The foliage industry in Florida had its beginning in the visions of a "Mr. Powell" of Springfield, Ohio. Powell was sales manager for Springfield Floral Company which sold among other items Boston fern, *Nephrolepis exaltata* Shott. He also owned some land near Orlando, Florida where he knew these ferns were naturalized. The vision was simply the idea to mass produce the relatively high value of Boston fern under Florida's subtropical climate and make them available to everyone at low cost through "five-and-dime" stores. He convinced Harry Ustler, a clerk in the firm, to go into business with him in Florida. Harry Ustler came to Florida in 1912, but failed to receive the backing promised by Mr. Powell. However, he soon found a partner and began growing Boston ferns in Orlando about 1913. The business was moved to Apopka in 1914 because of unavailability of land in Orlando and the die was cast for the present title, "Apopka, The Foliage Capitol of the World".

The present foliage industry grows over 300 kinds of tropical foliage plants. However, the first and almost only plant grown from 1913 until the early 1930's was Boston fern. During the late 1930's other plants similar in cultural requirements to Boston fern appeared in the area. The first foliage plants (other than true ferns) to become part of the industry were species of *Aglaonema*, *Hedera*, *Peperomia*, *Philodendron*, *Sansevieria* and *Syngonium*. The addition of tropical foliage plants to the product line strongly

---

**IN THIS ISSUE**

<table>
<thead>
<tr>
<th>Floridacy's Changing Foliage Industry</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>

| Floriculture Short Course            | 8    |

---
influenced the industry, because growth and quality was superior when these plants were grown in greenhouses rather than in open slat sheds where fern had been grown for over 30 years. Growers began to build glass greenhouses during the early 1940's to provide controlled environment production areas. Construction of glass greenhouses slowed with the advent of low cost plastics and fiberglass which became available during the 1950's and 60's, but is increasing again.

The Florida foliage industry is at present a rapidly expanding industry with more opportunities than problems. Foliage production in Florida during 1972 was nearly 26 million dollars at wholesale, an increase of over 100% during the last 5 years. Table 1 shows the rapid increase in sales and acreage during the period 1948-1972. Unfortunately, sales data of foliage plants are inaccurate because most large specimen material such as Araucaria excelsa Tuss., Chrysalidocarpus lutescens Wendl., Ficus benjamina L., Ficus nidita Thunb. and many others are listed in the woody nursery industry statistics. Therefore their estimated value of nearly 10 million dollars in sales are not included in the above figures. The foliage product line includes rooted cuttings and finished plants in pot sizes from a 1 1/2 ounce whiskey jigger (one inch pot) to 95 gallon containers holding indoor trees. These products are shipped to all parts of North America, mainly by truck, but also by air.

Table 1. Estimated acreage and sales at wholesale of foliage plants in Florida, selected years from 1949-1972.

<table>
<thead>
<tr>
<th>Year</th>
<th>Acreage</th>
<th>Sales (millions of dollars)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1949</td>
<td>---</td>
<td>1.8</td>
</tr>
<tr>
<td>1957</td>
<td>585</td>
<td>12.0</td>
</tr>
<tr>
<td>1961</td>
<td>640</td>
<td>12.3</td>
</tr>
<tr>
<td>1968</td>
<td>605</td>
<td>14.3</td>
</tr>
<tr>
<td>1970</td>
<td>621</td>
<td>15.9</td>
</tr>
<tr>
<td>1972</td>
<td>710</td>
<td>25.7</td>
</tr>
</tbody>
</table>

Florida's foliage industry is a complex conglomeration of large, medium and small growers with owners having vastly different training in ornamentals production. Only in recent years have owners begun to hire college trained personnel to handle grower and manager positions. Of the 117 producers reporting during 1972, over 60% of total sales was accounted for by 13 firms and over 92% was accounted for by 53. However, almost all of the larger firms are supported in part by smaller operations through contract buying of specific items.

Production of tropical foliage plants is as intensive or more so than most other ornamental crops and diversity of the crops grown is a major problem facing many growers. Although estimated data for 1967 indicates that only 14 genera made up 77% of the industry (Table 2), this is not true today, because of a shift by consumers away from some of the standard items of several years ago. During the last 5 years sales of Philodendron have

---

See footnote 2.
increased the least, while substantial gains have been made with Aglaonema, Aphelandra, Brassaia, Dracaena, Ferns and Palms. In addition, smaller items such as terrariums and dish gardens and large items, such as specimens and trees have experienced the largest increase during the past few years.

Table 2. Importance of specific genera of foliage plants in the Florida industry, 1967.

<table>
<thead>
<tr>
<th>Plant genus</th>
<th>Distribution (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Philodendron</td>
<td>35.6</td>
</tr>
<tr>
<td>Dieffenbachia</td>
<td>7.2</td>
</tr>
<tr>
<td>Ficus</td>
<td>6.4</td>
</tr>
<tr>
<td>Scindapsus</td>
<td>6.3</td>
</tr>
<tr>
<td>Sansevieria</td>
<td>5.6</td>
</tr>
<tr>
<td>Dracaena</td>
<td>4.4</td>
</tr>
<tr>
<td>Syngonium</td>
<td>3.3</td>
</tr>
<tr>
<td>Collinia</td>
<td>2.1</td>
</tr>
<tr>
<td>Peperomia</td>
<td>1.5</td>
</tr>
<tr>
<td>Hoya</td>
<td>1.4</td>
</tr>
<tr>
<td>Aglaonema</td>
<td>1.2</td>
</tr>
<tr>
<td>Spathiphyllum</td>
<td>1.1</td>
</tr>
<tr>
<td>Maranta</td>
<td>0.7</td>
</tr>
<tr>
<td>Pilea</td>
<td>0.2</td>
</tr>
<tr>
<td>All others†</td>
<td>33.0</td>
</tr>
</tbody>
</table>

†See footnote 2.

†This includes 10.8% combinations which are mixtures of the above plant genera.

Location

In Florida tropical foliage is produced primarily in two areas: Central Florida - Apopka, Plymouth and Zellwood areas with an estimated 375 acres; and Southeast Florida - Miami and Homestead areas with an estimated 335 acres. Generally production in these two areas is quite different because of climate and crops grown. Although there is little difference in acreage, there is a large difference in crop value because Central Florida growers obtain twice the income per acre compared to South Florida growers and therefore, Central Florida accounts for about two-thirds of sales.

The climate in the Central Florida area is characterized by frequent frosts with temperatures as low as 25°F most winters. This necessitates heated, enclosed structures which increases production costs. Foliage plants grown in Central Florida are primarily smaller pot sizes (from 1 to 6 inches), although some larger material is grown. Some of the reasons Apopka became the center of foliage production include land availability, good soil type for ground beds,
adequate supply of high quality water, mild climate with high humidity, location outside of the hurricane belt, and access to transportation. Present major expansions in the area are still based on these factors.

In South Florida the climate is characterized by infrequent frosts and temperatures seldom below 30°F most winters. South Florida growers have been able to produce foliage in open fields and under shaded nonheated structures. Generally, greater emphasis has been placed on growing larger (6 inch and up) specimen foliage in South Florida rather than smaller sized material. Although this practice results in decreasing production costs, it also lowers gross sales per acre. Profitability, or return on investments, have been nearly equal in both sections of Florida.

Structures

Tropical foliage plants are grown in almost every type of facility including glass, fiberglass and film plastic greenhouses, shade structures of slats or shade cloth (Polypropylene and Saran) and open fields. The latest data shows that of the 710 acres in production, 127 are under glass or fiberglass, 324 are under temporary plastic or slat houses and the remaining 259 acres are open field production. Nearly all of the open field and temporary plastic or slat house production is on ground beds, while approximately 75% of the production in glass and fiberglass greenhouses is on raised benches.

Considerable industry growth is occurring at present as would be expected from the production figures in Table 1. For the most part, new facilities in Central Florida are constructed of glass and fiberglass and are equipped with automatic heating, fan and pad cooling, raised benches and automated irrigation and fertilization equipment. About 60% of the new construction replaces older slat sheds and plastic film or rigid KDA greenhouses. In South Florida, new construction is centered around polypropylene shade structures to replace previous open field production and fiberglass greenhouses to obtain better climatic control.

Foreign Production

A recent adjunct to the Florida foliage industry has been the development in Central America of large foliage businesses owned by U. S. citizens which produce stock and ship unrooted and rooted cuttings into the U. S. Although these operations do not seem to be economically affecting U. S. producers, they are not looked upon with favor by many growers. At present, these foreign producers are not allowed to ship soil into the U. S., and therefore, they are unable to compete against finished foliage products.

Foliage Research

Research on foliage plant production has been relatively limited for many years, and cultural practices utilized throughout the industry have until recently been developed primarily by growers. For the most part, these cultural methods produced satisfactory foliage plants, but did not maximize profit or produce highest quality.

One of the main production obstacles has been the failure of many growers to identify proper growing conditions for the varied genera and species. This has been particularly troublesome in the areas of light intensity, nutrition and soil medium requirements.
The main portion of foliage plants grown by the industry are native to tropical and subtropical areas of the world. In these areas most species are found growing on or under trees in reduced light intensity, usually in organic soils with high moisture holding capacities and medium to high cation exchange capacity. Therefore, foliage growers have over the years developed cultural programs which utilize organic soils, reduced light intensities and relatively high fertilization and irrigation levels.

With the establishment in 1969 of the Agricultural Research Center - Apopka, (ARC-A) the growers had for the first time a group of professionals organized for the sole purpose of developing research programs to overcome factors responsible for limitations in foliage production. By utilizing research information generated over the years at other universities on foliage and other floricultural crops and initiating additional research in specific areas a number of problems have been solved. Some of these problem areas are among the major production decisions to be made by foliage growers.

**Light Problems**

Foliage growers have always been faced with decisions concerning light intensities, or conversely, the amount of shade to utilize on foliage crops. Growers generally found that most stock plantings had fewer nutritional problems and better color under heavy shade (80% reduction or more). Therefore, although growers had some knowledge of shading requirements on their crops, they considered this from the appearance standpoint and did not consider yield per unit area. During the past several years research at ARC-A has provided information on the influence of shade levels on yield of cuttings from stock plants. Specific light intensity recommendations for several of the more important genera are listed in Table 3. Generally, most of the foliage crops presently grown under heavy shade (80% or more light reduction) will yield from 20 to 60% more if shade level is reduced to 60% and nutritional level increased approximately 25%.

<table>
<thead>
<tr>
<th>Genus</th>
<th>Light Intensity (ft-c)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aglaonema</td>
<td>2500 - 3000</td>
</tr>
<tr>
<td>Aphelandra</td>
<td>1500 - 2000</td>
</tr>
<tr>
<td>Dieffenbachia</td>
<td>3000 - 3500</td>
</tr>
<tr>
<td>Dracaena</td>
<td>3500 - 4000</td>
</tr>
<tr>
<td>Ficus</td>
<td>4000 - 5000</td>
</tr>
<tr>
<td>Peperomia</td>
<td>3000 - 3500</td>
</tr>
<tr>
<td>Philodendron</td>
<td>3000 - 4000</td>
</tr>
<tr>
<td>Scindapsus</td>
<td>4000 - 5000</td>
</tr>
<tr>
<td>Syngonium</td>
<td>3000 - 4000</td>
</tr>
</tbody>
</table>
Nutritional Problems

Nutritional requirements of foliage plants have been examined by researchers on a few genera. However, there are wide variations between genera, as could be expected. A major consideration in fertilization of foliage crops is whether they are grown in shade structures or outside, where they are subjected to rainfall, or in greenhouses. A second consideration is the effect light intensity has on nutritional requirements. Plants grown under heavy shade are unable to utilize high levels of fertilizer because of low photosynthetic rate, while those under high light need high levels. Therefore, to maximize production of high quality plants the proper interaction of light intensity and nutritional level must be determined and employed. Unfortunately, at this time, this has been accomplished on relatively few genera. For example, the most desirable shade level for Philodendron oxycardium cutting production under Florida conditions is 60% which will maximize yield when approximately 1800 lb. N and K are utilized/acre/yr. Under 80% shade, 1200 lb. N and K produces maximum yield, which is 50% less than the maximum under 60% shade.

Soil Media

Media utilized for ground bed stock production are generally composed of native sand and peat moss in a 2:1 to 3:1 combination by volume at a 6 inch depth. Media for potted plant production are usually composed of various organic components such as peat moss, pine bark and cypress shavings with small portions of inorganic materials such as mason sand, perlite and calcined clay. One commonly used potting mixture includes combinations of 2 parts peat moss: 1 part bark: 1 part cypress shavings by volume.

A major objective of growers is to produce a satisfactory medium at the lowest cost possible. This objective often results in combining media components that do not provide desirable water and nutrient holding capacities while maintaining good aeration and drainage. This is further complicated by the often common grower practice of compacting the medium in containers when potting especially when pots contain more than one plant. Although cost of media is a relatively small portion of the total production costs growers are quick to discard high-cost-per-cubic-yard mixtures, especially when additional labor costs are involved in their preparation.

Disease Problems

Florida's climate, so conducive to plant growth, is also ideal for the development of disease-causing plant pathogens. Identification and control of these foliage plant pathogens has been an area of intensive study at ARC-A during the past 4 years. Research information obtained has helped growers realize and identify their major disease problems and has given them the choice of safe and effective chemical controls, previously non-existent for many foliage diseases. Several reports covering the description and control of the more common diseases of foliage plants have been produced and found quite beneficial to growers of tropical foliage plants.

Future emphasis in plant pathology is being directed in the area of disease-free production of foliage plants and the cultural changes needed for its implementation. One new area of study is that of non-chemical disease control and includes research designed to investigate the possibility of biological control of soil-borne fungal pathogens with other soil-inhabiting microorganisms.
Pest Problems

A major problem facing the foliage industry is the lack of factual information needed to guide the grower in the most efficient utilization of the various insect and nematode control measures. Most pesticides currently used for pest control by the foliage grower were not developed specifically for the ornamental industry. With the enormous number of foliage species and cultivars under cultivation within this vastly expanded industry, information on application rates and phytotoxic reactions of specific plant species is needed. Cultural techniques that minimize the impact or prevent the initiation of pest problems, such as the use of raised benches and cultural sanitation measures, need additional development and incorporation into the foliage industry.

Currently the foliage grower usually is able to recognize larger or more conspicuous pest problems, i.e. aphids, mealybugs, scales, leaf miners, caterpillars and root-knot nematodes. However, where the pest is hidden from his view by either its size or place of development such as bud mites and soil inhibiting nematodes, the problem often remains undiagnosed and hence untreated. From this lack of correct identification, unsatisfactory growth or production is frequently believed to have resulted from other cultural or physiological factors.

The Future

As the population continues to grow and the individual in modern society becomes further and further removed from nature, the demand for living green plants in his immediate surroundings increases. Tropical Foliage plants are excellent for indoor culture because they are able to survive environmental conditions unfavorable to most temperature zone plants.

Florida's foliage growers recognize the need for plants and are rapidly expanding their operations to supply the demand. However, they also recognize the need to supply a quality product with point of sale information on placement in the home and cultural directions. Certainly, improved cultural and plant use recommendations will do much to improve consumer satisfaction and allow Florida to maintain its leadership in foliage production.

This article was adapted from HortScience, Volume 8(6): December 1973.

Florida Foliage Grower edited by
Richard W. Henley
Associate Ornamental Horticulturist (Ext.-Foliage)
Agricultural Research Center, Apopka, Fla.

This public document was promulgated at an annual cost of $142.10 or .04 cents per copy to inform county and state extension personnel, foliage growers, marketers and allied trades of research results and improved practices in ornamental horticulture.

To simplify information in "Florida Foliage Grower" it is sometimes necessary to use trade names of products, equipment and firms. No endorsement of named products is intended nor is criticism implied of similar products which are not mentioned.
REGISTER NOW FOR THE

** 1974 ** FLORICULTURE SHORT COURSE

Tues. April 30 - Wed. May 1 - Thurs. May 2

Where???????? SHERATON SAND CASTLE on beautiful Lido Beach, SARASOTA

* see hot tip below

PROGRAM

Tuesday: don't miss MASS MARKETING
IMPORTS by those who know PLUS industry panel
COOPERATIVES - Are they for us?
GOVERNMENT in your life - the big brother twins OSHA & FEPCA
be sure to listen to LABOR & AGRICULTURE
SOCIALIZE with your friends and fellow flower growers
CELEBRATE the golden anniversary of the Bradenton Research Station

Wednesday: hear the latest RESEARCH HIGHLIGHTS from the horses mouth
TOUR the largest research center for cut flowers in the world
TALK person to person with scientists doing research on your crops
FEAST under the palms at a genuine HAWAIIAN LUAU (included in registration)
AUTHORITATIVE

Thursday: SPEAKERS on points, glads, statices, bedding plants, etc.
a panel on the use of STRUCTURES for CLIMATE CONTROL in the sunny south
COST ANALYSIS report on gladiolus and chrysanthemum production
a look at MECHANICAL INNOVATIONS for flower growers
last but not least, a peek into the CLOUDY CRYSTAL BALL

hot tip: A big block of rooms are reserved till 15 days prior. All are one price but some are better rooms. These deluxe rooms go on first come first serve basis. So send in your room reservation today to: Sheraton Sand Castle 1540 Benjamin Franklin Dr. Lido Beach, Sarasota, FL 813/388-2181 33577

FEES: Registration fee includes attendance at all sessions, bus trip to research center and return, and luau. The fee is $25.00 for the first registrant from a firm or organization and $12.50 for each additional registrant from that firm or organization.
MAKE CHECKS PAYABLE TO: Florida Cooperative Extension Service.
SEND FORM AND CHECK TO: Florida Floriculture Short Course Ornamental Horticulture Dept. University of Florida Gainesville, Florida 32611

REGISTRATION FORM --------- 1974 Florida Floriculture Short Course, Apr. 30, May 1 & 2

NAME OF FIRM

ADDRESS

PHONE

1st REGISTRANT

ADDITIONAL REGISTRANTS