

AN ANALYSIS OF TRAINING NEEDS AND
EMPLOYMENT CHARACTERISTICS OF
THE GREENHOUSE GROWER IN
THREE METROPOLITAN AREAS

Thesis for the Degree of Ed. D.
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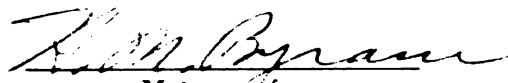
AN ANALYSIS OF TRAINING NEEDS AND EMPLOYMENT
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ABSTRACT

AN ANALYSIS OF TRAINING NEEDS AND EMPLOYMENT CHARACTERISTICS OF THE GREENHOUSE GROWER IN THREE METROPOLITAN AREAS

by Warren Parsons

Purposes. The purposes of this study were to determine the nature of the training desired for the commercial greenhouse grower, in terms of the relative importance of the species of ornamental flowering plants produced and of the degree of attainment of competencies needed; and to secure employment information relating to greenhouse workers that could be of value in guidance and training such workers.

Method. A personal interview form was developed after reviewing occupational literature and interviewing managers of greenhouses and specialists from the floriculture department of Michigan State University.

A personal interview was conducted with each of the managers of 58 greenhouses out of 64 which covered one acre or more in the Chicago, Cleveland, and Detroit areas.

The data were analyzed by tabulating species of flowering plants grown in pots, as cut flowers, and in flats; the training of the greenhouse grower desired by managers; and employment information supplied by them. These data were taken from the data form and total numbers and/or percentages computed.

Findings and Interpretations. The species of ornamental flowering plants produced in commercial greenhouses were ranked in importance according to the percentage of greenhouses growing each species. The reason for this was to provide a basis which could be used for the development of instruction to prepare the greenhouse grower. This was done when 59 major and minor crops were ranked in importance, based upon reports by 58 greenhouse managers. This included 56 produced in pots, 22 as cut flowers, and 28 raised in flats.

Under the basic areas of plant knowledge the categories of (1) plant parts, (2) growth processes, and (3) plant names were considered essential by two-thirds of the managers.

The second area of training, entitled competencies, included operational abilities such as greenhouse skills needed by the greenhouse grower to perform the operations involved in his job. Fifty-four percent of the greenhouse managers indicated that the following competencies were essential for the greenhouse grower to possess listed in order of importance: (1) watering, (2) controlling pests, (3) fertilizing, (4) mixing soils, (5) potting, (6) transplanting, (7) handling chemicals, (8) cleaning, (9) propagating, (10) sterilizing soil, (11) identifying growth containers, (12) applying growth substances, (13) operating boiler, (14) operating equipment, and (15) testing soil.

Three-fourths of the greenhouse managers reported that the following areas of training under crop understanding were essential in order of importance: (1) temperature, (2) water requirements, (3) pinching, (4) disbudding, (5) cutting, (6) special cultural practices, (7) humidity, (8) life cycle of plant, (9) grading and packaging, and (10) photo period.

Under the greenhouse management category of training 64 percent of the managers indicated that (1) knowledge of labor, (2) analysis of production, and (3) greenhouse layout were essential for the greenhouse grower to understand. Twenty-seven percent of the greenhouse managers stated that (1) understanding insurance, (2) managing money, (3) buying, (4) selling, and (5) marketing were essential for the greenhouse grower, while 41 percent said that such training was useful.

Of the mechanical activities that growers perform, 23 percent of the managers said that skill in (1) welding, (2) wiring, (3) constructing, (4) woodworking, and (5) plumbing were essential, while 45 percent indicated that these were useful.

Employment information for greenhouse workers was collected to determine job opportunities and working conditions for the grower. The occupation in commercial greenhouses, reported to offer the greatest number of opportunities for

entry was the grower helper, and the one which was reported to offer the greatest opportunity for advancement from this occupation was the grower.

The findings of this study lend support to the recommendation that employment information and training be provided for the prospective greenhouse growers by: (1) educators and employers cooperating to provide adequate training programs and placement of employees, (2) including the categories of training desired by managers in a course of study, (3) providing up-to-date employment information for prospective employees through guidance personnel, and (4) using follow-up studies to determine how improvements may be made.

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CHAPTER I

INTRODUCTION

During the last two decades significant changes have taken place in agriculture. One of the major changes has been the decreasing number of persons employed in farming. The number of people employed on farms in 1944 was about 10.1 million, and in 1964 it was about 6.1 million.¹ It is expected to decrease to less than six million by 1980. One of the reasons for this decline in farm population has been the evolution of the most efficient agricultural industry in the world. Today about two million farms produce more than 90 percent of the commercial farm products for the United States.²

This efficiency of production has resulted in large part from publicly supported programs of agricultural research and education since the early 1900's. The Morrill Act of 1862 provided land for agricultural colleges; the Hatch Act of 1887 set up experimental stations at the land-grant colleges; the Smith-Lever Act of 1914 established the Cooperative Extension Service which specialized in agricultural

¹United States Department of Agriculture, Agricultural Statistics 1965 (Washington, D. C., United States Government Printing Office), p. 445.

²H. M. Hamlin, Public School Education in Agriculture (Danville, Illinois: The Interstate, 1962), p. 40.

education for all farm families; and the Smith-Hughes Act of 1917 provided vocational education in agriculture for youths and adults. Research has been responsible for the mechanization of agriculture and increased food production. Educational programs have disseminated research results to the farmer so that today one farm worker in the United States produces enough food for about 32 persons.

While the percentage of persons employed in production agriculture continues to decrease, the percentage of persons employed in off-farm agricultural occupations is increasing.³ Some of the reasons for this trend include technological developments in the processing and distributing of agricultural products, and urbanization increasing the demand for agricultural goods and services. Some examples of off-farm agricultural occupations which are classified under business and industry include manufacturer, dealer, or salesman of fungicides, insecticides, or fertilizers. A recent survey in Pennsylvania showed that almost twice as many new persons would be hired by 1970 in the off-farm agricultural businesses, 5,694, as would enter farming, 2,859.⁴

These changes in agriculture have brought about a recent trend in vocational agriculture in this country to

³Alfred H. Krebs, Agriculture In Our Lives (Danville, Illinois: The Interstate, 1964), p. 16.

⁴Norman K. Hoover, D. R. McClay, and G. Z. Stevens, Technical Education Needs of Persons Engaged in Agricultural Occupations (report of a study; University Park, Pennsylvania: Department of Agricultural Education, The Pennsylvania State University, 1965), p. 5.

broaden objectives of programs. Originally the major purpose of the Smith-Hughes Act of 1917, which provided funds for vocational education in agriculture, was to prepare students for farming.⁵ Now to meet the new needs of increasing numbers of employees entering off-farm agricultural occupations, the Vocational Educational Act of 1963 has broadened the objectives to include preparation for all agricultural occupations.⁶ This change in objectives has stimulated educators to conduct studies of off-farm agricultural occupations. A recent indication of this research for occupational information is the summary of 26 state studies by the Center for Research and Leadership Development in Vocational and Technical Education.⁷ These studies indicate that one group of off-farm agricultural occupations which will need increasing numbers of agriculturally trained employees is that of ornamental horticulture. Judge estimated that there were 4,630 full-time and 2,420 part-time ornamental horticulture workers in the state of Massachusetts. This represented about 22 percent of the

⁵Administration of Vocational Education, Vocational Education, Bulletin No. 1, General Series No. 1, United States Department of Health, Education, and Welfare (Washington: Government Printing Office, 1958), p. 27.

⁶Committee of Labor and Public Welfare, United States Senate, Selected Education Acts of 1963 (Washington, D.C.: United States Government Printing Office, 1963), pp. 75-76.

⁷The Center for Research and Leadership Development in Vocational and Technical Education, Summary of Research Findings in Off-Farm Agricultural Occupations (Columbus, Ohio: The Ohio State University, 1965).

total number of off-farm agricultural employees, the largest occupational group in the study.⁸

Ornamental horticulture is increasing in importance because more plants are being used in and outside of homes, around public and private buildings, along city streets and highways, in parks, and in recreational areas. In the last ten years, according to Tukey, the value of horticultural specialities, including cut flowers, bedding and foliage plants, and nursery crops has more than doubled. Presently, Tukey says, horticulture is especially active throughout the world, and no aspect of horticulture has greater promise than floriculture and ornamental horticulture.⁹

Most of the recent off-farm agricultural occupational studies including the ornamental horticulture occupational family have inquired into the general areas of competencies such as agriculture, business, and mechanics for the various job titles.

Clark, Kennedy, and others have indicated that further study is needed of off-farm agricultural occupations to determine more specifically the requirements of employees in

⁸Homer V. Judge, Employment Opportunities and Needed Competencies in Off-Farm Agricultural Occupations in Massachusetts (research report; Boston, Massachusetts: Division of Vocational Education, Massachusetts Department of Education, 1965), p. 10.

⁹H. B. Tukey, Sr., The Role of Horticulture in Science and Society, Proceedings XVith, Volume II (Brussels, Belgium: International Horticultural Congress, 1962), pp. 3-14.

these areas.¹⁰ Many horticultural workers, suggests Phipps, need post-high school education.¹¹ Dillon indicates that detailed information is needed regarding competencies for floriculture employees and other horticultural workers before educational programs may be planned for present and prospective workers in these businesses.¹² Managers of off-farm agricultural occupations are interested in employing competent workers. According to Judge over 60 percent of all employers of off-farm agricultural businesses in Massachusetts interviewed indicated that they would be willing to hire high school students as trainees.¹³ Therefore, previous studies indicate that more qualitative types of studies of competencies required of workers in off-farm agricultural occupations are needed.

Two occupational titles listed under ornamental horticulture identified by one state survey in which new employees

¹⁰Raymond M. Clark, "Need for Training for Non-Farm Agricultural Business" (East Lansing, Michigan: Department of Teacher Education, Michigan State University, 1959); William Henry Kennedy, "A Clarification of Relationships Between Farming and Certain Other Agricultural Occupations with Implications for Guidance and Curriculum Development" (unpublished Ed. D. Dissertation, Michigan State University, East Lansing, 1958).

¹¹Lloyd J. Phipps, "Technical Education in and for Rural Areas" (Urbana, Illinois: Agricultural Education Division, Vocational and Technical Education Department, College of Education, University of Illinois, 1964).

¹²Roy D. Dillon, Comparison of Certain Abilities Needed by Workers in Licensed Nurseries and Licensed Ornamental Horticulture Businesses (report of a study; Morehead, Kentucky: Morehead State College, 1965).

¹³Judge, op. cit., p. 9.

would be needed in the next five years are those of the greenhouse grower and the greenhouse worker.¹⁴ The Dictionary of Occupational Titles does not list the greenhouse grower as a job title.¹⁵ However, managers of the greenhouse industry indicated that the greenhouse grower is a common job title used throughout the industry.

Annual summaries of studies in agricultural education have not listed any specific studies of the greenhouse grower, his training, or his employment.¹⁶ Therefore, a study of competencies desired and employment information for the greenhouse grower is needed at this time.

Determining the products produced by greenhouses were also included as one of the purposes of the author's study. According to Cook, one of the basic principles of educational method includes studying the enterprises of a community before planning and developing suitable instruction for that community.¹⁷ Phipps stated that some of these enterprises will be considered major and should be placed at the top of

¹⁴Hoover, McClay, and Stevens, op. cit., p. 7.

¹⁵Dictionary of Occupational Titles, United States Employment Service, Volume I - Definitions, Superintendent of Documents (Washington, D. C.: United States Government Printing Office, 1965).

¹⁶United States Office of Education, Summaries of Studies in Agricultural Education, Vocational Education Bulletin 180, Washington, D. C., 1963).

¹⁷Glen C. Cook, Handbook on Teaching Vocational Agriculture (Danville, Illinois: The Interstate, 1947), p. 116.

the list of enterprises to be included in instructional programs.¹⁸ Thompson's study of landscape employees indicated that managers desired that their skilled workers and sales people know the identification of plants.¹⁹ Because of the limited time in teaching a course in horticulture, it is necessary that teachers know the major plants produced in greenhouses.

Another purpose of this study was to learn the relative importance of plant species grown in the greenhouse and competencies desired in greenhouse growers in order to prepare trainees efficiently. Instructors of horticulture can prepare adequate instructional materials for trainees if they know the relative importance of their materials.

Other methods of determining the relative importance of crops produced in greenhouses might include: (1) the use of a jury consisting of professional workers, (2) survey of the seed, bulb, and plant supply businesses, and (3) United States census reports of agriculture. It was felt that greenhouse managers would provide the latest information concerning relative importance of plants produced because managers keep records of the crops they market and are well aware of the

¹⁸Lloyd J. Phipps, Handbook on Agricultural Education in Public Schools (Danville, Illinois: The Interstate, 1965), p. 158.

¹⁹O. E. Thompson, Training Requirements of Workers in the Production and Distribution of Nursery Plants (report of a study; Sacramento, California: California State Department of Education, 1959).

major and minor plants produced. A number of recent studies have been made in which managers of off-farm agricultural businesses were interviewed to obtain training requirements and employment information. According to The National Center for Advanced Study and Research in Agricultural Education:

Reports of failure to effect successful interviews with the manager or personnel director in each business were nearly nonexistent.^{19a}

The last purpose of this study was to determine the types and nature of employment information about greenhouse workers. This information was collected in order to aid in selection, guidance, and placement of prospective or presently employed greenhouse growers in order that their employment be satisfactory and reach maximum potential.

^{19a}The National Center for Advanced Study and Research in Agricultural Education, op. cit., p. 99.

Purposes of the Study

The purposes of this study are to determine the following:

- (1) The species of ornamental flowering plants produced in commercial greenhouses and their relative importance according to numbers produced.
- (2) The relative importance and degree of attainment of competencies in the greenhouse grower desired by employers.
- (3) The types and nature of employment information about greenhouse workers.

Scope and Limitation of the Study

The study includes information offered by managers of greenhouses covering one acre or more in the Chicago, Cleveland, and Detroit areas. It was limited to the production of flowers grown in pots, as cut flowers, and in flats in these greenhouses. Managers from these population areas were selected as the most informed about the occupations of the industry at the recommendations of the floriculture staff, Michigan State University.

Some Basic Assumptions

The following assumptions are basic to the study:

- (1) By studying agricultural industries, efficient training programs can be initiated for better training of more productive employees.

- (2) Managers of large greenhouse operations (covering one acre of glass or more) are capable and willing to provide accurate training information about their growers and other employees.

Definition of Terms

The terms needed to be defined for this study are as follows:

1. Agricultural Occupations - Occupations in which employees use competencies in one or more of the primary areas of plant science, animal science, agricultural management, and agricultural mechanization.

2. Levels of Employment - Classification of employees on the basis of training and job requirements into the following four categories.

- a. Professions - Occupations which require at least four years of college, experience, and a high degree of mental activity.

- b. Technical Occupations - Occupations which require at least two years of post high school training, experience, ability to perform all operations of the skilled worker, and the carrying out of assignments made by professional direction.

- c. Skilled Occupations - Occupations that require at least a high school education of the worker as he performs all operations necessary to produce a finished product, including knowledge of processes, considerable independent

judgment, responsibility for valuable products and equipment, and practical experience qualified by on-the-job training.

d. Semi-Skilled Occupations - Occupations with no educational requirements and important decisions being made by others as the worker performs part of the operations necessary to produce a finished product.

3. Greenhouse Grower - The occupational title given to a key person in a greenhouse operation, responsible for the efficient production of a quality product and able to perform all operations necessary to produce this product. At various points in the dissertation "job title" is used interchangeably with this term.

Overview

This study is being made to determine competencies desired and employment information of the greenhouse growers. In Chapter II the studies closely related to greenhouse employment and training information are reviewed. Chapter III includes the description of method and procedure used to secure data relevant to one of the job titles of an off-farm occupation. Results of the study are provided in Chapter IV. The data are analyzed by showing percentages of the responses to each question in the survey instrument.

Chapter II, which follows, presents a review of literature that points out the need, direction, and continuity for the present study.

CHAPTER II

REVIEW OF LITERATURE

A review of studies has been made of off-farm agricultural occupations as they relate to the family of ornamental horticulture occupations. The first part reviews studies of employment information and training desired for workers in ornamental horticulture; the second part reviews studies of employment information and training desired for the floriculture industry; and the last section reviews studies of employment information and training desired for workers in the greenhouse industry.

As of January 1964 studies of off-farm agricultural occupations were planned, in process, or completed in 40 states according to The National Center for Advanced Study and Research in Agricultural Education. At least eight of these have included ornamental horticulture as one agricultural occupational family.¹ They also reported that an agricultural occupational family is a group of similar agricultural occupations other than farming classified for ease of study and discussion.²

¹The National Center for Advanced Study and Research in Agricultural Education, op. cit., p. 99.

²Ibid., p. 61.

In a study of 17 Pennsylvania counties Hoover, McClay, Stevens, and others found more businesses and services (604) under the ornamental horticulture occupational family than any of seven other occupational families, including (1) farm machinery sales and services, (2) farm supplies and equipment, (3) livestock and poultry industries, (4) crops, forestry, and soil conservation, (5) wildlife and recreation, (6) farm service and (7) agricultural service. More businesses were started in ornamental horticulture during the preceding five years than in any other occupational family, and the second largest number of workers (5,795) were employed. Operators of ornamental horticulture businesses anticipated hiring during the next five years more employees (2,180) needing agricultural competencies than any of the other seven occupational families. Table 5-5 indicates occupational opportunities in all levels of employment with semi-skilled requiring the largest number, followed by skilled, managerial, supervisory, sales, clerical, technical, and professional. The Pennsylvania report, only preliminary, was limited to 17 counties of the state, but it did indicate a need for providing training for ornamental horticulture occupations. It is incomplete because specific competencies required of workers and significant employment information such as salaries and entry age for horticulture workers were omitted.³

³Norman K. Hoover, D. R. McClay, and G. Z. Stevens, op. cit.

Table 5-5.* Estimated Number of Persons Who Need Agricultural Competencies, Current, Five Years Hence, and To Be Hired During Next Five Years, in the Ornamental Horticulture Occupational Family, by Level of Employment and Occupational Title Summary of 17 Counties, 1964

Level of Employment Occupational Titles	Current		Expected 5 Years from Now		Employees to be Hired During Next 5 Years	
	Full- time	Part- time	Full- time	Part- time	Full- time	Part- time
Professional Occupations	8	0	12	0	4	0
Managerial Occupations	324	56	344	36	56	12
Supervisory Occupations	132	20	140	20	20	16
Technical Occupations	16	4	24	4	4	0
Sales Occupations	84	32	84	28	16	12
Clerical Occupations	28	12	28	12	0	0
Skilled Occupations	560	292	692	396	212	276
Semi-Skilled Occupations	576	1200	664	1300	276	1276
Totals	1728	1616	1988	1796	588	1592

*Source: Norman K. Hoover, D. R. McClay, and G. Z. Stevens, Technical Education Needs of Persons Engaged in Agricultural Occupations (report of a study; University Park, Pennsylvania: Department of Agricultural Education, The Pennsylvania State University, 1965).

Judge found more businesses (815) under the horticultural service occupational family than under any of the other 12 occupational families studied in Massachusetts.

The other 12 occupational families were as follows:

(1) miscellaneous agriculture, (2) agricultural services, (3) meat products, (4) dairy products, (5) logging and saw-mills, (6) public warehousing, (7) hardware and farm equipment, (8) meat and fish markets, (9) fruit and vegetable markets, (10) miscellaneous food stores, (11) farm and garden supply, and (12) sports. The horticultural services also had the largest estimated number of employees; 4,630 full-time and 2,320 part-time. This estimate of the number of workers was made on the basis of a ten percent random sample.⁴ Judge indicated the number of employees by occupational level for horticultural services as follows:

<u>Occupational Level</u>	<u>Number of Employees</u> ⁵
Professional	10
Technical	91
Proprietors and Managers	347
Sales	350
Clerical	130
Skilled	1605
Semi-skilled	4526
Unskilled	926

Agricultural competencies were required by many of the employees, and because present training programs were

⁴Homer V. Judge, Employment Opportunities and Needed Competencies in Off-Farm Agricultural Occupations in Massachusetts (research report; Boston, Massachusetts: Division of Vocational Education, Massachusetts Department of Education, 1965).

⁵Ibid., p. 28.

inadequate, Judge recommended programs be developed to train workers for ornamental horticulture. Even though Judge recorded some job titles in which there were 100 or more workers who required agricultural competencies, he omitted total numbers of workers with specific job titles needed in the next five years. Employment information such as educational requirements and salaries were listed for all off-farm agricultural businesses or omitted from the study. Therefore, it is difficult to determine specific requirements and needs for an occupational family.

A study by Bailey in West Virginia of non-farm agricultural employment placed ornamental horticulture fourth among other categories. In Bailey's study ornamental horticulture represented 11.2 percent of the employing agencies and 9.7 percent of the agricultural employees. The other categories selected were: (1) agricultural service, (2) forestry, (3) farm machinery sales and service, (4) farm service, (5) farm supplies and equipment, (6) livestock and poultry industries, and (7) wildlife and recreation. Bailey found that the second greatest opportunity for employment in the next five years existed in the ornamental horticulture occupational family. At present the significant number of employing agencies included 61 greenhouses with 404 employees and 60 nurseries with 381 employees. Other businesses included greenhouse-nursery-garden centers, tree services, landscape services, county governments, garden centers, flower production greenhouses, state institutions, and city governments.

According to Bailey, vocational education programs might be needed in the following occupations and occupational groups: turf manager, greenhouse technician, landscape aide and technician, arborist, and nursery technician. Bailey's study is incomplete in that it does not include employment information for specific agricultural occupational families.⁶

Barwick's study of off-farm agricultural occupations in Delaware showed that ornamental horticulture, with a total of 176 businesses and services, ranked sixth among the eight occupational families. The other occupational families were: (1) farm machinery sales, (2) farm supplies and equipment, (3) livestock and poultry industries, (4) crops, forestry, and soil conservation, (5) wildlife and recreation, (6) agriculture and farm service, and (7) food marketing and distribution. The occupational families with the greatest percentage of employees needing agricultural competencies were farm machinery sales and service and ornamental horticulture, 64.5 percent and 54.4 percent respectively. Three occupational families in which 30 percent or more of the businesses have been established in the last ten years, were farm machinery sales and service,

⁶Joseph K. Bailey, Non-Farm Agricultural Employment in West Virginia with Implications for Vocational Education (report of a study; Charleston, West Virginia: Division of Vocational, Technical and Adult Education, 1965).

ornamental horticulture, and food marketing and distribution. Occupational families needing the largest number of employees in the next five years were food marketing and distribution and ornamental horticulture. Barwick's study, only preliminary in nature, was primarily an enumeration of occupations by title and/or occupational family.⁷

Non-farm agriculture occupations were studied in seven metropolitan areas of Louisiana by Mondart and Curtis. They found 111 businesses and agencies in ornamental horticulture, ranking it sixth among the eight occupational families. The other occupational families included: (1) farm machinery sales and service, (2) farm supplies and equipment, (3) livestock and poultry, (4) crops, forestry, and soil conservation, (5) wildlife and recreation, (6) farm service, and (7) agricultural service. According to the authors:

The number of firms engaged in ornamental horticulture was surprisingly large for a state so recently rural. This is indicative of both urban development and increasing occupational opportunities provided by this area of service.

The investigators presented the following employment statistics when they compared ornamental horticulture with seven other occupational families:

1. Ornamental horticulture as eighth in the number of employees (872).

⁷Ralph P. Barwick, Identification of Off-Farm Agricultural Occupations (report of a study; Newark, Delaware: Department of Agricultural Education, School of Agriculture, University of Delaware, 1965).

2. Ornamental horticulture was sixth according to the number of employees (845) using knowledge and skill in agricultural subjects.

3. Ornamental horticulture was sixth in the number of job titles (102).

4. Ornamental horticulture job titles were expected to increase to 125 in the next five years.

5. The occupational level for ornamental horticulture had the following number of employees: unskilled (362), managerial (151), skilled (79), sales (72), and semi-skilled (35).

6. The average entry age for all levels of employment in ornamental horticulture was a minimum of 25 and maximum of 51.

7. Median monthly salary of workers in ornamental horticulture, by level of employment, ranged from \$213 to \$677.

The study also revealed that most managers (312) preferred that persons entering ornamental horticulture have at least a high school education; 9 would like post high school education; 97 wanted some college; and 60 desired college completion. Twenty-one percent of the managers preferred a farm background for ornamental horticulture employees while 77 percent had no preference in regards to residential background.⁸

⁸C. L. Mondart, Sr. and C. M. Curtis, Occupational Opportunities and Training Needs for Non-Farm Agricultural

Yetman's study of employers in ornamental horticulture in Massachusetts indicated that 90 percent would hire one or two students of vocational agriculture. A large majority desired part-time student help. Employers were hiring students 17 years of age and older. Physical strength was considered a need by a large number of firms. Students with a farm background were preferred.⁹

Griffin studied agricultural occupations other than farming in Saline County, Missouri. Of the eight types of firms needing agriculturally oriented personnel, plant products and services, with a total of 21.43 percent, had the largest percentage of employees. These same firms indicated a need for additional employees, according to Griffin. Further investigations and study need to be made of the horticulture industry, among others, to determine the nature of these occupations.¹⁰

A Cornell study of training needs for occupations "related to farming" located in five areas surrounding the city of Syracuse, brought out that increasing emphasis should

Jobs in the Metropolitan Areas of Louisiana (report of a study: Baton Rouge, Louisiana: Department of Vocational Agricultural Education, Louisiana State University, 1965).

⁹George Yetman, "What Employers in Ornamental Horticulture Want," Agricultural Education Magazine, Volume 37, Number 8 (March, 1965), pp. 224-225.

¹⁰Warren L. Griffin, "The Nature of Agricultural Occupations, Other than Farming, in Saline County, Missouri" (summary report of an Ed. D. dissertation, University of Missouri, Columbia, Missouri, 1964).

first be placed on providing training in the areas of farm machinery and equipment, and secondly in the areas of trucking, landscape gardening, and merchandising of farm supplies.¹¹

Two recent studies in Michigan also indicated employment opportunities in the areas of ornamental horticulture. In a study of student involvement in off-farm agriculture experience and on-farm placement programs in Michigan departments of vocational agriculture, Haslick found that landscape horticulture offered the greatest opportunity for student employment. The other occupational families in order of importance were: (1) farm services, (2) crops marketing and processing, (3) agricultural machinery sales and service, (4) forestry and soil conservation, (5) livestock marketing and processing, (6) agriculture supplies and equipment, (7) agricultural services, (8) wildlife and conservation, (9) other livestock industries, (10) poultry industry.¹²

Charles Langdon studied the agricultural occupations of firms, organizations, and agencies in Michigan. The findings

¹¹Frederick K. T. Tom, Charles W. Hill, and Kingsley L. Greene, Employment Opportunities in Certain Occupations Related to Farming in the Syracuse Economic Area, New York (report of a study; Ithaca, New York: Agricultural Education Division, Rural Education Department, Cornell University, 1961).

¹²Clifford G. Haslick, "A Study of Student Involvement in Off-Farm Agricultural Experience and On-Farm Placement Programs in Michigan Department of Vocational Agriculture" (unpublished report for summer conference of Michigan Association of Teachers of Vocational Agriculture, Department of Public Instruction, Lansing, Michigan, 1965).

of the survey of nurseries and landscape services of Michigan revealed a 38.9 percent increase in the number of employees expected in the next five years. Of the 19 job titles listed by the nurserymen, semi-skilled labor had the largest number of employees, with garden center sales the next largest.¹³

In a study of 286 nurserymen in California Thompson found the nursery business in California growing rapidly because of increased home building and outdoor living, building of super highways, and industrial landscaping. About 40 percent of the nurseries had been operating for ten years or less and about one-third of the companies planned to add new employees. Over 60 percent of the nursery businesses employed one to six workers; 39 hired more than 15 employees, and the largest had 253 employees. Growers included about one-third of the workers, an average of five per company, with sales persons next with an average of two per nursery. A high percentage of the managers (27.6 percent) had a college education, with 13.3 percent having two years of college or less.

Salaries for skilled workers ranged between \$225 and \$524 per month, with sales people and supervisors highest.

¹³Charles L. Langdon, "A Survey of Agricultural Occupations in Michigan" (report by The Michigan Agricultural Conference and the Vocational Agriculture Service of the Michigan Department of Public Instruction, Lansing, Michigan, 1965).

About one-third of the managers earned over \$600 per month.¹⁴

Salaries and conditions of work varied, but compare favorably with those in other fields. Self-employed growers started at about \$4,500 and in time earn \$20,000 or more. Busy seasons in spring, summer, and fall include long days and work on week-ends. Better working conditions and salary are directly proportional to the employee's education and experience.¹⁵

Dillon recorded the following trends for ornamental horticulture:

1. The number of nurseries licensed to grow and wholesales nursery plants in Illinois has increased 31.7 percent during the past five years.
2. The number of dealers licensed to retail nursery stock in Illinois has increased 25 percent during the past five years.
3. There has been an increase in the number of workers in horticulture firms, and increasing employment opportunities for horticultural workers in park districts, golf courses, in cemeteries, on state highway department staffs, and on institutional staffs.
4. Present and projected manpower utilization data show that people in the 16-24 age group who have appropriate marketable skills in the ornamental horticultural area will be in demand.¹⁶

¹⁴O. E. Thompson, op. cit., pp. 16-17.

¹⁵"Landscape Horticulture" (a pamphlet by the Department of Horticulture, Michigan State University, East Lansing, Michigan, 1965).

¹⁶Roy D. Dillon, Comparison of Certain Abilities Needed by Workers in Licensed Nurseries and Licensed Ornamental Horticulture Businesses (report of a study; Morehead, Kentucky: Morehead State College, 1965).

In a study of "Technicians in Agriculture" by Halterman the following position and job titles were listed for the landscape and nursery technician.

- a. Landscape design technician
- b. Landscape foreman
- c. Park leadman
- d. Landscape foreman
- e. Nurseryman
- f. Plants specialists

Members of this group made the following observations, as gathered from the results of the interview or survey. This study included personal interviews of wholesale and retail nurserymen; landscape contractors; landscape architects; landscape designers; state, county, and city recreation departments, plant propagators and breeders; officers of state associations of nurserymen and landscape contractors, and educators in landscape horticulture. The result of this study indicated that there was a need for trained technicians for landscaping in the areas of drafting, sales, and materials.¹⁷

Cushman, Christensen, and Bice listed the following job titles for the landscape horticulture family of agricultural occupations: salesman, sales clerk, nurseryman, flower raiser, and landscape gardener.¹⁸

¹⁷Jerry J. Halterman, Technicians in Agriculture (research project; Sacramento, California: California State Department, n.d.).

¹⁸Harold R. Cushman, Virgil E. Christensen, and Garry R. Bice, A Study of Off-Farm Agricultural Occupations in New York State (study; Ithaca, New York: Cornell University, 1965).

In a study of non-farm agricultural occupations in Kansas, Agan found that one cluster of occupations included the nursery aides.¹⁹

Training Desired for Ornamental Horticulture

In Langdon's study of competency areas for the landscape industry, managers rated "essential" to "highly desirable" at one or more levels of employment the following: salesmanship, customer relations, office procedures, advertising, and business principles. Agricultural competencies under the headings of crops, horticulture, and floriculture received the highest rating for farm supplies and equipment workers at the semi-skilled level.²⁰

Judge investigated competencies needed by agricultural workers in Massachusetts and recommended training programs be developed to train workers specifically for ornamental horticulture, agricultural mechanics, food processing and distribution. The number of workers who needed to possess agricultural competencies, by job level and job title for horticultural services, is recorded in Table X.²¹ Job titles in which 100 or more horticultural workers needed agricultural

¹⁹R. J. Agan, "Kansas Studies Agriculture Non-Farm Occupations," Agricultural Education Magazine, Volume 37, Number 1 (July, 1964), pp. 15-16.

²⁰Langdon, op. cit., p. 6.

²¹Judge, op. cit., p. 21.

Table X.* Index of Agricultural Competencies Required by Workers in Agricultural Businesses in Massachusetts

Job Title	Number of Workers	Number Needing Agric.	Competency Index				Average
			Plant Science	Animal Science	Agric. Business Management	Agric. Mechanics	
<u>Professional</u>	10		(Mixed with other occupational families)				
<u>Technical Propagator</u>	91	9	(Mixed with other occupational families)				25
	9		100	0	0	0	
<u>Proprietors & Managers</u>	347		(Mixed with other occupational families)				
<u>Sales Personnel</u>	350		(Mixed with other occupational families)				
<u>Clerical</u>	130		(Mixed with other occupational families)				
<u>Skilled Workers</u>	1605		(Mixed with other occupational families)				
<u>Florist</u>	72	72	88	0	0	0	22
<u>Arborist</u>	20	20	50	50	50	30	45
<u>Tree Surgeon</u>	120	40	19	0	18	15	13
<u>Landscape & Nurseryman</u>	405	405	91	0	35	38	41
<u>Semi-skilled Workers</u>	4526		(Mixed with other occupational families)				
<u>Greenskeeper</u>	144	117	45	2	2	25	19
<u>Groundsman</u>	54	38	36	4	0	13	13
<u>Maintenance Man</u>	540	339	15	7	2	10	12
<u>Tree climber</u>	198	198	17	0	3	9	7
<u>Unskilled</u>	926		(Mixed in with other occupational families)				

*Source: Homer V. Judge, Employment Opportunities and Needed Competencies in Off-Farm Agricultural Occupations in Massachusetts (research report; Boston, Massachusetts: Division of Vocational Education, Massachusetts Department of Education, 1965), p. 21.

competencies included landscape and nurseryman, greenskeeper, maintenance man, and tree climber. In addition to agricultural competencies, Judge indicated that training programs should include the study of salesmanship, business principles, and scientific principles.²²

Barwick's study of Delaware indicated that the following horticultural occupational sub-families needed workers having agricultural competencies.

Table 3.* Number of Agricultural Businesses and Services, Total Estimated Persons Employed, Estimated Number of Employees Needing Agricultural Competencies, and Percent of Employees Needing Agricultural Competencies, by Occupation Sub-Family (Delaware, 1964)

Occupational Sub-Family	Number of Businesses and Services	All Persons Employed	Number Employees Needing Agricultural Competencies	Percent Employees Needing Agricultural Competencies
1. Horticultural Services	43	590	557	94.4
2. Nurseries	30	882	426	48.3
3. Farm and Garden Supplies	53	334	204	61.1
4. Florists	34	124	73	58.9
5. Golf and Country Clubs	14	279	30	10.8

*Source: Ralph P. Barwick, Identification of Off-Farm Agricultural Occupations (report of a study; Newark, Delaware: Department of Agricultural Education, School of Agriculture, University of Delaware, 1965), pp. 11-12.

In the Louisiana study of non-farm agricultural jobs, Mondart and Curtis surveyed major areas of competencies for

²²Ibid., p. 36.

each occupational family. Agricultural areas in ornamental horticulture with which employees needed to be familiar indicated in Table XII-5.

Table XII-5.* Agricultural Areas in Ornamental Horticulture with Which Employees Must Be Familiar

Level of Employment	No.	Agricultural Subject Areas (Employee Frequency)			
		Animal Science	Plant Science	Agri. Bus. Mangt. & Marketing	Agri. Mech. & Automation
Professional	19	2	13	10	5
Technical	1	1	1	1	1
Managerial	151	3	137	111	66
Supervisory	18	0	18	9	5
Sales	72	3	72	42	11
Office	11	0	8	7	0
Skilled	79	0	69	21	11
Semi-skilled	35	2	30	0	8
Unskilled	362	3	309	11	164

Total	748				

*Source: C. L. Mondart, Sr. and C. M. Curtis, Occupational Opportunities and Training Needs for Non-Farm Agricultural Jobs in the Metropolitan Areas of Louisiana (report of a study: Baton Rouge, Louisiana: Department of Vocational Agricultural Education, Louisiana State University, 1965), pp. 42-45.

Certain trends were recognized in ornamental horticulture, as well as in other occupational families. They were as follows:

- (1) generally, a rather broad coverage of all subject matter areas was required of all workers, 2) the work performed within a particular family tended to prescribe the subject matter area or areas involved, 3) workers at the management and supervisory levels were widely knowledgeable, and 4) employees at the professional, technical, and skilled levels were

intensively trained in a particular area or one of the divisions of subject matter making up an area.

Training in Agricultural Business and Management was emphasized for workers at all levels, except those in the skilled and unskilled levels.²³

According to Thompson's study in California, the amount of education needed by employees in the nursery business was increasing. He found that the basic understandings necessary for production and distribution of ornamental plants require that the employee have training beyond high school.²⁴ In Thompson's study about 55 percent of the employers were not satisfied with the education of their employees. The majority of these nurserymen reported that a high school education was important for all levels of employment, except for the laborer.

The nursery operators interviewed in Thompson's study stated the need for business training. New employees learned the names of plant materials and common nursery chores, but some concepts regarding the operation of the business were harder to gain on the job. Laborers had little to do with the commercial aspect of the industry, but salesmanship and merchandising were important for the skilled worker and the salesman.

Knowledge of plant identification and use was not important to the laborer, but was important to the skilled worker and sales person, and was somewhat important to the

²³Mondart and Curtis, op. cit., pp. 42-43.

²⁴Thompson, op. cit., p. 18.

supervisor. Knowledge of propagation was not as necessary, for only 31 percent of the nurseries grew the materials they merchandised. For all levels of employment except the laborer, preparing plants for display and sale was important. Skill in forcing plants to bloom for holidays was not reported as useful to many employees except supervisors, although it was very important in the industry. The preparation of the soil and the watering of plants was reported as important to the skilled worker, sales person, and supervisor.²⁵ About one-third to one-half of the skilled workers, the sales people, and the supervisors were reported to need the ability to manage a greenhouse according to Thompson. Although nursery workers were called upon for recommendations of what plants to use in certain locations under various conditions, they were seldom involved in preparing a complete landscape plan. Thompson also indicated that skilled employees and sales people had the greatest need for mechanical skills involving machines such as sprayers and roto-tillers.²⁶

The agricultural competencies reported to be needed most for landscape horticulture according to Cushman, Christensen, and Bice are as follows:

1. Prepare seed beds.
2. Plant seeds, bulbs, trees or shrubs.
3. Perform proper tillage practices.
4. Operate, maintain and adjust gasoline engines.

²⁵Thompson, op. cit., pp. 20-22.

²⁶Ibid., pp. 18-24.

5. Control insects, diseases and weeds.
6. Operate, maintain and adjust garden machines and equipment.
7. Maintain trees and shrubs.
8. Maintain lawns.
9. Manage nursery, planting, transplanting, pruning, shaping and trimming.
10. Correct physical defects of sites being landscaped.
11. Knowledge of paint and painting.
12. Make lime or fertilizer recommendations.
13. Choose proper planting sites.
14. Operate, maintain and adjust tractors, trucks, agricultural equipment and agricultural machinery.
15. Locate and design drives, walks and fences.
16. Provide seasonal protection to ornamental plants.
17. Decide what to grow.
18. Select varieties.
19. Select seed, cuttings, bulbs or stock plants.
20. Mix soil composites.
21. Knowledge of characteristics and appropriate use of landscaping materials.
22. Select, buy, adjust or maintain lawn and garden sprinkler and irrigation equipment.²⁷

Dillon's study of abilities needed by workers in licensed nurseries and licensed ornamental horticulture businesses indicated that the training for general directors, salesmen, supervisors, and field workers should include (1) a basic course for all employees who plan to enter both licensed nurseries and licensed ornamental horticultural businesses and (2) specialized courses for one or more job titles but not needed by all workers in either licensed nurseries or licensed ornamental horticulture businesses.²⁸

According to Phipps, many horticultural workers need post-high school education in horticultural technology. The factor analysis of the data in the Phipp's study revealed that

²⁷Cushman, Christensen, and Bice, op. cit., pp. 33-34.

²⁸Dillon, op. cit., p. 25.

general directors, salesmen, supervisors, and field workers needed ability in the same four general areas of agricultural knowledge: (1) horticulture, (2) agricultural chemicals, (3) floriculture, and (4) soils. Phipps indicated that detailed information is needed in these four areas in order to train workers in ornamental horticulture.²⁹

Donker investigated the nature of the work actually done by landscape and nursery technicians on the job as viewed by the technicians themselves and observed and evaluated by the investigator. He summarized their job requirements as:

Individuals qualifying for this occupation require first of all an understanding of plant materials and adaptation characteristics for the area in which these plants are grown. Secondly, they require a sound understanding of moisture and fertility requirement as well as disease and pest control problems associated with these plant materials. Finally they need some training in the landscape arts. All of this is required because frequent, sound advice is quite evident as one of the prime requisites for success in the field. Further recommendations include basic sales and business training. Some shop skills can be added as very desirable.³⁰

Employment Information for Floriculture

Floriculture involves the growing, distributing, and selling of potted plants, cut flowers, and plants in flats,

²⁹Lloyd J. Phipps, "Technical Education in and for Rural Areas" (Urbana, Illinois: Agricultural Education Division, Vocational and Technical Education Department, College of Education, University of Illinois, 1964).

³⁰Luverne Donker, Agricultural Technicians (report of a study; Modesto, California: Agricultural Department, Modesto Junior College, 1963).

as well as the selling of flower seeds and bulbs. It includes the manufacture and sale of florist supplies and the writing of articles and books for florists and gardeners.³¹

Floriculture sales and services in the United States are valued at one billion dollars annually. There are about 11,500 firms which produce floriculture plants in the United States and 60,000 retail firms that sell floral products. Size of firms and sales of products is expected to increase.³²

The annual value of florist sales and services in Michigan was about \$60,000,000 as of January 1965. There were 150 wholesale growers and 450 retail growers who produced \$17,500,000 worth of sales in 7,000,000 sq. ft. of glass houses; 400 growers who produced \$650,000 worth of flowers outdoors on 700 acres; and there were 1,550 retail florists.³³

Floriculture offers opportunities for careers for those who are interested in growing plants, floral design, greenhouse or store management, marketing, writing, teaching, research, extension, and many related fields. Employment can be found in the following:

- Retail flower shops
- Garden centers
- Greenhouse production

³¹Department of Horticulture, "Floriculture" (a pamphlet; East Lansing, Michigan: Michigan State University, 1965).

³²Ibid., p. 1.

³³Department of Horticulture (a pamphlet describing the Horticulture Department, East Lansing, Michigan: Michigan State University, 1965).

Outdoor production
 Propagation specialists
 Seed producers
 Florists brokerage firms
 Florist wholesale distributors
 Trade organizations
 Agricultural chemical companies
 Universities
 Agricultural manufacturing firms
 Publishers (newspapers, magazines, books)
 Public arboretums, gardens, and parks
 U. S. Department of Agriculture
 Cooperative Extension Service
 Technical schools
 High schools³⁴

Salary and conditions of work are comparable to other areas of agriculture. Starting salaries range from \$3,500 to \$10,000 depending on area, type of employment, productivity of the individual, and education. There is no "ceiling" for most positions in floriculture.³⁵

The estimated number of persons who needed agricultural competencies for the floriculture industry in 17 counties in Pennsylvania are recorded on the following page.

According to Pennsylvania investigators 474 full-time and 228 part-time workers were employed in floriculture. The expected number of employees five years from the time the survey was made include 538 full-time and 266 part-time employees. In the ensuing five years 144 full-time and 296 part-time employees were expected to be hired.³⁶

³⁴Department of Horticulture, "Floriculture," op. cit.

³⁵Ibid.

³⁶Hoover, op. cit., pp. 20-22.

Estimated Number of Persons Who Need Agricultural Competencies, Currently, and to be Hired During the Next Five Years, in Floriculture by Level of Employment and Occupational Title*

<u>Level of Employment</u> <u>Occupational Titles</u>	<u>Current</u>		<u>Employees to be</u> <u>Hired During</u> <u>Next Five Years</u>	
	<u>Full-</u> <u>time</u>	<u>Part-</u> <u>time</u>	<u>Full-</u> <u>time</u>	<u>Part-</u> <u>time</u>
<u>Managerial Occupations</u>				
Greenhouse Manager	76	24	16	0
Floral Shop Manager	44	0	0	0
Greenhouse Production Supervisor	20	0	0	0
Wholesale Florist Sales Manager	4	0	0	0
<u>Technical Occupations</u>				
Greenhouse Pathologist	4	0	0	0
<u>Sales Occupations</u>				
Greenhouse Salesman	32	0	0	0
Wholesale Florist Salesman	16	24	16	0
<u>Clerical Occupations</u>				
Greenhouse Bookkeeper	20	4	0	0
Floral Shop	4	4	0	0
<u>Skilled Occupations</u>				
Florist	16	0	8	0
Grower (Greenhouse)	40	28	60	40
Floral Designer	32	20	8	8
<u>Semi-Skilled Occupations</u>				
Greenhouse Worker	124	108	32	236
Greenhouse Grower's Assistant	4	8	0	0
Greenhouse Truck Driver	4	4	0	0

*Source: Norman K. Hoover, D. R. McClay, and G. Z. Stevens, Technical Education Needs of Persons Engaged in Agricultural Occupations (report of a study; University Park, Pennsylvania: Department of Agricultural Education, The Pennsylvania State University, 1965).

In his study of agricultural competencies needed by agricultural workers in Massachusetts, Judge found 60 skilled florists employed full-time that were grouped together under laborers and not specifically classified.³⁷

Barwick's investigation of off-farm agricultural occupations revealed 33 full-time floral shop managers, and ten full-time and 40 part-time floral designers. According to Barwick; floral designers needed in the next five years in Delaware would be 10 full-time and 50 part-time.³⁸

In the Louisiana study of non-farm agricultural occupations the authors listed the number of employees under each job title by occupational level for the ornamental horticulture occupational families. The job titles for floriculture are recorded in Table D on the following page.

Training for Floriculture

Agricultural competencies needed by the skilled florist according to Judge were in the area of plant science. No other competency areas were checked.³⁹

In Barwick's study of off-farm agricultural occupations 34 businesses employed 124 florists. Over 58 percent of these florists needed agricultural competencies.⁴⁰

³⁷Judge, op. cit., p. 23.

³⁸Barwick, op. cit., p. 12.

³⁹Judge, op. cit., p. 23.

⁴⁰Barwick, op. cit., p. 12.

Table D.*

Job Title	Number of Workers
<u>Technical</u>	
Florist	1
<u>Manager</u>	
Small house plants manager	1
<u>Supervisor</u>	
Greenhouse foreman	1
<u>Skilled</u>	
Floral designer	37
Assistant floral designer	4
<u>Semi-Skilled</u>	
Grower	9
Potter	3
Planter	1
Grower	2
<u>Unskilled</u>	
Greenhouse attendant	1
Potter	1

* Source: C. L. Mondart, Sr. and C. M. Curtis, Occupational Opportunities and Training Needs for Non-Farm Agricultural Jobs in the Metropolitan Areas of Louisiana (report of a study: Baton Rouge, Louisiana: Department of Vocational Agricultural Education, Louisiana State University, 1965), p. 102.

Employment Information for Greenhouse Workers

According to Hoover, McClay, and Stevens in their Pennsylvania study of 17 counties, a total of 324 greenhouse employees were employed full-time and 196 part-time. The number was expected to increase to 378 full-time and 224 part-time employees in the next five years.⁴¹

⁴¹Hoover, McClay, and Stevens, op. cit., pp. 20-22.

The number of employees and job titles for greenhouses according to the study of non-farm agricultural jobs in the metropolitan areas of Louisiana is listed as follows:⁴²

<u>Managerial</u>	<u>Number of Employees</u>
Small house plant manager	1
<u>Supervisory</u>	
Greenhouse foreman	1
<u>Skilled</u>	
Propagator	8
<u>Semi-Skilled</u>	
Grower	9
Potter	3
Planter	1
Grower	2
<u>Unskilled</u>	
Greenhouse attendant	1
Potter	1

Training for Greenhouse Employees

No studies were found that inquired into general or specific kinds of training desired for employees of the greenhouse industry, in such a way as to obtain information sought for the present study.

Summary

This review of studies of off-farm agricultural occupations reveals that ornamental horticulture offered opportunities for employment as is indicated by the many businesses and employees found in this industry. Most of the studies were preliminary in specific employment information and

⁴²Mondart and Curtis, op. cit., pp. 102-103.

competencies for specific occupations, and were limited to certain areas within a state. Investigators pointed out that there were occupational opportunities at all levels of employment. The largest number of workers were in the semi-skilled category, followed by skilled, managerial, supervisory, sales, clerical, technical, and professional employees. Other employment information specifically for ornamental horticulture included: (1) the average minimum and maximum age of entry for all levels of employment was 25 and 51 respectively; (2) the median monthly salaries by level of employment, as between \$213 and \$677; (3) the typical requirement of a high school education for entry jobs; (4) the preference for a farm background by 21 percent of the managers.

Because most of the studies dealing with ornamental horticulture asked for general occupational information, employment information such as salaries, age of entry, and education were omitted completely, partially, or included under all occupational families. The researchers did not ask for specific understandings, skills, and abilities desired for employees.

Very little employment information such as the kind sought for the present study was discovered through the studies reviewed about the floriculture industry. There were

a total of 839 full-time employees and 268 part-time employees in the studies reviewed. Employers expected to hire 154 full-time and 346 part-time employees in the ensuing five years. The total number of employees for floriculture could not be estimated because they were listed under other horticultural job titles. There were no specific kinds of employment information for floriculture, such as minimum age of entry, salary, and union requirements. There were only two general areas of training for floriculture employees found in the review of literature; plant science and agricultural competencies. The total number of greenhouse employees expected in five years was 378 full-time and 224 part-time. No occupational studies of the greenhouse industry as such were found in the literature. The only information found was provided as small parts of larger studies of one or more occupational families. It is concluded that employment information and competencies of the greenhouse grower are needed. If such data were available they could help to answer problems of workers training in the greenhouse industry.

CHAPTER III

METHODS AND PROCEDURES OF THE STUDY

In this chapter the procedures used in carrying out the study are described: (1) development and testing of interview form, (2) population and sample used, (3) administration of the interview form, and (4) analysis of data.

Development of the Interview Form

Preliminary to the development of the interview form a number of survey instruments used for studies of off-farm agricultural occupations were studied. The literature was studied to determine the kinds of occupational and training information which might be included in a survey form for greenhouse employees. Then a detailed interview form was developed including all the possible kinds of questions that might be asked of managers of greenhouses. During the fall of 1963 this detailed interview form was tested and developed further with the assistance of two large commercial greenhouse managers in Michigan.¹ The interview form was then tested November 28-29, 1963 on four managers of greenhouses in the Chicago area.² The sample of greenhouse managers was

¹Appendix A.

²Appendix A.

used to test the reaction to the value of the study and the adequacy of the interview form. Greenhouse managers were very cooperative and were interested in the proposed study of their industry. They indicated that the interview form was too long and detailed to be practical. Therefore, under the counsel of Dr. Richard Lindstrom, floriculturist, of Michigan State University it was revised by grouping detailed questions under major headings, and only asking questions which served the purposes of the study.³

The revised survey form was tested for its reliability through personal interviews with two greenhouse managers. Dr. C. E. Wildon, floriculturist, of Michigan State University recommended two greenhouse managers who he felt would allow the investigator to secure information on the interview form at two different times to test the reliability of the method of securing information.⁴ Both managers were visited the same day, and the interview form was used with them. After an interval of 11 days the managers were again interviewed in the same manner as the first time. It may be noted here that there were no right and wrong answers to the questions listed on the interview form, rather most of the answers were the opinion of the managers and naturally might be subject to change. Therefore, some differences in responses between the first and second interview would be expected.

³Appendix B.

⁴Appendix C.

The interview form contained three sections. The first section on the front page entitled "list of crops produced" lists 57 flowering crops produced in greenhouses in pots, as cut flowers, and in flats. Each manager was asked to indicate if the plants were major or minor crops. A major crop was defined as any crop which produced ten percent or more of the gross income. The interviewer placed a check opposite each crop listed on the interview form which the manager indicated he produced. The first manager interviewed indicated under the "crops produced" section of the survey form a total of 46 responses during the first interview. He indicated a total of 38 responses during the second interview. Thirty-three responses were identical, five were different by one degree (recorded as minor instead of major or vice versa) while eight were omitted either during the first or second interview.⁵ Thirteen different responses out of a total of 46 produced a 26 percent difference in responses between the first and second interviews for the crops produced section of the survey form.

The second section in the center of the survey form entitled "employment information" contained 28 statements regarding the employment for 13 different job titles which are found in the greenhouse industry. Each manager was asked to indicate the number of employees, their requirements for employment, salaries, benefits, and annual turnover for each

⁵Appendix D.

job title. The first manager interviewed indicated under the "employment information" section of the interview form a total of 26 responses during the first and second interview; 21 responses were identical, five were different. Five different responses out of a total of 27 produced an 18 percent difference in responses between the first and second interview for the employment part of the survey form.

The third section of the interview form entitled "training desired" on the back page contained statements to determine the kinds and degree of training desired to successfully fulfill the job of the greenhouse grower. Each manager was asked to indicate the degree of training desired by selecting essential, useful, or unnecessary for each item of training listed. The first manager indicated a total of 42 responses during the first and second interviews. Thirty-six of the responses were identical and six were different; the difference was in one degree from essential to useful or useful to unnecessary. This gave a difference of 14 percent for this section. The number of responses for the entire survey instrument was 115, with 90 identical, 11 with a slight difference in degree, and 14 different. The difference in response between the total first and second interviews with the first manager was 21 percent, 9 percent of which was a slight difference in degree.

The second manager also responded to the items listed under the "crops produced" section of the survey form for two interviews. Thirty responses were identical, three were

different by one degree, that is, recorded as minor instead of major or vice versa while nine were omitted either during the first or second interview. Twelve different responses out of a total of 42 produced a 28 percent difference in response between the first and second interviews for the crops produced section of the interview form.⁶

The "employment information" section received a total of 31 responses with 27 identical, four different by one degree of difference, and eight omitted either during the first or second interview. This accounted for a 12 percent difference in responses between the first and second interviews. The "training desired" part of the interview form had a total of 42 responses. Thirty-seven were identical and five were different (the difference was in one degree from essential to useful or useful to unnecessary), giving a difference of 12 percent for this section.

The total number of responses for the entire survey instrument was 115, with 94 identical, 12 with a slight difference in degree, and 17 different responses. The difference in response between the total parts of the first and second interviews with the second greenhouse manager was 25 percent, 10 percent of which was a slight difference.

The average difference in response between the duplicated interviews of both greenhouse managers was 23 percent.

⁶Appendix E.

Nine and one-half percent of the difference in response was only a slight difference in degree, an average of 15.5 percent complete difference for the interview form. According to the above data, the interviewer and interviewee were 77 percent consistent in the administration and answering of the interview form, and another 9.5 percent was partially consistent. Therefore, more than three-fourths of the information obtained by the use of the survey form was reliable. For practical purposes for which the form was designed this percentage was high enough to use the form.

Validity of the Interview Form

The pre-testing of the interview form determined its validity in obtaining all of the kinds of information considered desirable for the training of the greenhouse grower. The managers indicated at the close of the interviews that the interview form was adequate. There were no similar interview forms which could be used to measure the validity of the interview form used in this study. However, there are survey forms in use which measure the degree of competencies needed by employees as well as recording other employment information.

Population and Sample Used

The population studied included all managers of greenhouses of one acre of glass or larger found in the Chicago, Cleveland, and Detroit areas. Greenhouses covering one acre

or larger were selected because they represented the best size for the study in the industry. As a group they provided the latest information on job titles, kinds of crops produced, production operations, and recent trends of the industry. It was felt that smaller greenhouses would be limited in the kind and amount of production, number of employees and job titles and thus production operations. The sample included all cooperating greenhouse managers from the above population. A cooperating greenhouse manager included any who in the opinion of the horticultural extension specialist of each area would agree to cooperate with the study. Dr. Richard Lindstrom, floriculturist, of Michigan State University wrote each horticultural extension specialist in the Chicago, Cleveland, and Detroit areas and explained the nature and purpose of the study. He then requested a list of all cooperating greenhouses of the desired size.⁷ Additional greenhouses were added to the sample from inquiries made of each greenhouse manager visited. The total number of managers interviewed was 58. One greenhouse manager in Detroit and five in the Chicago area were not interviewed because they could not be contacted. The total population was 64 and the sample was 58, which represented 90.62 percent of the population.

⁷Appendix F.

Administration of Interview Form

A personal interview was conducted with 58 greenhouse managers to determine plants produced, employment information and training desired for the greenhouse grower in the Chicago, Cleveland, and Detroit areas. During the summer of 1964 a letter was sent to all managers explaining the purpose of the study and the approximate time when they would be called by telephone to arrange an appointment for an interview.⁸

Interview procedure. After the development of some rapport, a copy of the interview form was handed to the manager to read as each question was asked and checked by the interviewer.⁹

Plants produced. The first page of the interview form indicated the kinds of plants produced in greenhouses. The greenhouse manager was asked to indicate the major and minor plants produced in pots, as cut flowers, and in flats. A major crop was defined as any crop producing ten percent or more of the gross income of the greenhouse.

Training desired. After the first page of the interview form was completed, the interview form was then turned over to the back side, and the section entitled "training desired" was administered. This part of the interview form listed statements to determine the kinds and degree of training desired to successfully fulfill the job of the greenhouse

⁸Appendix G.

⁹Appendix D.

grower. Each manager was asked to indicate the degree of training desired by selecting essential, useful, or unnecessary for each item of training listed.

Employment information. After the back page of the survey instrument was completed, the interview was concluded with the examination of the center section, entitled "employment information." Some managers were reluctant to provide certain types of information, such as salaries and fringe benefits. However, when assured that all information would be kept confidential and used only for educational purposes, the managers were very cooperative. Each interview was completed in 30 to 50 minutes and then additional questions, comments, and reactions were encouraged. Managers said the interview form was adequate for the purposes of the study.

Analysis of Data

The species of plants produced in greenhouses were established by tabulating them from the survey instrument. This was accomplished by placing a check opposite each species listed on the survey instrument during each interview. The most important plants were determined by: (1) whether the plants were considered major or minor by the greenhouse manager (a major plant was any plant which produced 10 percent or more of the gross income) and (2) the percentage of greenhouses growing each species of plant. It was decided that the plant species would be listed in order according to the percentage of greenhouses producing them.

Two methods of analysis were used to determine the kinds of training greenhouse growers should have: (1) training items listed on the interview form were checked if they were desired by managers for the greenhouse grower, and (2) those items of training, checked desired, were further measured by determining the percentage of greenhouse managers who indicated whether the training was essential or useful. It was decided that a competency would be considered essential if a majority of managers classified it as such.

The data used to analyze employment information were obtained by: (1) recording the actual numbers of workers employed under each job title and their annual turnover; (2) determining the percentage of managers who desire a residence background, employment level and education, and work experience in their workers; (3) determining the percentage of managers who provide fringe benefits for their workers, have workers who pay union dues, and who list a salary range per week for their workers.

Summary

The interview form to obtain employment information and to determine training desired for the greenhouse grower was developed by interviewing greenhouse managers and a floriculture specialist. In testing the reliability of the survey instrument about 77 percent of the information collected by use of the survey form was reliable. All cooperating greenhouse managers with one acre of glass or more were contacted

in the Chicago, Cleveland, and Detroit areas. Then the survey form was administered to each manager by means of a personal interview.

The data for the study were analyzed by tabulating items from the survey instrument and measuring the total numbers and/or determining percentages of these items. It was decided that if a majority of the greenhouse managers indicated a response to an item in the same way, it would be accepted as a significant item.

CHAPTER IV

COMPETENCIES DESIRED AND EMPLOYMENT INFORMATION FOR THE GREENHOUSE GROWER

Managers from 58 greenhouses provided information concerning employment practices and competencies desired for the greenhouse grower. In the first part of Chapter IV plants produced in the greenhouse are discussed. Crops produced were listed separately from competencies because of the large number of species of plants grown in the greenhouses surveyed. The second part includes competencies desired for the greenhouse grower, while the last section deals with employment information about greenhouse workers.

I. PLANTS PRODUCED

The first purpose of the study was to determine the species of ornamental flowering plants produced in commercial greenhouses, and to note their importance according to the percentage of greenhouses growing major and minor plants in order to provide a better basis for the development of suitable instruction for greenhouse growers.

Plants were classified as those grown in pots, as cut flowers, and in flats. A major crop was defined as any crop producing ten percent or more of the gross income of the business.

Potted Plants

The percentage of managers growing potted plants, either as a major or a minor enterprise is shown in Table I. Only five of these crops (geraniums, chrysanthemums, poinsettias, lilies, and azaleas) were grown in half or more of the greenhouses surveyed. These crops also are the ones having the greatest wholesale value in the United States compared to all the species of potted plants included in the survey, as shown in Table II. Another group of eight plants (hyacinths, hydrangeas, tulips, begonias (root), begonias (tuberous), roses, gloxinias, and vincas) was produced in 24 to 36 percent of the greenhouses, and a third group included 12 plants (caladiums, cyclamens, lantanas, foliage plants, daffodils, coleus, impatiens, orchids, ageratums, kalanchoes, petunias, and dahlias) that were grown in nine to 22 percent of the greenhouses. The three groups of plants may be used to determine the most frequently grown plants in pots and the degree of their importance so that an improved basis might be provided for preparing instructional materials for greenhouse growers.

Another measure that helps to indicate a crop's importance is the number of employees working in the greenhouse where the plants are produced.¹ Perhaps a more nearly accurate method of determining crop importance would be to

¹Appendix H

Table I. Total Number and Percentage of Greenhouses Growing Major and Minor Potted Plants

Name of Plant	Number			Percentage of Greenhouses Growing
	Major	Minor	Total	
Geraniums	30	11	41	74
Chrysanthemums	25	4	29	52
Poinsettias	24	4	28	50
Lilies	21	7	28	50
Azaleas	18	10	28	50
Hyacinths	9	11	20	36
Hydrangeas	5	13	18	32
Tulips	9	8	17	30
Begonias (root)	2	13	15	27
Begonias (tuberous)	1	14	15	27
Roses	9	5	14	25
Gloxinas	2	11	13	24
Vincas	1	12	13	24
Caladiums	1	11	12	22
Cyclamens	3	8	11	20
Lantanas	1	10	11	20
Foliage plants	6	4	10	18
Daffodils	3	6	9	17
Coleus	3	6	9	17
Impatiens	2	5	7	13
Orchids	4	2	6	11
Ageratums	2	4	6	11
Kalanchoes	1	5	6	11
Petunias	2	3	5	9
Dahlias	1	4	5	9
Rhododendrons	2	2	4	7
Delphiniums	1	3	4	7
Gardenias	0	4	4	7
Carnations	2	1	3	6
Palms	1	2	3	6
Daisies	1	2	3	6
Cacti	1	2	3	6
Pachysandras	0	3	3	5
Stephanotises	0	3	3	5

Continued

Table I - Continued

Name of Plant	Number			Percentage of Greenhouses Growing
	Major	Minor	Total	
Marigolds	2	0	2	4
Vegetables	1	1	2	4
Amaryllis	1	1	2	4
Alyssum	0	2	2	4
Asters	0	2	2	4
Balsams	0	2	2	4
Salvias	0	2	2	4
Stocks	0	2	2	4
Sweet peas	0	2	2	4
Pansies	1	0	1	2
Crocuses	1	0	1	2
Callas	1	0	1	2
Cosmos	0	1	1	2
Larkspurs	0	1	1	2
Phlox	0	1	1	2
Snapdragons	0	1	1	2
Verbenas	0	1	1	2
Zinnias	0	1	1	2
Amazon lilies	0	1	1	2
Primroses	0	1	1	2
Ivy	0	1	1	2
African violets	0	1	1	2

count the number of employees who work on each crop. This was realized when the number of employees working in the greenhouses surveyed was analyzed. It may be noted in Appendix I that one greenhouse employed 600 workers and only produced three different species of flowering plants, while other greenhouses employed less than ten workers.² Knowing the number of employees working on an individual species of

²Appendix I.

flowering plant is important from the standpoint of providing instruction for employees about the plants they will be working on. However, it was not feasible to ask each manager the number of employees growing each crop, especially if a large number of crops was produced.

Cut Flowers

Chrysanthemums were grown in 64 percent of the greenhouses, carnations in 43 percent, and snapdragons in 30 percent. Roses and irises were raised in 12 percent (Table III). These five crops were also grown in greenhouses which employed the largest number of workers.³ Chrysanthemums, carnations, snapdragons, and roses ranked among the top 11 crops on the basis of wholesale value (Table II).

Flats

The most popular plants grown in flats were alyssum, petunias, and salvias. Another group of 14 plants (marigolds, ageratums, zinnias, portulacas, verbenas, impatiens, vegetables, snapdragons, pansies, asters, phlox, coleus, balsams, and delphiniums) was produced in 25 to 29 percent of the greenhouses, and a third group included 12 plants (dahlias, daisies, cosmos, larkspurs, carnations, begonias (root), gloxinias, lantanas, daffodils, hyacinths, tulips, and pachysandras) that were grown in two to 20 percent of the greenhouses (Table IV). There is a similar relationship between

³Appendix J.

Table II. Rank of Potted Plants and Cut Flowers by Value at Wholesale Prices for the Conterminous United States 1959

Name of Plant	Rank	Value at Wholesale Prices (dollars)
<u>Potted Plants</u>		
Foliage or green plants	1	25,606,996
Geraniums	2	16,387,934
Chrysanthemums	3	11,733,853
Poinsettias	4	8,963,194
Azaleas	5	8,253,144
Lilies	6	5,779,511
Hydrangeas	7	4,159,390
African violets	8	2,276,146
Begonias	9	1,388,064
Cacti and succulents	10	1,227,876
Roses	11	982,404
Orchids, cattleya	12	801,705
Orchids, all others	13	730,544
Gardenias	14	521,332
Orchids, cymbidium	15	292,937
All others		5,971,418
<u>Cut Flowers</u>		
Roses	1	30,942,064
Carnations	2	30,508,596
Chrysanthemums, pompon	3	19,027,540
Chrysanthemums, standard	4	16,443,420
Gladioli	5	15,473,799
Orchids, cattleya	6	6,276,016
Snapdragons	7	4,562,007
Asparagus, plumosus	8	2,433,054
Stocks	9	2,238,745
Orchids, cymbidiums	10	1,841,070
Gardenias	11	1,474,594
Asters	12	935,514
Lilies	13	719,791
Peonies	14	719,791
Orchids, all others	15	579,936
All others		8,525,083

¹United States Bureau of Census, U. S. Census of Agriculture 1959. Volume 5, Part 1, Special Reports, Washington: Government Printing Office, 1962.

Table III. Total Number and Percentage of Greenhouses Growing Major and Minor Cut Flowers

Name of Plant	Number			Percentage of Greenhouses Growing
	Major	Minor	Total	
Chrysanthemums	30	7	37	64
Carnations	24	1	25	43
Snapdragons	5	12	17	30
Roses	6	1	7	12
Iris	6	1	7	12
Callas	4	0	4	7
Orchids	3	0		5
Gladioli	1	2	3	5
Daffodils	1	2	3	5
Delphiniums	0	2	2	3
Stephanotises	0	2	2	3
Sweet peas	0	2	2	3
Stocks	1	1	2	3
Alstroemarias	1	0	1	2
Tulips	0	1	1	2
Lilies	0	1	1	2
Marigolds	0	1	1	2
Petunias	0	1	1	2
Dahlias	0	1	1	2
Pansies	0	1	1	2
Asters	0	1	1	2
Amazon lilies	0	1	1	2

the number of employees and the number of plants grown in flats, as was shown in greenhouses growing potted plants and cut flowers. This is to say that those greenhouses which produced the more frequently raised plants also employed the largest number of workers.⁴

Summary of Plants Produced

The 58 greenhouse managers surveyed grew a total of

⁴Appendix K.

Table IV. Total Number and Percentage of Greenhouses
Growing Major and Minor Plants in Flats

Name of Plant	Number			Percentage of Greenhouses Growing
	Major	Minor	Total	
Alyssums	10	15	25	45
Petunias	15	4	19	33
Salvias	11	7	18	32
Marigolds	9	7	16	29
Ageratums	9	7	16	29
Zinnias	9	7	16	29
Portulacas	9	7	16	29
Verbenas	9	7	16	29
Impatiens	11	5	16	28
Vegetables	11	5	16	28
Snapdragons	11	5	16	28
Pansies	9	6	15	27
Asters	9	6	15	27
Phlox	9	6	15	27
Coleus	9	5	14	25
Balsams	9	5	14	25
Delphiniums	9	5	14	25
Dahlias	9	2	11	20
Daisies	9	2	11	20
Cosmos	9	1	10	18
Larkspurs	9	1	10	18
Carnations	9	0	9	17
Begonias (root)	0	2	2	4
Gloxinias	0	1	1	2
Lantanas	0	1	1	2
Daffodils	0	1	1	2
Hyacinths	0	1	1	2
Tulips	0	1	1	2
Pachysandras	0	1	1	2

59 different species of ornamental flowering plants including 56 produced in pots, 22 as cut flowers, and 29 raised in flats. The relative importance of each of the species grown in the greenhouses surveyed was determined by the percentage of greenhouse managers who raised them in order that a basis be provided for preparing instructional materials for the greenhouse grower.

II. COMPETENCIES DESIRED

The second purpose of the study was to determine the relative importance and degree of attainment of competencies in the greenhouse grower desired by employers.

Every greenhouse manager was asked to indicate the training desired for the greenhouse grower. He was also requested to state the degree of importance of this training for the grower.⁵

Knowledge of Fundamental Information

Knowledge of fundamental information was included under four content areas of plant science: (1) plant parts, (2) growth processes, (3) plant names, and (4) anatomical parts (Table V). Two-thirds of the managers indicated that knowledge of basic plant parts, basic growth processes, and plant names was essential for the greenhouse grower. Learning anatomical parts was not considered essential. However, this knowledge was considered useful by 59 percent of the managers.

Competencies (operational abilities)

The second category of training, called competencies, included those operational abilities such as greenhouse skills needed by the grower to perform the operations involved in his job. The percentage of managers who indicated that competencies were essential, useful, or unnecessary for the greenhouse grower is recorded in Table VI. Eighty-nine percent of the

⁵Appendix B.

Table V. Percentage of Managers Who Indicated Knowledge of Basic Fundamental Information Was Essential, Useful, or Unnecessary for the Greenhouse Grower

Knowledge of Fundamental Information	Percent		
	Essential	Useful	Unnecessary
Basic plant parts (e.g. root and stem)	86	13	2
Understanding basic growth processes (e.g. photosynthesis, and transpiration)	75	21	4
Plant names (e.g. scientific and common)	66	27	7
Anatomical parts (e.g. root and stem)	27	59	14

Table VI. Percentage of Managers Who Classified Certain Competencies as Essential, Useful, or Unnecessary for the Greenhouse Grower

Competencies	Percentage of Managers		
	Essential	Useful	Unnecessary
Watering	100	0	0
Identify and control insects, disease, virus, etc.	98	2	0
Fertilizing	96	2	2
Soil preparation	95	2	3
Potting	93	4	3
How to plant or transplant seedlings	93	0	7
Handling of chemicals	93	7	0
Maintain sanitary conditions	93	7	0
How to propagate (seeds, cuttings, etc)	89	7	4
Soil sterilization (steam, chemical, etc.)	89	7	4
Identify and use growing containers	75	21	4
Use of growth substances	66	21	13
Boiler operation	62	36	2
Equipment operating and maintenance	62	32	6
Soil testing	54	43	5

managers stated that the following competencies were essential for the greenhouse grower--soil sterilization (steam and chemical); plant propagation (seeds and cuttings); sanitation maintenance; chemical handling; seedling planting and transplanting; potting; soil preparation; fertilization; insect identification and control of insects, disease, and virus; and watering.

Seventy-five percent of the managers said that the competency, "identification and use of growing containers" was essential while 21 percent indicated it was useful. Those greenhouse managers in the study who produced only cut flowers did not use growing containers. Sixty-two percent of the managers indicated that the competencies, "boiler operation," "equipment operation and maintenance," and "use of growth substances," were essential for a greenhouse grower, while 21 percent of the managers said that these competencies were useful. In addition to the check list additional comments were encouraged. Two greenhouse managers said that growing plants is a highly specialized skill, and that they did not want a grower working in areas outside his specialty.

Boiler operators and equipment maintenance workers were employed in 25 percent of the greenhouses surveyed. In some instances the union specifies that a grower may not operate the boilers. The fact that the practical use of growth substances is relatively new may explain the fact that only 66 percent of the managers indicated that their use was essential.

Fifty-four percent of the greenhouse managers indicated that the competency, soil testing, was essential while 42 percent said it was useful. In some instances the soil to be tested was sent to a local soil testing laboratory which explains the relatively low percentage of managers who indicated essential for this competency. Fifty-four percent of the managers indicated that all of the competencies listed in Table VI were essential and 87 percent of the managers stated that they were essential or useful.

Crop Understanding

The third category of training considered with the greenhouse manager was crop understanding. The percentage of managers who indicated that the training of crop understanding was essential, useful, or unnecessary is recorded in Table VII. One hundred percent of the greenhouse managers said that understanding temperature and water requirement of plants was essential. Ninety-one percent indicated that understanding disbudding and pinching was essential. Two managers said that they did not grow plants which required disbudding or pinching; therefore, this understanding was unnecessary for their growers. Eighty-eight percent of the managers indicated that understanding cutting and special cultural practices such as staking and hardening was essential. Three managers reported that their crops did not require these operations. Eighty-two percent of the managers indicated that knowledge of the humidity requirements of plants and

Table VII. Percentage of Managers Who Indicated Training in Crop Understandings was Essential, Useful, or Unnecessary for the Greenhouse Grower

Crop Understanding	Percentage of Managers		
	Essential	Useful	Unnecessary
Temperature	100	0	0
Water requirements	100	0	0
Pinching	93	0	0
Disbudding	91	4	5
Cutting	88	4	8
Special cultural practices (staking, hardening, etc.)	88	9	3
Humidity	82	16	2
Life cycle of plant	82	13	5
Grading and packaging	75	18	7
Photo period	75	9	16

knowledge of the life cycle of a plant were essential, while 13 percent said such information was useful. Seventy-five percent of the greenhouse managers said competency in grading and packaging plants and understanding of plant photo period were essential. In five greenhouses grading and packaging was reported to be a specialty handled by the wholesale employees and not the growers. Knowledge of the photo period was reported as critical for some crops, especially in greenhouses which produced chrysanthemums. Three-fourths of the managers stated that all the areas of training under crop understanding (Table VII) were essential.

Greenhouse Management

The fourth category of training studied with the greenhouse manager listed the types of management activities.

The percentage of managers who indicated each aspect of greenhouse management training was either essential, useful, or unnecessary for the greenhouse grower is recorded in Table VIII.

Table VIII. Percentage of Managers Who Indicated Greenhouse Management Training was Essential, Useful, or Unnecessary for the Greenhouse Grower

Greenhouse Management	Percentage of Managers		
	Essential	Useful	Unnecessary
Labor	71	21	8
Greenhouse layout	71	23	6
Analysis of production	64	30	6
Marketing	41	41	18
Selling	36	46	18
Buying	36	50	14
Management of money (budgeting, financing, etc.)	30	54	16
Insurance	27	55	18

Sixty-four percent of the greenhouse managers said that knowledge of labor, analysis of production, and greenhouse layout were essential to the greenhouse grower, and 21 percent considered them useful. Most greenhouse growers had helpers working under their direction, and, as might be expected many managers felt that an understanding of labor management was important. Fifty percent of the managers also stated that growers do become involved directly or indirectly with greenhouse layout and production and should have a good training in these areas.

Twenty-seven percent of the greenhouse managers stated that marketing, selling, buying, managing money (budgeting and financing), and understanding insurance were essential to the greenhouse grower while 41 percent said that such training was useful. A number of managers stated that greenhouse management training was unnecessary for the grower because management was the job of the manager. Sixty percent of the managers indicated that management of labor, analysis of production, and greenhouse layout were essential.

Greenhouse Mechanics

The last category of training which managers were asked to react to was the mechanical activities that growers perform.

The percentage of managers who indicated that greenhouse mechanics training was either essential, useful, or unnecessary is recorded in Table IX.

Table IX. Percentage of Managers Who Indicated Greenhouse Mechanics Training was Essential, Useful, or Unnecessary for the Greenhouse Grower

Greenhouse Mechanics	Percentage of Managers		
	Essential	Useful	Unnecessary
Plumbing	36	45	19
Woodwork	30	46	24
Construction (parts, types, etc.)	27	51	22
Electrical	27	50	23
Welding	23	46	41

Twenty-three percent of the greenhouse managers said that skill in plumbing, woodworking, constructing (parts and types), wiring, and welding were essential, while 45 percent indicated that they were useful to know. Twenty percent of greenhouse managers indicated that it was essential that their growers know greenhouse mechanics because the growers performed mechanical operations often; another 20 percent of the managers stated that they could not afford having their skilled growers perform any operations except those directly related to growing plants. Twenty-five percent of the managers indicated that those businesses large enough to employ one or more maintenance men generally left greenhouse mechanics to the maintenance department. Where greenhouses were unionized more specialization of jobs was reported. Three managers indicated that, because of the increased use of automatic watering, physics, specifically hydraulics, plumbing, and electricity, was important for the grower to know. Forty-six percent of the managers listed greenhouse mechanics as useful rather than essential.

Sixty-nine percent of the greenhouse managers indicated all of the aspects of training recorded on the survey instrument were desirable for a greenhouse grower to know. Twenty-three percent of the greenhouse managers also indicated that all of the items listed under each category of training were essential while 41 percent of the managers stated that some of the items were useful.

Summary of Competencies Desired

The second purpose of the study was to determine the competencies and the degree of attainment of these competencies desired of the greenhouse grower. Under the basic areas of plant knowledge, the categories of plant parts, growth processes, and plant names were considered essential by two-thirds of the managers. The competencies (operational abilities) recorded as essential by almost 90 percent of the managers were: watering, identifying and controlling pests, fertilizing, preparing soil, potting, transplanting, handling chemicals, propagating, sterilizing soil, and cleaning greenhouse benches, floors, and equipment.

The third category of training investigated was crop understandings. Three-fourths of the managers stated that the areas of training under crop understanding were essential. Sixty percent of the managers indicated that management of labor, analysis of production, and greenhouse layout were essential. Other areas of management were considered useful but not essential. Most of the managers listed greenhouse mechanics as useful rather than essential.

III. EMPLOYMENT INFORMATION

The third purpose of the study was to determine the types and nature of employment for greenhouse workers. This information was collected to determine job opportunities and working conditions for the greenhouse grower, as well as for other greenhouse workers.

Number of Non-Family Employees Engaged
Under Each Job Title

The number of non-family employees engaged in each job is recorded in Table X. The grower helper with 193 part-time and 414 full-time jobs appeared to offer the greatest opportunity for job entry into this industry.

Table X. Number of Family and Non-Family Employees Engaged Under Each Job Title*

Job Title	Number			
	Family		Non-Family	
	Full-time	Part-time	Full-time	Part-time
Manager	78	0	15	0
Assistant manager	30	0	14	0
Grower foreman	1	0	42	0
Grower	6	8	260	6
Grower helper	5	3	414	193
Maintenance foreman	0	0	14	0
Maintenance worker	0	0	52	1
Maintenance helper	0	2	27	0
Wholesale foreman	1	0	5	0
Wholesale worker	0	0	22	1
Wholesale helper	2	0	5	0
Clerical help	12	3	72	10
Truck driver	1	0	38	4

Total	136	16	980	215

*For those managers interviewed who operated greenhouses containing one acre of glass or more in the Chicago, Cleveland, and Detroit areas.

The second largest number of full-time positions, totaling 260 jobs, was that of the grower. This position offered the most opportunity for advancement for the grower helper. Promotion is available to other job categories.

Forty-five percent of the managers interviewed said that a grower helper could advance to management status. Fifty-five percent said that a grower helper could not advance to management status.

Number of Family Employees Engaged
Under Each Job Title

The number of full-time and part-time family employees engaged under each job title is recorded in Table X. The job title with the largest number of full-time employees was the manager, with a total of 78. The job title with the second largest number of employees was the assistant manager, with a total of 30 positions. The third largest number of jobs was 12 for the secretary-bookkeeper position. Because most of the greenhouses surveyed were family owned and operated, a large number of family members were recorded as managers or assistant managers. Family ownership also explains the third largest number, secretary-bookkeepers, because many of the wives and daughters hold such positions.

The fact that many greenhouse businesses are family owned and operated is an important consideration when exploring advancement opportunities.

Expected Number of Family Employees Engaged
Under Each Job Title

The number of additional full-time and part-time family members that managers anticipated would be employed during the next five years is recorded in Table XI. The managers

indicated an average increase of two full-time assistant managers, seven part-time grower helpers, and one part-time maintenance helper over this period. A total increase of ten family employees is estimated.

Expected Number of Non-Family Employees
Engaged Under Each Job Title

The expected number of non-family employees engaged under each job title during the next five years is recorded in Table XI.

Table XI. Expected Number of Additional Family and Non-Family Employees Expected to be Engaged Under Each Job Title

Job Title	Number			
	Family		Non-Family	
	Full-time	Part-time	Full-time	Part-time
Manager	0	0	0	0
Assistant manager	2	0	0	0
Grower foreman	0	0	2	0
Grower	0	0	112	0
Grower helper	0	7	18	27
Maintenance foreman	0	0	11	0
Maintenance worker	0	0	0	0
Maintenance helper	0	1	3	0
Wholesale foreman	0	0	0	1
Wholesale worker	0	0	0	2
Wholesale helper	0	0	0	1
Secretary-bookkeeper	0	0	0	1
Truck driver	0	0	0	0

Total	2	8	146	32

The greenhouse managers stated that they expected a total increase of 136 full-time and 32 part-time employees. Some managers indicated anticipation of a total decrease of ten full-time and one part-time employees. There could be opportunities for 112 growers, 18 grower helpers full-time, and 27 grower helpers part-time during the next five years, according to greenhouse managers surveyed.

Annual Turnover of Employees

The annual turnover of employees under each job title is recorded in Table XII. Greenhouse managers stated that their total average replacements each year were 29 growers and 189 grower helpers.

Table XII. Annual Turnover of Employees Under Each Job Title

Job Title	<u>Employees Turnover</u>	
	Full-time	Part-time
Manager	0	0
Assistant manager	0	0
Grower foreman	0	0
Grower	27	2
Grower helper	29	160
Maintenance foreman	0	0
Maintenance worker	0	0
Maintenance helper	0	0
Wholesale foreman	0	0
Wholesale worker	0	0
Wholesale helper	0	0
Secretary-bookkeeper	0	0
Truck driver	0	0

Percentage of Managers Who Desired that
Their New Employees Have Work Experiences

The percentage of managers who desired that their new employees have work experiences is recorded in Table XIII. Forty percent or more of the managers stated that greenhouse work experience was desirable for the grower, grower helper, assistant manager, and manager.

Forty-five percent of the managers indicated that business work experience was desirable for the secretary-bookkeeper.

Table XIII. Percentage of Managers **Who** Desired that Their Employees Have Work Experiences

Job Title	Work Experience				Position did not exist or no response
	Green-house	Miscellaneous	Business	None	
Manager	93	11	10	4	0
Assistant manager	50	7	5	2	46
Grower foreman	40	0	0	0	60
Grower	66	5	4	4	21
Grower helper	79	13	9	13	0
Maintenance foreman	5	9	4	0	78
Maintenance worker	7	4	0	2	87
Maintenance helper	7	9	5	0	79
Wholesale foreman	9	2	7	0	82
Wholesale worker	2	2	4	2	90
Wholesale helper	0	0	2	2	96
Secretary-bookkeeper	11	7	45	0	37
Truck driver	2	4	0	11	83

Employment Level and Education Desired

The percentage of managers who indicated employment level and education desired of greenhouse workers is recorded in Table XIV. Seventy percent of the managers stated that it

would be desirable that the manager have professional qualifications, with four years of college; while 21 percent said he should be classified as a technician, with two years of post-high-school training.

Thirty-nine percent of the managers said that it would be desirable that the assistant manager be classified as a professional with four years of college; while 14 percent said that he should be classified as a technician with two years of post-high-school training.

Forty-one percent of the managers said that it would be desirable that the grower be classified as a skilled worker with a high school education; while 25 percent said that he should be classified as a technician with two years of post-high-school training.

Table XIV. Percentage of Managers Who Indicated Employment Level and Education Desired for Employees

Job Title	Professional-- 4 yrs. college	Technical 2 yrs. post high school	Skill- ed high school	Semi- skill- ed none	Position did not exist or no re- sponse
Manager	70	21	7	2	0
Assistant manager	39	14	4	2	41
Grower foreman	9	13	5	2	71
Grower	7	25	41	2	25
Grower helper	5	7	66	23	0
Maintenance foreman	0	5	0	0	95
Maintenance worker	0	7	20	0	73
Maintenance helper	0	2	2	0	96
Wholesale foreman	5	2	2	0	91
Wholesale worker	0	5	7	0	88
Wholesale helper	0	0	3	0	97
Secretary-bookkeeper	14	11	27	0	48
Truck driver	0	0	14	7	79

Sixty-six percent of the managers said that it would be desirable that the grower helper be classified as a skilled worker with a high school education, but 23 percent said that he should be a semi-skilled worker with no education requirements.

Twenty-seven percent of the managers said that it would be desirable that the grower helper be classified as a skilled worker with a high school education, while 14 percent said that he should be classified as a professional with four years of college, and 11 percent said that he should be classified as a technician with two years of post-high-school training.

Residence Background

The percentage of managers who desired a farm background for greenhouse employees is recorded in Table XV.

Table XV. Percentage of Managers Who Indicated Kind of Background Desired for Employees

Job Title	Farm	Urban	No Preference	Position did not exist or no response
Manager	52	7	41	0
Assistant manager	21	2	20	57
Grower foreman	16	0	16	68
Grower	43	2	23	32
Grower helper	59	0	39	2
Maintenance foreman	5	0	4	91
Maintenance worker	16	0	13	71
Maintenance helper	7	24	0	69
Wholesale foreman	0	1	9	90
Wholesale worker	24	0	11	65
Wholesale helper	0	0	4	96
Secretary-bookkeeper	24	4	36	36
Truck driver	2	24	11	63

Forty-three percent of the managers indicated that it would be desirable for growers, grower helpers, and managers to have a farm background; while 41 percent or less stated no preference for workers with these titles. Half of the managers stated that farm boys have worked better than urban boys because they are used to hard work.

Salary Ranges

The percentage of managers who indicated various salary ranges for their greenhouse employees is recorded in Table XVI.

Table XVI. Percentage of Managers Who Indicated Each of Specified Salary Ranges for Their Greenhouse Employees

Job Title	Salary Range in Dollars per Week					Position did not exist or no response
	40 to 69	70 to 99	100 to 129	130 to 159	160 +	
Manager	0	0	7	11	16	66
Assistant manager	0	0	7	5	5	83
Grower foreman	0	4	5	7	7	77
Grower	0	32	50	9	0	0
Grower helper	39	52	9	0	0	0
Maintenance foreman	0	2	5	0	2	91
Maintenance worker	2	7	4	2	0	85
Maintenance helper	5	2	2	0	0	91
Wholesale foreman	0	0	4	2	2	92
Wholesale worker	2	2	2	2	0	92
Wholesale helper	4	0	0	0	0	96
Secretary-bookkeeper	7	4	5	4	0	80
Truck driver	0	5	4	2	0	89

Fifty-two percent of the grower helpers received 70 to 99 dollars per week and 50 percent of the growers received 100 to

129 dollars per week. Managers indicated that employees may earn more as a grower or by advancing to a managerial position.

Union Membership

The percentage of managers who said that their greenhouse workers were union members is recorded in Table XVII. Forty-three percent of the managers indicated that grower helpers belonged to a union: that 25 percent of the growers belonged; and that two to 14 percent of the workers in the other job titles as listed in the table belonged. Membership dues in the union was about five dollars per month.

Table XVII. Percentage of Managers Who Indicated Union Membership was Required for Greenhouse Workers

Job Title	Percentage of Union Membership	Position did not exist or no response
Manager	4	96
Assistant Manager	7	93
Grower foreman	11	89
Grower	25	75
Grower helper	43	57
Maintenance foreman	2	98
Maintenance worker	14	86
Maintenance helper	4	96
Wholesale foreman	2	98
Wholesale worker	4	96
Wholesale helper	2	98
Secretary-bookkeeper	11	89
Truck driver	13	87

Fringe Benefits

The percentage of managers who indicated that they provided fringe benefits for their employees is recorded in Table XVIII. Seventy-five percent of the managers provided two weeks vacation for their workers, 23 percent provided three weeks, while 29 percent provided one week. Sixty-six percent of the managers gave employees the six major holidays off with pay. Fifty percent of the managers gave group health and accident insurance plans to their employees. Fourteen percent or less of the managers gave other benefits as listed in Table XVIII.

Table XVIII. Percentage of Greenhouse Managers Who Indicated Fringe Benefits for Greenhouse Workers

Fringe Benefits	Percentage of Managers
Paid major holidays	66
Half day Saturday paid	2
One week vacation	29
Two weeks vacation	75
Three weeks vacation	23
Pension plan after three years of service	5
Clothes laundered	4
Group health and accident insurance	50
Bonus (various plans)	14
Life insurance	13

All of the categories listed under the employment section of the interview form received responses by a majority of the greenhouse managers.

Summary of Employment Information

Employment information for greenhouse workers was collected to determine job opportunities and working conditions for the greenhouse grower as well as for other greenhouse workers. There were 152 family and 1,180 part-time or full-time, non-family employees engaged under the various job titles. The number of new family and anticipated to be non-family employees during the next five years is 162 and 1,358 respectively. The annual employment opportunities for greenhouse workers within the industry sample was 218.

The job title which offered the greatest opportunity for entry was the grower helper, and the job title which offered the most opportunity for advancement was the grower. Advancement from grower helper to manager was reported to be possible within the industry.

The majority of managers expressed a desire for greenhouse work experience and at least a high school education for their growers. One-fourth of the managers indicated that the grower should have two years of post-high-school training. Forty-three and 59 percent of the managers indicated that it would be desirable for growers and grower helpers to have farm backgrounds respectively. The salary range for greenhouse employees varied from 40 to 160 dollars or more per week, with various kinds of fringe benefits for many. Forty percent or less of the employees in different job titles were reported to be members of a union.

CHAPTER V

SUMMARY AND CONCLUSIONS

Personal interviews were conducted with the managers of 58 out of 64 greenhouses which covered one acre or more in the Chicago, Cleveland, and Detroit areas to determine employment information and training desired for the greenhouse grower.

Summary

The data were analyzed by tabulating species of flowering plants grown in pots, as cut flowers, and in flats, training of the greenhouse grower desired by greenhouse menegers, and employment information. These data were taken from the survey form and total numbers and/or percentages computed.

The first purpose of the study was to determine the species of ornamental flowering plants produced in commercial greenhouses and to rank their importance according to the percentage of greenhouses growing each species in order to provide a basis for development of instructional materials for the greenhouse grower. This was done when 59 major and minor crops were ranked in importance, based upon reports by 58 greenhouse managers. This included 56 produced in pots, 22 as cut flowers, and 28 raised in flats.

Managers differentiated the plants mentioned, listing them as major or minor. Five of the plants classified as

major were grown in over half of the greenhouses and included geraniums, chrysanthemums, poinsettias, lilies, and azaleas while one species grown as a minor crop was only grown in two percent of the greenhouses.

The second purpose of the study was to determine the relative importance and degree of attainment of certain competencies in the greenhouse grower desired by the employer. Under the basic areas of plant knowledge the categories of (1) plant parts, (2) growth processes, and (3) plant names were considered essential by two-thirds of the managers.

The second area of training, entitled competencies, included operational abilities such as greenhouse skills needed by the greenhouse grower to perform the operations involved in his job. Fifty-four percent of the greenhouse managers indicated that the following competencies were essential for the greenhouse grower to possess: (1) watering, (2) controlling pests, (3) fertilizing, (4) mixing soils, (5) potting, (6) handling chemicals, (7) cleaning, (8) propagating, (9) sterilizing soil, (10) identifying growing containers, (11) applying growth substances, (12) operating boiler, (13) operating equipment, and (14) testing soil.

Three-fourths of the greenhouse managers stated that the following areas of training under crop understanding were essential: (1) temperature, (2) water requirements, (3) pinching, (4) disbudding, (5) cutting, (6) special cultural practices, (7) humidity, (8) life cycle of plant, (9) grading and packaging,

and (10) photo period.

Under the greenhouse management category of training 64 percent of the managers said that (1) knowledge of labor, (2) analysis of production, and (3) greenhouse layout were essential for the greenhouse grower to understand. Twenty-seven percent of the greenhouse managers state that (1) understanding insurance, (2) managing money, (3) buying, (4) selling, and (5) marketing were essential for the greenhouse grower while 41 percent said that such training was useful.

The last category of training investigated was the mechanical activities that growers perform. Twenty-three percent of the greenhouse managers said that skills in (1) welding, (2) wiring, (3) constructing, (4) woodworking, and (5) plumbing were essential, while 45 percent indicated that they were useful to know.

The third purpose was to determine the types and nature of employment information for greenhouse workers. Employment information for greenhouse workers was collected to determine job opportunities and working conditions for the grower, as well as for other greenhouse workers. There were 152 family and 1,180 non-family employees in the 58 greenhouses. The expected number of family and non-family employees during the next five years was 162 and 1,358 respectively. The average annual employment opportunities for greenhouse employees was 218. The job title which offered the greatest opportunity for entry was the grower helper, and the job title which

offered the greatest opportunity for advancement was the grower because these job titles had the largest number of employees. Advancement from grower helper to manager was reported to be possible within the industry. However, it would be easier if one were a family member because of the large number of family-owned businesses. The majority of managers desired greenhouse work experience and at least high school education for their growers. One-fourth of the managers indicated that the grower should have two years of post-high-school training.

Forty-three percent of the managers indicated that it would be desirable for growers and grower helpers to have a farm background. Forty percent of the employees under different job titles were members of a union. The salary for the greenhouse grower was in the bracket of 100 to 129 dollars, with various kinds of fringe benefits for many.

Conclusions

1. Fifty-nine species of ornamental flowering plants were grown in commercial greenhouses and should be considered in developing a program of instruction for the greenhouse grower.

2. Geraniums, chrysanthemums, poinsettias, lilies, and azaleas were grown as a major crop in over half of the greenhouses surveyed, and should be considered when planning instruction for greenhouse growers. Amazon lilies, ivy, and primroses were grown only as a minor crop in two percent of

the greenhouses, and therefore, might logically receive less emphasis in a course of instruction for the greenhouse grower.

3. Greenhouse managers wanted the greenhouse grower to have the following competencies: (a) basic plant knowledge including plant parts, growth processes, and plant names; (b) operational abilities including watering, controlling pests, fertilizing, mixing soils, potting, transplanting, handling chemicals, cleaning, propagating, sterilizing soil, identifying growing containers, applying growth substances, operating boiler, operating equipment, and testing soil; (c) crop understanding including temperature, water requirements, pinching, disbudding, cutting, special cultural practices, humidity, life cycle of plant, grading and packaging, and photo period; (d) greenhouse management including knowledge of labor, analysis of production, and greenhouse layout. Therefore, the above competencies should be considered in planning a program of instruction for greenhouse growers.

4. Greenhouse managers desired but did not consider the following competencies essential for the greenhouse grower: (a) the areas of greenhouse management including understanding insurance, managing money, buying, selling, and marketing; (b) mechanical activities including welding, electrical, construction, woodwork, and plumbing.

5. There were five times as many opportunities to enter the greenhouse industry studied as a part-time grower helper than as a full-time grower helper.

6. The opportunities for advancement in the greenhouse industry from a part-time grower helper to a full-time grower was one opportunity for every five grower helpers.

7. Greenhouse managers desired at least a high school education and practical work experiences for their growers.

8. Most prospective greenhouse employees did not have to belong to a union. However, in some greenhouses employees are members of a union.

9. Prospective greenhouse growers should plan to obtain at least a high school education.

10. Greenhouse growers should have adequate on-the-job training for practical experiences.

Recommendations

Since employment opportunities may be found in commercial greenhouses for trained workers, recommendations are offered for leaders in agriculture responsible for developing educational programs to prepare greenhouse employees:

1. Guidance personnel and educators having the responsibility for providing employment information to students and prospective employees should be informed of the opportunities for greenhouse employment and related information.

2. Schools in which prospective greenhouse growers are prepared should consider training in the following areas: fundamental information about plants, competencies (operational abilities) crop understanding, greenhouse management,

and greenhouse mechanics at the high school or post-high school level.

3. Greenhouse employees who want to advance to managerial positions in the industry should obtain four years of college.

4. The following categories of training were reported to be essential for the greenhouse grower by managers. They are listed in order of their importance based on what greenhouse managers desire in their grower. Educators responsible for curriculum development may consider the following kinds of training in a course of study for the greenhouse grower.

I. Knowledge of Fundamental Information About Plants

- A. Basic plant parts
- B. Basic growth processes
- C. Identification of plants grown in greenhouses

II. Competencies (operational abilities)

- A. Watering
- B. Identifying and controlling pests
- C. Fertilizing
- D. Preparing soil
- E. Potting
- F. Transplanting
- G. Handling chemicals
- H. Propagating
- I. Sterilizing soil
- J. Cleaning

III. Crop Understandings

- A. Temperature
- B. Water requirements
- C. Pinching
- D. Disbudding
- E. Cutting
- F. Special cultural practices
- G. Humidity
- H. Life cycle of plant
- I. Grading and packaging
- J. Photo period

IV. Greenhouse Management

- A. Labor
- B. Greenhouse layout
- C. Analysis of production

5. The following categories of training were reported to be desirable for the greenhouse grower by managers. They are listed in order of their importance based on what greenhouse managers desire in their grower. These competencies might be considered in planning instruction for the greenhouse grower if time permits, but should receive less emphasis than those areas reported to be essential by greenhouse managers.

I. Knowledge of Fundamental Information

- A. Anatomical parts

II. Competencies (operational abilities)

- A. Identification and use of growing containers

- B. Use of growth substances
- C. Boiler operation
- D. Equipment operation and maintenance
- E. Soil testing

III. Greenhouse Management

- A. Marketing
- B. Selling
- C. Buying
- D. Management of money (budgeting, financing)
- E. Insurance

IV. Greenhouse Mechanics

- A. Plumbing
- B. Woodwork
- C. Construction (parts, types)
- D. Electrical
- E. Welding

6. Practical experience in actually growing plants in order to learn all operations should be provided. This may be done in a school greenhouse or in a commercial greenhouse.

7. Greenhouse managers and educators should cooperate to provide placement of the students during and after training.

Related Studies Should be Made

1. Follow-up studies should be made to keep up with changes in the kinds of training desired for the greenhouse grower.

2. Studies of other job titles within the production phase of floriculture as well as other divisions of the floriculture industry should be made.

3. Studies of employment information for divisions of floriculture other than production should be carried out.

4. Number of employees who work on each species of flowering ornamental plants should be determined.

5. The common competencies performed on each species of flowering ornamental plants grown in greenhouses should be determined.

6. The different competencies specific to each species of flowering ornamental plants grown in greenhouses should be determined.

7. The amount of time each employee spends on each species of ornamental plants grown in greenhouses should be determined.

8. Analysis of each operation performed on several major species of flowering plants grown in the greenhouse should be determined.

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APPENDICES

APPENDIX A

Names and Addresses of Greenhouse Managers who Assisted in
Developing the Interview Form:

Furnival's Flowers
Gilbert Furnival, Manager
1105 W. Ganson Street
Jackson, Michigan

Weiland Brothers Greenhouse
George Weiland, Manager
Aptakisic Road
Prairie View, Illinois

Harrington's Greenhouse
Al Harrington, Manager
7735 Bunkerhill Road
Jackson, Michigan

Woodland Flower Shop
Fred Voorthuizen, Manager
2321 Francis Street
Jackson, Michigan

Holmberg Greenhouses
Richard Holmberg, Manager
3521 Highland Avenue
Berwyn, Illinois

McFarland's Greenhouses
Frank McFarland, Manager
East Rockland Road
Libertyville, Illinois

Oechslein Greenhouses
Gus Lamos, Manager
2000 Harlem Avenue
Chicago, Illinois

Smith Floral Company
Bob Soos, Manager
1124 E. Mt. Hope
Lansing, Michigan

Van Bochove & Brothers Greenhouses
Mr. Tourman, Manager
2301 Flower Street
Kalamazoo, Michigan

APPENDIX C

Greenhouse Managers who were Interviewed for the Reliability Study of the Interview Form:

Greenhouse Manager Number 1

Norton's Greenhouse
Donald Norton, Manager
2900 Washtenaw Avenue
Ypsilanti, Michigan

Greenhouse Manager Number 2

Ben Sovey's Greenhouse
Ben Sovey, Manager
950 North River Street
Ypsilanti, Michigan

APPENDIX F

MICHIGAN STATE UNIVERSITY East Lansing

College of Agriculture - Department of Horticulture

November 26, 1963

Mr. Warren Parsons
Vocational Agricultural Department
Jackson High School
Jackson, Michigan

Dear Warren:

Enclosed is a copy of a letter I have sent to Mr. Juchartz in Detroit and Mr. Buscher in Cleveland in regard to your Ph.D. project. By the way, I also received a carbon copy of the letter that Mr. Fizzell sent you from the Chicago area. Between the three of these men this ought to give you a good list of growers to contact.

Sincerely,

Richard S. Lindstrom
Associate Professor
in Horticulture

RSL:dls

Enc.

APPENDIX F - Continued

MICHIGAN STATE UNIVERSITY East Lansing

College of Agriculture - Department of Horticulture

November 21, 1963

Mr. Don:

I have a friend who is working on a Ph.D. in the College of Education. He is doing this under the off-campus research plan. His job is a Vocational Agricultural instructor at one of the high schools in the State of Michigan. He has become interested in the floricultural field and has injected floricultural courses into his curriculum at this high school. The proposed title of his thesis is "A Job Analysis of Greenhouse Workers in the Floricultural Industry".

In order to be able to study the problem he would like to visit greenhouse growers in three areas. I have suggested that he contact greenhouse men in the Cleveland, Chicago and Detroit area. In order to accomplish the task without an undue burden on him, we are restricting his interviews to managers and owners of greenhouses of more than one acre. Secondly, you will agree with me, that not all growers or managers would be interested in cooperating with him.

What I would like from you is a list of greenhouse growers or owners in your area of over one acre who this gentleman might interview. As I have just mentioned, we would be interested in those individuals who would cooperate with a man who is in this position. Your help will be greatly appreciated.

Sincerely,

Richard S. Lindstrom
Assoc. Prof.
of Horticulture

Here is a copy of the letter I sent out -

APPENDIX F - Continued

6155 Edgewood Drive
Jackson, Michigan
January 21, 1964

Dear Mr. Fizzell,

I would like to thank you for the list of names of greenhouses in your area. I visited four during the Thanksgiving holiday and learned much to help complete the development of my survey instrument. Presently I am revising and refining my survey instrument. When I complete it and find time, I would like to return to your area and complete my survey.

When I visited Chicago the Friday after Thanksgiving, I called your office and home from outside Arlington Heights, but you must have been away. During my next trip I hope that I may be able to see you. Thanks again for your help.

Sincerely yours,

Warren Parsons

APPENDIX F - Continued

Names and Addresses of Greenhouse Managers in the Chicago Area:

Amling Flowerland
Roy Amling, Manager
8900 W. North Avenue
Maywood, Illinois

Dramm Greenhouses
E. Gramm, Manager
S. York Street
Elmhurst, Illinois

Balmes Greenhouses
Wilfred Balmes, Manager
1720 Greenbay Road
Waukegan, Illinois

Flowerwood, Inc.
Fred McCannon, Manager
Rts. 14 & 176
Crystal Lake, Illinois

Berlin Greenhouses
George Stuenkel, Manager
Elmhurst, Illinois

Garfield Park Greenhouses
John Lundgren, Chief Horticulturist
Chicago, Illinois

Bezdek & Sons Greenhouses
Joseph Bezdek, Manager
2246 Wilmette Avenue
Wilmette, Illinois

Green Mill Gardens
Don Dobby, Manager
W. Lake Street
Addison, Illinois

Biernacki Greenhouses
Raymond Biernacki, Manager
R.R. #1, Box 153
Blue Island, Illinois

Haigard Brothers Greenhouses
M. Saggan, Manager
2734 W. 111th Street
Chicago, Illinois

Breiter Greenhouses
Bernard Breiter, Manager
780 Church Road
Bensenville, Illinois

Haussermann Orchids
Edwin Haussermann, Manager
Box 636
Elmhurst, Illinois

Breiter Greenhouses
Herman Breiter, Manager
141 Church Road
Bensenville, Illinois

Heinz Greenhouses
Steve Heinz, Manager
464 N. Northwest Highway
Park Ridge, Illinois

Christensen Greenhouses
Victor Christensen, Manager
540 North Northwest
Chicago, Illinois

Kellen Greenhouses
Jacob Kellen, Manager
618 E. Golf
Mt. Prospect, Illinois

Dahms Greenhouses
Mr. Dahms, Manager
800 Oakton
Des Plaines, Illinois

Kellen Greenhouses
Fred Kellen, Manager
618 Greenleaf
Mt. Prospect, Illinois

APPENDIX F - Continued

Kinsch Greenhouses
Val Kinsch, Manager
301 W. Johnson
Palatine, Illinois

Klippert & Sons Greenhouses
Al Klippert, Manager
Oakton St.
Des Plaines, Illinois

Leider Greenhouses
Richard Leider
Dempster Street
Arlington Heights, Illinois

Leider & Sons Greenhouses
M. Leider, Manager
1316 Oakton
Evanston, Illinois

Leider Brothers Greenhouses
J. Leider, Manager
309 E. Green Street
Bensenville, Illinois

McFarland Greenhouses
Frank McFarland
East Rockland Road
Libertyville, Illinois

Nelson & Holmberg Greenhouses
R. E. Holmberg, Manager
3521 Highland Avenue
Berwyn, Illinois

Oechslin Greenhouses
Ernest Oechslin, Manager
2000 Harlem Street
Chicago, Illinois

Oechslin Greenhouses
H. W. Oechslin, Manager
7976 Madison
River Forest, Illinois

Pesches Flowers
Frank Pesches, Manager
170 N. River Road
Des Plaines, Illinois

Schau & Sons Greenhouses
Herman Schau, Manager
10817 South Hale
Chicago 43, Illinois

Scheiden & Sons Greenhouses
Alvin Scheiden, Manager
1855 Mt. Prospect Road
Des Plaines, Illinois

Scheffler Greenhouses
Bert Scheffler, Manager
24W730 Geneva Road
Wheaton, Illinois

Schneider Greenhouses
Henry Schneider, Manager
731 South Harrison
Chicago, Illinois

Schroeder Greenhouses
Nick Schroeder, Manager
6962 N. Hameton Street
Chicago, Illinois

Weiland Brothers Greenhouses
George Weiland, Manager
Aptakistic Road
Prairie View, Illinois

APPENDIX F - Continued

Names and Addresses of Greenhouse Managers in Detroit Area:

Belle Isle Greenhouses
 Frank Blanchard, Manager
 Belle Isle,
 Detroit, Michigan

Pearce Floral Co.
 Charles Coppersmith, Manager
 559 Orchard Lake Avenue
 Pontiac, Michigan

Bordine Greenhouses
 Darrell Bordine, Manager
 1835 So. Rochester Road
 Rochester, Michigan

Post Gardens Greenhouses Inc.
 Spencer Smith, Manager
 21189 Huron River Drive
 Rockwood, Michigan

Boucard & Sons Greenhouse
 Al Boucard, Manager
 17300 Southfield Road
 Detroit, Michigan

Weber Brothers Greenhouses
 Ted Weber, Manager
 10105 W. 10 Mile Road
 Oak Park, Michigan

Coydendall Greenhouses
 Bill Coykendall, Manager
 17155 Martinsville Road
 Belleville, Michigan

Dinser's Flowers
 Jim Dinser, Manager
 Greenfield at 10 $\frac{1}{2}$ Mile Road
 Oak Park, Michigan

Fischer Greenhouses
 Harold Fischer, Manager
 40875 Plymouth Road
 Plymouth, Michigan

Floral Ave. Greenhouses Co.
 Joe Vermeulen, Manager
 154 Floral Ave.
 Mt. Clemens, Michigan

Mt. Clemens Rose Gardens
 Fred Weiss, Manager
 Mt. Clemens, Michigan

Nielsen's Greenhouses Inc.
 Bent Nielsen
 1021 Maiden Lane
 Ann Arbor, Michigan

APPENDIX F - Continued

Names and Addresses of Greenhouse Managers in the Cleveland Area:

Barco Greenhouses
 Art Barco, Manager
 20745 Detroit Road
 Rocky River, Ohio

Schneider & Son Greenhouses
 Ray Andree, Manager
 1943 Northview Road
 Rocky River 16, Ohio

Diederich & Sons Greenhouses
 Mr. Diederich, Manager
 Avoni, Ohio

Volkert & Son Greenhouses
 Jim Volkert, Manager
 South Riverview Road
 Brecksville, Ohio

Hall Gardens
 Burton Hall, Manager
 7288 McKenzie Road
 Olmsted Falls 38, Ohio

Yoder Brothers Greenhouses
 Jake Miller, Manager
 Barberton, Ohio

Hyde Greenhouses
 Bill Hyde, Manager
 Avoni, Ohio

Kaiser Greenhouses
 Eugene Kaiser, Manager
 2157 Northview Road
 Rocky River 16, Ohio

Laisy Greenhouses
 Fred Laisy, Manager
 25746 Butternut Ridge Road
 Rocky River 16, Ohio

Laubinger Greenhouses
 Kurt Laubinger, Manager
 Cleveland, Ohio

Perkins Greenhouses
 Robert Perkins, Manager
 28399 Center Ridge Road
 Westlake, Ohio

Neill Greenhouses
 Mr. Neill, Manager
 2045 Center Ridge Road
 Cleveland 24, Ohio

APPENDIX G

6155 Edgewood Drive
Jackson, Michigan
July 9, 1954

Dear Sir,

I am conducting a survey to determine employment information and training desired for the greenhouse grower.

Dr. Richard Lindstrom, of the Michigan State University Floriculture Department and who is on the faculty advisory committee for this project, suggested that I contact you in order to answer some questions for the study.

I will be in Cleveland July 13th-16th. When I arrive, I will call you to set a time when it might be convenient to see you.

Yours truly,

Warren Parsons

APPENDIX G - Continued

6155 Edgewood Drive
Jackson, Michigan
January 16, 1964

Dear Mr. Lamos,

Thank you very much for your cooperation and participation in my survey entitled "Competencies Needed for the Greenhouse Grower."

I learned many things from my interview with you which will be helpful for the study and also for my teaching of floriculture. I will send you a copy of my findings at the conclusion of the study. Thanks again.

Yours sincerely,

Warren Parsons

APPENDIX H

TOTAL NUMBER OF EMPLOYEES WHO WORKED IN GREENHOUSES THAT PRODUCED MAJOR AND MINOR PLANTS IN POTS

Name of Plant	Number of Employees		
	Major	Minor	Total
Geraniums	1190	195	1385
Chrysanthemums	1233	40	1270
Lilies	999	106	1105
Poinsettias	628	64	692
Azaleas	450	176	626
Gloxinias	180	365	545
Roses	399	74	473
Begonias (tuberous)	32	389	421
Rhododendrons	197	204	401
Kalanchoes	165	235	400
Begonias (root)	197	184	381
Hyacinths	178	193	371
Caladiums	165	202	367
Lantanas	165	195	360
Cyclamens	218	136	354
Hydrangeas	139	205	344
Daffodils	224	93	317
Coleus	194	108	302
Tulips	178	115	293
Impatiens	39	231	270
Orchids	237	24	261
Ageratums	183	73	256
Gardenias	0	251	251
Dahlias	31	214	245
Delphiniums	28	202	230
Vincas	21	203	224
Petunias	183	34	217
Foliage plants	115	99	214
Daisies	28	183	211
Palms	165	37	202
Cacti	165	36	201
Amaryllis	165	32	197
Balsams	0	197	197
Asters	0	197	197
Stock	0	197	197
Marigolds	183	0	183
Carnations	0	165	165
Pansies	165	0	165
Callas	165	0	165
Larkspurs	0	165	165

Continued

APPENDIX H - Continued

Name of Plant	<u>Number of Employees</u>		
	<u>Pots</u>		
	Major	Minor	Total
Phlox	0	165	165
Snapdragons	0	165	165
Verbenas	0	165	165
Zinnias	0	165	165
Cosmos	0	165	165
Stephanotis	0	73	73
Pachysandras	0	56	56
African violets	0	45	45
Primroses	0	39	39
Crocuses	0	39	39
Amazon lilies	0	33	33
Salvias	0	29	29
Alyssums	0	29	29
Vegetables	0	28	28
Ivy	0	17	17
Sweet peas	0	16	16

APPENDIX I

NUMBER OF GREENHOUSES THAT PRODUCED MAJOR AND MINOR POTTED
PLANTS IN RELATIONSHIP TO THE NUMBER OF EMPLOYEES

Name of Plant	Number of Employees						
	1-10	11-20	21-30	31-40	41-50	165	600
Geraniums	13	7	5	3	0	1	1
Chrysanthemums	7	5	5	5	1	1	1
Poinsettias	6	6	6	4	1	1	0
Lilies	6	5	5	3	1	1	0
Azaleas	6	5	1	4	1	1	0
Roses	2	2	1	2	1	1	0
Tulips	2	4	1	2	0	0	0
Hyacinths	2	4	1	2	0	0	0
Foliage plants	2	1	0	1	1	1	0
Hydrangeas	0	2	0	2	1	0	0
Orchids	0	2	0	1	0	1	0
Cyclamens	0	0	1	1	0	1	0
Daffodils	1	1	0	1	0	0	0
Coleus	0	1	1	0	0	1	0
Ageratum	0	0	1	0	0	1	0
Begonias (root)	0	0	0	1	0	1	0
Carnations	0	1	0	0	0	0	1
Gloxinas	0	1	0	0	0	1	0
Impatiens	0	1	1	0	0	0	0
Marigolds	0	0	1	0	0	1	0
Petunias	0	0	1	0	0	1	0
Rhododendron	0	0	0	1	0	1	0
Vinca	0	0	1	0	0	0	0
Palms	0	0	0	0	0	1	0
Vegetables	0	0	1	0	0	0	0
Pansies	0	0	0	0	0	1	0
Kalanchoe	0	0	0	0	0	1	0
Lantana	0	0	0	0	0	1	0
Delphiniums	0	0	1	0	0	0	0
Daisies	0	0	1	0	0	0	0
Dahlias	0	0	0	1	0	0	0
Crocus	0	0	0	1	0	0	0
Caladiums	0	0	0	0	0	1	0
Callas	0	0	0	0	0	1	0
Cacti	0	0	0	0	0	1	0
Begonias (tuberous)	0	0	1	0	0	0	0
Amaryllis	0	0	0	0	0	1	0

APPENDIX J

TOTAL NUMBER OF EMPLOYEES WHO WORKED IN GREENHOUSES THAT PRODUCED CUT FLOWERS AS A MAJOR AND MINOR CROP

Name of Plant	Number of Employees		
	Major	Minor	Total
Chrysanthemums	974	79	1053
Carnations	882	10	892
Snapdragons	61	140	201
Roses	105	4	109
Iris	6	74	80
Callas	0	50	50
Stocks	28	12	40
Amazon lilies	0	33	33
Sweet peas	0	32	32
Gladioli	11	16	27
Orchids	0	22	22
Daffodils	6	15	21
Stephanotis	0	18	18
Delphiniums	0	16	16
Alstroemarias	12	0	12
Lilies	0	4	4
Tulips	0	4	4
Marigolds	0	4	4
Petunias	0	4	4
Pansies	0	4	4
Asters	0	4	4
Dahlias	0	4	4

APPENDIX K

TOTAL NUMBER OF EMPLOYEES WHO WORKED IN GREENHOUSES THAT PRODUCED PLANTS IN FLATS AS A MAJOR AND MINOR CROP

Name of Plant	Number of Employees		
	Major	Minor	Total
Alyssums	155	243	398
Petunias	251	135	386
Salvias	172	186	358
Portulacas	133	195	328
Verbenas	133	195	328
Zinnias	133	195	328
Impatiens	174	152	326
Ageratums	133	187	320
Marigolds	133	186	319
Coleus	133	181	314
Pansies	133	178	311
Asters	133	178	311
Phlox	133	178	311
Balsams	133	168	301
Snapdragons	133	154	287
Dahlias	133	149	282
Daisies	133	130	263
Cosmos	133	126	259
Larkspurs	133	107	240
Delphiniums	133	160	193
Vegetables	0	167	167
Begonias (root)	0	21	21
Daffodils	0	8	8
Tulips	0	8	8
Hyacinths	0	8	8
Gloxinias	0	4	4
Lantanas	0	4	4
Pachysandras	0	4	4

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