OHIO FLORISTS' ASSOCIATION
Bulletin
The Information Source for the Floriculture Industry Since 1929

NUMBER 862 • OCTOBER 2001

CIRCULATE

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Publication Brochure Enclosed

How to Determine the Source of Plant Problems

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INTRODUCTION

This article will provide tips to becoming a better plant diagnostician. It will not be a picture show. I want you to increase your skills, not images. For more on images, which can help in certain situations, please buy a copy of one of the many good guides that are available. Refer to the OFAS Publication Brochure in this *Bulletin* or www.ofa.org.

Symptoms of poor plant health trigger the need for diagnosis as to the source of the problem. Symptoms are the result of plant stress, either living (infectious) or environmental (non-living or noninfectious) agents of stress. With the great variety of greenhouse plant types and environments, there are usually one or more elements present that can contribute to potential plant stress. Noninfectious stresses are much more common than infectious stresses. However, noninfectious stresses can lead to infectious stresses if not corrected in a timely manner.

Any good grower who spots any sign of plant stress is immediately concerned. Plants are not healthy! The immediate reaction to that concern should be, "What is causing this?" The second reaction should be, "What can be done about the problem?" Only with a correct diagnosis can a solution to the problem be planned and implemented.

Diagnostic work begins when the first signs of stress are noted. This is called the initial perception of the problem. As you will see in the following paragraphs, these first signs and symptoms, though only the beginning, can be very valuable. They lead to further questioning and data gathering. This all ends up with correct strategies as to what can be done.

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OFA COMMENTS ON SEPTEMBER 11 EVENTS

by Dennis M. Kirven, OFA Executive Director

By the time you read this, I am sure the "open sore" caused by the tragic events of September 11 continues to weep and is far from ever healing! I am certain that the victims and the families of this heinous attack are constantly in our thoughts and prayers and will be for some time, if not forever!

Even though many have said, "the world as we know it has changed," the attack has galvanized us as a nation to protect all that we have built. It has dissolved differences, rekindled our deep patriotism, and has reunited us with an outpouring of help and support to our citizenry. The heroism in common man has surfaced time and again during and after the tragedy. Those actions are the God-given selfless acts we each possess, but normally have little opportunity to use!

Yet, we are a vital part of the capitalistic society that the terrorist tried to destroy. It is vital that we continue our efforts to conduct our business with even greater vigor and yet with sensitivity to our customers and employees. Our products are as important as were the "Victory Gardens" of the past. More than ever our society needs the emotional uplift our products provide. We will need to "sharpen our skills" even more than

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OHIO FLORISTS' ASSOCIATION
Bulletin
The Information Source for the Floriculture Industry Since 1929

OFA
An Association of Floriculture Professionals

Our mission is to assist the floriculture industry in being competitive, profitable, and responsive to its needs.
(As adopted by the OFA Board of Directors 2/18/01)

OHIO FLORISTS' ASSOCIATION
SPONSORS OF THE SHORT COURSE
U.S. Floriculture's Premier Educational and Trade Show Event
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e-mail: ofa@ofa.org home page: www.ofa.org

BULLETIN
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2000 OFA EXECUTIVE DIRECTOR'S REPORT

JANUARY 1 TO DECEMBER 31, 2000

Dennis M. Kirven
OFA Executive Director

FINANCES

The audited financial statement for the period January 1 to December 31, 2000 is included on page 6 of this *Bulletin*.

Review of 2000 Financial Statements: Includes Ohio Florists' Association, a 501(c)(5) Tax Exempt (not for profit) organization and OFA Services Inc., its (for Profit) subsidiary.

The 2000 year-end consolidated statements of financial position show the following assets and liabilities changes. Total assets were down $117,877 compared to the increase of $52,946 between 1999 and 1998. Our cash balance in the CNBC checking account declined $85,068 due to timing issues of 2001 Trade Show income. Investment in the "Reserve" grew from $378,894 to $387,755. The investment split recommended by the Finance Committee's Investment sub-committee is 37% CDs, 25% Vanguard 500 Index Fund, 20% Vanguard Money Market, and 18% Bank Money Market Sweep Account. The Vanguard Money Market and CDs fared well earning $21,039. The Vanguard Index 500 did not fare as well declining by $12,178. Office furniture and equipment decreased $27,903 due to write-offs of office equipment that was fully depreciated.

On a consolidated basis, total revenues were $1,991,291, above prior year by $6,967 from $1,984,324. As you can see we have had a relatively flat year. Trade Show booth sales were up $67,488 due to the increase in exhibit booths. Membership Dues were up $20,538 due to increased membership and retention efforts. Publication sales were down $19,261. In 1999 we had a great year in publication sales due to the release of two new books. We are anticipating the same in 2001 with the release of the interior plantscape and the growth regulator books. Investment income was down $25,552 due to fluctuations in the stock market. Directory advertising was down $20,516. This is due to the every- other-year cycle of printing our full membership directory. In addition we had a record breaking 10,277 attendees at the 2000 Short Course.

Total Expenses were $2,107,137 up from $1,933,299. The larger Short Course and Trade Show directly impacted expenses. Short Course expenses were $130,205 over prior year.

Income over expenses showed a loss of $115,846 versus an excess of $51,890 in 1999. Our 2000 budgeted excess over expenses was $33,522. This difference was mainly due to the timing of Trade Show booth sales and our unanticipated investment loss. For 2001 we have budgeted an excess of $25,560, and through May 2001 we are tracking at a much higher excess. This is mainly due to the income shift of Trade Show exhibit space and efforts of the staff in exercising close control of the accounts they manage.

OFA Forum

MEMBERSHIP

At the end of December 2000, our membership (including affiliates) stood at 3,504 versus 3,360 at the end of 1999, which is an increase of 144 members. That gain for the THIRD consecutive year continues the significant reversal of loss trend last experienced in 1997. Much of credit for this reversal goes to Melinda Howells, our Membership Coordinator/Manager hired in April 1998. She has a very aggressive promotion orientation, sensitivity to the many opportunities for membership promotion, and the understanding of the importance of regular recognition to new members.

Total paid membership was 3,430, up 169 members from 3,261 paid in 1999. Of the total paid membership, 1,676 are Active Growers (48%) versus 1,636 in 1999, 1,026 are Active Non-Growers (29%) versus 1,005 in 1999, 728 are Associates (21%) versus 694 in 1999. Honorary Members and Affiliates stood at 74 versus 70 in 1999. Of the total paid members, 24% (818 versus 789 in 1999) are from Ohio, 70% (2,388 versus 2,305 in 1999) are located outside Ohio and 6% (224 versus 233 in 1999) are located in foreign countries; Canada has the largest group, with 150 members.

OFA *BULLETIN*

The Ohio Florists' Association *Bulletin* has undergone extensive redesign since 1994, while continuing to provide the membership with timely and original technical, management, and marketing articles each month. The *Bulletin* is the association's best-known, continuously available educational vehicle. Its articles are reprinted with regularity in other floriculture publications and newsletters. It is also OFA's most well known, most useful member service, which continues to be fine-tuned annually adding a mix of articles to better satisfy our diverse member needs.

Again in 2000, the "fine-tuning" effort continued based upon the results of the member telephone survey of 1996, individual member input and suggestions, and guidance from the OFA publications committee, our associate editor/consultant, Peter Konjoian, and the OFA staff publication team of Melanie Wilt, Laura Kunkle, Steve Carver, Dennis Kirven, and Michelle Gaston. The team approach has been in place since 1994 and has flourished under the able leadership of Michelle Gaston.

To update member input about the *Bulletin*, a fax back survey was sent to a random sample of 1,710 members in August 2000. A total of 437 responded for a response rate of 25.5%. The results were summarized in March 2001 and will be discussed by the OFA Publications Committee in July 2001 to determine any changes or adjustments that may be needed in the year 2002.

To better serve our retail florist segment, we continued our relationship with the Michigan Floral Association to provide their *Michigan Florist Magazine*. This publication contains more specific information on floral design and florist shop management. In 2000, a total of 306 subscribed to the magazine from 40 states and 5 foreign countries This alternative allowed us to provide greater article emphasis in the *Bulletin* for growers, our largest member segment, as well as our interior plantscape segment, and the growing garden center segment. The number of color inserts increased from three to four in 2000.

We continue to fulfill the obligation to keep those in the industry across the country, which contributed so substantially to fund the Kiplinger Chair, informed about research and education efforts at The Ohio State University. As many know, the "Chair" or endowed professorship in floriculture was established in D.C. Kiplinger's memory. "Kip" was a professor and head of floriculture education at The Ohio State University. "Kip" also served as OFA's secretary-treasurer from 1952 until his death in 1977. We have provided the current chair holder, Dr. James Metzger, with a column dubbed the "Kip Korner." This every- other-month feature's purpose is to update the membership on floricultural research and education activities at The Ohio State University.

A Forum feature was added to the *Bulletin* in 1996. Its intent is to offer industry representatives the opportunity to provide our members with information or opinions of importance to our industry. Also, coverage of industry legislative and environmental issues is now regularly featured.

A publication change instituted in 1998 seemed well received by the membership and continues. Twelve issues of the Bulletin are still issued with the following changes. Monthly issues continue with the exception of a combined June/July issue. The twelfth issue is a SPECIAL EDITION – Sales Summary of Spring Plant Sales, including annuals and perennials, for the prior year conducted, compiled, summarized, and analyzed by Dr. Bridget Behe of Michigan State University and her team of student research assistants. The Association is one of three sponsors and for this support publishes an OFA version of the report under guidance of the OFA publications team.

EDUCATIONAL SEMINARS AND OUTREACH ACTIVITIES

Our Strategic Plan calls for "partnering" with other associations to offer educational opportunities to our membership and reduce duplication among associations. One of the longest running examples of this "partnering" is supplying the *Michigan Florist Magazine* to our members desiring a more in-depth publication dealing with floral design and retail floral shop management. Our review indicated that the *Michigan Florist*, a publication of the Michigan Floral Association, was the association magazine that provided the quality of articles and information that would be most beneficial to OFA members with a retail floral sales and design interest.

A second major partnering was started in 2000. Through the efforts of Melanie Wilt and an interior plantscape committee member, Sylvia Donner, OFA began a promotional and co-sponsorship partnership with the Mid-Atlantic Interior Landscape Conference Planning Committee. Wilt noted in her press release that, "The partnership is mutually beneficial because OFA can use its marketing and conference planning skills to help insure the sustainability of the conference, while introducing interiorscapers in the region to the programming and educational opportunities OFA is doing on a national level."

Our outreach activity schedule was not at full strength this year. The garden center committee's bi-annual garden center workshop on display and merchandising was postponed to obtain Ian Baldwin of Nursery Business Consultant as the featured presenter. It was scheduled for February 20, 2001 and to be held in Middletown, Ohio at Berns Garden Center.

Our interior plantscape segment held two Plantscape Pest Control Seminars in the winter of 2000. On February 1, 40

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EXECUTIVE DRIECTOR'S REPORT

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attended the seminar at the Franklin Park Conservatory in Columbus, Ohio. Attendees from Ohio, Indiana, and Kentucky participated. On February 10, the second seminar was held in Northwest Chicago using the Atrium at the Wyndham Hotel as the site of the diagnostics portion of the program. Fourteen attended from the states of Illinois, Wisconsin, and Michigan.

Retail hands-on outreach workshops were held in April with the following attendance in Louisville, Kentucky (10), Cincinnati, Ohio (37), and Columbus, Ohio (35) in cooperation with wholesaler Walter J. Engel Inc. The Kentucky Florists' Association co-sponsored the Louisville meeting. The fall retail workshops featuring sympathy work was held in Holland, Ohio and Akron, Ohio with a combined attendance of 37. OFA hosted the Midwest Regional Florists' Association meeting October 21-23. Representatives from Connecticut, Illinois, Indiana, Michigan, Ohio, Oklahoma, Tennessee, and Texas attended.

For the second year in a row an extensive series of grower outreach seminars were held in conjunction with grower member sponsors or state/regional grower groups. This year's program was a workshop demonstrating and using the PourThru Media Testing Technique. The following are the locations of the workshops and the attendance at each: New Jersey (30), Minnesota (23), and New York (13).

An International 4-day tour in conjunction with a 3-day visit to the IPM Show in Essen, Germany was held from January 31 to February 6, 2000. Twenty-five participated. The preparatory arrangements were by Ernst Walz, Ed Markham, and Tom Mulleder. OFA Staffers participating were Michelle Gaston, Melinda Howells, Wendy McAtee, and Team Leader, Steve Carver.

EDUCATIONAL MEETING AND TRADE SHOW

The Ohio Florists' Association Short Course celebrated its 71st anniversary in 2000 and has earned the reputation as the premier floriculture educational event with the most extensive, affordable choice of information and usable ideas in the United States. The Short Course has earned the title of "U.S. Floriculture's Premier Educational and Trade Show Event."

2000 was the third year back to Columbus and we, once again, broke all attendance records, for our eighth consecutive year, as well as cracking the 10,000-registered-attendee level. We had 10,277 attendees, up 870 over 1999. Obviously, Short Course educational registration income was also favorable, exceeding 1999 by $59,301, and over budget by $27,935. The 2000 overall demographics survey showed attendees from 47 states, 469 from Canada (up 11), and 176 from other foreign countries (up 35). A total of 3,238 (down 331) registered for the 180 seminars conducted by 150 industry professionals.

The Trade Show exhibit sales were once again up significantly in 2000. The 1,113 exhibit spaces sold represented 495 companies, an increase of 95 spaces and 16 companies versus 1999. The New Varieties Display was at 96 display tables and 36 companies, up 11 tables with the same number of companies versus 1999. The New Products Display was at 42 companies with 57 display spaces, up one company and 12 additional spaces versus 1999. The 2000 exhibit sales exceeded 1999 by an astounding $139,194.

Our all-industry Trade Show continues to benefit by being selected to introduce new equipment and products, making it a visit that allows attendees to see not only the "tried and true" performers, but also the newest in products and services. Its timing after the spring season and before the fall season positions attendees at a time when they know how successful the spring season was and with enough time and income to place orders of equipment and supplies for the fall and early winter. Just as important to the Trade Show's success is its management by our Trade Show Manager, Wendy McAtee. She combines the savvy of knowing what the show "needs to be" to satisfy the attendee, the sensitivity and knowledge of exhibitors' needs, and experience gained through her long time association (17 years) with the show.

Another strength, as confirmed in the exhibitor survey of 1996, is that the Short Course educational sessions are complementary to the Trade Show. Yes, both are of equal importance to exhibitors and attendees. The one stop visit to the Short Course is a satisfying event attracting both groups.

From a financial standpoint, we were pleased to be able to exercise better control of the combined Short Course/Trade Show expenses. Those expenses were under budget by $26,567 or 3.2%.

THE OHIO STATE UNIVERSITY

Since the Ohio Florists' Association, which was incorporated in 1931, has its "roots" with The Ohio State University and its early Secretary-Treasurer/Executive Directors were floriculture faculty members, the organization has continued to support floriculture-related programs in teaching, research, Extension, and student activities at The Ohio State University. Although exact records are not available, it is estimated that the Association has contributed more than $1.5 million to the University since OFA's inception.

Another educational area with the University is the payment of one-half tuition for one floriculture representative in Ohio State's Leadership Education and Development (L.E.A.D.) program. Our L.E.A.D. VIII recipient was Brian Benton, an Akron, Ohio retail florist. The Association has supported an industry representative since L.E.A.D.'s inception. A total of $1,700 was contributed to L.E.A.D. in 2000.

The Association also supported two scholarships at OSU – the D.C. Kiplinger scholarship of $500 awarded to Erica Humphrey of Oak Forest, Illinois and the Jerry Robertson Memorial scholarship of $500 awarded to Audrey Bates of Williamsfield, Ohio, both for the 2000-2001 school year. OFA, through the Ohio Floriculture Foundation (OFF), continues to support and administer the Gus Poesch Endowment. These funds are assigned to OFF's Development Fund designed to support approved requests for student education and research efforts by OSU's Department of Horticulture and Crop Science.

Since 1984 OFA has been the custodian of a scholarship fund set-up to help fund the college education of Jerry and Barbara Robertson's sons, Jeremy and Jason, following Jerry's untimely death in February 1984. Jeremy graduated from The Ohio State University in 1998 with a degree in Human Ecology. Jason graduated from the Kelley School of Business at Indiana University in 2000. With the graduation of both, all funds were distributed to them and the account was closed.

OFFICE ACTIVITIES

Historically, the Association's office has grown from locations in the homes of the early Association leaders Professor Alex Laurie, Dr. D.C. Kiplinger, and Dr. Harry Tayama to a rented suite on Ackerman Road in 1984.

In 1990, the Association purchased a 7,500-square-foot building at 2130 Stella Court and moved in January 1991. In February 1995 the Association paid off the building mortgage of $360,000 in just under five years. This was possible due to a combination of the payment of building pledges by 137 OFA members and the judicious fiscal management by your Association staff and its finance committee.

Libby Streamer joined the staff as Office Support Assistant in March 2000. Her pleasant personality, great phone answering techniques, and rapid absorption of the Short Course housing responsibilities are a great asset to OFA. The newer team members, plus the core team are hard working, member responsive, and work extremely well together to fulfill the Association's mission. Each brings their own strengths to the team, and the total team contribution is always greater and more effective than the sum of their individual strengths.

The 2000 OFA staff team, their current position, and their dates of employment and/or position changes follow:

• Michelle Gaston – Communications Coordinator (Started January 1, 1993) & Acting Assistant Executive Director (April 1997) & Promoted to Director of Association Projects (May 1999)

• Dr. Steve Carver – Technical Education Manager (Started May 31, 1994) & Systems Administrator (May 1998)

• Wendy McAtee – Trade Show Manager (Started February 1994) & Assistant Retail Education Liaison (April 1998)

• Laura Kunkle – (Started March 1998), Promoted to Communication Specialist (January 1999), and now functions as Technology Communications Manager.

• David Savoia – (Started May 1998) Accounting Manager

• Melinda Howells – (Started full time April 1998) Membership Manager

• Melanie Flax Wilt – (Started January 1999) Assistant Communications Coordinator; Now serves a Media Relations Manager

• Libby Streamer – Office Support Assistant (Started March 2000)

• Dennis M. Kirven – Executive Director (Started January 1, 1993)

As noted earlier, Michelle and Steve, along with our part-time consultant/Associate Editor, Peter Konjoian and with the more recent addition of Laura Kunkle and Melanie Wilt as well as the OFA Publications Committee, continue to combine to keep quality, accuracy, and usefulness in our OFA publications. That team is also responsible for the Tips series, *Bulletin*, *FirstNews*, *Exhibitor Connection*, and *Hotline*. Each of these publications and our web site, managed by Laura Kunkle, at www.ofa.org have been updated and re-designed, with a broader authorship to reflect modern communications developments. A "fine tuning" of each publication and the web site occurs throughout the year to be sure we serve the needs of our members. This team approach, committee input, and member feedback will continue to serve the membership well into the next millennium.

For some time we had expertise on our staff for upgrading, programming, and implementation of our computers and related systems. This effort helped us improve our communication effectiveness and timeliness. Each of the several individuals who carried that responsibility has left our employ. Yet, our programming and computer support continuous to be a serious need of the association and its staff. We have used a combination of existing OFA staff (Howells-iMIS/McAtee-NT/Carver-Systems Administrator), supplemented with computer consultants, and have invested in iMIS software, an off-the-shelf association management tool. With adequate training on the system, as well as additional computer software training with the key staff noted, we hope to serve those needs while controlling our overall costs.

Wendy's strong association and trade show management skills have safely anchored our largest income generator, Trade Show sales. OFA exhibitors feel our Trade Show has the experienced attention it deserves. She walks the "tight rope" of representing and responding to her customer exhibitors, while managing the income and expenses associated with the income source responsible for nearly 50% of the Association's total gross income. Her management of the event and her knowledge and sensitivity of the exhibitors and their relations with others in the show is largely responsible for the comment that it is the "best organized" in the industry. Even with that said it is apparent that as the show grows it will soon be too much for one person to manage alone. As an initial step recognizing this situation, Michelle Gaston has been asked to assume the responsibilities of Assistant Trade Show Manager while David Savoia handles Short Course sponsorship, and Melanie Wilt handles Short Course advertising.

Our OFA Mail Supervisor passed away in December of 1996. We are pleased that the OFA Board of Directors and the OFF Board of Trustees saw fit to establish the Paris Fracasso Production Scholarship for $2,000 per year through the Bedding Plant Foundation Institute (BPFI) Scholarship Fund. The second scholarship in Paris' name was awarded in 2000 to Sarah McQueen, a senior in Horticulture Agribusiness at Michigan State University.

As pleased as I am of our full time OFA staff's contributions, it would be impossible to accomplish all we do, particularly arranging and conducting the Ohio Florists' Association Short Course each year, without additional part-time assistance. Making it possible to conduct an event of this magnitude is a group of interested Short Course volunteers and workers that numbered 78 in 2000. While at the office, other helped us on a daily basis. Emilie Miller provided general office assistance including answering hundreds of Short Course registration questions and filling information requests. Other office OFA "part-timers," were Mary Jane Weals, DeAnne Kirven, and Niki Howells, who provided support, guidance, and dedication equivalent to our regular OFA staff. Also Destination Marketing and Management (DM&M), whose principals Woody and Linda King successfully handle the parking and shuttle transportation to the compliments and raves by the hospitality community and attendees alike. This type of commitment by the "regulars," "part-timers," and DM&M made it possible to once again conduct the most successful Short Course ever! All need to be commended for their "long hours" and dedication to assure that attendees, exhibitors, and members alike received an outstanding educational experience as well as an enjoyable experience while at the Short Course.

The support and assistance we receive from The Ohio State University and its faculty becomes more significant each year. The OSU team of Claudio Pasian, Peg McMahon, Kiplinger Chair-holder Jim Metzger, and Steve Nameth, once again participated in planning and assisting with the 2000 Short Course. The joint funding by OFA and the Ohio Floriculture Foundation (OFF) of the Floriculture Industry Roundtable of Ohio (FIROO) has resulted in the addition of 20

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EXECUTIVE DRIECTOR'S REPORT

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Extension agents and specialists in many disciplines from Ohio and surrounding states now available to support firms and individuals in the floriculture industry, not just in Ohio, but also throughout the country.

Charles Behnke, Lorain County Extension Agent, coordinates this effort along with Claudio Pasian, OSU Extension Specialist. As important as it is to have added more technical support directly available to producers, we are also pleased to have the continued support and assistance with our educational efforts by faculty, staff, and private consultants. Our thanks to Richard Lindquist (OSU/OARDC), Chuck Powell (Plant Health Advisory Services), Gary Anderson, Terry Lanker, and Bob McMahon (OSU/ATI), and the encouragement of the respective Departmental Chairs and College Administrators at OSU.

The OFA Executive Committee and the elected Board of Directors continue to give us the flexibility to accomplish our tasks. In addition, they provide us with large doses of support, guidance, understanding, and encouragement.

Volunteer assistance and leadership continues to be the key to our educational success. Our OFA committee members and chairpersons provide us with information, guidance, and many actually assist by helping fill the gaps to make OFA a true member and committee-driven organization.

The foundation has been successfully laid for some years now. The names and faces of the volunteers, elected Directors, and staff may change, but that foundation will permit us to continue to accomplish our mission "to provide superior educational services to keep our industry profitable, competitive, and responsive to the needs and interests of consumers and make a positive contribution to our environment while increasing public knowledge of the care, use, and value of floral products and services."

THE FUTURE

Our tag line, "OFA, Making Floriculture Work for You," aptly describes our purpose. The key to "making floriculture work," continues to be member involvement. Our goal is to continue to: 1) solicit active committee member volunteers, 2) appoint dedicated, interested chairperson leaders, and 3) elect Directors who effectively evaluate requests and make decisions in keeping with member needs, our strategic plan, and our mission. We will then, most assuredly, supply the products and services our industry needs.

Yet, to be most effective, we (staff, committees, chairpersons, directors, and officers) need to know your true thoughts and opinions. Do take the time to call, write, fax, or e-mail us. Tell us not only what needs changed or added, but also tell us what needs to remain unchanged. Tell us those things that are most helpful, useful, and important to you! That information will assure you that we do not inadvertently eliminate those items and programs that are of most importance to you! Thanks to all of you that have responded to our inquiries and surveys. As you have seen, those results are used as the basis for the changes and improvements made to serve you BETTER! **OFA**

OHIO FLORISTS' ASSOCIATION INC. AND O.F.A. SERVICES INC.

CONSOLIDATED STATEMENT OF REVENUE AND EXPENSES FOR THE YEAR ENDED DECEMBER 31, 2000*

Revenue:	
Trade Show	$1,123,185
Short Course	470,836
Dues	235,110
Publications	51,410
Short Course Reception Sponsorship	29,695
Investment Income	28,490
Workers' Compensation program	20,563
Rent	16,533
Directory advertising	3,415
Schools, tours and other educational meetings	2,304
Sponsorship Income	5,750
Miscellaneous	4,000
Total Revenue	$1,991,291
Expenses:	
Employee leasing	$579,918
Short Course	715,532
Trade Show	210,199
Contributions	27,950
Professional fees	57,909
Depreciation	57,431
Bulletin	43,972
Building maintenance and taxes	38,026
Membership Directory	16,911
Publication costs	55,916
Administrative meetings/functions	23,453
Office equipment leases	31,771
Office supplies	17,670
Telephone	13,794
Postage	12,940
Travel	42,129
Membership recruitment and correspondence	28,864
Credit card processing fees	22,674
Office maintenance	35,170
Member newsletter	10,280
Distributions – Robertson Fund	9,691
Insurance	8,473
Public relations	8,306
Dues and subscriptions	4,352
Hotline	1,315
Alex Laurie Award	2,686
Retail Extension	3,087
Environmental Affairs	714
Miscellaneous	26,004
Total Expenses	$2,107,137
Change In Net Assets	$(115,846)
Net Assets – Beginning of Year	$1,158,618
Net Assets – End of Year	$1,042,772

* Audited financial statements are available upon request. This document was transcribed from the Consolidated Financial Statements with the independent auditor's report of December 31, 2000.

OHIO FLORISTS' ASSOCIATION 2000-2001 MEMBERSHIP REPORT

Association Category	Ohio	Out of State	Foreign	Total	
Active: Grower (B, C, D)	344	1,203	90	1,637	47%
Active: Non-grower (A)	273	665	111	1,049	30%
Associate (S)	187	482	30	699	20%
Honorary Members (H) & Affiliates (F)	35	40	2	77	3%
Total	**839 24%**	**2,390 69%**	**233 7%**	**3,462**	

Domestic Members

	Paid	Honorary & Affiliates
ALABAMA	19	0
ALASKA	1	0
ARIZONA	4	0
ARKANSAS	6	0
CALIFORNIA	151	4
COLORADO	43	0
CONNECTICUT	30	1
DELAWARE	11	0
DISTRICT OF COLUMBIA	3	1
FLORIDA	129	3
GEORGIA	48	2
HAWAII	11	1
IDAHO	4	0
ILLINOIS	194	2
INDIANA	118	2
IOWA	42	1
KANSAS	20	1
KENTUCKY	57	0
LOUISIANA	15	0
MAINE	7	0
MARYLAND	49	0
MASSACHUSETTS	59	1
MICHIGAN	234	5
MINNESOTA	64	1
MISSISSIPPI	12	0
MISSOURI	59	0
MONTANA	13	0
NEBRASKA	9	0
NEVADA	0	1
NEW HAMPSHIRE	25	0
NEW JERSEY	71	0
NEW MEXICO	6	0
NEW YORK	172	5
NORTH CAROLINA	56	2
NORTH DAKOTA	2	0
OHIO	804	35
OKLAHOMA	10	0
OREGON	53	0
PENNSYLVANIA	191	2
RHODE ISLAND	9	0
SOUTH CAROLINA	14	1
SOUTH DAKOTA	6	0
TENNESSEE	24	1
TEXAS	70	2
UTAH	8	0
VERMONT	5	0
VIRGINIA	48	2
WASHINGTON	42	0
WEST VIRGINIA	30	0
WISCONSIN	94	0
WYOMING	2	0
Total	**3,154**	**75**

Foreign Members

	Paid	Affiliates
ARGENTINA	1	0
AUSTRALIA	10	1
CANADA	146	0
CHILE	1	0
COLOMBIA	1	0
COSTA RICA	1	0
DENMARK	3	0
FRANCE	3	0
GERMANY	7	0
INDIA	1	0
INDONESIA	1	1
ISRAEL	4	0
ITALY	7	0
JAPAN	12	0
KENYA	1	0
KOREA	1	0
MEXICO	5	0
NETHERLANDS	10	0
NEW ZEALAND	3	0
SOUTH AFRICA	2	0
THAILAND	1	0
UNITED KINGDOM	10	0
Total	**231**	**2**

	Year End 6/30/01
Paid Memberships	
Ohio	804
Out of State	2,350
Foreign	231
Total	**3,385**
Honorary Members and Affiliates	
Ohio	35
Out of State	40
Foreign	2
Total	**77**
Total Membership	
Ohio	839
Out of State	2,390
Foreign	233
Total	**3,462**

HOW TO DETERMINE THE SOURCE OF PLANT PROBLEMS

Continued from page 1

Good diagnosticians start with lots of background information. They also have a common-sense approach to problem-solving. They do not get sidetracked. They keep their eyes and ears open to new information. They ask questions and get outside help, often from laboratories and plant clinics. They are constantly learning and improving.

Good diagnostics depends on good knowledge management (record keeping). How can you compile and apply good background information about plant stress without reliable records in a form and place where they can be used?

UNDERSTANDING HOW TO DEAL WITH SYMPTOMS

A symptom is any noticeable, abnormal plant condition. The most common error made in diagnostics is that of misinterpreting symptoms. All too often, the inexperienced plant person does not know how to make good use of the symptoms that are there. They let symptoms confuse them or lead them off on the wrong track.

Symptoms let us know there is a problem. Most of us also feel that symptoms should help us directly determine the causes or the source of the problem. Generally, however, this does not happen at the first observation of a symptom.

Part of making a correct diagnosis is learning that symptoms are used initially to merely make us aware that a problem exists. You need to "see" and define the problem correctly in the beginning. When did the problem start? Is it progressing rapidly within the plant or to other plants nearby? Is only one type of plant affected?

Careful observation and answers to questions like those listed above will usually reveal more symptoms. When you begin to see more symptoms, you will begin to see the problem in its entirety. Only then can you begin to use symptoms to help you determine the causes of the problem. The more symptoms you have, the closer you will be to determining the causes.

Take plenty of time in this problem perception phase of diagnosis. Don't be rushed into thinking about causes of the problem too soon. This is a common tendency, which leads to hasty conclusions and failure in diagnosis.

IMPROVING SYMPTOM PERCEPTION

You can improve your ability to observe symptoms by changing your observational perspective or point-of-view. There are five main "perspectives" that you should consider: 1. the close-up view, 2. the general view, 3. a consideration of the times involved, 4. your past knowledge and experience, and 5. the impact of more data from outside labs or clinics.

THE CLOSE-UP VIEW

The detailed or close-up view is a common method used to look for symptoms. It can be very rewarding. You might need a hand lens magnifier to view the plant tissue. Spider mites or powdery mildews can often be diagnosed quickly in this way. Don't forget to knock the root ball out of the container and get a good look at the roots. Feel and smell the growing medium.

THE GENERAL VIEW

In many cases, however, the more general view is just as important as the close-up view. Look for general wilting, stunting, or discoloring of leaves. Compare the plant with "symptoms" to a fresh, healthy plant and to other plants nearby. Does the problem occur on only one kind of plant or on several kinds?

Taking a general view of the problem plant or plants gives you a chance to make observations concerning the environment, too. Are the problem plants associated with a particular portion of the greenhouse? Spend some time investigating the nature of the environment surrounding the sick plant(s). View the plant(s) at different times of the day.

A CONSIDERATION OF TIME

How long have the symptoms or set of symptoms been present? The plants cannot tell you how long they have been sick. However, you can learn to recognize and evaluate the perspective of time in plant diagnostics by using indirect methods and knowledge. For instance, experienced growers routinely keep records of plant conditions and care practices. They can trace back through records to the start of a particular problem. This is another way that good knowledge management can help you.

USING YOUR PAST KNOWLEDGE AND EXPERIENCE

As we study more about plants, we learn the general things to look for in different situations or on different types of plants. Sweet potato vines, for example, are particularly susceptible to mites. Certain Hiemalis begonias or verbena varieties often are seen with powdery mildew. When caring for these plants, be on the lookout for these problems.

THE IMPACT OF MORE DATA FROM OUTSIDE LABS

Sending plant material and a description of the problem to a diagnostic clinic can be helpful. It is perhaps more useful as we move to the determination of causes in the diagnostic process. The knowledge of the clinicians can add to your knowledge and experience. They will look at the plant parts through a microscope. They can culture pieces of the plant to see if a bacterial or fungal pathogen is present. Working with a plant clinic can be most helpful if done properly.

Gathering more data also includes finding out about the plant's chemical environment. Knowing the soluble salts and pHs of the growing media of the symptomatic plants is basic to this diagnostic area. Most good growers can do this themselves with reliable testing equipment.

Further chemical information can be obtained by sending growing media, water, and/or tissue samples to a laboratory. Remember, pathology laboratories and chemical analysis laboratories look at different aspects of your problem. You may have both a chemistry (non-infectious) problem and a biotic (infectious) problem present at the same time. In many cases, you should have both types of laboratories assist you.

DETERMINING THE SOURCE OF PROBLEMS

The whole set of symptoms you have drawn together can now be used to help determine the source of the problem. Generally, there is not just one isolated source of a plant problem. There may be a primary or most obvious cause, such as the occurrence of spider mites or powdery mildew fungus. However, some associated environmental stress might

also be present, contributing greatly to the problem.

Determining the causes of plant problems is especially difficult because of the widespread occurrence of "non-specific" symptoms. Non-specific symptoms like leaf yellowing, leaf drop, or browning of the tips and edges of leaves may be serious and easily detected. However, they do not, in and of themselves, relate to a specific cause.

As I have said above, I strongly feel that the only way to arrive at a correct determination of the causes of a plant problem is to gather data. Enlarge the set of symptoms and conditions. Even if your set of symptoms includes nothing more than a group of individually non-specific conditions, it might still lead to a correct conclusion as to causes if you will spend the time to do it well.

IMPROVING OBSERVATIONAL SKILLS

Here are some suggestions to improve your observational skills and gather more diagnostic data:

1. Look for a pattern in the planting or on individual plants. Are symptoms different or consistent, uniform, or scattered?

2. What is the frequency and intensity of the problem? Does it appear to have stages of development?

3. Are there signs of pathogens, pests, or other causal factors (chemical residues, odors, holes in the leaves, webbing, insect frass, spore bearing pustules)?

4. Is there any evidence of plant recovery on the new growth?

5. Do nearby plants (same or different) show any symptoms?

6. Inspect the interior, crown, and roots of plants. Cut open stems, crowns, flowers, fruits, and roots. Are there any hidden, internal symptoms or signs of disease (e.g. rotten, smelly or discolored tissue)?

7. What is the condition of the growing medium? Wet? Dry? Compacted? Smelly?

8. If the plant is in a pot, what is the distribution of roots in the pot? Is there any evidence of root growth and then rotting or root re-growth and recovery?

PLANNING PROBLEM SOLUTIONS

You may have noticed that I have made repeated reference to determining the "causes" of a certain problem, not the "cause" of a problem. Trying to identify a single cause of a plant problem is the second most common error in diagnosing plant problems. (Remember, the first most common error is that of incorrectly interpreting a non-specific symptom.)

Though there may well be a primary or most obvious cause, usually there are several secondary causes as well. Sometimes secondary causes are easier to deal with than the primary cause. As you learn to recognize more of the causes often associated with one particular problem, you will see that you will have more latitude in the types of treatment you may want to plan and carry out. Perhaps changing the environment will forgo the need for a pesticide application.

Planning the solution(s) to the problem is the third step in the diagnosis process. If you have proceeded through the first two parts of the diagnosis properly, you should be in a good position to plan corrective measures. You will have determined primary causes that need immediate attention. You will have determined secondary causes that also need attention, but perhaps not immediate attention.

Remember that good diagnosis takes time. Get together your problem-solving plan carefully. Check it out from different perspectives with different co-workers. Don't ignore the "realities" of horticulture. If excessive wetness, for example, persists in the growing medium in a ground bed or pot and causes root rot, treatment with a fungicide will do little good. You really need to improve the drainage of the bed or growing media, change the kinds of plants you are growing, or alter your watering practices.

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OFA COMMENTS ON SEPTEMBER 11 EVENTS

Continued from page 1

ever now. We cannot leave anything to chance. Our efficiency and effectiveness will be tested and we must be prepared to make the most of that opportunity. By conducting our business well, we strengthen the base needed for our economy to rebound. While doing that, we provide products to improve our feeling of well being for ourselves and others which help overcome the often-depressing moments we each are bound to experience.

I recognize that you, individually and as a business, have probably already given financially. I also realize others have been so stunned or concerned with personal losses that you may not have had time to contribute. Those of us that did give initially now recognize that we need to do more. The need is not over; unfortunately it continues! We recognize that no one idea captures the feelings of our OFA membership, but I would like to mention two ways you can "do something."

One of our members suggested that October 11, one month from the tragedy, be designated as "A Day for America," and those willing or so moved can voluntarily donate their proceeds to recognized Disaster Relief agencies.

From an Association standpoint, we want to join with you to contribute as well. We are establishing OFA's Floriculture for America fund. As you renew your dues from now until December 31, 2001, we are suggesting that instead of taking the 5% early pay discount, consider applying it to the American Red Cross (ARC) Disaster Relief Fund. If you choose to voluntarily do that, OFA will MATCH your 5% and will forward your donation to the ARC on behalf of you and the Association. We have provided a space on our dues renewal to choose that option.

Let's continue our thoughts, prayers, and contributions as well as our business efforts to assure that our products will be available to provide the emotional uplift everyone will want and need. Don't forget the prayers and GOD BLESS AMERICA!

OFA

AN INTRODUCTION TO PLANT GROWTH REGULATION

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Editor's note: *Comments from last year's survey of Bulletin readers and recent Short Course seminar evaluations included requests that we continue to address topics at two levels of understanding, introductory and advanced. The topic of Plant Growth Regulation lends itself to this approach perfectly. As a result of this guidance from you, our readers, we've included a two-part article authored by Ohio State faculty Michelle Jones and Jim Metzger, and OSU's Stakeholder in Residence appointee Peter Konjoian. Complementing this article is the recent OFAS release of Tips on Regulating Growth of Floriculture Crops, which includes contributions from floriculturists nationwide.*

A significant reference point in the modern history of floriculture is the discovery of chemical plant growth regulators (PGRs). In pre-PGR days growers regulated the growth of crops such as geraniums, chrysanthemums, poinsettias, and bedding plants by manipulating the greenhouse and plant environments. By either supplementing or withholding water, fertilizer, heat, and light the rate of growth could be increased or decreased to adjust crop timing and quality. Pinching and spacing practices were also used to regulate growth as soft or hard pinches and tight or open spacing all influenced crop development.

Sometime during the 1960s the first of our modern chemical growth regulating products hit the greenhouse scene. By the mid 70s A-rest, B-Nine, Cycocel, and Florel were receiving a tremendous amount of attention in university research programs. Early results categorized the major products by the crops whose growth could be controlled. Back then, to control height, A-rest found a niche on Easter Lilies, Cycocel on poinsettias, and B-Nine on pot mums. In just another decade or two there will be few growers left among us who have first-hand experience folding poinsettia stems as a method of regulating their final height.

THE HORMONAL EPICENTER

During this period floriculture researchers also began translating their knowledge of fundamental plant hormone physiology into commercial application. Auxin research resulted in the development of synthetic forms of the hormone that cuttings were dipped in prior to sticking. The increased level of auxin at the base of the cutting stimulated root initiation and root development. Both responses resulted in increased profitability for growers.

Today our understanding of hormone physiology is advancing in what feels like light year increments. Not only do we use auxins in the commercial greenhouse, but we also apply various forms of gibberellic acids, cytokinins, and ethylene. Of the five classes of plant hormones, the only class that we don't yet use commercially is abscisic acid, the hormone responsible for leaf abscission. In four decades we've learned to use 80 percent (four out of five) of the plant world's hormone classes profitably in the commercial greenhouse.

As researchers learned about plant hormones they were next able to determine how and why the commercial plant growth regulators A-rest, B-Nine, Cycocel, and more recently Bonzi and Sumagic work. Once it was understood that gibberellic acid is largely responsible for cell elongation it was determined that these synthetic chemicals helped control stem stretch by interfering with the plant's ability to make and use this hormone.

At first it wasn't understood why Cycocel worked on poinsettias but not on pot mums, and why B-Nine worked on pot mums but not geraniums. Then it became understood that many forms of gibberellic acids exist in plants and that our major floriculture crops have different combinations of these forms. As a result, the active ingredient in one PGR product worked on certain forms of gibberllic acids, and therefore crop species, while other products did not. This knowledge answered the question of why a PGR product controls height in one crop but not another.

Today's generation of modern chemical growth regulators includes Bonzi and Sumagic, both extremely versatile and very active chemicals. Associated with their increased activity is the fact that they are also more universal in their effects over the range of different gibberellic acids found in the array of crops we grow. As a result, these two products are finding uses across a much broader range of crops than their predecessors, and at significantly lower rates.

The product Florel is interesting because its active ingredient releases the hormone ethylene upon penetration of the plant's tissue. While it is usually included in the group of chemical PGRs it is important to understand that it doesn't really belong there. The other products – A-rest, B-Nine, Bonzi, Cycocel, and Sumagic – are synthetic chemicals that, once applied to a plant, interfere with gibberellic acid activity which then affects growth and development. This mode of action is indirect. Florel differs in that it releases the actual hormone ethylene in the plant tissue, a more direct mode of action. The result is a nearly complete range of crops that responds to treatment.

BIOTECHNOLOGY

In the second part of this article Drs. Metzger and Jones discuss hormone physiology from the biotech perspective. Understanding how hormones and their physiology are at the center of crop development is paving the way to engineer plants that will not require PGR treatment in the future. Their

discussion of how biotechnology will help commercial greenhouse growers increase their profitability in the near future is very interesting.

HOW TO USE THE PRODUCTS

The remainder of this part of the article will focus on the five commercial PGRs and Florel. The information is extracted from Dr. Jim Barrett's chapter "Mechanisms of Action" in *Tips on Regulating Growth of Floriculture Crops*. Please refer to the book for a comprehensive handling of PGRs. The five commercial products are discussed in order of the relative activity of their active ingredients.

B-Nine: Concentrations range from 1,250 to 5,000 ppm. It is not effective as a drench and therefore only applied as a foliar spray. It is mobile in the plant, moving to all plant parts soon after application. B-Nine is effective on a fairly wide range of species with a few notable exceptions, including geraniums, impatiens, pansy, lilies, and some other, less popular crops. It is less active in warmer climates, seedlings in plug trays are more sensitive than in finished containers, and often multiple applications are required to achieve desired growth control.

Cycocel: Its use is expanding but still centers primarily on poinsettias, geraniums, and azaleas. Concentrations range from 1,500 to 3,000 ppm. While Cycocel is most often applied as a foliar spray, it does have drench activity and can be applied to the growing medium at 300 to 500 mg per 6-inch pot. It does not provide as much control as a drench as some other products applied in this manner. Because Cycocel is similar to B-Nine in terms of relative activity, often multiple applications are required. Also, Cycocel is less active in warm climates.

A-Rest: Concentrations range from 5 to 15 ppm for plugs, 25 to 50 ppm for established plants. It is effective both as a spray and drench and is mobile. Drench rates range from 0.15 to 0.5 mg per 6-inch pot. A-Rest is effective on a wide range of crops. Major crop uses include bulb crops, lilies, hanging baskets, and plugs. It is a preferred product on plugs due to its level of activity and ease of use.

Bonzi and Sumagic: New generation chemistry with both products belonging to the same class of extremely active chemicals. Bonzi's concentrations range from 2 to 90 ppm, Sumagic's from 1 to 50 ppm. They both can be applied either as a spray or drench. Unlike the other PGRs discussed to this point, Bonzi and Sumagic spray applications carry an added effect. Excess spray that drips off of the plant and onto the growing medium then acts additionally as a drench. Therefore, inconsistent application will result in inconsistent response. Once growers familiarize themselves with the level of activity of these products, more growth control can be achieved with fewer applications and less active ingredient.

Florel: Concentrations range from 300 to 500 ppm. Applied only as a foliar spray and effective on most floriculture crops. In addition to inhibiting internode elongation, Florel also stimulates lateral branching and inhibits flower initiation and development.

PRACTICE MAKES PERFECT

Learning to use PGRs takes time and practice. Perhaps the most important rule to learn is that an application of any of the products should only be made to plants that are growing actively. If plants are not growing actively then they are by definition experiencing some degree of stress. Depending on the nature and degree of the stress, applying a PGR in such situations often results in negative responses, such as extreme stunting, abnormal growth, or delayed flowering.

Think of PGRs as follows: use of these products can make a good grower better, or a poor grower worse. Geographic and climatic conditions, greenhouse environment conditions, and cultural practices all make PGR use a combination of science and art. **OFA**

The Future of Plant Growth Regulators

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Control of plant growth and architecture is a major consideration during the production of many floriculture crops. At present, growers have many effective tools at their disposal to control plant growth. Most of these technologies are based on the application of a chemical. The use of chemical growth regulators can lead to considerable additional costs to the grower. This, along with environmental concerns about agricultural chemicals in general, highlights the need for alternative methods of growth regulation that are more cost effective with reduced environmental impact. Currently, many new technologies for growth regulation are being developed and evaluated. In this article we discuss a few of these that show particular promise for reducing the reliance on chemical growth regulators.

How do plant growth regulators work? Plant growth and development is controlled and integrated by chemicals produced within the plant called hormones. These natural growth regulators are present in very small amounts, and promote, inhibit, or modify physiological processes. Synthetic plant growth regulators (PGRs) work by influencing – either positively or negatively – the status of a specific hormone within the plant. Some commercial PGRs, like Florel™, work by releasing the naturally occurring plant hormone, while others block the biosynthesis (Bonzi™) or action (MCP or EthylBloc™) of the hormone. Likewise, many of the new methods of growth regulation target some aspect of the plant's hormonal regulatory system.

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THE FUTURE OF PLANT GROWTH REGULATORS

Continued from page 11

If not chemicals, what? Some of the new, non-chemical technologies for growth regulation involve manipulation of some aspect of the greenhouse environment, such as temperature (DIF) or light. However, while reducing the need for chemicals, some of these techniques can be difficult or costly to implement. The most advantageous method of growth regulation is one in which the grower inputs are minimal; that is, the regulation of growth is built in the plant itself. Therefore, plants genetically predisposed to specific desirable growth habits will lead to crops that are easier and cheaper to produce. Traditional genetic approaches to plant growth regulation rely on conventional breeding. One of the limiting features in conventional breeding programs is access to the right genes. With the recent initiation of the Ornamental Plant Germplasm Center at Ohio State University, this will be less of a problem for breeders of ornamental plants in the future. Another limitation in conventional breeding programs is that cultivar development is a slow and expensive process, particularly for species like chrysanthemum and poinsettia.

Genetic engineering provides an attractive alternative to conventional breeding because individual traits can be incorporated quickly in existing cultivars, which can greatly reduce the time and costs of development. This is especially relevant to floriculture crops in which there are many species, each with numerous cultivars under commercial production.

In addition, there are two other advantages of a biotechnological approach to crop improvement. First, genes conferring useful traits from other species, even from non-plant species, can be transferred. Second, it is possible to "turn off" genes through so-called antisense technology in which a copy of an existing gene is inserted into a plant in the reverse orientation. This technology is useful in situations where it is desirable to reduce the production of chemicals, such as toxins, allergens, or even ethylene. Biotechnology forms the basis of most of the new technologies that we discuss in this article.

Height control. The first step in developing new methods of growth regulation is the identification of suitable targets. Most currently used PGRs for height control work by inhibiting the synthesis of gibberellins, a class of plant hormones that controls stem elongation. Cycocel, B-Nine, Sumagic, and Bonzi are examples of such compounds. Likewise, it has been possible to genetically engineer plants to underproduce gibberellins by targeting genes in the gibberellin biosynthetic pathway. However, much more work needs to be done before this strategy becomes a viable means to control growth in floriculture crops. Plants engineered to produce less gibberellin tend to be extremely dwarfed and look as though they have been treated with an excessive dose of a growth retardant. This is because gibberellin biosynthesis is usually greatly reduced during the entire life cycle of the engineered plant. In contrast, growers apply growth retardants at doses that do not result in severe reductions in gibberellins, and therefore, less reduction in growth. Moreover the inhibition of gibberellin biosynthesis by PGRs is not permanent and the application can be timed during the appropriate portion of the production schedule so that plant height can be controlled to a rather precise degree. So far, this has not been achieved using plants genetically engineered to under-produce gibberellins. However, with current technology, it should be possible to engineer plants in which gibberellin biosynthesis is reduced during specific times and in specific tissues so that desirable reduction in plant height is achieved.

It is well known that the light environment has a profound impact on plant growth. Plants use light signals as a means to detect how close their neighbors are. Red light inhibits stem growth while far red light causes stems to stretch. Plants grown in open sunlight are more compact because the ratio of red to far-red light is high. On the other hand, when plants are grown under crowded conditions, like those on a typical greenhouse bench, there is a greater proportion of far-red light, and plants respond by stretching. Therefore, another strategy in height control is to modify the greenhouse light environment. The recent development of photoselective plastics that selectively filter out the far-red light have shown great promise in reducing the need for chemical growth regulators for a variety of floriculture crops.

Alternatively, biotechnology can be used to modify how plants respond to the light environment. The sensor for measuring the relative amounts of red and far-red light is a plant pigment called phytochrome. Plants that have more phytochrome are shorter because they "see" more of the growth inhibiting red light signals than normal plants. One way to generate plants with more phytochrome is to put an extra copy of the gene coding for phytochrome into plants. This has been done with one floriculture crop – chrysanthemum – resulting in plants that are 15 percent to 20 percent shorter, but otherwise identical to the original cultivar.

Prolonging post harvest life. The quality of many cut flowers deteriorates rapidly after harvest. A short vase life is a major obstacle in the marketing of these flowers. The post harvest life of most cut flowers is limited by the onset of petal senescence. The senescence of many flowers is regulated by internal production of the gaseous plant hormone ethylene and accelerated by external ethylene contamination in wholesale or retail environments. Because of risk of exposure to external sources of ethylene, most PGRs used to prolong vase life of cut flowers block ethylene action, rather than biosynthesis. Examples of this class of PGRs include silver thiosulfate (STS) and 1-methylcyclopropene (EthylBloc). Genetic engineering approaches have created flowers with enhanced vase life without STS treatment. In carnations, internal synthesis of ethylene in the flowers was inhibited by turning off the gene for the last step in the ethylene biosynthetic pathway using antisense technology. These flowers last three to four days longer than non-engineered flowers. However, despite the reduced capacity to make their own ethylene, the flowers are still sensitive to external ethylene contamination.

More recently flowers have been genetically engineered to be insensitive to ethylene, thereby mimicking the action of chemicals like STS and EthylBloc. Flowers from genetically engineered petunia plants that are insensitive to ethylene last at least 10 days longer than non-engineered flowers. One huge advantage to this technology is that it can potentially reduce the need to employ expensive ethylene mitigation processes during shipping and storage.

In some cut flowers, ethylene is not a major factor in vase life. A related phenomenon that occurs in many potted plants is leaf yellowing. Likewise leaf senescence in many species is also relatively insensitive to ethylene. However, applications of members of another class of plant hormones called cytokinins are able to delay senescence in both cut flowers and leaves. Biotechnology has been used to generate plants that synthesize more cytokinins only when the leaves begin to senesce and turn yellow. By utilizing a gene involved in cytokinin biosynthesis isolated from *Agrobacterium tumafaciens*, the bacterium that causes Witch's Broom in plants, a number of species have been genetically engineered to produce more cytokinin. For example, petunia plants genetically engineered with this gene exhibit reduced leaf yellowing following drought stress. This same technology has been used to produce plants of an ornamental tobacco species (*Nicotiana alata*) that exhibit a significant delay in both leaf and flower senescence.

Conclusions. There are a number of new technologies at advanced stages of development that have great potential in reducing reliance on traditional chemical growth regulators. How much these technologies will replace chemical PGR applications will depend on the premium that growers will have to pay for them. Regardless, there will always be a need to have chemical PGRs. The sheer number of floriculture crops and cultivars makes it virtually impossible to totally eliminate the need for chemical PGRs. More likely, these new technologies will be utilized on large volume species and cultivars. **OFA**

CYCLAMEN – A VERSATILE COOL SEASON CROP

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Improved cultivars, growing techniques, and schedules have reduced the production time for cyclamen from more than a year to less than seven months. Most are produced and sold as flowering potted plants. In addition to potted plants, cyclamen is commonly used in floral arrangements and as cut flowers in Europe. In the United States, a late winter bedding plant market is emerging in areas with moderate temperatures.

Earlier cyclamen cultivars were open-pollinated while most cultivars today are F_1 hybrids. Several cultivar series are available in flower colors from white to pink, red, and purple. Some recent cultivars are fragrant or have nontraditional flower forms such as ruffled and wavy petals or bicolored flowers. Although development and morphology among individual plants are more uniform than earlier selections, larger variation than in F_1 hybrids of other species can be expected.

The F_1 cultivars can be divided into three main categories. The maxi type or large flowered selections are similar to the earlier open-pollinated cultivars. They are recommended for production of high quality large florist cyclamen in 6- or 7-inch pots. The mini or miniature types are very popular in 3-, 3 1/2- or 4- inch pots. Two or three miniature cyclamen are sometimes planted together in 6- or 7-inch containers. The intermediate or midi types are excellent in 4- or 5-inch pots for year-round production. They combine the abundant and early flowering of the miniature cyclamen with the large flower size and growth habit of the maxi types.

Cyclamen used to be asexually propagated by the enlarged hypocotyl (stem portion between the root and the seedling leaves), commonly called the corm. Today, seed is the preferred propagation method. There are 2,500 seeds per ounce, although the seed is usually sold by count rather than weight. At proper storage with low relative humidity and 40°F to 45°F (4°C to 7°C), the seed may remain viable but growers are advised to only use seeds less than a year old. Soaking the seed in warm water over night may facilitate germination but is not a requirement. Seedlings are produced as plugs in flats with 50 to 100 cells. A peat-lite germination mix with a pH above 6 works well. The seed should be covered with 1/8- to 1/4-inch layer of medium to maintain moisture. Recommendations for germination vary from 60°F (16°C) to 68°F (20°C). The germination rate decreases rapidly above 72°F (22°C). Light is not required for germination and flats are kept dark. A fungicide drench may be necessary at seeding to

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CYCLAMEN – A VERSATILE COOL SEASON CROP

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decrease the risk for disease during germination and early seedling development.

The germination process is slow. The hypocotyl expands to initiate the formation of the corm following the appearance of the primary root. Although cyclamen is a dicot, only one seed leaf emerges three to four weeks from seeding. At this stage, light and high relative humidity (75% to 90%) are essential. Without light, the stem of the seed leaf quickly elongates excessively resulting in poor seedling quality. The first true leaf is expected to unfold opposite the seed leaf 60 to 70 days after seeding. By the 120th day, the plants should have at least six or seven leaves.

Low light is sufficient at the appearance of the first leaf. As additional leaves develop, increasing light to 700 to 1,000 foot-candles for 16 hours each day (8 to 11.5 $mol \cdot d^{-1}m^{-2}$) produces high quality cyclamen transplants. Four weeks from seeding, 68°F (20°C) supports good vegetative growth. Transplanting can be done as early as eight weeks from seeding. Miniature and midi types are planted directly into the final 3-, 4- or 5-inch pots. Maxi type cultivars may first be transplanted into 2 1/2- or 3-inch containers and at the five to six leaf stage transferred to a larger pot. A peat-lite medium with pH close to 6 is recommended, although established plants tolerate pH down to 5.0. The small corm formed by the seedling should be planted level with the medium surface. Burying the corm increases the risk for crown rot and poor growth. An alternative to the long and sometimes unpredictable germination process is to buy cyclamen seedlings from a reputable professional propagator. Depending on type and size of purchased plants, 8 to 24 additional weeks are required to finish the plants for marketing.

A continuously moist medium is essential. Even short periods of drought quickly result in yellowing of lower leaves. Most germination media have limited initial charge of nutrients. Therefore, a low rate fertilizer application (50 ppm nitrogen) may be necessary as early as four weeks from seeding. Immediately following transplant, 150 to 200 ppm nitrogen in combination with 150 ppm potassium as constant liquid feed can be recommended. Miniature and intermediate cultivars usually require less fertilizer than standard or large flowered cyclamen. Nitrogen with a balance of nitrate and ammonium forms gives best results. Decreasing nitrogen in relation to potassium at the five to six leaf stage encourages bud and flower development. A small amount of phosphorous (30 to 50 ppm) and micronutrients are recommended. Too much fertilizer results in large and dark green leaves, prolonged production of new leaves, short flower stems and increased production time. Weak plants, light green foliage, and sparse flowering on long flower stems are indications of inadequate fertilizer.

The node of the sixth leaf is the suggested initiation site for the first flower on a shoot. Conditions supporting leaf unfolding can, therefore, be expected to result in the earliest onset of flower initiation. Increasing the temperature in a specific range results in faster leaf unfolding for many commercially produced floriculture crops. However, recent studies show limited correlation among cyclamen leaf unfolding, timing, and extent of flowering. Seed propagated cyclamen, in contrast to asexually propagated plants, tend to simultaneously develop several shoots and crowns from the corm. Although the fastest leaf unfolding for cyclamen has been observed at 66°F (19°C) in recent studies, time to flower was similar for plants kept in the range of 54°F to 68°F (12°C to 20°C) during leaf unfolding. Dropping the temperature to 46°F (8°C) slowed flowering up to two months and 75°F (24°C) delayed flowering two to three weeks.

Leaf and flower formation occurs simultaneously following the development of five or six expanded leaves. Lowering the temperature from 68°F (20°C) to between 58° and 60°F (14 to 16°C) is expected to adequately support both the leaf and flower formation process. The fastest flowering, however, has been recorded at day and night temperatures of 66°F to 68°F (19°C to 20°C). If one or two weeks slower flowering is acceptable, the lower production temperature (58°F to 60°F) is a viable alternative. Flower abundance at decreased temperature is another concern. Most flowers per plant were produced at 68°F to 75°F (20°C to 24°C). The effect of a lower temperature on flower number varies with cultivar. As low as 54°F (12°C) is sufficient for some cultivars while others require at least 58°F to 60°F (14°C to 16°C) to satisfactory produce flowers.

Plant height is usually not a problem. Reverse day and night temperatures or DIF is, therefore, not necessary to control stem elongation. Still, different day and night temperatures are sometimes recommended and may provide opportunities to simultaneously optimize the development of both leaves and flowers. Specific guidelines are limited but day or night temperatures should not exceed 77°F (25°C).

Daily amount of light is more important than day length for growth and flowering. Cyclamen was grown at 3 or 12 $mol \cdot d^{-1}m^{-2}$ from transplanting. The day length was 8 or 16 hours. Approximately 500 footcandles for 8 hours or 250 footcandles for 16 hours is required to provide 3 $mol \cdot d^{-1}m^{-2}$ and 2,100 footcandles for 8 hours or 1,050 footcandles for 16 hours to provide 12 $mol \cdot d^{-1}m^{-2}$. Plants at 12 $mol \cdot d^{-1}m^{-2}$ had 12 to 15 expanded leaves after eight weeks, while those at 3 $mol \cdot d^{-1}m^{-2}$ had seven or eight leaves. Day length did not affect the recorded number of leaves. The first flowers also appeared independently of day length, at the higher light level. Light at 3 $mol \cdot d^{-1}m^{-2}$ is not uncommon in Midwest greenhouses during the winter. Under these conditions, supplemental lighting would significantly speed cyclamen development and improve plant quality. The ability to withstand high levels of light is correlated and dependent on temperature, although shading is recommended at 4,000 footcandles (800 $\mu mol \cdot m^{-2}s^{-1}$). Below 77°F (25°C), cyclamen can be exposed without plant injury to "full sunshine."

Gibberellic acid (GA_3) has been used to accelerate flowering. A solution of 10 ppm GA_3 is prepared from a commercially available growth regulator such as ProGibb. To be effective, the solution needs to be applied directly to the barely visible flower buds. A proper GA_3 treatment is expected to reduce production time with two to four weeks. For the fast growing F_1 hybrids, GA_3 is predicted less effective than in earlier open pollinated cultivars.

Disease is a major concern in cyclamen production. Various fungi including *Pythium*, *Phytophthora*, and *Rhizoctonia* cause root rot that may appear at any stage from seeding to finish. Good sanitation, sufficient air circulation, satisfactory irrigation techniques, and proper transplanting depth are critical control measures. Progressive leaf yellowing and wilting are signs of fusarium wilt (*Fusarium oxysporum*, *Fusarium cyclaminis*). Any stage of development including finished flowering plants may be attacked by fusarium wilt. The vascular system of the corm is affected showing brown and reddish-purple discolorations. Crown rot or *Botrytis* blight (*Botrytis*

cinerea) are soft rots with leaves and flowers collapsing. Gray mold may develop at a later stage. Low night temperatures (below 60°F), high humidity, too deep transplanting, and less than optimal fertilization are favorable conditions for crown rot.

Bacterial soft rot (*Erwinia carotovora*) causes entire plants to suddenly wilt. Roots stay intact but the corm turns soft and mushy. To limit spread and severity of bacterial soft rot, foliage should be kept dry and water splash avoided. Damaged plant tissue provides entry paths, and plants stressed by improper environmental or cultural conditions are more susceptible. In warm weather, bacteria soft rot can easily and rapidly spread out of control.

Brown line patterns or round initially yellow spots developing into dry brown leaf areas are symptoms of tomato spotted wilt virus (TSWV). In severe cases, TSWV causes stem browning, stunted growth, and plant death. There is no chemical control for viral diseases. Indirect and preventive methods including eliminating thrips, the insect vector for TSWV, and starting with virus-free plant material are used.

Potential pest problems include fungus gnats, thrips, and mites. Good pest management strategies usually control aphids. Young plants are injured as fungus gnat larvae feed on the limited root systems. Fungus gnats especially thrive in bark or peat when algae grow on the medium surface. A layer of sand or allowing the surface to dry between irrigations discourages adult fungus gnats to lay eggs in the media.

Thrips are small, slender insects. Both adults and larvae leave white, silvery, or dark streaks on leaves and flowers. Thrips hide in flowers and are difficult to control. Since thrips are vectors for transmitting TSWV, close monitoring and control are essential in cyclamen production.

OFA Grower

Cyclamen mites and spider mites remove the cell content and affected plant tissues appear light colored. More advanced symptoms include growth distortion and curling. Spider mites form webs while cyclamen mites are too small to be seen without a magnifying glass. Under hot and dry conditions, spider mites flourish and left uncontrolled quickly develop into large populations.

Physiological disorders include excessively long or short flower and leaf stems. The likely cause is low light, crowded growing conditions, or improper fertilizer practices. A finished cyclamen in a bright and relatively cool location (65°F night) should remain attractive for four to six weeks when kept continuously moist. Spent flowers are removed before seeds develop to promote uninterrupted flowering. Pull or snap old leaves and flower stems from the corm without leaving a stub. Disease easily enters decaying stubs and postharvest quality is quickly reduced.

The now-available maxi, midi, and mini types provide opportunities to produce cyclamen for alternative markets and applications. These selections have more flexible requirements, and dropping the temperature to 58°F to 60°F (14°C to 16°C) only results in slightly slower flowering. Profuse flowering can be expected at the lower temperature, although most flowers form at approximate 68°F (20°C). **OFA**

Tis the Season of Poinsettia Maintenance

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Thanksgiving may mark the beginning of the holiday season for most people, but for interior landscapers the holiday season began months ago. The key to having great success with poinsettias starts at the beginning of fall, when most people haven't even starting planning holiday events. We need to visit with growers and take a quick look at the poinsettias to begin getting a feel for how we are going to effectively sell, install, and maintain them. This first look can give us some hints as to the quality of poinsettias, such as how consistent they are with height, how full they are, and if there are any problems with pests and diseases early on. Most importantly, this visit to the greenhouse can tell the grower how important high quality poinsettias are to us and that we care about what we are purchasing. A visit to a grower during the slower part of the season and a handshake still goes a long way in creating and maintaining a good relationship. A second visit is paid a week or two before poinsettias begin being shipped to us, just to make sure there are no surprises when opening boxes and installing these plants. Keeping poinsettias looking great during the season begins with high quality plants.

Poinsettia madness begins just a few days before Thanksgiving and continues until just after Christmas. During this time, hundreds and thousands of poinsettias are installed in what seems like one very long week. Poinsettias need to be unboxed and unsleeved as soon as they arrive. Care needs to be taken when doing this, as branches are easily broken. Also, check them to make sure there are no dry or damaged plants. When installing poinsettias, a few things need to be considered. First, they are very sensitive to cold. Poinsettias should never be transported or installed in areas with less than 50˚F. If the temperature is less than 50˚F when they are to be transported, that vehicle needs to be properly heated to temperatures above 50˚F before poinsettias are ever placed into that vehicle. Another thing to consider is the amount of moisture that plant has and the next time it is scheduled to be serviced. The quickest way to kill a poinsettia in an interior setting is to let it dry out. If it is dry or will need water before it is scheduled to be serviced, it needs to be watered-in at the time of installation. We schedule poinsettias to be changed out after about 2 1/2 to 3

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TIS THE SEASON OF POINSETTIA MAINTENANCE

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weeks of original installation so that the client has the freshest looking poinsettia throughout the holiday season as possible.

Once they are installed into accounts, it is up to the technicians to keep them alive and looking great. There are several factors that can affect the longevity of poinsettias. Light makes a difference in how long they will hold up and how much water they will take. The more light, the better. More light also means that a poinsettia uses more water so more frequent watering may be needed. Temperature can also affect the longevity and quality of poinsettias. The colder it is outside, the more the heating is used inside which can dry out poinsettias faster. Warmer temperatures inside result in increased water consumption by poinsettias. Watering is the one factor over which we have the most control. To aid in watering, we use either cover pots with oasis in the bottom or saucers with oasis in the bottom to keep water from dripping onto the surface on which the plant is placed. The goal is to let the poinsettia dry out but not wilt by the next time the plant is watered. Watering should be done through the soil of the plant and allowed to drip from the grow pot and into the oasis. The oasis helps prevent plants from sitting in water that runs through the grow pot. Poinsettias should not be allowed to sit in water between visits. If a poinsettia is really dry, it can be allowed to sit in water for up to 20 minutes. A poinsettia will take all of the water it can use in about 20 minutes. After 20 minutes, there should be no water sitting in the bottom of the cover pot or saucer. Once the first week and a half has passed, poinsettias should be acclimated and may begin to use less water. If the soil is no longer drying out, try watering less.

OFA Interiorscape

If poinsettias are changed during the season, or after the holiday season has passed, many customers will want to take them home. Giving away old flowers that still look good can be great for your company's customer relations. There are a few tips that you can give your customers about caring for their poinsettias. If taken care of properly with the right amount of water and light, poinsettias can keep their colorful bracts for several months. During the summer months they can be moved outdoors. Once fall approaches and night temperatures begin to get below 50˚F they need to be moved indoors again. In order to get them to re-bloom, they must be placed near a window where the lights are never turned on so, that the only light they get is natural light from outside. This is because poinsettias need short day lengths to flower and produce their colorful bracts. A little fertilizer every now and then can really help bring the poinsettia back into bloom. Oftentimes the bracts will not be as large as those grown in a greenhouse but can still be gratifying, as many people are unable or unwilling to do what it takes to get poinsettias to re-bloom indoors.

The winter holiday season is one of the busiest times of year for interior landscapers. Starting with high quality poinsettias and maintaining them to the best of our abilities can make our jobs easier, as well as more profitable. The best part about keeping poinsettias looking great is keeping our customers satisfied. Satisfied customers continue to return to us for their poinsettia and other holiday needs. **OFA**

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