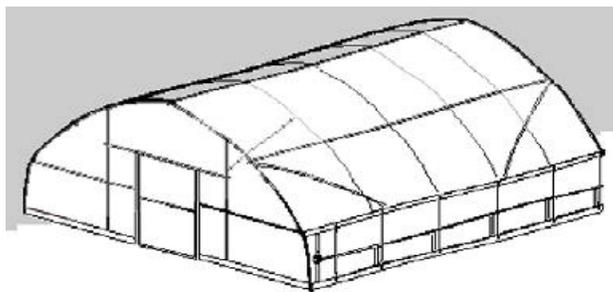


November 2000

E.B. 2000-16

**2000 Cornell Greenhouse
Management Conference**

GROW YOUR GREENHOUSE!



Conference Proceedings

**Edited by
Wen-fei L. Uva**

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Cornell University
Ithaca, NY 14853-7801**

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Publication Price Per Copy: \$10.00

For additional copies, contact:

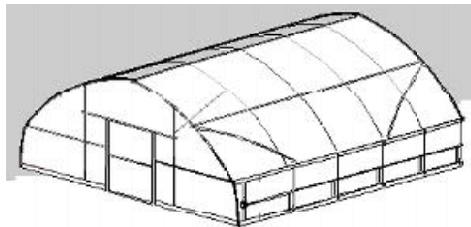
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Industry Overview



Debbie (Deborah) Hamrick
FloraCulture International Magazine
Ball Publishing

Biography

Debbie (Deborah) Hamrick

FloraCulture International Magazine, Ball Publishing

Debbie Hamrick is the editor of *FloraCulture International Magazine* and the manager of trade shows and conferences for Ball Publishing at Batavia, Illinois. She edits the international floriculture industry's leading trade magazine, *FloraCulture International*, a trade magazine for producers of cut flowers, flowering and green potted plants and garden flowers all over the world with circulation to 13,000 subscribers in more than 40 countries. She travels extensively to cover events and meet with industry leaders. As manager of trade shows and conferences, she coordinates production of GrowerExpo, an annual conference and trade show in Chicago in January.

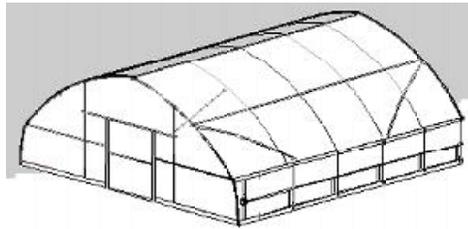
In June 1990 she founded *FloraCulture International* and has since served as the publisher and editor, traveling extensively from 1990 to 1994 to report on the international industry and to coordinate FCI offices in Bunnik, Netherlands, and in the US in Batavia and Mt. Morris, Illinois.

In September 1994, she became editorial director of Ball Publishing to coordinate editorial for *GrowerTalks* magazine and *FloraCulture International*, book publishing projects (including the 16th edition of the Ball RedBook, released in June 1997), the Floriculture Worldwide Network on the worldwide web, and GrowerExpo and other seminars. Under her editorial direction Ball Publishing launched the third floral industry trade magazine, *Green Profit*, which is geared for chain stores, mass marketers, supermarkets and garden centers.

She was the field marketer for Ball Seed Co., West Chicago, Illinois from July 1997 - May 1999 as an independent representative for the country's largest privately held horticultural brokerage firm. Ball Seed Co. markets seeds, plugs and rooted cuttings of flowers and plants to more than 90 commercial and institutional greenhouse producers.

She is a frequent industry speaker and serves on many industry association committees, including Illinois Agriculture Leadership, Ohio Florists Association Publications Committee, Professional Plant Growers Association Board, North Carolina Flower Growers Association Board, Bedding Plants Inc. Foundation Markham Scholarship Committee, and was recently elected to the board of Florastar, the national pot plant trialing organization. She is also a member of the Society of American Florists and American Nursery & Landscape Association.

Getting Started in Business -- The Big Questions



**Ralph N. Freeman
Floriculture Specialist
Cornell Cooperative Extension of Suffolk County**

Biography

Ralph N. Freeman

Floriculture Specialist

Cornell Cooperative Extension of Suffolk County

Ralph N. Freeman is a regional Cooperative Extension Educator for Long Island in the field of Floriculture. He works under an agreement between the Cornell Cooperative Extension Associations of Suffolk and Nassau Counties. His office is located in Riverhead, NY and conducts educational and research programs in Manhattan, Queens, Brooklyn, Nassau and Suffolk Counties in cooperation with Cornell University in the general areas of floriculture crop production management, business management and marketing.

During his 36-year tenure on Long Island, the floriculture industry has increased in size, gained national prominence, improved in sophistication, modernized and is now well recognized for its importance in the national marketplace. The quality educational programs offered have caused numerous businesses to move to eastern Long Island, existing businesses to expand their facilities, both local and out-of-state firms to seek the professionally given information offered; and program supporters to fully support both Cornell Cooperative Extension and Cornell University in various ways.

Freeman is active in numerous local industry organizations and provides encouragement, guidance, and direction to them. He has served on the Board of Directors of the Center for Controlled Environmental Agriculture (Rutgers, The State University), Board of Directors of Controlled Environmental Agriculture (Cornell University), and Board of Directors of the John G. Seeley Conference (Cornell University). He has also served on the Board of Directors of Bedding Plants, Inc. (BPI) and Professional Plant Growers Association (PPGA), both of which are international industry trade associations. He was Chairman of the Education Committee for PPGA and BPI as well as Chairman of the International Committee which managed and organized International Educational Tours to the countries of Japan, Australia, New Zealand, Europe, Canada, and Scandinavia. He has conducted numerous educational tours to Holland, Germany, and Canada as well as California, Florida, Colorado, Oregon, Washington, New Jersey and New England. Additionally, he has served on BPI's World Congress Committee as chairman planning an international educational conference in The Netherlands in 1990.

Working closely with Cornell faculty in the Department of Floriculture and Ornamental Horticulture he is involved in several cooperative research projects. Some of these include the growth and development of plugs, integrated pest management for floriculture, growth regulators on greenhouse plants, and development of recommendations for Cornell 'Guidelines' and 'Recommendations' series. He was editor of *Long Island Horticulture News*, and is currently editor of *Regional Greenhouse IPM News* and a regular columnist in *GM Pro*, an international trade magazine, and *Suffolk County Agriculture News*.

Getting Started in Business — The Big Questions

Ralph Freeman
Cornell Cooperative Extension, Suffolk County

This presentation will review the practical ways on how to get started in a horticultural business. The information is there—but where? Who are the ones to contact? What portion of horticulture should I become associated with and where is the market? Can I make a living from a venture like this? What will it cost? What are the options? Are there risks? Where should I start up my business? All these and many more questions will be addressed.

Horticulture is the fastest growing segment of agriculture. Particularly, the production of flowering house plants, bedding plants, perennials, field-grown cut flowers, certain specialty crops and nursery crops may be worthy of consideration. Are you willing to make the commitment? How do you do this?

This discussion will help provide some direction of what to do, how to do it and give some outstanding guidance on becoming a successful business person.

Why Agriculture?

Why Floriculture?

- Isn't the grass greener over there?
- The hard work...
- The long hours...
- What's there at the end?
- Can I make it?
- Is there a future?

What Turns Your Crank?

- Retailing?
- Production?
- Marketing?
- Retail-Grower?
- Salesperson?
- Other?

This is the richest time!

- Richest time in history!
- Richest country in the world!
- Longest economic expansion!
- Fastest growing segment of agriculture!

Beware...it's not like it used to be!

- Unusual alliances—partnering
- Product value is shifting to intangibles
- Products are driven by the consumer
- Computer technology necessary
- Assets—keep them current (bldg. & eqpt.)
- Garden centers are lessening—except NE
- Becoming a 'fast pace' industry

Greatest Opportunities...

- ☉ Nursery:
 - In-ground or containerized plants
- ☉ Floriculture:
 - Field-grown products
 - Perennials
 - Bedding plants/flowering potted plants
 - Cut flowers

Overview of Industry Status

- ☉ Phenomenal!
- ☉ Outstanding!
- ☉ Expansion—and, lots of it!

Outline

- ☉ Purpose
- ☉ Planning
- ☉ Site Selection
- ☉ Centrality of Services
- ☉ Efficiency
- ☉ Building Permits
- ☉ Windbreaks
- ☉ Safety & Light
- ☉ Floors, Doors, Paints
- ☉ Herbicides
- ☉ Heating & Cooling
- ☉ Benches
- ☉ Covering
- ☉ Pipes
- ☉ Floor Heat
- ☉ Service Areas

What is horticulture?

- ☉ Ornamental horticulture is the cultivation of plants of all kinds for show and to satisfy the eye rather than for commercial production of food. It is divided into three major divisions with regard to their commercial and other uses and market outlets: 1) commercial floriculture; 2) nursery plants; and 3) turf crops. [J. Soule]

Commercial floriculture

The culture of greenhouse and field crops grown as bedding plants, bulbous plants, cut flowers, foliage plants, perennials, hanging baskets and potted plants.

Industry ranking

- ☉ Nursery:
 - 60% on Long Island
 - \$80+ million annually
- ☉ Floriculture:
 - 7th in U.S.
 - 60% NYS production on Long Island
 - \$300+ million annually

Value of floriculture/horticulture

- ☉ “Floriculture and horticulture is the fastest growing sector of agriculture in NYS, with related economic activities of more than \$5.4 billion per year. It’s second only to livestock and dairy products.” (W. Miller)

Intensive agriculture

- ☉ Production of greenhouse, nursery and field-grown crops is very intensive. That is, many units per square foot with a very high gross revenue per unit area.
- ☉ The gross revenue could be as much as 100-200 times that of typical agricultural production.

Trends

- ☉ Crops: bedding plants, flowering house plants, perennials, field-cuts, herbs
- ☉ Consolidation of businesses
- ☉ Niche markets
- ☉ Pre-finished crops...increasing interest!
- ☉ Plugs (the way to start plants)
- ☉ Bulbs

Trends

- ☉ Evaluating the value of owning land to conduct business.
- ☉ Protections: Land corporations; business corporations; transportation corporations, etc.

Ownership

- ☉ Sole proprietorship
- ☉ Partnership
- ☉ Corporation
 - Land
 - Business
 - Delivery
 - Other

Which crops?

- ☉ Perennials
- ☉ Bedding plants
- ☉ Flowering potted plants
- ☉ Specialty crops
- ☉ Field-grown cut flowers
- ☉ Foliage plants
- ☉ Greenhouse-grown cuts
- ☉ Other:
 - Forsythia
 - Flowering quince
 - Curly willow
 - Pussy willow
 - Lilac

Where is your market?

Greenhouses and other structures

- ☉ Open-roof greenhouses
 - hinged at gutter—opens at ridge
 - hinged at ridge—articulating
 - hinged at one gutter, roof lifts on one side
- ☉ Retractable roofs
- ☉ Overwintering greenhouses
- ☉ Mostly gutter-connected (poly and glass)

Licenses

- ☉ NYS Dept. Agric. & Markets (Nursery License)
- ☉ NYS Dept. of Environmental Conservation (pesticide license)
- ☉ Commercial Drivers License (trucks)

Some Exemptions on Taxes

- ☉ NYS Sales Tax (production items only)
- ☉ Ten years exemption from school and real estate taxes on newly constructed real property of farmers (barns, greenhouses...)
- ☉ Agriculture District
- ☉ Development rights sold (county, town, village)

Layout of Operation

The Future

- ☉ Businesses will become larger
 - more complex and efficient
 - capitalization will be larger and much from outside the industries
 - streamlining of businesses—\$\$\$

The Future...

- ☉ Where will your business be in:
 - 5 years?
 - 10 years?
 - 20 years?
 - 50 years?
 - 100 years?

Business Structure

- ☉ Sole Ownership
- ☉ Partnership
- ☉ Corporation
- ☉ Future Transfers

Key Elements to Continue

Business

- ☉ Business plan
- ☉ Cash flow projections
- ☉ Review ownership options
- ☉ Board of “Advisors”
- ☉ Board of Directors

Key Elements to Continue Business (*continued*)

- ☉ Be ‘Visionary’!
- ☉ Advisors and Directors need to be visionary
- ☉ If there is no vision the business will die—RNF

Estate Planning

- ☉ Start when you are young!
 - Draw up your plan
 - CCE can guide and help you
 - Use an impartial advisor
 - May need a CPA
 - Will need an attorney

Trends

- ☉ More plant sales on E-Commerce
- ☉ Machines will watch plants grow
- ☉ Automation will replace “green fingers”
 - Mechanization will cut labor costs
 - Mechanization will expand production

Purpose of a Greenhouse

- ☉ A structure providing and maintaining a favorable environment that will result in optimum crop production.
- ☉ Therefore, thoughtfully plan...and properly lay out the facility for maximum efficiency.

Monthly heating percentages

☉ Jul	<2	☉ Jan	27
☉ Aug	<2	☉ Feb	13
☉ Sep	2	☉ Mar	11
☉ Oct	6	☉ Apr	8
☉ Nov	9	☉ May	6
☉ Dec	12	☉ Jun	3

Site Selection

- Level
- Surface water
- Water supply/quality
- Energy sources
- Nearness to market
- Labor
- Services

Some Considerations

- Centrality of Services
- Efficiency
- Soil Conservation Service
- Zero Runoff
- Building Permits
- Windbreaks

Considerations—Purchasing a Greenhouse

- Cost
- Durability
- Expected life
- Retrofits
- Truss/roof design
- Dead load
- Live load
- Wind load
- Snow load
- Combined loads
- Light transmission
- Alloy of metals
- Ease of erection
- Style of house
- Maintenance
- Venting

Considerations—Purchasing a Greenhouse (continued)

- Heating
- Benching
- Floors
- Energy saving eqpt
- Service areas
- Meet codes?
- Electric (110, 220, 3ph)
- Open roof
- Side ventilation
- Doors
- Loading docks
- Height to gutter
- Future service eqpt
- Service area
- Offices
- Computers

Considerations — Purchasing a Greenhouse (continued)

- Fire safety
- Thermal transmission
- Coverings
 - Polyethylene
 - Glass
 - Polycarbonate
 - Acrylic
 - Fiberglass
- Costs of coverings
- Pipes
- Services
 - underground
 - above ground
- Useful life of covering
 - maintenance
 - discolorations?

Greenhouse Brokers

Rough Bros, Cincinnati, OH
 Westbrook Grhs, Grimsby, Ont
 National Grhs Co, Pana, IL
 V & V Noordland, Medford, NY
 X S Smith, Red Bank, NJ

Greenhouse Coverings

Fire Rating

- ☉ Glass — None
- ☉ Polyethylene — Melts
- ☉ Polycarbonate — Melts
- ☉ Fiberglass — Burns
- ☉ Acrylic - Burns

Paints

- ☉ Greenhouse paint only!
- ☉ Wood treatments:
 - Cuprinol GREEN (only)
 - CCA

Floors

Concrete
 Porous concrete
 Bluestone dust
 Sand

Heating

- ☉ Use vented heaters only
- ☉ Oxygen supply needed
- ☉ Burners properly adjusted
- ☉ Stacks 4 feet minimum above the highest point of structure
- ☉ Location: outside, covered, special boiler room

Heating

- ☉ Hot water
- ☉ Steam
- ☉ Hot air
- ☉ Infra red

Greenhouse Cooling

☉ When selecting exhaust fans for greenhouses...use quality fans only.

E.g.,

- ACME
- COOLAIRE
- Refer to the performance rating charts...use the 0.1 SP column only!

Fuel Sources

- ☉ Natural Gas
- ☉ LPG
- ☉ Oil (No. 2, 4, 6)
- ☉ Coal
- ☉ Wood

Average Fuel Usage

☉ The average amount of fuel used in most year-round production greenhouses amounts to approximately 1.6 gal/sq ft/yr if No. 2 fuel oil is used. This assumes an average temperature of 60 F.

Benches — Basics

- ☉ Convenient height
- ☉ Maintenance
- ☉ Width (4-5 ft)
- ☉ Aisle widths 18"
- ☉ Service areas 5%
- ☉ Stationary, Movable or Transportable

Selecting Plastic Pipe

- ☉ Irrigation: PVC, PE
- ☉ Cold water: PE, PVC, CPVC
- ☉ Hot water: CPVC, PB, ABS
- ☉ Drainage: PE
- ☉ Waste: ABS, PVC
- ☉ Fire Sprinkler: PB
- ☉ Root-Zone heat: PB, CPVC, PE
- ☉ Fertilizer, Pesticide: PVC
- ☉ Electrical: PVC
- ☉ Compressed Air: ABS

Cooling Greenhouses

- ☉ Natural Ventilation
- ☉ Exhaust Fans & Vents
- ☉ Fan Jets
- ☉ HAF

Greenhouse Costs

- ☉ Glass
 - about \$10-13 per sq ft
- ☉ Polyethylene:
 - about \$6-8 per sq ft

Summary

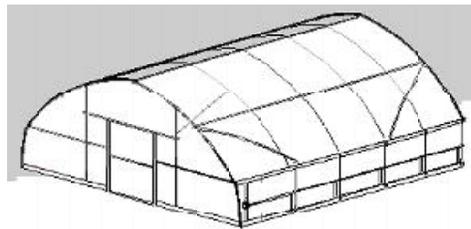
- ☉ Horticulture is a very exciting industry...a *growth* industry!
- ☉ We expect a minimum of 15-20% return on our investments.
- ☉ Striving to meet consumers' needs with new and different products is very challenging.
- ☉ We expect growth in the future!

Be Prepared...You'll Be Everything!!!

- ☉ Owner
- ☉ Manager
- ☉ Bill payer
- ☉ Mixing growing media
- ☉ Fertilizing
- ☉ Checking temperatures
- ☉ Repairing equipment
- ☉ Plumber
- ☉ Building greenhouses
- ☉ Establishing an office
- ☉ Hiring/firing people
- ☉ Answering phone
- ☉ Carting garbage
- ☉ Delivering
- ☉ Electrician
- ☉ And...more!

Where to Start?

Funding Sources and Strategies



David Stafford
Farm Business Consultant
Farm Credit of Western New York, ACA

and

Jamie Block
Farm Credit of Western New York, ACA

Biographies

David Stafford

Farm Credit of Western New York, ACA

David Stafford is employed by Farm Credit of Western New York as a Farm Business Consultant. Dave has worked with several hundred small and large agricultural businesses in New York, Connecticut and Pennsylvania. He provides a wide range of consulting services including: business planning, expansion planning, business succession, income & estate tax planning and labor management. Dave has been with Farm Credit over 15 years as a loan officer, tax specialist and as a farm business consultant. Dave has a bachelor's degree from Cornell University and is married with two children.

Jamie Block

Farm Credit of Western New York, ACA

Jamie Block obtained a Bachelor's degree from Cornell University and started employment with Farm Credit in 2000. He promotes and supports all of the record and tax services offered by the farm business services department, including on-farm demonstrations of the AgCHEK software, software installation and training, annual records review visits, and tax preparation.

Where to Start? Funding Sources and Strategies

David Stafford
Farm Credit of Western New York, ACA

Be Prepared

- Learn to be a successful business manager
- Have a financial management plan

Become a Business Manager

- Be motivated
- Associate with other successful managers
- Have fun managing
- Practice financial discipline

Financial Management Plan

- Have a business plan
- Know your industry
- Know the fundamental rules of risk management
- Get better before getting bigger

Expansion Planning

- Business Plan
- Capital Investment Plan
- Budgets
- Organizational structure
- Cost Quotes
- Marketing Plan

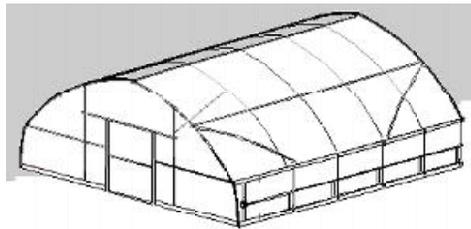
What Farm Credit Can Provide

- Farm loans
- Leasing
- Appraisals
- Financial / Farm Business Consulting
- Tax Planning / Preparation
- Financial Record keeping
- Payroll Service

Financial Ratio Standards

	<u>Standard</u>	<u>Your Business</u>
<u>Financial</u>		
Gross Margin %	30 – 40%	_____
Net Margin %	10 – 15%	_____
Return on Assets	> 10%	_____
Asset Turnover	2 – 3:1	_____
Equity / Assets	> 60%	_____
 <u>Cost Control</u>		
Overhead expenses	20 - 30% of sales	_____
Labor costs	20 – 25% of sales	_____
 <u>Efficiency</u>		
Sales / Customer	\$5 – 10/customer (retail)	_____
Gross Sales / Owner	\$150 - 250,000	_____
 <u>Growth</u>		
Sales Increase / Year	5 – 15%	_____
Customers Increase / Year	5 – 10%	_____
New Products / Year	3 – 10%	_____

How to Develop an Effective Marketing Plan



Wen-fei Uva
Senior Extension Associate
Department of Agricultural, Resource, and
Managerial Economics
Cornell University

Biography

Dr. Wen-fei Uva

Senior Extension Associate

**Department of Agricultural, Resource, and
Managerial Economics, Cornell University**

Wen-fei Uva is a senior extension associate in the Department of Agricultural, Resource, and Managerial Economics at Cornell University. She joined the department in March 1999 after receiving her Bachelor of Science degree from National Taiwan University and her Master and Ph.D. degrees from Cornell University. Before coming to Cornell, she owned and operated a retail floral business in Taipei, Taiwan. Her primary responsibility at Cornell is to develop an extension and applied research program on the marketing and economics of horticultural products including fruit, vegetable and ornamental horticulture crops. This program is designed to enhance the competitive position of the New York fruit, vegetable, and ornamental horticultural industry through targeted, curriculum-driven educational programs.

Her research interest is in market development for horticultural products and sustainability of horticultural businesses. Recent research work focuses on economic and risk analysis of adopting zero runoff subirrigation technology in greenhouse operations, economic dimensions of the New York State greenhouse industry, and fruit and vegetable supply-chain management, innovations, and competitiveness. The web-site address for the Horticultural Business Management and Marketing Program at Cornell is: <http://www.cals.cornell.edu/dept/arme/hortmgt/index.htm>.

Travel the Road to Success with a Marketing Plan

Dr. Wen-fei L. Uva
Senior Extension Associate
Horticultural Product Marketing
Department of Agricultural, Resource, and
Managerial Economics, Cornell University

Successful marketing requires planning. Marketing involves more than the product you are selling. Developing a sound marketing plan that works for you is the first step to improving profitability. A marketing plan serves as a road map. It establishes objectives, assigns responsibilities, and recommends actions for achieving goals. A marketing plan requires the individual to think through the process of how a product/service will be sold. It minimizes the emotion and guesswork when making a marketing decision.

The following outlines the steps in developing a marketing plan.

I. Situation Analysis – gather market information

Explore who the consumers are. It is important to take a moment and determine who the consumers are and their needs and wants. A good start is to identify the geographic area you wish to serve and analyze consumer demographics, their lifestyles, income, and expected changes in the future.

Research the industry and the environment. It is wise to collect as much information as possible about the industry you are in as well as relevant elements in the competitive environment, including government policies and regulations, technological changes, effect of globalization, social and cultural behavior, and industry trends.

Assess your strengths and weaknesses. A self-analysis will help you develop strategies which take advantage of the firm's strengths and opportunities – neutralizing weaknesses and avoiding threats.

Investigate the competition (current and potential). Important information about the competition includes who they are, their location, their products and services, their price range, their reputation, their promotional activities, and what they do better than you. You can develop your competitive edge based on this information.

Develop product or service ideas. Your product or service ideas should be developed based on the information from the consumer and industry research. You should be able to answer the following questions: What are your products and services? What are the benefits of your products? What makes them different from your competitors' products and services?

Determine the target market. A target market is not just who is buying, or will buy, your products, but a market segment which you identify as the most desirable and profitable. A firm can compete more effectively in a limited number of market segments. Criteria useful to segmenting a market include demographic, geographic, psychographic, consumer behavior, and business markets.

Test the market potential. This refers to estimating the expected sales of a product/service for the market over a specific time period. A starting point for an existing firm can be based on recent history. One way to test a new product/service is to conduct simple test-market research, i.e., offer a free trial period to a small focus group and collect their honest opinion.

II. Determine your marketing objectives

Objectives are measurable, quantifiable, and realistic statements of what you expect to accomplish. For example, specific objectives for the next two years might be to increase sales by 15%, increase net profit by 15%, or increase your market share by 15%.

III. Select marketing strategies

Marketing strategies are about how you expect to accomplish your objectives. Strategies can include product differentiation, market segmentation, new product introduction, diversification, business positioning, and any number of alternatives.

IV. Implementation

This is to determine *who* is responsible, *what* tasks they are responsible for, and *when* the tasks are to be completed. Tactical actions are designed to implement the strategies and meet the objectives. They can be grouped as product/service, price, promotion, distribution, and people.

Products are more than the physical item that a buyer purchases. All agricultural products can have services added to them. Services can include packing, grading, storing, inventory management. **Prices** are determined by market conditions and competition. While the price received for an agricultural product often depends on the distribution channel through which the product is sold, marketing texts admonish us not to "lack courage in pricing!" **Promotion** includes a variety of advertising, public relations, and sales promotion activities. To maximize the effect of your promotion, select your media and activities based on your target market. **Distribution** includes product delivery systems, hours of operation, and number of locations. A company wants a distribution channel that meets customers' needs as well as provides an edge on competition. **People** are perhaps the most important part of a marketing plan. A

marketing plan eventually becomes a schedule of activities, and responsibilities are assigned to individuals who must get the job done.

V. Monitor, evaluate, and modify the plan

This is the control phase of a marketing plan. It requires setting up performance standards to monitor the progress made toward achieving the objectives. Four key control areas are monitoring sales, costs, net margin, and customer satisfaction. The plan might have to be modified according to the evaluation results. It is important to note that a good plan must be flexible.

Marketing plans can be developed to answer questions, such as whether a specialty crop should be added to the product mix of an operation, or used to consider more complex questions, such as entrance into a new market. Develop a marketing plan tailored to your needs and you are ready to travel the road to success.

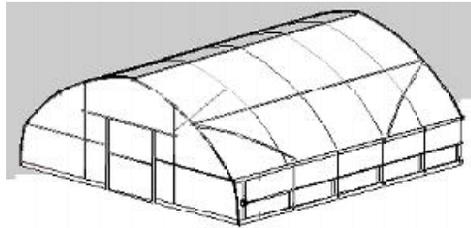
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This article was published in the *Smart Marketing* informational series in December 1999 and is available on the web at:

<http://www.cals.cornell.edu/dept/arme/hortmgt/pubs/smartmkt/index.htm>

Grower Panel Discussion -- Choosing a Market



Moderator

Wen-fei L. Uva, Cornell University

Panelists

Peter Konjoian, Konjoian's Greenhouse

Janet Vollmer, Vollmer Farm

Andy and Meg Sicko, Twin Buds Specialty Cut Flowers

George and Vickie Schaefer, Schaefer's Garden

Biographies

Peter Konjoian, Konjoian's Greenhouse

Peter is a part owner-operator of Konjoian's Greenhouses, Inc., in Andover, MA, a 55,000 square foot retail greenhouse business. Started in 1960, crop specialties include hanging baskets, flowering potted crops, bedding plants, perennials, and mixed containers. Peter is president of Konjoian's Floriculture Education Services, Inc., a private research and consulting business serving commercial greenhouse operators worldwide. He is a consultant to the Ohio Florists' Association and chairperson of the organization's publications, research, and Short Course Planning committees. Peter received a Ph.D from Ohio State University and is currently adjunct professor at the University of Massachusetts.

Janet Vollmer, Vollmer Farm

Dave and Janet Vollmer are the owners of an approximately 50,000 square foot bedding plant operation and a 65 acre vegetable farm with an accompanying farm market in the suburbs of Syracuse, New York. The farm, which was begun by David's grandfather in 1926, is celebrating its 75th anniversary in the year 2001. For the past ten years, their emphasis has been on improving the quality and selection of plants, updating structures and the appearance of the farm, making the operation more efficient, and extending the sale of plants throughout the summer and into the fall.

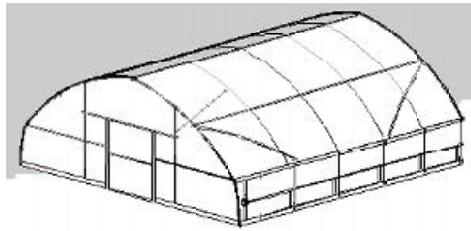
Andy and Meg Sicko, Twin Buds Specialty Cut Flowers

Andy and Meg are the owners and sole operators of Twin Buds Specialty Cutflowers in Berlin, New York (eastern Rensselaer County). They have just over 9,000 square feet of greenhouse space where they grow year-round. They also grow outdoor crops in the summer. Their market covers Great Barrington, Massachusetts, to Saratoga Springs, New York, focusing primarily on the capital district. They sell the majority of their flowers directly to retail florists, and wholesale a small percentage to another local wholesaler. Andy's responsibilities focus on growing and maintaining the greenhouses while Meg's focus on sales, customer relations and bookkeeping. Andy has a degree from SUNY Cobleskill and Meg has a degree from Franklin Pierce College and a teaching certificate from North Adams State College. They also have two small children ages 2½ and 1 year.

George Schaefer, Schaefer's Garden

Schaefer's Gardens is a second-generation family business which was started in 1934. The business is now owned and operated by George and his wife, Joan. George has an A.A.S. degree from Farmingdale. The operation is 50,000 square feet of wholesale production. Schaefer's is a year-round producer of quality seasonal pot crops, bedding plants and hanging baskets.

Where to Build a Greenhouse



**Karen Dean Hall
Greenhouse Specialist
Cornell Cooperative Extension of Erie County**

Biography

Karen Dean Hall

Greenhouse Specialist

Cornell Cooperative Extension of Erie County

Karen grew up in a greenhouse business in Western New York. Her education includes an Associates degree from Alfred State College and a Bachelor's degree in Floriculture and Ornamental Horticulture from Cornell University. Karen has been with Cornell Cooperative Extension since 1994 and spends much of her time working with the Greenhouse businesses in Western New York.

SITE SELECTION

Karen Hall
Extension Educator
CCE, Erie County

Develop a Business Plan by identifying the following:

- 1 – Market & Competition
- 2 – Type of business (sole proprietor, partnership)
- 3 – Management (from personnel to financial management)
- 4 – Location

Resources for developing a business plan.

Small Business Association *www.sba.gov*

The SBA addresses marketing, finance, human resource, and production management.

SCORE (Service Corps. Of retired Executives)

Counselors to America's Small Business, *www.score.org*, 1-800-634-0245

Bank

Consultants

Floriculture Trade Associations

New York State Flower Industries (716-532-0397)

Ohio Florists' Association (614-487-1117)

Long Island Growers

Society of American Florist (1-800-336-4743- member services)

Farm Bureau

Universities and Colleges

Chambers of Commerce

Other necessary resources

Soil & Water Conservation District

Accountant

Lawyer

Insurance Broker

Location

Considerations for wholesale or retail

Water:	Public or private (well or pond)	Energy source:	natural gas
	Quality		propane
	Quantity		oil
	pH		coal
	alkalinity		electric
	soluble salts		phone, etc.
Soils and land:	soil map	Size of the area:	large enough area
	level		for potential ex-
	drainage		pansion
	flooding, etc.		accessible

Location

Considerations for wholesale or retail (continued)

Other: Fire Department	Building
Police Department & security	orientation: Southfacing slope
Medical assistance - emergency & hospital	Headhouse to the
Neighborhood (Is it changing?)	north
Environmental considerations (Farmland protection, pesticide tolerance, water quality protection)	
Cost	
Taxes	
Zoning	

Contacts and regulations

Visit town clerk (Building Inspector)

Business license

Building permit

Zoning permit

Acquire a DBA ("Doing Business As")

County Clerk

Sales tax

IRS – request a "Going into Business Tax Kit"

Tax ID # (NYS Sales tax 1-800-225-5829)

Federal ID #

Department of Agriculture and Markets (NY – 1-800-554-4501)

If selling plant material, you must register with this department. Plant material will then be inspected regularly. Requirements vary depending on where you are shipping plant material.

For example, Canada may require that plant material coming into the county be free of "Pest B." Ag & Markets will inspect plant material for "Pest B."

Department of Environmental Conservation (Region 9 – WNY – 716-851-7220)

Pesticide Applicator License

Department of Labor

OSHA – Occupational Safety and health Administration

Horticulture Contacts

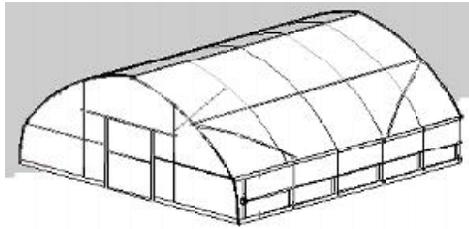
Visit Trade Shows (locally & nationally)

Local – NYGrower Show

1 national suggestion – Ohio Shortcourse in July (OFA)

Participate in Local/Regional Educational Programs

Why am I a Greenhouse Grower?



Peter Konjoian
Konjoian's Floriculture Education Service
and
Konjoian's Greenhouses

Retailing 2000: Think Digital... Act Analog

Peter Konjoian

Less than three years ago the buzz around the retailing world was whether a company was high tech or high touch. This one's not very hard to figure out, Home Depot was establishing itself along with WalMart, Lowe's, and others by using barcoding and electronic inventory control to whittle the costs of doing business down to levels that the small independents could not imagine. The small retailers countered by digging in their heels around one of the hallowed cornerstones of our industry, service. We decided to do battle with the mass merchants by using our friendly service and years of knowledge and experience to maintain our customer bases. In short, the mass market was discovering high tech while we were exercising our high touch.

Back to school

The 1999 Texas A&M's Center for Retailing Studies annual conference was held in Dallas, Texas in October. The slate of speakers was as impressive as in previous years and the theme of the conference as I perceived it is captured in the title of this article. Guy Kawasaki, CEO of *garage.com* and author of "Rules for Revolutionaries" predicted that in the next year, in the next retail cycle it's no longer enough to be either high tech or high touch. That's the old rule and we are all aware of how fast the business rules of engagement changed during the nineties. Get ready to turn yourself into your favorite superhero because now you have to be able to do both. That's right, the experts are telling us that we HAVE to take advantage of technology. We HAVE to provide our businesses with the resources to think digitally. And at the same time we HAVE to act in a high touch manner and commit to exceeding customer expectations. Digital is the future, analog is the past. Whoever succeeds in bringing the two worlds together will hit the mother load. Remember the movie "Back to the Future"? Technology is going to allow the world of retailing to move "Ahead to the Past".

Another speaker on the program was Stew Leonard, President of Stew Leonard's, an upscale grocery store in Connecticut. He talked about the grocery business from several angles. He stated that great service companies are always dissatisfied with their service. If that's not a perfectionist's view of his business, what is. Here's to the perfectionists among us, we take a lot of grief. He had me chuckling under my breath when he said that in his store they don't subscribe to the "buy two, get one free" philosophy. In his words "If you can't interest customers in buying one they certainly don't want three". A final message from this successful independent retailer living in an industry driven by chains and consolidation, "The big don't eat the small, the fast eat the slow". Sports teach us this lesson repeatedly. As a youngster I remember how Chamberlain towered over Russell, yet it was Russell who ended up with all the NBA championships.

The good old days

Another way of describing the ‘think digital-act analog’ rule is ‘hurry up and move ahead fast enough to get back to where we used to be’. Do you remember the personal service offered by the corner grocery store? How about milk and breadmen who would walk right into your house to deliver fresh bread and milk. I can close my eyes and still see our breadman walk right across the kitchen to the breadbox and put loaves of fresh bread inside. Online shopping is beginning to bring much more than just bread and milk. With a click of your mouse button your dry cleaning, video rentals, and a complete grocery list can be delivered to your home.

A very good article about retailing appeared in the September 1999 issue of the Arthur Andersen ‘Retailing Issues Letter’. The author is Austen Mulinder, executive vice president of one of the Fujitsu family of technology companies. The article is titled “Hear Today... or Gone Tomorrow? Winners Listen to Customers”. A few passages from Mr. Mulinder’s article are particularly appropriate for this discussion. “In the beginning, retailers served every customer one on one by traveling to the customer to find out what she or he needed. As the village became a town and then a city, retailers found ways to bring customers into their stores where they listened and stocked their shelves based on customer needs.”

Mulinder goes on to say “Consumers... are discovering their power. They are taking charge. They know they can get the lowest price almost anywhere. Quality is assumed. Convenience is available. The choices are many.” Doesn’t that sum up where our industry is today. On several occasions in past articles I have stated that while quality was enough to hang one’s hat on years ago, today quality plants are nothing more than the prerequisite to get into the game.

Traditional marketing is based around the four Ps of Product, Place, Promotion, and Price. The author argues that marketers of the future will turn this traditional philosophy upside down by thinking of four Is instead: Individuals, Integrity, Intimacy, and Interaction. Mulinder states we must “reverse our thinking about channels—as being from each customer individually rather than to many customers at once”. He is telling retailers that in order to succeed in the future they must be able to cultivate relationships with individual customers around their individual needs, in an intimate environment, based on integrity and honesty.

The retailer will once again, as in the beginning, travel to the customer. Only this time the travel will be done electronically, not in person. The computer, the digital world is going to make it possible for the retailer to efficiently interact with every customer individually. It will allow the retailer to interact with the customer wherever, whenever, and however the customer wants. This kind of digital technology is going to allow us to bring back the old-fashioned service of the analog world.

The chains of supply and demand

Mulinder states “The global supply chain has given shoppers access to a wide choice of quality products at everyday low prices. These factors are no longer sufficient. Customers are raising

the bar. The expected personal touch of the demand chain must now be wedded to the efficiencies of the supply chain... retailers who thrive in the future will offer both". How many ways can we say it. High tech, high touch. Think digital, act analog.

So the race is on in the ornamentals industry. Who will master the 'think digital, act analog' skill first? Will it be the mass marketers or the independent retailers? Who will wed the personal touch of demand pull marketing with the efficiencies of supply push economics? The mass market has come a long way in digital thinking. Bar coding, consolidation of the supply chain, advertising, and low prices have become their battle cry. But they lack the personal touch.

To the independents, acting analog is second nature... it's natural. Countless successful garden centers and retail florists have made it their battle cry to know their customers and interact with them as individuals, with integrity. I have witnessed this event in my own business as customers search out my parents in the spring looking for that special attention and intimacy that comes with it. There has been much attention paid to the subject of branding in our industry in recent years. I have come to appreciate that, in many of our country's independent operations, our parents ARE THE BRAND. It has been this way for decades (try and pass that one down in your succession planning). Our problem is that we are behind in the computer end of things. Our businesses are not yet capable of thinking digitally, at least to the extent of the mass merchants.

If you're on your toes you are ready to take me to task for making the statement "so the race is on in our ornamentals industry". It isn't that specific, it's about retailing in a broader sense. It's about ornamentals competing with movies, food, cosmetics, and travel. Tear off the blinders that the railroad industry wore when it foolishly believed it was in the railroad business and not the transportation business. We are in the entertainment business when the blinders are removed.

Computers still need humans

Don't be trapped into believing that just because you have a computer, you are thinking digitally. I've had a computer for over a decade and just got my crop schedules into it two years ago. It's not about the hardware. That's just the prerequisite. It's the software and all the digital information stored inside that is at issue here. It still takes a human to make it all work.

Sometimes this all sounds futile, like a vicious, never-ending spiral. Need the hardware, the software, the information, the barcoding, the efficiencies, and all at low everyday prices. Instead of getting frustrated, think of it as you do the housing ladder. Remember buying your first home and knowing it was only a stepping stone to the next? Most of us climbed several rungs on that ladder to get to where we are today.

Learn from others

Don't let yourself become overwhelmed, we don't HAVE to do this all overnight. Our country's leading retailers, those whose executives have spoken at this retailing conference over the four years I have attended, are showing us the way. It's not important that we "get there" immediately. It's not important that we invent the answers. These companies spend millions of dollars each year to this end. Instead, small independents need to make a commitment to consciously and deliberately move ahead. Learn from the giants, the leaders. The battle cry that I use is short and to the point... Press On.

My next steps are going to be in the customer service arena. After expanding our business to produce more plants during the last decade (thinking digitally) we are now in position to raise the bar in our merchandising and retailing effort (acting analog). One of my New Year's resolutions is to spend more time "up front" in May instead of being out back with the plants. I have no idea how I'm going to do this but do believe that thinking more digitally out back is the key to freeing me up for more analog activities up front.

So there you have it, how much simpler could it be. Think digital, act analog. A piece of cake you're thinking. Been there, done that you say? Well, even if you have, get ready to turn it up another notch. Remember what Stew Leonard said, "the big don't eat the small, the fast eat the slow". How much faster are you and your business going to be this year?

"Reprinted courtesy of the Ohio Florists' Association"

Is Your Small Business an Endangered Species?

Peter Konjoian

In an industry where large greenhouse operations receive plenty of ink, it's nice to stop to acknowledge the contribution that small growers and garden centers make in both the retail and wholesale arenas. Our field of horticulture is much like a delicate ecosystem where organisms of all sizes need to coexist and compete simultaneously in order for stability and prosperity to result.

Who remembers Jacques Cousteau and his wonderful narrations of life in the sea. He repeatedly spoke of delicate ecosystems that needed balance in order to flourish. While people have hated sharks for generations, we are realizing that their presence is necessary in order to maintain balance. They eat large fish which in turn eat smaller fish and so on down the food chain. If man steps in and kills too many sharks, the fish they feed on will increase in numbers due to fewer predators. They will eat more of the smaller fish, thereby leaving fewer smaller fish to feed on even-smaller organisms. These smaller organisms then increase because they aren't threatened by as many predators and... well... you get the picture.

Mr. Cousteau in his thick French accent would narrate as follows. "Zee shark eez one ov zee most feared huntares of zee oshun. Weethout heme zee delicaate balanse wood not exeste."

The shark of our industry

Allow me to draw an analogy between the shark, all the fishes and our greenhouse industry. Can the shark be anything but the mass market? Isn't it true that most small and medium sized growers think of the Home Depot, WalMart, and the grocery store chain as their most feared predator. These companies search for large and medium growers to feed their appetites and as they grow they endanger the smallest businesses by their sheer volume of activity. When you hear the word hypercompetition you can't help but look over your shoulder to see where the nearest shark is lurking.

A decade ago experts predicted that the mass market would become the primary outlet for our products and that small and medium size businesses would become scarce. There's an old saying that if you hear something often enough eventually you will believe it to be true. It almost happened to me during the early years of this decade. Mass marketers became so aggressive selling plants and gardening supplies that it was easy to get caught up in the moment and conclude that the end was in sight for the neighborhood outlet. It is no exaggeration that holiday plants are used as loss leaders by these retailing giants and that their retail prices are often lower than generally accepted wholesale prices.

I take great pride in calling myself a small grower. While my family's greenhouse range of 55,000 sq.ft. is viewed by some as being a little too large to be called small, at most it could be considered to be a somewhat large, small size operation. There are five full time family members and several part time non-family members during the spring rush.

As the dust has settled in recent years my opinion of what the future holds has been whittled into a pretty reasonable interpretation of how this delicate ecosystem is going to survive. In certain areas I will concede a portion of the business that has traditionally been "mine". These areas include holiday business, particularly Christmas and to a smaller extent Easter. I can't compete well enough to make it worth the effort. Last year I wrote an article in this publication explaining why my family and I decided to get out of the Christmas season and the growing presence of the mass market played a significant role in our decision.

Hard goods and gardening supplies have also been a concession to the mass market. Again, I can't compete so why bother. Sometimes you have to see the shark coming. Another concession is a segment of the spring shopping population that is price sensitive. Price conscious shoppers have become a currency of sorts in mass marketing. Mass merchants are seeing that the lower the price, the more shoppers enter the store.

Sardines learn from sharks

If the mass market is going to succeed in taking a portion of the small retailer's business, how can the small grower compete? One answer is to learn from the shark. During the last five years I have been watching my competitors, trying to learn how they think and act. If we can adopt their most successful tactics without losing our established identity then perhaps we will be less vulnerable. Remember that the small fish are fast and keep moving out of the way of the big fish.

Small growers and retailers have speed and reaction time on their side. In this era of new and different crops, we small growers should be the most responsive in learning how to produce and market nontraditional crops. The large growers may need time to modify their production facility in order to add a new crop to the product mix. Be careful, however, the honeymoon doesn't last long. As soon as the large growers figure out how to grow a crop it is just about time for the small fish to get out of the way. Case in point... poinsettias.

This brings me to my peaceful coexistence rule for large and small growers. If the large grower is going to learn how to grow crops which could render them less profitable for the small grower then the small grower had better find a way to profit from the large grower. In my mind it is in the area of technology and automation that small growers can benefit from watching large growers. Think of how seeders have been scaled down in size and cost over the years. The first units were so expensive that small growers could only dream of someday owning one. Today, there is a seeder for any size operation that automates one of the most basic tasks in the greenhouse.

Watching large growers jump in and try new technologies and then picking from their most successful ventures is a way I rationalize my peaceful coexistence philosophy. If I had not benefited in this way during the period when the mass market and large growers both grew by leaps and bounds I could have become very bitter. The small fish keeps moving, watching, and learning from his predator to become a more formidable competitor.

Is the future small

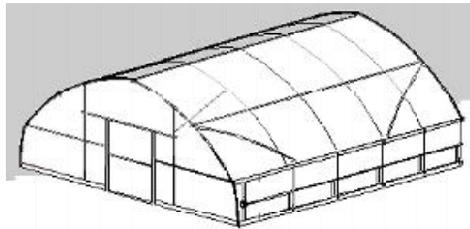
Let me keep the ocean analogy open for another minute. Think of our industry as you think of the ocean's tides. We can look back and document surges and retreats, sometimes connected to our local, regional, or national economies, sometimes connected to nothing at all. The green plant revolution of the seventies brought our industry into a new era. Some of us experienced a drop in business during the recession of the early nineties. We seem to be in another growth spurt currently, although most agree that the double-digit annual growth of a decade ago may not return. Instead, more sustainable steady growth looks more attractive to many today.

So what is the future for small growers and retailers in our industry? My opinion is that our future is bright and secure provided we pay attention to what we and our competitors are doing. The neighborhood garden center should have a safe, secure place for a long time. It is not an automatic thing, however. It is going to take more attention than ever to survive in present and future economies. Sticking a cutting in a pot, watering it, and plopping it on a retail bench won't cut it for long. The small operation needs to embrace the phrase 'quality and service' even more than in the past. The mass market is trying very hard to learn how we live by this phrase. If these large retailers succeed in learning these things from us, we had better be ready to move on and find another attractive feature to add to the way we conduct business.

If Mr. Cousteau were here he might advise us as follows. "Zee small growares must lurn how zee shark thinks so he can move out of heez path. Eef zee small groware failz to keep ahead, he weel be eaten by zee shark." I tip my hat to the skipper of the Calipso, his profound understanding of nature is helping me understand how to run my business. He's made me understand that competition is healthy, that it keeps us alert and creative, and that the grass is not greener in someone else's greenhouse or garden center.

"Reprinted courtesy of the Ohio Florists' Association"

Choosing a Greenhouse



Dr. William Roberts
Director, Center for Controlled Environment
Agriculture (CCEA)
Rutgers University

Biography

Dr. William Roberts Rutgers University

Professor William (Bill) Roberts, Director of the Center for Controlled Environment Agriculture (CCEA) and Extension Specialist in Bioresource Engineering, retired September 1, 1999, after serving as a faculty member at Rutgers University for 40 years. He was 25 years old when he applied for and received membership (number 94) in ASAE, and since has been a major contributor, as indicated by his being given Fellow status in 1982. He was made Chair of the Department of Agricultural Engineering in 1971 and continued in that capacity for 22 years and two departmental name changes (Biological and Agricultural Engineering, and currently Bioresource Engineering).

Bill served in the U.S. Army Signal Corps in Japan for two years (1955-57) after receiving his B.S. and before starting his Master's program. Both of his degrees are in Agricultural Engineering from Rutgers University. He is also a licensed Professional Engineer in New Jersey.

Probably best known for his development of the two-layer plastic film cover and floor heating for greenhouses that are now in use worldwide, Bill received many distinguished awards and served on many executive committees during his tenure at Rutgers. He's written countless publications and articles, has been invited to speak at international conferences throughout the world, and has served as trustee of the New Jersey Museum of Agriculture since its inception. Bill's name is synonymous with the greenhouse industry. His dream to establish a Center for Controlled Environment Agriculture became reality in 1988. Even after retirement he continues to be active in the agricultural community.

How Do You Choose a Greenhouse?

Greenhouse Design and Construction

William J. Roberts
Professor Emeritus, Rutgers University and
Former Director, CCEA

Changes in the greenhouse industry during the past 10-15 years have made greenhouse facilities much more expensive. This makes it necessary to plan the overall design of the facilities with extreme care in order to avoid costly retrofits at a later stage. A comprehensive master plan is required which reflects how the owner/operator intends the completed facility to look. A key component of the plan is the integration of all the systems and buildings comprising the entire greenhouse system.

For financial reasons, it is usually not possible to include all the desired systems and installations in the initial design of the facility. However, the overall plan should provide that these systems and installations are included and that they can be added at a later date without trouble or high costs.

It is always a good idea to establish priorities and not to compromise in the plan. The priorities and systems selected and included in the first installation should always be options that provide the greatest returns. The 'luxury items' can be added at a later date.

There are many items to consider in formulating a facilities master plan because it is only part of an organizational master plan. It is always easier to add a greenhouse than to develop an overall goal and a plan to achieve it. Both technical and business management skills are required in any organization. Excellence in only one area cannot guarantee business and operational success.

Greenhouse Design

There are many items to consider when contemplating the location and design of a greenhouse. These include the following:

- Site selection
- Orientation for optimum light utilization
- Strength to handle environmental conditions of wind and snow
- Suitable glazing materials
- Energy conservation considerations
- Environmental control systems, heating and ventilation
- Watering system supply and irrigation systems
- Availability of services, water, electricity, fuel transportation

- Plant production systems, inputs, outputs
- Materials handling systems and labor availability

Requirements for a Greenhouse Production System

There are many pieces to a greenhouse production system puzzle. The diagram in Figure 1 graphically portrays some of the inputs and outputs that need to be considered when planning an expansion to a greenhouse production system. Each of the items mentioned needs to be considered. Some items such as heat have arrows going in both directions. Residue is an item often forgotten. Some items are easier to handle than others because they flow, such as water and air. Others require manual labor and storage facilities. Deciding upon a growing system will determine how the materials are required to move and be moved throughout the greenhouse. Cost effectiveness, that is labor versus initial capital expenses, of the system may help make the final decision. Thinking of the greenhouse as a system, that is planning how each item moves, can help forestall subsequent problems.

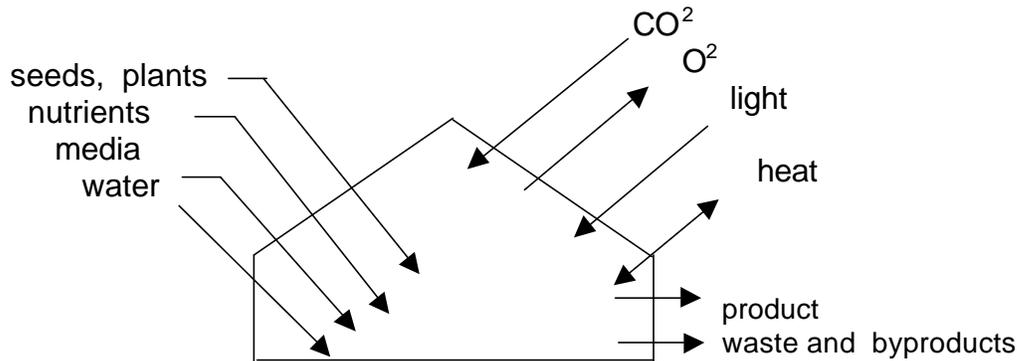


Figure 1. Parameters Required for Greenhouse Production System

Key Components for Greenhouse Facilities

The Foundation

With new environmental regulations limiting run-off from greenhouses it is becoming increasingly beneficial to construct a solid concrete foundation for the greenhouse. The walls must extend below frostline and should be 8" wide. Interior walkways should be 4" thick and at least 10 feet wide for vehicle travel.

The Structure

The type of structure should be based upon the growing system, the level of automation, the crops to be grown and the overall physical arrangement possible on the site. These choices determine bay width and length, gutter height, glazing, and type of ventilation. Hanging baskets can determine gutter height and irrigation booms can require special clearances.

Ventilation and Cooling System

Ventilation systems can be either mechanical or natural with natural being determined mostly by site because of wind considerations. Natural ventilation through side walls is becoming a popular choice but its appropriateness depends on crops being grown, location, and automation potential. Open roof greenhouses are taking the industry by storm. Performance for cooling is outstanding.

Heating System

The heating system should be selected based on personal choice and the crop being grown. The initial cost is important but may not be the most important consideration. A uniform crop is a necessity for some growing systems, and the heating and ventilation systems are major players in producing a uniform crop. Heating systems that give good temperature uniformity are preferred.

Thermal Screens or Curtain Systems

A thermal screen that doubles for summer shading is one of the best investments a grower can make. The greenhouse structure must be able to accommodate a thermal screen. If the installation cannot be made at the beginning of the project, the design must include the provisions for it to be added without expensive modification or alteration to the greenhouse at a later date.

Growing Systems

Efficient use of greenhouse space and the cost and energy savings realized are major considerations for growers. Being able to fill and empty the greenhouse efficiently and quickly is an important consideration. The bedding plant industry is a good example of how mechanization has developed and how each piece of required equipment works within a system to achieve the desired goal of efficient movement and reduced time, effort, and cost.

Environmental Control System

Quality analog and computer systems are available that accurately sense and control both aerial and soil temperatures. Computer systems have the advantage of recording data for subsequent use in evaluating plant performance or identifying problems with the growing system.

Adequate Water Supply

In siting the greenhouse, consideration must be given to the water supply. Is there an adequate water supply? Water availability via certification should be determined prior to the site purchase and/or greenhouse construction or the grower will risk not obtaining a water certification for the volume of water needed.

Irrigation Systems

Irrigation systems vary in design and layout. Automation is a major consideration; a greenhouse design should be chosen that allows for future installations of automatic control and equipment. The fertilizer injection system must be compatible with the installed irrigation system and must be understood by the operator so that expectations of its performance are realized.

Utilities Installations

The installation and availability of common utilities (water, fuel and electricity) is of utmost importance, particularly when thinking about capacity for future expansion. The use of appropriate electrical installation practices within the greenhouse can forestall future safety and operational problems as well as maintenance and breakdown situations. Each electrical installation should have provisions for the addition of an emergency generation system, preferably to be installed when the greenhouse is constructed.

Selecting a greenhouse requires much thought and a good master plan composed of many components. Considerable thought and evaluation has to be made before the plan is completed and before the intended program of growth or expansion is undertaken. The important issues include a business plan, a site evaluation, an evaluation of the type of growing structures, equipment desired and required, and the impact the expansion might have on the community at large. The listed references contain information helpful in preparing a master plan for the grower who would like to erect new facilities or enlarge current ones.

My former co-worker gave me good advice when he said to me, ***“Don’t sew a shirt to a button.”*** Growers who are the most unhappy after a change are those who altered existing facilities, tried to make them work, and ended up spending as much money as if they had built new, without the benefit of a new facility. Make mistakes on paper. Think, plan and consult with those who can help you make an admirable facility which will be a joy to operate.

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3. Roberts, William J. “Greenhouse Structures for Controlled Environment.” *Bedding Plant IV*, Chapter 17, page 215, J. Holcomb, Editor.
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Greenhouse Check List

William J. Roberts, Professor Emeritus, Rutgers University

Permits

Site Preparation

- Leveling
- Drainage

Greenhouse Foundation

- Perimeter knee wall
- Walk ways
- Concrete floors
- Splash ways for roof runoff
- soil bearing capacity
- Interior post design

Utility Provisions

- Electricity
- Potable Water
- Irrigation water
- Telephone
- Natural Gas
- LP Gas storage tank
- Fuel oil storage tank
- Sewage system

Greenhouse Structure

- Roof glazing
- Side wall glazing
- End wall glazing

Ventilation and Cooling Systems

- Gable ventilation system
- Exhaust fans
- Pad system
- Roof ventilation system
- Natural ventilation system
- Open Roof Design
- Horizontal air flow fans
- Fog cooling system

Curtain Systems

- Energy retention systems thermal screens
- Inside shade system
- External shade system
- Gable shade system
- Black out system/day length control

Environmental Control Units

- Analog controllers
- Computer based controllers
- Alarm systems

Electrical Installations

- Service Entrance equipment
- Stand-by power generator
- Interface panels
- Main and low voltage cables and boxes
- Distribution Boards

Heating Systems

- Gas fired unit heater
- Oil fired unit heater
- Hot water unit heater
- Hot water boiler unit
- Perimeter piped hot water system
- Overhead piped hot water system
- Under-bench system piped hot water
- In-floor system piped hot water
- Pipe/rail heating system

Irrigation Systems

- Hand watering
- Overhead spray nozzle
- Floor sprinkler
- Irrigation boom (movable)
- Low level spray nozzle
- Flooded floor
- Drip irrigation

Fertilizer Injection Equipment

- Proportioners
- Injection units
- Liquid fertilizer injection system

CO2 Injection units

- Pure CO2 distribution system
- CO2 burners
- Flue gas CO2 extraction system

Greenhouse Lighting

- Supplementary lighting system
- Cyclic lighting system
- Walk-way and security lighting
- Day length control

Growing Systems

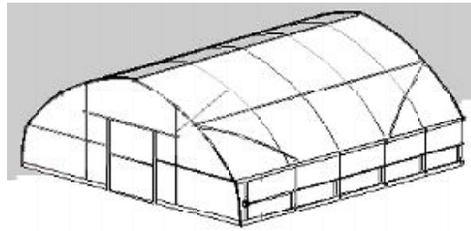
- Greenhouse floor
- Flooded greenhouse floor
- Fixed tables or benches
- Rolling tables
- Mobile or transportable tables
- Hanging basket systems
- Vegetable growing system

Misc Installations Equipment

Site Finishing

*Courtesy John Hoogeboom, CEO
Agronomico International
Hendersonville, NC*

How to Find, Develop and Expand Your Markets



**Skip Jackson
Iron Kettle Farm**

and

**Walter Nelson
Cornell Cooperative Extension, Chemung County**

Biographies

Skip Jackson

Iron Kettle Farm, Owego, NY

The Iron Kettle Farm was started by Skip and Jeanne Jackson in 1969. In 1992 a partnership was formed with their three children, Brian, Bonnie and Jennifer. The farm's season begins in May with bedding plants, continues with strawberries in June, and follows with vegetables in the summer. Fall brings the Spooktacular Pumpkin display. The farm has an acre of greenhouse space used to grow annuals, perennials and hanging baskets. There are 10 acres of strawberries, 50 acres of sweet corn, and 50 acres of fall vegetables. Iron Kettle Farm closes each year on October 31.

Walter N. Nelson

Cornell Cooperative Extension, Chemung County

Walter N. Nelson is horticulture educator with Cornell Cooperative Extension in Southern Central New York, providing educational programs to the Christmas tree, greenhouse, landscape horticulture and turfgrass industries. He also provides guidance for the community horticulture program in Chemung County and writes garden columns appearing in the *Elmira Star Gazette*. Walt is an alumnus of Penn State University (horticulture) and the University of Rochester (MBA).

The Promotion World According to Retail

John L. Park and Gene A. German
(Edited by Kris Park)
Food Industry Management Program
Department of Agricultural, Resource,
and Managerial Economics
Cornell University

As agricultural producers start to budget promotional activities to retailers, it is important for them to understand how various types of retailers rate the effectiveness of different promotional programs. This report is based on a study of the promotional preferences of supermarket, drug store, and mass retail executives.

Responses were received from the key retail companies in each channel of distribution, including over forty responses from the nation's top supermarket chains. Retail executives were asked to evaluate twenty-two promotional programs in terms of the promotion's effectiveness in (a) increasing product movement and (b) increasing overall store sales. In addition, respondents identified the programs that were used most frequently in their company, and answered questions relating to their company's interest in increasing spending for account specific marketing.

Status of Promotional Activities

The top seven programs that were used most frequently by retailers were:

- In-Store Demos and Sampling
- Shipper Displays
- Promotion with a Local Charity
- Targeted Direct Mail
- In-Store Coupons
- Co-op Radio
- Retailer Generated Shelf Talkers

It is important to note that the frequency of use does not necessarily relate to the retailer's evaluation of the promotion's effectiveness in moving product or in increasing overall store sales. It must be assumed that these are promotions that are frequently offered, easy to implement, and that match the company's promotional strategy.

Although in-store coupons ranked very high among all three retail groups, there was a wide difference in the distribution methods of the coupons. For example, more than half of all supermarket executives reported using paperless coupons while very few mass or drug retailers used paperless. Instant redeemable coupons (IRC), however, were reported to be used by over two thirds of all types of retail companies.

What Works?

Product Movement

The promotions that retail executives rated the most effective in terms of moving product included:

- Shipper Displays
- Targeted Direct Mail
- Frequent Shopper Programs
- In-Store Demos and Sampling

All three types of retail companies included in this survey rated shipper displays and targeted direct mail as very effective at moving product. Supermarket executives rated frequent shopper programs higher in product movement effectiveness than did executives from either drug stores or mass retail outlets.

Overall Store Sales

When retail buyers and merchandisers were asked to evaluate promotions in terms of their effectiveness in increasing overall store sales, they chose all but one of the same top four promotions considered most effective in increasing product movement. These four were:

- Targeted Direct Mail
- Frequent Shopper Programs
- In-Store Demos and Sampling
- Retail Generated Shelf Talkers

Shipper displays (which rated high in effectively moving product) were not considered to be as effective in increasing overall store sales. Retailer generated shelf talkers were considered effective at increasing overall store sales by all retail groups, with drug store executives giving this promotion their highest rating.

The promotional program that was identified as the least effective of all twenty-two promotions by executives from all three retail groups was national sweepstakes.

**Table 1. What works in terms of increasing overall store sales is led by targeted direct mail and frequent shopper programs.
What didn't work? Again, national sweepstakes is at the bottom of the pack.**

Promotional Program	Evaluation Score <i>on a scale from 1 to 5</i>
Targeted direct mail	4.18
Frequent shopper programs	4.03
In-store demos and sampling	3.89
retail generated shelf talkers	3.85
Retailer cross-ruff	2.46
Premium giveaways	2.43
Tear pads	2.38
National sweepstakes	1.97

Funding Preferences

We asked retail executives “which programs would you negotiate to increase (or decrease) funding?” The following were identified as the top five promotions for which retail executives would try to negotiate a funding increase:

- Targeted Direct Mail
- In-Store Demos and Sampling
- Shipper Displays
- Co-op Radio
- Frequent Shopper Programs

Here we can see that the ratings reflect the buyer's beliefs regarding the effectiveness of the promotions as well as the ease with which the promotion can be implemented. This choice is also an indication of the trends in marketing strategy now being employed by leading retail firms.

Table 2. Negotiations for increased funding were most often indicated for targeted direct mail and in-store demos and sampling.

Promotional Program	Would Negotiate for Increased Funding <i>% respondents</i>
Targeted Direct Mail	89
In-Store Demos and Sampling	87
Shipper Displays	70
Co-op Radio	70
Frequent Shopper Programs	68
Co-op television	66
Paperless couponing	62
Retail shelf-talkers	60

Respondents to this survey also identified promotions for which they felt funding should be decreased. The five promotions receiving the most votes to decrease funding were:

- National Sweepstakes
- Premium Giveaways
- Tear Pads
- Chain-Wide Sweepstakes
- Manufacturer Generated Shelf Talkers

There was general agreement among all retailers regarding the funding decrease for these five types of promotions.

Summary

Of the twenty-two promotional programs that retail executives were asked to evaluate regarding effectiveness (to increase product movement or overall store sales), twelve consistently rose to the top of list. Likewise, the other ten were consistently perceived as average or below average in their effectiveness at either moving product or increasing store sales. Each group is listed below.

Lackluster Promotions

- Chain-Wide Sweepstakes
- National Sweepstakes
- Near Pack Offers
- Premium Giveaways
- Manufacturer Shelf Talkers
- Tear Pads
- Internet Programs
- Retailer Cross-Ruff
- In-Store Advertising
- Promotions Tied to Local Charities

Shining Promotions

- In-Ad Coupons
- In-Store Coupons
- Paperless Coupons I
- Instant Redeemable Coupons
- Retail Shelf Talkers
- Co-op Television
- Co-op Radio
- Targeted Direct Mail
- In-Store Demos and Sampling
- Frequent Shopper Programs
- Shipper Displays
- Manufacturer Purchased Display Space

Glossary of Terms Used in the Promotional Preference Survey

Chain-wide sweepstakes - a sweepstakes promotion offered in all stores through a retail chain.

Co-op media - promotional advertising for a manufacturer's product that appears on a retailers' television or radio ad and is funded by the manufacturer.

Frequent shopper programs - the support by manufacturers of promotions offered by the retailer through its loyalty card program (i.e., discounts - paperless coupons, etc.)

In-ad coupons - coupons for manufacturers' products that appear in the print ad of one retail company and are redeemable only through that one company.

In-store advertising - point of sale advertising in the retail store; on shopping carts, aisle markers, in-store radio or TV, etc.

In-store coupons - coupons that are distributed in the retail store.

In-store demos/sampling - the sampling of products in the retail store.

Instant redeemable coupons (IRC) - coupons that are attached to products in the retail store.

Internet programs - promotional programs that are offered to consumers through the retailer's web page.

Manufacturer purchased display space - special displays that are built in the retail store in space that is paid for by the manufacturer.

National sweepstakes - a sweepstakes promotion advertised and promoted by a national organization and available through various types of retail stores throughout the country.

Near pack offers - premiums that are offered by manufacturers as an incentive for purchasing a product and are available in the store.

Paperless coupons - coupons that are made available to consumers through a frequent shopper program or some type of card marketing program.

Premium giveaways - any promotion that offers a premium to consumers as an incentive for purchase a product, often a mail-in offer. This promotion can also be one that offers a premium to a store or department manager.

Promotion tied to local organization or charity - a special promotion where the retailer and manufacturer agree to contribute a portion of the sales to a local group.

Retailer cross-ruff promotions or coupons delivered on one product (national brand) that are good on another product (retailer brand).

Shelf talkers - point-of-sale signage designed to hang over the edge of a shelf and deliver a promotional message. They may be produced by the retailer (usually price oriented) or by the manufacturer (usually product oriented).

Shipper displays - product that arrives at the store in its own display unit.

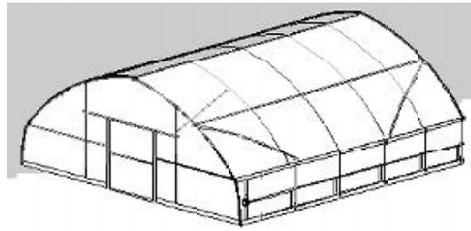
Targeted direct mail - promotional mailings sent to specific customers or a retail store encouraging the purchase of a specific product or brand.

Tear pads - promotional information in the form of a tear pad that is posted in the store - either by the product or at a central location such as a bulletin board.

This article was published in the October 2000 issue of the *Smart Marketing* informational series. It is available on the web at:

<http://www.cals.cornell.edu/dept/arme/hortmgt/pubs/smartmkt/index.htm>

Fundamentals of Financial Management



Steve Richards
Farm Management Specialist
Cornell Cooperative Extension
Wyoming and Erie Counties

Biography

Steve Richards

Cornell Cooperative Extension, Wyoming and Erie Counties

Steve currently works in the Western New York region as a Farm Management Educator. He has taught many different programs related to agricultural finance and production, and performs an annual financial analysis of over 75 farms in Wyoming and Erie counties.

Steve received his B.S. in Food Science from the Ohio State University in 1992. He studied Agricultural Development in the Dominican Republic and majored in Food Plant Management (Food Science with a Business Management Minor). He then worked as a manager in the food processing industry for 5 years (ConAgra, Bob Evans) and spent 3 years in Quality Assurance and 2 years in Operations and Logistics.

He completed a Master's Degree in Business Administration in January 1997 and majored in Strategic Marketing and Project Management. He presented research at the annual ASAE and AAEE annual international meetings. His research was published in the *Journal of Production Agriculture* (January 2000 issue).

He also completed a Master's Degree in Agricultural Economics in December 1998 and majored in Strategic Management and Financial Analysis.

Greenhouse Financial Analysis: How & Why? How is your business doing? Find out through financial analysis programs

Steve Richards
Cornell Cooperative Extension, Wyoming and Erie Counties

Budgets are good. Computer-kept records are wonderful. But to really understand your business' financial performance, nothing compares to participating in a financial analysis program. You learn how your business is doing and how it compares with similar businesses.

Typically, financial analysis and benchmarking have not been performed with the greenhouse industry. You now have an option: Cornell Cooperative Extension is offering a Greenhouse Competitive Enhancement benchmarking program! Participation involves some work. You have to keep records and be able to retrieve them for submission to the financial analysis program. But the benefits far outweigh the work.

What's in it for me? Financial analysis programs give you a report card on your business. With that, you can do several things:

- Compare your greenhouse to competitive standards in the greenhouse industry.
- Compare your business to its previous years' performances.

But don't stop there.

- Ask yourself why your business performance in any of several areas does or does not differ from last year's performance.
- Ask yourself how your greenhouse's performance differs from industry standards. It's difficult to compare one business to another given all the variables, but it's worth doing because of what you learn.

For instance, if you discover through a financial analysis program that your cost of production is higher than the industry average, ask why. How do other greenhouses produce at a lower cost? Use the answers to questions like these to set goals and improve your business' financial performance.

Plan to participate.

What might seem like a daunting task can be made easier if you take it one step at a time.

Step 1: CONSTRUCT YOUR FINANCIAL STATEMENTS

Good bookkeeping is the most important ingredient in financial analysis. To analyze your performance, construct your income statement and balance sheet.

The income statement is a categorized list of accrual incomes and expenses for a specified period of time. The balance sheet is a statement of financial position. It reports your business' assets, liabilities and equities at a specified time.

Constructing these statements can be as tedious as filling out tax forms or as easy as clicking a computer button. Many financial analysis services can help with these statements.

Step 2: FINANCIAL STATEMENT ANALYSIS

This step should shed light on how well your business is doing at earning a satisfactory return on investment and maintaining a sound financial position. These measures only address the numerically measurable aspects of a business such as liquidity, solvency, profitability, repayment capacity and financial efficiency. They don't address personal success areas. Most financial services will help you calculate these financial measures.

Step 3: BENCHMARKING

Benchmarking—the process of comparing the financial position and performance of one business to other similar businesses—is the outcome of any financial analysis program. After participating in a program for more than one year, you can compare various measures within your business from year to year and also unearth industry trends.

To get useful benchmark data, make sure the financial analysis program calculates its financial measures according to specified standards, such as those set by the Farm Financial Standards Council.

Where to start?

Financial analysis is necessary for business improvement. All you need to start are accurate farm account records, a farm appraisal, usually done annually by your lender, and balance sheets recording inventories and liabilities.

Armed with those, contact the financial analysis program in your area of New York. It can walk you through the steps and help you set goals to improve your greenhouse's financial performance.

SAMPLE GREENHOUSE COSTS OF PRODUCTION BUDGETS

**Developed by Dr. Robin Brumfield
Farm Management Specialist
Rutgers Cooperative Extension
Rutgers, The State University of New Jersey**

Bedding Plants

Table 1. Overhead costs¹		
	<u>Annual total</u>	<u>Cost per sq. ft. week of bench</u>
Overhead labor & benefits	\$63,000	\$0.079
UTILITIES		
Heating fuel (13,420 gal.)	13,420	0.017
Electricity	1,935	0.002
Telephone	1,273	0.002
Depreciation	25,000	0.031
Interest	15,000	0.019
Insurance	4,852	0.006
Repairs	12,409	0.015
Property taxes	769	0.001
Advertising	716	0.001
Dues & subscriptions	344	0.000
Travel & entertainment	1,697	0.002
Office expenses	796	0.001
Professional fees	1,000	0.001
Truck expenses & equipment rental	14,000	0.017
Land rental	1,565	0.002
Contributions	400	0.000
Miscellaneous	2,800	0.003
Bad debts	700	0.001
Total	\$161,675	\$0.200

¹ 20,000 sq. ft. double layer, polyethylene greenhouse.

	Barerooted			Time (seconds per flat)			
	Small	Med.	Large	Small	Med.	Large	
						Non Auto	Auto
Seedling stage							
Fill flat	35	37	22	24	49	47	47
Seed and move to germination area	144	162	85	103	140	81	81
Move to greenhouse	16	40	33	36	29	14	14
Irrigate	14	14	6	14	7	5	5
Move to work area	40	30	67	46	51	25	25
Total	249	283	213	223	276	172	172
Finished flat stage							
Fill flat	45	120	35	36	44	66	4
Transplant and move to greenhouse	209	180	191	76	187	137	108
Irrigate	99	78	62	84	66	53	53
Spray growth regulator	14	10	2	14	10	2	2
Spray pesticide	14	2	2	14	2	2	2
Total	381	390	292	224	309	260	169

	Conventional			Plug		
	Small	Med.	Large	Small	Med.	Large
	Seeds ¹	\$12.50	\$10.80	\$10.00	\$3.60	\$3.11
Tray	0.47	0.42	0.38	0.59	0.32	0.47
Medium	0.46	0.42	0.37	0.15	0.14	0.14
Fertilizer	0.01	0.01	0.01	0.01	0.01	0.01
Labor	0.55	0.61	0.46	0.48	0.60	0.37
Interest on Variable costs ²	0.63	0.55	0.50	0.22	0.19	0.17
Overhead-costs ³	0.98	0.73	0.70	2.95	2.18	2.10
Total per flat	\$15.60	\$13.54	\$12.42	\$8.00	\$6.55	\$6.14
Total per seedling	\$0.03	\$0.03	\$0.02	\$0.03	\$0.03	\$0.02

¹ 555 seeds planted per conventional flat and 288 per plug flat. Germination rate is assumed to be 90%.

² Interest rate is assumed to be 9% for 6 months.

³ Overhead costs are calculated using \$0.200, \$0.148, and \$0.142 per square foot-week, respectively for small, medium, and large greenhouses. It is assumed that a flat uses 1.64 square feet x 3 weeks for bare root seedling flats and 9 weeks for plug flats.

	Barerooted			Plug Produced in 288-cell Tray			
	Small	Med.	Large	Small	Med.	Large	
						Non Auto	Auto
Variable costs							
Seedlings ¹	\$1.08	\$1.08	\$0.72	\$1.08	\$1.08	\$0.72	\$0.72
Flat	0.47	0.42	0.38	0.47	0.42	0.38	0.38
Insert	0.29	0.25	0.23	0.29	0.25	0.23	0.23
Rooting medium	0.37	0.36	0.35	0.37	0.36	0.35	0.35
Label	0.15	0.13	0.12	0.15	0.13	0.12	0.12
Fertilizer	0.03	0.02	0.02	0.03	0.02	0.02	0.02
Growth regulator	0.03	0.02	0.02	0.03	0.02	0.02	0.02
Pesticide	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Labor	0.85	0.87	0.65	0.50	0.69	0.58	0.38
Interest on variable cost	0.15	0.14	0.11	\$3.06	\$3.11	\$2.54	\$2.33
Total variable costs	\$3.42	\$3.30	\$2.61	\$3.06	\$3.11	\$2.54	\$2.33
Overhead costs²	2.62	1.94	1.86	0.66	0.49	0.47	0.47
Loss allocation³	0.32	0.28	0.24	0.20	0.19	0.16	0.15
Total per flat	\$6.37	\$5.52	\$4.71	\$3.91	\$3.79	\$3.16	\$2.94

¹ 36 seedlings per finished flat.

² Overhead costs are calculated at \$0.200, \$0.048, and \$0.142 per square foot-bench-week for small, medium, and large greenhouses respectively. It is assumed that a flat uses 1.64 square feet of bench area per week and production takes 8 weeks for barerooted flats and 2 weeks for plug flats.

³ Based on a 5% loss.

	Plug Purchased in 288-cell tray				Plug Purchased in 512-cell tray			
	Small	Medium	Large		Small	Medium	Large	
			Non Auto	Auto			Non Auto	Auto
Variable costs								
Seedlings ¹	\$2.52	\$2.16	\$1.98	\$1.98	\$1.80	\$1.62	\$1.44	\$1.44
Flat	0.47	0.42	0.38	0.38	0.47	0.42	0.38	0.38
Insert	0.29	0.25	0.23	0.23	0.29	0.25	0.23	0.23
Rooting medium	0.37	0.36	0.35	0.35	0.37	0.36	0.35	0.35
Labels	0.15	0.13	0.12	0.12	0.15	0.13	0.12	0.12
Fertilizer	0.03	0.02	0.02	0.02	0.03	0.02	0.02	0.02
Growth regulator	0.03	0.02	0.02	0.02	0.03	0.02	0.02	0.02
Pesticide	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Labor	0.50	0.69	0.58	0.38	0.50	0.69	0.58	0.38
Interest on variable costs	0.20	0.18	0.17	0.16	0.16	0.16	0.14	0.13
Total variable costs	\$4.46	\$4.24	\$3.85	\$3.64	\$3.81	\$3.67	\$3.29	\$3.08
Overhead costs²	0.66	0.49	0.47	0.47	1.64	1.21	1.16	1.16
Loss allocation³	0.27	0.25	0.23	0.22	0.29	0.26	0.23	0.22
Total per flat	\$5.50	\$4.97	\$4.55	\$4.32	\$5.74	\$5.15	\$4.61	\$4.47

¹ 36 seedlings per finished flat.

² Overhead costs are calculated at \$0.200, \$0.048, and \$0.142 per square foot-bench-week for small, medium, and large greenhouses, respectively. It is assumed that a flat uses 1.64 square feet of bench area per week and production takes 2 weeks for flats using plugs from a 288-cell tray and 5 weeks for flats using plugs from a 512-cell tray.

³ Based on a 5% loss.

Geranium Cutting Production and 4 in. Pots from Unrooted Cuttings

Table A: Overhead Costs¹	
<u>Item</u>	<u>Annual Total/Cost per sq.ft.-week of Bench</u>
Overhead Labor & Benefits	\$60,000 / \$ 0.075
Utilities	
Heating Fuel (13,140 gal.)	13,420 / 0.017
Electricity	1,843 / 0.002
Telephone	1,212 / 0.002
Depreciation	23,887 / 0.030
Interest	14,848 / 0.019
Insurance	4,621 / 0.006
Repairs	11,818 / 0.015
Property Taxes	732 / 0.001
Advertising	682 / 0.001
Dues & Subscriptions	328 / 0.000
Travel & Entertainment	1,616 / 0.002
Office Expenses	758 / 0.001
Professional Fees	960 / 0.001
Truck Expenses & Equipment Rental	13,333 / 0.017
Land Rental	1,490 / 0.002
Contributions	379 / 0.000
Miscellaneous	2,651 / 0.003
Bad Debts	631 / 0.001
Total	\$155,208 / \$0.194

¹ 20,000 sq.ft., double layer, polyethylene greenhouse.

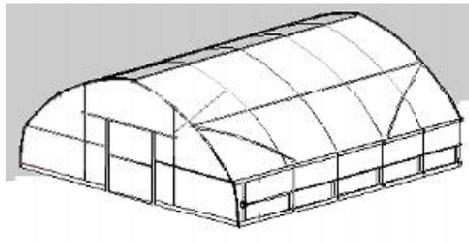
Table B: Production Costs per 4" Pot from Unrooted Cuttings.	
<u>Item</u>	<u>Dollars per Pot</u>
Variable Costs	
Fertilizer	\$ 0.013
Insecticide	\$ 0.001
Fungicide	\$ 0.003
Unrooted Cutting	\$ 0.240
Oasis Rootcube	\$ 0.023
4-inch Plastic Pot	\$ 0.074
Rooting Medium	\$ 0.037
Labor ¹	\$ 0.159
Interest on Materials and Labor	\$ 0.025
Total Variable Costs	\$ 0.575
Overhead Costs ²	\$ 0.257
Loss Allocation ³	\$ 0.044
Total Costs per Plant	\$ 0.876

¹ See Table B1 for more details. ² See Table A2 for more details. ³ Based on 5% of total production.

Table B1: Labor Inputs per 4" Pot from Unrooted Cuttings

<u>Task</u>	<u>Seconds per Pot/Dollars per Pot</u>
Stick Cuttings	15.0/\$0.033
Pot	5.5/\$0.034
Irrigate and Fertilize	14.6/\$0.032
Apply Pesticide	3.3/\$0.008
Harvest	23.7/\$0.052
Total	62.1/\$0.159

Economics of Producing Hydroponic Lettuce



Dr. Gerald White
Department of Agricultural, Resource, and
Managerial Economics
Cornell University

Biography

Gerald B. White, Professor Department of Agricultural, Resource, and Managerial Economics, Cornell University

Jerry White was raised on a small dairy farm near Statesville, North Carolina. He graduated from North Carolina State University with a B.S. in Dairy Husbandry in 1961. He served as an Army officer from 1962 to 1966. He was employed as an extension agent for the Virginia Cooperative Extension Service from 1966 to 1973, working first in dairy and livestock management and later as an area farm management specialist. He received a M.S. degree from Virginia Tech in 1973 and a Ph.D. degree in agricultural economics from Penn State in 1978.

Jerry joined the Cornell faculty in 1978. He conducts extension programs and applied research in business management and economics of horticultural crops. His program emphasizes economic analyses of orchard, vineyard, and greenhouse production systems and the economic outlook for the fruit, grape and wine sectors. Current research projects include the economics of irrigation of horticultural crops and increasing the economic growth of the food industry in Central New York. Extension projects include risk management for horticultural producers. He teaches a course on strategic marketing for horticultural firms. International experience has focused on working with Eastern and Central European universities and research institutes to develop their capacity for economic training and education during the transition to a market economy. He serves as co-chairman of the Cornell University College of Life Sciences' Central and Eastern European Program Committee.

Economics of Producing CEA Hydroponic Lettuce in New York

**Gerald B. White, Professor
Department of Agricultural, Resource, and
Managerial Economics, Cornell University***

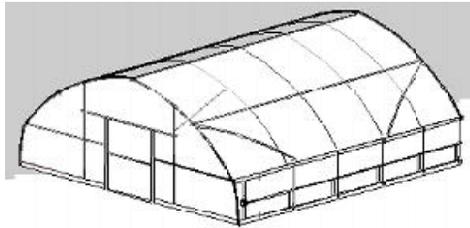
This research examined the economic investment and operating costs for producing lettuce in a hydroponic production system in the CEA demonstration module located in Ithaca. The research summarizes total capital investment costs and annual production and operating costs of the CEA facility. Comparisons were made with eight other locations in the US: Chicago, Denver, Los Angeles, Miami, Phoenix, Raleigh, Seattle, and St. Louis.

Investment costs for the 96' X 84' facility were \$553,914. Total annual cash costs were \$236,312 for 344,925 heads annual production, or \$.69 per head. The largest annual cash cost was for labor, estimated at \$68,418, including a manager's salary of \$15,000. The second largest cash cost was electricity, estimated at \$47,120, by far the highest of any location. Heating costs at the Ithaca facility, estimated at \$16,788, were also the greatest for any location. The breakeven product price was \$.98 (calculated as the price level at which, with an after tax, nominal cost of capital of eight percent, the Net Present Value of the investment is equal to zero).

In this study, the analysis showed that given current prices and costs, production in areas such as Ithaca (and other high-cost, northern locations in the Northeast and Midwest, such as Chicago) is probably marginal to negative in terms of economic viability. The rest of this presentation is devoted to a discussion of the potential role of CEA in future agricultural and food systems economic vitality in urban states such as New York. The discussion will focus on product quality and the importance of local produce, state programs to promote agriculture, and the need to provide cheaper electrical rates, such as those made available for industrial firms in New York.

*This presentation is based on a Ph D. Dissertation by Gunes Ilaslan, "Investment Analysis and Future Potential of Controlled Environment Agriculture Hydroponic Production System for Boston Lettuce," completed in May 2000.

Worker Protection Standards for Greenhouse Operations



Ed Hanbach
Department of Environmental Conservation

Biography

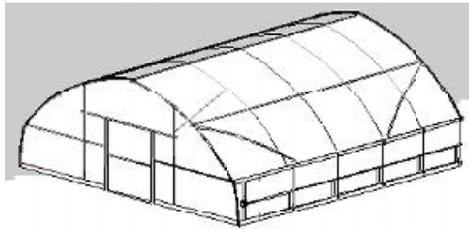
Edward Hanbach

DEC

Ed Hanbach has been in the pesticide field for 22 years. For 8 1/2 years Ed worked for and managed Abalene/Orkin Pest Control in Rochester and Albany, New York and in New Haven, Connecticut. Ed has been a certified applicator or supervising certified applicator in New York, Vermont and Connecticut. He also has extensive knowledge in Structural/Wood Destroying Insect Control, as well as Agricultural Pest Control.

Ed has an Associate Degree from ESF in Syracuse and has worked as a Pesticide Specialist in Region 8 for 13 1/2 years. He also has been known to guide hunters as they chase a variety of game from whitetail deer to turkey (or vultures as the case may be)!

Insurance for Greenhouse Operations



Jim Van Buskirk
Senior Account Executive
Florists' Mutual Insurance

Biography

Jim Van Buskirk Senior Account Executive Florists' Mutual Insurance

Jim Van Buskirk is a Senior Account Executive for FMI (Florists Mutual Insurance). Jim has represented FMI for fifteen years in New York State. During that time, he has been a risk management partner to some of the largest greenhouse operations in New York. FMI provides a broad range of property and liability coverage as well as group health and life insurance products. Their technology division has developed software to assist growers in planning their production processes. Since 1887, FMI has been the insurer of choice for the horticulture industry.

Crop Insurance

Jim Van Buskirk Florists' Mutual Insurance

There is no greater threat to the survival of a greenhouse business than the loss of its crop. Many growers insure their greenhouses, buildings, equipment and liability exposures, yet fail to protect the investment they have in the "green gold" within those greenhouses. Why is that?

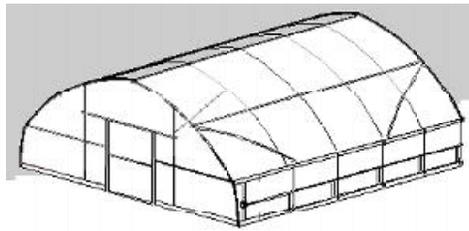
Many perceive that the cost of crop coverage is simply too high. While that may be true in some cases, in the overwhelming majority of cases the cost of **not** insuring your crop is too high. There are several products available in today's insurance market which address the issue of how best to safeguard your investment. First, there is coverage available through the Department of Agriculture's subsidized insurance program. If your firm is eligible for this coverage and you do not take advantage of it, you will not be eligible for federal disaster aid in the form of low interest loans and other programs. For a filing fee of \$100, you can preserve your eligibility for federal relief programs by purchasing the Catastrophic Coverage Policy. Or, if you prefer, you can improve upon that limited coverage by "buying up" to a level of coverage equal to 100% of the federal government's price for your eligible crops with a deductible as low as 25% of your covered inventory.

Not all crops grown by New York's growers are eligible for coverage under the program described above. Not all perils that can cause a loss are covered either. You may need to explore other options. FMI offers "broad form" or "special form" coverage for crops grown in greenhouses that meet its engineering requirements for wind resistance and snow load. Crop loss due to direct damage and indirect damage can be covered. Direct damage can be caused by wind-storm, collapse under snow and/or ice, and fire, for example. Indirect damage can be caused by the loss of power either on premises or off premises resulting in a freeze or heat damaged crop, for instance. Unlike the federal program, FMI can cover your crop for its market value. This protects your potential profit had the crop made it to market on time as intended.

Losing the crop and receiving a settlement from your insurer is not the end of the story, or of your troubles. In the case of collapsed greenhouses, the grower faces the potential disaster of not being able to rebuild in time to plant the next scheduled crop. How will the business survive the interruption in cash flow? FMI can provide coverage for those clients who purchase the primary crop coverage. It is called "Greenhouse Crop Income Coverage". Simply put, it provides a predetermined sum of money available on a monthly maximum basis for a set number of months. It covers not only the lost profit from your inability to plant a crop, but it is structured to cover your continuing expenses as well. Some greenhouse growers even take an optional "extended period of restoration". This allows you to continue drawing money from that predetermined sum even after you have resumed normal operations, but not at pre-loss sales levels.

During the “Grow Your Greenhouse” conference, Jim Van Buskirk will describe these coverages in detail. Loss scenarios, potential solutions and methodologies for determining your firm’s monetary exposures to loss will also be explored. Jim will be available at the conference after his presentation to answer any questions attendees may have.

How to Attract and Hire the Best Employees



Thomas R. Maloney
Senior Extension Associate
Department of Agricultural, Resource, and
Managerial Economics
Cornell University

Biography

Thomas R. Maloney

Department of Applied Economics and Management

Cornell University

Thomas R. Maloney is a Senior Extension Associate in the Department of Agricultural, Resource, and Managerial Economics at Cornell University. He received his Bachelors and Masters in Agricultural Economics from Cornell University.

For the last 25 years he has been an Extension Educator teaching a variety of management topics. He spent the first ten years of his career as a Cooperative Extension agent in Cortland County New York. He then joined the Department of Agricultural, Resource, and Managerial Economics and for fifteen years has been responsible for Extension programs in human resource management, labor policy and regulations.

He has conducted numerous workshops and written a variety of bulletins on personnel topics related to agricultural and horticultural businesses. His applied research includes studies in the greenhouse industry, on employee recruitment, selection and compensation. His primary areas of interest include employee recruitment, selection, compensation, performance evaluation, motivation and incentives.

Tom has also worked extensively on labor policy issues affecting employers. Over the last five years his work has been instrumental to the success of a New York Agricultural/Horticultural Worker Certification Program. In 1999 he received a certificate in Management Development from the school of Industrial and Labor Relations at Cornell University.

He is co-author of the book entitled *Human Resource Management for Golf Course Superintendents*, published by the Golf Course Superintendents Association of America.

How to Attract and Hire the Best Employees

Thomas R. Maloney
Department of Agricultural, Resource, and
Managerial Economics, Cornell University

Recruitment Defined

Recruitment is the process of attracting individuals on a time basis, in sufficient numbers, with appropriate qualifications, to apply for jobs within a business.

Recruitment Methods

1. Suggestions from current employees
2. Word of mouth
3. Want ads
4. Government job services
5. College placement offices
6. Posting job announcements on bulletin boards
7. Executive search firms
8. The Internet

Writing a “Help Wanted” Ad That Sells the Position

The following steps demonstrate one way to write better help-wanted ads and recruit more qualified applicants:

- Step 1. Give the appropriate job title.
- Step 2. Say something positive about the organization.
- Step 3. Describe the job.
- Step 4. Highlight positive working conditions.
- Step 5. If appropriate, provide information on wages and benefits.
- Step 6. Indicate how to apply.

Segments of the Labor Market

1. Immigrant workers
2. Retirees
3. High school students
4. College students
5. Homemakers
6. Part-timers
7. Unemployed or downsized workers

Selection Defined

Employee selection is the process of choosing from a group of candidates the individual or individuals who will be offered a position.

Selection Tools

1. Application forms
2. Interviews
3. Reference checks
4. Trial periods
5. Skills tests

Sample Interview Questions

This list of example questions is intended to provide ideas for developing your own list of interview questions.

1. Job-Related Questions:
 - What skills do you bring to a golf course maintenance job?
 - Can you work 7 am to 3 pm?
 - What experience have you had with mower operation and maintenance?
 - Describe any formal education or training in horticulture.
 - Describe work experiences from previous jobs that are relevant to this job.
2. Probing Questions:
 - What did you like most about your last job?
 - What did you like least about your last job?
 - How well did you get along with your supervisor and co-workers on your last job?
 - Why are you looking for a new job?
3. General Recruitment Questions:
 - What is your salary/pay requirement?
 - When would you be available to start?
 - Do you have any questions for me (us)?

Interview Preparation: How to Ensure Reliability

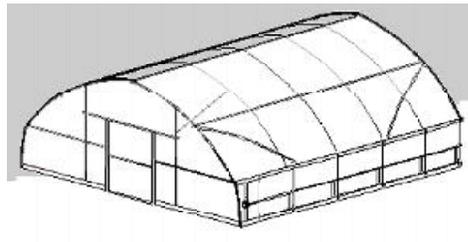
1. Identify job characteristics.
2. Write a list of questions based on job characteristics.
3. Plan to ask each applicant the same questions.
4. Plan to score responses.

Reliability results from consistently using a systematic selection process which results in the best candidate being hired.

Interview Steps

1. Prepare.
2. Put the applicant at ease.
3. Ask questions then listen.

Grower Panel: What Makes a Business Successful?



Moderator

Karen Dean Hall, CCE, Erie County

Panelists

Ellen Talmage, Talmage Farm

Gerry Miller, Miller Farm

Kathy Pufahl, Beds and Borders

Mike Weber, Weber Greenhouses

Biographies

Ellen Talmage Talmage Farm

Ellen Talmage is part of a fifth-generation family farm located on the East End of Long Island. Ellen started the wholesale nursery division at Talmage farm 18 years ago with 40 different types of perennials. The business has expanded to carry over 1100 varieties with a full line of perennials, herbs, groundcovers, grasses and native plants. Pioneering the native plant market has been an “interesting” and rewarding experience.

Gerry Miller Miller Farm

Miller Farm is a second-generation farming operation. It was started in 1976 as a retirement hobby for Gerry’s dad and his grandsons. From one glass house of 3000 sq. ft. the business has grown to 30,000 sq. ft. of controlled environment agricultural space. They operate year-round, producing annuals, potted crops and perennials. G.W. Miller, current owner/operator, is a graduate of SUNY Buffalo and is the recipient of the 1997 IPM Award. He currently serves on the NYSFI Board of Directors, is Chair of the Cornell Greenhouse and Controlled Environment Agriculture committee, and is a member of the Farm Bureau Greenhouse Committee and the statewide IPM committee.

Kathryn Pufahl Beds and Borders

Kathryn Pufahl, owner and President of Beds & Borders, Inc., in Laurel, NY, is the premier wholesale supplier of unusual annuals and non-hardy plant material in the New York metropolitan area. She started the business 13 years ago in one small greenhouse and expanded to a 2-acre glass range in 1997.

The business grows specialty annuals and tender perennials exclusively and has never produced any commodity crops such as impatiens or geraniums. The business is known as a source for innovative plant material and is considered a pioneer in the area of vegetative and specialty annuals.

Ms. Pufahl has lectured for the New York Horticultural Society, the Pennsylvania Horticultural Society, Longwood Gardens, American Horticultural Society, the New York Botanical Garden, Long Island Horticultural Society, American Association of Landscape Contractors, Grower

Talks Expo, the Ohio Short Course, Southeast Greenhouse Growers Conference, and numerous garden clubs.

Her work has been featured in *Home & Garden* magazine, *American Homestyle and Gardening* and as the cover story of *Horticulture Magazine*, July/August 1998 issue. The *NY Times* on April 8, 1999 presented an article on tender perennials stating that “Ms. Pufahl’s eye and determination have changed the face of summer gardening on the East Coast.” *Martha Stewart’s Living* TV show produced a ½ hour special exclusively on her business and container designs.

Grower Talks magazine named Beds & Borders as one of the “Top Ten Up-and-Coming Growers” for 1999.

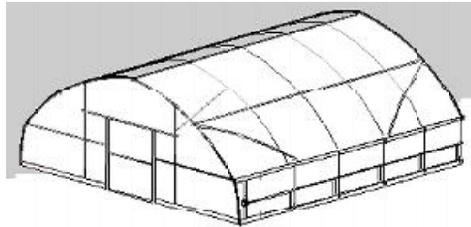
Mike Weber

Weber Greenhouses

Mike Weber and his wife, Sue, began renting the former Edwin Galley Greenhouses in 1978 and purchased it in 1983, incorporating the business in 1985. Weber Greenhouses is a 50,000 square-foot under cover operation, growing a variety of herbs, perennials, accent plants, hanging baskets, mums, pansies, primula and ornamentals at various times of the year. They market 30 percent of their crops retail, and wholesale the remaining 70% mostly to garden centers. They employ 6 full-time, 3 part-time and 4 seasonal part-time workers. Their operation utilizes forced air heat, some ridge vented, some exhaust fan, and some roll-up ventilation.

Mike believes “We are able to compete because, as a grower, we are able to offer a product that has our ‘handle’ on it, something that is perceived by the customer as different enough to be a good value.”

How Do I Grow the Crop?



Walt Nelson, CCE, Chemung County

John Sanderson, Cornell University

Margery Daughtrey, Cornell University

Jana Lamboy, Cornell University

Biographies

Walter N. Nelson

Cornell Cooperative Extension, Chemung County

Walter N. Nelson is horticulture educator with Cornell Cooperative Extension in Southern Central New York, providing educational programs to the Christmas tree, greenhouse, landscape horticulture and turfgrass industries. He also provides guidance for the community horticulture program in Chemung County and writes garden columns appearing in the *Elmira Star Gazette*. Walt is an alumnus of Penn State University (horticulture) and the University of Rochester (MBA).

John Sanderson

Associate Professor of Entomology

Cornell University

John received his B.S. (Zoology) from San Diego State University and a M.S. and Ph.D. (Entomology) at the University of California, Riverside. He did a post-doc with Dr. Michael Parrella before joining the faculty at Cornell University in 1987. He is currently Associate Professor of Entomology with specialization in Insect Pest Management of Greenhouse Pests. He has a 50% research/50% Extension appointment. He also serves as the Department Extension Leader for the Entomology Department, and co-chairs the Cornell Greenhouse and Controlled Environment Agriculture Work Group. His past work has emphasized whitefly management on greenhouse crops, though he has worked on spider mites, fungus gnats, aphids, and most recently, western flower thrips. He is coauthor of the *Ball Identification Guide to Greenhouse Pests and Beneficials*.

Margery Daughtrey

Plant Pathology

Long Island Hort Research Lab

Cornell University

Margery Daughtrey, Senior Extension Associate with the Department of Plant Pathology, Cornell University, has conducted a research and extension program on the management of diseases of ornamental plants for the past 22 years. She is stationed at Cornell's Long Island Horticultural Research and Extension Center in Riverhead, NY, where she diagnoses greenhouse and nursery crop diseases and investigates controls for problems such as powdery mildew, Fusarium wilt, and Pythium and Phytophthora root rot. Ms. Daughtrey holds a B.S. degree in Biology from the College of William and Mary, and a M.S. in Plant Pathology from the University of Massachusetts. Daughtrey is coauthor of the *Ball Field Guide to Diseases of Greenhouse Ornamentals*

with A. R. Chase. She has also coauthored *Diseases of Annuals and Perennials, A Ball Guide*, with A. R. Chase and Gary Simone, and the *Compendium of Flowering Potted Plant Diseases*, with R. L. Wick and J. L. Peterson. Daughtrey was selected as the recipient of the Society of American Florists' 1998 Alex Laurie Award for Research and Education.

Jana Lamboy
IPM Extension Educator
NYS IPM Program
NYSAES
Cornell University

Jana received a B.A. in Biology from Southeast Missouri State University in 1985, a M.S. in Plant Pathology from the University of Illinois in 1988, and a Ph.D. from same in 1992. She began working as ornamentals IPM Specialist in March 1998. Prior to that, she worked in the plant pathology department in Geneva for seven years, including research on a biological control system for the management of Botrytis in greenhouse tomatoes.

As an IPM extension educator, Jana is responsible for education and outreach on IPM for greenhouse, nursery crops, landscapes and turf for New York State west of the Hudson Valley. Her work includes research and demonstration projects in several counties, making presentations at workshops on topics such as less toxic alternatives for pest management, prevention of diseases in greenhouses, and microbial products for biological control of plant diseases.

Previous employment includes work at a garden store and running her own greenhouse business.

Growing Crops, the Nutritional Angle

Walter N. Nelson

Extension Educator, Horticulture South Central New York, Cornell University

Goals

- Provide an overview of growing media and fertilization for floriculture crops
- Equipment for Your Nutrition Tool Box .

Water and Water Quality

- Its most of our crops and relates directly with growing medium, fertilizer and your management practices
- Issues: hardness & mineral content
- pH
 - How acid or basic solution is impacts availability of micronutrients
- Alkalinity measure of water's capacity to neutralize acids
 - Bicarbonate and carbonate
 - Reported as meq/L , desire <2.0, <1.5 for plugs
- Acid injection reduces bicarbonates (sulfuric, phosphoric citric or citric)

Ingredients for Growing Medium

- Ingredient ratios
- Peat
- Coir
- Peat-Lite Mix
- Mineral Soil
- Composts

The Fertilizer

- Organic
 - Green sand
 - Bone meal
 - Rock phosphate
- Synthetic
- Water soluble
 - Solubility
 - KNO₃ 1.0#/gal.
 - CaNO₃ 22#/gal.
 - Salt index
- Slow release
 - Controlled release or encapsulated (CRF)
- Macro nutrients
- Micro Elements
 - Stem & Compound 111
 - Mg/Mo
 - Chelates
 - Available over wider range
- Heavy metals

Nutrition Related Symptoms

- Descriptions
- Picture clues

Application Technology

- Venturi
 - Gewa
 - Hozon
- Proportioner injector
 - Positive displacement
 - Turbulence
 - Anderson
 - Dosatron
 - Dosmatic
 - Smith

Methods of Application

- Top-down
- 10% overage
- Spray, drip, mist
 - Hand
 - Trickle
- Subirrigation
 - Capillary action
 - Mats
 - Constant moist
 - NFT, constant flow
 - Trough
 - Slope
 - Solution passes by for 10-15 minutes
 - Intercepted by containers
 - Ebb/flood
 - Pump & fill
 - <1/2 water soluble fertilizer of top down
 - 1/2 inch depth
 - 10 minutes

A Systems Approach

The Math

- (% fertilizer) (.75) = PPM of 1 ounce/100 gal.
- Volume per bale
- PPM
- Depth of mix in pots
- TSS
- pH
- Dilution ratio
- Developing a fertilizer program

Resources

- Greenhouse Engineering (NRAES 33, available from CCE)
- Greenhouses for Homeowners and Gardeners (NRAES 137, available from CCE)
- Water and Nutrient Management for Greenhouses (NRAES 56, available from CCE)
- <http://www.ces.ncsu.edu/depts/hort/hil/flowers-index.html>

Other

Summary

Common Disease Problems in the Greenhouse and How to Avoid Them

Margery Daughtrey
Dept. of Plant Pathology
Cornell University
Long Island Hort. Research & Extn. Center

Symptoms of plant diseases include leaf spots, cankers, wilt, rust pustules, powdery mildew, root rot, damping off, and ring spots. Symptoms on crops either result from cultural stresses, or follow attack by a wide range of different pathogens, including fungi, bacteria, nematodes and viruses. Diseases caused by pathogens are contagious. One goal of a grower is to keep these in check in order to have maximum crop quality and salability. Keeping pathogens away from your crop requires knowledge, good sanitation practices, scouting, and prompt response to symptoms. Planning ahead for common disease problems is advantageous. Cultural and environmental conditions in the greenhouse will have a lot of impact on the level of disease problems in your crops.

Some examples of disease management strategies follow:

I. *Botrytis* blight and powdery mildews

Although both of these diseases affect foliage, *Botrytis* is favored by actual leaf wetness, whereas powdery mildew can thrive even in a greenhouse where the plant surfaces are kept dry. Hence, watering early in the day, trickle irrigation, or ebb & flood watering are very helpful for avoiding *Botrytis* problems, but these practices will not always decrease the impact of powdery mildew diseases. Open wire mesh benches are helpful because they allow air circulation, thus minimizing powdery mildew problems by reducing humidity next to the plant surface. Good air circulation with fans is important for managing both *Botrytis* and powdery mildew.

Botrytis cinerea causes flower blights on many crops, and leaf spots and stem cankers on especially sensitive crops such as poinsettia, geranium, exacum, fuchsia and lisianthus. Powdery mildew diseases all look alike, but they are caused by host-specific fungi. Begonia, verbena, miniature rose, and poinsettia are some of the greenhouse crops that are noteworthy for their susceptibility to a powdery mildew disease. To make your job easier, choose to grow the most resistant cultivars available.

Resistance management is important when using fungicides for control of either *Botrytis* or powdery mildew. Many greenhouse *Botrytis* populations are already insensitive to thiophanate-methyl materials (Fungo, Cleary's 3336) and show reduced sensitivity to iprodione and vinclozolin (Chipco 26019, Vorlan). Treatments should be rotated among effective materials.

Some Effective Materials to Rotate for Botrytis Control		
<u>Chemical Class</u>	<u>Active Ingredient</u>	<u>Product Examples</u>
dicarboximides	iprodione, vinclozolin	Chipco 26019, Vorlan
phenylpyrrole	fludioxonil	Medallion
nitrile	chlorothalonil	Daconil, PathGuard, Spectro
hydroxyanilide	fenhexamid	Decree

For powdery mildew control, too, rotating among fungicides with different modes of action is appropriate. This will preserve the effectiveness of particular active ingredients as long as possible. Documented cases of powdery mildews resistant to fungicides in American ornamental crops are rare. An exception is the observed lack of control when attempting to utilize Strike for powdery mildew management on roses, even though this fungicide works very well against the powdery mildews on many other crops. Note that the new strobilurin fungicide labels specify exactly how many applications may be made before shifting to an alternative, and list the number of applications allowable per season.

Generally Effective Powdery Mildew Fungicides Potentially Subject to Resistance	
<u>Chemical Class</u>	<u>Product examples</u>
sterol inhibitors	Systhane*, Strike, Rubigan, Terraguard
strobilurins	Cygnus*, Heritage
benzimidazoles	3336, Fungo, Systec

* Not for use in Nassau & Suffolk counties.

Some Powdery Mildew Control Alternatives (Resistance Unlikely)
bicarbonates
coppers
piperalin (Pipron)

Oils (Triact, Ultrafine Oil) are also very effective against powdery mildew but these should be applied very cautiously — test on a few plants before trying a large-scale application in the greenhouse, and avoid treating during high-humidity conditions.

II. *Pythium* fungi

A number of *Pythium* species, particularly *Pythium irregulare*, *P. aphanidermatum* and *P. ultimum*, are currently being found attacking root systems of major greenhouse crops such as geranium and poinsettia. *Pythium* and *Phytophthora* root rots were also problematic on hanging basket crops of Callibrachoa and verbena this past season. These fungi are “water molds” which have a swimming spore stage, hence they can easily spread from plant to plant in a recirculating irrigation system. The best cultural controls for *Pythium* are having well-drained growing medium and avoiding excessive soluble salts levels. Anything that injures the roots can help the *Pythium* to infect.

Pythium causes a soft rot of the outer cortex of the root, leaving only the harder core when an infected plant is pulled out of the growing medium. Both *Pythium* and *Phytophthora* can also attack the stem base, causing a crown rot (often seen on African violets). Handling, insects or water splash can easily spread the sporangia to new areas. Some of the strains of *Pythium* and *Phytophthora* which have been causing epidemic disease losses in recent years have been found to be resistant to Subdue/Subdue Maxx (these fungicides have very similar chemistry). For this reason, materials for *Pythium* control should always be used in rotation. If Subdue resistance develops in *Pythium* that is causing root rot on a crop, there is no point to using it again that season.

Fungicides That Can Be Used Against <i>Pythium</i> & <i>Phytophthora</i>	
Active ingredient	Product Examples
mefenoxam/metalaxyl-resistance known	Subdue MAXX, Subdue, Quell
fosetyl-AI	Aliette
etrizazole	Truban, Terrazole (and in Banrot)
propamocarb	Banol

III. *Xanthomonas pelargonii*, the cause of bacterial blight of geraniums; *Ralstonia solanacearum*, the cause of Southern wilt of geraniums, etc.

Xanthomonas pelargonii causes a highly contagious disease of greenhouse Pelargoniums, both ivy & zonal, but inoculum for the disease may originate from hardy geraniums. *Ralstonia (Pseudomonas) solanacearum* causes another systemic bacterial disease. Symptoms of the two bacterial diseases are often indistinguishable, but the *Xanthomonas* disease may include leaf spot symptoms that are not possible with *Ralstonia*. Scouting for tiny round brown leaf spots (1/16-1/8” in diameter) or yellowing and wilting of leaves is critical for finding these diseases promptly. The diseased plants need to be rogued out immediately. Preventive practices include growing geraniums from different suppliers separately from one another, as well as separating seedlings from zonals and never putting hanging baskets of ivy geraniums directly above a crop of zonals. Individual-tube watering systems are ideal; overhead irrigation should be done with a minimum of splashing.

A laboratory diagnosis is usually necessary to determine whether one of these bacterial diseases is involved. The symptoms look very similar to symptoms caused by *Botrytis*, spider mite feeding injury, Verticillium wilt or other bacterial or fungal leaf spots. Copper sprays may help somewhat to limit the spread of the bacteria, but throwing away visibly diseased plants is essential to get control of a disease outbreak.

Distinguishing the Symptoms of Bacterial Blight and Southern Wilt on Geraniums (<i>Pelargonium</i> spp.)	
<u>Bacterial Blight (<i>Xanthomonas</i>)</u>	<u>Southern Wilt (<i>Ralstonia/Pseudomonas</i>)</u>
Tiny, round brown leaf spots	—
Angular brown wedges	—
Leaf yellowing	Leaf yellowing
Wilt	Wilt

What's Different About Greenhouse IPM?

**Jana S. Lamboy, IPM Extension Educator
IPM Program, NYSAES, Geneva, NY**

Integrated pest management (IPM) is a site-specific strategy for solving problems with insects, diseases and weeds that emphasizes the biology of the pest. How do we prevent serious problems and determine effective management practices? Whether you are growing orchard fruits, fresh market vegetables, or maintaining an athletic field, the following methods are important:

- site selection and soil preparation
- planting methods
- cultural practices as the basis for IPM
- forecasting, weather data to predict pests
- pest trapping to follow populations
- monitoring for pests and symptoms
- record keeping, develop a site history
- thresholds for taking action
- biological controls
- chemical controls

The goals of IPM are to improve the effectiveness of pest management while preserving environmental quality. What's different about greenhouse IPM? How does the greenhouse environment impact pest management, changing the daily activities of the grower?

Pre-season Activities

All crop residues, old media and weeds should be removed from the greenhouse because they harbor insects and pathogens. A fallow period of two to four weeks is recommended. Benches, floors, and greenhouse interior surfaces should be disinfested with a labeled product such as Physan 20 or Green Shield. Now is a good time to make repairs or install new sensors, mist systems or fans.

Environmental Controls and Space Utilization

Optimum day and night temperatures, day length and humidity can be arranged for different crops. Ventilation with outside air to reduce humidity, and horizontal air flow fans to dry leaves are critical in disease management. Separate chambers or greenhouses will help when starting seeds, making cuttings, holding stock plants or sequestering new stock that might be contaminated.

Nutrient Management and Water Quality

Plants that are stressed are more susceptible to disease and insect problems. It is very different to rely on a drip line and artificial medium for growing plants than in natural soil with its buffering and cation exchange capacity. Monitoring the pH of water, electrical conductivity of

nutrient solutions (saltiness) or testing the leaf nutrient content regularly will help to follow changes that take place during the growing season.

Sanitation

Wise growers establish rules to avoid unnecessary contamination. To avoid tobacco mosaic virus there should be no smoking in the greenhouse and routine hand washing with soap after breaks before touching plants. Foot baths can be placed by the door to wash shoes or boots if outdoor workers are coming into the greenhouse from the field. Visitors should not enter your greenhouse after possibly picking up whitefly, thrips, mites or powdery mildew spores at another greenhouse. Infested plants should be thrown out and infested leaves picked off when symptoms are apparent. Do not carry infected plant material through the greenhouse inoculating healthy plants. Plant debris should go directly into a plastic bag at the location where it is found before being carried to a covered garbage can. Place compost piles far away from greenhouse air intakes to avoid windborne insects and inoculum.

Plant Selection

Try to purchase the very best clean seeds, cuttings, and stock plants from reputable suppliers. If your greenhouse becomes contaminated with bacteria or virus, it may not be possible to eliminate the problem.

Scouting Techniques

Regular, frequent monitoring is the best defense against pest outbreaks or epidemics. It includes whole plant inspection (especially undersides of lower leaves), yellow sticky cards for flying insects, and tagging sentinel plants for follow-ups after treatment. Specific procedures are available in the 2000 Guide for the Integrated Management of Greenhouse Florist Crops. Pathogen and insect identification is extremely important in selection of effective materials for treatment. Be sure to budget for diagnostic services from a reputable laboratory.

Weeds as a Reservoir for Pests

Weeds outside the greenhouse and under the benches harbor pests. They will not receive the same pesticide applications as the crop; the pests multiply and move onto the crop. During a fallow period, weeds can survive in gravel floors and in between layers of plastic, providing a source of insects and disease to the new young crops. There are herbicides labeled for empty greenhouses, but hand pulling may be more efficient. If the land surrounding the greenhouse is planted with crops, when they are harvested, insects will move into the greenhouse. Vent screening may be necessary.

Pest Management

The greenhouse ecosystem is very different from outdoors since there is not a continuous mixing with beneficial microorganisms and natural enemies of plant pathogens and harmful

insects. An advantage of the enclosed space: introduced beneficials can be very successful in a greenhouse. What is unique about greenhouse pesticide issues?

- Greater risk of pest resistance to chemicals (they won't control pests)
- Slower breakdown of chemicals without direct sunshine, wind and rain
- Difficulties with re-entry intervals (REI) because of need to care for plants
- Fewer products labeled for greenhouse use (human exposure issues)
- Different formulations for greenhouse use, greater expense
- Phytotoxicity problems with many plant species, more tender in the greenhouse

In summary, you can hope to manage a greenhouse without pesticides if you grow a crop from seed in a clean, screened greenhouse where people don't bring in any pests. Biological controls can work if treatment is scheduled in a preventative manner. If plants are imported from another greenhouse, you probably imported their pests as well; it is critical to identify pests early and treat promptly. Many new products are available with reduced toxicity and shorter REI; experiment in your setting with labeled alternatives to develop the best IPM strategy for your operation.

Reference Books

2000 Guide for the Integrated Management of Greenhouse Florist Crops, Cornell University, Media and Technology Services Resource Center, 7 Cornell Business & Technology Park, Ithaca, NY 14850. Phone 607-255-2080. E-mail: Dist_Center@cce.cornell.edu

Gill, S. and J. Sanderson, 1998. *Ball Identification Guide to Greenhouse Pests and Beneficials*. Ball Publishing Co., 335 North River Street, Batavia, Illinois 60510.

Chase, A.R., M. Daughtrey, and G.W. Simone, 1995. *Diseases of Annuals and Perennials*. Ball Publishing Co., 335 North River Street, Batavia, Illinois 60510.

Integrated Pest Management for Bedding Plants: A Scouting and Pest Management Guide, Cornell Cooperative Extension #102IPM407. Cornell University, Media and Technology Services Resource Center, 7 Cornell Business & Technology Park, Ithaca, NY 14850. Phone 607-255-2080. E-mail: Dist_Center@cce.cornell.edu

Tips on Managing Floriculture Crop Problems, available from the Ohio Florists' Association Services Inc., 2130 Stella Court, Suite 200, Columbus, OH 43215.

Trade Journals

Greenhouse IPM Notes, a quarterly publication from Cornell & Rutgers Cooperative Extension. Jim Willmott, editor. Email: willmott@aesop.rutgers.edu. Web: <http://aesop.rutgers.edu:80/-floriculture/grower/IPMintro.htm>

Greenhouse Product News, Scranton Gillette Communications, 380 E. Northwest Hwy, Des Plaines, IL 60016-2282.

GrowerTalks Magazine, Ball Publishing Co., 335 North River Street, Batavia, Illinois 60510.
Email: info@ballpublishing.com Web: <http://www.growertalks.com>

Yankee Grower, produced six times a year by the Plant Science Dept., University of Connecticut, Storrs. R. McAvoy and L. Pundt, editors. Email: lpundt@canr.cag.uconn.edu Web: <http://www.canr.cag.uconn.edu/ces/ipm/general/htmls/yankgrwr.htm>

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801 South Street, Triangle
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Twin Buds Speciality Cut Flowers
1 Lanphier Lane
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Greenhouse Business Information Resources, 1998

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These partial lists are not intended to endorse or discriminate against any organization or resource. Asterisks (*) mark resources judged to be the most up-to-date or comprehensive.

Conferences

- January: GrowerExpo (GrowerTalks Magazine, P.O. Box 501, West Chicago IL 60185)
- January: National Tropical Foliage Short Course (Florida Foliage Assn., P. O. Box Y, Apopka, FL 32704)
- January: NTV (Dutch Horticultural Trade Show), Aalsmeer or Auction 'Dekring', Bleiswijk, The Netherlands (Laan van Meerdervoort 39, Postbus 61090, 2506 AB Den Haag, The Netherlands).
- January: Hydroponic Society of America Conference and Trade Show (HSA, 2819 Crow Canyon Road, Ste 218, San Ramon CA 94583)
- July: International Floriculture Industry Short Course (Ohio Florists' Association, Suite 200, 2130 Stella Court, Columbus OH 43215-1033)
- September: Society of American Florists' Convention (SAF, 1601 Duke Street, Alexandria VA 22314-3406).
- October: New England Greenhouse Conference (location and coordinator varies, held on even-numbered years)
- October: Cornell Greenhouse Conference (Ithaca NY, held on odd-numbered years)
- October: Canadian Greenhouse Conference (Dr. John Hughes, Horticultural Science Department, University of Guelph, Guelph, Ontario, Canada N1G 2W1)
- November: Association of Specialty Cut Flower Growers Conference (Association of Specialty Cut Flower Growers, Inc., M.P.O. 268, Oberlin OH 44074-0268). (216)774-2887, fax-2435

Trade Journals and Newsletters

- American Nurseryman. (111 N. Canal St., Suite 545, Chicago, IL 60606).
- American Vegetable Grower (37841 Euclid Ave., Willoughby, OH 44094).
- Canadian Florist. (Horticulture Publications, Ltd., 1090 Aerowood Dr., Unit 1, Mississauga, Ontario L4W 1Y5, Canada).
- FloraCulture International. (P. O. Box 9, Batavia IL 60510).
- Floral Management. (Society of American Florists, 1601 Duke Street, Alexandria VA 22314-3406).
- Florist. (FTD, P. O. Box 2227, Southfield, MI 48076).
- Florist's Review. (111 N. Canal St., Suite 545, Chicago, IL 60606).
- Florida Foliage (P. O. Box Y, Apopka, FL 32703).
- Flower News (549 W. Randolph St., Chicago, IL 60606)
- Flowers &. (2400 Compton Blvd., Redondo Beach, CA 90278).
- Greenhouse Business (P. O. Box 698, Park Ridge IL 60068-0698).
- Greenhouse Product News (650 S. Clark Street, Chicago IL 60605-1799)
- Greenhouse Canada (31A Passmore Ave., Unit 19, Scarborough, Ontario M1V 3H3 Canada).
- Greenhouse Grower. (37841 Euclid Ave., Willoughby, OH 44094).

Trade Journals and Newsletters (cont.)

Greenhouse Vegetable Newsletter, S. Khosla and G. Ferguson, editors. Ontario Ministry of Agriculture and Food, Harrow Research Station, Harrow, Ontario NOR 1G0
 GMPro. (P. O. Box 1868, Fort Worth, TX 76101).
 Grower. (49 Doughty St., London WC1N 2LP, England).
 GrowerTalks. (George J. Ball, Inc., West Chicago, IL 60185).
 Ohio Florists' Association Bulletin, H. K. Tayama, editor. (OFA, Suite 200, 2130 Stella Court, Columbus OH 43210-1033).
 Produce Marketing Association. (700 Bardsdale Rd., Suite 6, Newark, DE 19711)
 Roses, Inc. Bulletin (1152 Haslett Rd., Haslett, MI 48840).

INDUSTRY ORGANIZATIONS

National and International Organizations

American Greenhouse Vegetable Growers Association, P. O. Box 25058, Colorado Springs CO 80936, (719)531-0505, fax-0506
 Association of Specialty Cut Flower Growers, Inc., M.P.O. 268, Oberlin OH 44074-0268, (216)774-2887, fax-2435
 Florists' Transworld Delivery (FTD), P. O. Box 2227, Southfield MI 48076
 Hydroponic Society of America, 2819 Crow Canyon Road, Suite 218, San Ramon CA 94583, (510)743-9605
 International Herb Growers and Marketers Association, Dr. James E. Simon, Department of Horticulture, Purdue University, West Lafayette IN 47907
 Floral Marketing Association (FMA), P. O. Box 6036, Newark DE 19714-6036, (302)738-7100
 Ohio Florists' Association, 2130 Stella Court, Suite 200, Columbus OH 43215-1033, (614)487-1117, fax-1216
 Perennial Plant Association, 3383 Shirtzinger Road, Hilliard OH 43206, (614)771-8431
 Roses, Inc., P. O. Box 99, Haslett MI 48840, (517)339-9544
 Society of American Florists (SAF), 1601 Duke Street, Alexandria VA 22314
 Wholesale Florists and Florist Suppliers of America, P. O. Box 7308, Arlington VA 22207

State Industry Organizations

Growers Assn. of Greater Rochester, c/o Mr. Steve Rockcastle, 246 Gibson St., Canandaigua, NY 14424
 Long Island Flower Growers Assn., Ute Leuthardt, Secretary, 40 Moriches Avenue, East Moriches, NY 11940, (516)878-2828
 New York State Flower Industries, c/o Gary Patterson, 11649 W. Perrysburg Road, Perrysburg, NY 13129, (716)532-0397
 Northeast Organic Farming Assn., c/o Ammie Chickering, Admin. Sec., P. O. Box 21, South Butler NY 13154-0021, (315)365-2299
 Southern Tier Growers Assn., c/o Mrs. Joan Schaefer, R.D.1, Box 346, Chenango Forks, NY 13746, (607)692-4877

GREENHOUSES AND GREENHOUSE SUPPLIES

Greenhouse Supplies

BFG Supply, 95 Stark St., Tonawanda, NY 14150, (716)694-7115 or 688-8436
 Brighton By-Products Co., P. O. Box 23, New Brighton, PA 15066, (800)245-3502
 Florist Products, Inc., 2242 N. Palmer Dr., Schaumburg, IL 60195, (312)885-2242
 E. C. Geiger, Box 285, Harleysville, PA 19438, (800)443-4437
 Griffin Greenhouse Supplies, 4 Cornell Road, Latham NY 12110, (518)489-8419
 OR 1 Ellis Drive, Auburn NY 13021, (315)255-1450
 A. H. Hummert, 2746 Chouteau Ave., St. Louis, MO 63103, (800)225-3055

GREENHOUSES AND GREENHOUSE SUPPLIES (cont.)

Al Saffer and Co., Pearl & Williams Streets, Port Chester, NY 10573, (914)937-6565
Slater Supply Co., 143 Allen Blvd., Farmingdale, NY 11735, (516)249-7080
X. S. Smith, Inc., Drawer X, Red Bank, NJ 07701, (201)222-4600
Stuppy Greenhouse Supply Div., P. O. Box 12456, Kansas City, MO 64116, (800)821-2132

Greenhouse Manufacturers and Suppliers

NATIONAL GREENHOUSE MANUFACTURERS ASSOCIATION, 7800 S. Elati, Suite 113, Littleton CO 0120
(800)792-6462, <http://www.ngma.com>.
Ludy Greenhouse Mfg., Corp., P. O. Box 141, New Madison, OH 45346, (513)996-1921
National Greenhouse Co., Box 500, Pana, IL 62557, (217)562-9333
Nexus Greenhouse Systems, 10983 Leroy Drive, Northglenn CO 80233, (305)457-9199
Poly Growers, Box 359, Muncy, PA 17756, (717)546-3216
Rough Bros., 5513 Vine Street, Cincinnati, OH 45217, (513)242-0310
V and V Noordland, Inc., 16 Commercial Blvd., Medford, NY 11763, (516)698-2300
Van Wingerden Greenhouse Co., 4078 Haywood Rd., Horse Shoe, NC 28742, (704)891-7389
Westbrook Greenhouse Systems, Ltd., P. O. Box 99, Grimsby, Ontario L3M 4G1, Canada, (905)945-4111
Winandy Greenhouse Co., 2211 Peacock Rd., Richmond, IN 47374, (317)935-2111
X. S. Smith, Drawer X, Red Bank NJ 07701, (908)222-4600

Hydroponic Systems

Agro Dynamics, 12 Elkins Road, East Brunswick NJ 08816, (800)872-2476
CropKing, P. O. Box 310, Medina OH 44258, (216)725-5656
Gro-Master Division, Midwest Trading, P. O. Box 384, St. Charles IL 60174, (312)888-1728
Hydro-Gardens, P. O. Box 9707, Colorado Springs CO 80932, (719)495-2266
Smithers-Oasis, P. O. Box 118, Kent OH 44240, (800)321-8286

Insurance

Florist Mutual Insurance Co., Edwardsville, IL 62025, (800)851-7740

Plant Materials - Seeds and Plants

Ball Seed Co., P. O. Box 335, West Chicago, IL 60185, (800) 323-3677
Bruinsma Seeds, P. O. Box 1463, High River, Alberta, Canada, (403)652-4768
H. B. Davis Seed Co., 50 Railroad Ave., Box 5047, Albany, NY 12205, (518)489-5411
De Ruyter Seeds, Inc., P. O. Box 20228, Columbus OH 43220, (614)459-1498
G. S. Grimes Seeds, 201 West Main Street, Smethport, PA 16749, (800)241-7333
Fred C. Gloeckner Co., 600 Mamaroneck Avenue, Harrison NY 10528-1631, (914)698-2300
McHutchison and Co., Inc., P. O. Box 95, Ridgefield, NJ 07657, (201)943-2230
Henry F. Michel Co., P. O. Box 160, King of Prussia, PA 19406, (215)265-4200
Northrup King, P. O. Box 959, Minneapolis, MN 55440, (800)328-2420
Park Seed Co., Greenwood SC 29647-0001, (800)922-6232
S. S. Skidelsky, 685 Grand Ave., Ridgefield, NJ 07657, (201)943-7840
Utica Seed Co., Harold Gardner, Menands Market, Albany, NY 12204, (518)434-6521
Van Bourgondien & Sons, Inc., 245 Farmingdale Rd., Babylon, NY 11702, (516)669-3500
Vandenberg Bulb Co., Inc., 1 Black Meadow Rd., Chester, NY 10918, (914)469-9161
Novartis, 5300 Katrine Ave., Downers Grove, IL 60515, (800)323-7253
Walters Gardens, Inc., P. O. Box 137, Zeeland MI 49464, (616)772-4697
Yoder Bros., Inc., P. O. Box 230, Barberton, OH 44203, (216)745-2143

DIAGNOSTIC SERVICES

Nutrients in Water and Solutions, Substrates, and Plants

Scotts Analytical Laboratory, 6656 Grant Way, Allentown PA 18106-9316. (215)395-7104.

Diseases and Arthropods

Cornell Plant Pathology Diagnostic Laboratory, Diane M. Karasevich, 321 Plant Science, Cornell University, Ithaca NY 14853. (607)255-7850.

Cornell Entomological Diagnostic Laboratory, Carolyn Klass, 4140 Comstock Hall, Cornell University, Ithaca NY 14853. (607)255-3144.

Mail Order Libraries (Suppliers of Numerous Books and Videotapes)

American Nurseryman, 77 W. Washington Street, Suite 2100, Chicago IL 60602-2904. (800)621-5727, fax (312)782-3232.

APS Press, American Phytopathological Society, 3340 Pilot Knob Road, St. Paul MN 55121-2097.

Ball Publishing Co., P. O. Box 247, St. Charles IL 60174-0247. Phone: (888)888.00013, fax-0014.

Capability's Books, P. O. Box 114, Deer Park WI 54007.

Cornell Cooperative Extension Resource Center, 7 Business and Technology Park, Cornell University, Ithaca NY 14853. (607)255-2080, Fax-9946.

Cornell University Instructional Materials Service, Department of Education, 109 Kennedy Hall, Cornell University, Ithaca NY 14853. (607)255-9252, Fax-7905.

Grower Publications, Grower Publications, Ltd., Freeport, London WC1N 2BR, England.

Harvard Business School Press (Manager's Bookshelf), 60 Harvard Way, Boston MA 02163. (800)988-0886.

Hydroponic Society of America. 2819 Crow Canyon Road, Suite 218, San Ramon CA 94583. (510)743-9605, fax-9302.

International Specialized Book Services, 5602 NE Hassalo Street, Suite T6, Portland OR 97213.

NRAES, Northeast Regional Agricultural Engineering Service, 152 Riley-Robb Hall, Ithaca NY 14853-5701. (607)255-7654, fax-4080.

Ohio Florists' Association, 2130 Stella Court, Suite 200, Columbus OH 43215-1033. (614)487-1117, fax-1216.

San Luis Video Publishing, P. O. Box 6715, Los Osos CA 93412. (805)528-8322, fax-7227.

Society of American Florists' Product Services, 1601 Duke Street, Alexandria VA 22314-3406. Phone:

(800)336-4743, fax (703)836-8705, FastFax (information) (888)727-2000.

Timber Press, 133 SW Second Avenue, Suite 450, Portland OR 97204.

California Polytechnic State University Visual Education Productions, San Luis Obispo CA 93407.

Phone:(800)235-4146, Fax:(805)756-5550.

BUSINESS PLANNING AND OPERATION

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Block, Z. and I. C. MacMillan. 1985. Milestones for Successful Venture Planning. Harvard Business Review 85(5):184-196 (Harvard Business Review Reprints, Soldier Field, Boston, MA 02163-9988).

Farming Alternatives: A Guide to Evaluating the Feasibility of New Farm-Based Enterprises. NRAES 32. NRAES, 152 Riley-Robb Hall, Ithaca NY 14853-5701.

Market Research

Agricultural Wholesale Census. (Published every 5 years by U.S. Dept. of Commerce). Superintendent of Documents. U.S. Govt. Printing Office, Washington, DC 20402. (Horticultural Specialties is published every 10 years)

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- Economic Indicators Monthly by Council of Economic Advisors. Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20402.
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- Floriculture Crops Summary. (Published yearly). ERS/NASS, P. O. Box 1608, Rockville MD 20850. (800)999-6779.
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- National Market Trends - Ornamental Crops (Imported Crops). (Published weekly). Fruits and Vegetables Div., USDA, 727 US Appraisers Bldg., 630 Sansone Bldg., San Francisco, CA 94111.
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- U.S. Agricultural Statistics. (Published yearly by USDA). Supt. of Documents, U.S. Govt. Printing Office, Washington, DC 20402.
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INTERIORESCAPE INFORMATION

Associations

- American Association of Botanical, Gardens and Arboreta (AABGA), P. O. Box 206, Swarthmore, PA 19081
- Interior Plantscape Division, Associated Landscape Contractors of America (ALCA), 12200 Sunrise Valley, Drive, Suite 150, Reston VA 20191, (703)620-6363
- Florida Foliage Association, P. O. Box Y (116 E. Fifth Street), Apopka, FL 32703, (305)886-1036

Periodicals

Architectural Digest (monthly), Knapp Communications Corp., 5900 Wilshire Blvd., Los Angeles CA 90036.
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Instructional Materials Service, Department of Education, 109 Kennedy Hall, Cornell University, Ithaca NY 14853. (607)255-9252, FAX-7905.

Video Instruction (Various Topics)

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Department of Agricultural, Resource, and Managerial Economics: <http://www.cals.cornell.edu/dept/arme/>
Department of Agricultural and Biological Engineering: <http://aben.cals.cornell.edu/homepage.html>
Department of Entomology: <http://www.cals.cornell.edu/dept/entom/default.htm>
Cornell Horticultural Business Management and Marketing Program: <http://www.cals.cornell.edu/dept/arme/hortmgt/index.htm>.
Controlled Environment Agriculture Program: <http://www.cals.cornell.edu/dept/arme/>
Farming Alternative Program: <http://www.cals.cornell.edu/dept/ruralsoc/fap/fap.html>
Horticultural Business Management and Marketing Program, Department of Agricultural, Resource, and Managerial Economics: <http://www.cals.cornell.edu/dept/arme/hortmgt/>
Integrated Pest Management in New York State: <http://www.nysaes.cornell.edu/ipmnet/ny/>
Cornell Cooperative Extension: <http://www.cce.cornell.edu/>
Cornell University College of Agriculture and Life Science: <http://www.cals.cornell.edu/>

Greenhouse and Controlled Environment Agriculture Faculty

<u>Unit</u>	<u>Name</u>	<u>Specialization</u>
Agricultural and Biological Engineering	Louis Albright	Greenhouse engineering
Long Island Hort. Research and Extension Center	Margery Daughtrey	Plant pathology
Integrated Pest Management Program	Jana Lamboy	Ornamental IPM
Horticulture	Robert Langhans	Controlled environ. agric.
Horticulture	William Miller	Greenhouse crop physiology
Horticulture	Marvin Pritts	Small fruit production
Entomology	John Sanderson	Arthropod pest mgt.
Geneva Expt. Sta.	Alan Taylor	Seed physiology
Applied Economics and Management	Wen-fei Uva	Marketing
Horticulture	Thomas Weiler	Greenhouse crop production
Applied Economics and Management	Gerald White	Management and economics

County/Regional Cooperative Extension Greenhouse Programs

<u>Region</u>	<u>Field Specialist</u>	<u>Specialization</u>
Finger Lakes, Monroe County Coop Ext.	Brian Eshenaur	Horticulture/Environment
Long Island, Suffolk County Coop Ext.	Ralph Freeman	Floriculture
Western New York, Erie County Coop Ext.	Karen Dean Hall	Commercial Horticulture
Capital District, Schenectady County Coop Ext.	Christopher Logue	Horticulture
Lower Hudson Valley, Orange County Coop Ext.	Susan MacAvery	Commercial Horticulture
Oneida County Coop Ext.	Steve Miller	Commercial Horticulture
Central New York, Chemung County Coop Ext.	Walter Nelson	Commercial Horticulture
Oswego County Coop Ext.	Jan Van der Heide	Vegetable Production
Wyoming County Coop Ext.	Steven Richards	Farm Management