In addition, several respondents made comments and suggestions on how to improve the questionnaire. These suggestions

were taken into consideration when preparing the final four page questionnaire.

Sample Population

A sample population had to be established for this study so that the data analyzed would be meaningful and the correct number of questionnaires could be printed. A number of membership lists that were cited in the literature review in Chapter I could have been used. The list in the Directory of American Horticulture was chosen because it was the most recent (1974), the most comprehensive, and because it furnished a list by state and province. In most cases, this list also included the name of the director or principal officer in charge of the institution.

The state and province list in the Directory of American Horticulture did present one problem. A number of institutions were included which according to their titles did not appear to fit the classification of either a botanical garden or arboretum as defined in this study. However, a brief description included in the listing suggested that the institution met the criteria established for a related institution. It was felt that to eliminate an institution on the list would indicate pre-judgment on the part of the researcher as to what the sample population should be for this study. Thus, it was deemed appropriate to include all institutions listed, except for associations and horticultural societies. Garden centers were included because many were described as offering workshops, exhibits, classes, lectures or maintaining gardens. It may have been an error

to include garden centers because the majority of this group failed to respond to the questionnaire (see data return response, Chapter III). It may be argued that horticultural societies should have been included in the study. At least one large midwestern horticultural society (Chicago Horticultural Society) is the parent organization of a botanic garden but also conducts other urban horticultural programs. In this instance, a questionnaire was sent to the botanical garden but not to the parent organization.

A final check in completing the population sample was made by comparing the list used from the Directory of American Horticulture against the membership listing for the American Association of Botanical Gardens and Arboreta, Inc. This comparison added 33 institutions to the list for a total of 299 institutions plus the 2 institutions mentioned on page 9 of this study. The total sample population included 301 institutions.

A number was assigned to each institution on the lists taken from the Directory of American Horticulture and the AABGA Membership List. Each questionnaire, prior to mailing, was numbered in the upper right-hand corner of the questionnaire to correspond to the same number assigned to the institution on the Directory of American Horticulture and AABGA Membership List. Likewise, each return envelope had the same number printed in the lower left-hand corner. As each envelope was returned to the researcher, the date it was received was noted on the directory list and the number for that institution was circled. This procedure made it easy to tabulate a list of unreturned questionnaires at all times.

The costs incurred for preparing the questionnaire and mailing them were borne by the researcher. The mailing was done in September, 1974. A follow-up mailing should have taken place as early as October, but the costs involved made it impossible to do this. A tabulation of the unreturned questionnaires was made in December of 1974. At that time 111 questionnaires had not been returned.

A reminder postcard was mailed to these 111 institutions on December 30, 1974 (Appendix A-3). A number of requests were received for another copy of the questionnaire. The duplicate questionnaires were mailed out to those respondents requesting them because the final coding program was still being formulated and there was enough time to receive the duplicate questionnaires before the information was transferred to the summary sheets and then processed onto computer cards.

Many institutions enclosed brochures relating to their organizations along with the completed questionnaires. These brochures included information on programs that were currently being offered in 1974. Comments and suggestions were also received. This information was both interesting and helpful in analyzing the data for this study and was greatly appreciated by the researcher.

CHAPTER III

ANALYSIS OF THE GENERAL RESEARCH DATA

The data generated from the questionnaire that was mailed to the sample population of 301 institutions form the basis for this analysis.

Data Return Response

The questionnaires were mailed out to the institutions included in this study on September 11, 1974. The questionnaires were returned to the researcher during the period from September 14, 1974 through February 14, 1975. An analysis of the returns showed that four institutions had been duplicated due to the institution having more than one official name. Sixteen institutions did not complete the questionnaire but either returned it to the researcher or enclosed a letter in the return envelope stating why they had not completed the questionnaire. This figure includes four questionnaires that were returned by the post office as undeliverable because of incorrect addresses. The return response of valid questionnaires is 69.8% of the total sample population when the twenty institutions referred to above are removed from the sample. It is also questionable whether eleven garden centers should have been included in the sample. The number of valid responses represents 72.6% of the total sample provided the eleven garden centers

are removed from the study. The adjusted population sample represents 258 institutions in the United States and 12 institutions in Canada. The return response for the United States was 185 out of a possible 258 responses or 71.7% of the total. There were eleven out of twelve returns for Canada which resulted in a 91.7% return response.

Analysis Procedure

The questionnaire data were converted from alpha-numeric to numeric values through the use of the questionnaire codebook (Appendix A-4). The information was transferred to computer laboratory coding forms (summary sheets) and then keypunched to data cards. Each of the 196 respondents was represented by two data cards. All "no response" and "not applicable" replies were treated as missing values and assigned the value zero (0).

The computer system program used for this study was SPSS (Statistical Package for the Social Sciences). A frequency count was used to assess the data that are discussed in this chapter.

Analysis of the General Data

The analysis deals with the number of valid respondents (196 institutions) and not the total sample population of 301 institutions. In this study all subsequent references that are made to the total sample population will pertain to the 196 respondents. Percentages will not always equal 100% as the values used in the tables are given as calculated on the computer printout.

Location

This variable classifies the institutions by state or province. Those states not represented either lack known institutions or those institutions failed to respond to this survey. Ten states are not included; however, the Virgin Islands are included in the study. The five states with the largest number of institutions are: California (23); New York (16); Pennsylvania (16); Michigan (8); and Ohio (8). Ontario led the Canadian provinces with five institutions or 45.5% of all the institutions in Canada. Table 1 shows a complete classification for those states and provinces represented in the study. The United States institutions represent 94.4% of the total sample. The geographical distribution of the institutions is illustrated in Appendix C, Figure 1.

Region

The continental United States was divided into six geographical regions similar to the regions shown in Map I in The Prospective Role of an Arboretum. Hawaii and the Virgin Islands were treated as distinct regions separate from the conterminous United States. Each province of Canada was considered a separate region (Table 2). Region 1 in the United States is the smallest in land area but contains the largest number of institutions (33.5%). The regions are shown in Figures 1 and 3, Appendix C. Each institution is represented by the number assigned to that institution in Appendix A-1.

TABLE 1.--Distribution of Responding Institutions by State and Province.

State or Province	No.	%	State or Province	No.	%
<u>United States:</u>					
Alabama	3	1.6	North Carolina	4	2.2
Arizona	4	2.2	North Dakota	1	.5
California	23	12.4	Ohio	8	4.3
Colorado	1	.5	Oklahoma	1	.5
Connecticut	4	2.2	Oregon	4	2.2
District of Columbia	4	2.2	Pennsylvania	16	8.6
Delaware	1	.5	South Carolina	5	2.7
Florida	7	3.8	Tennessee	4	2.2
Georgia	5	2.7	Texas	3	1.6
Hawaii	4	2.2	Utah	1	.5
Iowa	2	1.1	Virginia	3	1.6
Illinois	3	1.6	Virgin Islands*	3	1.6
Indiana	3	1.6	Washington	4	2.2
Kansas	2	1.1	West Virginia	1	.5
Kentucky	2	1.1	Wisconsin	5	2.7
Louisiana	6	3.2		<u>185</u>	<u>98.6</u>
Maine	2	1.1			
Maryland	3	1.6			
Massachusetts	5	2.7	<u>Canada:</u>		
Michigan	8	4.3	Alberta	1	9.1
Minnesota	5	2.7	British Columbia	2	18.2
Missouri	1	.5	Manitoba	1	9.1
New Hampshire	1	.5	Ontario	5	45.5
New Jersey	6	3.2	Quebec	2	18.2
New Mexico	1	.5		<u>11</u>	<u>100.0</u>
New York	16	8.6	Total population sample =	196	

* Not a state but classified as a unit of the United States sample population.

TABLE 2.--Responding Institutions by Regions.*

United States				Canada		
Region	Classification	No.	%	Region	Classification	No. %
1.	Northeast and Middle Atlantic	62	33.5	9.	Quebec	2 18.2
2.	North Central and Ohio River	37	20.0	10.	Ontario	5 45.5
3.	South	34	18.4	11.	Manitoba	1 9.1
4.	Northern and Central Plains	4	2.2	12.	Alberta	1 9.1
5.	Southwest	10	5.4	13.	British Columbia	2 18.2
6.	Pacific Coast	31	16.8		TOTAL	11 100.1
7.	Hawaii	4	2.2			
8.	Virgin Islands	3	1.6			
	TOTAL	185	101.1			

* See also Appendix C, Maps 1 and 3.

SMSA-CMA

The institutions located in urban area, i.e., SMSA for the United States and SMA for Canada, are considered here. The twelve largest SMSA's represented in Table 3, have fifty-two institutions (28.1%) of all United States institutions. The number of institutions located in all population centers classified as SMSA's is more significant. One hundred fifty-five institutions (83.8%) are located in these urban areas. The SMSA's of the United States are delineated in Figure 1 of Appendix C. The institutions inside the boundaries of all SMSA's are considered urban institutions. Based on current projections, by the year 2000 A.D., most of the institutions in the United States will be situated in urban environments and only seventeen currently existing institutions or 9.2% of the total will remain in rural areas (Figure 2, Appendix C).

TABLE 3.--Number of Responding Institutions Located in the Twelve Major SMSA's by Population (United States).

SMSA*	No.	%
1. New York	9	5.0
2. Los Angeles-Long Beach	6	3.2
3. Chicago	3	1.6
4. Philadelphia	11	6.0
5. Detroit	1	.5
6. San Francisco-Oakland	6	3.2
7. Washington D.C.-Maryland-Virginia	7	3.8
8. Boston	3	1.6
9. Pittsburgh	2	1.1
10. St. Louis-Illinois	1	.5
11. Baltimore	1	.5
12. Cleveland	2	1.1
TOTAL	52	28.1

*SMSA's (Standard Metropolitan Statistical Areas) are ranked according to population size). Total Cases = 185.

The five major CMA's of Canada now have five institutions within their boundaries. Nine of the eleven institutions are located in urban areas classified as CMA's or 81.8% of the Canadian sample (Figure 3, Appendix C). Table 4 shows the number of institutions located in the five major CMA's of Canada. No data are available for urban areas in Canada for the year 2000 A.D.

TABLE 4.--Number of Responding Institutions Located in the Five Major CMA's by Population (Canada).

CMA*	No.	%
1. Montreal	1	9.1
2. Toronto	1	9.1
3. Vancouver	2	18.2
4. Ottawa-Hull	1	9.1
5. Winnipeg	<u>0</u>	<u>0.0</u>
TOTAL	5	45.5

*CMA's (Census Metropolitan Areas) are ranked according to population size). Total Cases = 11.

Type of Institution

Each respondent was asked to indicate the type of organization with which he or she was affiliated. The United States has eight organization types while Canada has three types (Table 5).

Park Systems

The question was asked whether the institution was part of a larger park system. The response indicated that fifty-seven (31.1%) of the United States institutions were a part of a larger park system. The institutions that are independent entities totaled 126

TABLE 5.--Responding Institution Type by Country.

	Number of Institutions	Percent of Total
<u>United States:</u>		
Private organization	52	28.1
Public organization	90	48.6
Foundation	28	15.1
Private-public combined	8	4.3
Cultural	2	1.1
Garden club or association with garden club	2	1.1
Public organization and foundation	2	1.1
International	<u>1</u>	<u>.5</u>
TOTAL United States cases	185	99.9
<u>Canada:</u>		
Public organization	9	81.8
Private-public organization combined	1	9.1
Canadian federal government	<u>1</u>	<u>9.1</u>
TOTAL Canada cases	11	100.0

(68.9%) and there were two non-respondents. Three Canadian institutions are part of larger park systems while the remaining eight (72.7%) are not affiliated with a larger park system. Institutions belonging to larger park systems were then classified according to the type of park system (Table 6).

TABLE 6.--Type of Park System to Which Responding Institutions Belong.

	United States		Canada	
	No.	%	No.	%
Municipal	30	51.7	2	66.7
County	12	20.7		
Municipal-county	3	5.2		
State or provincial	6	10.3	1	33.3
Federal	3	5.2		
Private-sanctuary	2	3.4		
Special district	1	1.7		
Municipal-state	1	1.7		
TOTAL	58	99.9	3	100.0

Membership Organization Data

It is customary for many organizations to have an ancillary membership body that supports the institution. There are eighty-one responding institutions in the United States that have membership groups (45.0% of the total) and three more are proposing membership organizations in the near future. Five institutions (2.7% of the sample) did not respond to the question. Table 7 gives the size of the institution membership organizations. The two largest institutions on this table are somewhat atypical and merit further description. The Georgia Federation of Garden Clubs represents a garden club membership of 21,000 members while the Woodlawn Plantation, is part of the National Trust for Historic Preservation, an organization that has 50,000 members.

Institutions with membership organizations were asked if they charged a fee for membership. The response indicated that

TABLE 7.--Size of Responding Institution Membership Organizations.

Size*	United States		Canada	
	Institutions	% of Total	Institutions	% of Total
1.	5	6.8	1	20.0
2.	4	5.4		
3.	12	16.2		
4.	11	14.9		
5.	15	20.3		
6.	11	14.9	2	40.0
7.	10	13.5	2	40.0
8.	4	5.4		
9.	2	2.7		
TOTAL	74	100.1	5	100.0

No Response (United States): 7 or 8.6% of 81 cases

*Code: Number of Members:

1. 50 or less	4. 251-500	7. 2001-4000
2. 51-100	5. 501-1000	8. 4001-8000
3. 101-250	6. 1001-2000	9. Over 8000

eighty-one such institutions have membership dues (54.0%) and sixty-nine do not (46.0%). Thirty-five institutions or 18.9% of the United States sample did not answer the question.

The membership rates for the institutions varied from \$1.00 to \$25.00 annually. Fourteen institutions gave more than one rate so a value labeled "various" was necessary for keypunching this datum. The objective was to obtain the dues rate per individual member only, but the question did not ask for this category explicitly. The dues rate data represent seventy-eight respondents.

Membership Dues Rates

<u>Number of Institutions</u>	<u>Dues Rates</u>
1	\$ 1.00
1	1.50
1	2.00
6	3.00
11	5.00
1	7.00
4	7.50
20	10.00
1	12.00
4	12.50
9	15.00
3	20.00
2	25.00
14	Various
<u>78</u>	

(No organization membership: 107 or 57.8% of the United States sample).

Five institutions in Canada have membership organizations and one institution is proposing a membership organization in the near future. Table 8 shows the membership data for the five institutions. Guelph Arboretum, the respondent proposing a membership organization in the near future, will also charge a dues rate to members.

TABLE 8.--Membership Number and Dues Rate--Canada.

<u>Number of Institutions</u>	<u>Membership Group</u>	<u>Number of Institutions</u>	<u>Dues Rate</u>
1	50 or less	1	\$ 3.00
2	1001-2000	1	5.00
2	2001-4000	2	10.00
		2*	Various

* Includes Guelph Arboretum

Entrance Fee

The institutions were asked whether they charged an entrance fee. In some cases, a fee is charged on Sundays in an attempt to encourage visitation at other times of the week or for parking facilities. Supposedly, a fee evens out the number of visitors to the institution and prevents overcrowding. However, the majority of institutions are free to the general public and only forty-seven in the United States charge an entry fee (26.7% of the sample). Two respondents are proposing entrance fees to the general public (1.1% of the sample). Even so, 72.2% of all United States institutions remain free to the public. There were nine no responses (4.9%) for this variable.

Eight Canadian institutions (72.2%) are free to the general public and no respondent is proposing an entry fee.

The range in entrance fee for United States and Canadian institutions is varied:

	<u>United States</u>			<u>Canada</u>		
	<u>Minimum</u>	<u>Maximum</u>	<u>Mean</u>	<u>Minimum</u>	<u>Maximum</u>	<u>Mean</u>
Adults	\$.15	\$5.00	\$1.62	\$.25	\$1.00	\$.75
Children	.10	3.00	.88	.10	.50	.37

Institution Size

Information was sought regarding the size of the institution. Table 9 ranks the number of institutions according to their size in acres for the United States and Canada. Data on the United States respondents (98.9% of the sample) and their Canadian counterparts

TABLE 9.--Size of Responding Institution (in Acres).

		Under 10	10-50	50-100	100-250	250-500	500-1000	Over 1000
<u>United States:</u>								
No.:	35	44	32	31	15	9	17	
% :	19.1	24.0	17.5	16.9	8.2	4.9	9.3	
Number of cases shown: 183; No response: 2 (1.1% of total cases)								
<u>Canada:</u>								
No.	1		3	3	2	1	1	
%	9.1		27.3	27.3	18.2	9.1	9.1	
Number of cases shown: 11; No response: 0								

(100.0% of the sample) revealed that the majority of responding institutions tend to be less than 250 acres in size. The mean size in the United States is 135 acres; mean size in Canada is 273 acres.

Publications

Publications are one of several ways in which an institution can disseminate information to the general public. It was felt that publications constituted an important institution program and several questions on the questionnaire were directed toward gathering publication data. Currently, seventy-four United States institutions publish a journal or newsletter on a regular basis and two more institutions will do so in the near future. A total of 40.9% of the institutions are engaged in publishing information for the benefit of organization members or the general public. Information dealing with the type of publication and number of times it is published appears in Table 16. There were ninety-three United States respondents (50.3% of the total sample). Six institutions in Canada have regular publications and one more institution is proposing this program (Table 10).

Organization Purpose

A variable dealing with organization purpose was developed with instructions that the respondents select one of the four values given or assign priority to the values by numbering them according to their importance (Table 11).

TABLE 10.--Publication Information for Responding Institutions.

	United States		Canada	
	No.	%	No.	%
<u>Type of Publication:</u>				
1. Journal or magazine	12	12.9	2	28.6
2. Newsletter	46	49.5	2	28.6
3. Research bulletin	4	4.3	1	14.3
4. 1 and 2 combined	7	7.5		
5. 1, 2 and 3 combined	1	1.1		
6. 1 and 3 combined			1	14.3
7. 2 and 3 combined	2	2.2		
8. Special publications (pamphlets, guides, postal cards)	<u>21</u>	<u>22.6</u>	<u>1</u>	<u>14.3</u>
TOTAL	93	100.1	7	100.1
<u>Number of Times Publications are Issued per Year:</u>				
Weekly	1	1.1		
Monthly	14	15.2	1	14.3
Bimonthly	6	6.5		
Quarterly	33	35.9	3	42.9
Annual	10	10.9		
Semi-annual/5 issues or 10 issues	10	10.9	1	14.3
More than one publication issued at various times	5	5.4	1	14.3
Irregular	13	14.1	1	14.3
No response	<u>1</u>	<u>--</u>	<u>—</u>	<u>—</u>
TOTAL	93	100.1	7	100.1

TABLE 11.--Organization Purpose.

	United States		Canada	
	No.	%	No.	%
1. Physical facility for collecting, preserving, evaluating and displaying plants	30	17.3	1	10.0
2. Educate the general public and increase awareness of plants	83	48.0	5	50.0
3. Recreational experience in highly populated areas with few plants	22	12.7		
4. Support teaching and research for government or university	21	12.1	4	40.0
5. Combinations of the above	<u>17</u>	<u>9.9</u>	<u>—</u>	<u>—</u>
TOTAL	173	100.0	10	100.0

No response (United States): 12 or 6.5% of 185 cases.

No response (Canada): 1 or 9.1% of 11 cases.

Subjective Variables

Several variables were designed subjectively to determine how the respondent would answer certain questions that pertained to programs and activities and their social implications. In their replies, a number of respondents commented that they felt the questions were subjective.

The respondents were asked whether their institution appealed to a large segment of the general public. The majority of United States respondents said yes (77.8%); thirty-seven said no (20.0%); and four (2.2%) did not know or failed to respond to the question. The

majority of Canadian respondents said yes (72.7%); two said no (18.2%); and there was one no response (9.1%).

A question that dealt with special interest groups was actually a rewording of the appeal question discussed previously. The special interest groups were defined as gardeners, nature lovers, and plant specialists. This response varied rather significantly from the question on appeal to the general public.

	<u>Special Interest Groups Appeal</u>					
	<u>Yes</u>		<u>No</u>		<u>No Response</u>	
United States	109	58.9%	62	33.5%	14	7.6%
Canada	7	63.6%	4	36.4%		

The data indicate that both United States and Canadian respondents felt their institutions did attract the general public, but in particular, those special interest groups defined in the question.

Are minority groups attracted to these institutions? If so, are they given the same chance to participate in the programs and activities that are offered to other segments of the public? Eighteen United States respondents (10.5%) said they emphasized attracting minority groups and 153 institutions (89.5%) said this was not emphasized. Many added that all were welcome to their facility and no one was shown preference. Fourteen institutions did not respond to the question (7.6% of the sample). Eight Canadian institutions (71.7%) said they did not emphasize attracting minority groups and three institutions (27.3%) did not respond. The results appear to support the statement that these institutions have as their prime goal

the desire to attract plant lovers to their institutions. Most institutions are free to the general public and are near or in the urban centers of the United States and Canada. Thus, they are accessible to those who wish to visit them and race or ethnic background is not a barrier because of economic disparity.

Can a visit to one of these institutions be considered a recreational experience? In the questionnaire, the definition for recreational experience was stated as, "A voluntary leisure activity that gives satisfaction, pleasure or gives an individual self-expression." The definition was specified because the term recreational experience can be perceived in many different ways. Without a definition the question would have been ambiguous and totally dependent upon the individual respondent's personal attitude toward recreation. Several respondents stated that the question was subjective.

	<u>Recreation Experience</u>					
	<u>Yes</u>		<u>No</u>		<u>No Response</u>	
United States	160	86.5%	12	6.5%	13	7.0%
Canada	10	90.9%	1	9.1%		

The majority of the respondents felt that the general public had an awareness of their institution and that the amount of public support for their institution was increasing. The question, stated in two parts, would have been more meaningful as awareness and public support are different variables. Nevertheless, 144 United States

respondents (77.8%) said yes; 15 (8.1%) said no; and 26 (14.1%) did not respond to the question. All Canadian respondents said yes to this question.

Most institutions, regardless of type, stated that they were underfunded. Available resources are finite and the allocation of these resources, be they public or private, has always been a source of contention. Administrators face the problem of allocating the funds they receive between new and existing programs. The allocation is further complicated during periods of inflation because it becomes more difficult to know to what extent the available funds will cover the costs that will be incurred. Cutbacks in programs and activities occur when the source of the funds withdraws the original allocation, the amount of the funds is reduced drastically or inflation reduces what a stable budget can purchase. Predictably, the comments made in the margins alongside this question indicated that the overwhelming majority of respondents felt they were underfunded:

	<u>Receiving Support Needed</u>					
	<u>Yes</u>		<u>No</u>		<u>Don't Know</u>	
United States	8	5.2%	135	87.8%	11	7.1%
Canada	1	10.0%	9	90.9%		
No Response (United States):	31	(16.8%)				
No Response (Canada):	1	(9.1%)				

Visitor Data

Earlier in this study the statement was made that the majority of institutions are located in SMSA's and CMA's in the United States

and Canada (83.8% and 81.8% respectively). In addition, projections were provided for the year 2000 A.D. At the present time, the institutions located in the twelve major SMSA's of the United States account for 28.1% of the total sample. The five major CMA's of Canada have 45.5% of that country's responding institutions.

The number of visitors to these institutions is an indication of their public appeal. These data are difficult to determine because the term "visitor" requires definition. Does institution visitor mean the actual number of visits or the total number of visitors? The two terms are not synonymous. Some individuals visit the institutions on a regular basis while others may visit perhaps once a year. How can the percentage of the local population visits to an institution be determined? One way to obtain the figure is to divide the number of visits (defined as the number of times people come to the institution) by the total SMSA, or CMA, population in which the institution is located. These data could be refined by taking into account the repeat visits and visitors from outside the SMSA-CMA. The formula devised here would give a precise figure for the percentage of visitors living in the SMSA or CMA who visit the institutions:

$$\% \text{ SMSA(CMA)}_{V_i} = \frac{V_i - r - n \times I_n}{\text{SMSA(CMA)}_p}$$

In this equation, V_i = institution visits by residents of the SMSA or CMA; r = repeat visits; n = non-resident visits; I_n = number of institutions located in the SMSA or CMA; and p = total SMSA or CMA population in which the institution is physically located. Another

analysis on visitor data can be made by categorizing the visitors into groups as in Table 12. However, the relatively high number of no responses makes the reliability of the data questionable. Accurate figures on visitor data are not available at this time by SMSA or CMA area because of poor data.

Peak Season

An institution may have a particular season when it receives the greatest number of visits. This variance is probably due to the types of plant material found in the institution's collection. An azalea garden will receive the greatest number of visitors in the spring months when the plants are in flower as will a garden featuring spring ephemerals. On the other hand, conservatories have the ability to display flowering plant materials during every season. Table 13 shows that the majority of institutions are non-seasonal and that visitors come at all times of the year rather than at one peak season.

Age Groups

Eight age groups were devised and the respondents were asked to rate the people visiting their institution by age group. The first and second highest age groups are given in Table 14 for the United States and in Table 15 for Canada.

Funding

The variable on funding proved to be the most diverse, resulting in thirty values for the United States and ten for Canada. The institutions exhibit funding complexities that comprise any

TABLE 12.--Number of Visitors to Responding Institutions.

No. of Visitors	United States		Canada	
	Institution	%	Institution	%
1. 1-5,000	13	11.7	1	14.3
2. 5,001-10,000	6	5.4		
3. 10,001-25,000	13	11.7	1	14.3
4. 25,001-50,000	17	15.4	1	14.3
5. 50,001-100,000	14	12.6		
6. 100,001-250,000	19	17.1	1	14.3
7. 250,001-500,000	13	11.7		
8. 500,001-1,000,000	14	12.6	3	42.8
9. 1,000,001-5,000,000	<u>2</u>	<u>1.8</u>	<u>—</u>	<u>—</u>
TOTAL	111	100.0	7	100.0

No response (United States): 74 or 40.0% of 185 cases.

No response (Canada): 4 or 36.4% of 11 cases.

TABLE 13.--Peak Visitor Season of Responding Institutions.

Season	United States		Canada	
	Institution	%	Institution	%
Spring	55	30.6	1	9.1
Summer	24	13.3	7	63.6
Fall	4	2.2		
Winter	10	5.6		
Non-seasonal	<u>87</u>	<u>48.3</u>	<u>3</u>	<u>27.3</u>
TOTAL	180	100.0	11	100.0

No response (United States): 5 or 2.7% of 185 cases.

No response (Canada): 0 or 0.0% of 11 cases.

TABLE 14.--Visitors to Responding Institutions (United States) Ranked by Age Group.

Age Group	Number of Institutions	Percent of Total
<u>Highest Number of Visitors</u>		
1. 6-12	18	11.5
2. 13-17	2	1.3
3. 18-25	19	12.1
4. 26-35	7	4.5
5. 36-45	12	7.6
6. 46-55	28	17.8
7. 56-65	13	8.3
8. Over 65	4	2.5
9. Unknown	<u>54</u>	<u>34.4</u>
TOTAL	157	100.0
<u>Second Highest Number of Visitors</u>		
1. 6-12	7	5.1
2. 13-17	10	7.4
3. 17-25	7	5.1
4. 26-35	11	8.1
5. 36-45	15	11.0
6. 46-55	18	13.2
7. 56-65	21	15.4
8. Over 65	5	3.7
9. Unknown	<u>42</u>	<u> </u>
TOTAL	136	99.9

No response: 49 or 26.5% or 185 cases.

TABLE 15.--Visitors to Responding Institutions (Canada) Ranked by Age Group.

Age Group	Number of Institutions	Percent of Total
<u>Highest Number of Visitors</u>		
1. 6-12		
2. 13-17		
3. 18-25		
4. 26-35	1	10.0
5. 36-45		
6. 46-55	3	30.0
7. 56-65		
8. Over 65		
9. Unknown	<u>6</u>	<u>60.0</u>
TOTAL	10	100.0
<u>Second Highest Number of Visitors</u>		
1. 6-12		
2. 13-17		
3. 18-25		
4. 26-35		
5. 36-45	2	22.2
6. 46-55		
7. 56-65	1	11.1
8. Over 65		
9. Unknown	<u>6</u>	<u>66.7</u>
TOTAL	9	100.0

No response: 2 or 18.2% of 11 cases.

number of combinations of the six factors furnished on the questionnaire (Tables 16 and 17).

TABLE 16.--Sources of Responding Institution Funding (United States).

Source of Funding	Number Institutions	Percent of Total
1. Endowment or Foundation	31	17.4
2. State government	6	3.4
3. Local (city or county government)	38	21.3
4. Private funds (dues, plant sales, donations)	38	21.3
5. University	15	8.4
6. Federal government	6	3.4
7. 2, 3 and 6	1	.6
8. 1, 2, 3 and 4	1	.6
9. 4 and 5	4	2.2
10. Admissions charges	4	2.2
11. 1, 2, 4, 5 and 6	1	.6
12. 1, 3 and 4	3	1.7
13. 1 and 5	1	.6
14. 1 and 4	8	4.5
15. 3 and 10	2	1.1
16. 2 and 5	2	1.1
17. 1, 2, 3 and 6	1	.6
18. 1, 4 and 5	2	1.1
19. 2, 5 and 6	2	1.1
20. 2 and 3	2	1.1
21. 1 and 2	2	1.1
22. 1, 3, 4 and 6	1	.6
23. 3 and 4	2	1.1
24. 1, 2, 3, 4 and 5	1	.6
25. 2 and 6	1	.6
26. Special tax	1	.6
27. 1 and 10	1	.6
28. 4 and 6	1	.6
29. 5 and 6		
30. 2, 3 and 4		
TOTAL	178	101.1

No response (United States): 7 or 3.8% of 185 cases.

TABLE 17.--Sources of Responding Institution Funding (Canada).

Source of Funding	Number of Institutions	Percent of Total
1. State government	1	9.1
2. Local (city or county government)	1	9.1
3. Private funds (dues, plant sales, donations)	1	9.1
4. University	1	9.1
5. Federal government	2	18.2
6. 1, 2 and 3 and endowment	1	9.1
7. 3 and 4	1	9.1
8. Endowment or foundation and university combined	1	9.1
9. University and Federal government	1	9.1
10. 1, 2 and 3	<u>1</u>	<u>9.1</u>
TOTAL	11	100.1

Annual Budget

Budget categories were purposely given a wide scale so that respondents could check the appropriate value without disclosing the specific dollar amounts in their respective budgets. Often this information is confidential and foundations and other private organizations may be reluctant to divulge their annual budgets to the public. Table 18 depicts the budget range and number of institutions with respect to annual budgets. There were twenty institutions that did not respond to the question for the United States (10.8% of the sample) and none for Canada.

Data were obtained for three specific budget items: education, research and publications. Table 19 gives the percentages allocated to these three programs in the United States and Canada. Because of the relatively high number of missing values, these data are somewhat

inconclusive. However, they do point out the strong emphasis that is placed on these three programs by the institutions represented.

TABLE 18.--1974 Responding Institution Budgets.

Annual Budget	United States		Canada	
	No.	%	No.	%
Under \$25,000	44	26.7		
\$25,000 - \$50,000	21	12.7	1	9.1
\$50,000 - \$100,000	24	14.5	2	18.2
\$100,000 - \$500,000	53	32.1	6	54.5
\$500,000 - \$1,000,000	8	4.8	1	9.1
\$1,000,000 - \$2,500,000	9	5.5	1	9.1
\$2,500,000 - \$5,000,000	3	1.8		
\$5,000,000 - \$10,000,000	1	.6		
Over \$10 million	<u>2</u>	<u>1.2</u>	<u>—</u>	<u>—</u>
TOTAL	165	99.9	11	100.0

No response (United States): 20 or 10.8% of 185 cases.

Mean (United States)	= 3.1	Mean (Canada)	= 3.9
Mode (United States)	= 4.0	Mode (Canada)	= 4.0
Median (United States)	= 3.2	Median (Canada)	= 3.9

TABLE 19.--Responding Institution's Annual Expenditures for Education, Research and Publications--
United States and Canada.

Percent of Budget	Education		Research		Publications	
	United States	Canada	United States	Canada	United States	Canada
Less or = 1%	6		7		13	
Less or = 2%	1		5		5	2
Less or = 3%	2		1		1	
Less or = 4%	2		1			
Less or = 5%	20	1	9		12	2
Less or = 6%			1		2	
Less or = 7%			1		2	
Less or = 8%	2				1	
Over 8%	<u>55</u>	<u>5</u>	<u>26</u>	<u>8</u>	<u>17</u>	<u>2</u>
TOTAL	88	6	51	8	53	6
No Response	97 (52.4%)	5 (45.5%)	134 (72.4%)	3 (27.3%)	132 (71.4%)	5 (45.5%)

CHAPTER IV

ANALYSIS OF DATA DIRECTLY RELATED TO THE OBJECTIVES

Programs and Activities

What is the scope of the programs and activities that arboreta, botanical gardens and related institutions offer? These programs and activities can best be described as diverse, with more programs and activities being planned in the near future. A list of the future programs and activities has been compiled (Appendix B-1). A glance at these new ventures indicates just how innovative these institutions are in creating new programs and activities. A great deal of emphasis is placed on education.

The questionnaire deals with a number of specific programs. One program is the student work-study program designed to train students for future positions at these or similar institutions. Currently, fifty-nine United States institutions offer work-study programs. These institutions represent 33.1% of the total sample. One institution will include a student work-study program as an addition to its programs soon. Seven institutions did not answer the question (3.8% of the United States sample). Fifty-five United States institutions (93.2% of the fifty-nine that offer work-study programs) furnished the season when their program is offered (Table 20).

TABLE 20.--Season when Student Program is Offered.

	United States		Canada	
	No.	%	No.	%
Spring	3	5.5		
Summer	17	30.9	1	25.0
Fall	1	1.8		
Winter				
Two seasons	5	9.1	1	25.0
Three seasons	7	12.7		
All year	<u>22</u>	<u>40.0</u>	<u>2</u>	<u>50.0</u>
TOTAL	55	100.0	4	100.0

The work-study programs are not limited to any one season. As can be expected, a large number of programs are offered during the summer since most students are not in school at that time. However, it appears that the programs are important enough to merit consideration throughout the year.

The Canadian response to student work-study programs is similar to that for the United States. Three institutions now offer such programs (33.3% of the sample) with one more proposing this program soon. Two institutions (18.2% of the sample) did not respond to the question. The all year category received the greatest number of responses (Table 20).

Table 21 illustrates the number of students by groups who were enrolled in these programs in the United States and Canada.

TABLE 21.--Number of Students in Programs.

Number of Students	United States		Canada	
	No.	%	No.	%
1-5	24	49.0	1	33.3
6-10	8	16.3	1	33.3
11-15	6	12.2	1	33.3
16-20	3	6.1		
21-25	1	2.0		
26-30	1	2.0		
31-35				
36-40	1	2.0		
Over 40	<u>5</u>	<u>10.2</u>	—	—
TOTAL	49	99.8	3	99.9

Eight programs were rated on the questionnaire. Each rating had five categories that were developed as nominal measurements. Tables 22 and 23 show the ratings received for each program, including the institutions which did not respond. Other programs may have warranted as much importance as those included in the survey instrument. However, the eight that appear on the table represent a fair cross-section of programs offered by institutions.

A number of institutions offer special courses to the general public. In the United States, eighty-six institutions (48.3%) offer courses and one institution plans to offer them soon. There are seven no response observations (3.8% of the sample). Five Canadian institutions offer special courses (45.5%) and one more will offer this program shortly. All Canadian respondents replied to the question.

TABLE 22.--Responding Institution Program Ratings--United States.

Program	Extremely Important		Important		Important but not Essential		Important if the time and money are available		Not Important		Totals	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Braille	2	1.7	9	7.6	15	12.6	46	38.7	47	39.5	119	100.1
Elderly	10	7.9	59	46.8	17	13.5	26	20.6	14	11.1	126	99.9
Handicapped	10	8.3	40	33.3	29	24.2	26	21.7	15	12.5	120	100.0
Live Interpretation	42	33.9	51	41.1	13	10.5	12	9.7	6	4.8	124	100.0
Therapeutic	9	8.1	18	16.2	27	24.3	29	26.1	28	25.2	111	99.9
Research	31	23.8	33	25.4	27	20.8	21	16.2	18	13.8	130	100.1
Publications	13	10.6	50	40.7	14	11.4	27	22.0	19	15.4	123	100.1
Education in General	106	69.3	39	25.5	1	.7	5	3.3	2	1.3	153	100.0

Total number of cases in United States sample = 185

No response:

Braille = 66 (35.7%)

Live Interpretation = 61 (33.0%)

Publications = 62 (33.5%)

Elderly = 59 (31.9%)

Therapeutic = 74 (40.0%)

Education in general = 32 (17.3%)

Handicapped = 65 (35.1%)

Research = 55 (29.7%)

TABLE 23.--Responding Institution Program Ratings--Canada.

Program	Extremely Important		Important		Important but not Essential		Important if the time and money are available		Not Important		Total	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Braille			2	22.2			4	44.4	3	33.3	9	99.9
Elderly	2	22.2	3	33.3	1	11.1	3	33.3			9	99.9
Handicapped			3	37.5	2	25.0	3	37.5			8	100.0
Live Interpretation	3	33.3	3	33.3			3	33.3			9	99.9
Therapeutic			2	22.2	3	33.3	4	44.4			9	99.9
Research	7	77.8	1	11.1					1	11.1	9	99.9
Publications	2	20.0	7	70.0			1	10.0			10	100.0
Education in General	8	80.0			1	10.0	1	10.0			10	100.0

Total number of cases in Canadian sample = 11

No response:

Braille = 2 (18.2%)

Live Interpretation = 2 (18.2%)

Publications = 1 (9.1%)

Elderly = 2 (18.2%)

Therapeutic = 2 (18.2%)

Education in general = 1 (9.1%)

Handicapped = 3 (27.3%)

Research = 2 (18.2%)

The courses offered to the general public vary greatly. Appendix B-2 lists the special courses offered by each of the respondents. Courses range from Annuals to Wildflowers and include astronomy and taxidermy. Several large institutions offer so many courses that it was necessary to label them under the category "numerous courses."

The interpretation of the data generated on the number of people enrolled in special courses is not representative of the population because the missing values are greater than the figures reported. Enrollment for courses at United States institutions was not available because of poor data. Only a partial enrollment for those institution offering 1974 fall and winter courses would have been available at the time the questionnaire was completed. The Canadian response shows that two institutions (18.2%) had enrollments in courses and were in the 1-100 persons category (1973). In 1974, two Canadian institutions enrolled from 1-100 people and one enrolled from 101-500. The number of no responses for 1973 were nine (81.8%) and eight (72.7%) for 1974.

A number of institutions have special facilities: nature interpretation trails, therapeutic or handicap facilities, braille gardens (Table 24). Respondents also included other facilities such as special gardens (19); museums (13); and guided tours (10).

Research is an important facet of the programs conducted at 50.0% of the United States institutions and 90.0% of the Canadian institutions. The no response categories for the United States and Canada were 4.9% and 9.1% respectively.

TABLE 24.--Special Facilities.

	Yes		No		Proposed		Total	
	No.	%	No.	%	No.	%	No.	%
<u>United States:</u>								
Nature Trails	79	43.4	100	54.9	3	1.6	182	99.9
Therapeutic-handicap	14	7.7	166	91.2	2	1.1	182	100.0
Braille	21	11.6	156	86.2	4	2.2	181	100.0
TOTAL No. of Institutions: 185								
<u>Canada:</u>								
Nature Trails	5	45.5	6	54.4			11	99.9
Therapeutic-handicap	3	27.3	8	72.7			11	100.0
Braille			11	100.0			11	100.0
TOTAL No. of Institutions: 11								
No response (United States): Nature Trails: 3 or 1.6% of 185 Therapeutic-handicap: 3 or 1.6 of 185 Braille: 4 or 2.2% of 185.								

The types of research conducted at the institutions are given in Table 25. Institution involvement in the areas of plant exploration, evaluation and exchange are also included.

TABLE 25.--Type of Research Program.

	United States		Canada	
	No.	%	No.	%
<u>Type of Research:</u>				
1. Solely confined to institution	22	25.0	2	22.2
2. In cooperation with federal government	1	1.1		
3. In cooperation with other botanical gardens and arboreta	7	8.0	1	11.1
4. University	26	29.5	1	11.1
5. Two of the above	15	17.0	2	22.2
6. Three or more of the above	12	13.6	3	33.3
7. All of the above	1	1.1		
8. In cooperation with organizations other than above	<u>4</u>	<u>4.5</u>	<u>—</u>	<u>—</u>
TOTAL	88	99.8	9	99.9
No Response:	97	52.4	2	18.2
<u>Plant Materials Programs:</u>				
1. Plant exploration	9	8.0		
2. Plant evaluation	23	20.4	1	10.0
3. Plant exchange	25	22.1	2	20.0
4. 1 and 2 combined	4	3.5	1	10.0
5. 1 and 3 combined	2	1.8		
6. 2 and 3 combined	23	20.4	3	30.0
7. All of the above	<u>27</u>	<u>23.9</u>	<u>3</u>	<u>30.0</u>
TOTAL	113	100.1	10	100.0
No Response	72	38.9	1	9.1

Research programs and other programs often require a reference library. Sometimes a special library is a part of the institution and its volumes are available for public use. The majority of institutions have special libraries of modest size (Table 26). The data do not include those institutions affiliated with major universities where the books on plant materials are part of the centralized library.

TABLE 26.--Special Libraries.

	United States		Canada	
	No.	%	No.	%
<u>Institutions with Special Libraries:</u>				
Yes	116	65.2	10	90.9
No	<u>62</u>	<u>34.8</u>	<u>1</u>	<u>9.1</u>
TOTAL	178		11	
No Response	7	3.4	0	0.0
<u>Number of Volumes in Special Library:</u>				
1 - 100	22	21.4	2	28.6
101 - 500	25	24.3	2	28.6
501 - 1,000	13	12.6	1	14.3
1,001 - 5,000	31	30.1	2	28.6
5,001 - 10,000	4	3.9		
10,001 - 25,000	2	1.9		
25,001 - 50,000	1	1.0		
50,001 - 75,000	3	2.9		
75,001 - 100,000	<u>2</u>	<u>1.9</u>		
TOTAL	103	100.0	7	100.1
No Response	82	44.3	4	36.4

An indication of an institution's internal growth is the expansion of programs and facilities. The respondents were asked to provide information on the expansion of three programs: education, research and publications.

Do You Plan to Expand Your Education Program?

	<u>Yes</u>	<u>%</u>	<u>No</u>	<u>%</u>
United States	116	76.8	35	23.2
Canada	8	80.0	2	20.0
No Response (United States):	34 (18.4%)			
No Response (Canada):	1 (9.1%)			

Do You Plan to Expand Your Research Program?

	<u>Yes</u>	<u>%</u>	<u>No</u>	<u>%</u>
United States	62	47.0	70	53.0
Canada	8	88.9	1	11.1
No Response (United States):	53 (28.6%)			
No Response (Canada):	2 (18.2%)			

Do You Plan to Expand Your Physical Size (Acres)?

	<u>Yes</u>	<u>%</u>	<u>No</u>	<u>%</u>
United States	50	33.3	100	66.7
Canada	4	44.4	5	55.6
No Response (United States):	35 (18.9%)			
No Response (Canada):	2 (18.2%)			

The programs and activities of the institutions in this study are numerous and varied. The tables illustrate the scope and extent of these programs and activities. The programs can be classified into two groups: (1) those developed for the general public directly, i.e., special courses and facilities, and (2) those related to the scientific community, i.e., research, plant exploration, evaluation and exchange. The second group is indirectly related to the first because the research will ultimately benefit the general public.

Institution Growth

The second objective of this study was to determine the growth of the institutions in the United States and Canada. Growth includes the increase in the number of institutions and where this growth is occurring by geographic region. Two variables were developed to determine institution growth. Each institution was asked to supply the dates established and opened to the general public. The date established is not synonymous with the date opened to the general public in all cases because the institution may have been in private ownership and thereby closed to the general public for a number of years. Fourteen of the 185 institutions in the United States did not give the date of establishment and twelve failed to report the date opened to the general public. The no response categories represent 7.6% and 6.5% respectively of the United States sample. Four institutions, included in the no response group of twelve, stated that they are not presently open to the general public. St. George Village Botanical Garden of St. Croix, Inc. in the Virgin Islands, is one of

the four institutions because it is still in the process of being developed. All but one Canadian respondent furnished the dates established and open to the general public.

The data were recoded into groups to make it easier to analyze. Several institutions were established prior to the founding of the countries in which they are located (Tables 30 and 32). The greatest period of growth in the United States occurred from 1961-1970 (22.2%). The trend in establishing new institutions appears to be on the decline with the period from 1971-1974 comprising 4.3% of the total. The greatest number of institutions opened to the general public occurred during the period from 1961-1970 (24.3%) as shown in Table 31. The Canadian figures show that the number of new institutions has declined slightly from earlier periods (1851-1900; 1911-1950). The greatest number of institutions opened to the general public has occurred from 1971-1974 (27.3%) as shown in Table 33.

The number of new institutions would appear to be on the decline in both countries. Likewise, the number of institutions opened to the general public has reached its zenith. Only four institutions remained closed to the public in the United States and none in Canada.

The greatest concentration of growth in the United States for the period 1971-1974 has occurred in the Pacific Region (25.0%). The South led the new institution growth for the period from 1961-1970 (37.9%). Tables 34-37, Appendix C, show the institution dates established and opened to the public in graph form by region.

The number of new institutions reached a high point earlier in this century in both the United States and Canada. The decline in new institutions in the United States is rather significant when compared to the period of the greatest number of new institutions being founded (1961-1970). The decline could change if there is a substantial number of new institutions founded later in this decade because the figure represented now is for 1971-1974 only. The largest number of institutions opened to the public has occurred within the last fourteen years in both the United States and Canada.

Function

Earlier in this study several definitions were given for the terms botanical garden, arboretum, and related institution. A question was devised relating to function that enabled the respondent to choose any one of four functions which best fit the respondent's institution. The "other" category was provided in addition to the four functions listed. Objective 3 of this study was to show that the institutions perform similar functions regardless of name and that it is difficult to differentiate institution function. It is interesting to note that only ninety-eight United States institutions (54.2%) felt that these four functions applied to them. The other eighty-three (45.8%) felt they were a combination of the four functions given or were a totally different function. The results were twenty-nine values that are represented in Table 28. Six Canadian institutions were classified under these four functions but five felt they were a combination of these functions (Table 27).

TABLE 27.--Prime Function of Institution--Canada.

Function	Number	Percent
1. Arboretum	1	9.0
2. Botanical garden	4	36.4
3. Nature center		
4. Horticultural garden	1	9.1
5. Arboretum-botanical garden	2	18.2
6. Arboretum-nature center	1	9.1
7. 1-4 combined	1	9.1
8. 1, 2 and 4 combined	<u>1</u>	<u>9.1</u>
TOTAL	11	100.0

The difference in function appears to be slight for the majority of institutions. The added values are simply combinations of one or more functions that were already included on the questionnaire. An analysis of function by type of institution gives an idea as to the type of institution that classified itself under each function (Table 38-39, Appendix D). To prove that many institutions deal in similar programs, the institutions were categorized according to their involvement in plant exploration, plant evaluation and plant exchange programs (Table 40-41, Appendix D). These programs are conducted at institutions which list themselves as recreational; historical, cultural and zoological as well as those which are primarily an arboretum, botanical garden or horticultural garden.

It appears that the terms arboretum and botanical garden are somewhat nebulous. Although 33.7% of the United States respondents and 45.4% of the Canadian respondents classify themselves this way, a

TABLE 28.--Prime Function of Institution--United States.

Function	Number	Percent
1. Arboretum	27	14.9
2. Botanical garden	34	18.8
3. Nature center	9	5.0
4. Horticultural garden	28	15.5
5. Education--research	14	7.7
6. Arboretum-botanical garden	11	6.1
7. Arboretum-nature center	6	3.3
8. Arboretum-horticultural garden	4	2.2
9. Recreation	2	1.0
10. 1-4 combined	3	1.7
11. 1, 2 and 4 combined	2	1.0
12. Historical	8	4.4
13. Cultural	3	1.7
14. 3 and 4 combined	2	1.0
15. 2 and 4 combined	7	3.9
16. 1, 3, 4 and 9 combined	1	.6
17. 1, 2 and 3 combined	2	1.0
18. 5 and 9 combined	1	.6
19. 4 and 12 combined	1	.6
20. Native plants	2	1.0
21. 1 and 9 combined	1	.6
22. Zoological	1	.6
23. Publishing house	1	.6
24. 4 and 5 combined	2	1.0
25. 1, 2, 3, 4 and 13 combined	1	.6
26. 3 and 20 combined	1	.6
27. Social emphasis rather than plant materials	5	2.8
28. 1 and 5 combined	1	.6
29. 1, 3 and 4 combined	1	.6
TOTAL	181	100.0

No response: 4 or 2.2% of United States cases.
 Total cases: 185

large number of the sample populations in the United States and Canada evidently feel they do not fit those terms. In a few cases, the institutions include the word arboretum or botanical garden in their name, yet classify themselves as a horticultural garden. The terms arboretum and botanical garden apply to the plant collections found at these institutions and the terms are not relevant when used to define the programs of these institutions. The reason is the programs discussed here deal primarily with people rather than plants.

Data on Institution Administrators

The last objective of this study was to gather data on the academic training and experience of those who direct the overall operations of these institutions. The respondents were asked three questions that related to their training and experience: formal education, field of training and the number of years they have been administrators.

The number of years of experience for administrators in this field proved to be varied. Almost half of the respondents (47.8%) have five years or less experience in this field. Each age group is fairly well represented (Table 29). In Canada, the distribution is more even and all respondents completed this question (Table 29).

The academic training of the institution administrators is not limited to the plant sciences, although 77.4% of the 146 United States respondents and 57.1% of the seven Canadian respondents took their degrees in the plant sciences (Table 29). In several cases, more than one field of study was marked on the questionnaire. It was impossible to determine which field was the last in the academic sequence of

TABLE 29.--Administrator Information.

	United States		Canada	
	No.	%	No.	%
<u>Years of Administrative Experience:</u>				
1-5	77	47.8	3	27.3
6-10	31	19.3	2	18.2
11-15	18	11.2	1	9.1
16-20	17	10.6	2	18.2
Over 20	18	11.2	3	27.3
TOTAL	161	100.1	11	100.1
No response	24	13.0	0	0.0
<u>Academic Background of Administrators:</u>				
B.S.	57	36.3	2	18.2
B.A.	11	7.0	1	9.1
M.S.	22	14.0	1	9.1
M.A.	11	7.0	1	9.1
Ph.D.	39	24.8	3	27.3
Sc.D. or J.D.	2	1.3	2	18.2
Other Special Degrees	5	3.2	1	9.1
High School or Some College	10	6.4		
TOTAL	157	100.0	11	100.1
No response	28	15.1	0	0.0
<u>Field of Study:</u>				
Taxonomy	13	8.9		
Horticulture	59	40.4	3	42.9
Forestry	11	7.5	1	14.3
Botany	30	20.5		
Recreation	1	.7		
Other Natural Sciences	10	6.8	1	14.3
Education or Social Sciences	5	3.4	1	14.3
History or Fine Arts	9	6.2	1	14.3
Business	8	5.5		
TOTAL	146	99.9	7	100.1
No response	39	21.1	4	36.4

training. There was no way to code these responses so it was necessary to place them in the no response category. This study was not refined to the point where it could reflect this type of data, even though it was realized that a respondent can take his academic training in more than one field of study.

The question that related to the respondent's degree should have been developed in more detail. It was poor judgment on the part of the researcher to assume that all respondents had university degrees. The question was not designed intentionally to exclude anyone but the way it was worded on the questionnaire may have affected the results. It was rewarding to note that fifteen respondents did mention their level of education, even though it varied from the values listed. There were twenty-eight missing values (15.1%) for the United States sample. The Canadian respondents are included in every category with the greatest number of respondents in the Ph.D. category (27.3%). All Canadian respondents answered the question. Data on the degree taken and the field of study are presented in Tables 42-43. The data for the United States respondents are highly significant ($\chi^2 = 0.0$).

The questionnaire concluded with a line for the respondent's signature and title. It was felt that this was the only way to determine whether the questionnaire actually reached the administrator or whether it was completed by a staff member. In most cases, the questionnaire was completed by the director or a key administrator of the institution. A total of 176 United States respondents (95.7%) signed the questionnaire. All returned questionnaires from Canada were signed.

CHAPTER V

CONCLUSION

This study has examined in detail the programs and activities that are being conducted at botanical gardens, arboreta and related institutions in the United States and Canada. It is apparent that the programs vary as greatly as do the institutions that offer them. Programs and activities are not limited to any specific age group. There are children's gardens for the young, nature studies and special courses for high school and college students and special courses, clinics, workshops and exhibits for adults. Demonstration gardens are being developed to help home owners select plant materials that will enhance the appearance of their property. Special gardens have been designed for the blind, using fragrant flowers and other aromatic plants. Therapeutic greenhouses have been incorporated into the physical facilities of many institutions. Special walks or ramps enable the handicapped to visit the institutions without having to overcome physical barriers imposed by steps, narrow walks and door handles too difficult to reach.

The list of special courses given in Appendix B that are being offered now or will be offered in the near future indicate the importance of these programs to the institutions offering them. The number of courses continue to increase and diversify. By no means

are the special courses limited to the study of plant materials alone.

It is unfortunate that better attendance records are not available from the institutions. Institutions should maintain enrollment information to provide historical data for implementing new programs and courses. Revisions of present programs also require judgments that can only be made from past performances. Institutions retain dynamic programs only by evaluating their programs on a periodic basis.

This study should not give the impression that the institutions are merely places for learning about plants vis-a-vis special courses. Education is an integral part of the institution's purpose but so are research, publications and recreation.

Perhaps the majority of visitors view their visit as a recreational experience. This experience in turn may induce the visitor to enroll in a special course or purchase a book on shrubs. Most visitors probably receive a passive recreational experience from their visit to the institutions. They walk through the grounds and admire the forms of the trees and shrubs and those plants in bloom at that particular time. The visitors who stroll through the conservatory delight in viewing the exotic tropicals with their brilliant flowers and unusual foliage. Often visitors who were strangers minutes before will become engaged in a lively conversation about an exotic that they are admiring and thus develop a common bond.

The institutions are botanic gardens, arboreta and related institutions because they label the many species of plant materials

that are grown in the confines of the institution's grounds for the benefit of the visitors. Many a visitor sees only a tree and does not care that the plants have labels. The plant labels are placed near the plant for those who are interested and desire knowledge about the plant materials. Donald Wyman considers labelling to be one of the distinguishing characteristics of these institutions. The institutions are laboratories of living plant materials as well as recreation areas.

The majority of institutions are free to the general public. If there is an entrance charge it is nominal compared to many of the admissions to other recreational activities. The goals of the institution's have been segregated into four main categories or combinations of these categories. Profit is secondary to knowledge, recreation and research.

Four objectives were outlined in this study. All four have been shown to be interrelated to and dependent upon each other. In addition, the general data serves to give a more complete picture of the institutions that have been studied. The tables and programs described here help to create a part of the total picture but the picture is still a one-sided view. The other side to the institution concerns the plant materials grown there or the botanical function of the institution. This study deals exclusively with the social functions of the institution and no attempt has been made here to examine the botanical endeavors in which the institutions are engaged.

The institution growth rate can only be conjectured. However, the importance of the institutions in the future is evident. According to the Commission on Population Growth and the American Future,

Trend projections indicate that urban regions will contain 74 percent of the United States population in 1980, and about 83 percent of the total by the end of the century, while the land area covered in the conterminous United States expanded from two percent in 1920 to about 16 percent in 2000. In other words, five-sixths of our population will be living within one-sixth of our land area, at the end of this century.¹⁵

This is only a projection but it emphasizes the fact that urban areas will contain approximately 90.8% of the United States institutions and 81.8% of the Canadian institutions by the year 2000. The institutions will be "green islands" located within highly urbanized settings. They will continue to face the challenge of providing dynamic programs that will benefit the general public. At the same time public involvement on the part of the institutions should result in a greater amount of public support for the institutions. This study of the programs and activities of arboreta, botanical gardens and related institutions leads to the conclusion that these institutions have perceived their role in society and are prepared to meet the challenges of the future. A better definition of the terms arboretum, botanical garden, nature center and horticultural garden should be undertaken. These terms are used freely by people in this field as well as by the general public and little thought is given

¹⁵U.S. Commission on Population Growth and the American Future, Population Distribution and Policy, Sara Mills Mazie, ed., V (7 Volumes of Commission Research Reports; Washington, D.C.: Government Printing Office, 1972), p. 141.

to their meanings. A thorough study of the structure of the institution based on its social endeavors and plant collections could give clarity to these terms that are used so often, yet poorly understood.

In addition, the research programs that are presently being conducted should be reviewed. An inventory of plant materials should be developed for the institutions. The AABGA and the American Horticultural Society have taken positive action in this direction within the last few years. Studies should be done on the training of employees at these institutions. More research is required on plant labelling and visual identification at the institutions. Visitor data is needed to determine why the visitor is motivated to make repeat visits to the institution. Some of the areas requiring more research are horticultural in nature while others are sociological; both are equally important. It is hoped that through research we can better understand the importance and meaning of the institutions called botanic gardens and arboreta.

SOURCES CONSULTED

SOURCES CONSULTED

- Babbie, Earl R. Survey Research Methods. Belmont, Calif.: Wadsworth Publishing Company, Inc., 1973.
- Brockman, C. Frank; Merriam, Lawrence C. Jr.; Catton, William R. Jr.; and Dowdle, Barry. Recreational Use of Wild Lands. 2nd ed. New York: McGraw-Hill Book Company, 1973.
- Bunce, Fred; Voight, John E.; Lighty, Richard W.; and Locke, Howard W. Arboreta, Botanical Gardens, Special Gardens. NRPA Aids in Management Bulletin No. 90. Washington, D.C.: National Recreation and Park Association, 1971.
- Canada Yearbook 1973. Ottawa: Information Canada, 1973.
- Contenau, Georges. Everyday Life in Babylon and Assyria. London: Edward Arnold, 1954.
- Directory of American Horticulture. Rev. ed. Mount Vernon, Va.: The American Horticultural Society, 1974.
- Fletcher, H. R.; Henderson, D. M.; and Prentice, H. T. (comp.). International Directory of Botanical Gardens II. International Bureau for Plant Taxonomy and Nomenclature for the International Association of Plant Taxonomy. Utrecht: Oosthoek, Schetema & Holkama, 1969.
- Franzblau, Abraham N. A Primer of Statistics for Non-Statisticians. New York: Harcourt, Brace & World, Inc., 1958.
- Frowine, Steven A. "An Educator's Guide to Arboreta and Botanical Gardens in the Northeastern United States and Nearby Canada." Master's Thesis, Cornell University, 1972.
- Gager, C. Stuart. "Botanic Garden." Vol. I of The Standard Cyclopedia of Horticulture. Edited by L. H. Bailey. 3 Vols. New York: The MacMillan Company, 1947.
- Gasden, John M. A Basis for Facility Development at Guadalupe Mountains National Park. Research Report No. 1. Lubbock, Texas: Texas Tech University, 1970.
- Heeps, Angus Paxton, ed. The Bulletin. Vol. 8. Gladwyne, Penn.: American Association of Botanical Gardens and Arboreta, 1974.

McGourty, Frederick Jr., ed. "American Gardens--A Traveler's Guide." Plants & Gardens. Vol. 26:3. Baltimore, Md.: Brooklyn Botanic Garden, 1970.

Membership List, 1974. American Association of Botanical Gardens and Arboreta, Inc. n.p., 1974.

Montreal Botanical Garden. n.p., 1974.

1974 Commercial Atlas & Marketing Guide. 105th ed. Chicago: Rand McNally & Company, 1974.

Seltzer, Leon, ed. The Columbia Lippincott Gazetteer of the World. Morningside Heights, N.Y.: Columbia University Press, 1962.

Taylor, Pat Dwayne. "A Proposal for the Development of a Recreational Environment for Lubbock County, Texas." Master's Thesis, Texas Tech University, 1969.

The Commission on Population Growth and the American Future. Population and the American Future. Washington, D.C.: U.S. Government Printing Office, 1972.

The Royal Horticultural Society. "Arboretum," Vol. I of Dictionary of Gardening. Fred J. Chittenden, ed. 3 Vols. and supplements. Oxford: Clarendon Press, 1951.

The Times Atlas of the World. 4th ed., rev. London: Times Newspapers, Ltd. in collaboration with John Bartholomew & Sons, Ltd., Edinburgh, 1974.

U.S. Bureau of the Census. U.S. Census of Population: 1970 Number of Inhabitants Final Report PC (1)-A1 United States Summary. Washington, D.C.: U.S. Government Printing Office, 1971.

U.S. Commission on Population Growth and the American Future. Population Distribution and Policy. Sara Mills Mazie, ed. Vol. V of Commission Research Reports. Washington, D.C.: Government Printing Office, 1972.

U.S. Department of Commerce. Statistical Abstract of the United States, 1974. 95th Annual Edition. Washington, D.C.: Government Printing Office, 1974.

Walpole, Ronald E. Introduction to Statistics. New York: The MacMillan Company, 1968.

Widmoyer, Fred B. "Botanic Garden," Encyclopedia Americana, 1973, Vol. IV.

- Widmoyer, Fred B. "Size and Funding Characteristics of American Arboreta and Botanical Gardens," The Longwood Program Seminars, 1970. II. Newark, Del.: University of Delaware, 1970.
- Wright, Christopher, ed. The Prospective Role of an Arboretum. The Institute for the Study of Science in Human Affairs, Columbia University. ISHA Bulletin No. 10. Mentor, Ohio: The Holden Arboretum, 1972.
- Wyman, Donald. The Arboretums and Botanical Gardens of North America. Jamaica Plain, Mass.: The Arnold Arboretum of Harvard University, 1959.
- Wyman, Donald. Wyman's Gardening Encyclopedia. New York: The MacMillan Company, 1971.

APPENDICES

APPENDIX A

- A-1 LIST OF QUESTIONNAIRE RESPONDENTS
- A-2 QUESTIONNAIRE COVER LETTER AND BOTANICAL GARDENS AND ARBORETA EDUCATIONAL PROGRAMS AND ACTIVITIES QUESTIONNAIRE
- A-3 QUESTIONNAIRE FOLLOW-UP POST CARD
- A-4 QUESTIONNAIRE CODEBOOK

APPENDIX A-1

LIST OF QUESTIONNAIRE RESPONDENTS

1. Auburn Arboretum
Auburn, Alabama
2. Bellingrath Gardens
Theodore, Alabama
3. Birmingham Botanical Garden
Birmingham, Alabama
4. Arizona-Sonora Desert Museum and Demonstration Garden
Tucson, Arizona
5. Boyce Thompson Southwestern Arboretum
Superior, Arizona
6. Desert Botanical Garden of Arizona
Phoenix, Arizona
7. Encanto Park
Phoenix, Arizona
8. Sharlot Hall Museum*
Prescott, Arizona
9. Botanical Garden
University of California
Los Angeles, California
10. C. M. Goethe Arboretum
Sacramento, California
11. Descanso Gardens
La Canada, California
12. Golden Gate Park
San Francisco, California
13. Hearst Castle
San Luis Obispo, California
14. Hellman Park
Oakland, California
15. Heritage Park Garden for the Blind+
Bakersfield, California

* Questionnaire was returned but not completed

+ Questionnaire was returned because of wrong address

16. Huntington Botanical Gardens
San Marino, California
17. Luther Burbank Art and Garden Center, Inc.*
Santa Rosa, California
18. Marin Art and Garden Center
Ross, California
19. Max Watson Eucalyptus Grove
Los Gatos, California
20. Muir Woods National Monument
Mill Valley, California
21. Orange County Memorial Garden Center
Costa Mesa, California
22. Quail Botanic Gardens
Encinitas, California
23. Rancho Santa Ana Botanic Garden
Claremont, California
24. San Diego Botanical Garden Foundation
San Diego, California
25. Santa Barbara Botanic Garden, Inc.
Santa Barbara, California
26. Saratoga Horticultural Foundation, Inc.
Saratoga, California
27. Sherman Foundation Garden
Corona del Mar, California
28. South Coast Botanic Garden
(including Los Angeles State and County Arboretum)
Palos Verdes Peninsula, California
29. Strybing Arboretum and Botanical Gardens
San Francisco, California
30. University of California-Davis Arboretum
Davis, California
31. University of California UCR Botanic Gardens
Riverside, California
32. Villa Montalvo Arboretum
Saratoga, California
33. William Joseph McInnes Memorial Botanic Garden
Oakland, California
34. Denver Botanic Gardens
Denver, Colorado
35. Bartlett Arboretum of the State of Connecticut
Stamford, Connecticut

36. Connecticut Arboretum
New London, Connecticut
37. Marsh Botanical Garden
New Haven, Connecticut
38. New Canaan Nature Center
New Canaan, Connecticut
39. Henry Francis du Pont Winterthur Museum Gardens
Winterthur, Delaware
40. Dumbarton Oaks
Washington, D.C.
41. Kenilworth Aquatic Gardens
Washington, D.C.
42. U.S. Botanic Garden Conservatory
Washington, D.C.
43. U.S. National Arboretum
Washington, D.C.
44. Fairchild Tropical Garden
Miami, Florida
45. Florida Cypress Gardens, Inc.
Cypress Gardens, Florida
46. Highlands Hammock State Park*
Sebring, Florida
47. Miami Beach Garden Center and Conservatory
Miami Beach, Florida
48. Orchid Jungle
Homestead, Florida
49. Selby Botanical Gardens
Sarasota, Florida
50. Suncoast Botanical Garden+
Largo, Florida
51. Thomas A. Edison Winter Home and Botanical Garden
Fort Myers, Florida
52. Vizcaya-Dade County Art Museum
Miami, Florida
53. Callaway Gardens
Pine Mountain, Georgia
54. Fernbank Science Center
Atlanta, Georgia
55. Founders Memorial Garden
Athens, Georgia

56. Garden Club Center
Atlanta, Georgia
57. Piedmont Park+
Atlanta, Georgia
58. University of Georgia Botanical Garden
Athens, Georgia
59. Harold L. Lyon Arboretum
Honolulu, Hawaii
60. Olu Pua Botanic Garden
Kalaheo, Hawaii
61. Pacific Tropical Botanical Garden
Lawai, Kauai, Hawaii
62. Wahiawa Botanic Garden
Wahiawa, Oahu, Hawaii
63. Maimea Arboretum
Haleiwa, Hawaii
64. Botanic Garden of the Chicago Horticultural Society
Glencoe, Illinois
65. Garfield Park Conservatory
Chicago, Illinois
66. Lincoln Park Conservatory
Chicago, Illinois
67. Christy Woods Arboretum
Muncie, Indiana
68. Hayes Regional Arboretum
Richmond, Indiana
69. Honeywell Gardens
Wabash, Indiana
70. Jerry E. Clegg Botanic Gardens+
Lafayette, Indiana
71. Bickelhaupt Arboretum
Clinton, Iowa
72. University of Northern Iowa
Cedar Falls, Iowa
73. Kansas Landscape Arboretum
Abilene, Kansas
74. Meade Park Garden Center
Topeka, Kansas
75. Bernheim Forest Arboretum
Clermont, Kentucky

76. Land Between the Lakes
Golden Pond, Kentucky
77. Barnwell Memorial Garden and Art Center
Shreveport, Louisiana
78. Louisiana Tech Arboretum
Ruston, Louisiana
79. Live Oak Gardens
New Iberia, Louisiana
80. Louisiana State Arboretum
Baton Rouge, Louisiana
81. Rosedown Plantation and Gardens
St. Francisville, Louisiana
82. University of Southwestern Louisiana
Lafayette, Louisiana
83. Fay Hyland Botanical Plantation
Orono, Maine
84. Wild Gardens of Acadia
Bar Harbor, Maine
85. Brookside Gardens
Wheaton, Maryland
86. Ladew Topiary Gardens
Monkton, Maryland
87. Stronghold, Inc.
Dickerson, Maryland
88. Alexandra Botanic Garden and Hunnewell Arboretum
Wellesley, Massachusetts
89. Arnold Arboretum
Jamaica Plain, Massachusetts
90. Botanic Garden of Smith College
Northampton, Massachusetts
91. Garden in the Woods
Framingham, Massachusetts
92. Heritage Plantation and Garden
Sandwich, Massachusetts
93. Anna Scripps Whitcomb Conservatory
Detroit, Michigan
94. Beal-Garfield Botanic Garden
East Lansing, Michigan
95. Chadwick Garden Center
Grand Rapids, Michigan

96. Doty Native Flower Garden Association, Inc.
Bellevue, Michigan
97. Fenner Arboretum
Lansing, Michigan
98. Fernwood Incorporated
Niles, Michigan
99. Hidden Lake Gardens
Tipton, Michigan
100. Nichols Arboretum
Ann Arbor, Michigan
101. Botanical Garden of the University of Minnesota
St. Paul, Minnesota
102. Como Park Conservatory
St. Paul, Minnesota
103. Eloise Butler Wild Flower Garden and Bird Sanctuary
Minneapolis, Minnesota
104. Hormel Foundation Arboretum
Austin, Minnesota
105. University of Minnesota Landscape Arboretum
Chaska, Minnesota
106. Missouri Botanical Garden
St. Louis, Missouri
107. Fuller Gardens
North Hampton, New Hampshire
108. Cora Hartshorn Arboretum and Bird Sanctuary
Short Hills, New Jersey
109. Frelinghuysen Arboretum
Morristown, New Jersey
110. Princeton University*
Princeton, New Jersey
111. Rutgers Display Gardens
New Brunswick, New Jersey
112. Skylands Gardens of Ringwood State Park
Ringwood, New Jersey
113. Unitarian Church of Southern New Jersey Arboretum
Cherry Hill, New Jersey
114. Willowood Arboretum of Rutgers University
Gladstone, New Jersey
115. Carlsbad Botanical and Zoological Park
Carlsbad, New Mexico

116. Bartow-Pell Mansion Museum and Garden
Bronx, New York
117. Bayard Cutting Arboretum
Oakdale, New York
118. Brooklyn Botanic Garden
Brooklyn, New York
119. Cornelia van Rensselaer Marsh Memorial Sanctuary
Mt. Kisco, New York
120. Cornell Plantations
Ithaca, New York
121. George Landis Arboretum
Esperance, New York
122. Highland Park and Durand Eastman Park
Rochester, New York
123. Jackson's Garden
Schenectady, New York
124. L. H. Bailey Hortorium*
Ithaca, New York
125. New York Botanical Garden
(Cary Arboretum included)
Bronx, New York
126. Old Westbury Gardens
Old Westbury, New York
127. Parrish Art Museum*
Southampton, New York
128. Queens Botanical Garden Society, Inc.
Flushing, New York
129. Readers Digest Gardens
Pleasantville, New York
130. Sterling Forest Gardens
Tuxedo, New York
131. Tackapausha Preserve
Seaford, New York
132. The Root Glen*
Clinton, New York
133. Ward Pound Ridge Reservation (Meyer Arboretum)
Cross River, New York
134. Wave Hill Center for Environmental Studies
Bronx, New York
135. Coker Arboretum
Chapel Hill, North Carolina

136. Reynolda Gardens
Winston-Salem, North Carolina
137. Sarah P. Duke Gardens
Durham, North Carolina
138. Tryon Palace Gardens
New Bern, North Carolina
139. International Peace Garden#
Dunseith, North Dakota
140. Cox Arboretum
Dayton, Ohio
141. Dawes Arboretum
Newark, Ohio
142. Eden Park (Krohn) Conservatory
Cincinnati, Ohio
143. George P. Crosby Park Garden
Toledo, Ohio
144. Secor Park Arboretum
Berkey, Ohio
145. Secrest Arboretum
Wooster, Ohio
146. Stanley M. Rowe Arboretum*
Cincinnati, Ohio
147. The Garden Center of Greater Cleveland
Cleveland, Ohio
148. The Holden Arboretum
Mentor, Ohio
149. Will Rogers Horticulture Garden
Oklahoma City, Oklahoma
150. Arboretum Arnheim Inusitatus Incorporealis
Eugene, Oregon
151. Hoyt Arboretum
Portland, Oregon
152. Peavy Arboretum
Portland, Oregon
153. Portland International Rose Test Garden
Portland, Oregon
154. Arboretum of the Barnes Foundation
Merion Station, Pennsylvania

#Includes International Peace Garden, Boissevain, Manitoba, Canada

155. Arthur Hoyt Scott Horticultural Foundation
Swarthmore, Pennsylvania
156. Bartram's Garden
Philadelphia, Pennsylvania
157. Bowman's Hill State Wildflower Preserve
Washington Crossing, Pennsylvania
158. Elan Memorial Park
Bloomsburg, Pennsylvania
159. Greensburg Garden and Civic Center
Greensburg, Pennsylvania
160. Campus Arboretum of Haverford College
Haverford (Newton), Pennsylvania
161. Henry Foundation for Botanical Research
Gladwyne, Pennsylvania
162. Hershey Rose Gardens and Arboretum
Hershey, Pennsylvania
163. Longwood Gardens
Kennett Square, Pennsylvania
164. Masonic Homes Arboretum
Elizabethtown, Pennsylvania
165. Phipps Conservatory
Pittsburgh, Pennsylvania
166. Pittsburgh Garden Center*
Pittsburgh, Pennsylvania
167. Reading Public Museum and Art Gallery
Reading, Pennsylvania
168. The Shrunken Garden
Narberth, Pennsylvania
169. Swiss Pines
Malvern, Pennsylvania
170. Taylor Memorial Arboretum*
Wallingford, Pennsylvania
171. The Morris Arboretum
Philadelphia, Pennsylvania
172. Brookgreen Gardens
Murrels Inlet, South Carolina
173. Cypress Gardens
Charleston, South Carolina
174. Glencairn Garden
Rock Hill, South Carolina

175. Magnolia Gardens
Charleston, South Carolina
176. Middleton Place
Charleston, South Carolina
177. Memphis Botanic Garden
Memphis, Tennessee
178. Reflection Riding
Lookout Mountain, Tennessee
179. Southwestern Arboretum
Memphis, Tennessee
180. University of Tennessee Arboretum
Oak Ridge, Tennessee
181. University of Tennessee Botanical Garden and Arboretum*
Martin, Tennessee
182. Bayou Bend Gardens of the Museum of Fine Arts
Houston, Texas
183. Fort Worth Botanic Garden
Fort Worth, Texas
184. Tyler Rose Garden
Tyler, Texas
185. Brigham Young University
Provo, Utah
186. Colonial Williamsburg Foundation
Williamsburg, Virginia
187. Norfolk Botanical Gardens
Norfolk, Virginia
188. Woodlawn Plantation
(National Trust for Historic Preservation)
Mt. Vernon, Virginia
189. St. George Village Botanical Garden of St. Croix, Inc.
Christiansted, St. Croix, Virgin Islands
190. St. Thomas Gardens, Inc.
St. Thomas, Virgin Islands
191. Water Isle Botanical Garden, Inc.
St. Thomas, Virgin Islands
192. Finch Arboretum
Spokane, Washington
193. Hiram Chittenden Locks
(Carl S. English, Jr. Gardens)
Seattle, Washington

194. University of Washington Arboretum
Seattle, Washington
195. Wright Park (Seymour Conservatory)
Tacoma, Washington
196. West Virginia University Arboretum
Morgantown, West Virginia
197. Louis R. Head Arboretum
Madison, Wisconsin
198. Kinn River Canyon Arboretum*
River Falls, Wisconsin
199. Mitchell Park Horticultural Conservatory
Milwaukee, Wisconsin
200. Paine Art Center and Arboretum
Oshkosh, Wisconsin
201. Riveredge Nature Center
Newburg, Wisconsin
202. University of Wisconsin Arboretum
Madison, Wisconsin

CANADA

203. Agriculture Canada Research Station
Morden, Manitoba
204. Arboretum of the University of Guelph
Guelph, Ontario
205. Botanic Garden and Field Laboratory
Edmonton, Alberta
206. Botanical Garden of the University of British Columbia
Vancouver, British Columbia
207. Civic Garden Centre
Don Mills, Ontario
208. Montreal Botanical Garden
Montreal, Quebec
209. Morgan Arboretum
St. Anne de Beaupre, Quebec
210. Ornamentals Research Service
Ottawa, Ontario
211. Royal Botanical Gardens
Hamilton, Ontario
212. School of Horticulture
Niagara Falls, Ontario
213. Vandusen Botanical Gardens
Vancouver, British Columbia

A-2 QUESTIONNAIRE COVER LETTER

MICHIGAN STATE UNIVERSITY

DEPARTMENT OF PARK AND RECREATION RESOURCES
NATURAL RESOURCES BUILDING

EAST LANSING • MICHIGAN • 48824

Dear Director:

The enclosed questionnaire has been sent to you to aid in a study of educational programs and activities being conducted at botanical gardens and arboreta in the United States and Canada. This questionnaire has been prepared by Mr. Marvin Ellenbecker, a graduate student in this department. Mr. Ellenbecker earned his B.S. degree in horticulture at the University of Wisconsin-Madison.

This research will form the basis for this student's thesis work for the Master of Science. Mr. Ellenbecker is a member of the American Horticultural Society and the American Association of Botanical Gardens and Arboreta and plans a career in the area of botanical garden or arboretum administration.

At this time the department is unable to give full financial assistance toward the costs of this questionnaire and these costs are being paid for by Mr. Ellenbecker. However, the possibility of publishing the results is being considered as a future effort.

We would appreciate your help in supporting Mr. Ellenbecker's research in this area. Your participation will insure meaningful results. Please complete the four-page questionnaire and return it in the stamped self-addressed envelope.

Respectfully yours,



Pat D. Taylor

PDT/me

A-2 BOTANICAL GARDENS AND ARBORETA
EDUCATIONAL PROGRAMS AND ACTIVITIES
QUESTIONNAIRE

(Please check the appropriate answer.)

GENERAL INFORMATION

1. Official name of institution:
2. Institution address:
(street)
(city) (state)
3. Type of institution: 1 _____ Private organization
2 _____ Public organization
3 _____ Foundation
4 _____ Other(specify below)

4. Is this institution a part of a larger park system?
1 _____ Yes 2 _____ No
5. Type of park system: 1 _____ Municipal
2 _____ County
3 _____ Other(specify below)

6. What is the prime function of your institution?
1 _____ Arboretum 4 _____ Horticultural garden
2 _____ Botanical garden 5 _____ Other(specify below)
3 _____ Nature center
7. When was your organization founded? Year _____
8. When was your physical facility opened for public use? Year _____
9. Do you have a membership organization?
1 _____ Yes 2 _____ No
10. If yes(Ques. 9), what is your current membership?
Number _____
11. Do you have membership dues? 1 _____ Yes
2 _____ No
12. If yes(Ques. 11), what is your current dues rate?
\$ _____ per _____ year(s)
13. Do you charge an entrance fee to the general public?
1 _____ Yes 2 _____ No
14. If yes(Ques. 13), what is the fee?
\$ _____ per adult \$ _____ per child(age 12
and under)
15. What is the physical size of your institution?
1 _____ Under 10 acres 5 _____ 250-500 acres
2 _____ 10-50 acres 6 _____ 500-1,000 acres
3 _____ 50-100 acres 7 _____ Over 1,000 acres
4 _____ 100-250 acres
16. Do you publish an official journal or newsletter on a regular basis? 1 _____ Yes 2 _____ No
17. Name(s) of publication(s):

FOR CODING ONLY

Gen 1 2
() ()
3 4 5
I.D. No. 6 () () ()
Card No. (1)
7 8 9
1. () () ()
10 11
2. () ()
12
3. ()
13
4. ()
14
5. ()
15
6. ()
16
7. ()
17
8. ()
18
9. ()
19 20
10. () ()
21
11. ()
22
12. ()
23
13. ()
24 25
14. () ()
26
15. ()
27
16. ()
28 29 30
17. () () ()

18. Type of publication: 1 _____ Journal or magazine
2 _____ Newsletter 3 _____ Research bulletin
4 _____ Other(specify) _____
19. This publication is:
1 _____ Weekly 5 _____ Quarterly
2 _____ Biweekly 6 _____ Annual
3 _____ Monthly 7 _____ Other(specify below)
4 _____ Bimonthly
20. Which of these best describes the purpose of your organization(check one only or list in order):
1 _____ To provide a physical facility for collecting, preserving, evaluating and displaying plants.
2 _____ To educate the general public and increase an awareness of the importance and beauty of plants.
3 _____ To provide a recreational experience to people in highly populated areas where plant materials are limited.
4 _____ To support teaching and research for the government or a university.
- PROGRAMS
21. Do you offer a work-study program for students?
1 _____ Yes 2 _____ No
22. When is this program offered?
1 _____ Spring 3 _____ Fall
2 _____ Summer 4 _____ Winter
23. How many students are selected annually for this program? Number _____
24. How would you rate the following programs as to priority at your botanical garden or arboretum(check one of the five categories only):

FOR CODING ONLY

- 31
18. ()
32
19. ()
33
20. ()
34
21. ()
35
22. ()
36 37
23. () ()
38 39 40
24. () () ()
41 42 43
() () ()
44 45
() ()
46
25. ()
47 48
26. () ()

PROGRAM	EXTREMELY IMPORTANT	IMPORTANT	IMPORTANT BUT NOT ESSENTIAL	IMPORTANT IF THE TIME AND MONEY ARE AVAILABLE	NOT IMPORTANT
BRAILLE					
ELDERLY					
HANDICAPPED					
LIVE					
INTERPRETATION					
THERAPEUTIC					
RESEARCH					
PUBLICATIONS					
EDUCATION IN GENERAL					

25. Do you offer any special courses to the general public?
1 _____ Yes 2 _____ No
26. If yes(Ques. 25), please list specific courses:

PERSONNEL AND BUDGETS

42. How many people do you employ full-time?
Number _____
43. How are you funded(primarily)? 4 _____ Private funds
1 _____ Endowment or foundation 5 _____ University
2 _____ State government 6 _____ Federal gov't
3 _____ Local(city or county) 7 _____ Other(specify)
44. What is your annual budget? (NOTE: This information will remain strictly confidential and will be coded by groups in the final analysis)
1 _____ Under \$25,000. 6 _____ \$1 - 2.5 million
2 _____ \$25,000-50,000. 7 _____ \$2.5 - 5 million
3 _____ \$50,000-100,000. 8 _____ \$5 - 10 million
4 _____ \$100,000-500,000. 9 _____ Over 10 million
5 _____ \$500,000-1,000,000.
45. Approximately what part(%) of your budget goes to the following:
Education programs 1 _____ (%)
Research programs 2 _____ (%)
Publications 3 _____ (%)
46. Do you plan to expand your
Research programs? 1 _____ Yes 2 _____ No
Education programs? 1 _____ Yes 2 _____ No
Physical size(acres)? 1 _____ Yes 2 _____ No
47. Please list any new programs you plan to offer in the near future:

FOR CODING ONLY
Duplicate Col. 1-9
from CARD 1 10
CARD 2 (2)
11 12
42. () ()
13
43. ()
14
44. ()
15 16 17
45. () () ()
18 19 20
46. () () ()
21
47. ()
22
48. ()
23
49. ()
24
50. ()
25
51. ()
26
52. ()

48. Are botanical gardens and arboreta receiving the type of financial support they need to meet their goals?
1 _____ Yes 2 _____ No

ADMINISTRATION INFORMATION

49. How many years have you been in charge of a botanical garden or arboretum?
1 _____ 1-5 years 4 _____ 16-20 years
2 _____ 6-10 years 5 _____ Over 20 years
3 _____ 11-15 years
50. What is your highest academic degree?
1 _____ B.S. 4 _____ M.A.
2 _____ B.A. 5 _____ Ph.D.
3 _____ M.S. 6 _____ Other(please specify)
51. In what field was your degree earned?
1 _____ Taxonomy 4 _____ Botany(specify area)
2 _____ Horticulture
3 _____ Forestry 5 _____ Other(specify below)
52. Please sign below along with your title.

Name _____

Title _____

PLEASE RETURN THIS QUESTIONNAIRE AS PROMPTLY AS POSSIBLE. THANK YOU FOR YOUR COOPERATION AND FOR TAKING THE TIME TO COMPLETE THIS QUESTIONNAIRE.

APPENDIX A-3
QUESTIONNAIRE FOLLOW-UP POST CARD

December 30, 1974

Dear Director:

I am in the process of analyzing the green 4 page questionnaire that was mailed out to 301 institutions in September. I notice that your institution is not among the respondents.

Could you take the time to complete and return this questionnaire at this time? Thank you.

Marvin Ellenbecker

APPENDIX A-4 QUESTIONNAIRE CODEBOOK

Columns Question		Code Explanation
1		Card number (1)
2-4	1	Name of institution (1-301)--taken from the upper right corner of the green questionnaire.
5-6	2	State or province where institution is located--see following list*
		States:
		1 - Alabama
		2 - Arkansas
		3 - Arizona
		4 - California
		5 - Colorado
		6 - Connecticut
		7 - District of Columbia
		8 - Delaware
		9 - Florida
		10- Georgia
		11- Hawaii
		12- Iowa
		13- Idaho
		14- Illinois
		15- Indiana
		16- Kansas
		17- Kentucky
		18- Louisiana
		19- Maine
		20- Maryland
		21- Massachusetts
		22- Michigan
		23- Minnesota
		24- Mississippi
		25- Missouri
		26- Nebraska
		27- New Hampshire
		28- New Jersey
		29- New Mexico
		30- New York

Columns Question

Code Explanation

- 31- North Carolina
- 32- North Dakota
- 33- Ohio
- 34- Oklahoma
- 35- Oregon
- 36- Pennsylvania
- 37- Rhode Island
- 38- South Carolina
- 39- Tennessee
- 40- Texas
- 41- Utah
- 42- Virginia
- 43- Virgin Islands
- 44- Washington
- 45- West Virginia
- 46- Wisconsin

Provinces:

- 47- Alberta
- 48- British Columbia
- 49- Manitoba
- 50- Ontario
- 51- Quebec

*Excludes certain states and provinces
not listed in the directories.

7-8

2

Geographical regions of the United States
and Canada*

- 1 - Northeast and Middle Atlantic
- 2 - North Central and Ohio River
- 3 - South
- 4 - Northern and Central Plains
- 5 - Southwest
- 6 - Pacific Coast
- 7 - Hawaii
- 8 - Virgin Islands
- 9 - Quebec
- 10- Ontario
- 11- Manitoba
- 12- Alberta
- 13- British Columbia

*Canada is by provinces, not regions

9-10

2

Twelve major SMSA's of United States

- 0 - Not applicable
- 1 - New York
- 2 - Los Angeles-Long Beach
- 3 - Chicago

Columns	Question	Code Explanation
		4 - Philadelphia 5 - Detroit 6 - San Francisco-Oakland 7 - Washington, D.C.-Md.-Va. 8 - Boston 9 - Pittsburgh 10- St. Louis-Ill. 11- Baltimore 12- Cleveland
9-10	2	Five major CMA's in Canada 50- Montreal 51- Toronto 52- Vancouver 53- Ottawa-Hull 54- Winnipeg 99- Not applicable
11	2	Specifically urban now or in the future 0 - Not applicable 1 - Located in urban area now--SMSA or CMA 2 - Located in urban area by 2000 A.D.
12	3	Type of institution 0 - No response 1 - Private organization 2 - Public organization 3 - Foundation 4 - 1 and 2 5 - Cultural 6 - Garden club or association with garden clubs 7 - 2 and 3 8 - International 9 - Canadian federal government
13	4	Institution is part of a larger park system 0 - No response 1 - Yes 2 - No
14	5	Type of park system 0 - No response 1 - Municipal 2 - County 3 - 1 and 2 4 - State or provincial park 5 - Federal

Columns		Question	Code Explanation
			6 - Private sanctuary 7 - Special district or institution 8 - 1 and 4
15-16	6	Prime function of institution	0 - No response 1 - Arboretum 2 - Botanical garden 3 - Nature center 4 - Horticultural garden 5 - Education-research 6 - 1 and 2 7 - 1 and 3 8 - 1 and 4 9 - Recreation 10- 1,2,3 and 4 11- 1,2 and 4 12- Historical 13- Cultural 14- 3 and 4 15- 2 and 4 16- 1,3,4 and 9 17- 1,2 and 3 18- 5 and 9 19- 4 and 12 20- Native plants 21- 1 and 9 22- Zoological 23- Publishing house 24- 4 and 5 25- 1,2,3,4 and 13 26- 3 and 20 27- Socially oriented rather than plants 28- 1 and 5 29- 1,3 and 4
17-20	7	Date organization was founded	0 - No response Punch year given
21-24	8	Date physical facility opened to public	0 - No response Punch year given 9 - Not open to general public
25	9	Membership organization	0 - No response 1 - Yes 2 - No 3 - Proposed in near future

Columns Question		Code Explanation
26	10	Current membership number 0 - No response 1 - 50 or less 2 - 51-100 3 - 101-250 4 - 251-500 5 - 501-1,000 6 - 1,001-2,000 7 - 2,001-4,000 8 - 4,001-8,000 9 - Over 8,000
27	11	Membership dues 0 - No response 1 - Yes 2 - No 3 - Proposed in near future
28-31	12	Current membership dues 0 - No response Punch figure given 9 - Various
32	13	Entrance fee 0 - No response 1 - Yes 2 - No 3 - Request donation
33-35	14	Adult entrance fee 0 - No response Punch \$ figure given
36-38	14	Children entrance fee 0 - No response 99- Free Punch \$ figure given
39	15	Physical size of institution 0 - No response 1 - Under 10 acres 2 - 10-50 acres 3 - 51-100 acres 4 - 101-250 acres 5 - 251-500 acres 6 - 501-1,000 acres 7 - Over 1,000 acres

Columns	Question	Code Explanation
40	16	Publish official journal or newsletter 0 - No response 1 - Yes 2 - No 3 - Proposed in near future
41	18	Type of publication 0 - No response 1 - Journal or magazine 2 - Newsletter 3 - Research bulletin 4 - 1 and 2 5 - 1,2 and 3 6 - 1 and 3 7 - 2 and 3 8 - Specialties, post cards of plants, pamphlets
42	19	Publication issued 0 - No response 1 - Weekly 2 - Biweekly 3 - Monthly 4 - Bimonthly 5 - Quarterly 6 - Annual 7 - 10 issues per year, semi-annual or 5 issues per year 8 - More than one publication at various times 9 - Irregular
43-44	20	Organization purpose 0 - No response 1 - Physical facility for collecting, preserving, evaluating and displaying plants 2 - Educate the general public and increase awareness of plants 3 - Recreational experience in highly populated areas with few plants 4 - Support teaching and research for government or university 5 - 1 and 2 6 - 1 and 3 7 - 1 and 4 8 - 2 and 3 9 - 2 and 4 10- 3 and 4

Columns Question		Code Explanation
		11- 1,2,3 and 4 12- 1,2 and 3 13- 2,3 and 4 14- 1,2 and 4 15- 1,3 and 4
45	21	Work-study program for students 0 - No response 1 - Yes 2 - No 3 - Proposed
46	22	When program is offered 0 - No response 1 - Spring 2 - Summer 3 - Fall 4 - Winter 5 - Two seasons 6 - Three seasons 7 - All year
47	23	No. of students in program (annually) 0 - No response 1 - 1-5 2 - 6-10 3 - 11-15 4 - 16-20 5 - 21-25 6 - 26-30 7 - 31-35 8 - 36-40 9 - Over 40
48-55	24	Program rating: Braille, Elderly, Handicapped, Live Interpretation, Therapeutic, Research, Publications and Education in general 0 - No response 1 - Extremely important 2 - Important 3 - Important but not essential 4 - Important if time and money are available 5 - Not important
56	25	Special courses to general public 0 - No response 1 - Yes

Columns Question		Code Explanation
		2 - No
		3 - Proposed
	26	List of special courses (Appendix B-2)
57-60	27	Number of people in special courses, 1973
		0 - No response
		Punch figure given
		999- Not known
61-64	27	Number of people in special courses, 1974
		0 - No response
		Punch figure given
		999- Not known
65-70	28	Special facilities:
		Nature interpretative trails, therapeutic or handicap facilities, braille gardens, other (special gardens or preserves, museums and related cultural institutions with exhibits, displays, workshops, and guided tours)
		0 - No response
		1 - Yes
		2 - No
		3 - Proposed in near future
71	29	Involved in research programs
		0 - No response
		1 - Yes
		2 - No
72-73	30	Type of research
		0 - No response
		1 - Solely confined to own institution
		2 - Cooperation with federal government
		3 - Cooperation with botanic gardens and arboreta
		4 - University
		5 - Two of the above
		6 - Three or more of the above
		7 - Environmental
		8 - Alone but special research is done in cooperation with appropriate organizations
74	31	Institution is involved in
		0 - No response
		1 - Plant exploration

Columns Question		Code Explanation
		2 - Plant evaluation 3 - Plant exchange program 4 - 1 and 2 5 - 1 and 3 6 - 2 and 3 7 - All of the above
75	32	Special library 0 - No response 1 - Yes 2 - No
76-80	33	Number of volumes in library 0 - No response Punch figure given 9 - Unknown CARD 2
1		Card number (2)
2-4		Name of institution (1-301)--taken from from upper right corner of the green questionnaire
5	34	Facility appeals to large segment of the population 0 - No response 1 - Yes 2 - No
6	35	Special interest group appeal 0 - No response 1 - Yes 2 - No
7-13	36	Number of annual visitors 0 - No response Punch figure given 99- Unknown
14	37	Visitor peak season 0 - No response 1 - Spring 2 - Summer 3 - Fall 4 - Winter 5 - Non-seasonal

Columns	Question	Code Explanation
15	38	Emphasize attracting minority groups 0 - No response 1 - Yes 2 - No
16-19	39	Age groups attracted (from questionnaire) 0 - No response 1 - Highest group (1-9) 2 - Second highest age group (1-9) 3 - Third highest age group (1-9) 4 - Fourth highest age group (1-9)
20	40	Institution offers recreation experience 0 - No response 1 - Yes 2 - No
21	41	Base of support increasing 0 - No response 1 - Yes 2 - No
22-24	42	People employed full-time 0 - No response Punch figure given 999- 1,000 or over
25-26	43	Funding 0 - No response 1 - Endowment or foundation 2 - State government 3 - Local (city or county) 4 - Private funds (dues, plant sales) 5 - University 6 - Federal government 7 - 2,3 and 6 8 - 1,2,3 and 4 9 - 4 and 5 10- Admission charge 11- 1,2,4,5 and 6 12- 1,3 and 4 13- 1 and 5 14- 1 and 4 15- 3 and 10 16- 2 and 5 17- 1,2,3 and 6 18- 1,4 and 5 19- 2,5 and 6 20- 2 and 3

Columns		Question	Code	Explanation
			21-	1 and 2
			22-	1,3,4 and 6
			23-	3 and 4
			24-	1,2,3,4 and 5
			25-	2 and 6
			26-	Special tax
			27-	1 and 10
			28-	4 and 6
			29-	5 and 6
			30-	2,3 and 4
27	44	Annual budget		
			0 -	No response
			1 -	Under \$25,000.
			2 -	\$25,000.-50,000.
			3 -	\$50,000.-100,000.
			4 -	\$100,000.-500,000.
			5 -	\$500,000.-1,000,000.
			6 -	\$1-2.5 million
			7 -	\$2.5-5 million
			8 -	\$5-10 million
			9 -	Over \$10 million
28-30	45	Percent of budget allocated for the following: education, research and publications		
			0 -	No response
			1 -	Less than or equal to 1%
			2 -	Less than or equal to 2%
			3 -	Less than or equal to 3%
			4 -	Less than or equal to 4%
			5 -	Less than or equal to 5%
			6 -	Less than or equal to 6%
			7 -	Less than or equal to 7%
			8 -	Less than or equal to 8%
			9 -	Over 8%
31-33	46	Plan to expand the following: research program, education program and physical size		
			0 -	No response
			1 -	Yes
			2 -	No
	47	List new programs (see Appendix B-1)		
34	48	Receive financial support needed		
			0 -	No response
			1 -	Yes

Columns Question		Code explanation
		2 - No
		3 - Don't know
35	49	Number of years in charge of institution
		0 - No response
		1 - 1-5 years
		2 - 6-10 years
		3 - 11-15 years
		4 - 16-20 years
		5 - Over 20 years
36	50	Highest academic degree
		0 - No response
		1 - B.S.
		2 - B.A.
		3 - M.S.
		4 - M.A.
		5 - Ph.D.
		6 - Sc.D. or D.J.
		7 - A.A.S. and other special degrees
		8 - High school, some college or practical experience
37	51	Field in which degree was earned
		0 - Not applicable or no response
		1 - Taxonomy
		2 - Horticulture
		3 - Forestry
		4 - Botany
		5 - Recreation
		6 - Chemistry, biology or natural sciences
		7 - Education, english, law or social sciences
		8 - History, fine arts or landscape architecture
		9 - Business, economics, resource development or public administration
38	52	Respondent signed questionnaire and gave title
		1 - Yes
		2 - No

APPENDIX B

B-1 NEW PROGRAMS

B-2 SPECIAL COURSES OFFERED AT INSTITUTIONS

APPENDIX B-1

NEW PROGRAMS

Institution*	Program
5	Mini-courses for college students during summer and semester breaks; docent training and subsequent expansion of guided tours
6	Nature center and trails; plant sales building; auditorium
10	Native plants
25	Docent training; apprentice horticulturists
27	Friends (membership organization); quarterly publication; more classes
29	Night programs; field trips; more education in schools
30	Publish more interpretive materials; planting and developing new areas, general beautification
32	Expanded interpretation and demonstration programs
34	Will soon have approximately 800 acres for development of an arboretum
43	Additional educational classes
55	Lighting
56	Ecology; conservation through nature's bounty-- natural sources of food, water, plant and animal life
59	Resident training program
62	Educational guided tours for school children; work-shops in propagation
64	Horticulturist will teach grades 5 and 6 in local school system this winter
71	Recreation activities; outdoor education programs in conjunction with area school systems
77	Riverfront development and trail
78	Conservation and interpretive education
85	Short course in house plant culture during January break

Institution	Program
88	More specific tours for young people; more research: shade tree evaluation
89	Starting education program with high school students at local high school; short courses for adults
94	Increase emphasis on Indian food and medicinal plants; improve self-guiding trail system
95	We try to introduce new programs each year on various phases of gardening
96	Leader, In-service sessions
97	We plan to expand programs on content--not size or number of programs
98	High school vocational course for prep. college
100	Brochure for general public now being prepared
105	Sunday lectures and garden films
109	Audio-visual center; horticulture therapy; children's gardening; senior citizen gardening
112	Education, library, live interpretation
114	Publication of a booklet, <u>Trees and Shrubs at Willowood</u> ; an annotated catalogue of woody materials planted here since the beginnings of the collections in 1908
117	Expanded educational program; expanded collection; plant propagation--introduction--distribution
118	Plant breeding; new popular level adult education courses
119	Mushroom walks; tree identification walks; wildflower walks
120	Expansion of arboretum; conservation; plant records
122	Braille; handicapped
123	Aim of garden is for college and public pleasure
125	Suburban forestry; tree breeding, environmentally sound building design, environmental diagnostics; revegetation of land-fill sites; urban container plantings
126	Work/study-classes for public; a college-level class in home horticulture offered in cooperation with a nearby university
131	General exhibit hall renewal
133	Bicentennial

Institution	Program
140	Continued education; newspaper articles; continuation of plantings
147	Additional gardening classes for children
148	Horticulture therapy in our soon to be built therapeutic greenhouses
150	Extremely varied, including an International Music Education Center and certain botanical activities
151	Improved self-guided tour trails
153	Curator will teach class on rose culture at local community college
156	We are planning to restore the garden to the way it was in the 18th Century. The house (historic home of John Bartram) needs only to be stabilized
157	Student interns from local high school; use of park and preserve as extension of classrooms by local school district
159	Horticulture programs for retirees and mixed groups
161	More on conservation and the role of American native plants
171	Expanded environmental education to school teachers and students; more research on urban trees
172	Living exhibit of the flora and fauna of the Southeastern United States
176	Restore more of the original (1741) garden plan, archeological diggings of mansion, house museum orientation program--audio-visual
180	Special courses to general public; special tours
182	Student field study
186	A working 18th Century plantation = Carter's Grove Estate
187	Self-guided tours; more adult education
189	We are still in the building stage
194	Plan to develop a new research and teaching facility
199	Self-guided nature trail in park; self-guided trail inside tropical and arid domes; clinics on various phases of house plant culture
200	Currently involved in a docent program which will give presentations to local school children (grades 4-7) on various aspects of our art center and arboretum

Institution	Program
201	Expanded teacher training in environmental education and ecology
202	It all depends on how soon we can build a building (in the arboretum)
204	Work study program for eight students, which will be of two year duration
206	Extensive demonstration and teaching program related to the home production of food and decorative plants
207	Dried flower and preserved materials design workshop--fall and spring
211	Breeding of ornamentals; extension programs in horticulture and natural history
213	Training of volunteer guides

*Refer to Appendix A-1 for names and locations of institutions

APPENDIX B-2

SPECIAL COURSES OFFERED AT INSTITUTIONS

Special Courses	Institution (See Appendix A-1)
Annuals	38
Arts and crafts	47,70,76,104,108,134,141
Astronomy	102,144
Beaded flowers	47
Birds (various courses)	7,70,99,135,144,148
Bonsai	3,11,28,34,43,88,99,141,144,187,199
Botany, field botany, ecology	34,66,114,148,154,185,201
Bulb forcing	199
Composting	34
Container gardening	7,28,38,206
Dahlias	34
Desert plants (various courses)	6
Docent training	12,29,76,131,155
Entomology	148
Evergreens	36,148
Fine arts	139
Flowering plants, floriculture	36,185
Flower shows	56,177
Fruits and seeds	148
Garden demonstrations, workshops	12,29,38,53,56,95,99,121,135,140,159,194
General gardening and horticulture	27,28,44,56,59,60,64,74,75,77,83,87,102,105,120,134,143,154,163,165,187,206,207,208
General guide classes	3
Guided tours	43,96
Guide training	25

Special courses	Institution (See Appendix A-1)
Hawaiian botany	59,61
Home gardening fair	7
Home horticulture, house plants	11,28,34,43,48,108,134,135,160, 165,177,187,199,206,207
Hydroponics	34
Interpretive programs, nature training	138,141,144,148,209
Japanese flower arranging, flower arranging	16,28,56,95,143,159,207,208
Landscape courses dealing with various plant materials	26,36,43,53,64,74,88,95,105,109, 117,141,154,157,183
Lectures, symposiums	12,29,53,55,56,102,121,131,140, 177,199,206
Master's garden program	195
Methods of plant culture	183
Native plants in your garden	25,99,201
Native walks	43
Numerous courses	84,86,98,106,118,125,133,147,171, 211
Orchid culture	59
Palm weaving	47
Photography	27,70,99,104,135,144
Plant dyes and natural dyeing	66,134,135
Plant identification	11,28,34,99,144,148,157,161
Plant propagation	25,26,38,95,109,135,157,160
"Plants of the Davis Arboretum"	30
Poisonous, medicinal and edible plants	28,148
Pruning	64,99,109,117,160
Soils	117
Specialty horticulture	44,99
Taxidermy	104
Terrariums	47,108,141
Trees about town, tree courses	25,34,99,177,209
Tropical plants of the conservatory	34

Special courses	Institution (See Appendix A-1)
Turf management	66,117
Use of garden chemicals	117
Vegetable gardening	28,141,161
Wildflowers	25,135,148

APPENDIX C

FIGURE 1. GEOGRAPHICAL DATA--UNITED STATES

FIGURE 2. URBAN REGIONS IN THE UNITED STATES: YEAR 2000

FIGURE 3. GEOGRAPHICAL DATA--CANADA

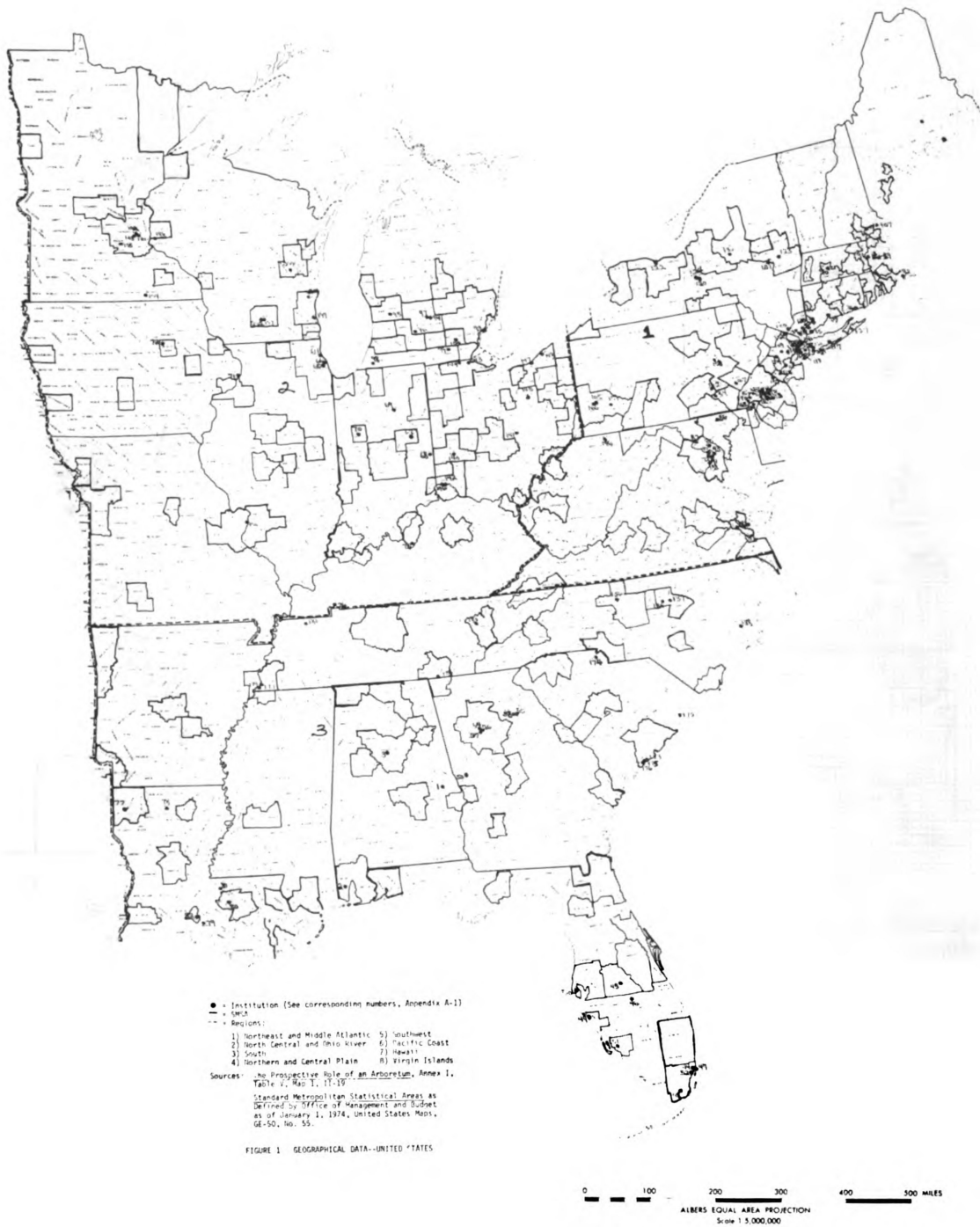
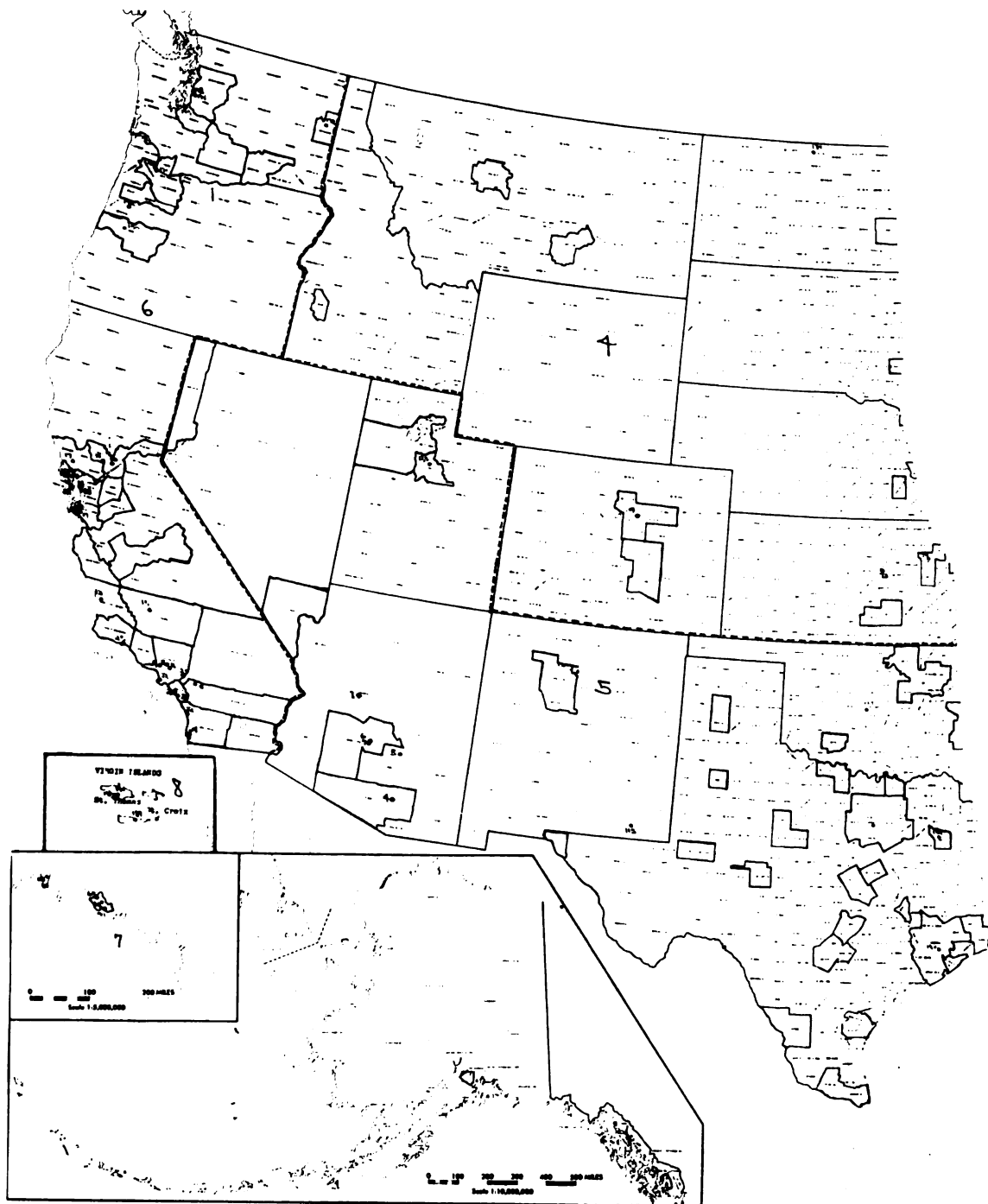
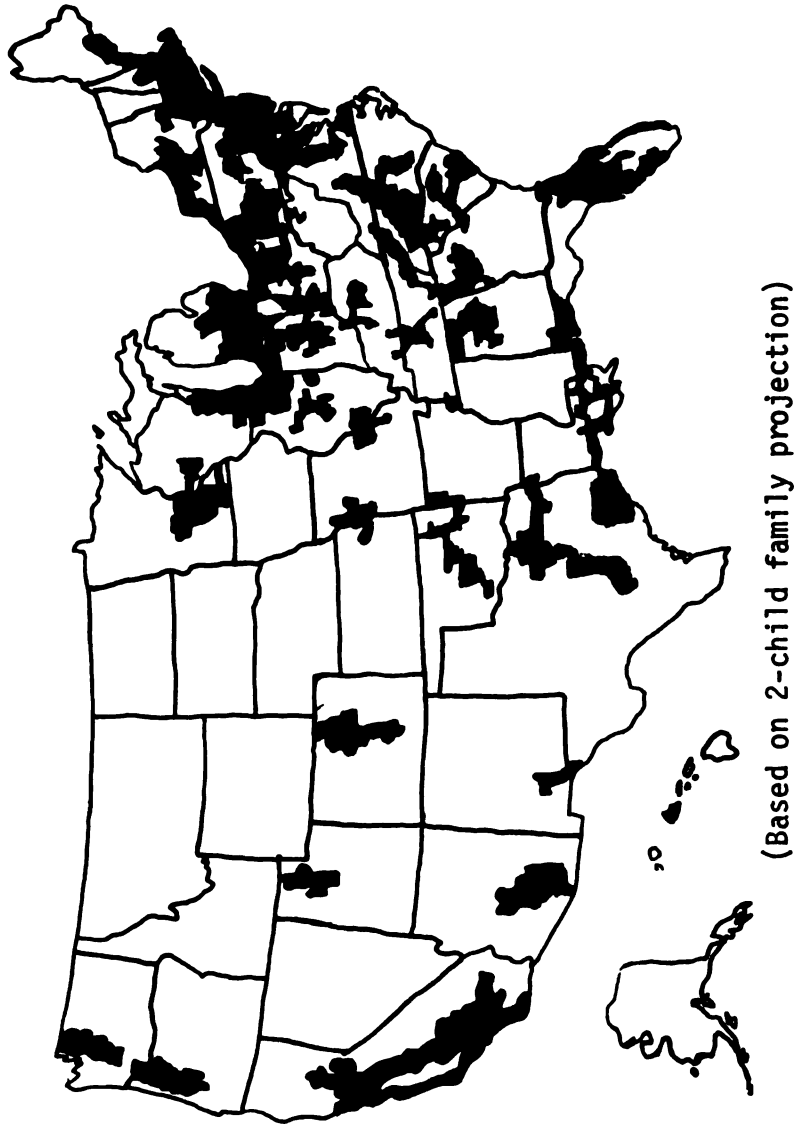


FIGURE 1 (CON'T.).





Source: Jerome P. Pickard, "U.S. Metropolitan Growth Expansion, 1970-2000, with Population Projections."

FIGURE 2. URBAN REGIONS IN THE UNITED STATES: YEAR 2000

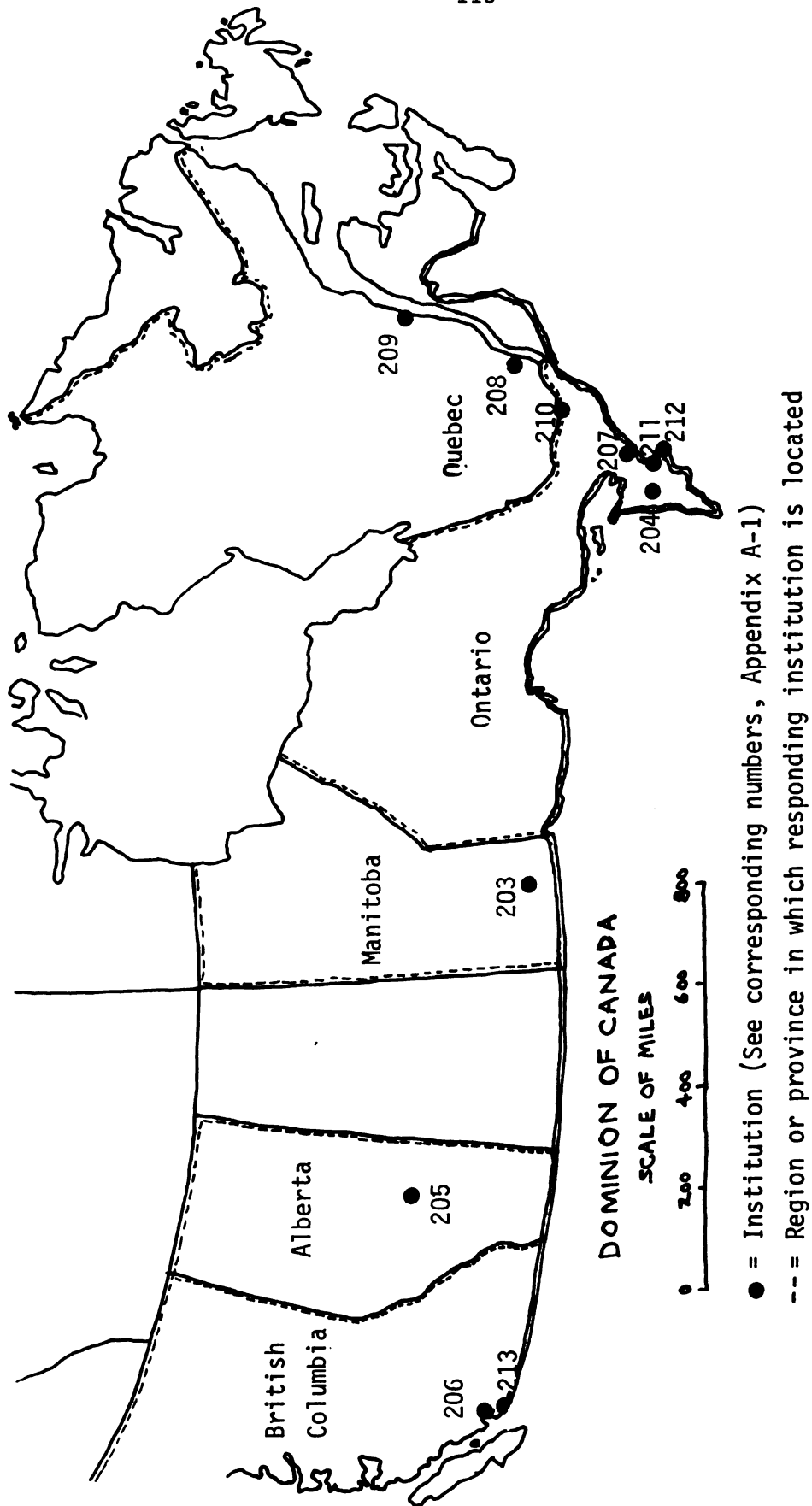


FIGURE 3. GEOGRAPHICAL DATA--CANADA

APPENDIX D

- TABLE 30. DATES RESPONDING INSTITUTIONS WERE ESTABLISHED--
UNITED STATES
- TABLE 31. DATES RESPONDING INSTITUTIONS WERE OPENED TO THE
GENERAL PUBLIC--UNITED STATES
- TABLE 32. DATES RESPONDING INSTITUTIONS WERE ESTABLISHED--CANADA
- TABLE 33. DATES RESPONDING INSTITUTIONS WERE OPENED TO THE GENERAL
PUBLIC--CANADA
- TABLE 34. DATES RESPONDING INSTITUTIONS WERE ESTABLISHED BY
REGION--UNITED STATES
- TABLE 35. DATES RESPONDING INSTITUTIONS WERE OPENED TO THE GENERAL
PUBLIC BY REGION--UNITED STATES
- TABLE 36. DATES RESPONDING INSTITUTIONS WERE ESTABLISHED BY
REGION--CANADA
- TABLE 37. DATES RESPONDING INSTITUTIONS WERE OPENED TO THE GENERAL
PUBLIC--CANADA
- TABLE 38. TYPE OF RESPONDING INSTITUTION BY INSTITUTION FUNCTION--
UNITED STATES
- TABLE 39. TYPE OF RESPONDING INSTITUTION BY INSTITUTION FUNCTION--
CANADA
- TABLE 40. RESPONDING INSTITUTION INVOLVEMENT BY INSTITUTION
FUNCTION--UNITED STATES
- TABLE 41. RESPONDING INSTITUTION INVOLVEMENT BY INSTITUTION
FUNCTION--CANADA
- TABLE 42. RESPONDING INSTITUTION ADMINISTRATOR'S DEGREE BY FIELD
OF STUDY--UNITED STATES
- TABLE 43. RESPONDING INSTITUTION ADMINISTRATOR'S DEGREE BY FIELD
OF STUDY--CANADA

TABLE 31. DATES RESPONDING INSTITUTIONS WERE OPENED TO THE GENERAL PUBLIC--UNITED STATES

FILE ARBORFETA (CREATION DATE = 02/26/75)	
SUBFILE USA	
VARIABLE DATEPUB	
YEAR CODE	
1.00=	1.1 PCT
1728-1850	
2.00=	6.5 PCT
1851-1900	
3.00=	2.7 PCT
1901-1910	
4.00=	3.2 PCT
1911-1920	
5.00=	9.7 PCT
1921-1930	
6.00=	16.2 PCT
1931-1940	
7.00=	5.4 PCT
1941-1950	
8.00=	15.1 PCT
1951-1960	
9.00=	24.3 PCT
1961-1970	
10.00=	7.0 PCT
1971-1974	
11.00=	2.2 PCT
NOT OPEN TO	
GENERAL PUBLIC	
(MISSING)	
FREQUENCY (NUMBER OF INSTITUTIONS)	
STATISTICS..	
KURTOSIS	-4.04
SKENNESS	-5.44
VALID OBSERVATIONS -	173
MISSING OBSERVATIONS -	12

TABLE 34. DATES RESPONDING INSTITUTIONS WERE ESTABLISHED BY REGION--UNITED STATES

FILE ARBORETA (CREATION DATE = 02/26/75)
SUBFILE USA

***** C R O S S T A B U L A T I O N O F *****
***** REGION BY DATEEST ***** PAGE 1 OF 1

REGION	COUNT ROM PCT COL PCT TOT PCT	1.001	2.001	3.001	4.001	5.001	6.001	7.001	8.001	9.001	10.001	ROW TOTAL
NE + MID ATL.	1.00	3 5.2 60.0 1.9	8 13.8 40.0 4.7	1 1.7 16.7 5.5	0 0 0 0	9 15.5 40.9 5.3	10 17.2 42.0 5.9	13 21.7 53.7 7.6	13 21.7 53.7 7.6	15 25.0 62.5 8.0	15 25.0 62.5 8.0	58 33.9
NORTH CENT. + OH	2.00	0 0 0 0	7 20.6 35.0 4.1	3 8.8 50.0 1.8	2 5.9 50.0 1.2	5 14.7 22.7 2.9	3 8.8 13.0 1.8	3 8.8 13.0 1.8	3 8.8 13.0 1.8	9 28.5 71.5 9.0	9 28.5 71.5 9.0	34 19.9
SOUTH	3.00	2 4.0 40.0 1.2	3 10.3 15.0 1.8	0 0 0 0	0 0 0 0	0 0 0 0	4 13.0 18.0 2.3	4 13.0 18.0 2.3	7 25.9 41.1 5.1	11 37.9 56.4 7.4	11 37.9 56.4 7.4	29 17.0
NORTH + CENT. PL	4.00	0 0 0 0	0 0 0 0	0 0 0 0	0 0 0 0	0 0 0 0	1 25.0 4.0 4.6	1 25.0 4.0 4.6	1 25.0 4.0 4.6	2 50.0 1.2 1.2	2 50.0 1.2 1.2	4 2.3
SOUTHWEST	5.00	0 0 0 0	1 11.1 5.0 5.6	0 0 0 0	0 0 0 0	1 11.1 4.6 4.6	4 44.4 12.0 2.3	4 44.4 12.0 2.3	1 11.1 3.6 3.6	1 11.1 3.6 3.6	1 11.1 3.6 3.6	5 5.3
PACIFIC COAST	6.00	0 0 0 0	3 3.0 5.0 5.6	2 6.7 33.3 1.2	2 6.7 50.0 1.2	3 23.3 50.0 4.1	7 70.0 13.0 1.8	7 70.0 13.0 1.8	2 20.0 25.5 3.3	2 20.0 25.5 3.3	2 20.0 25.5 3.3	30 17.5
HAWAII	7.00	0 0 0 0	0 0 0 0	0 0 0 0	0 0 0 0	0 0 0 0	0 0 0 0	0 0 0 0	0 0 0 0	7 70.0 13.0 1.8	7 70.0 13.0 1.8	4 2.3
VIRGIN ISLANDS	8.00	0 0 0 0	0 0 0 0	0 0 0 0	0 0 0 0	0 0 0 0	0 0 0 0	0 0 0 0	0 0 0 0	2 66.7 16.7 1.2	2 66.7 16.7 1.2	3 1.8
COLUMN TOTAL		5 2.9	20 11.7	6 3.5	2 4	22 12.9	25 14.6	13 7.5	27 15.8	41 24.0	47 4.7	171 100.0

RAW CHI SQUARE = 75.4606 WITH 63 DEGREES OF FREEDOM. SIGNIFICANCE = .1345
NUMBER OF MISSING OBSERVATIONS = 14

TABLE 35. DATES RESPONDING INSTITUTIONS WERE OPENED TO THE GENERAL PUBLIC BY REGION--UNITED STATES

FILE ARBOREYA (CREATION DATE = 02/26/75)												
SUBFILE USA												
CROSS TABULATION OF												
REGION DATEPUB												
COUNT	DATEPUB	1.00	2.00	3.00	4.00	5.00	6.00	7.00	8.00	9.00	10.00	ROW TOTAL
POW PCI												
CL PCI												
TOT PCI												
NE + MID ATL.	1.00	2	5	0	2	5	14	4	9	13	3	52
	2	3.3	6.7	0	3.3	10.3	20.7	6.9	15.5	20.7	5.2	33.5
	1.2	1.2	2.9	0	1.2	3.5	8.1	2.3	3.2	5.9	1.7	
NORTH CENT. + OH	2.00	0	4	3	2	9	6	3	3	11	3	32
	0	0	12.5	9.4	6.3	10.7	6.7	20.3	10.7	34.4	15.4	18.5
	0	0	33.3	60.9	33.3	10.7	6.7	20.3	10.7	24.4	15.4	
	0	0	2.3	1.7	1.2	1.7	1.2	1.2	1.7	2.4	1.2	
SOUTH	3.00	0	1	0	0	6	6	2	7	13	2	33
	0	0	3.0	0	0	11.3	18.0	6.3	21.0	33.4	15.4	19.1
	0	0	8.6	0	0	11.3	20.3	2.3	21.0	29.9	15.4	
	0	0	0	0	0	0	3.5	1.3	2.4	2.3	1.2	
NORTH + CENT. PL	4.00	0	0	0	0	0	25	0	0	50	25	2.3
	0	0	0	0	0	0	3.6	0	0	4.4	7.7	
	0	0	0	0	0	0	0	0	0	1.2	1.0	
SOUTHWEST	5.00	0	10	0	0	10	40	0	20	10	10	10
	0	0	10.0	0	0	10.0	40.0	0	20.0	10.0	10.0	5.8
	0	0	8.6	0	0	3.6	12.3	0	1.2	2.6	1.6	
	0	0	0	0	0	0	0	0	0	0	0	
PACIFIC COAST	6.00	0	3	2	3	5	10	3	2	10	3	16.8
	0	0	8.6	40.2	6.3	3.5	10.0	20.3	10.0	10.0	15.3	29
	0	0	0	0	0	0	0	0	0	0	0	
	0	0	0	0	0	0	0	0	0	0	0	
HAWAII	7.00	0	0	0	0	0	0	0	0	25	20	4.3
	0	0	0	0	0	0	0	0	0	2.6	1.2	2.3
	0	0	0	0	0	0	0	0	0	0	0	
VIRGIN ISLANDS	8.00	0	0	0	0	0	0	0	0	66.7	0	1.7
	0	0	0	0	0	0	0	0	0	1.2	0	
	0	0	0	0	0	0	0	0	0	0	0	
COLUMN TOTAL	1.2	12	6.9	2.9	3.6	10.4	17.3	5.9	16.2	25.0	7.3	100.0

[illegible]

02/26/75

[illegible]

TABLE 38 (CONT'D.)

FILE ARBORETA (CREATION DATE = 02/26/75)

SURFILE USA

***** C R O S S T A B U L A T I O N O F ***** PAGE 2 OF 3

COUNT ROW PCT COL PCT TOT PCT	FUNCTION												ROW TOTAL
	1,2,4	AL	11,001	12,001	13,001	14,001	15,001	1,3,4,9	1,2,3	5,9	4,12	NATIVE P LANDS	
INTYPE	1.9	2.0	1.9	1.9	1.9	0.0	0.0	0.0	0.0	0.0	0.0	1.9	28.7
PRIVATE ORG.	50.0	25.0	33.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	50.0	
	.6	1.1	.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	.6	
PUBLIC ORG.	1.1	5.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	48.6
	50.0	25.0	0.0	100.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
	.6	1.1	0.0	1.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
FOUNDATION	0.0	1.9	33.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	28.7
	0.0	12.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	15.5
	0.0	.6	.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
1+2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.9
	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
CULTURAL	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.6
	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
GARDEN CLUB	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.1
	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
2+3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.1
	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
INTERNATIONAL	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.6
	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
COLUMN TOTAL	1.1	4.4	1.7	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	100.0

(CONTINUED)

(CONTINUED)

TABLE 38 (CONT'D.)

FILE ARBOPETA (OPERATION DATE = 02/26/75)
SUBFILE USA

***** CROSS TABULATION OF *****
***** INTYPE ***** BY FUNCTION ***** PAGE 3 OF 3

COUNT		FUNCTION										ROW TOTAL	
ROW PCT	COL PCT	1,9	21,9	22,00	23,00	4,5	24,00	1,2,3,4, 3,20	26,00	SOCIALS PLANTS	27,00	1,3,4	29,00
INTYPE	1.00	0	0	0	1	1	1	1	0	0	0	0	0
PRIVATE ORG.	52	0	0	0	100.0	1.9	1.9	1.9	0	0	0	0	0
PUBLIC ORG.	2.00	1	1	1	0	1	1	0	1	1	1	0	0
FOUNDATION	3.00	1	1	1	0	1	1	0	1	1	1	0	0
1+2	4.00	0	0	0	0	0	0	0	0	0	0	0	0
CULTURAL	5.00	0	0	0	0	0	0	0	0	0	0	0	0
GARDEN CLUB	6.00	0	0	0	0	0	0	0	0	0	0	0	0
2+3	7.00	0	0	0	0	0	0	0	0	0	0	0	0
INTERNATIONAL	8.00	0	0	0	0	0	0	0	0	0	0	0	0
COLUMN TOTAL		1	1	1	1	1	1	1	1	1	1	1	1
TOTAL		.6	.6	.6	.6	.6	.6	.6	.6	.6	.6	.6	.6

RAM CHI SQUARE = 196.1730 WITH 196 DEGREES OF FREEDOM. SIGNIFICANCE = .4863
NUMBER OF MISSING OBSERVATIONS =

TABLE 39. TYPE OF RESPONDING INSTITUTION BY INSTITUTION FUNCTION--CANADA

CROSS TABULATION BY FUNCTION											
INTYPE	COUNT	LABOR	COOP.	AGRIC.	IND.	1+2	1+3	1,2,3,4	1,2,4	ROW TOTAL	
PUBLIC ORG.	2.00	11.1	100.0	11.1	100.0	11.1	11.1	0	11.1	81.8	9
1+2	4.00	11.1	100.0	11.1	100.0	11.1	11.1	0	11.1	9.1	1
CANADIAN GOV'T	9.00	11.1	100.0	11.1	100.0	11.1	11.1	0	11.1	9.1	1
COLUMN TOTAL		11.1	100.0	11.1	100.0	11.1	11.1	0	11.1	100.0	11

128

15,4483 WITH 12 DEGREES OF FREEDOM. SIGNIFICANCE = .1964

RAW CHI SQUARE = 15.3488 WITH 12 DEGREES OF FREEDOM. SIGNIFICANCE = .1964

TABLE 40. RESPONDING INSTITUTION INVOLVEMENT BY INSTITUTION FUNCTION--UNITED STATES

FILE ARDORRETA (CREATION DATE = 02/26/75)

SUSFILE
USA

***** C R O S S T A B U L A T I O N O F *****
 INSINV ***** BY FUNCTION ***** PAGE 1 OF 3

FUNCTION		COUNT										ROW TOTAL	
		ARR	REC	ROT	NAT	G	H	E	ED	1+3	1+4	RECREATI	1,2,3,4
		1.00	2.00	3.00	4.00	5.00	6.00	7.00	8.00	9.00	10.00	ON	10.00
INSINV		11.1	11.1	11.1	11.1	11.1	11.1	11.1	11.1	11.1	11.1	11.1	11.1
PLANT EXP.		5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3
PLANT EVALU.		21.7	21.7	21.7	21.7	21.7	21.7	21.7	21.7	21.7	21.7	21.7	21.7
PLANT EXCH.		13.5	13.5	13.5	13.5	13.5	13.5	13.5	13.5	13.5	13.5	13.5	13.5
1+2		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1+3		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2+3		34.9	34.9	34.9	34.9	34.9	34.9	34.9	34.9	34.9	34.9	34.9	34.9
ALL ABOVE		11.1	11.1	11.1	11.1	11.1	11.1	11.1	11.1	11.1	11.1	11.1	11.1
COLUMN TOTAL		16.8	16.8	16.8	16.8	16.8	16.8	16.8	16.8	16.8	16.8	16.8	16.8

(CONTINUED)

TABLE 40 (CONT'D.)

FILE ARBORETA (CREATION DATE = 32/26/75)

SUBFILE USA

***** C R O S S T A B U L A T I O N O F *****
 INSINV ***** BY FUNCTION ***** PAGE 3 OF 3

		FUNCTION										ROW TOTAL
		COUNT		ZOOLOGIC 4,5		1,2,3,4, 3,20		SOCIAL + 1,5 PLANTS		1,3,4		
		POW PCT	COL PCT	22.00I	24.00I	25.00I	26.00I	27.00I	28.00I	29.00I		
		TOT PCT	TOT PCT	11.1 100.0	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0		
		1.00	1.00	11.1 100.0	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0		
INSINV	PLANT EXP.	1.00	1.00	11.1 100.0	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0	9.0	
	PLANT EVALU.	2.00	2.00	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0	20.4	
	PLANT EXCH.	3.00	3.00	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0	22.1	
1+2		4.00	4.00	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0	3.5	
1+3		5.00	5.00	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0	1.8	
2+3		6.00	6.00	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0	20.4	
ALL ABOVE		7.00	7.00	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0	23.9	
	COLUMN TOTAL			1.9	1.9	1.9	1.9	2.7	1.9	1.9	113.0	

RAM CHI SQUARE = 186.27373 WITH 156 DEGREES OF FREEDOM. SIGNIFICANCE = .0478
 NUMBER OF MISSING OBSERVATIONS = 72

TABLE 42. RESPONDING INSTITUTION ADMINISTRATOR'S DEGREE BY FIELD OF STUDY--UNITED STATES

CROSS TABULATION OF DEGREE											
FIELD	DEGREE	B.S.	R.A.	M.S.	M.A.	PH.D.	SC.D. OR J.D.	A.A.S. SPE.	H.S. XP.	E	ROW TOTAL
		1.001	2.001	3.001	4.001	5.001	6.001	7.001	8.001		
TAXONOMY	1.00	1.7 7.7	0 0	3 23.1	0 0	8 61.5	0 0	1.7 7.7	0 0	0 0	13 9.0
HORTICULTURE	2.00	34 57.6	17 10.0	12 20.3	6.8 40.0	4 2.8	0 0	3 5.1	1.7 100.0	1.7	59 40.7
FORESTRY	3.00	3 27.3	1 10.0	3 13.6	1 10.0	2 15.2	0 0	1 9.1	0 0	0 0	11 7.6
BOTANY	4.00	5 16.7	1 10.0	2 9.1	6.7 20.0	19 50.0	1 3.3	0 0	0 0	0 0	30 20.7
NAT. SC.	6.00	2 20.0	1 10.0	1 10.0	1 10.0	5 50.0	0 0	0 0	0 0	0 0	10 6.9
ED.+SOC. SC.	7.00	3 60.0	1 20.0	0 0	0 0	0 0	1 20.0	0 0	0 0	0 0	5 3.4
HIST.+FINE ARTS	8.00	4 44.4	3 33.0	1 11.1	1 11.1	0 0	0 0	0 0	0 0	0 0	9 6.2
BUSINESS REL.	9.00	5 62.5	2 25.0	0 0	1 12.5	0 0	0 0	0 0	0 0	0 0	7 5.5
COLUMN TOTAL		57 39.3	10 6.9	22 15.2	10 6.9	38 26.2	2 1.4	5 3.4	.7	.7	145 100.0

RAW CHI SQUARE = 101.15344 WITH 49 DEGREES OF FREEDOM.. SIGNIFICANCE = .0000
 NUMBER OF MISSING OBSERVATIONS = 40

MICHIGAN STATE UNIV. LIBRARIES



31293104795269

