CONSUMER RESPONSE TO CONTAINERIZED FOLIAGE PLANT COMBINATIONS

By

EMILY ANNA STEFANSKI

A THESIS PRESENTED TO THE GRADUATE SCHOOL
OF THE UNIVERSITY OF FLORIDA IN PARTIAL FULFILLMENT
OF THE REQUIREMENTS FOR THE DEGREE OF
MASTER OF SCIENCE

UNIVERSITY OF FLORIDA

2008

To my family, friends, and fiancé.

ACKNOWLEDGMENTS

The completion of my degree would not have been possible if not for the assistance and support of many people. My greatest debt of gratitude is to my major professor, Dr. James L. Gibson, for his tremendous dedication to my success and the countless hours spent guiding me through my program. He is truly one of the most unselfish people I have ever had the pleasure of meeting and working with.

I wish to thank my supervisory committee members (Drs. Tracy A. Irani, James E. Barrett, and Terril A. Nell) for all of their guidance and support. In addition to my committee members, I would like to express my appreciation to all the faculty and staff of the Environmental Horticulture Department both in Gainesville and Milton. They answered my questions along with providing assistance and direction over the last two years.

I would also like to thank the National Foliage Foundation for grant support along with Agri-Starts and ForemostCo for numerous foliage plant donations. For the opportunity to utilize their garden centers for research, appreciation is given to Chris and Kim Carter of Nobles Greenhouse in Live Oak, FL; and to Kevin and Theresa Riley of Rockledge Gardens in Rockledge, FL. I am grateful for the hard work the owners and staff at both garden centers committed to including the research setup and data collection.

All of this would not have been possible though without the love and support of my family and friends. I am blessed to have parents and a family that continues to motivate me to succeed. For my friends, old and new, they have helped to keep me grounded and not take life too seriously. And finally I would like to acknowledge my fiancé, Jeff, who has been there from the start of my graduate career and has bared the blunt of my many struggles and the joys of my accomplishments; he is truly a saint.

TABLE OF CONTENTS

page

ACKNOWLEDGMENTS 4

LIST OF TABLES 8

LIST OF FIGURES 11

ABSTRACT 12

CHAPTER

1 LITERATURE REVIEW 14

Introduction 14
Florida's Wholesale Floriculture Industry 15
Container Gardening Trends 16
Plant Growth Regulators in the Foliage Industry 17
Paclobutrazol 18
Flurprimidol 20
Foliage Plant Marketing 21
Consumer Behavior 22
Marketing Survey 26
Product Placement 28
Objectives 29

2 GROWTH RESPONSE OF FOLIAGE PLANTS TO FLURPRIMIDOL AND PACLOBUTRAZOL 30

Introduction 30
Materials and Method 33
Experiment 1 33
Data Analysis 34
Experiment 2 34
Data Analysis 37
Plant growth regulator treatments in individual and combination containers 37
Consumer survey 37
Results 37
Experiment 1 37
Flurprimidol and paclobutrazol sprays 37
Flurprimidol and paclobutrazol drenches 39
Experiment 2 42
Plant growth regulator treatments in individual containers 42
Plant growth regulator treatments in combination containers 42
Consumer survey 43
Conclusion 46

3 FOLIAGE PLANT CONTAINER GARDEN PILOT STUDIES 61

Introduction 61
Consumer Purchase Behavior 63
Marketing Survey 66
Survey population and sample size 68
Instrumentation 69
Survey procedures 69
Threats to validity 70
Product Placement 70
Materials and Methods 72
Pilot Study 1 72
Data Analysis 73
Pilot Study 2 74
Pilot Study 3 75
Data Analysis 76
Results 77
Pilot Study 1 77
Pilot Studies 2 and 3 78
Conclusion 80

4 IMPACT OF FOLIAGE PLANT CONTAINER GARDEN SALES THROUGH IDENTIFYING CONSUMER NEEDS, TRENDS AND PREFERENCES 91

Introduction 91
Materials and Methods 93
Results 96
Conclusion 102

5 RESEARCH SUMMARY 112

APPENDIX

A PRODUCT PLACEMENT ZONES WITHIN A GARDEN CENTER 121

B INFORMED CONSENT STATEMENT 122

C FOLIAGE PLANT DONATION REQUEST 123

D PLANT GROWTH REGULATOR INSTRUMENTATION 124

E FOLIAGE CONTAINER GARDEN PILOT STUDY 1 INSTRUMENTATION 125

F PLANT SALE INSTRUMENTATION 127

G GARDEN CENTER INSTRUMENTATION 129

H FOLIAGE CONTAINER GARDEN STUDY INTRODUCTION 131

I INSTRUCTIONS FOR ADMINISTERING INSTRUMENT 134

J FOLIAGE CONTAINER GARDEN INFORMATION SHEET 136

K FOLIAGE CONTAINER GARDEN PRICE SIGN.....137

L TYPE 1 INFORMATIONAL SIGN FOR FOLIAGE CONTAINER GARDEN 138

M TYPE 2 INFORMATIONAL SIGN FOR FOLIAGE CONTAINER GARDEN 139

N TYPE 3 INFORMATIONAL SIGN FOR FOLIAGE CONTAINER GARDEN 140

LIST OF REFERENCES.....141

BIOGRAPHICAL SKETCH 145

LIST OF TABLES

Table page

2-1 *Colocasia esculenta* 'Nancy's Revenge' pooled data nine weeks after foliar spray treatments of flurprimidol and paclobutrazol (Expt. 1). 50

2-2 *Colocasia esculenta* 'Gigantea' pooled data nine weeks after foliar spray treatments of flurprimidol and paclobutrazol (Expt. 1). 50

2-3 *Xanthosoma violaceum* pooled data nine weeks after foliar spray treatments of flurprimidol and paclobutrazol (Expt. 1). 51

2-4 *Colocasia esculenta* 'Nancy's Revenge' pooled data nine weeks after substrate drench treatments of flurprimidol and paclobutrazol (Expt. 1). 51

2-5 *Colocasia esculenta* 'Gigantea' pooled data nine weeks after substrate drench treatments of flurprimidol and paclobutrazol (Expt. 1). 52

2-6 Visual quality of *Xanthosoma violaceum* by week using flurprimidol and paclobutrazol substrate drenches (Expt. 1). 52

2-7 *Xanthosoma violaceum* pooled data nine weeks after substrate drench treatments of flurprimidol and paclobutrazol (Expt. 1). 53

2-8 *Cordyline* 'Sundance' six weeks after substrate drench treatments of flurprimidol and paclobutrazol (Expt. 2). 53

2-9 *Asparagus densiflorus* 'Sprengeri' six weeks after substrate drench treatments of flurprimidol and paclobutrazol (Expt. 2). 54

2-10 Pooled data nine and 12 weeks after treatment of flurprimidol and paclobutrazol drench effects on combination containers composed of *Cordyline* 'Sundance', *Ardisia humalis*, and *Asparagus densiflorus* 'Sprengeri' (Expt. 2). 55

2-11 Foliage container garden preference by consumer group (Expt. 2). 55

3-1 Pilot Study 1 traditional foliage plant combinations. 84

3-2 Pilot Study 2 foliage plant combinations. 84

3-3 Pilot Study 3 foliage plant combinations. 85

3-4 Income ranges of respondents of Pilot Study 1. 85

3-5 The level of education achieved by each respondent in Pilot Study 1. 85

3-6 Age ranges of respondents of Pilot Study 1. 86

3-7 How often the respondents typically purchase plants in Pilot Study 1. 86

3-8 The gardening level indicated by the respondents in Pilot Study 1. 86

3-9 Familiarity of plants within the foliage plant container gardens in Pilot Study 1. 86

3-10 The aspect(s) that drew consumers to the foliage container garden display in Pilot Study 1. 87

3-11 The reason(s) the consumer purchased a foliage plant container in Pilot Study 1. 87

3-12 Pilot Study 2 consumer purchasing location results. 87

3-13 Pilot Study 2 foliage combination sales. 88

3-14 Pilot Study 3 foliage combination sales. 88

3-15 Post-purchase survey results for reason of foliage container garden purchase. 88

3-16 Post-purchase survey results for frequency of plant purchases. 88

3-17 Post-purchase survey results of length of gardening involvement. 89

3-18 Post-purchase survey results for familiarity of plants within the container gardens they were purchasing. 89

3-19 Gender of Pilot Studies 2 and 3. 89

3-20 Age ranges of respondents of Pilot Studies 2 and 3. 89

3-21 Income ranges of respondents of Pilot Studies 2 and 3. 90

3-22 Highest education level achieved by respondents of Pilot Studies 2 and 3. 90

3-23 Number of adults 18 years old or older living in the household for Pilot Studies 2 and 3. 90

3-24 Number of children under 18 years old living in the household for Pilot Studies 2 and 3. 90

4-1 Foliage plant container garden combinations for Florida garden centers. 107

4-2 Sales of foliage plant container gardens over the course of the study. 107

4-3 Florida garden center patterns of foliage container garden purchases. 107

4-4 Foliage container garden combinations purchased at Florida garden centers. 108

4-5 Data from Nobles Greenhouse during each study period on foliage container sales by product category and by total sales. 108

4-6 Data from Rockledge Gardens during each study period on foliage container sales by product category and by total sales. 108

4-7 Nobles Greenhouse's customer count data and number of customers purchasing foliage plant container gardens during each study period. 108

4-8 Rockledge Gardens' customer count data and number of customers purchasing foliage plant container gardens during each study period. 109

4-9 Tropical foliage plant product category sales compared to the overall total sales at both Florida garden centers during each study period. 109

4-10 How often foliage plant container garden consumers make plant purchases on a yearly basis. 109

4-11 Foliage plant container garden consumer's familiarity with the plants they purchased. ..110

4-12 Yearly income of those that purchased foliage plant container gardens at Florida garden centers. 110

4-13 Education level of those that purchased foliage plant container gardens at Florida garden centers. 110

4-14 Average temperatures and precipitation in Live Oak and Rockledge, Fla. during each two week study period in 2007 including the normal temperatures and precipitation expected. 111

5-1 Foliage plant container garden combinations that yielded the most sales during Pilot Studies 1, 2, and 3, along with Florida area garden centers. 120

LIST OF FIGURES

Figure page

2-1 *Colocasia esculenta* 'Nancy's Revenge' plant height response to plant growth regulators (Expt.1). 56

2-2 *Colocasia esculenta* 'Gigantea' plant height response to plant growth regulators (Expt. 1). 57

2-3 *Colocasia esculenta* 'Nancy's Revenge' plant diameter response to plant growth regulators (Expt. 1). 58

2-4 *Colocasia esculenta* 'Gigantea' plant diameter response to plant growth regulators (Expt. 1). 59

2-5 Visual difference 12 weeks after treatment of increasing concentrations of flurprimidol treated plants planted together in container gardens (Expt. 2). 60

A-1 An illustration of where the landing, transition, and destination zones are within a garden center. 121

Abstract of Thesis Presented to the Graduate School
of the University of Florida in Partial Fulfillment of the
Requirements for the Degree of Master of Science

CONSUMER RESPONSE TO CONTAINERIZED FOLIAGE PLANT COMBINATIONS

By

Emily Anna Stefanski

August 2008

Chair: James L. Gibson
Cochair: Terril A. Nell
Major: Horticultural Science

The introduction of new and vigorous tropical foliage plants initiated a series of plant growth regulator (PGR) experiments, along with interpreting surveys on consumer preferences of foliage plant container gardens. In the first set of PGR experiments, tropical foliage plants *Colocasia esculenta* 'Nancy's Revenge', *Colocasia esculenta* 'Gigantea', and *Xanthosoma violaceum* were treated with paclobutrazol and flurprimidol applied as a spray or substrate drench. Spray concentrations ranged from 20 to 80 mg/L and substrate drench concentrations ranged from 0.5 to 2.0 mg active ingredient (a.i.) per pot to determine the most effective, cost-efficient application method and chemical. Substrate drenches were the most effective for *Colocasia* resulting in the best control of both plant height and spread, however excessive stunting occurred with *Xanthosoma*. *Xanthosoma violaceum*, a smaller leaved foliage plant, responded best to foliar sprays of paclobutrazol at 20 mg/L ($0.02 per pot).

In the second experiment *Cordyline* 'Sundance', *Ardisia humalis*, and *Asparagus densiflorus* 'Sprengeri' were treated with substrate drenches of paclobutrazol and flurprimidol. Substrate drench concentrations ranged from 0.25 to 4.0 mg a.i. per pot. At 6 weeks after treatment single, similarly treated plants of *Cordyline* 'Sundance', *Ardisia humalis*, and *Asparagus densiflorus* 'Sprengeri' were transplanted together into 24.1cm x 30.5cm (12-inch)

round terra-cotta colored plastic containers. After measuring carry-over PGR efficacy a representative container garden from each flurprimidol treatment was presented to consumers to measure their preferences on size, price, and intent to buy. Results indicated the recommended price range was $10.00 to $19.99 for 12-inch sized container gardens composed of three foliage plants. Plant sale consumers preferred the most robust (untreated control) container garden, while industry professionals and master gardeners preferred a moderately controlled foliage container (flurprimidol at 0.50 and 1.0 mg a.i.). As for the respondent's intent to buy, no factors within this study explained why they would or would not purchase the container.

The third experiment was a directly administered survey that collected preferences and demographics of consumers purchasing foliage plant container gardens. This experiment included multiple pilot studies in preparation for the industry-based study conducted at Florida garden centers in the summer and fall of 2007. Implementing this study at actual retail outlets allowed further insight into the possibility of using tropical foliage plants in outdoor combination container gardens. Three studies took place at Nobles Greenhouse in Live Oak, Fla. and Rockledge Gardens in Rockledge, Fla. A collection of similarly produced foliage plant container gardens were displayed in three different areas of the garden center: landing, transition and destination zones. Consumers purchasing foliage container gardens during both the pilot studies and the Florida garden centers corresponded to demographics of the national container gardening statistics (Natl. Gardening Assn., 2007). These consumers indicated unfamiliarity with the foliage plant material and impulse purchase behavior which may indicate a need for additional marketing strategies. Also the majority of consumers at both garden centers recalled seeing all three container garden displays in the store, however most chose to purchase from the transition and destination zone. This data may show the possible benefits of having multiple displays.

CHAPTER 1
LITERATURE REVIEW

Introduction

Gardening is a popular hobby of American homeowners, unfortunately a decline in lawn care and garden activity has recently occurred. Nationwide participation in lawn and garden activities decreased by 7% from 91 million (Mn) in 2005 to 85 Mn households in 2006 (Natl. Gardening Assn., 2007). Furthermore, the average gardening expenditure per household only increased by 3% from $387.00 to $401.00. Despite the grim national gardening profile, households in the southern U.S. (South Carolina, Georgia, Alabama, Louisiana, Mississippi, Virginia, North Carolina, Florida, Tennessee, Arkansas, Oklahoma, Texas and Kentucky) continue to engage in gardening activities and have spent the most on their lawns and gardens, when compared to other regions of the United States (Natl. Gardening Assn., 2007).

In recent years, Florida has experienced steady growth in retail garden center sales with $3.64 Billion (Bn) generated in 2000 to $6.97 Bn in 2005 (Hodges and Haydu, 2006). One of the contributing factors to this increase is due to Floridian consumers shopping aggressively at garden centers year-round. Among 910 Florida garden center customers interviewed statewide, 98% shopped in the spring, 82% shopped again in the summer, 89% shopped for horticulture products in the fall and 77.5% shopped again in winter (Satterthwaite and Haydu, 2004). Urban sprawl is another contributing factor that has helped increase sales at retail garden centers by way of increased demand for locally produced plant products. From 2000 to 2005, Florida's population increased by 11.3% to 17.8 million people (U.S. Census Bureau, 2007). Florida is now one of the leading states for urban sprawl in the country (Bouvier and Stein, 2001); each day 750 people reach permanent Florida residence status (U.S. Census Bureau, 2003). University of Florida economists Satterthwaite and Haydu (2004) report that Florida maintains its market share

of environmental horticulture crops because it is the fourth most populous state (in 2000) with an annual growth rate of 2.3%. The economists also state that Florida's home building industry remained active during 2000, and subsequently increased the demand for landscape plants.

Florida's Wholesale Floriculture Industry

In terms of overall environmental horticulture industry value, Florida is a leading state, ranked second to California (Hodges and Haydu, 2006). Florida is primarily recognized for large-scale, wholesale bedding plant and woody ornamental production. Another major component of Florida's floral industry is tropical foliage plants; the state dominates this category with 74% share of the national wholesale value (USDA Floriculture Crops Summary, 2008). In addition to the favorable climate for plant production, Florida dominates the foliage market because plant breeders and growers continually introduce new genera and cultivars (Chen et al., 2002). The amount of popular foliage plant species has steadily increased since the 1970's (Henny and McConnell, 2002). In 2005, foliage plants represented $476 Mn of the $976 Mn in total Florida floriculture crop sales, and were second only to woody shrub sales (Hodges and Haydu, 2006). This is a substantial increase from the late 1960's when foliage crops first became economically significant. By the late 1970s Florida foliage represented only $15 Mn in wholesale value (Conover, 1998). Foliage plants have become a major economic commodity in a relatively short period of time and according to the 2008 USDA Floriculture Crops Summary the total value of wholesale foliage plant production was estimated at $630 Mn, which was a 19% increase from 2006. In recent years though, there has been some discrepancy with the USDA's report on foliage plants with the large decline in sales and number of producers reported in 2006. The more actual picture of the foliage industry is the value of wholesale foliage plant production has steadily increased from $574 Mn in 2000 and has since recovered from the

hurricane destruction of 2004 (J.E. Barrett, personal communication; USDA Floriculture Crops Summary, 2008).

Container Gardening Trends

Container gardening originated in Europe in the 1980s as a way to garden in small spaces; by the early 1990s, this activity was introduced in North America to meet the demands of increased urbanization and has become a staple in the horticulture industry (Ouellet, 2001). Between 1999 and 2004 the National Gardening Association (2007) reported that container gardening doubled in popularity with upwards of 26 Mn households participating nationwide. In response to the popularity of container gardens, there has been an increase in demand for new and unique plant varieties along with a surge in sales of bedding and garden plants (Ouellet, 2001). To determine what consumers are looking for in a container garden, a recent online survey by Mason et al. (2008) examined the consumer preferences of three container gardening attributes; color harmony, price and care information provided. The survey had 985 respondents that answered questions on past experience and future intentions of container gardening. The researchers found that the respondents considered $24.99 an appropriate price for a container garden composed of plants that reflected complementary color harmony. Another important finding was that if detailed care information was provided with the container garden, 76% of the respondents would more likely purchase and 85% would consider visiting a website to obtain further information on container gardening. Also, consumers stated they would likely return to the garden center to purchase additional plant material to replenish their container garden.

In 2006, the national key consumer groups for container gardening sales were women (62% of sales), college-educated households (91% of sales), two-person households (38% of sales), households with no children (70% of sales) and households with incomes of $50,000 and over (52% of sales) (Natl. Gardening Assn., 2007). An upward trend in container gardening has

significantly contributed to national and regional horticulture retail sales. In 2006, the southern states had the second highest percentage of total sales (27%) just behind the western U.S. (32%) in the container gardening category which has an average total retail sale value of $1.203 Bn (2000 through 2006) (Natl. Gardening Assn., 2007). As a staple in the industry, container gardens require new and unique plant material with increased educational and promotional materials to continually create interest and appeal for the product. These efforts will help to maintain container gardens in the growth phase of the product lifecycle.

Plant Growth Regulators in the Foliage Industry

Plant growth regulation is defined as "any chemical process used to produce a specific growth response" such as increased rooting or uniform rooting on cuttings, stimulation of seed germination, control of root and shoot growth in tissue culture propagation, and induction or retardation of stem elongation (Dole and Wilkins, 2004). Chemical growth retardants are the most commonly used and commercially important plant growth regulators (PGRs) in floriculture that limit stem elongation of container grown plants to produce a more compact plant (Gaston et al., 2002). Growth regulating chemicals usually affect plant hormone levels which define and direct plant growth; gibberellins are one such endogenous plant growth regulator. Gibberellins are responsible for shoot elongation, thus anti-gibberellin compounds are commonly used to control height (Dole and Wilkins, 2004). For the highest efficacy, growth retardants require application prior to or during the rapid growth phase to reduce internode elongation (Dole and Wilkins, 2004). The effects of stem elongation can not be reversed; however, the application of growth retardants can slow the process.

The wholesale production growth control standards for plant height are typically 20 to 35% shorter plants, when compared to untreated plants (B.E. Whipker, personal communication). Plant diameter wholesale standards normally range from 15 to 25% smaller plants, when

compared to untreated plants. For perennial plant growers, Thomas et al. (1997) established a 30% height reduction assessment point when chemical regulation is used. Other effects of a chemical growth retardant treatment is the production of a stockier plant with thicker stems that produce higher survival rates during shipping, along with the aesthetic benefit of greener foliage (Dole and Wilkins, 2004).

Foliage plants are one such container grown plant that can benefit from the use of PGRs to control plant size (height and spread). Foliage plants tend to be lush and bold in size making them sometimes appear disproportionate with the container during production. Interiorscape displays of foliage plants demand tidy plants that do not appear leggy and overgrown. There is a need to investigate the use of PGRs to control growth of new foliage genera and cultivars in small and large containers.

Paclobutrazol

Paclobutrazol ((+)-(R*,R*)-β([4-cholorphenyl]methyl-α-(1,1-dimethylethyl0-1*H*-1,2,4-triazole-1-ethanol) (Bonzi, Syngenta Crop Protection, Greensboro, N.C.) has been proven effective on several foliage plants (Conover, 1994; Cox and Whittington, 1988; Poole and Conover, 1992; Pulley and Davis, 1986; Wang and Blessington, 1990). Substrate drenches of paclobutrazol are one such method for effectively controlling a range of upright and spreading foliage plants. Pulley et al. (1986) applied paclobutrazol drenches of 0.1 and 0.5 mg a.i. per pot to croton (*Codiaeum variegatum*), ficus (*Ficus benjamina*), Swedish ivy (*Plectranthus forsteri*), and wandering jew (*Tradescantia zebrina*). All treatments significantly reduced shoot growth of all four species eight weeks after treatment. Poole et al. (1992) treated angel-wing begonia (*Begonia coccinea*), schefflera (*Schefflera actinophylla*), 'Petra' croton (*Codiaeum variegatum*), golden pothos (*Scindapsus aures*), purple passion plant (*Gynura aurantiaca*), 'Duda Red' hibisicus (*Hibisicus* sp.), 'Double White' hibisicus (*Hibisicus* sp.), and 'China Doll'

rademachera (*Rademachera sinica)* with paclobutrazol substrate drenches between 0.25 and 1.0 mg a.i. per pot. Shorter and smaller plants of all eight species were produced with a paclobutrazol drench 11 weeks after treatment (WAT). The largest significant difference in plant size for each species was found when the height of plants treated with the lowest rate was compared to the height of the untreated control plants (Poole et al., 1992). Conover (1994) also evaluated angel-wing begonia (*Begonia coccinea*) using a paclobutrazol drench between 0.12 and 0.50 mg a.i. per pot. All paclobutrazol treatments produced smaller plants, when compared to untreated plants 16 WAT. Applications of 0.12 and 0.25 mg a.i. per pot resulted in the overall best plant quality.

Paclobutrazol spray applications were also effective at controlling foliage plant growth (Cox and Whittington, 1988; Henny, 1990). Contact with the stem or roots is critical for spray applications as paclobutrazol is not readily translocated to the shoot apex through the foliage (Barrett et al., 1994). Cox et al. (1988) evaluated paclobutrazol sprays (25 to 400 $mg \cdot L^{-1}$) and drenches (0.12 to 2.0 mg a.i. per pot) on aluminum plant (*Pilea cadierei*). Both spray and drench applications of paclobutrazol produced smaller plants eight WAT. Overall, drench applications resulted in greater control than sprays; however foliar necrosis was observed on plants grown in substrates drenched with paclobutrazol. Spray concentrations of 25 and 50 $mg \cdot L^{-1}$ were not as effective as higher spray concentrations; however these concentrations did not produce necrotic foliage under a simulated interior environment.

Henny (1990) conducted an extensive screening with paclobutrazol on foliage plants and categorized PGR response as slight, moderate and high for sprays and drenches. He discovered little response to paclobutrazol sprays at concentrations of 5 to 100 $mg.L^{-1}$ on *Ficus elastica*. For drenches, he found rates of 0.75 to 3.0 mg a.i. per pot slightly controlled growth of *Ficus*

elastica. A moderate response with paclobutrazol drenches (mg a.i. per pot) was produced with *Dieffenbachia maculata* and *Peperomia obtusifolia* at rates of 0.06 to 0.25. *Syngonium podophyllum* also yielded a moderate growth response at 0.1 to 1.0 mg a.i. per pot. A high response to paclobutrazol drenches occurred with *Ficus lyrita*, *Plectranthus australis*, and *Zebrina pendula* at rates of 0.75 to 4.0, 0.2 to 1.0, and 0.5 mg a.i. per pot, respectively.

Flurprimidol

Flurprimidol (1.5% a.i.) (α-(1-methylethyl)-α-[4-(trifluoromethyoxy) phenyl]-5-pyrimidinemethanol) (SE-5004, SePRO, Carmel, Ind.) is a recently introduced PGR to the U.S. market, but has been available in Europe and other countries for several years (Dole and Wilkins, 2004). Flurprimidol has proven to be effective on foliage plants and can be applied as a spray or drench; similar to paclobutrazol, the chemical solution must contact the stem or roots, as it is not readily translocated to the shoot apex through the foliage (Barrett et al., 1994). Early work conducted with flurprimidol on chrysanthemums (*Dendranthema* x*grandiflorum* Kitam.) demonstrated that it had a greater effect on plant height than paclobutrazol (Barrett, 1982). Later research by Barrett and Nell (1983) showed that flurprimodol as a 2,000 $mg \cdot L^{-1}$ spray was successful in controlling plant height on unpruned or pruned *Ficus benjamina* plants; a 10 mg a.i. per pot drench also controlled height of unpruned *Ficus* plants.

Pennisi (2006) evaluated flurprimidol and ancymidol (α-cyclopropyl-α-(*p*-methoxyphenyl)-5-pyrimidine methanol) (A-Rest, SePro Corp., Carmel, Ind.) on a recently introduced foliage cultivar *Geogenanthus* 'Inca' (*Geogenanthus* sp.). Similar flurprimidol and ancymidol drench rates of 0.50 to 1.5 mg a.i. per pot were applied 12 weeks after potting (WAP). At 16 WAP, plants were placed in a simulated interior environment with high and low light levels. At 18 WAP plant height was measured and both flurprimidol and ancymidol treatments produced shorter *Geogenanthus* 'Inca' plants with superior plant performance, when compared

to untreated plants. Flurprimidol treatments produced shorter plants with a better visual quality rating than ancymidol treated plants. Pennisi concluded that plants treated with ancymidol or flurprimidol at 0.50 mg a.i. per pot produced the most visually proportional 'Inca' plants at the lowest chemical cost per pot.

Foliage Plant Marketing

Consumer behavior is an important topic to consider when marketing new foliage genera and introducing cultivars to the retail market. Garden center customers tend to buy what they want, not what they need (Dunn, 1992). Thus the buying process of new plants in retail outlets falls under the definition of an impulse purchase. Impulse buying is defined in this study as "a purchase decision made in-store with no explicit recognition of a need (or want) for such a purchase prior to entry into the store" (Abratt and Goodey, 1990). An unplanned purchase is similar to an impulse purchase because it is a purchase decision made in-store; however it fulfills a present or future need or want. Promoting products as impulse or unplanned purchases increases awareness, trial-ability, and ultimately market share (Abratt and Goodey, 1990). Demand is created as an impulse or an unplanned purchase becomes a repeat purchase; thus a new product evolves into a planned purchase. The driving mechanism for impulse buying is the use of in-store stimuli that act as a reminder of shopping needs; this includes in-store sitting, on-shelf positions, price-off promotions, sampling, point-of-purchase displays, coupons and in-store demonstrations (Abratt and Goodey, 1990). Highlighting in-store awareness and providing consumer education on new products alleviates consumer hesitation and may remind the consumer of a present or future need, and thus makes it easier to justify purchases.

Pennisi et al. (2005) addressed ways to increase awareness and promote new tropical foliage plants to consumers. To increase sales, the researchers described the benefits of foliage plants that need to be conveyed to consumers to encourage a need or a want for purchasing.

They indicate that foliage plants are fairly maintenance-free having few insect and disease problems and no petal drop or flower removal. Since most foliage plants thrive in humid conditions, fungal problems are generally not an issue. Some foliage species can tolerate lower temperatures, especially if they are exposed to temperatures that drop slowly. Several of these plants can even withstand freezing on a limited basis if the relative humidity is high and the air is still, and many foliage plants can be over wintered indoors to increase their versatility. Also the majority of foliage plants can tolerate low-light environments as opposed to many of the new vegetatively produced flowering plants. Pennisi et al. (2005) described one potential marketing outlet or niche for new tropical foliage plant species- their use in container gardens. They state that due to the increased popularity of combination gardens with consumers, colorful foliage plants can be used alone or combined with flowering plants to create attractive, low-maintenance containers.

Consumer Behavior

The grocery industry has done extensive research into prior consumer knowledge of the store, time available for shopping, and point-of-purchase materials in how that affects consumer purchase behavior (Point of Purchase Institute, 1978; Park et al., 1989; Abratt and Goodey, 1990; Bucklin and Lattin, 1991). Park et al. (1989) conducted a field experiment to explore the effects of two situational factors on consumers' grocery shopping behavior: prior store knowledge and time available for shopping. Their study of 68 subjects found that consumers with low store knowledge and no time pressure engaged in significantly more in-store informational processing and thus higher amounts of unplanned purchases. One alternative explanation for this occurrence is when the number of products that consumers actually purchase is large, their likelihood of exposure to in-store product stimuli increases, which may in turn increase the level of unplanned buying. Consumers within this category of low store knowledge and no time

pressure resulted in 47% of unplanned purchases. Consumers with high store knowledge and no time pressure resulted in 20% of unplanned purchases. Those consumers that were under a time pressure situation and had low store knowledge resulted in 16% of unplanned purchases, compared to 13% of unplanned purchases from high store knowledge and under a time pressure situation. Among all unplanned purchases, 33% were due to reasons other than simple exposure effects and involved active processing of product information that may have made subjects aware of previously unrecognized needs.

Park et al. (1989) included strategies for the grocery industry to adopt that would help increase purchasing behavior by embracing a coordinated approach to the store environment. These strategies include arrangement of aisles based on consumers' prior knowledge or expectations of product location, and arrangement of product displays for non-staple items in prime locations to reduce purchase failure rates. Another strategy includes joint displays of substitutable products to encourage product-level switching as opposed to purchase postponement when a preferred brand or product is not available. A final strategy was to place highly visible displays of brand or product information to promote the recognition of previously unrecognized needs.

In the grocery industry, point-of-purchase promotional materials are particularly important given the large proportion of in-store decisions (Bucklin and Lattin, 1991). According to the Abratt and Goodey (1990) study on unplanned buying and in-store stimuli in supermarkets, in-store stimuli significantly affect unplanned purchases. From a sample of 400 respondents involved in unplanned brand purchase decisions, 70% said that the purchase decision was due to shelf signs, point-of-sale material, end-of-aisle displays and special displays. With a previous study by the Point-of-Purchase Institute (1978) citing 65% of supermarket purchases being made

in-store and over 50% of these purchases being unplanned purchases, the grocery industry has parallels to retail garden centers as 83% of garden center purchases are unplanned or made in-store (Niemieria et al., 1993). Thus grocery in-store marketing strategies can be adapted to garden centers to promote unplanned or impulse purchasing on new or unfamiliar products.

A garden center-based marketing needs survey by Niemieria et al. (1993) revealed that consumers desired plant information and that only 17% of customers had a specific idea of what plants to purchase. The overriding conclusion from this study shows that many garden center customers wait until they are in the store to develop reasons for making purchases, similar to the grocery industry. One setback for the horticulture retail industry is the low ratio of garden center salespersons to customers during the active buying season. This often makes it difficult to educate the consumer about products. Becker and Poorbaugh (1996) noted that verbal consultation between salespeople and consumers is time-consuming, and its effectiveness depends on employee knowledge. They also suggested providing visual materials highlighting essential plant information that could be helpful to both customers and employees. According to the Garden Center Institute, more than 70% of all purchasing decisions are made independently of a salesperson's help (Dunn, 1992). Thus garden centers must provide good informational signage and keep their stores well-merchandised to achieve impulse purchases on new products and those that have likely been untried by their customer base. Also, garden centers may consider adopting some of the grocery industry strategies for achieving higher incidences of impulse and unplanned sales. Stegelin (2001) looked at the role of point-of-sale information on consumers' purchase decisions in a survey conducted at urban and rural garden centers in Georgia. He found that point-of-sale information is the third highest factor below plant quality and selection when consumers are selecting a garden center. Also point-of-sale information

came in second under garden center staff when consumers were looking for a source for technical assistance. Stegelin states that repeat customers are the "lifeblood" of the garden center industry and in order to achieve this advertised specials are needed to draw in customers similar to the grocery industry. Once in the garden center, information must be provided in the form of sales staff or promotional materials to assist customers with their purchase decisions.

Consumer behavior theories can be utilized to explain the purchasing behavior when consumers are exposed to an array of product choices. The attitude-nonattitude continuum explains how attitudes or preferences towards objects can vary in strength and as the strength increases the likelihood towards activation also increases (Mitchell, 1993). When this attitude is activated there is an increased likelihood that the immediate perceptions will be inline with the attitude. Fazio et al. (1986) concluded with their activation of attitude research that stronger attitudes and those that are more accessible from memory are more likely to influence behavior. Therefore, a stronger attitude on the attitude-nonattitude continuum, the greater the likelihood that attitude will guide purchase behavior (Mitchell, 1993). To further explain one's behavior, the theory of planned behavior states that not only is it necessary to have an attitude towards the behavior, but the attitude also has be inline with subjective norms and the person must have the perception that the behavior is accomplishable (Ajzen, 1991). A person may have a strong positive attitude towards the behavior, however if the attitude is in conflict with their subjective norms or they do not possess the resources or opportunities thought necessary to achieve the behavior than the behavior may not be performed. However creating strong positive attitudes towards objects in a largely non-branded environment is a challenge as Sanbonmatsu et al. (1986) addresses; products that are branded make it easier for the consumer to store information about the brand and when the brand is introduced consumers can activate attitudes automatically

from memory and once activated, brands can influence their purchasing behavior. In a garden center environment, where many of the products do not carry a brand name or the consumer has yet to associate the particular product with the brand, and where many of the products are unlikely to provoke long deliberation makes it difficult for the consumer to activate attitudes from memory; thus the purchase is more spontaneous. Therefore the challenge for garden centers is to implore ways to create positive consumer attitudes towards their products and to continually strengthen those attitudes. Mitchell (1993) describes some of the tactics from consumer behavior research that can be utilized to promote attitude accessibility that could be implemented in an environment like a garden center. The tactics the researcher illustrates are direct behavior experiences; this allows the consumer to become more familiar with the product (i.e. samples) than advertising alone. Another research tactic to strengthen attitudes is the use of cues in the advertising materials that may request the consumer to consider their feelings toward the product and to utilize point of purchase displays to link the advertisement with the product in the store. And consumers possessing highly inaccessible attitudes because the attitudes have yet to be formed are more easily swayed by new information about the product or product category.

Marketing Survey

Surveys are the most commonly used interactive instrument where consumers respond to questions asking about their beliefs or behaviors (Solomon, 2000). The Tailored Design Method (Dillman, 2000) is one of the most widely accepted sources for methodology used in conducting and analyzing a survey in the social sciences. Six basic steps to conduct an effective survey include 1) determine a research question to answer, 2) define the population, 3) select a sample from the population, 4) construct the questionnaire, 5) conduct the survey and 6) process the data. To construct a reliable and valid survey, steps are outlined to write survey questions that

are short, simple, unbiased, that avoid unambiguous answers and leading questions and reviewed by a panel of experts and pilot tested (Dillman, 2000).

In-store or directly administered surveys are one tool used to determine how and who to market new products too because they provide information on needs, trends, preferences, and demographics. They have been used repeatedly in the horticulture industry to collect consumer information at garden centers on buying habits, marketing needs, and service and quality attributes (Garber and Bondari, 1998; Hudson et al., 1997; Satterthwaite et al., 2004). Pennisi et al. (2005) conducted a post-purchase survey on the demand for foliage plants in large urban centers of Georgia, Alabama, and South Carolina. This post-purchase survey was distributed to 30 independent retail garden centers in nine communities in the three states. An identical one-page instrument utilized questions in a Likert-scale format and was attached to the consumers receipt with instructions to bring the questionnaire back during their next visit to the garden center. Most retailers did provide a gift as an incentive to return the completed questionnaire. The researchers received 1,897 completed questionnaires in late spring of 2003. Results from the surveys indicated that foliage was not predominantly displayed in the garden centers, foliage plant selection was limited, and promotional materials for foliage was nil to non-existent. The retailers that administered these surveys were in agreement with their consumer's observations. Retailers indicated they had received little or no point-of-purchase promotional materials from the growers or brokers that provided them with the foliage plant material. In addition, researchers examined public media sources where foliage plants may have been promoted 30 days prior to survey distribution and only one magazine article on foliage use in interiorscapes was revealed. Pennisi et al. (2005) concluded that these consumers were largely unaware of the benefits and potential associated with foliage plants. The survey revealed that consumers

associated foliage plants to florist shops where one item per purchase is common. The researchers also found through their surveys that there is little differentiation among plant types, forms, sizes, or colors by the consumers, much less the different genus, species, cultivars, and varieties. The researchers proposed that if foliage demand is to grow in the traditional markets, consumer education efforts are mandatory and that this can be done through push and/or pull marketing strategies. To implement a push strategy the grower or broker would try to move foliage plants through the channel by convincing other growers or retailers to offer them (Solomon, 2000). If a push strategy is implemented than the grower or broker would try to move foliage plants through the channel by building desire for the plants among consumers, thus convincing other growers or retailers to respond to this demand by stocking these items (Solomon, 2000). Pennisi et al. (2005) stated that "price is not an issue [for foliage plants]; rather "why purchase?" is the issue."

Product Placement

Product placement is another potential component to achieve maximum sales in retail establishments. Underhill (2001) states that all shopping or retail experiences follow a standard pattern. Different constraints exist whether men or women, young or old, by themselves or as a family are shopping; however the overall shopping pattern is the same. The challenge for retailers- from a person with an up-scale garden center to a person with a table at a farmers' market- is to enhance the shopping experience to promote sales. Underhill's research shows that the shopping experience goes through five steps or stages called "zones".

The five zones Underhill identifies are the landing, transition, destination, transaction and exit zones. Within a garden center, the landing zone is the initial experience that ranges from the signs, parking lot appearance, to the welcoming eye contact at the garden center. The transition zone is the point of entry- the doorway space, the overall presentation which clarifies the space at

the entry of the garden center. The destination zone is where products are displayed and offered for sale. This zone requires space for consumers to conduct shopping. Additionally the destination zone should feature a sub-zone called a hovering zone for people who are accompanying the shopper yet not actively involved in the purchasing process. The transaction zone is where the actual sale is made and goods and services are exchanged. Finally, the exit zone is the departure point to facilitate the removal of the purchased items which were purchased. The exit zone is also a place to encourage a return shopping trip. Within these five zones, three represent the areas where most of the purchasing decisions are made; landing, transition and destination zones. Among these three zones, it is important to determine whether any of these zones with the same product display lead to more consumer purchases so that displays in this location can be utilized to their fullest potential to achieve the most sales. Gibson et al. (2007) conducted research on consumer purchase patterns in Florida utilizing displays in the three retail zones identified by Paco Underhill: landing, transition and destination zones. In the study, the landing zone yielded the most sales, yet with the limited data collected, further investigation into this area is needed to make definitive conclusions.

Objectives

1. Identify plant growth regulator rates of paclobutrazol and flurprimidol on vigorous foliage plant species for use in container gardens.

2. Determine consumer preferences and demographics towards foliage plant container gardens by means of directly administered surveys. This study will identify consumer purchase behavior at University of Florida Environmental Horticulture student plant sales or rural and urban Florida garden centers.

3. Use the data collected from the directly administered survey along with sales and customer information to support outdoor foliage plant container gardens as a possible outlet to increase foliage plant sales in the horticulture industry. Determine from the garden center point-of-sale system which retail zone constituted the most foliage container garden sales.

CHAPTER 2
GROWTH RESPONSE OF FOLIAGE PLANTS TO FLURPRIMIDOL AND PACLOBUTRAZOL

Introduction

Certain foliage plants are lush and bold in size causing them to appear disproportionate to their container. Foliage plant appearance can improve with the use of plant growth regulators (PGRs) to control plant size (height and spread). Wholesale production growth control standards for plant height are typically 20 to 35% shorter plants, when compared to untreated plants (B.E. Whipker, personal communication). Plant diameter wholesale standards normally range from 15 to 25% smaller plants, when compared to untreated plants. For perennial plant growers, Thomas et al. (1997) established a 30% height reduction assessment point when chemical regulation is used. Other effects of chemical growth retardants are the production of stockier plants with thicker stems that produce higher survival rates during shipping, plus the aesthetic benefit of greener foliage (Dole and Wilkins, 2004). The foliage and interiorscape plant industries would benefit from a PGR program that would reduce or eliminate the need to replace or prune plants (Pennisi, 2006).

Paclobutrazol ((+)-(R*,R*)-β([4-cholorphenyl]methyl-α-(1,1-dimethylethyl0-1*H*-1,2,4-triazole-1-ethanol) (Bonzi, Syngenta Crop Protection, Greensboro, N.C.) has been proven effective on several foliage plants (Conover, 1994; Cox and Whittington, 1988; Poole and Conover, 1992; Pulley and Davis, 1986; Wang and Blessington, 1990). Substrate drenches of paclobutrazol are one such method for effectively controlling a range of upright and spreading foliage plants. Pulley et al. (1986) applied paclobutrazol drenches of 0.1 and 0.5 mg a.i. per pot to croton (*Codiaeum variegatum*), ficus (*Ficus benjamina*), Swedish ivy (*Plectranthus forsteri*), and wandering jew (*Tradescantia zebrina*). All treatments controlled shoot growth of all four species eight weeks after treatment. Poole et al. (1992) treated angel-wing begonia (*Begonia*

coccinea), schefflera (*Schefflera actinophylla*), 'Petra' croton (*Codiaeum variegatum*), golden pothos (*Scindapsus aures*), purple passion plant (*Gynura aurantiaca*), 'Duda Red' hibisicus (*Hibisicus* sp.), 'Double White' hibisicus (*Hibisicus* sp.), and 'China Doll' rademachera (*Rademachera sinica)* with paclobutrazol substrate drenches between 0.25 and 1.0 mg a.i./pot. Shorter and smaller plants of all eight species were produced with a paclobutrazol drench 11 weeks after treatment (WAT). The most effective and cost efficient treatment was paclobutrazol at the lowest concentration of 0.25 mg a.i./pot on each species (Poole et al., 1992). Conover (1994) also evaluated angel-wing begonia (*Begonia coccinea*) using a paclobutrazol drench between 0.12 and 0.50 mg a.i./pot. All paclobutrazol treatments produced smaller plants, when compared to untreated plants 16 WAT. Applications of 0.12 and 0.25 mg a.i./pot resulted in the best overall best plant quality.

Paclobutrazol spray applications were also effective at controlling foliage plant growth (Cox et al., 1988; Henny, 1990). Contact with the stem or roots is critical for spray applications, as paclobutrazol is not readily translocated to the shoot apex through the foliage (Barrett et al., 1994). Cox et al. (1988) evaluated paclobutrazol sprays (25 to 400 $mg \cdot L^{-1}$) and drenches (0.12 to 2.0 mg a.i./pot) on aluminum plant (*Pilea cadierei*). Both spray and drench applications of paclobutrazol produced smaller plants eight WAT. Overall, drench applications resulted in greater control than sprays; however foliar necrosis was observed on plants grown in substrates drenched with paclobutrazol. Spray concentrations of 25 and 50 $mg \cdot L^{-1}$ were not as effective as higher spray concentrations; however these concentrations did not produce necrotic foliage under a simulated interior environment.

Henny (1990) conducted an extensive screening with paclobutrazol on foliage plants and categorized PGR response as slight, moderate and high for sprays and drenches. He discovered

little response to paclobutrazol sprays at concentrations of 5 to 100 mg.L^{-1} on *Ficus elastica*. For drenches, he found rates of 0.75 to 3.0 mg a.i./pot slightly controlled growth of *Ficus elastica*. A moderate response with paclobutrazol drenches was produced with *Dieffenbachia maculata* and *Peperomia obtusifolia* at rates of 0.06 to 0.25 mg a.i. *Syngonium podophyllum* also yielded a moderate growth response at 0.1 to 1.0 mg a.i.. A high response to paclobutrazol drenches occurred with *Ficus lyrita*, *Plectranthus australis*, and *Zebrina pendula* at rates of 0.75 to 4.0, 0.2 to 1.0, and 0.5 mg a.i./pot, respectively.

Flurprimidol (1.5% a.i.) (α-(1-methylethyl)-α-[4-(trifluoromethyoxy) phenyl]-5-pyrimidinemethanol) (SE-5004, SePRO, Carmel, Ind.) is a PGR that was recently introduced to the U.S. market, but has been available in Europe and other countries for several years (Dole and Wilkins, 2004). Flurprimidol has proven to be effective on foliage plants and can be applied as a spray or drench; similar to paclobutrazol, the chemical solution must contact the stem or roots, as it is not readily translocated to the shoot apex through the foliage (Barrett et al., 1994). Early work conducted with flurprimidol on chrysanthemum (*Dendranthema* x*grandiflorum* Kitam.) demonstrated that it had a greater effect on plant height than paclobutrazol (Barrett, 1982). Later research by Barrett and Nell (1983) showed that a flurprimidol spray at 2,000 mg·L^{-1} was successful in controlling plant height on unpruned or pruned *Ficus benjamina* plants; a 10 mg a.i./pot drench also controlled height of unpruned *Ficus* plants.

Pennisi (2006) evaluated flurprimidol and ancymidol (α-cyclopropyl-α-(*p*-methoxyphenyl)-5-pyrimidine methanol) (A-Rest, SePro Corp., Carmel, Ind.) on a recently introduced foliage cultivar *Geogenanthus* 'Inca' (*Geogenanthus* sp.). Similar flurprimidol and ancymidol drench rates of 0.50 to 1.5 mg a.i./pot were applied 12 weeks after potting (WAP). At

16 WAP, plants were placed in a simulated interior environment with high and low light levels. At 18 WAP plant height was measured and both flurprimidol and ancymidol treatments produced shorter *Geogenanthus* 'Inca' plants with superior plant performance, when compared to untreated plants. Flurprimidol treatments produced shorter plants with better visual quality ratings than ancymidol treated plants. Pennisi concluded that plants treated with ancymidol or flurprimidol at 0.50 mg a.i./pot produced the most visually proportional 'Inca' plants at the lowest chemical cost per pot.

There is limited information on the effectiveness of PGRs on newly introduced foliage plant species. Therefore the objectives for Experiments 1 and 2 are to identify the optimal rates of PGRs on vigorous new foliage plant species. The objective for Experiment 1 is to measure the growth control of Elephant Ear-type genera using paclobutrazol and flurprimidol as foliar sprays and substrate drenches. The objectives for Experiment 2 is to measure the growth control of traditional vigorous foliage plants using a broad range of concentrations of paclobutrazol and flurprimidol as a substrate drench, then combine similarly treated plants in container gardens to measure carry-over efficacy and then to pose these varying sized PGR container gardens to the public to gather their responses.

Materials and Method

Experiment 1

Plugs (3.8 x 6.4 cm [1.5 x 2.5 inch] cells) of tropical foliage plants *Colocasia esculenta* 'Nancy's Revenge', *Colocasia esculenta* 'Gigantea', and *Xanthosoma violaceum* were transplanted into 8.3 x 11.4 cm (3.25 x 4.5 inch) round plastic containers on 11 Dec. 2006. The root substrate was Fafard® 4-P (Conrad Fafard, Inc., Anderson, SC), which contained (v/v): 4 sphagnum peat: 2 pine bark: 2 vermiculite: 1 perlite. Plants were fertilized once weekly with

200 $mg \cdot L^{-1}$ N using Total Gro 14-4-14 (14N-1.8P-11.6K) (Total Gro, Winsboro, La.). The plants were grown under natural daylength.

PGR foliar sprays (in $mg \cdot L^{-1}$) were applied 24 d after potting (using a volume of 0.5 gal/100ft^2): flurprimidol at 20, 40, or 80; paclobutrazol at 20, 40, or 80; and an untreated control for each chemical. PGR substrate drench treatments (in mg a.i./pot) were also applied 24 d after potting using a volume of 90 mL [3 oz] of solution per pot: flurprimidol at 0.50, 1.0, or 2.0; paclobutrazol at 0.50, 1.0, or 2.0; and an untreated control for each treatment. The experiment was arranged in a randomized complete block design with five single-plant replications of the thirteen treatments. Total plant height (measured from the pot rim to the top of the foliage), plant diameter (diameter was measured at the widest dimension and turned 90°, and averaged), and visual quality (1 to 5 scale, 1 = excellent, five or more leaves; 2 = good, three or more leaves; 3 = satisfactory, two leaves; 4 = unsatisfactory, one leaf/stem; 5 = poor, 0 leaves, dying) were measured 3, 6 and 9 weeks after treatment (WAT).

Data Analysis

Data for plant height, plant diameter, and visual quality were tested by analysis of variance. Means were separated by least significant differences (LSD) at $P \leq 0.05$. Plant height and diameter values were regressed using the PROC REG procedure (SAS Inst., Cary, NC) to determine the best fit linear or quadratic model for substrate drenches of flurprimidol or paclobutrazol. Terms of the model were judged to be significant or nonsignificant and included in the final model based on a comparison of F values at $\alpha = 0.05$. The quadratic and the linear models were compared to determine best fit based on r^2 values.

Experiment 2

Experiment 2 measured plant growth of vigorous foliage plants produced in small pots grown in substrates treated with a substrate drench of flurprimidol or paclobutrazol, then

transplanted into larger containers to measure carry-over efficacy. Plugs (3.8 x 6.4 cm [1.5 x 2.5 inch] cells) of upright *Cordyline* 'Sundance' plants, mounding *Ardisia humalis* plants, and trailing *Asparagus densiflorus* 'Sprengeri' plants were placed in 8.3 x 11.4 cm (3.25 x 4.5 inch) round plastic containers on 11 Dec. 2006. The root substrate was Fafard® 4-P (Fafard, Anderson, SC), which contained (v/v): 4 sphagnum peat: 2 pine bark: 2 vermiculite: 1 perlite. Plants were fertilized once weekly with 200 $mg \cdot L^{-1}$ N using Total Gro 14-4-14 (14N-1.8P-11.6K) (Total Gro, Winsboro, La.). The plants were grown under natural daylength. Ten PGR drench treatments (in mg a.i./pot) were applied 67 d after potting using a volume of 90 mL [3 oz] of solution per pot: flurprimidol or paclobutrazol at 0.25, 0.50, 1.0, 2.0, or 4.0; and an untreated control for each treatment. The experiment was arranged in a randomized complete block design with six single-plant replications of the eleven treatments. Total plant height (measured from the pot rim to the top of the foliage), plant diameter (diameter was measured at the widest dimension and turned 90°, and averaged), and visual quality (1 to 5 scale, 1 = excellent, five or more leaves; 2 = good, three or more leaves; 3 = satisfactory, two leaves; 4 = unsatisfactory, one leaf/stem; 5 = poor, failing, almost dead) were measured 6 WAT.

At 6 WAT single, similarly treated plants of *Cordyline* 'Sundance', *Ardisia humalis*, and *Asparagus densiflorus* 'Sprengeri' were transplanted into 24.1 cm x 30.5 cm (12-inch) round terra-cotta colored plastic containers to measure carry-over efficacy as a result of the previously applied substrate drenches. The root substrate was Fafard® 2 (Conrad Fafard, Inc., Anderson, SC), which contained (v/v): 6.5 sphagnum peat: 2 perlite: 1.5 vermiculite. Plants were watered using drip irrigation and fertilized once weekly with 200 $mg \cdot L^{-1}$ N using Total Gro 14-4-14 (14N-1.8P-11.6K) (Total Gro, Winsboro, La.). A topdressing of 30 g of Harrell's controlled release fertilizer 19-6-12 (19N-2.62P-9.96K) (Harrell's Fertilizer, Inc., Holt, Mich.) was also

applied. The experiment was arranged in a randomized complete block design with six, triple-plant replications of the eleven treatments. Total plant height (measured from the pot rim to the top of the tallest foliage plant), plant diameters (diameter was measured at the widest dimension and turned 90°, and measured again) and visual quality (1 to 5 scale, 1 = excellent, all plants proportionate; 2 = good, disproportionate with one plant smaller; 3 = small, two plants having stunted growth; 4 = poor, all plants stunted; 5 = very poor, dead or dying plants) were measured 9 and 12 WAT.

On 31 Mar. and 1 Apr. 2007, a display of six foliage container gardens composed in Experiment 2 of the untreated control and the five concentrations of flurprimidol substrate drench treated *Cordyline* 'Sundance', *Ardisia humalis*, and *Asparagus densiflorus* 'Sprengeri' were placed in a single row at the Emerald Coast Flower Festival, Pensacola Junior College, Milton, FL for use in a consumer survey (Fig. 2-5). The objectives of this study were: 1) describe the consumer's preference for a specific container garden after being told the container gardens varied in size due to the use of plant growth regulators applications 2) determine the recommended price range of the selected foliage container garden; and 3) correlate the consumers' intent to buy with their preferred foliage container, price range given, and which consumer group they were associated with.

Randomly selected consumers at the plant sale were asked to complete a three question questionnaire (see Appendix D): 1) of the six foliage containers, which one would you purchase?; 2) what would be an appropriate price for the container garden you chose?; 3) would you buy this container garden today? This survey was repeated with similar foliage plant container gardens at the University of Florida-Gainesville Environmental Horticulture Graduate Student Association plant sale on 14 and 15 Apr. This survey was also administered to north-

central Florida Master Gardener groups on the University of Florida campus during the Master Gardener Field Day on 18 May, and to the members of the Frontrunners Chapter of the Florida Nursery, Growers and Landscape Association (FNGLA) on 12 June.

Data Analysis

Plant growth regulator treatments in individual and combination containers

At 6 WAT data for plant height, plant diameter, and visual quality were tested by analysis of variance. Means were separated by least significant differences (LSD) at $P \leq 0.05$. At 9 and 12 WAT data for overall container plant size (total plant height + first diameter + second diameter/ 3) and visual quality were tested by analysis of variance. Means were separated by least significant differences (LSD) at $P \leq 0.05$.

Consumer survey

Data were entered into a database and statistical analysis was conducted using SPSS® version 14.0 for Windows™. In order to accomplish the objectives of this study, descriptive statistics of frequencies were utilized.

Results

Experiment 1

Flurprimidol and paclobutrazol sprays

Visual quality. Visual quality ratings of *Colocasia esculenta* 'Nancy's Revenge' plants were significant by week and treatment. Visual quality improved slightly from 2.9 three WAT to 2.3 nine WAT (data not shown). Concentrations of flurprimidol at 80 $mg \cdot L^{-1}$ or paclobutrazol at 40 or 80 $mg \cdot L^{-1}$ expressed poorer quality, when compared to the untreated control (Table 2-1). All other treatments were similar in quality to the control. *Colocasia esculenta* 'Gigantea' had visual quality ratings that were significant by week and improved from 2.5 to 2.1 to 1.2 at 3, 6 and 9 WAT, respectively (LSD = 0.3, n = 35). Visual quality was not significant by treatment in

the pooled data (Table 2-2). Visual quality ratings of *Xanthosoma violaceum* were significant by week. The plants appeared their best 6 WAT (1.6) compared to 3 WAT (2.4) when foliage was slow to expand or 9 WAT (2.3) when foliage appeared chlorotic (LSD = 0.3, n = 35). Visual quality was also significant by treatment; concentrations of flurprimidol or paclobutrazol at 80 $mg \cdot L^{-1}$ produced poorer quality plants, when compared to the untreated control (Table 2-3). All other treatments were similar in quality to the untreated control.

Plant height. Flurprimidol and paclobutrazol sprays were ineffective at limiting plant height for *Colocasia esculenta* 'Nancy's Revenge'. Plant height was significant only by week. Overtime, plant height increased from 20.4 to 25.7 cm and finally 30.3 cm, during 3, 6 and 9 WAT, respectively (LSD = 1.8 , n = 35). Plant height of *Colocasia esculenta* 'Gigantea' was significant by week and treatment. Overtime, plant height increased from 21.7 to 30.0 to 35.3 cm at 3, 6 and 9 WAT, respectively (LSD = 1.6, n = 35). The pooled data 9 WAT indicated that plants sprayed with flurprimidol at 40 $mg \cdot L^{-1}$ were 17% shorter when compared to the untreated control; however the highest concentration of flurprimidol produced a similar sized plant as the untreated control (Table 2-2). It is unclear why these results occurred. The highest concentration of paclobutrazol at 80 $mg \cdot L^{-1}$ did produce 16% shorter plants, when compared to the untreated control. Plant height of *Xanthosoma violaceum* increased from 16.8 cm 3 WAT to 18.4 cm 6 WAT (LSD = 1.5, n = 35). Between 6 and 9 WAT, plant height remained the same. By treatment, flurprimidol spray concentrations at 40 and 80 $mg \cdot L^{-1}$ produced 17% and 30%, shorter plants, respectively, when compared to the untreated control (Table 2-3). Paclobutrazol treatments of 20, 40 and 80 $mg \cdot L^{-1}$ produced 18%, 23% and 15% smaller plants, respectively, when compared to the control.

Plant diameter. Plant diameter of *Colocasia esculenta* 'Nancy's Revenge' was not controlled by flurprimidol or paclobutrazol sprays up to 80 $mg \cdot L^{-1}$ (Table 2-1). Plant diameter of *Colocasia esculenta* 'Gigantea' was 61.5, 74.4 and 91.1 cm at 3, 6 and 9 WAT, respectively (LSD =3.8, n = 35). Plants treated with flurprimidol at 40 $mg \cdot L^{-1}$ were 20% smaller in plant diameter when compared to the untreated control; however the highest and lowest concentrations of flurprimidol produced a similar sized plant as the untreated control (Table 2-2). It is unclear why these results occurred. All paclobutrazol treatments were similar to the untreated control. Plant diameter of *Xanthosoma violaceum* was 40.5 cm 3 WAT and grew to 48.9 cm 6 WAT (LSD = 3.3, n = 35). Between 6 and 9 WAT, plant diameter remained the same. Applying flurprimidol at 40 and 80 $mg \cdot L^{-1}$ resulted in 11% and 15% smaller plant diameters, respectively, when compared to the control (Table 2-3). All paclobutrazol spray concentrations produced similar sized plant diameters (12 to 15%), when compared to the untreated control.

Flurprimidol and paclobutrazol drenches

Visual quality. Visual quality ratings of *Colocasia esculenta* 'Nancy's Revenge' were significant by treatment. Flurprimidol drench rates and paclobutrazol at 0.5 mg a.i. produced similar quality plants, but were lower in quality than the untreated control because of foliar chlorosis and fewer unfurled leaves. As paclobutrazol concentration increased the visual quality ratings became worse; paclobutrazol at 2.0 mg a.i. produced severely stunted plants with leaf curl (Table 2-4). Visual quality ratings of *Colocasia esculenta* 'Gigantea' were significant by week and improved from 2.8 to 2.3 to 1.7 at 3, 6 and 9 WAT, respectively (LSD = 0.3, n = 35). Flurprimidol at 0.5 mg a.i. produced similar quality plants to the untreated control (Table 2-5). Flurprimidol at 1.0 and 2.0 mg a.i. resulted in stunted plants with puckered, curled leaves; similar visual quality ratings and foliar effects occurred for paclobutrazol at 0.5 or 1.0 mg a.i., and paclobutrazol at 2.0 mg a.i. produced the worst looking plants. For the substrate drench treated

Xanthosoma violaceum plants, there was a week x treatment interaction for visual quality. Three WAT, concentrations of flurprimidol and paclobutrazol at 1.0 mg a.i./pot had similar visual quality ratings to the untreated control; all other treatments produced lower quality plants (Table 2-6). Six WAT, only flurprimidol at 1.0 mg a.i./pot was similar in quality to the untreated control; however by 9 WAT all PGR treatments were lower in quality than the untreated control.

Plant height. Plant height of *Colocasia esculenta* 'Nancy's Revenge' was significant by week and treatment. Over time plant height increased from 15.3 to 17.7 to 20.5 cm at 3, 6 and 9 WAT, respectively (LSD = 1.5, n = 35). All plants grown in substrates drenched with PGRs were shorter than the control (Table 2-4). All flurprimidol treatments were similar in height and within wholesale growth control standards (Fig. 2-1). Flurprimidol drenches at 0.50 to 2.0 mg a.i./pot produced 24 to 33% shorter smaller plants compared to the control. Paclobutrazol at 0.50 to 2.0 mg a.i./pot produced 27% to 56% compared to the untreated control. Only the 0.5 mg a.i. rate of paclobutrazol was within wholesale growth control standards; all other paclobutrazol treatments produced stunted plants (Fig. 2-1). Plant height of *Colocasia esculenta* 'Gigantea' was significant by week and treatment. Over time, plant height increased by 20.7 to 24.9 to 31.6 cm at 3, 6 and 9 WAT, respectively (LSD = 1.8, n = 35). Applying 0.5, 1.0, and 2.0 mg a.i./pot of flurprimidol resulted in 11%, 20%, and 28% shorter plants, respectively, when compared to the untreated control (Table 2-5). Paclobutrazol at 0.5, 1.0, and 2.0 mg a.i./pot produced 17%, 26%, and 35% shorter plants, respectively, when compared to the control. PGR rates of 1.0 and 2.0 mg a.i./pot produced plants within wholesale growth control standards (Fig. 2-2). *Xanthosoma violaceum* plants naturally became shorter over time with the upright leaves spreading out and growing horizontal rather than vertical. Three and 6 WAT mean plant height was 16.19 cm and 13.4 cm, respectively (LSD = 1.3, n = 35). Nine WAT plant heights

remained the same. All flurprimidol and paclobutrazol drench treatments resulted in plants that were 38% to 40% shorter than the untreated control (Table 2-7). These treatments exceeded wholesale growth control standards and resulted in stunted, distorted looking plants.

Plant diameter. Plant diameter of *Colocasia esculenta* 'Nancy's Revenge' was significant by treatment. Flurprimidol at 0.5 and 1.0 mg a.i. had no effect on plant diameter; however 2.0 mg a.i. resulted in 14 % smaller plants compared to the untreated control (Table 2-4). Paclobutrazol at 0.5, 1.0, and 2.0 mg a.i. plant produced 11%, 23%, and 33% smaller plants, respectively, when compared to the untreated control. Paclobutrazol at 1.0 mg a.i. and flurprimidol at 2.0 mg a.i. were the only treatments within wholesale plant diameter control standards; all other treatments were either below or above standard (Fig. 2-3). Plant diameter of *Colocasia esculenta* 'Gigantea' was significant by week and treatment. Plant diameter grew from 56.9 to 69.8 to 80.7 cm at 3, 6 and 9 WAT (LSD = 3.4, n = 35). PGR drenches controlled growth and produced smaller plants than the untreated control. Paclobutrazol at 0.5 mg a.i. produced smaller plants than flurprimidol at 0.5 mg a.i. (Table 2-5). Both flurprimidol and paclobutrazol at 1.0 or 2.0 mg a.i./pot produced similar sized plants. Flurprimidol at 2.0 mg a.i./pot and all paclobutrazol rates produced plants within wholesale growth control standards (Fig. 2-4). As *Xanthosoma violaceum* plants decreased in height over time, plant diameter increased as a result of the natural downward and horizontal growth effect. Three WAT, plant diameter was 38.0 cm and at 6 WAT plant diameter was 45.9 cm then remained the same at 9 WAT (LSD = 4.8, n = 35). Flurprimidol at 0.5 and 2.0 mg a.i./pot produced 31% and 25% smaller plants, respectively compared to the untreated control (Table 2-7). It is unclear why flurprimidol at 1.0 mg a.i./pot was similar to the untreated control. All paclobutrazol treated plants were smaller in diameter when compared to the control and had similar sized diameters

(17 to 26%). Flurprimidol at 2.0 mg a.i. and paclobutrazol at 0.5 and 1.0 mg a.i. were within wholesale growth control standards.

Experiment 2

Plant growth regulator treatments in individual containers

For *Ardisia humalis*, treatments did not impact visual quality, plant height, or diameter (data not shown).

Flurprimidol at 4.0 mg a.i./pot produced the worst visual quality rating for *Cordyline* 'Sundance', while all other PGR treatments were similar to the control (Table 2-8). Paclobutrazol was ineffective at controlling plant height and diameter. Flurprimidol applied at 2.0 and 4.0 mg a.i. resulted in *Cordyline* plants within wholesale height control standards. Only flurprimidol at 1.0 mg a.i./pot controlled plant diameter, resulting in 21% smaller plants compared to the untreated control and it is unclear why this moderate rate was effective compared to 2.0 and 4.0 mg a.i.

For *Asparagus densiflorus* 'Sprengeri', flurprimidol at 2.0 or 4.0 mg a.i. and paclobutrazol at 1.0 or 2.0 mg a.i. had lower plant quality than all other treatments (Table 2-9). PGR treatments did not affect plant height; all were similar to the untreated control. Flurprimidol rates greater than 0.5 mg a.i and paclobutrazol rates greater than 0.25 and less than 4.0 mg a.i./pot resulted in smaller plant diameters (16% to 33%) when compared to the untreated control. The variability in plant diameter may be due to the initial seed count per plug during propagation rather than the chemical treatment (Irish, J., personal communication).

Plant growth regulator treatments in combination containers

When plants were combined in one large container visual quality was not significant by week or treatment with a rating of excellent; all plants were proportionate to one another. Overall container plant size was significant by week and treatment. At 9 and 12 WAT overall

plant size was 51.6 cm and 61.2 cm, respectively (LSD = 1.8, n = 66). Flurprimidol at 4.0 mg a.i. produced a 9% smaller overall plant size, when compared to the untreated control and all PGR treatments (Table 2-10).

Consumer survey

The consumer survey was administered at four locations, and within location consumers were divided into three distinct groups; plant sale consumers, individuals that work within the floriculture industry, and master gardeners. Plant sale consumers were surveyed at university plant sales, floriculture industry professionals were surveyed during a Florida Nursery Growers and Landscape Association (FNGLA) chapter meeting at the University of Florida, and master gardeners were surveyed during the Master Gardener Field Day at the University of Florida. A total of 521 questionnaires amongst these three groups were completed. Plant sale consumers were made up of consumers shopping at Emerald Coast Flower Festival, Pensacola Junior College, Milton, FL and the University of Florida-Gainesville Environmental Horticulture Graduate Student Association plant sale. At the Milton plant sale 193 questionnaires (37% of the total) were completed and at the Gainesville plant sale 203 questionnaires (39% of the total) were collected. Consumers that worked within the floriculture industry consisted of members of the Frontrunners Chapter of the FNGLA; 30 questionnaires (5.8% of the total) were completed. Master gardeners representing north-central Florida Master Gardener groups at the Master Gardener Field Day completed 95 questionnaires (18.2% of the total).

The first question of the instrument asked of the six foliage containers, which one would they consider purchasing. Foliage container 1 represented the control while containers 2 through 6 represented plants that were treated with flurprimidol drenches from 0.25 to 4.0 mg a.i./pot. Respondents were aware that the variance in plant size was a result of plant growth regulator applications. Of the total 512 questionnaires collected, 176 consumers (33.8%) chose the

control, 62 (11.9%) chose container 2, 134 (25.7%) chose container 3, 57 (10.9%) chose container 4, 62 (11.9%) chose container 5, 15 (2.9%) chose container 6, and four (0.8%) consumers did not provide a container preference.

The next question asked the consumer what would be an appropriate price for the container they chose. Some consumers gave an exact price while others provided a price range. Responses, whether an exact price or a price range, were placed within a price range scale. The first price range was between $0.00 and $9.99; 100 of the 512 consumers (19.2%) selected this range. The next price range of $10.00 to $19.99 was where the majority of consumers (n = 315, 60.5%) indicated preference. Ninety consumers (17.3%) chose a range of $20.00 to $29.99, seven (1.3%) chose $30.00 to $39.99, and only two (0.4%) consumers selected $40.00 to $49.99. Seven consumers (1.3%) did not indicate a price or declined to answer the question.

The third question measured intent; consumers were asked if they would buy the container today. Of the 512 total consumer questionnaires, 160 (30.7%) indicated they would purchase today, 313 (60.1%) consumers said that they would not buy the container today, and 37 (7.1%) consumers wrote they might consider buying the container today. There were 11 (2.1%) questionnaires that did not have a response.

A cross tabulation was performed on foliage container garden preference by the three consumer groups. This initial cross tabulation did not meet the assumptions of the test which states an observed count of at least five be represented within each cell. To overcome this two groups of consumers, those that work within the floriculture industry and the master gardeners, were combined and compared to the plant sale consumers. The foliage container garden preference was also condensed into four choices from the untreated control to slightly controlled foliage containers (flurprimidol at 0.25 mg a.i.), moderately controlled foliage containers

(flurprimidol at 0.50 and 1.0 mg a.i.), and highly controlled foliage containers (flurprimidol at 2.0 and 4.0 mg a.i.). While there was only a statistical difference in overall plant sizes between the highest drench rate and all other treatments, there was a visual difference in treatments as container gardens appeared smaller when the concentration of flurprimidol increased (Fig. 2-5). The cross tabulation performed on this data did produce significant results by the Pearson Chi-square test (53.78, df = 4, $P < .001$) (Table 2-11). Plant sale consumers preferred the untreated control (most robust) foliage container garden (40.6%, n = 159) while the horticulture industry and master gardener group preferred a moderately controlled foliage container (flurprimidol at 0.50 and 1.0 mg a.i.) (63.2%, n = 72) that contained smaller plant material.

Another cross tabulation was performed on foliage container garden preference (control, slightly controlled, moderately controlled, or highly controlled) by intent to buy (yes/no), however the Pearson's Chi-square test reported no significant differences (6.870, df = 3, $P = .076$). Therefore preference of container garden was not an indicator of intent to buy. Price chosen for the foliage container garden ($0-9.99, $10-19.99, $20-29.99, $30+) by intent to buy (yes/no) was examined and that test also resulted as not significant (3.410, df = 3, $P = .333$). The price of container gardens chosen by the consumer was not an indicator of intent to buy either. The consumer group (plant sale consumer, horticulture industry consumer, or master gardener consumer) by intent to buy (yes/no) was also tested and found to be not significant (3.898, df = 2, p = .142). However there may be some bias associated with intent to buy between consumer groups because of the different environments they were in when the survey was administered. The plant sale consumers were in a buying mode at the plants sale when the survey was conducted, while the industry professionals and master gardeners were attending meetings and

classes the day of the survey. In summary though, neither consumer group had the intent to buy more often than the other.

Conclusion

Flurprimidol and paclobutrazol are effective plant growth regulators for use on tropical foliage plants. Application of substrate drenches provided the greatest control, however excessive stunting occurred with *Xanthosoma violaceum.* Foliar sprays of flurprimidol at 40 $mg \cdot L^{-1}$ and paclobutrazol at 20 to 40 $mg \cdot L^{-1}$ produced plants within wholesale standards with the highest quality for *Xanthosoma violaceum* (Table 2-3). Plant height of *Colocasia esculenta* 'Nancy's Revenge' was not controlled by foliar sprays, however substrate drenches of flurprimidol at 0.5, 1.0, and 2.0 mg a.i./pot and paclobutrazol at 0.5 mg a.i./pot resulted in plants within wholesale standards (Table 2-4). Flurprimidol at 2.0 mg a.i./pot was the optimum concentration for controlling plant diameter of *Colocasia esculenta* 'Nancy's Revenge'. Flurprimidol would be the preferred PGR unless paclobutrazol at concentrations at or below 0.5 mg a.i./pot are used to avoid stunting. Plant height of *Colocasia esculenta* 'Gigantea' did respond to foliar sprays of flurprimidol at 40 $mg \cdot L^{-1}$ and paclobutrazol at 80 $mg \cdot L^{-1}$; however growth did not meet the wholesale standards (Table 2-2). Plant height of *Colocasia esculenta* 'Gigantea' responded best to substrate drenches of flurprimidol at 1.0 and 2.0 mg a.i./pot and paclobutrazol at 0.5 mg a.i./pot; these concentrations produced appropriately sized plants for wholesale production, while expressing the best visual quality (Table 2-5).

Application of flurprimidol ($117.92 per liter) and paclobutrazol ($131.98 per liter) foliar sprays of 20 to 80 $mg \cdot L^{-1}$ cost between $0.02 and $0.09 per pot, respectively and substrate drenches of 0.5 to 2.0 mg a.i./pot are $0.02 to $0.07, respectively. A foliar spray of paclobutrazol at 20 $mg \cdot L^{-1}$ cost $0.02 per pot and was the most cost effective option for *Xanthosoma violaceum,* as it produced results within the wholesale growth control standards.

For *Colocasia esculenta* ‘Nancy’s Revenge’ a substrate drench of flurprimidol or paclobutrazol at 0.5 mg a.i./pot is recommended to control plant height within wholesale standards at $0.02 per pot. If both plant diameter and plant height are to be achieved within wholesale growth control standards, while maintaining visual quality, then a substrate drench of flurprimidol at 2.0 mg a.i./pot is recommended, however this will increase PGR cost per pot to $0.07. For *Colocasia esculenta* ‘Gigantea’ a low substrate drench rate of paclobutrazol at 1.0 mg a.i./pot is recommended for height control compared to higher concentrations of flurprimidol. Pennisi (2006) and Pulley et al. (1986) also reported similar results of poor visual quality as the concentration of flurprimidol and paclobutrazol increased.

Expt. 2 focused only on substrate drenches of flurprimidol and paclobutrazol because of effective growth control of vigorous foliar species. *Ardisia humalis* was not impacted by either chemical. *Cordyline* ‘Sundance’ did not respond to paclobutrazol, however flurprimidol at 2.0 mg a.i./pot did provide height control within the wholesale standards, while maintaining the best visual quality (Table 2-8). Plant diameter of *Cordyline* ‘Sundance’ was not controlled by either PGR. Plant height of *Asparagus densiflorus* 'Sprengeri' was not affected by either PGR, however plant diameter was controlled using flurprimidol at 0.5 and 1.0 mg a.i./pot and paclobutrazol at 0.25 and 0.50 mg a.i./pot (Table 2-9).

The cost to control plant growth for Expt. 2 within wholesale growth control standards ranged from $0.01 to $0.07 using substrate drenches of flurprimidol or paclobutrazol. With *Cordyline* ‘Sundance’ only plant height can be manipulated by flurprimidol at 2.0 mg a.i./pot at a cost of $0.07 per pot. Plant diameter was controlled with *Asparagus densiflorus* 'Sprengeri' using both PGRs, however paclobutrazol at 0.25 mg a.i./pot was the most cost effective at $0.01 per pot.

Consumer surveys on foliage container gardens treated with different rates of flurprimidol provided insight on consumer preference, container price, and customer intent to buy. For foliage container preference the hypothesis was that the consumers would choose the control, essentially the largest plant material for their financial investment. Pooling all consumer groups together (33.8%, n = 176) exhibited preference for the control. However preference towards the control was lower than expected. A cross tabulation was performed on the foliage container preference by consumer group and differences were found between the two consumer groups examined; plant sale consumers and horticulture industry/master gardeners. Plant sale consumers were inline with the hypothesis and preferred the control, however industry professionals and master gardeners choose the foliage container with slightly smaller plant material that had been controlled by flurprimidol rates of 0.5 and 1.0 mg a.i. The consumer behavior theory of the attitude-nonattitude continuum (Mitchell, 1993) may explain the differences in preferences observed in this survey. Respondents to this survey may have never encountered a PGR container before so their attitude or preferences toward a container garden with slightly smaller plant material may not have been determined prior to this study. This result may indicate that mainly plant sale consumers are looking for the most mature plant material (immediate gratification), thus the best value for their investment. The industry professionals, master gardeners, and the remaining plant sale consumers may have understood more of the benefits of PGR treated plant material and preferred slightly smaller plant material for increased longevity of the container garden. There may be some potential to sell container gardens composed of plants treated with PGRs by marketing the container garden as compact with low maintenance attributes.

Consumers were then asked to indicate an appropriate price and the majority provided a price between $10.00 and $19.99 for a 12-inch container containing only foliage plants. In a national container garden survey conducted by Mason et al. (2008) respondents considered $24.99 an appropriate price for a container garden. These price points may aid the retail industry on a proper price reference when producing or selling similar container gardens. Finally consumers were asked if they would consider buying their preferred foliage container garden today in order to measure intent. Nearly two-thirds of all the consumers indicated that they would not buy their preferred foliage container that day. Different factors were examined to determine if price, preference or the different consumer groups explained intent to buy, and all factors of this survey were inconclusive. Thus intent to buy may be linked to other factors not explored in this survey as the type or color of plant material within the container garden, light and water requirements of the container garden, or overall size of container garden. Certain survey participants did make comments that *Asparagus densiflorus* 'Sprengeri' was an invasive species in south Florida. Pennisi et al. (2005) discovered that consumers in garden centers had nearly no exposure to any foliage plant promotional materials and knew little about the benefits of foliage plants, thus a lack of marketing. Mason et al. (2008) found in their container garden survey that consumers desired educational materials be provided with their container garden purchase and that consumers would likely return to purchase plants to replenish their container garden. Increased promotional materials accompanying foliage plants, along with examples of various uses for foliage plants would likely be factors that would link consumer intent to purchase.

Table 2-1. *Colocasia esculenta* 'Nancy's Revenge' pooled data nine weeks after foliar spray treatments of flurprimidol and paclobutrazol (Expt. 1).

Treatment	Conc. ($mg \cdot L^{-1}$)	Visual quality[z]	Plant height (cm)	Plant diameter (cm)
Untreated control	0	2.0c	25.4abc	48.6a
Flurprimidol	20	2.3bc	25.4abc	50.2a
	40	2.4bc	26.8ab	52.5a
	80	2.7ab	27.3a	51.0a
Paclobutrazol	20	2.3bc	26.2abc	50.9a
	40	2.9a	23.3c	47.1a
	80	2.6ab	24.1bc	48.5a
LSD ($\alpha \leq 0.05$)		0.4		
Significance[y]		***	NS	NS

[z]Visual quality scale: 1 = excellent, 5 or more leaves; 2 = good, three or more leaves; 3 = satisfactory, two or more leaves; 4 = unsatisfactory, one leaf/stem; 5 = poor, 0 leaves, dying.
[y]NS, *** Nonsignificant or significant at $P \leq 0.001$, respectively; n = 5. Treatments with similar letters were similar in visual quality or similar in size.

Table 2-2. *Colocasia esculenta* 'Gigantea' pooled data nine weeks after foliar spray treatments of flurprimidol and paclobutrazol (Expt. 1).

Treatment	Conc. ($mg \cdot L^{-1}$)	Visual quality[z]	Plant height (cm)	Plant diameter (cm)
Untreated control	0	1.7a	31.8a	80.2ab
Flurprimidol	20	2.0a	29.2ab	74.0b
	40	2.1a	26.4c	64.6c
	80	2.1a	29.8a	74.6b
Paclobutrazol	20	1.8a	29.6a	79.3ab
	40	1.9a	29.3ab	82.1a
	80	1.9a	26.8bc	75.0b
LSD ($\alpha \leq 0.05$)			2.4	5.7
Significance[y]		NS	***	***

[z]Visual quality scale: 1 = excellent, 5 or more leaves; 2 = good, three or more leaves; 3 = satisfactory, two or more leaves; 4 = unsatisfactory, one leaf/stem; 5 = poor, 0 leaves, dying.
[y]NS, *** Nonsignificant or significant at $P \leq 0.001$, respectively; n = 5. Treatments with similar letters were similar in visual quality or similar in size.

Table 2-3. *Xanthosoma violaceum* pooled data nine weeks after foliar spray treatments of flurprimidol and paclobutrazol (Expt. 1).

Treatment	Conc. ($mg \cdot L^{-1}$)	Visual quality[z]	Plant height (cm)	Plant diameter (cm)
Untreated control	0	1.7c	21.4a	52.2a
Flurprimidol	20	1.8bc	19.6ab	48.4ab
	40	2.1abc	17.8bc	46.5b
	80	2.5a	15.0d	44.3b
Paclobutrazol	20	2.2abc	17.6bc	44.2b
	40	2.2abc	16.5cd	45.2b
	80	2.3ab	18.2d	46.2b
LSD ($\alpha \leq 0.05$)		0.5	2.4	5.0
Significance[y]		*	***	*

[z]Visual quality scale: 1 = excellent, 5 or more leaves; 2 = good, three or more leaves; 3 = satisfactory, two or more leaves; 4 = unsatisfactory, one leaf/stem; 5 = poor, 0 leaves, dying.
[y]NS, *, *** Nonsignificant or significant at $P \leq 0.05$ or $P \leq 0.001$, respectively; n = 5. Treatments with similar letters were similar in visual quality or similar in size.

Table 2-4. *Colocasia esculenta* 'Nancy's Revenge' pooled data nine weeks after substrate drench treatments of flurprimidol and paclobutrazol (Expt. 1).

Treatment	Conc. (mg a.i./pot)	Visual quality[z]	Plant height (cm)	Plant diameter (cm)
Untreated control	0.0	2.0d	25.4a	48.6a
Flurprimidol	0.5	3.2c	18.9b	44.4ab
	1.0	3.0c	19.2b	46.3ab
	2.0	3.3c	16.9bc	41.6bc
Paclobutrazol	0.5	3.3c	18.6b	43.3b
	1.0	3.6b	14.8c	37.3c
	2.0	3.9a	11.1d	32.4d
LSD ($\alpha \leq 0.05$)		0.3	2.3	4.7
Significance[y]		***	***	***

[z]Visual quality scale: 1 = excellent, 5 or more leaves; 2 = good, three or more leaves; 3 = satisfactory, two or more leaves; 4 = unsatisfactory, one leaf/stem; 5 = poor, 0 leaves, dying.
[y]*** Significant at $P \leq 0.001$, respectively; n = 5. Treatments with similar letters were similar in visual quality or similar in size.

Table 2-5. *Colocasia esculenta* 'Gigantea' pooled data nine weeks after substrate drench treatments of flurprimidol and paclobutrazol (Expt. 1).

Treatment	Conc. (mg a.i./pot)	Visual quality[z]	Plant height (cm)	Plant diameter (cm)
Untreated control	0.0	1.6d	31.8a	80.2a
Flurprimidol	0.5	1.9cd	28.5b	74.9b
	1.0	2.1bc	25.5cd	69.5c
	2.0	2.2bc	23.0de	63.8de
Paclobutrazol	0.5	2.1bc	26.7bc	67.6cd
	1.0	2.5b	23.6de	67.0cd
	2.0	3.3a	20.9e	60.9e
LSD ($\alpha \leq 0.05$)		0.4	2.7	5.2
Significance[y]		***	***	***

[z]Visual quality scale: 1 = excellent, 5 or more leaves; 2 = good, three or more leaves; 3 = satisfactory, two or more leaves; 4 = unsatisfactory, one leaf/stem; 5 = poor, 0 leaves, dying.
[y]*** Significant at $P \leq 0.001$, respectively; n = 5. Treatments with similar letters were similar in visual quality or similar in size.

Table 2-6. Visual quality of *Xanthosoma violaceum* by week using flurprimidol and paclobutrazol substrate drenches (Expt. 1).

Treatment	Conc. (mg a.i./pot)	Visual quality[z] week 3	Visual quality[z] week 6	Visual quality[z] week 9
Untreated control	0.0	2.0c	1.2b	1.8c
Flurprimidol	0.5	3.4a	3.0a	3.6ab
	1.0	2.4bc	2.0b	3.4b
	2.0	3.4a	3.0a	4.0ab
Paclobutrazol	0.5	3.2a	3.2a	3.2b
	1.0	2.4bc	3.4a	3.2b
	2.0	3.0ab	3.0a	3.6ab
LSD ($\alpha \leq 0.05$)		0.68	0.88	0.60
Significance[y]		***	***	***

[z]Visual quality scale: 1 = excellent, 5 or more leaves; 2 = good, three or more leaves; 3 = satisfactory, two or more leaves; 4 = unsatisfactory, one leaf/stem; 5 = poor, 0 leaves, dying.
[y]*** Significant at $P \leq 0.001$, respectively; n = 5. Treatments with similar letters were similar in visual quality.

Table 2-7. *Xanthosoma violaceum* pooled data nine weeks after substrate drench treatments of flurprimidol and paclobutrazol (Expt. 1).

Treatment	Conc. (mg a.i./pot)	Plant height (cm)	Plant diameter (cm)
Untreated control	0.0	21.4a	52.2a
Flurprimidol	0.5	12.8b	36.1c
	1.0	14.7b	47.8ab
	2.0	12.9b	39.2c
Paclobutrazol	0.5	12.5b	39.1c
	1.0	13.3b	43.3bc
	2.0	12.8b	38.5c
LSD ($\alpha \leq 0.05$)		2.02	7.32
Significance [z]		***	***

[z] *** Significant at $P \leq 0.001$, respectively; n = 5. Treatments with similar letters were similar in size.

Table 2-8. *Cordyline* 'Sundance' six weeks after substrate drench treatments of flurprimidol and paclobutrazol (Expt. 2).

Treatment	Conc. (mg a.i./pot)	Visual quality[z]	Plant height (cm)	Plant diameter (cm)
Untreated control	0.0	1.8bc	36.05b	65.7bc
Flurprimidol	0.25	1.7c	37.8ab	64.7bc
	0.5	1.0c	37.2ab	68.2ab
	1.0	1.7bc	34.9bc	51.7d
	2.0	2.3b	28.6cd	66.0bc
	4.0	3.3a	27.1d	57.0cd
Paclobutrazol	0.25	1.7bc	36.7ab	69.5ab
	0.5	1.0c	39.7ab	74.2ab
	1.0	1.2c	43.1a	76.1a
	2.0	1.3c	40.9ab	73.4ab
	4.0	1.2c	40.6ab	72.8ab
LSD ($\alpha \leq 0.05$)		0.9	6.9	9.7
Significance[y]		***	***	***

[z]Visual quality scale: 1 = excellent, 5 or more leaves; 2 = good, three or more leaves; 3 = satisfactory, two or more leaves; 4 = unsatisfactory, one leaf/stem; 5 = poor, 0 leaves, dying.
[y]*** Significant at $P \leq 0.001$, respectively; n = 6. Treatments with similar letters were similar in visual quality or similar in size.

Table 2-9. *Asparagus densiflorus* 'Sprengeri' six weeks after substrate drench treatments of flurprimidol and paclobutrazol (Expt. 2).

Treatment	Conc. (mg a.i./pot)	Visual quality[z]	Plant height (cm)	Plant diameter (cm)
Untreated control	0.0	1.2c	24.3ab	54.6a
Flurprimidol	0.25	1.2c	24.1ab	50.4ab
	0.5	1.5c	23.6abc	36.8e
	1.0	1.7bc	23.6abc	45.1bcd
	2.0	2.3ab	21.9abc	39.3de
	4.0	2.7a	19.5c	41.7cde
Paclobutrazol	0.25	1.7bc	21.2abc	45.6bcd
	0.5	1.3c	21.4abc	41.7cde
	1.0	2.3ab	21.7abc	44.3bcd
	2.0	3.0a	20.3bc	42.0cde
	4.0	1.8bc	25.2a	47.3abc
LSD ($\alpha \leq 0.05$)		0.8	NS	7.9
Significance[y]		***		**

[z]Visual quality scale: 1 = excellent, 5 or more leaves; 2 = good, three or more leaves; 3 = satisfactory, two or more leaves; 4 = unsatisfactory, one leaf/stem; 5 = poor, 0 leaves, dying.
[y]NS, **, *** Nonsignificant or significant at $P \leq 0.01$ or $P \leq 0.001$, respectively; n = 6.
Treatments with similar letters were similar in visual quality or similar in size.

Table 2-10. Pooled data nine and 12 weeks after treatment of flurprimidol and paclobutrazol drench effects on combination containers composed of *Cordyline* 'Sundance', *Ardisia humalis*, and *Asparagus densiflorus* 'Sprengeri' (Expt. 2).

Treatment	Conc. (mg a.i./pot)	Plant size [z]
Untreated control	0.0	57.4ab
Flurprimidol	0.25	55.6abc
	0.5	59.9a
	1.0	55.9abc
	2.0	53.3bc
	4.0	52.0c
Paclobutrazol	0.25	55.8abc
	0.5	58.3a
	1.0	57.7a
	2.0	57.6ab
	4.0	57.0ab
LSD ($\alpha \leq 0.05$)		4.3
Significance [y]		*

[z] Plant size = (plant height + diameter 1 + diameter 2) / 3. [y] * Significant at $P \leq 0.05$, respectively; n = 6. Treatments with similar letters were similar in size.

Table 2-11. Foliage container garden preference by consumer group (Expt. 2).

Foliage container garden preference	Consumer Group: Plant sale consumer	Consumer Group: Horticulture industry and master gardener consumers	Total
Untreated control	159 40.6%	17 14.9%	176 34.8%
Slightly controlled (flurprimidol at 0.25 mg a.i.)	43 10.9%	19 16.7%	62 12.3%
Moderately controlled (flurprimidol at 0.50 and 1.0 mg a.i.)	119 30.4%	72 63.2%	191 37.7%
Highly controlled (flurprimidol at 2.0 and 4.0 mg a.i.)	71 18.1%	6 5.2%	77 15.2%
Total	392 100%	114 100%	506 100%

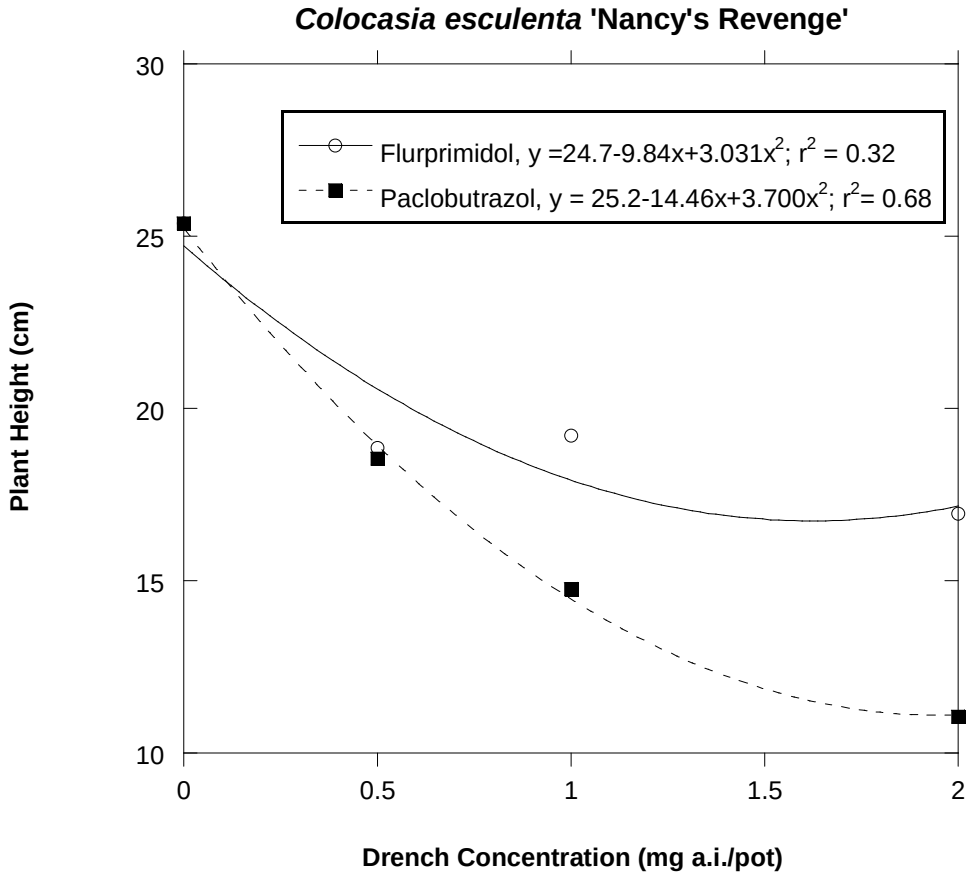


Figure 2-1. *Colocasia esculenta* 'Nancy's Revenge' plant height response to plant growth regulators (Expt.1). Regression lines were generated from the means of pooled data nine weeks after treatment, and points are means for each treatment (n = 5). *** Significant at the $P \leq 0.001$; L = linear, Q = quadratic. Flurprimidol substrate drench: L *** Q ***. Paclobutrazol substrate drench: L *** Q***.

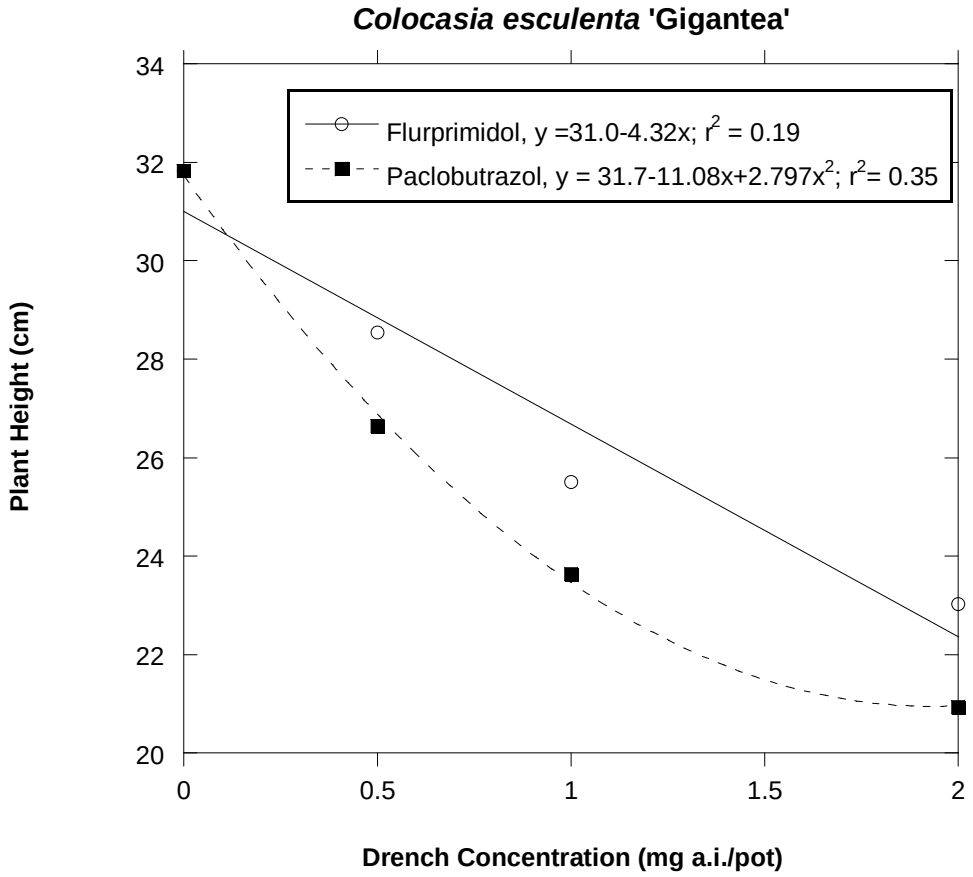


Figure 2-2. *Colocasia esculenta* 'Gigantea' plant height response to plant growth regulators (Expt. 1). Regression lines were generated from the means of pooled data nine weeks after treatment, and points are means for each treatment (n = 5). *** Significant at the $P \leq 0.001$; L = linear, Q = quadratic. Flurprimidol substrate drench: L *** Q ***. Paclobutrazol substrate drench: L *** Q ***.

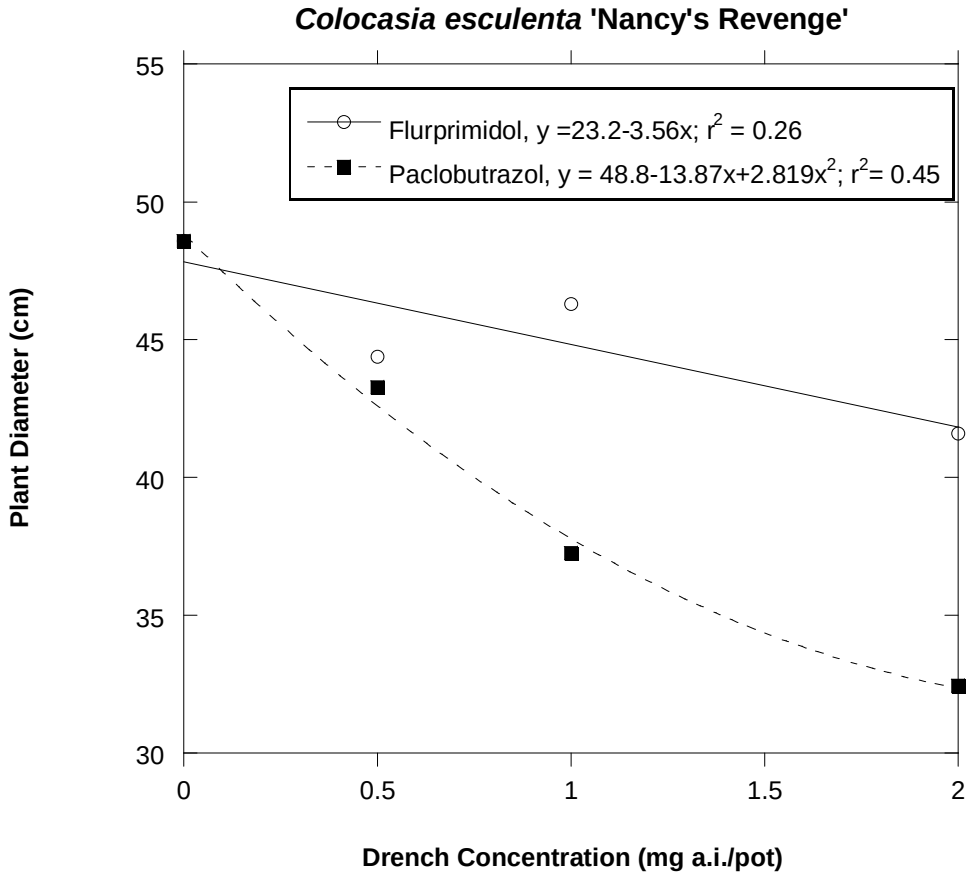


Figure 2-3. *Colocasia esculenta* 'Nancy's Revenge' plant diameter response to plant growth regulators (Expt. 1). Regression lines were generated from the means of pooled data nine weeks after treatment, and points are means for each treatment (n = 5). *, **, *** Significant at the $P \leq 0.05$, 0.01, 0.001, respectively; L = linear, Q = quadratic. Flurprimidol substrate drench: L** Q *. Paclobutrazol substrate drench: L *** Q ***.

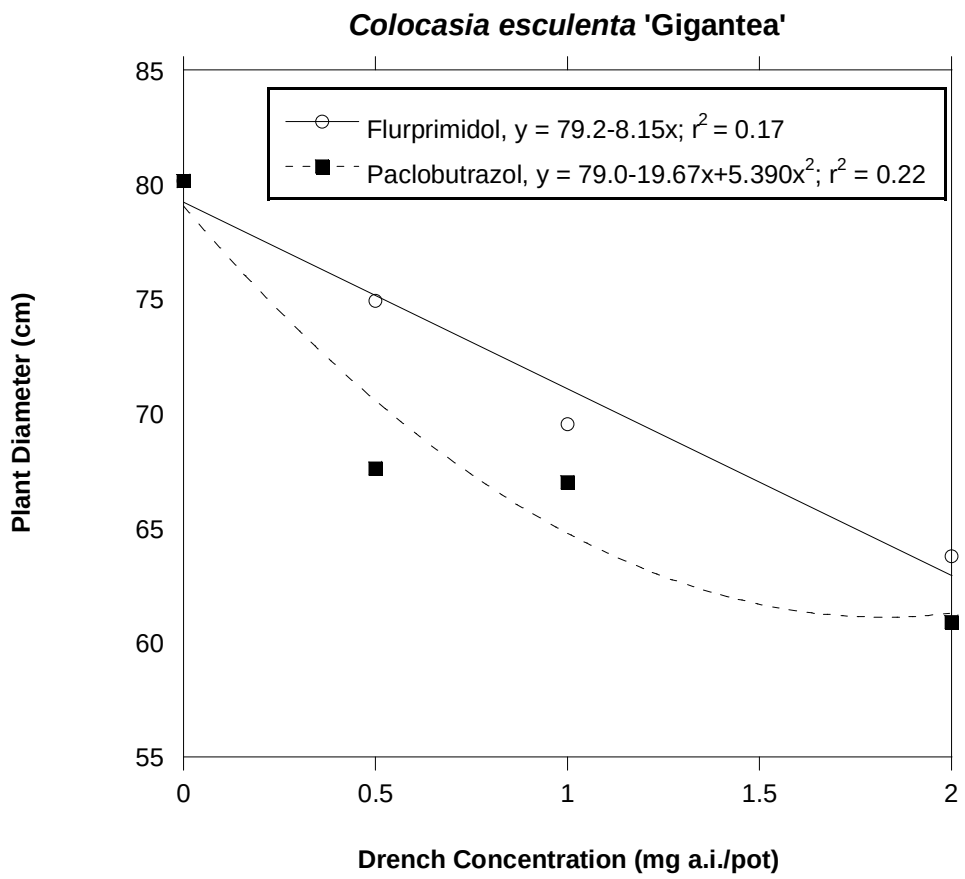


Figure 2-4. *Colocasia esculenta* 'Gigantea' plant diameter response to plant growth regulators (Expt. 1). Regression lines were generated from the means of pooled data nine weeks after treatment, and points are means for each treatment (n = 5). **, *** Significant at the $P \leq 0.01$, 0.001, respectively; L = linear, Q = quadratic. Flurprimidol substrate drench: L *** Q **. Paclobutrazol substrate drench: L*** Q***.

Figure 2-5. Visual difference 12 weeks after treatment of increasing concentrations of flurprimidol treated plants planted together in container gardens. From left to right the concentrations range from 0 mg a.i./pot (untreated control) to 0.25, 0.5, 1.0, 2.0, and 4.0 mg a.i./pot (Expt. 2).

CHAPTER 3
FOLIAGE PLANT CONTAINER GARDEN PILOT STUDIES

Introduction

New and innovative marketing strategies are needed to meet one of the goals of the National Foliage Foundation and to combat against the recent reduction in lawn and garden activities (Natl. Gardening Assn., 2007). One possible new marketing approach is the use of foliage plants in outdoor container gardens. Between 1999 and 2004 the National Gardening Association (2007) reported container gardening doubled in popularity with upwards of 26 Mn households participating nationwide. An upward trend in container gardening has significantly contributed to national and regional horticulture retail sales.

Pennisi et al. (2005) addressed ways to increase awareness and promote new tropical foliage plants. To increase sales, researchers described the benefits of foliage plants to consumers to encourage a need or a want for purchasing. They indicated that foliage plants are fairly maintenance-free having few insect and disease problems and no petal drop or flower removal. Since most foliage plants thrive in humid conditions, fungal problems are generally not an issue. Some foliage species can tolerate lower temperatures, especially if they are exposed to temperatures that drop slowly. Certain species can withstand freezing temperatures on a limited basis if the relative humidity is high and wind levels are low; many foliage plants can be over wintered inside to increase their versatility. Also the majority of foliage plants can tolerate low-light environments, as opposed to many of the new vegetatively produced flowering plants. Pennisi et al. (2005) described one potential marketing outlet or niche for new tropical foliage plant species- their use in container gardens. They stated that due to the increased popularity

of combination gardens with consumers, colorful foliage plants can be used alone or combined with flowering plants to create attractive, low-maintenance containers.

In response to the popularity of container gardens, there has been an increased demand for new and unique plant varieties along with a surge in sales of bedding and garden plants (Ouellet, 2001). Tropical foliage plants may be one option to meet the demand set forth by the container gardening industry as proposed by Pennisi et al. (2005). To determine what consumers are looking for in a container garden, a recent online survey by Mason et al. (2008) examined national consumer preferences of three container gardening attributes: color harmony, price and care information provided. The survey had 985 respondents that answered questions on past experience and future intentions of container gardening. The researchers found that respondents considered $24.99 an appropriate price for a container garden composed of plants that reflect complementary color harmony, along with many respondents wanting educational materials provided with the purchase. Another important finding was that if extensive care information was provided with the container garden, 76% of the respondents would more likely purchase and 85% would consider visiting a website to obtain further information on container gardening. Also, consumers stated they would likely return to the garden center to purchase additional plant material to replenish their container garden.

In 2006, the national key consumer groups for container gardening sales were women (62% of sales), college-educated households (91% of retail sales), two-person households (38% of sales), households with no children (70% of sales) and households with incomes of $50,000 and over (52% of sales) (Natl. Gardening Assn, 2007). From 2000 through 2006, the southern states had the second highest percentage of total sales

(27%) just behind the western U.S. (32%) in the container gardening category which has an average total retail sale value of $1.203 Bn (NGA, 2007). As a staple in the industry, container gardens require the addition of new and unique plant material with increased educational and promotional materials to continually create interest and appeal for the product. These efforts will help to maintain container gardens in the growth phase of the product lifecycle.

Consumer Purchase Behavior

Consumer behavior is an important topic to consider when marketing new foliage genera and cultivars to the retail market. Garden center customers tend to buy what they want, not what they need (Dunn, 1992). Thus the buying process of new plants in retail outlets falls under the definition of an impulse or unplanned purchase. Impulse buying is defined in this study as "a purchase decision made in-store with no explicit recognition of a need (or want) for such a purchase prior to entry into the store" (Abratt and Goodey, 1990). An unplanned purchase is similar to an impulse purchase because it is a purchase decision made in-store that fulfills a present or future need or want. Promoting products as impulse purchases increases awareness, trial-ability, and ultimately market share. Demand is created as an impulse or an unplanned purchase becomes a repeat purchase, thus a new product evolves into a planned purchase. The driving mechanism for impulse and unplanned buying is the use of in-store stimuli that act as a reminder of shopping needs; this includes in-store sitting, on-shelf positions, price-off promotions, sampling, point-of-purchase displays, coupons and in-store demonstrations (Abratt and Goodey, 1990). Creating in-store awareness and providing consumer education on new products alleviates consumer hesitation and may remind the consumer of a present or future need, therefore making it easier to justify purchasing.

The grocery industry has conducted extensive consumer purchase behavior research into prior consumer knowledge of the store, time available for shopping, and point-of-purchase materials (Point of Purchase Institute, 1978; Park et al., 1989; Abratt and Goodey, 1990; Bucklin and Lattin, 1991). Park et al. (1989) conducted a field experiment to explore the effects of two situational factors on consumers' grocery shopping behavior: prior store knowledge and time available for shopping. Their study of 68 subjects found that consumers with low store knowledge and no time pressure engaged in significantly more in-store informational processing and thus higher amounts of unplanned purchases. One alternative explanation for this occurrence is when the number of products that consumers actually purchase is large, their likelihood of exposure to in-store product stimuli increases, which may in turn increase the level of unplanned buying. Consumers within this category of low store knowledge and no time pressure resulted in 47% of unplanned purchases. Consumers with high store knowledge and no time pressure resulted in 20% of unplanned purchases. Those consumers that were under a time pressure situation and had low store knowledge resulted in 16% of unplanned purchases, compared to 13% of unplanned purchases from high store knowledge and under a time pressure situation. Among all unplanned purchases, 33% were due to reasons other than simple exposure effects and involved active processing of product information that may have made subjects aware of previously unrecognized needs.

Park et al. (1989) included strategies for the grocery industry to adopt that would help increase purchasing behavior by embracing a coordinated approach to the store environment. These strategies include arrangement of aisles based on consumers' prior

knowledge or expectations of product location, and arrangement of product displays for non-staple items in prime locations to reduce purchase failure rates. Another strategy includes joint displays of substitutable products to encourage product-level switching as opposed to purchase postponement when a preferred brand or product is not available. A final strategy was to place highly visible displays of brand or product information to promote the recognition of previously unrecognized needs.

In the grocery industry, point-of-purchase promotional materials are particularly important given the large proportion of in-store decisions (Bucklin and Lattin, 1991). According to the Abratt and Goodey (1990) study on unplanned buying and in-store stimuli in supermarkets, in-store stimuli do significantly affect unplanned purchasing. From a sample of 400 respondents involved in unplanned brand purchase decisions, 70% said that the purchase decision was due to shelf signs, point-of-sale material, end-of-aisle displays and special displays. With a previous study by the Point-of-Purchase Institute (1978) citing 65% of supermarket purchases being made in-store and over 50% of these purchases being unplanned purchases, the grocery industry has parallels to retail garden centers as 83% of garden center purchases are unplanned or made in-store (Niemieria et al., 1993). Therefore grocery in-store marketing strategies might be adapted to garden centers to promote unplanned or impulse purchasing on new or unfamiliar products.

A garden center-based marketing needs survey by Niemieria et al. (1993) revealed that consumers desired plant information and that only 17% of customers had a specific idea of what plants to purchase. The overriding conclusion from this study shows that many garden center customers wait until they are in the store to develop reasons for making purchases, similar to the grocery industry. One setback for the horticulture retail

industry is the low ratio of garden center salespersons to customers during the active buying season. This often makes it difficult to educate the consumer about products. Becker and Poorbaugh (1996) noted that verbal consultation between salespeople and consumers is time-consuming, and its effectiveness depends on employee knowledge. They also suggested providing visual materials highlighting essential plant information that could be helpful to both customers and employees. According to the Garden Center Institute, more than 70% of all purchasing decisions are made independently of a salesperson's help (Dunn, 1992). Thus garden centers must provide good informational signage and keep their stores well-merchandised to achieve impulse purchases on new products and those that have likely been untried by their customer base. Also, garden centers may consider adopting some of the grocery industry strategies for achieving higher incidences of impulse and unplanned sales. Stegelin (2001) looked at the role of point-of-sale information on consumers' purchase decisions in a survey conducted at urban and rural garden centers in Georgia. He found that point-of-sale information is the third highest factor below plant quality and selection when consumers are selecting a garden center. Also point-of-sale information came in second under garden center staff when consumers are looking for a source for technical assistance. Stegelin states that repeat customers are the "lifeblood" of the garden center industry and in order to achieve this advertised specials are needed to draw in customers similar to the grocery industry. Once in the garden center, information must be provided in the form of sales staff or promotional materials to assist customers with their purchase decisions.

Marketing Survey

Surveys are the most commonly used interactive instrument where consumers respond to questions asking about their beliefs or behaviors (Solomon, 2000). The

Tailored Design Method (Dillman, 2000) is one of the most widely accepted sources of methodology to be utilized in conducting and analyzing a survey in the social sciences. Six basic steps to conduct an effective survey include 1) determine a research question to answer, 2) define the population, 3) select a sample from the population, 4) construct the questionnaire, 5) conduct the survey and 6) process the data. To construct a reliable and valid survey, steps are outlined to write survey questions that are short, simple, unbiased, and avoid unambiguous answers and leading questions (Dillman, 2000).

In-store surveys are one tool used to determine how and who to market new products too because they provide information on needs, trends, preferences, and demographics. They have been used repeatedly in the horticulture industry to collect consumer information at garden centers on buying habits, marketing needs, and service and quality attributes (Garber et al., 1998; Hudson et al., 1997; Satterthwaite et al., 2004). Pennisi et al (2005) conducted a post-purchase survey on the demand for foliage plants in large urban centers of Georgia, Alabama, and South Carolina. This post-purchase survey was distributed to 30 independent retail garden centers in nine communities in the three states. An identical one-page survey utilized questions in a Likert-scale format and was attached to the consumers receipt with instructions to bring the survey back during their next visit to the garden center. Most retailers did provide a gift as an incentive to return the completed survey. The researchers received 1,897 completed surveys in late spring of 2003. Survey results indicated that foliage was not predominantly displayed in the garden centers, foliage plant selection was limited, and promotional materials for foliage was nil to non-existent. The retailers that administered these surveys were in agreement with their consumers' observations. Retailers indicated they had received little or no

point-of-purchase promotional materials from the growers or brokers that provided them with the foliage plant material. In addition, researchers examined the public media sources where foliage plants may have been promoted 30 days prior to survey distribution and only one magazine article on foliage use in interiorscapes was revealed. Pennisi et al (2005) concluded that these consumers were largely unaware of the benefits associated with foliage plants. The survey revealed that consumers associated foliage plants to florist shops where one item per purchase is common as it is primarily purchased for a gift. The researchers also found through their surveys that there is little differentiation among plant types, forms, sizes, or colors by the consumers, much less the different genus, species, cultivars, and varieties. The researchers proposed that if foliage demand is to grow in the traditional markets, consumer education efforts are mandatory through push and/or pull marketing strategies. To implement a push strategy the grower or broker would try to move foliage plants through the channel by convincing other growers or retailers to offer them (Solomon, 2000). If a push strategy is implemented than the grower or broker would try to move foliage plants through the channel by building desire for the plants among consumers, thus convincing other growers or retailers to respond to this demand by stocking these items (Solomon, 2000). Pennisi et al. (2005) stated that "price is not an issue [for foliage plants]; rather "why purchase?" is the issue."

Survey population and sample size

For directly administered questionnaires, a specific sample from the population is targeted and questions are customized to them. As in the previous post-purchase survey example by Pennisi et al. (2005), the sample was garden center consumers. The accessible population targeted in the following pilot studies is consumers of two

University of Florida plant sales in Milton and Gainesville, Fla. A convenience sample of those consumers purchasing foliage plant container gardens at the two plant sales was utilized to conduct the study. These samples are considered convenience samples as they do not represent the entire population.

Instrumentation

The advantages of a directly administered questionnaire is the very high response rate, low-cost of collecting the data, and having the administrator on-site to answer questions (Ary et al., 2002). A properly composed survey directly administered to garden center consumers can provide valuable information to the horticulture industry and enhance the understanding of consumer needs, wants, and target markets.

Survey procedures

In order to capture sound data for statistical interpretation, researchers must eliminate biased questions. Proper instrument questions avoid misleading the reader due to unstated assumptions and double-barreled questions (Ary et al., 2002). Alternatives to each questionnaire item should express all the possible options for the answer and that the respondents should be familiar enough with the topic to answer the questions (Ary et al., 2002). Reviewing the instrumentation with a panel of experts and conducting a pilot study on the sample population will increase the validity and reliability of the instrumentation.

Prior to beginning the following pilot studies the researcher submitted the study's protocol for review and received approval from the University of Florida Institutional Review Board (see Appendix B).

Threats to validity

The questionnaire should "demonstrate face validity; the survey should appear valid for its intended purpose and all questions are relevant and meaningful" (Ary et al., 2002). The goal is to collect the most accurate answers from the questionnaire, so questions should reflect the question the researcher is trying to solve. Thus in garden centers, consumer questionnaires should be based on gardening or a landscaping topic that reflects that sample. To increase validity, the survey should be administered to a sample that finds the topic important and the person answering the questionnaire should remain anonymous to increase the truthfulness of their responses (Ary et al., 2002). The instrumentation should also be reviewed by a panel of experts and pilot studies should be conducted to establish validity and reliability. Limitations that may cause unavoidable bias include where and when the questionnaire can be administered, along with results that only reflect the convenience sample (Ary et al., 2002). The directly administered questionnaire is subject to the naturalistic setting, where not all individuals in the population have an equal opportunity to be apart of the sample. Therefore, caution is warranted when attempting to generalize findings beyond the specific sample at the approximate time the directly administered questionnaire is conducted.

Product Placement

Product placement is another potential component to achieve maximum sales in retail establishments. Underhill (2001) states that all shopping or retail experiences follow a standard pattern. Different constraints exist whether men or women, young or old, by themselves or as a family are shopping; however the overall shopping pattern is the same. The challenge for retailers- from a person with an up-scale garden center to a person with a table at a farmers' market- is to enhance the shopping experience to

promote sales. Underhill's research shows that the shopping experience goes through five steps or stages called "zones".

The five zones Underhill identifies are the landing, transition, destination, transaction and exit zones. Within a garden center, the landing zone is the initial experience that ranges from the signs, parking lot appearance, to the welcoming eye contact at the garden center. The transition zone is the point of entry- the doorway space, the overall presentation which clarifies the space at the entry of the garden center. The destination zone is where products are displayed and offered for sale. This zone requires space for consumers to conduct shopping. Additionally the destination zone should feature a sub-zone called a hovering zone for people who are accompanying the shopper yet not actively involved in the purchasing process. The transaction zone is where the actual sale is made and goods and services are exchanged. Finally, the exit zone is the departure point to facilitate the removal of the purchased items which were purchased. The exit zone is also a place to encourage a return shopping trip. Within these five zones, three represent the areas where most of the purchasing decisions are made; landing, transition and destination zones (see Appendix A). Among these three zones, it may be important to determine whether any of these zones with the same product display lead to more consumer purchases so that displays in this location can be utilized to their fullest potential to achieve the most sales. Gibson et al. (2007) conducted research on consumer purchase patterns in Florida utilizing displays in the three retail zones identified by Paco Underhill: landing, transition and destination zones. In the study, the landing zone yielded the most sales, yet with the limited data collected, further investigation into this area is needed to make definitive conclusions.

The objective of this study was to explore an additional marketing outlet for the foliage industry by recording the consumer preferences and demographics for foliage plant container gardens, along with collecting data on the effects of different display locations within a retail setting. The purpose of Pilot Study 1 was to gather preliminary data of consumer purchasing patterns and preferences towards foliage container gardens constructed with traditional foliage plants. The purpose of Pilot Studies 2 and 3 was to improve upon the first pilot study and examine the use of newer foliage varieties in container gardens and update the study's instrumentation. Using this data, future studies at garden centers can be created to collect more information on consumer preferences towards foliage container gardens.

Materials and Methods

Pilot Study 1

The objective of Pilot Study 1 was to introduce a consumer purchasing pattern study with container gardens composed of traditional foliage plants and collect data using a post-purchase survey at the University of Florida-Milton student plant sale on 7 Oct. 2006. Unrooted foliage plants were propagated on 6 July 2006 then potted on 21 Aug. The root substrate was Fafard® 4-P (Conrad Fafard, Inc., Anderson, SC), which contained (v/v): 4 sphagnum peat: 2 pine bark: 2 vermiculite: 1 perlite. Traditional foliage plants were allowed to mature in 8.3 x 11.4 cm (3.25 x 4.5 inch) round plastic containers until they were transplanted to create container gardens. The container garden pots were green or terra-cotta colored, square, fluted plastic containers measuring 10 inches x 10 inches (25 cm x 25 cm). The root substrate for the container gardens was Fafard® 4-P (Conrad Fafard, Inc., Anderson, SC), which contained (v/v): 4 sphagnum peat: 2 pine bark: 2 vermiculite: 1 perlite. Plants were watered using drip irrigation and fertilized once

weekly with 200 $mg \cdot L^{-1}$ N using Total Gro 14-4-14 (14N-1.8P-11.6K) (Total Gro, Winsboro, La.). The plants were grown under natural daylength. Pesticides were applied as needed.

Three different foliage plant combinations in container gardens were used for Pilot Study 1 (Table 3-1). Each container garden had foliage plants that represented upright, mounding, and trailing growth habits and were combined on the bases of vigor, water and light requirements. Each of these combinations were planted in a green or terra-cotta colored square container with three replications of each combination and container color.

For Pilot Study 1, setup of the three traditional foliage container garden displays mimicked the layout of a retail store. To identify possible purchasing differences among these three retail zones, the same foliage container garden display was setup in each zone. Display areas measured 3 ft x 9 ft (0.9 m x 2.7 m) raised 3 ft (0.9 m) off of the retail floor. Each container combination and pot color was replicated three times in each retail display, resulting in 18 foliage container gardens per display.

Data Analysis

Pilot Study 1 was conducted over a 9 hour period from 8:00 am until 5:00 pm on 7 Oct. 2006. Consumer purchasing preferences were measured using a post-purchase survey. Pilot Study 1 post-purchase questionnaire consisted of fourteen questions of which consumers were asked to circle an answer or answers that best depicts them (see Appendix E). Also recorded on each consumer's questionnaire were the foliage combination(s) the consumer selected, what container color they purchased and which retail display they shopped from. Data collection from this survey was analyzed using

SPSS® (Statistical Software for Social Sciences) version 14.0 for Windows™ descriptive statistics were calculated.

Pilot Study 2

The objective for Pilot Study 2 was to initiate a consumer purchase pattern study with container gardens composed of new or unique foliage plant containers. This study took place at the Emerald Coast Flower Festival on the campus of the Pensacola Junior College on 31 March and 1 April 2007. Unique or new foliage plugs (3.8 x 6.4 cm [1.5 x 2.5 inch] cells) were obtained (Agri-Starts in Apopka, Fla. and ForemostCo in Winter Garden, Fla.) and transplanted into 8.3 x 11.4 cm (3.25 x 4.5 inch) round plastic containers on 11 Dec. 2006. On 28 Feb. 2007 five types of foliage container gardens were constructed in 12-inch (24.1cm x 30.5cm) round, terra-cotta colored plastic containers. Each foliage container garden contained three foliage plants: an upright, mounding, and trailing plant and were combined on the basis of similar vigor, water and light requirements. Also considered during container garden construction were aesthetically pleasing plant combinations (Table 3-2). Different colored containers were eliminated as a factor in Pilot Studies 2 and 3 and only terra-cotta colored containers were used. The root substrate for the container gardens was Fafard® 4-P (Conrad Fafard, Inc., Anderson, SC), which contained (v/v): 4 sphagnum peat: 2 pine bark: 2 vermiculite: 1 perlite. Plants were watered using drip irrigation and fertilized once weekly with 200 $mg \cdot L^{-1}$ N using Total Gro 14-4-14 (14N-1.8P-11.6K) (Total Gro, Winsboro, La.). A topdressing of 30 g of Harrell's controlled release fertilizer 19-6-12 (19N-2.62P-9.96K) (Harrell's Fertilizer, Inc., Holt, Mich.) was also applied.

Ten of each of the five foliage container garden combinations were arranged on displays in the three retail zones, resulting in 50 container gardens per display. Similar to

Pilot Study 1, display locations included the landing zone, transition zone, and the destination zone. Display areas measured 3 ft x 9 ft (0.9 m x 2.7 m) raised 3 ft (0.9 m) off of the retail floor. The foliage container gardens were arranged in blocks according to the combination for each display table and the same arrangement was used in each display area.

Pilot Study 3

The objective for Pilot Study 3 was to duplicate a consumer purchase pattern trial with container gardens composed of new or unique foliage plant containers. This study took place at the University of Florida-Gainesville at the student plant sale on 14 and 15 April 2007. Unique or new foliage plugs (3.8 x 6.4 cm [1.5 x 2.5 inch] cells) were obtained from reputable suppliers (Agri-Starts in Apopka, Fla. and ForemostCo in Winter Garden, Fla.) and transplanted into 3.25 x 4.5 inch (8.3 x 11.4 cm) round plastic containers on 11 Dec. 2006. On 5 March 2007 four types of foliage container gardens were constructed in 12-inch (24.1cm x 30.5cm) round terra-cotta colored plastic containers. Each foliage container garden contained three foliage plants: an upright, mounding, and trailing plant. Foliage plants were combined on the bases of vigor, water, light requirements, and aesthetically pleasing (Table 3-3). The root substrate was Fafard® 2 (Conrad Fafard, Inc., Anderson, SC), which contained (v/v): 6.5 sphagnum peat: 2 perlite: 1.5 vermiculite. Plants were hand watered and fertilized with 14N-1.8P-11.6K with N at 200 $mg \cdot L^{-1}$. A topdressing of 30 g of Harrell's controlled release fertilizer 19-6-12 (19N-2.62P-9.96K) (Harrell's Fertilizer, Inc., Holt, Mich.) was also applied.

Five replicates of each of four foliage container garden combinations were displayed in three retail zones, resulting in 20 container gardens per display. As in Pilot Study 1, display locations included the landing zone, transition zone, and the destination

zone. Display areas measured 2 ft x 6 ft (0.6 m x 1.8 m) raised 3 ft (0.9 m) off of the retail floor. The foliage container gardens were arranged in blocks according to plant combination on each display table and the same arrangement was used in each display area.

Data Analysis

Improvements were made to the instrumentation following Pilot Study 1. The post-purchase questionnaire was updated to collect more information from consumers and was reviewed by a panel of experts (Drs. Irani and Gibson from the University of Florida). The respondents to the post-purchase questionnaire of Pilot Studies 2 and 3 were limited to one answer choice per question and a better scale of answer choices were provided for questions on frequency of plant purchases and gardening length. Also a question was included about the familiarity of the foliage plants within the container gardens the respondent was purchasing and whether they would come back and buy a similar foliage plant. For the demographics section, more definitive answer choices were provided. In Pilot Studies 2 and 3, consumer preferences and demographics were measured using the same post-purchase questionnaire. Revising the instrumentation and testing on a convenience sample was an indication of instrumentation reliability and validity. On the questionnaire, twelve questions were asked (see Appendix F). Upon completion of each post-purchase questionnaire, the customer's foliage container type(s) and the location of the purchase(s) was/were reported on their questionnaire. This associated the consumer's questionnaire answers to the type of foliage containers they purchased and the location where they purchased from. Data collection from this survey was analyzed using SPSS® (Statistical Software for Social Sciences) version 14.0 for Windows™ descriptive statistics were calculated.

Results

Pilot Study 1

In total for Pilot Study 1, nineteen questionnaires were collected which resulted in 27 foliage container gardens sold. The average customer for Pilot Study 1 can be described as female (89%, n = 16), annual household income of $40,000.00 or above (64%, n = 13), that has a college degree and is diverse in age (Table 3-4, 3-5, 3-6). They are composed mainly of two person adult households (48%, n = 9), while 21% (n = 4) had one adult and 26% (n = 5) had three adults per household (one respondent declined to answer). The majority of the consumers, 63% (n =12), did not have children, while two consumers indicated 1 child (11%), three consumers indicated 2 children (16%), and one consumer had 3 children (5.3%) (one respondent declined to answer).

The consumers indicated that they purchase plants often (47%, n = 9) however they consider themselves a novice gardener (52%, n = 10) and the foliage container plants they were purchasing were new to them or only somewhat familiar (81%, n = 15) (Table 3-7, 3-8, 3-9). Overall, the respondents were pleased with the quality of the plants (90%, n = 17), while one respondent stated they were somewhat pleased (5%) and one respondent declined to answer (5%). The landing zone was the most frequented purchasing location with 41% (n = 11) of the total purchases, while the transition zone had 33% (n = 9) and the destination zone had 26% (n = 7). Also, one out of every three customers were making multiple purchases (30%, n = 6). The container color preference was nearly equal with this small sample size, 48% (n = 13) of the purchases were terra-cotta colored and 52% (n = 14) were the green containers.

For the remaining post-purchase instrument questions, the respondents were allowed to choose multiple answers to the questions. The customers indicated they were

drawn to the display because of foliage color combination (38%, n =14), quality of plants (16%, n = 6) and uniqueness (13%, n = 5) (Table 3-10). One of the main reasons consumers were purchasing the foliage plant container garden was for use in their garden (33%, n = 10) (Table 3-11). The container with the combination of assorted fern, *Pilea involuncratae,* angel wing begonia, and *Pothos sp.* (Type 3) was purchased by 55% (n = 15) of the consumers. The container with the combination of *Strobilanthes dyerianus, Pilea cadierei,* and *Tradescantia zebrine* (Type 1) was purchased by 45% of the consumers (n =12). The combination container of Upright Tradescantia, *Begonia glabra, Pilea cadierei,* and *Plectranthus australis* (Type 2) was not purchased at all. Comments were made by consumers about container Type 2 that the combination was too bland and not appealing.

Pilot Studies 2 and 3

Pilot Studies 2 and 3 had an equivalent number of foliage container garden purchases with Pilot Study 2 selling 45 container gardens and Pilot Study 3 selling 40. One of the objectives of the pilot studies was to determine if display location had an impact on were these purchases were made. For Pilot Study 2, the results of the purchasing location among the three different zones are shown in table 3-12. The landing and transition zones captured most of the consumer's attention with 78% (n = 35) of the purchases made from there. The results for Pilot Study 3 on the purchasing location were found to be nearly equal among the three different zones. The landing zone had 30% (n = 12) of foliage container garden purchases, the transition and the destination zone both had 35% (n = 14) of purchases from that location.

To determine which foliage container garden type was most successful for Pilot Studies 2 and 3, the different combinations sold were recorded at each plant sale. For

Pilot Study 2 foliage container Type 3 (*Xanthosoma aurea* 'Lime Zinger', Rex Begonia 'Escargot', and *Nephrolepis Biserrata* 'Macho Fern') and Type 5 (*Xanthosoma lindenii* 'Magificum', *Dryopteris erythrosora* 'Autumn Fern', and *Alternanthera sp.* 'Burgundy Thread') had the majority of the sales with 75.6% (n = 34) (Table 3-13). To determine which foliage container garden was most sought after for Pilot Study 3, the amount of each container type sold was recorded (Table 3-14). The foliage container Type 2 (*Cordyline sp.* 'Kiwi', *Alternanthera* 'Burgundy Thread', and *Dryopteris erythrosora* 'Autumn Fern') and Type 3 (*Colocasia esculenta* 'Ruffles', *Syngonium sp.* 'Neon', and *Cyanotis somaliensis* 'Fuzzy Jew') had the majority of the sales with 67.5% (n = 27).

There were a total of 56 completed post-purchased questionnaires collected from Pilot Studies 2 and 3. Answers from the post-purchase questionnaires in Pilot Study 2 and 3 were combined to learn more about the plant sale consumer purchasing a foliage container garden. The first question on the instrument sought to determine the reason why consumers were purchasing a foliage container garden. Primarily consumers (57.1%, n = 3 2) were making the purchase to use as an exterior plant for their deck, patio, or porch (Table 3-15). The second question on the instrument addressed how frequently the consumers purchased plants throughout the year. The majority of consumers (82.2%, n = 46) are making plant purchases on a seasonal basis or more often (Table 3-16). The third question asked how long each consumer has been involved in gardening. The majority of consumers (78.6%, n = 44) have been gardening for at least five years or more (Table 3-17). The fourth question asked how familiar they were with the plants in the foliage container garden(s) that they are purchasing. The amount of consumers that said that these foliage plants were all new to them or somewhat new was

39.3% (n = 22) versus 53.6% (n = 30) of the consumers saying they were somewhat familiar to very familiar with the plant material (Table 3-18). The fifth question addressed the likelihood of a return visit for a purchase of a similar foliage plant. Only one person (1.8%) indicated they would not likely come back and buy a similar foliage plant, otherwise 25.0% (n = 14) of the consumers said possibly and 73.2% (n = 41) said very likely.

The next six questions were demographic based questions, tables 3-19 through 3-24. These questions address another objective of the study; who are the primary customers making the purchases of the foliage container gardens. In turn, the answers to these questions help to determine the target market. The customers in this study were mostly female (83.9%, n = 47) with an age of 45 or above (67.8%, n = 38) a yearly household income of $50,000 or above (69.6%, n = 39) along with a college degree (73.2%, n = 41). Most households consisted of two adults (60.7%, n = 34) and no children under 18 years of age (78.5%, n = 44).

Conclusion

One of the goals of the National Foliage Foundation is to find new ways of utilizing and marketing foliage plants. The florist dish garden, which is primarily composed of foliage plants, was made popular in the 1970's. It is crucial to find more outlets for the foliage industry to market the growing number of new cultivars of the major foliage plant genera. This group of pilot studies looked at one possible outlet for the foliage plant industry- their use in outdoor container gardens. Pennisi et al. (2005) described the advantages of using tropical foliage in container gardening because they are attractive with a wide range of textures and color, are low-maintenance, and can tolerate low light levels. Selling foliage plants in this fashion is an example of commodity bundling and

promotes exposure to different plant materials that may have otherwise have gone untested and increases the consumer's plant palate. Also, this product may not have invoked a prior need or want for the consumer upon entering the plant sale, so this product can be promoted in ways that increase impulse and unplanned purchases with merchandising and consumer educational materials as suggested by Mason et al. (2008).

The objectives of the pilot studies were to test the experimental design and data collection instrumentation prior to implementing an industry study at Florida garden centers. One result of Pilot Studies 1, 2, and 3 was the importance of constructing an aesthetically pleasing foliage plant combination. Those plant combinations that were less interesting did not sell. Unique combinations using new plant material were essential to sales in Pilot Studies 2 and 3.

Demographic information had similar results to the 2006 National Gardening Association (NGA) Survey on Container Gardening. The NGA (2007) found that the key consumer groups for container gardening sales in 2006 were women (62% of sales), college-educated households (91% of sales), and two-person households (38% of sales). The survey went on to indicate consumer groups of households with no children at home (70% of sales) and households with annual incomes of $50,000.00 and over (52% of sales). With the convenience sample of these pilot studies aligned with the national demographics of container garden purchasers, there is a practical representativeness of the sample's preferences and survey answers.

The preliminary research of Pilot Studies 2 and 3 showed that foliage container gardens were primarily purchased (57%, n = 32) for use on the consumer's deck, porch, or patio (exterior). Beyond exterior use as a reason for purchasing, 29% (n = 16) of the

purchases were made because of good combination of plants and being unique or unusual. With the diversity of consumer reasons to purchase and the array of benefits of foliage plants indicated by Pennisi et al. (2005) there are multiple ways to market such a container garden such as exterior décor, plants for the poolside, containers for the lanai, and unique specimen plants. Just over half (54%, n = 30) of consumers were somewhat to very familiar with the foliage plants in the container gardens. However 39.3% (n = 22) of the consumers stated the plants were all new or somewhat new to them. This was a large percentage of consumers stating that these foliage plants were relatively new to them, even though the majority of consumers indicated they had been gardening at least five years or more and purchase plants on a seasonal or regular basis. This presents a need to accompany these foliage container gardens with informational signage and care instructions to help eliminate consumer hesitation towards the product. This would also help to educate the consumer on the benefits of foliages plants and change the perception that foliage plants are only available at florist shops that Pennisi et al. (2005) identified in their research. Signage is especially beneficial when the ratio of sales people to consumers is very low in the garden center and more than 70% of all purchasing decisions are made independently of a salesperson's help (Dunn, 1992). With 73% of the consumers indicating they would be very likely to come back and purchase a similar foliage plant, it is important to have high customer satisfaction after the first purchase. Again this can be done by educating the consumer with informational signage and care instructions. Becker and Poorbaugh (1996) suggested providing visual materials highlighting essential plant information that could be helpful to both customers and employees.

A definitive conclusion as to where to market the foliage container gardens within a store setting for the highest number of sales has yet to be determined as this research needs to encompass actual retail locations. Overall the numbers suggest more sales were in the landing and transition zones. Retailers may consider a display apart from product in their destination zone to entice customers in the landing and transition zones. Having multiple displays of the same product may be beneficial if the product is new or needs increased exposure time to appeal to consumers. A recommendation by Burns (1998) is to continually rotate displays around the retail space to promote a fresh look and to find the prime selling areas. This attracts attention to new products and plant material; therefore it will help promote more impulse or unplanned purchases. Future research implementing this study at garden centers will increase the data set and help to make more definitive conclusions about this research topic.

Table 3-1. Pilot Study 1 traditional foliage plant combinations.

Combination	Upright plant	Mounding plant	Trailing plant	Trailing plant
Type 1	Persian shield *Strobilanthes dyerianus*	Aluminum plant *Pilea cadiereii*	Wandering Jew *Tradescantia zebrine*	
Type 2	Upright Tradescantia *Tradescantia sp.*	Aluminum Plant *Pilea cadiereii*	Trailing Begonia *Begonia glabra*	Swedish Ivy *Plectranthus australis*
Type 3	Friendship Plant *Pilea involuncrata*	Assorted Ferns *Dryopteris sp.*	Angel Wing Begonia *Begonia coccinea*	Devil's Ivy *Pothos sp.*

Table 3-2. Pilot Study 2 foliage plant combinations.

Combination	Upright plant	Mounding plant	Trailing plant
Type 1	*Dieffenbachia* 'Carina'	*Alocasia* 'Cuprea'	*Cyanotis somaliensis* 'Fuzzy Jew'
Type 2	*Colocasia esculenta* 'Ruffles'	*Chlorophytum* 'Fire Flash'	*Syngonium* 'Neon'
Type 3	*Xanthosoma aurea* 'Lime Zinger'	Rex Begonia 'Escargot'	*Nephrolepis Biserrata* 'Macho Fern'
Type 4	*Cordyline sp.* 'Sensation'	*Croton sp.* 'Petra'	*Philodendron* 'Prince of Orange'
Type 5	*Xanthosoma lindenii* 'Magificum'	*Dryopteris erythrosora* 'Autumn Fern'	*Alternanthera sp.* 'Burgundy Thread'

Table 3-3. Pilot Study 3 foliage plant combinations.

Combination	Upright plant	Mounding plant	Trailing plant
Type 1	*Cordyline sp.* 'Sundance'	*Calathea sp.* 'Ornata'	*Dryopteris erythrosora* 'Autumn Fern'
Type 2	*Cordyline sp.* 'Kiwi'	*Alternanthera* 'Burgundy Thread'	*Dryopteris erythrosora* 'Autumn Fern'
Type 3	*Colocasia esculenta* 'Ruffles'	*Syngonium sp.* 'Neon'	*Cyanotis somaliensis* 'Fuzzy Jew'
Type 4	*Cordyline sp.* 'Sensation'	*Croton sp.* 'Petra'	*Philodendron sp.* 'Prince of Orange'

Table 3-4. Income ranges of respondents of Pilot Study 1.

Answer	Frequency	%
≤ $10,000	1	5.3
≥ $10,000	0	0.0
≥ $20,000	2	10.5
≥ $40,000	6	31.6
≥ $60,000	1	5.3
≥ $80,000	0	0.0
≥ $100,000	3	15.8
≥ $120,000	2	10.5
≥ $140,000	0	0.0
No answer	4	21.0
Total	19	100.0

Table 3-5. The level of education achieved by each respondent in Pilot Study 1.

Answer	Frequency	%
Some high school	0	0.0
High school graduate	2	10.5
College tech graduate	2	10.5
Undergraduate degree	7	36.8
Graduate degree	4	21.1
Other	1	5.3
Missing	3	15.8
Total	19	100.0

Table 3-6. Age ranges of respondents of Pilot Study 1.

Answer	Frequency	%
15 to 24	4	21.0
25 to 34	3	15.8
35 to 44	3	15.8
45 to 54	6	31.6
55+	2	10.5
Missing	1	5.3
Total	19	100.0

Table 3-7. How often the respondents typically purchase plants in Pilot Study 1.

Answer	Frequency	%
Rarely	3	15.8
Seasonally	6	31.6
Often	9	47.3
Missing	1	5.3
Total	19	100.0

Table 3-8. The gardening level indicated by the respondents in Pilot Study 1.

Answer	Frequency	%
Novice	10	52.6
Intermediate	3	15.8
Experienced	5	26.3
Missing	1	5.3
Total	19	100.0

Table 3-9. Familiarity of plants within the foliage plant container gardens in Pilot Study 1.

Answer	Frequency	%
New to me	7	36.8
Somewhat familiar	8	42.1
Very familiar	3	15.8
Missing	1	5.3
Total	19	100.0

Table 3-10. The aspect(s) that drew consumers to the foliage container garden display in Pilot Study 1.

Answer	Frequency	%
Color combination	14	37.9
Salesperson	1	2.7
Signs	1	2.7
Quality of plants	6	16.2
Quality of display	5	13.5
Plant type	2	5.4
Structure of display	3	8.1
Unique	5	13.5
Total	37	100.0

Table 3-11. The reason(s) the consumer purchased a foliage plant container in Pilot Study 1.

Answer	Frequency	%
Gift	2	6.6
For garden	10	33.3
Season to plant	1	3.3
Enjoy shopping	0	0.0
Houseplant	6	20.0
Hurricane replacement	1	3.3
Patio plant	6	20.0
Unique/unusual	4	13.3
Total	30	100.0

Table 3-12. Pilot Study 2 consumer purchasing location results.

Display location	Frequency	%
Landing zone	16	35.6
Transition zone	19	42.2
Destination zone	9	20.0
Missing data	1	2.2
Total	45	100.0

Table 3-13. Pilot Study 2 foliage combination sales.

Foliage combination	Frequency	%
Type 1	5	11.1
Type 2	1	2.2
Type 3	21	46.7
Type 4	4	8.9
Type 5	13	28.9
Missing data	1	2.2
Total	45	100.0

Table 3-14. Pilot Study 3 foliage combination sales.

Foliage combination	Frequency	%
Type 1	7	17.5
Type 2	13	32.5
Type 3	14	35.0
Type 4	6	15.0
Missing data	0	0.0
Total	40	100.0

Table 3-15. Post-purchase survey results for reason of foliage container garden purchase.

Answer	Frequency	%
For exterior: deck/porch/patio	32	57.1
Interior houseplant	3	5.4
Good combination of plants	8	14.3
As a gift	4	7.1
Unique or unusual	8	14.3
No answer	1	1.8
Total	56	100.0

Table 3-16. Post-purchase survey results for frequency of plant purchases.

Answer	Frequency	%
Yearly	5	8.9
Every 6 months	5	8.9
Seasonally	18	32.2
Monthly	12	21.4
Every 2 weeks	10	17.9
Weekly	6	10.7
Total	56	100.0

Table 3-17. Post-purchase survey results of length of gardening involvement.

Answer	Frequency	%
Less than 1 year	6	10.7
1 to 5 years	6	10.7
5+ years	44	78.6
Total	56	100.0

Table 3-18. Post-purchase survey results for familiarity of plants within the container gardens they were purchasing.

Answer	Frequency	%
All new to me	8	14.3
Somewhat new	14	25.0
Neutral	4	7.1
Somewhat familiar	23	41.1
Very familiar	7	12.5
Total	56	100.0

Table 3-19. Gender of Pilot Studies 2 and 3.

Answer	Frequency	%
Male	9	16.1
Female	47	83.9
Total	56	100.0

Table 3-20. Age ranges of respondents of Pilot Studies 2 and 3.

Answer	Frequency	%
15 to 24	3	5.4
25 to 34	8	14.3
35 to 44	7	12.5
45 to 54	18	32.1
55+	20	35.7
Total	56	100.0

Table 3-21. Income ranges of respondents of Pilot Studies 2 and 3.

Answer	Frequency	%
≤ $29,000	7	12.5
≥ $30,000	7	12.5
≥ $50,000	16	28.5
≥ $70,000	6	10.7
≥ $90,000	3	5.4
≥ $110,000	5	8.9
≥ $130,000	6	10.7
≥ $150,000	3	5.4
No answer	3	5.4
Total	56	100.0

Table 3-22. Highest education level achieved by respondents of Pilot Studies 2 and 3.

Answer	Frequency	%
Less than high school	0	0.0
High school/GED	7	12.5
Some college	8	14.3
2 year college degree	9	16.1
4 year college degree	14	25.0
Graduate degree	18	32.1
Total	56	100.0

Table 3-23. Number of adults 18 years old or older living in the household for Pilot Studies 2 and 3.

Number of adults	Frequency	%
1	14	25.0
2	34	60.7
3	7	12.5
4	1	1.8
Total	56	100.0

Table 3-24. Number of children under 18 years old living in the household for Pilot Studies 2 and 3.

Number of children	Frequency	%
0	44	78.5
1	3	5.4
2	8	14.3
3	1	1.8
Total	56	100.0

CHAPTER 4
IMPACT OF FOLIAGE PLANT CONTAINER GARDEN SALES THROUGH IDENTIFYING CONSUMER NEEDS, TRENDS AND PREFERENCES

Introduction

One of the goals for the National Foliage Foundation is to investigate new and innovative marketing strategies to promote and increase the use of tropical foliage plant varieties. Florida is an ideal state to study new foliage marketing techniques as the state retail gardening industry is strong, growing in sales from $3.64 Bn in 2000 to $6.97 Bn in 2005 (Hodges and Haydu, 2006) and Florida dominates the foliage market with 74% of the total wholesale value (USDA Floriculture Crops Summary, 2008). This growth in retail garden center sales stems from the continuous increase in population of 750 people moving to Florida everyday and the strong construction industry (Bouvier et al., 2001). Of the staple products within the garden centers both in Florida and nationwide that have had consistent growth is container gardening; now over 26 Mn households participate nationwide in this activity (Natl. Gardening Assn., 2007). Therefore to aid the marketing efforts of the retail and foliage industries, it is necessary to study the use of foliage plants utilized in container gardens at established Florida garden centers.

Understanding consumer behavior is an important topic to consider when marketing in the garden center environment. Garden center customers tend to buy what they want, not what they need (Dunn, 1992). Thus the buying process of new plants in retail outlets falls under the definition of an impulse purchase or unplanned purchase. Initially promoting products as impulse or unplanned purchases increases awareness, trial-ability, and ultimately market share (Abratt and Goodey, 1990). Creating in-store awareness and providing consumer education on new products alleviates shopper hesitation and may remind the consumer of a present or future need, thus making it easier

to justify a purchase. Consumer behavior theories state that to increase purchasing behavior towards products, that it is necessary to build strong consumer attitudes towards the products which are easily accessible from memory; thus turning spontaneous sales into planned purchases (Michell, 1993).

To capture consumer beliefs, behaviors and demographics for marketing efforts, surveys are the most commonly used interactive instrumentation (Solomon, 2000). The Tailored Design Method (Dillman, 2000) is one of the most widely accepted sources for methodology to be utilized in conducting and analyzing a social science survey. Six basic steps to conduct an effective survey include first determining a research question to answer, then defining the sample to target, and finally constructing, administering and analyzing the questionnaire responses. To achieve a high response rate with the lowest cost, a directly administered survey can be conducted, also allowing the administrator to be on-site to answer questions (Ary et al., 2002). However, a directly administered questionnaire is subject to the naturalistic setting, where not all individuals in the population have an equal opportunity to be apart of the sample, thus a limitation is a convenience sample. Therefore, caution is warranted when attempting to generalize findings beyond the specific population at the approximate time the directly administered questionnaire is conducted.

To construct a reliable and valid survey, procedures are outlined to write instrument questions that are short, simple, unbiased, and avoid unambiguous answers and leading questions (Dillman, 2000). Reviewing the instrumentation with a panel of experts and conducting a pilot study on the population will increase the validity and reliability of the instrumentation. The instrumentation utilized in this study has previously been tested on

pilot study participants and reviewed by a panel of experts at the University of Florida (Drs. Irani and Gibson) (refer to Chapter 3). Prior to initiating this study the researcher submitted the study's protocols for review and received approval from the University of Florida Institutional Review Board (see Appendix B).

Another parameter within the retail environment that may affect purchasing behavior is product placement. Underhill (2001) identified the five different retail zones found in a retail setting, among these zones three represent the areas where most of the purchasing occurs: landing, transition, and destination zones (see Appendix A). Gibson et al. (2007) observed purchasing differences among these three retail zones. Further research could benefit this area of interest, as to know where to display product for the highest purchasing rate in a retail setting.

To measure product placement and obtain consumer reaction towards container gardens comprised of foliage plants, six research objectives were studied: 1) analyze the impact of display location on purchase behavior, 2) determine consumer preference of foliage plant container garden combinations, 3) report number of shoppers and sales at each Florida garden center by the number of purchased foliage plant container gardens, 4) explore correlations of consumer survey answers to location of purchase and number of containers purchased, 5) describe the demographics of the convenience sample of foliage container garden purchasers at Florida area garden centers compared to the national container gardening demographics, 6) advise the horticulture industry on the marketability of foliage plant container gardens as part of the retail product mixture.

Materials and Methods

A foliage container garden survey study was established at two Florida garden centers: Nobles Greenhouse in Live Oak, Fla. and Rockledge Gardens in Rockledge, Fla.

These two garden centers represented a rural location- Nobles Greenhouse (in 2006 population of 7,024) and an urban location- Rockledge Gardens (in 2006 population of 24,290) (U.S. Census Bureau, 2007). Foliage container gardens were grown at the University of Florida-Gainesville campus. Foliage plant liners were donated by Agri-starts in Apopka, Fla. (see Appendix C) to produce three different container garden combinations. Each container combination contained three foliage plants: an upright, mounding and trailing plant in an aesthetically pleasing combination (Table 4-1). Plants were combined on the bases of vigor, water and light requirements. Foliage container gardens were scheduled for market over summer and fall holidays in 2007: the July 4th holiday, Labor Day weekend, and Halloween. Foliage plant liners were planted 12 weeks before the scheduled finish date on 11 April, 26 May, and 28 July into 3.25 x 4.5 inch (8.3 x 11.4 cm) round plastic containers. The root substrate was Fafard® 2 (Conrad Fafard, Inc., Anderson, SC), which contained (v/v): 6.5 sphagnum peat: 2 perlite: 1.5 vermiculite. Plants were hand watered and fertilized once weekly with N at 250 $mg \cdot L^{-1}$ using Peters 15-5-15 (15N-2.2P-12.45K) (Scotts, Marysville, Ohio). Eight weeks after potting (WAP) on 2 June, 28 July, and 22 Sept. foliage plants were transplanted into 12-inch (24.1cm x 30.5cm) round, terra-cotta colored, plastic container gardens. A topdressing of 30 g of Harrell's controlled release fertilizer 19-6-12 (19N-2.62P-9.96K) (Harrell's Fertilizer, Inc., Holt, Mich.) was also applied.

Foliage plant container gardens were delivered and sold at the garden centers one week prior to the targeted holiday on 28 June, 29 August, and 22 Oct. and remained for two weeks until 12 July, 11 Sept., and 6 Nov., respectively. A foliage plant container garden display was created at the landing, transition, or destination zones with six

replications of each container combination resulting in 18 container gardens per zone. Each container garden was provided with a point-of-sale generated barcode sticker indicating price, container type, and the display location. A consensus on price was established with the owners of both garden centers; Nobles Greenhouse priced the foliage containers at $19.99 and Rockledge Gardens priced the containers at $19.98. Retail staff at both garden centers were provided with maintenance instructions and directed to consolidate each display after a container garden was removed.

Prior to collecting data in this study, multiple pilot studies were conducted to establish the validity and reliability of the measurement instrument used (refer to Chapter 3). The fourteen question post-purchase foliage container garden instrument was developed based upon these pilot studies and reviewed by a panel of experts (Drs. Irani and Gibson from the University of Florida) to establish face and content validity (see Appendix G). The instrument provided questions that included predetermined answers of which the respondents were allowed to select only one that best depicted them. Each garden center was provided with a questionnaire research handbook along with training on how to conduct the consumer survey following the purchase of a foliage container garden (see Appendix H, I). In addition to providing a handbook, post-purchase questionnaires, cultural and care informational sheets, and laminated computer generated signage that indicated price, cultural, and care information on each container to be posted at each display (see Appendix J, K, L, M, N) were provided.

Data from the post-purchase questionnaires were entered into a database and statistical analysis was conducted using SPSS® version 14.0 for Windows™. In order to

accomplish the objectives of this study, descriptive statistics of frequencies and cross tabulations were utilized.

Results

Following the targeted holidays at the Florida garden centers, 27 foliage container gardens were purchased at Nobles Greenhouse and 26 container gardens were purchased at Rockledge Gardens. Targeted studies over July 4th and Labor Day produced similar sales of foliage container gardens at both garden centers (Nobles Greenhouse sold 22 foliage containers and Rockledge Gardens sold 20) (Table 4-2). In terms of shopping zone, most consumers that purchased foliage plant container gardens at Nobles Greenhouse purchased in the destination zone (45%, n = 12), while the transition zone at Rockledge Gardens yielded the majority of purchases (54%, n = 14). Overall, the transition and destination zones (64%, n = 34) gained the most attention of consumers purchasing foliage plant container gardens, when compared to the landing zone (Table 4-3). Foliage plant combination results indicated that container garden Type 2 (*Strobilanthes dyerianus*, *Dryopteris erythrosora* 'Autumn Fern', and *Syngonium sp.* 'Neon'), the most colorful of the three container gardens, yielded the most sales at 55% (n = 29) (Table 4-4).

Utilizing the point-of-sale computer system at both garden centers, data was generated on sales of foliage plant container gardens, sales per product category, overall total sales, and customer counts for each two week study period. Both garden centers included the foliage plant container gardens as part of their tropical foliage plant sales category. At Nobles Greenhouse, the foliage plant container gardens accounted for 10% of their tropical foliage plant category sales and 1% of their overall sales on average for the three studies (Table 4-5). At Rockledge Gardens, the foliage plant container gardens

also accounted for 10% of their tropical foliage plant category sales and 0.2% of their overall sales on average for the three study periods (Table 4-6). Examining the total customer count at both garden centers during each study period by the number of customers that purchased foliage plant container gardens, the data shows that less than 10 customers at each garden center were needed each study period to generate the average 10% of the tropical foliage plant category sales (Table 4-7; 4-8). The amount of customers that bought foliage plant container gardens compared to the overall number of shoppers at Nobles Greenhouse and Rockledge Gardens was on average 2% and 0.5%, respectively (Table 4-7; 4-8). The product category of tropical foliage plants represented 10% and 2% of the overall total sales on average for Nobles Greenhouse and Rockledge Gardens, respectively (Table 4-9). The average sale per customer during each study period was similar with $51.86 at Nobles Greenhouse and $55.10 at Rockledge Gardens.

The post-purchase survey served to discover why consumers were purchasing specific foliage container garden combinations, how many foliage container garden displays did they recall seeing in the store, the likelihood of a return visit for a similar purchase, and their gardening background and knowledge of foliage plants. Post-purchase questionnaires from both Florida garden centers were combined to gain an understanding about the foliage container garden target market (n = 35). The first instrument question asked the reason for purchasing the foliage container garden. The most popular answers were: for the exterior (deck, patio, porch) with 11 consumers (31.4%); eight consumers (22.9%) purchased an item because the container garden was unique and/or unusual. Other responses included: for the interior with five consumers (14.3%), five consumers (14.3%) replied that it was a good plant combination, and six

consumers (17.1%) purchased the container garden as a gift. Only those consumers who purchased foliage plant container gardens were asked to recall the number of foliage plant container garden displays they observed. The majority of foliage plant container garden consumers (71.4%, n = 25) recalled seeing all three displays, five consumers (14.3%) indicated they saw two displays, and five consumers (14.3%) only saw one display. Foliage plant container garden consumers were asked to indicate how frequently they made plant purchases on a yearly basis. The majority (45.7%, n = 16) indicated they make plant purchases seasonally (Table 4-10). When asked how long they had been involved with gardening, the majority of foliage plant container garden consumers said over five years (60%, n = 21); nine consumers (25.7%) said they had been involved for between one and five years, and five consumers (14.3%) indicated they have only recently been involved in gardening for less than one year.

To determine how knowledgeable foliage plant container garden consumers were on foliage plants, one question asked how familiar they felt they were with the foliage plants within the container garden they purchased (Table 4-11). Answers were set in a Likert-scale format with five answer choices ranging from all new to me, somewhat new, neutral, somewhat familiar and very familiar. By dummy coding these answers 1 (all new to me) to 5 (very familiar) the results showed that slightly more consumers considered these plants newer to them versus being familiar to them (M =2.57, SD =1.44, n = 35). Foliage plant container garden consumers were then asked if they would return and purchase similar foliage plants. The majority (62.9%, n = 22) said they would very likely return to buy similar foliage plants; 13 consumers (37.1%) said they would

possibly make a return visit to purchase foliage and no consumers said they were unlikely to purchase foliage again.

The remainder of the post-purchase instrument consisted of demographic questions about the foliage plant container garden consumer. The primary consumer was female (68.6%, n = 24) versus nine male consumers (25.7%); two consumers did not provide an answer (5.7%). A majority of consumers fell in the older age range categories with 11 consumers (31.4%) 55 years old or older and nine consumers (25.7%) were between 45 and 54 years old. Only one consumer (2.9%) fell in the 15 to 24 years old category, while six consumers (17.1%) were between the ages of 25 to 34, and six consumers (17.1%) were 35 to 44. Consumers were asked to indicate which yearly income bracket they fell in (Table 4-12). The majority of consumers had a household yearly income of $90,000 or below, however 10 consumers did not provide an answer. Consumers also provided their highest educational level achieved (Table 4-13). The majority of consumers had at least some college courses with many having college degrees. Consumers were also asked how many adults (18 years and older) and how many children under 18 years old lived in their household. Most consumers lived in a two person household (60%, n = 21); households with one adult were indicated by six consumers (17.1%), three person households were indicated by three consumers (8.6%), one consumer (2.9%) responded that they live in a four person household and four consumers (11.4%) did not provide an answer. Most consumers came from a household with no children under the age of 18 (71.4%, n = 25). Two consumers (5.7%) said they had one child, two consumers (5.7%) said they had two children, while one consumer

(2.9%) said they had three children and another one (5.7%) indicated they had five children. Four consumers (11.4%) did not provide an answer.

To show possible relationships existing between variables, cross tabulations were performed on the questions within the survey along with the location of purchase and the amount of purchases per transaction for foliage plant container customers. However, due to the small sample size, the cross tabulations did not meet the assumptions of the test and can not be reported. Yet, with the exploratory nature of this study, possible trends will be reported so that future researchers can thoroughly explore these trends. One trend that should be investigated further is the relationship between a display of new products replicated multiple times throughout the retail outlet by the location where the consumer decided to purchase from. The combined data of both Florida garden centers indicated that the majority of foliage plant container garden consumers recalled seeing all three foliage container garden displays (72.4%, n = 21) and within this group, 66% (n = 14) chose to purchase from displays further in the store after experiencing the landing zone. Possible support for a special display apart from the product's main display is of the two consumers that saw all three displays and chose to purchase from two different displays, each person chose containers from the landing zone and then went onto purchase from the transition or destination zones. This research would benefit from a larger sample size to perform a cross tabulation on the data from each garden center individually to determine significance between the three display locations.

Also investigated were the post-purchase survey answers of those consumers who purchased multiple foliage plant container gardens (18.2%, n = 6) as opposed to single foliage container purchases (81.8%, n = 27) of both Florida garden centers. A cross

tabulation was preformed on the consumer's reasoning for their purchase of a foliage plant container garden by the amount of foliage plant container gardens purchased, whether a single or multiple purchase. The cross tabulation on this data did not meet the assumptions of the test nor did it yield a significant chi-square test. However the test indicated that consumers purchasing multiple foliage plant container gardens were primarily consumers planning to use their purchase in an exterior setting (patio, porch, or deck) (50%, n = 3). Of the 70% of consumers purchasing a single foliage plant container garden were planning to use it in the consumer's interior spaces (lanai), as a gift, or the consumer desired the foliage container because it was simply a good or unique plant combination (n = 19). Another cross tabulation was performed on this data which included how familiar the consumer was with the plants in the foliage plant container garden by the amount of foliage plant container gardens purchased, whether a single or multiple purchase. Again, the cross tabulation on this data did not meet the assumptions of the test nor did it yield a significant chi-square test. However one trend to consider is of those consumers making multiple purchases (18.2%, n = 6) those that were more familiar with the plant material (50%, n = 3) were more inclined to purchase more than one foliage plant container garden.

Multiple post-purchase survey questions and demographics from both Florida garden centers were examined for possible relationships. Among the variables studied was the possible relationship between how frequently the consumer made plant purchases throughout the year and how long the consumer had been involved with gardening by how familiar they were with the plants within the foliage plant container garden they were purchasing. Due to the small sample size no definitive results were found and the

data did not meet the assumptions for the cross tabulations, nor was the chi-square test significant. However, it can be stated with this convenience sample that neither how frequently consumers purchased plants on a yearly basis nor how long they had been involvement in gardening was an indicator of whether they were more or less familiar with the plants that made up the foliage plant container gardens. Also explored were possible relationships between age of the consumer and gender by their familiarity of the plants within the foliage plant container gardens. As with the previous cross tabulations, the sample size was too small to meet the assumptions of the test and the chi-square test was not significant. However, no particular age range of the consumer indicated they were more familiar with the plants within their foliage container garden. In addition, the gender of the consumer was not a factor whether they were more familiar with the foliage plants within their container garden or not. Yet with the gender study, some bias may be present as the number of females that shop at garden centers typically exceeds males, so this may skew the results. Among all of these tests, the plants within these container gardens are all relatively new to the marketplace, so unfamiliarity is expected with this study. With further research, possible relationships may be found among these variables.

Conclusion

Implementing this study at actual garden retail outlets allowed further insight into the potential use of tropical foliage plants in outdoor combination container gardens. Despite the hot, dry weather in the summer and fall of 2007 (Table 4-14) at both garden center research locations, along with the reported below average customer turnout, the foliage plant container gardens still sold during each targeted holiday. Utilizing actual customer and sales data from the garden centers was a method to document actual characteristics of the retail environment. When working in the naturalistic setting in

social science, Ary et al. (2002) explains that the qualitative data derived should describe the setting, this approach can be adapted to the quantitative data of customer counts and sales figures supplied by the garden centers. Examining each garden center's sales and customer data showed that purchases of foliage plant container gardens by nine customers or less during each two week study period accounted for 10% of the sales in the overall product category of tropical foliage plants. However, these customers buying foliage plant container gardens represented less than 2% of the overall number of shoppers at each garden center during the study periods. This indicates that the foliage plant container gardens were primarily an impulse purchase for these few customers. If a small amount of customers are making a considerable impact on sales, this suggests better marketing strategies to target a larger number of customers to boost sales. With increased promotional efforts, there is potential to bring awareness to customers not shopping in the tropical foliage plant category or to convert container garden customers to a container garden composed of foliage plants. Thus foliage plant container gardens have potential to become a component of the product mix at garden centers. Even with the findings of a directly administered study being hard to generalize due to the answers reflecting only those respondents, the demographics of this Florida garden centers study were similar to the 2006 National Gardening Association survey on container gardening. With the convenience sample of this study aligned with the national demographics of container garden purchasers, there is practical representation of the sample's preferences and survey answers.

Customers at each garden center location were greeted with multiple displays of the foliage plant container gardens throughout the store with signage explaining the

benefits of the container and descriptions of the plant material. The foliage containers were priced near $20.00 at each garden center which may have enticed some consumers to purchase as Mason et al. (2008) found that $24.99 is the national perceived price point of container gardens that appeals to consumers. The majority of foliage plant container garden consumers recalled seeing all three foliage container displays, yet most purchased from displays further in the store. This emphasizes the possible benefits of having multiple displays of the same product throughout the store because of the increased exposure effect that could lead to impulse or unplanned purchases. This is especially beneficial if the product is new or needs increased exposure time to appeal to consumers. Abratt and Goodey (1990) and Park et al. (1989) determined even with just a special display setup with promotional materials would also lead to increased purchases. A recommendation by Burns (1998) is to continually rotate displays around the retail space to promote a fresh look and to find the prime selling areas.

With the diversity of consumer reasons to purchase the foliage plant container garden and the array of benefits of foliage plants indicated by Pennisi et al. (2005) there are multiple ways to market such a container garden as exterior décor, plants for the poolside, containers for the lanai, and unique specimen plants. By mainly positioning foliage plant container gardens for the household exterior (deck, porch, or patio) may be a possible way to entice consumers not only to buy but to also make multiple purchases as opposed to more singular purchases when marketed more as a gift or specimen plant. However, the benefits of tropical foliage plants are largely going unnoticed as garden center consumers are not being exposed to any marketing materials and are generally associating foliage plants with florist shops as Pennisi et al. (2005) found following their

consumer survey. If the horticulture industry sold foliage plants in this fashion, as mixed container gardens (i.e. commodity bundling), this method would help promote exposure to different plant material that may have otherwise gone untested and allows the consumer the choice of price points whether they chose the individual product or a combination (if plants are sold separately as well as combined) (Adams and Yellen, 1976). Combining plants in container gardens based on color harmony that delivers visual interest and a sense of order was a finding by Mason et al. (2008) and the foliage industry could follow this recommendation to appeal to consumers. To increase consumer confidence, a mixture of traditional and newer foliage plant varieties could be used in the container garden. This approach was indicated by a possible trend observed in this study as consumers with prior knowledge of the plant material were more likely to purchase more than one foliage plant container garden per transaction. Incorporating traditional foliage varieties along with newer ones will also help increase the consumer's plant palate.

Foliage plants may not have invoked a prior need or want by the consumer upon entering the garden center; if so, foliage plant sales could benefit from the techniques that increase impulse and unplanned purchasing similar to grocery industry. These strategies suggested by Park et al. (1989) that could be implemented in a garden center include arrangement of product according to the consumers' prior knowledge or expectations and the use of highly visible displays of brand or product information to promote the recognition of previously unrecognized needs. These strategies stem from research conducted on consumer behavior. Consumer behavior theories offer ways to promote less spontaneous and more planned purchases by establishing and building positive

consumer attitudes towards the product. In regards to foliage plants, possible ways to strengthen attitudes towards this generally unbranded product category consists of swaying the consumer with new information, providing direct experience (workshops and seminars), connecting advertising materials with the product in the store, and accompanying the product with additional resources to assure success in the post-purchase environment (Mitchell, 1993). With 62.9% (n = 22) of consumers stating they are very likely to come back and purchase foliage plants again, it is crucial that the consumer have a successful experience with their initial purchase, thus the need for educational materials. Becker and Poorbaugh (1996) suggested providing visual materials highlighting essential plant information that could be helpful to both customers and employees. These marketing methods and the use of consumer behavior theories already utilized by the grocery industry are essential for the garden center to adapt because of the high percentage of indecisive consumers.

In summary, there is a target market comprised of container gardening consumers and foliage container garden consumers alike. Implementing push and/or pull marketing strategies for foliage plants as indicated by the results from this research and the recommendation by Pennisi et al. (2005), along with utilizing techniques that are inline with consumer behavior theories are essential to promote awareness and increase demand. Currently these strategies are lacking. Incorporating foliage plant container gardens to demonstrate the versatility of foliage plants is one step in the process of increasing their utilization.

Table 4-1. Foliage plant container garden combinations for Florida garden centers.

Combination	Upright plant	Mounding plant	Trailing plant
Type 1	*Xanthosoma atrovirens* 'Dwarf Green'	*Xanthosoma aurea* 'Lime Zinger'	*Oxalis hedysaroides rubra* 'Fire Fern'
Type 2	*Strobilanthes dyerianus*	*Dryopteris erythrosora* 'Autumn Fern'	*Syngonium sp.* 'Neon'
Type 3	*Xanthosoma atrovirens* 'Dwarf Green'	*Dryopteris erythrosora* 'Autumn Fern'	*Syngonium sp.* 'Maria Allusion'

Table 4-2. Sales of foliage plant container gardens over the course of the study.

Location	Sale date	Number of purchases	%
Nobles Greenhouse	28 June to 12 July	9	17.0
Rockledge Gardens	28 June to 12 July	12	22.7
Nobles Greenhouse	27 Aug. to 11 Sept.	13	24.5
Rockledge Gardens	27 Aug. to 11 Sept.	8	15.1
Nobles Greenhouse	23 Oct. to 6 Nov.	5	9.4
Rockledge Gardens	23 Oct. to 6 Nov.	6	11.3
Total		53	100.0

Table 4-3. Florida garden center patterns of foliage container garden purchases.

	Nobles Greenhouse		Rockledge Gardens		Overall	
Location	Frequency	%	Frequency	%	Frequency	%
Landing zone	3	11.1	6	23.1	9	17.0
Transition zone	4	14.8	14	53.8	18	34.0
Destination zone	12	44.5	4	15.4	16	30.1
Missing	8	29.6	2	7.7	10	18.9
Total	27	100.0	26	100.0	53	100.0

Table 4-4. Foliage container garden combinations purchased at Florida garden centers.

	Nobles Greenhouse		Rockledge Gardens		Overall	
Combination	Frequency	%	Frequency	%	Frequency	%
Type 1	7	25.9	9	34.7	16	30.2
Type 2	14	51.9	15	57.7	29	54.7
Type 3	1	3.7	1	3.8	2	3.8
Missing	5	18.5	1	3.8	6	11.3
Total	27	100.0	26	100.0	53	100.0

Table 4-5. Data from Nobles Greenhouse during each study period on foliage container sales by product category and by total sales.

Study periods (2007)	Foliage container sales ($)	Percentage of foliage container sales by the tropical foliage plant product category	Percentage of foliage container sales by the total sales
28 June -12 July	179.91	8.5	0.8
29 Aug - 11 Sept	259.87	19.4	2.2
22 Oct - 6 Nov	99.95	4.6	0.4
Average	179.91	10.8	1.1

Table 4-6. Data from Rockledge Gardens during each study period on foliage container sales by product category and by total sales.

Study periods (2007)	Foliage container sales ($)	Percentage of foliage container sales by the tropical foliage plant product category	Percentage of foliage container sales by the total sales
28 June -12 July	239.76	14.3	0.2
29 Aug - 11 Sept	159.84	11.9	0.3
22 Oct - 6 Nov	119.98	4.3	0.1
Average	173.19	10.2	0.2

Table 4-7. Nobles Greenhouse's customer count data and number of customers purchasing foliage plant container gardens during each study period.

Study periods (2007)	Total customer count	Foliage container customers	Percentage of foliage container customers by total customers
28 June -12 July	431	9	2.1
29 Aug - 11 Sept	247	9	3.6
22 Oct - 6 Nov	454	5	1.1
Average	377	8	2.3

Table 4-8. Rockledge Gardens' customer count data and number of customers purchasing foliage plant container gardens during each study period.

Study periods (2007)	Total customer count	Foliage container customers	Percentage of foliage container customers by total customers
28 June -12 July	1614	8	0.5
29 Aug - 11 Sept	1184	7	0.6
22 Oct - 6 Nov	1666	5	0.3
Average	1488	7	0.5

Table 4-9. Tropical foliage plant product category sales compared to the overall total sales at both Florida garden centers during each study period.

	Nobles Greenhouse	Rockledge Gardens
Study periods (2007)	Percentage of tropical foliage plant product category sales by total sales	Percentage of tropical foliage plant product category sales by total sales
28 June -12 July	9.9	1.7
29 Aug - 11 Sept	11.4	2.2
22 Oct - 6 Nov	8.2	3.0
Average	9.8	2.3

Table 4-10. How often foliage plant container garden consumers make plant purchases on a yearly basis.

Frequency of Plant Purchases	Frequency	%
Yearly	2	5.7
Every 6 months	6	17.1
Seasonally	16	45.7
Monthly	6	17.1
Twice a month	1	2.9
Weekly	4	11.4
Total	35	100.0

Table 4-11. Foliage plant container garden consumer's familiarity with the plants they purchased.

Familiarity	Frequency	%
All new to me	11	31.4
Somewhat new	9	25.7
Neutral	3	8.6
Somewhat familiar	8	22.9
Very familiar	4	11.4
Total	35	100.0

Table 4-12. Yearly income of those that purchased foliage plant container gardens at Florida garden centers.

Yearly Income	Frequency	%
≤$29,000	1	2.9
≥$30,000	7	20.0
≥$50,000	7	20.0
≥$70,000	2	5.7
≥$90,000	2	5.7
≥$110,000	0	0.0
≥$130,000	1	2.9
≥$150,000	5	14.3
Missing	10	28.5
Total	35	100.0

Table 4-13. Education level of those that purchased foliage plant container gardens at Florida garden centers.

Education	Frequency	%
Less than high school	0	0.0
High school/GED	5	14.3
Some college	10	28.6
2-year college degree	4	11.4
4-year college degree	7	20.0
Graduate degree	6	17.1
Missing	3	8.6
Total	35	100.0

Table 4-14. Average temperatures and precipitation in Live Oak and Rockledge, Fla. during each two week study period in 2007 including the normal temperatures and precipitation expected (Weather Underground, 2008).

Location	Study period	Average high °F	Average high °C	Average low °F	Average low °C	Precipitation total in	Precipitation total mm	Normal high °F	Normal high °C	Normal low °F	Normal low °C	Normal precipitation totals (in/mm)
Nobles Greenhouse in Live Oak, Fla.	June 28 to July 11	93	33.8	72	22.2	0.83	21.1	93	33.9	70	21.1	June and July = 12.4/315.2
	Aug. 27 to Sept. 11	91	32.8	70	21.1	0.29	7.4	92	33.3	70	21.1	Aug and Sept = 10.8/273.6
	Oct. 23 to Nov. 6	77	25.0	55	12.8	0.19	4.8	79	26.1	55	12.8	Oct and Nov = 5.7/144.8
Rockledge Gardens in Rockledge, Fla.	June 28 to July 11	92	33.3	75	23.9	6.07	154.2	90	32.2	72	22.2	June and July = 11.2/284.7
	Aug. 27 to Sept. 11	89	31.7	79	26.1	1.9	48.3	89	31.7	72	22.2	Aug and Sept = 12.9/327.7
	Oct. 23 to Nov. 6	83	28.3	67	19.4	3.82	97.1	81	27.2	64	17.8	Oct and Nov = 7.9/200.7

CHAPTER 5
RESEARCH SUMMARY

To support one the National Foliage Foundation goals, new ways to market and utilize foliage plants, research objectives were established to study foliage plant sales in the retail setting. Implementing the study at Florida area garden centers was ideal as the retail garden industry is strong and plant material was readily available as Florida remains the largest state producer of foliage plants (Hodges and Haydu, 2006; USDA Floriculture Crop Summary, 2008). To determine how foliage plants were to be newly positioned to consumers, container gardening was identified as one of the product categories in retail garden centers across the country that has had consistent growth and is currently capturing market share (Natl. Gardening Assn., 2007). This was inline with the research conducted by Pennisi et al. (2005) that foliage plants used in containers gardens have the potential to be an outlet for the foliage industry to help boost consumer interest and increase sales. A consumer behavior study was established to investigate the potential use of foliage plants in container gardens. In the first of a series of experiments plant growth regulators (PGR) were applied as foliar sprays and substrate drenches on vigorous foliage plants to identify rates for plants that would be transferred to container gardens. The majority of experiments to follow involved directly administered surveys at plant sales and Florida area garden centers to record consumer preferences and demographics towards foliage plant container gardens.

In the PGR study, Expt. 1, *Xanthosoma violaceum* and *Colocasia esculenta* 'Nancy's Revenge' and 'Gigantea' were treated with flurprimidol and paclobutrazol foliar sprays and substrate drenches to achieve growth control results within wholesale standards (Thomas et al., 1997; B.E. Whipker, personal communication). Substrate drenches were the most effective with *Colocasia* varieties resulting in the best control of plant height and spread, however excessive

stunting occurred with *Xanthosoma*. *Xanthosoma violaceum*, a smaller leaved foliage plant, responded best to foliar sprays of paclobutrazol at 20 $mg \cdot L^{-1}$ ($0.02 per pot) because of less leaf obstruction and better contact with the petioles, stems, and roots. Plant height of *Colocasia esculenta* 'Nancy's Revenge' and *Colocasia esculenta* 'Gigantea' was controlled with substrate drenches of flurprimidol or paclobutrazol at 0.5 mg a.i./pot to avoid stunting at a cost of $0.02 per pot. If both plant height and diameter are to be controlled for wholesale market purposes a flurprimidol substrate drench at 2.0 mg a.i./pot is recommended for the Colocasias, however this will increase chemical costs to $0.07 per pot and visual quality may be impacted with some varieties (costs of flurprimidol and paclobutrazol can be found in Chapter 2, pg 47). Foliage growers should also consider lower PGR concentrations to improve visual quality with this crop.

In the second experiment, *Cordyline* 'Sundance', *Ardisia humalis*, and *Asparagus densiflorus* 'Sprengeri' were treated with substrate drenches of flurprimidol and paclobutrazol based on growth control standards achieved in Expt. 1. Neither chemical nor concentration affected *Ardisia humalis* significantly. Plant height of *Cordyline* 'Sundance' was controlled with flurprimidol at 2.0 mg a.i./pot ($0.07 per pot). Plant diameter of *Asparagus densiflorus* 'Sprengeri' was controlled with flurprimidol at 0.5 to 1.0 mg a.i./pot and paclobutrazol at 0.25 to 0.50 mg a.i./pot; paclobutrazol at 0.25 mg a.i./pot was the most cost effective at $0.01 per pot.

At 6 weeks after treatment single, similarly treated plants of *Cordyline* 'Sundance', *Ardisia humalis*, and *Asparagus densiflorus* 'Sprengeri' were transplanted into 24.1 cm x 30.5 cm (12-inch) round terra-cotta colored plastic containers. A representative from each flurprimidol treatment was lined up from 0 to 4 mg a.i/pot and a consumer survey was administered at four locations. Within each location consumers were divided into three distinct groups: plant sale consumers, consumers that work within the floriculture industry, and master gardeners. The

survey objectives were to collect data on container preference, suggested retail price, and intent to buy. All consumers were aware that the variance in plant size was a result of PGR treatments. The survey resulted in 521 completed questionnaires. Plant sale consumers preferred the most robust (untreated control) foliage container garden (40.6%, n = 159) while the horticulture industry and master gardener group preferred a moderately controlled foliage container (flurprimidol at 0.50 and 1.0 mg a.i.) (63.2%, n = 72). The consumer behavior theory of the attitude-nonattitude continuum (Mitchell, 1993) may explain the differences in preferences observed in this survey. Respondents to this survey may have never encountered a PGR container before so their attitude or preferences toward a container garden with slightly smaller plant material may not have been determined prior to this study. The plant sale consumers, industry professionals and master gardeners that may have understood the benefits of PGR treated plant material may explain why they would prefer a slightly smaller plant material for increased longevity of the container garden. However outside the survey setting the respondents' actual preferences when encountering container gardens in an actual retail setting may differ and a container garden with larger plant material may be the one that is ultimately preferred. Yet with consumer education and marketing materials, container gardens composed of plants treated with PGRs could have the potential to be sold as compact with little low maintenance required. The majority of respondents provided a price between $10.00 and $19.99 for a 12-inch, foliage plant container gardens. Price points gleaned from this study may assist the foliage industry on proper pricing for similar container gardens. Several factors were examined to explain intent to buy such as retail price suggested, preference of container, or the different consumer groups, and all factors were inconclusive. Thus intent to buy may be linked to other factors not explored in

this survey as to the type or color of plant material within the container garden, light and water requirements of the container garden, or overall size of container garden.

Certain survey participants did make comments that *Asparagus densiflorus* 'Sprengeri' was an invasive species in south Florida, so other foliage plant combinations may be better suited for Florida gardeners. An area for further investigation may include a blind study to observe if container gardens featuring smaller plant material translated to their actual purchases, especially for industry professionals and master gardeners.

The third experiment was a directly administered survey that collected preferences and demographics of consumers purchasing foliage plant container gardens. This experiment included multiple pilot studies in preparation for the industry-based study conducted at Florida garden centers in the summer and fall of 2007. One result of Pilot Studies 1, 2, and 3 was the importance of constructing an aesthetically pleasing foliage plant combination. Those plant combinations that were less interesting did not sell. Unique combinations using new plant material helped to boost awareness to the container gardens in Pilot Studies 2 and 3. Also 40% of the respondents from the pilot studies indicated the plant material used in the foliage container gardens was new to them, surprisingly the majority of consumers had been gardening for five or more years and purchase plants on a seasonal basis. This presents a need to accompany foliage container gardens with informational signage and care instructions to help eliminate consumer hesitation towards the product. The foliage plant combinations in Pilot Studies 1, 2, and 3 that achieved the most sales are listed in Table 5-1. With updated survey instrumentation after Pilot Study 1 by a panel of experts, Pilot Studies 2 and 3 attained reliable and valid results and the same instrumentation was utilized in the final experiment.

In the last experiment two Florida retailers were enlisted to sell a collection of similarly produced foliage plant container gardens that were displayed in three different areas of the garden center: landing, transition and destination zones. Three study replicates were conducted over the course of summer and fall 2007. Each study occurred for two weeks at a time and centered around the July 4th holiday, Labor Day weekend, and Halloween. Nobles Greenhouse in rural Live Oak, Fla. sold 27 foliage plant container gardens, while Rockledge Gardens in urban Rockledge, Fla. sold 26 foliage plant container gardens with a combined total of 35 completed questionnaires. Garden center staff directly administered post-purchase questionnaires to the customers purchasing foliage plant container gardens and also recorded what display the customer shopped from. Implementing this study at actual retail outlets allowed further insight into the possibility of using tropical foliage plants in outdoor combination container gardens. Despite the hot, dry weather of summer and fall 2007 at both garden center research locations, along with the reported below average customer turnout, the foliage plant container gardens sold during each targeted holiday. Examining each garden center's sales and customer data showed that purchases of foliage plant container gardens by nine customers or less during each two week study period accounted for 10% of the sales in the overall product category of tropical foliage plants. However, these customers buying foliage plant container gardens represented less than 2% of the overall number of shoppers at each garden center during the study periods. This indicates that the foliage plant container gardens were primarily an impulse purchase for these few customers. If a small amount of customers are making a considerable impact on sales, this suggests marketing strategies to target a larger number of customers to boost sales. With increased promotional efforts, there is potential to bring awareness to customers not shopping in the tropical foliage plant category or to convert container

garden customers to a container garden composed of foliage plants. Thus foliage plant container gardens have potential to become a component of the product mix at garden centers.

Even with the findings of a directly administered study being hard to generalize due to the answers reflecting only those respondents, the demographics of this Florida garden centers study were found to be similar to the 2006 National Gardening Association (NGA) survey on container gardening. With the convenience sample of this study aligned with the national demographics of container garden purchasers, there is a practical representativeness of the sample's preferences and survey answers. Foliage plant container gardens that resulted in the most sales are listed in Table 5-1.

Similar to the pilot studies, more consumers indicated that plants comprised in the foliage plant container gardens were new to them (57.1%, n = 20), yet most customers had been gardening for five years or more and purchase plants on a seasonal basis. This observation presents a need to support foliage plant container gardens with signage and consumer educational materials. To determine correct product placement, the survey indicated that the majority of consumers recalled they had seen all three container garden displays, yet most purchased from displays further in the store. This may show the possible benefits of having multiple displays of the same product throughout the store because of the increased exposure effect that could lead to impulse or unplanned purchases. This is especially beneficial if the product is new or needs increased exposure time to appeal to consumers.

Consumer behavior theories explain how to promote less spontaneous and more planned purchases by building positive consumer attitudes towards the product. These theories could aid the marketing of unbranded foliage plant container gardens constructed in this study. The attitude-behavior process model as explained by Mitchell (1993) states that inducing positive

attitudes alone is not enough to have sufficient influence over consumer behavior, thus the attitude about a product must be accessible from memory. The theory of planned behavior (Fazio et al., 1986) goes onto state that not only is a positive attitude necessary for consumer behavior to occur, but the behavior has to also be inline with the consumer's subjective norms and the consumer must have the necessary resources and opportunities to achieve the behavior. Thus foliage plant container gardens must possess a positive attitude accessible from memory, be inline with the consumer's subjective norms, priced within the consumer's budget, and accompanied with educational materials for the consumer to achieve success with the product. One of the greatest consumer behavior challenges that garden center owners face with their products is finding ways to develop strong positive attitudes that are easily accessible from memory to more reliably influence consumer purchasing behavior. To create a positive accessible attitude involves an object-evaluation association to give strength to the attitude, so that when the product is seen by the consumer a perception is immediately formed from prior knowledge (Mitchell, 1993). Consumer research has provided ways to develop a positive accessible attitude from memory and one method is the use of direct behavioral experience. To relate this method to foliage plant container gardens, holding seminars or workshops at the garden center to provide hands-on experience with the foliage plants helps the customer to behave in accordance with their attitude toward the product compared to consumers only having exposure to the product be means of advertisements. If advertising is to be utilized then the use of persuasive messages about the product can be effective according to consumer research, thus the use of celebrities in advertisements (Mitchell, 1993). For foliage plants, the use of creative, attention-grabbing advertisements may increase the link between the desired association of the product and the positive evaluation stored in the memory. Other techniques to strengthen an

attitude and promote activation is to present a cue linking the advertisement with the product, this can be accomplished with a point-of-purchase display to help consumers access previously formed attitudes. However if the attitude is weak to begin with, than presenting new information or re-positioning the product aids in developing new or stronger attitudes. Thus re-positioning foliage plants in outdoor combination container gardens accompanied with marketing materials and demonstrating their versatility will help to change the perceptions of foliage plants as only florist plants and hopefully strengthen consumer attitudes towards these plants.

Additional questions that could be incorporated into the survey instrumentation to strengthen the results include whether the purchase was intended before entering the store or was it made while in-store to determine if it was an unplanned or impulse purchase. Conducting an interview with the customer before and after the shopping experience would help to determine what purchases were made on impulse. To establish if the consumer was swayed to purchase a foliage plant container garden, they should be questioned if they had intended to purchase any sort of container garden. This would help determine if the consumer buying the foliage plant container garden was already a container garden purchaser or was the consumer converted from other product categories to purchase a foliage plant container garden. Knowing this information would help verify if foliage plant container gardens are attracting new customers or existing container garden customers. Consumers should be questioned why they were attracted to the display, or if the consumer did not purchase a foliage plant container garden, they should be questioned why they were not attracted to the display. Also, to determine what supportive materials should accompany the foliage plant container garden, a question should be asked about what information should be provided with the foliage container that would make the customer more prone to purchase.

Table 5-1. Foliage plant container garden combinations that yielded the most sales during Pilot Studies 1, 2, and 3, along with Florida area garden centers.

Combination	Upright plant	Mounding plant	Trailing plant	Trailing plant
Pilot Study 1, Type 1	Persian shield *Strobilanthes dyerianus*	Aluminum plant *Pilea cadiereii*	Wandering Jew *Tradescantia zebrine*	
Pilot Study 1, Type 2	Upright Tradescantia *Tradescantia sp.*	Aluminum Plant *Pilea cadiereii*	Trailing Begonia *Begonia glabra*	Swedish Ivy *Plectranthus australis*
Pilot Study 2, Type 3	*Xanthosoma aurea* 'Lime Zinger'	Rex Begonia 'Escargot'	*Nephrolepis Biserrata* 'Macho Fern'	
Pilot Study 2, Type 5	*Xanthosoma lindenii* 'Magificum'	*Dryopteris erythrosora* 'Autumn Fern'	*Alternanthera sp.* 'Burgundy Thread'	
Pilot Study 3, Type 3	*Colocasia esculenta* 'Ruffles'	*Syngonium sp.* 'Neon'	*Cyanotis somaliensis* 'Fuzzy Jew'	
Pilot Study 3, Type 2	*Cordyline sp.* 'Kiwi'	*Alternanthera* 'Burgundy Thread'	*Dryopteris erythrosora* 'Autumn Fern'	
Garden Center Study, Type 1	*Xanthosoma atrovirens* 'Dwarf Green'	*Xanthosoma aurea* 'Lime Zinger'	*Oxalis hedysaroides rubra* 'Fire Fern'	
Garden Center Study, Type 2	*Strobilanthes dyerianus*	*Dryopteris erythrosora* 'Autumn Fern'	*Syngonium sp.* 'Neon'	

APPENDIX A
PRODUCT PLACEMENT ZONES WITHIN A GARDEN CENTER

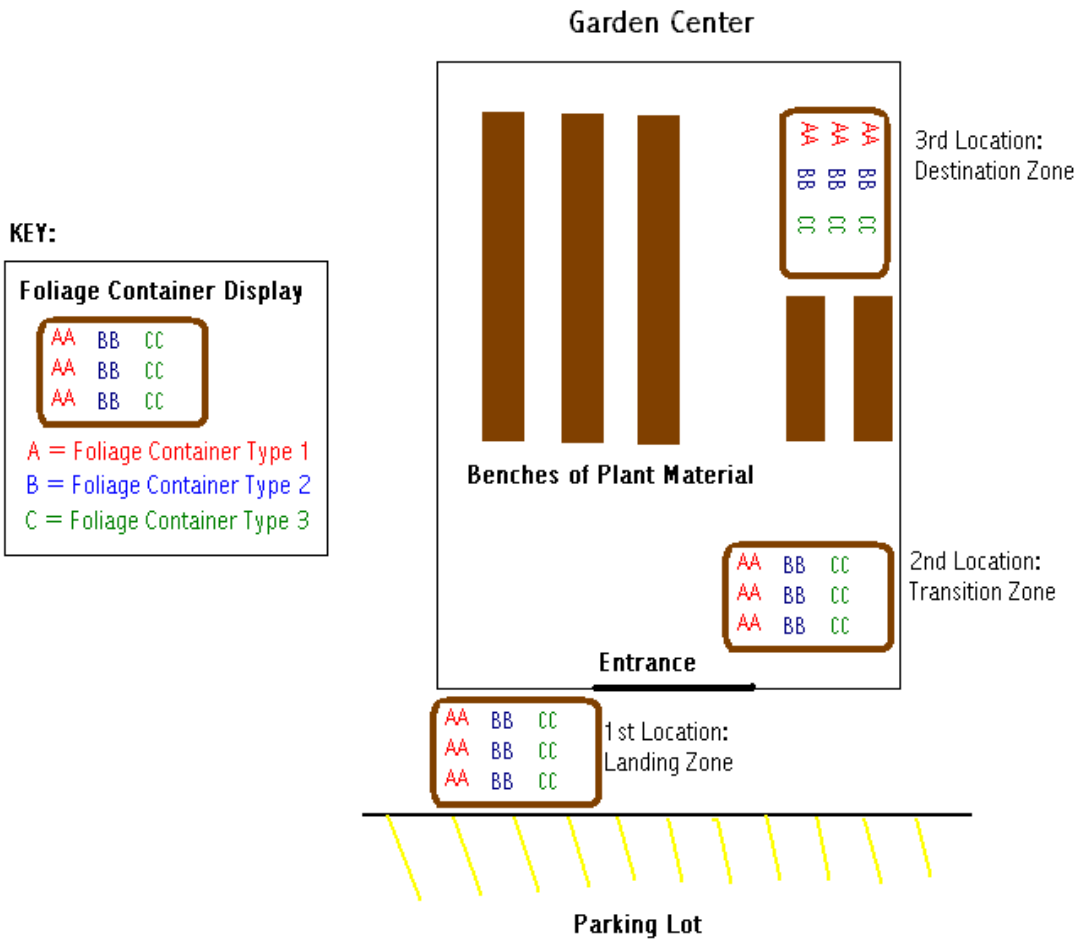


Figure A-1. An illustration of where the landing, transition, and destination zones are within a garden center.

APPENDIX B
INFORMED CONSENT STATEMENT

Department of Environmental Horticulture
University of Florida
1545 Fifield Hall
Gainesville, FL 32611

Verbal Process of Informed Consent

My name is Emily Stefanski and I am a graduate research assistant with the University of Florida in the Department of Environmental Horticulture. My major advisor is Dr. Terril Nell the department chair in Environmental Horticulture at the University of Florida. As part of my research I am administrating surveys to customers who have just purchased a foliage plant container garden. I am collecting this data in order to help identify plant combinations in container gardens that increase the use of foliage plants.

You will be asked to answer questions concerning reasons for making this purchase, plant quality, and display attractiveness of the foliage plant container garden. Along with questions on personal demographics, such as gender, age, education, and income level. This survey will only take a few minutes to complete. I will be the person administrating the survey right after the purchase is made and the surveys are to be turned back into me following completion. You may choose to not answer any questions that you do not feel comfortable about and may choose to withdraw consent at anytime without consequence. Your identity will be kept confidential to the extent provided by law. There is no anticipated risk or compensation proposed for filling out this survey. However, the benefits from this survey will help to increase the different uses of foliage plants and to make them more readily available to customers at garden centers. The results from this survey will be summarized and used in the writing of my thesis and in journal articles.

If you have any questions about this research protocol, please contact me at 352-262-0239 or my faculty supervisor, Dr. Terril Nell, at 352-392-1831. Questions or concerns about your rights as a research participant may be directed to the UFIRB office, University of Florida, Box 112250, Gainesville, FL 32611; ph (352) 392-0433.

Approved by
University of Florida
Institutional Review Board 02
Protocol # 2006-U-0890
Use Through 11/01/2008

APPENDIX C
FOLIAGE PLANT DONATION REQUEST

Agri-Starts
Ty Strode
Tystrode@agristarts.com

Ty,

I wanted to get back with you after talking to you at the FNATS tradeshow about plant donations for the National Foliage Foundation grant. Dr. Jamie Gibson and I met last week to decide on the plant material that we would like to use for the study. Attached you will find this plant list. I'm not sure of your tray size, however for each of the plants listed we would need a quantity of 72 plants.

I wanted to also describe to you my research plan on how I will be using your plant material and the information that Agri-Starts will acquire from this research. My research plan consists of two parts. The first part will be determining consumer preference of foliage container gardens. Three different foliage container gardens will be constructed using one upright, mounding and trailing plant per container. Each of these containers will then be replicated ten times and setup in three different retail locations at each of the Gainesville and Milton plant sales. Data will then be collected from a post-purchase survey. The survey will collect information on the reasons for purchasing, what attracted them to the display and the container garden, how often they buy plant material, and personal demographics.

The second part the research plan involves the use of plant growth regulators (PGRs) on foliage plants. The foliage plants will be treated with two different PGRs both as a drench and spray. These plants along with a control group will then be assembled into foliage container gardens and sold at both the Gainesville and Milton plant sales. The data that I'll gather will be visual quality (marketability), height and diameter. Also the consumer response to foliage container gardens treated with PGRs compared to container gardens that were not treated.

Agri-Starts will obtain the results of both of these studies along with acknowledgment in the trade and research manuscripts. We would need this plant material to arrive no later then December 7th, so if you could ship this plant material as soon as possible that would be great. The shipping address is:

West Florida Research and Education Center
5988 Highway 90
Building 4900
Milton, FL 32583
Attn: Jamie Gibson

Thank you so much for your time and support of this research project. If you have any questions or concerns, please do not hesitate to email me.
Sincerely,
Emily Stefanski

APPENDIX D
PLANT GROWTH REGULATOR INSTRUMENTATION

Foliage Container Garden Evaluation

1. Of the 6 foliage containers, which one would you consider purchasing?
2. What would be an appropriate price for the container you choose?
3. Would you buy this container today?

APPENDIX E
FOLIAGE CONTAINER GARDEN PILOT STUDY 1 INSTRUMENTATION

How did you learn about this plant sale? (circle)

Newspaper	Radio	Internet
Marquee/Billboard	Word of mouth	Other:

How often do you typically purchase plants? (circle)

Rarely	Seasonally	Often

Reason you bought plant material today (circle):

Gift	For garden	Season to plant
Enjoy shopping	Interior houseplant	Hurricane replacement
Patio plant	Unique or unusual	Other:

We observed your purchase today, why did you choose this display? (circle)

Attractive	Convenient	Well stocked
Had to have	Clean and easy to shop	Well labeled
Spontaneous purchase	Atmosphere	No reason

What drew you to the display? (circle)

Color combination	Salesperson	Signs
Quality of plants	Quality of display	Plant type
Structure of display	Unique	Other:

How would you classify yourself as a gardener? (circle)

Novice	Intermediate	Experienced

How familiar are you with the plants you are purchasing today? (circle)

New to me	Somewhat Familiar	Very Familiar

Are you pleased with the quality of the plants? (circle)

No	Somewhat	Yes

Gender (circle):

Male	Female

Age:

15 to 24	25 to 34	35 to 44	45 to 54	55+

Household Income (circle):

≤ $10,000	≥ $10,000	≥ $20,000
≥ $40,000	≥ $60,000	≥ $80,000
≥ $100,000	≥ $120,000	≥ $140,000

Education (circle):

Not a high school graduate	High school graduate	College tech graduate

4 year college graduate Graduate degree Other:

Number of adults in the household: _____
Number of children in the household: _____

APPENDIX F
PLANT SALE INSTRUMENTATION

1. Did you purchase a Foliage Container Garden today? (circle) Yes No

---

2. If Yes, please go to Question 3.

If No, what was your reason for Not purchasing a Foliage Container Garden? (circle One)

Not interested | Already have container garden(s)
Prefer container with flowers | Priced too high

We thank you for your input, please proceed to Question 8 (on Back)

---

3. Which answer Best describes your reason for purchase? (circle One)

For deck/patio/porch | Interior houseplant | Good combination of plants
As a gift | Unique or unusual

---

4. How often do you purchase plants (circle One)?

Yearly | Every 6 months | Seasonally | Monthly | Twice a Month | Weekly

---

5. How long have you been involved in gardening? (circle One)

Less than 1 year | 1 to 5 years | 5+ years

---

6. How familiar are you with the plants in the Foliage Container Garden(s) (circle One)?

All new to me | Somewhat new | Neutral | Somewhat familiar | Very familiar

---

7. How likely are you to come back and buy a similar foliage plant (circle One)?

Not likely | Possibly | Very likely

---

8. Gender (circle):

Male | Female

---

9. Age (circle):

15 to 24	25 to 34	35 to 44	45 to 54	55+

10. Household Yearly Income (circle):
*If student, report family's income

≤ $29,000	≥ $30,000	≥ $50,000	≥ $ 70,000
≥ $90,000	≥ $110,000	≥ $130,000	≥ $150,000

11. Highest level of education you have completed (circle One):

Less than High School	High School/GED	Some College
2-Year College Degree	4-Year College Degree	Graduate Degree

12. Number of adults in household, 18 years old or above _____

13. Number of children in household, younger than 18 years old _____

APPENDIX G
GARDEN CENTER INSTRUMENTATION

1. Did you purchase a Foliage Container Garden today? (circle) Yes No

2. If Yes, please go to Question 3.
If No, what was your reason for Not purchasing a Foliage Container Garden? (circle One)

Not interested | Already have container garden(s)
Prefer container with flowers | Priced too high

We thank you for your input, please proceed to Question 9 (on Back)

3. Which answer Best describes your reason for purchasing a Foliage Container Garden? (circle One)

For Exterior: deck/patio/porch | Interior houseplant | Good combination of plants
As a gift | Unique or unusual

4. How many Foliage Container Garden displays did you observe in the store? (circle One)

1 Display | 2 Displays | 3 Displays

5. How often do you purchase plants (circle One)?

Yearly | Every 6 months | Seasonally | Monthly | Twice a Month | Weekly

6. How long have you been involved in gardening? (circle One)

Less than 1 year | 1 to 5 years | 5+ years

7. How familiar are you with the plants in the Foliage Container Garden(s) (circle One)?

All new to me | Somewhat new | Neutral | Somewhat familiar | Very familiar

8. How likely are you to come back and buy a similar foliage plant (circle One)?

Not likely | Possibly | Very likely

9. Gender (circle):
Male | Female

10. Age (circle):

15 to 24 25 to 34 35 to 44 45 to 54 55+

11. Household Yearly Income (circle):
*If student, report family's income

≤ $29,000 ≥ $30,000 ≥ $50,000 ≥ $ 70,000

≥ $90,000 ≥ $110,000 ≥ $130,000 ≥ $150,000

12. Highest level of education you have completed (circle One):

Less than High School High School/GED Some College

2-Year College Degree 4-Year College Degree Graduate Degree

13. Number of adults in household, 18 years old or above_____

14. Number of children in household, younger than 18 years old_____

APPENDIX H
FOLIAGE CONTAINER GARDEN STUDY INTRODUCTION

New production and marketing trends are emerging in our industry everyday. The container garden is already becoming a staple of what we produce each season, but staying ahead of the market and producing something unique, and with a higher value, means you need to start looking for different plant materials to spice up what you do. One recent trend is the use of tropical plants in containers.

This study will investigate the impact of foliage plant container gardens on identifying consumer needs, trends, and preferences. A collection of foliage plant species will be planted in 12-inch containers based on sun/shade exposure and growth habit (trailing, mounding, and upright). Three plants each with a vertical growth habit, a mounding habit and a trailing habit will be installed per container.

The foliage plant container gardens will be constructed at the University of Florida in Gainesville. The container gardens will be sold at garden centers a week at a time in the spring, summer and fall. Consumer response will be measured with a post-purchase survey. The post-purchase survey will define the customer's profile (male/female, age range, how long they've been gardening, and reason for purchase).

Foliage Research Setup:

- There will be 3 different foliage container garden types. There will be 18 of each different type, with a total of 54 (18 * 3) for each study. These containers will be free of charge including delivery; all the profit generated is yours to keep for your support with this research project.

- 3 replications of the study over the season:
  Study 1.) Summer: 28 June through 12 July
  Study 2.) Fall: 27 August through 11 September
  Study 3.) Late fall: 23 October through 6 November

  - Foliage container gardens will be delivered and set up on the Wednesday or Monday prior to the start of the study: 27 June, 27 August, and 23 October.

- To sell the foliage plant container gardens, 3 different displays locations are needed within the garden center (to measure whether display location makes an impact):
  1st location: From the parking lot to the entrance (Landing Zone)
  2nd location: Just inside the entrance (Transition Zone)
  3rd location: Within the retail setting (Destination Zone)
- At each location, 6 of each of the different foliage plant container gardens should be displayed. Each display needs to hold 18 foliage plant container gardens, 6 of each type.
- Inventory of each foliage container garden display would be beneficial at the end of each day or the start of the following day, to see quantities sold each day from each display. This can easily be done with a digital camera if one is available,

just take a picture of each display everyday. This will also give me an idea of what other plant material is surrounding each foliage display.

- To collect information about the foliage container gardens, surveys need to be administered to both customers purchasing foliage container gardens and to those that are not during the week of the study.

- When a survey is submitted by a customer purchasing a foliage container garden(s), the data tag(s) in each foliage container needs to be removed and the number on the data tag(s) needs to be written on the survey. This information tells me which location they purchased from and which foliage container type they are purchasing.

*Example of Plant Data Tags, there will be one of these in each container.

- At the end of the study, of the foliage plant container gardens that did not sell, plant data tags need to be collected from each container. Combine these with all the surveys collected and that is what I need for my research. The remaining container gardens are yours to keep.

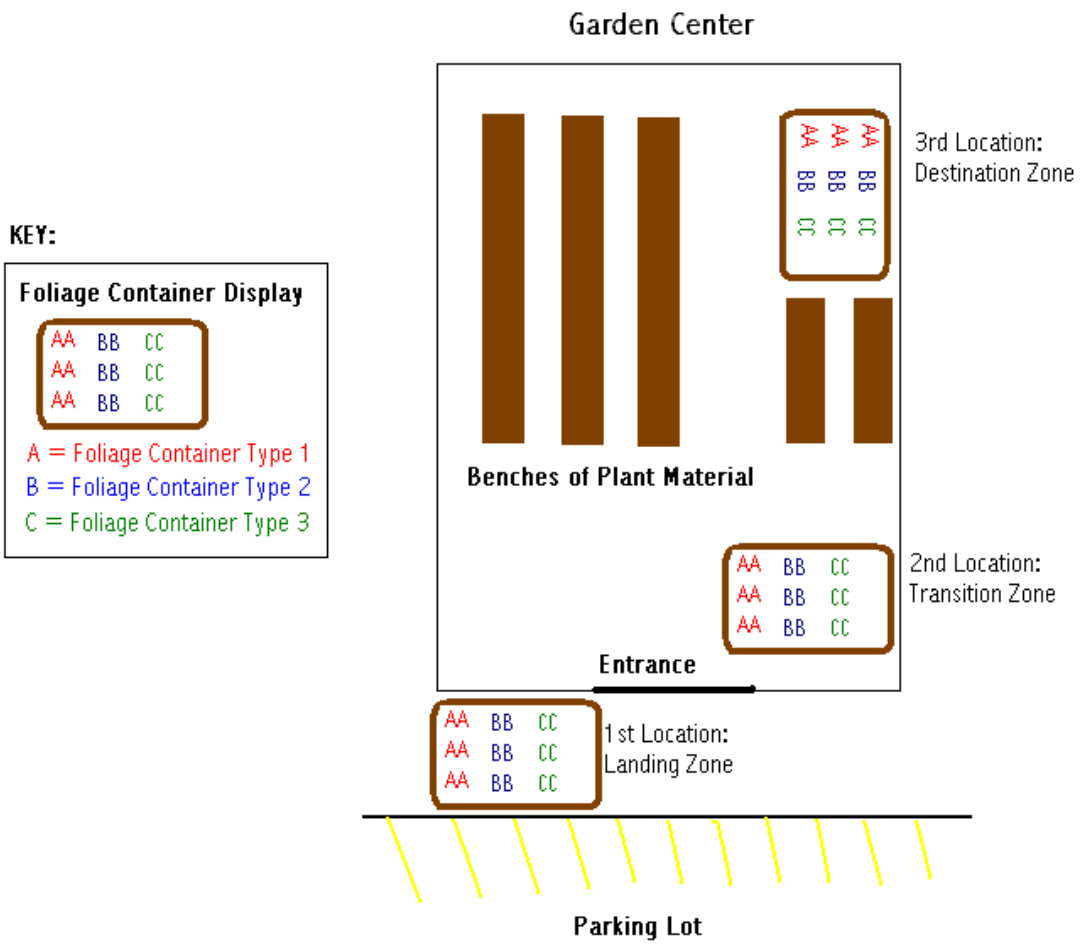
- During the study, foliage container gardens should not be moved around from the different display locations. They can be condensed within their location; however they should not be swapped around.

Timeline for each study:

Monday or Wednesday:
- Delivery and setup of foliage container garden displays
- Administer surveys to any customers purchasing these foliage containers
- Collect plant data tags from each foliage container sold and record on that customer's survey

Monday through the second following Monday:
- Administer surveys throughout the day and collect and record data tags
- Condense containers only within their displays
- Run daily inventory reports

Example of the foliage container garden display setup:




Foliage Container Example

Contact Information:
Emily Stefanski
University of Florida
Graduate Research Assistant
Department of Environmental Horticulture
1545 Fifield Hall
Gainesville, FL 32611
352-262-0239 Phone
352-392-3870 Fax
emilyhrt@ufl.edu

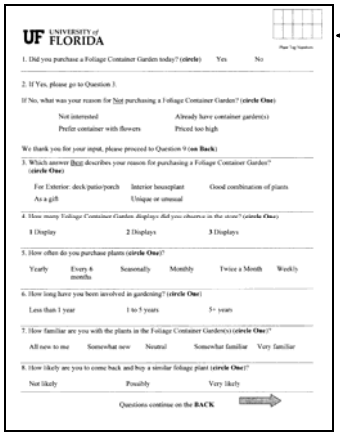
APPENDIX I
INSTRUCTIONS FOR ADMINISTERING INSTRUMENT

Setup:

- 3 display locations of foliage container gardens
- Each display has 3 different foliage container garden types
- Among the 3 different foliage container gardens, there are 6 of each type on each display.
- You may condense the containers within the display, but please do not move containers to different displays.
- Every foliage container garden has a colored numbered plant tag:
    1. Red Tags: All containers in Location 1
    2. Yellow Tags: All containers in Location 2
    3. Blue Tags: All containers in Location 3
- Post-Purchase Surveys and Foliage Information Sheets are included.

Instructions:

1. Each customer that purchases a foliage container garden is encouraged to complete a post-purchase survey
(2 pages; front and back).



UF UNIVERSITY of FLORIDA

1. Did you purchase a Foliage Container Garden today? (**circle**) Yes No

2. If Yes, please go to Question 3.

If No, what was your reason for Not purchasing a Foliage Container Garden? (**circle One**)

Not interested — Already have container garden(s)
Prefer container with flowers — Priced too high

We thank you for your input, please proceed to Question 9 (**on Back**)

3. Which answer Best describes your reason for purchasing a Foliage Container Garden? (**circle One**)

For Exterior: deck/patio/porch — Interior houseplant — Good combination of plants
As a gift — Unique or unusual

4. How many Foliage Container Garden displays did you observe in the store? (**circle One**)

1 Display — 2 Displays — 3 Displays

5. How often do you purchase plants (**circle One**)?

Yearly — Every 6 months — Seasonally — Monthly — Twice a Month — Weekly

6. How long have you been involved in gardening? (**circle One**)

Less than 1 year — 1 to 5 years — 5+ years

7. How familiar are you with the plants in the Foliage Container Garden(s) (**circle One**)?

All new to me — Somewhat new — Neutral — Somewhat familiar — Very familiar

8. How likely are you to come back and buy a similar foliage plant (**circle One**)?

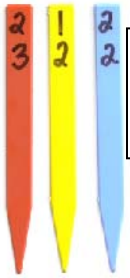
Not likely — Possibly — Very likely

Questions continue on the **BACK**

Write in the numbers from the colored plant tags here.

Important Note:
***The consumer information from this survey is benefiting the National Foliage Foundation in their pursuit to better market and utilize foliage plants. Permission was granted from the University of Florida to administer a market research survey (IRB# 2006-U-0890). All information from this survey is kept confidential. (This statement also appears on the back of every survey.)

2. Remove the colored numbered plant tag(s) from each foliage container garden, and then record these numbers in the upper front right-hand corner of the customer's survey (please save tags if possible).



Example of colored numbered plant tags, record these numbers.

3. The customer is then welcome to take a Foliage Container Garden Information Sheet which identifies and provides the cultural requirements for all the foliage species.
4. Also, please encourage a few customers that have not purchased a foliage container garden to fill out a survey to find out reasons why a purchase wasn't made.
5. Please save all completed surveys and colored tags to be mailed or picked up.
6. Please print off POS daily inventory sheets for all the foliage containers.
7. Completion of this study is at closing on Thursday, July 5th, 2007. Following completion, the foliage container gardens are yours to keep, rearrange, and sell. No surveys need to be administered after this date.
8. Again, thank you for all your help and support of this research project. I sincerely appreciate the extra time and effort put into this. All publications of this work will credit your garden center. I will be in contact with you throughout the week of the study, however if there are any questions do not hesitate to contact me:

Emily Stefanski
University of Florida
352.262.0239
emilyhrt@ufl.edu

APPENDIX J
FOLIAGE CONTAINER GARDEN INFORMATION SHEET

Foliage Container Garden Information Sheet

Xanthosoma atrovirens 'Dwarf Green'
Light: Part to Full Shade
Mature Height: 18-24"
Water: Keep Moist
Zone: 9

Syngonium 'Maria Allusion' & 'Neon'
Light: Part to Full Shade
Mature Height: 12"
Water: Keep Moist
Zone: 9

Dryopteris erythrosora 'Autumn Fern'
Light: Light Shade to Full Shade
Mature Height: 24"
Water: Keep Moist
Zone: 5-9

Xanthosoma aurea 'Lime Zinger'
Light: Part to Full Shade
Mature Height: 18-24"
Water: Keep Moist
Zone: 7b-11

Oxalis hedysaroides rubra 'Fire Fern'
Light: Part Shade
Mature Height: 8"
Water: Keep Moist
Zone: 9-11

Strobilanthes dyerianus
Light: Part Shade
Mature Height: 18-36"
Water: Keep Moist
Zone: 9-10

APPENDIX K
FOLIAGE CONTAINER GARDEN PRICE SIGN

Unique Foliage Container Gardens

Great for Patios, Porches, and Lanais!

Place in Part to Full Shade.

$19.99

Low Maintenance.

Keep Containers Moist.

Contains new foliage from Tropical America.

APPENDIX L
TYPE 1 INFORMATIONAL SIGN FOR FOLIAGE CONTAINER GARDEN

Foliage Container Garden Species

Xanthosoma atrovirens 'Dwarf Green'

Fast Growing

Attractive Bluish-Green Leaves

Height: 18" to 24"

Oxalis hedysaroides rubra 'Fire Fern'

Nice Maroon Foliage with Yellow Flowers

Blooms all summer

Xanthosoma aurea 'Lime Zinger'

Unique Golden Color

Heart-Shaped Leaves

Brightens a Shady Area

APPENDIX M
TYPE 2 INFORMATIONAL SIGN FOR FOLIAGE CONTAINER GARDEN

Foliage Container Garden Species

Strobilanthes dyerianus

Striking Foliage

Leaves are Striped with Shimmering Blue and Lilac Colors

Syngonium 'Neon'

The Brightest, Hot Pink, *NEW* Syngonium!

Rounded Busy Growth

Dryopteris erythrosora 'Autumn Fern'

Very Colorful Fern

New Leaves Emerge as Coppery-Pink in Color

Mature Leaves turn Green

APPENDIX N
TYPE 3 INFORMATIONAL SIGN FOR FOLIAGE CONTAINER GARDEN

Foliage Container Garden Species

Xanthosoma *atrovirens* 'Dwarf Green'

Fast Growing

Attractive Bluish-Green Leaves

Height: 18" to 24"

Syngonium 'Maria Allusion'

Red to Bonze overlay on Green Leaves

Pinkish Red Veins

Mounding Habit

Dryopteris erythrosora 'Autumn Fern'

Very Colorful Fern

New Leaves Emerge as Coppery-Pink in Color

Mature Leaves turn Green

LIST OF REFERENCES

Abratt, R. and S.D. Goodey. 1990. Unplanned buying and in-store stimuli in supermarkets. Managerial and Decision Economics 11(2):111-121.

Adams, W. J. and J.L. Yellen. 1976. Commodity bundling and the burden of monopoly. The Qrtly. J. of Economics 90(3):475-498.

Ajzen, I. 1991. The theory of planned behavior. Organizational Behavior and Human Decision Processes 50:179-211.

Ary, D., L. Cheser Jacobs, and A. Razavieh. 2002. Introduction to research in education. 6th ed. Wadsworth Thomson Learning, Belmont, Calif.

Barrett, J.E. 1982. Height control by ancymidol, PP333 and EL-500 dependent on medium composition. HortScience 17:896-897.

Barrett, J.E., C.A. Bartuska, and T.A. Nell. 1994. Application techniques alter uniconazole efficacy on chrysanthemums. HortScience 29(8):893-895.

Barrett, J.E. and T.A. Nell. 1983. *Ficus benjamina* response to growth retardants. Proc. Fla. State Hort. Soc. 96:264-265.

Becker, C.A. and J.A. Poorbaugh. 1966. Consumer response to landscape information in nursery garden centers. Penn. State Univ. Agr. Expt. Res. Sta. No. 63.

Bouvier L. and S. McCloe Stein. 2001. Focus on Florida: Population, resources, and quality of life. 3 Dec. 2007. <http://npg.org/specialreports/FL/fl_report.html>.

Bucklin, R.E. and J.M. Lattin. 1991. A two-state model of purchase incidence and brand choice. Mktg Sci. 10(1):24-39.

Burns, R. 1998. Center of Attention. American Nurseryman 188(4):61.

Chen, J., R.J. Henny, and D.B. McConnell. 2002. Development of New Foliage Plant Cultivars. P. 466-472. In: J. Janick and A. Whipkey (eds.), Trends in new crops and new uses. ASHS Press, Alexandria, Va.

Conover, C.A. 1994. Angle-wing begonia growth and water requirements affected by paclobutrazol. Central Fla. Res. and Educ. Ctr.-Apopka Res. Rpt. RH-94-4, Univ. of Fla./IFAS. http://mrec.ifas.ufl.edu.lp.hscl.ufl.edu/Foliage/Resrpts/rh_94_4.htm.

Conover, C.A. 1998. Foliage Plants, p. 273-294. In: V. Ball (ed.). Ball Redbook. 16th ed. Ball Pub., Batavia, Ill.

Cox, D.A. and F.F. Whittington. 1988. Effects of paclobutrazol on height and performance of Aluminum plant in a simulated interior environment. HortScience 23(1):222.

Dillman, D.A. 2000. Mail and internet surveys: The tailored design method. 2nd ed. Wiley, New York, N.Y.

Dole, J.M. and H.F. Wilkins. 2004. Floriculture principles and species. 2nd ed. Prentice Hall, Upper Saddle River, N.J.

Dunn, C. 1992. 19 Merchandising tips learned from supermarkets. Fla. Foliage Assn. 8(4):10-11.

Fazio, R.H. 1986. How do attitudes guide behavior?, p. 204-243. In: R.M. Sorrentino and E.T. Higgins (eds.). The handbook of motivation and cognition: Foundations of social behavior. Guilford Press, New York, N.Y.

Garber, M.P. and K. Bondari. 1998. Retail garden outlets: Plant material purchases and trends. J. Environ. Hort. 16(1):20-26.

Gaston, M., L.A. Kunkle, P.S. Konjoian, and M.F. Wilt (eds.). 2002. Tips on regulating growth of floriculture crops. Ohio Florists' Assn, Columbus, Ohio.

Gibson, J.L. and D. Bonelli. 2007. Make your display pay. Ornamental Outlook 16(1):46, 48, 50.

Henny. 1990. A review of literature concerning the use of growth retardants on tropical foliage plants. Central Fla. Res. and Educ. Ctr.-Apopka Res. Rpt. RH-90-10, Univ. of Fla/IFAS. http://mrec.ifas.ufl.edu/foliage/resrpts/rh_90_10.htm.

Hodges, A.W., and J.J. Haydu. 2006. Economic impacts of the Florida environmental horticulture industry, 2005. Electronic Data Information Source (EDIS) document FE675, Dept. of Food and Resource Economics, Univ. of Fla., Gainesville, Fla. <http://edis.ifas.ufl.edu/pdffiles/FE/FE67500.pdf>.

Hudson, J.T., B.K. Behe, H.G. Ponder, and W.E. Barrick. 1997. Consumer perceptions and expectations of garden center product and service quality. J. Environ. Hort. 15(1):12-15.

Mason, S.C., T.W. Starman, R.D. Lineberger, and B.K. Behe. 2008. Consumer preferences for price, color harmony, and care information of container gardens. HortScience 43:380-384.

Mitchell, A.A. 1993. Advertising exposure, memory, and choice. Lawrence Erlbaum, Hillsdale, N.J.

National Gardening Assoc. 2007. 2006 National gardening survey. National Gardening Assn., Inc. South Burlington, VT.

Niemiera, A.X., J. Innis-Smith, and C.E. Leda. 1993. Survey of garden center customer informational and marketing needs. J. Environ. Hort. 11(1):25-27.

Ouellet, K.P. 2001. The EuroAmerican container garden cookbook. Ball Publishing, Batavia, Ill.

Park, C.W., E.S. Iyer, and D.C. Smith. 1989. The effects of situational factors on in-store grocery shopping behavior: the role of store environment and time available for shopping. J.Consumer Res. 15(4):422-433.

Pennisi, B. 2006. Looking better longer. Ornamental Outlook 15(11):16-20.

Pennisi, B.V., P.A. Thomas, and A. Armitage. 2005. Tropical Plants Offer New Possibilities for Georgia Gardens. Coop. Ext. Serv. Uni. of Ga. College of Agricultural and Environmental Sci. Bul. 1272.

Pennisi, B.V., P.A. Thomas, and F.E. Stegelin. 2005. Foliage Products. Coop. Ext. Serv. Uni. of Ga. College of Agricultural and Environmental Sci. Bul. 1262.

Point-of-Purchase Institute of the United States of America. 1978. Popai/DuPont Consumer buying habits study: Special Rpt., New York: Popai.

Poole, R.T. and C.A. Conover. 1992. Water use and growth of eight foliage plants influenced by paclobutrazol. Foliage Dig. 15(12):1-3.

Pulley, G.E. and T.D. Davis. 1986. Effect of paclobutrazol on growth and interior performance of several foliage plant species. HortScience 21:702 (abstr.).

Sanbonmatsu, D.M. and R.H. Fazio. 1986. The automatic activation of attitudes toward products. Annu. Mtg. Assn. for Consumer Res., Toronto, Can.

Satterthwaite, L.N. and J.J. Haydu. 2004. Consumer purchasing habits of Florida environmental horticulture products. Electronic Data Information Source (EDIS) document FE473, Dept. of Food and Resource Economics, Univ. of Fla., Gainesville, Fla. <http://edis.ifas.ufl.edu/FE473>.

Stegelin, F. 2001. Role of point-of-sale information on consumers' purchase decisions. Southern Nursery Assn. Res. Conf. 46:536-538.

Solomon, M.R. and E. W. Stuart. 2000. Marketing: real people, real choices. 2nd ed. Prentice Hall, Upper Saddle River, N.J.

Thomas, P.A. and J.G. Latimer. 1997. Chemical regulation of growth of perennial bedding plants. HortScience 32(3):509 (abstr.).

U.S. Census Bureau. 2003. Census 2000 data for Florida. 3 Dec. 2007. <http://www.census.gov/census2000/states/fl.html>.

U.S. Census Bureau. 2007. State and county quickfacts. 3 Dec. 2007. <http://quickfacts.census.gov/qfd/states/12000.html>.

U.S. Department of Agriculture. 2006. Floriculture crops 2005 summary. U.S. Dept. Agri., Washington, D.C.

U.S. Department of Agriculture. 2008. Floriculture and nursery crops yearbook 2007 summary. U.S. Dept. Agr., Washington, D.C.

Underhill, P. 2001. Why we buy: The science of shopping. Texere Publishing, New York, N.Y.

Wang, Y.T and T.M Blessington. 1990. Growth of four tropical foliage species treated with paclobutrazol and uniconazol. HortScience 25(2):202-204.

Weather Underground. 2008. Weather history. Ann Arbor, Mich. 1 June 2008. <http://www.wunderground.com/history/>.

BIOGRAPHICAL SKETCH

Emily Anna Stefanski was born in 1982, in Kalamazoo, MI. She grew up in the small rural community of Tekonsha where she attended both Tekonsha High School and the Battle Creek Area Mathematics and Science Center. Emily gained an appreciation for nature at an early age and began taking part in her local 4-H club. By high school she was working part time at a local garden center and completing the Master Gardener classes.

After graduating in 2000, Emily started at Michigan State University where she began studying horticulture. During her undergraduate career, Emily gained industry experience working at the on-campus florist shop and assisting the executive director of the floriculture scholarship foundation, F.I.R.S.T. She also completed a three month internship at D.S. Cole Growers in Loudon, NH. Emily graduated with her Bachelor of Science degree with high honor in horticulture in 2004.

Her interests in the retailing aspect of the horticulture industry lead her to a position with Wojo's Greenhouse in Ortonville, MI. Within a year at Wojo's, Emily was promoted to the garden center's hard goods buyer and manager. After a successful year in her management position, she was recruited to the University of Florida to pursue graduate studies in horticulture. Emily accepted and began her master's program in environmental horticulture, with an emphasis in marketing. During her time at the University of Florida, she served as a graduate research assistant. Emily co-authored the Retailing 101 article series in the Lawn and Garden Retailer trade journal and was invited to speak at a number of horticulture meetings. She also took part in an international trip to France for a 10-day study abroad program featuring the gardens of France. In fall 2008 she will return to the industry in pursuit of improving horticulture marketing efforts.