MASSACHUSETTS FLOWER GROWERS' ASSOCIATION
Growers of Quality Plants and Flowers
www.massflowergrowers.com

The
MAYFLOWER

Massachusetts Flower Growers' Association
Growers of Quality Plants and Flowers

2005-2006
No. 6 of 6-2

UMass Extension Floriculture Water Quality Project: I. Salinity, Sodium and Chloride

Douglas Cox, UMass Plant, Soil, and Insect Sciences
Paul Lopes, Tina Smith, Outreach Educators, UMass Extension

In 2004 the UMass Extension Floriculture Program began a project studying greenhouse irrigation water quality supported by a grant from the Massachusetts Flower Growers' Association and water testing services partially subsidized by Ball Seed Co. and Scotts Company. In Massachusetts water has become a major factor in successful production of greenhouse plants through the effect of its pH, alkalinity, and mineral composition on the nutrition of many important species like marigold, geranium, calibrachoa and petunia. Some growers are also concerned about the presence of sodium (Na) and chloride (Cl) in their water and believe these elements might be adversely affecting the quality of their plants.

Over 50 growers in all regions of Massachusetts chose to participate in this project. Cooperating growers were asked to provide information about their water source, the crops they produce, their fertility program, and their testing history. Water was sampled and analyzed several times over two years. Analyses included pH, alkalinity, electrical conductivity (EC), and mineral composition. The tests were reviewed and interpreted, and based on the results, knowledge of current fertilizer practices, and any suspected problems growers were advised on corrective measures. Paul Lopes and Tina Smith helped the growers collect the samples and provided interpretation and advice based on the results of the water tests made by Scotts Testing Laboratory.

The main objectives of this project were to provide growers with information about their water quality to make better future crop management decisions and to help growers better understand how water quality, media pH, and fertility relate to each other. However, the water analysis data provided an opportunity to look at greenhouse irrigation water quality from different sources and in different regions of Massachusetts. This article reports the results of EC (salinity), Na, and Cl tests; a second article in the September-October issue will report the results of pH, alkalinity, and mineral composition tests.

How the results are tabulated

Results from a total of 183 samples collected from about 50 growers in spring of 2004 and again in 2005 are reported in this article. It is important for the reader to realize that the sample totals shown in the tables includes results of several tests (2-4) from several growers taken at different times during the sampling period. The Na and Cl results provided the biggest "surprises" in the project. Na and Cl are naturally occurring elements in soils and water but their levels

In This Issue

can become elevated due to road salt, water softeners, and some fertilizers. High levels of Na and Cl uptake can accumulate to toxic levels in plants, and abundant amounts in water can raise the EC to levels undesirable for plants by inhibiting water uptake. Table 1 shows accepted greenhouse irrigation water target and acceptable ranges for EC, Na, and Cl. Compare these ranges to the water test results shown in Tables 2, 3 and 4.

Table 2 shows the state-wide results of EC, Na, and Cl tests from municipal, well, and surface water sources. "Municipal" refers to public drinking water originating from a surface body of water or from wells provided by a city, town, or other authority (like the MWRA). "Well" refers to a private well owned by the grower. "Surface" refers to water from a private pond or perhaps pumped by the grower from a river; generally the surface water sources in this project were for irrigation only and not for drinking.

Tables 3 and 4 show results from municipal sources and wells, respectively, broken down for convenience into easily recognized regions by Massachusetts counties. Of course, counties are just political divisions drawn on a map, so they don't have much to do with the water quality in a region. No samples were taken from Suffolk county and only a handful were from the Cape and the Islands. There is not a table similar to Tables 3 and 4 for "surface" water because the number of samples collected for the whole state was very small (15).

Results

All water sources. Water test results from all sources (municipal, well, and surface) sampled throughout Massachusetts are compared in Table 2. The average EC of most samples was well within the "target range" (Table 1) for greenhouse irrigation water. Many samples had very low EC as we would generally expect in most of Massachusetts. Overall 75% of all samples tested within the target range regardless of water source. In a few greenhouses the EC greatly exceeded both the target and "acceptable" ranges for greenhouses. Adding water-soluble fertilizer to water with an already high EC would certainly increase the risk of soluble salts injury to greenhouse crops.

The average Na level in municipal and well waters exceeded the target range, but fell within the acceptable range for greenhouse water; many samples contained very little Na. In surface water the average Na level exceeded both the target and acceptable ranges. This fact along with the very high (>100 ppm) Na levels in some samples from the other water sources could pose serious problems for some growers. Overall, 16% of all samples had Na levels between 25-49 ppm, 8% 50-99 ppm, and 6% 100 ppm or more.

The average Cl level of all water sources exceeded the target level, but fell within the acceptable range. Overall, 18% of the samples had Cl levels between 25-49 ppm, 14% 50-99 ppm, and 15% 100 ppm or more. While many samples contained very little Cl, some had extremely high levels (>200 ppm) and these could result in toxicity to plants. In general, the highest EC, Na, and Cl levels occurred in the same samples. This combination of factors would make crop problems quite likely.

Municipal water. In Table 3 EC, Na, Cl test results for municipal water are shown by region. In all regions, average EC, Na, and Cl levels were within the acceptable range, but only in the 4 westernmost counties were Na and Cl in the lower, target range. Whether these results are broadly characteristic of water in the western counties or just a coincidence related to the water source in the communities where the greenhouses were located is not known. In all regions EC, Na, and Cl tested much lower than the average in many water samples, but some had much higher levels. It's puzzling that some municipal samples were so salty and had Na and Cl levels around the maximum level. A lot of effort has been made to protect public drinking water from road salt to reduce the Na content for people on a low Na diet. The USEPA recommends that Na in drinking water not exceed 20 ppm (Anonymous, 2003). A number of municipal samples in this project exceeded the Na limit to one degree or another if you look at the average and the maximum levels. In a few cases, around the maximum Na levels, water was undesirable for both greenhouse crops and human consumption.

Private well water. The average EC of private well water samples was within the target range for greenhouse crops (Table 4) in all regions. Many samples had very low ECs and a few were quite high, especially in the Berkshire and two eastern regions.

Na and Cl levels were within either the target or acceptable ranges in all but Franklin, Hampshire, and Hampden (Na, but only 5 samples total) and Berkshire (Cl) regions. Tests from a few greenhouses were quite high as suggested by the maximum levels shown in Table 4. Shallow wells and wells located near public roads and parking lots are most vulnerable to road salt contamination. In our experience road salt contamination is probably the main reason for high Na and Cl in well water used to water greenhouse crops.

Summary

The results of our greenhouse water testing project have shown that most Massachusetts growers are irrigating greenhouse crops with water containing safe levels of EC, Na, and Cl. However, a small, but significant number, of growers are using water containing elevated levels of Na and Cl and accompanying high EC with the result being

lower quality and even crop loss. Most often this water is from a private well or pond, but sometimes public drinking water is the source.

The solutions to the problem of high Na and Cl include regular water testing during the growing season in borderline cases of excess Na and Cl and avoidance of over-fertilization to prevent high growth medium EC; installation of water treatment systems to remove Na and Cl; efforts to protect wells and ponds from salt contamination by runoff; or, in extreme cases, finding a new source of water.

References

Anonymous, 2003. Healthy drinking waters for Rhode Islanders. Sodium chloride in private water wells. Private wells series. R.I. Dept. of Health and U.R.I. Coop. Ext. Water Quality Program.

Biernbaum, J.A. 1994. Water quality. In Tayma, H.K., T.J. Roll, and M.L. Gaston. Eds. Tips on growing bedding plants, 3rd ed., Ohio Flor. Assoc., Columbus, OH.

Table 1. Greenhouse water analysis interpretation for EC, Na, and Cl (Biernbaum, 1994).

Factor	Target range	Acceptable range
EC (mmho/cm)	0.2-0.8	0-1.5
Na (ppm)	0-20	Less than 50
Cl (ppm)	0-20	Less than 14

Table 2. EC, Na, and Cl levels in greenhouse water samples from three sources (all regions).

Water source	Samples	Average	Min.	Max.	75%[z]
	Electrical conductivity (EC), mmho/cm				
Municipal	82	0.39	0.05	3.14	0.41
Well	86	0.52	1.07	7.15	0.53
Surface	15	0.61	0.95	3.93	0.64
	Sodium (Na), ppm				
Municipal	82	37	3.0	436	30
Well	86	37	1.0	544	32
Surface	15	79	4.0	685	79
	Chloride (Cl), ppm				
Municipal	82	69	2.0	1020	66
Well	86	38	0.2	3510	49
Surface	15	105	2.0	748	120

Table 3. EC, Na, and Cl levels in greenhouse municipal water samples.

Region (counties)	Samples	Average	Min.	Max.	75%[z]
	Electrical conductivity (EC), mmho/cm				
Berkshire	13	0.17	0.1	0.25	0.24
Franklin, Hampshire, Hampden	15	0.25	0.1	0.35	0.31
Worcester	11	0.52	0.1	3.14	0.31
Middlesex, Essex	20	0.52	0.2	2.90	0.56
Norfolk, Plymouth, Bristol, Barnstable	23	0.35	0.1	0.90	0.48
	Sodium (Na), ppm				
Berkshire	13	11	7	17	13
Franklin, Hampshire, Hampden	15	11	3	18	15
Worcester	11	53	11	382	49
Middlesex, Essex	20	49	10	436	39
Norfolk, Plymouth, Bristol, Barnstable	23	36	6	105	35
	Chloride (Cl), ppm				
Berkshire	13	12	7	16	14
Franklin, Hampshire, Hampden	15	12	2	21	17
Worcester	11	129	10	1020	22
Middlesex, Essex	20	86	17	651	77
Norfolk, Plymouth, Bristol, Barnstable	23	64	8	193	79

Table 4. EC, Na, and Cl levels in greenhouse well water samples.

Region (counties)	Samples	Average	Min.	Max.	75%[z]
	Electrical conductivity (EC), mmho/cm				
Berkshire	17	0.85	0.20	6.98	0.57
Franklin, Hampshire, Hampden	5	0.64	0.35	0.81	0.80
Worcester	19	0.24	0.10	0.54	0.34
Middlesex, Essex	11	0.53	0.10	2.30	0.52
Norfolk, Plymouth, Bristol, Dukes	34	0.50	0.10	7.20	0.32
	Sodium (Na), ppm				
Berkshire	17	37	1.0	401	33
Franklin, Hampshire, Hampden	5	85	11.0	193	163
Worcester	19	15	1.0	52	16
Middlesex, Essex	11	52	5.0	334	44
Norfolk, Plymouth, Bristol, Dukes	34	36	5.0	544	23
	Chloride (Cl), ppm				
Berkshire	17	168	4.0	2310	82
Franklin, Hampshire, Hampden	5	8	4.0	19	10
Worcester	19	28	0.2	111	48
Middlesex, Essex	11	95	2.0	563	106
Norfolk, Plymouth, Bristol, Dukes	34	139	4.0	3510	34

[z]75% of the samples analyzed had levels **lower** than the value shown (25% had higher levels).

Doug Cole Elected President of OFA

Doug Cole, president of D.S. Cole Growers Inc., Loudon, New Hampshire, has been re-elected as president of the OFA – an Association of Floriculture Professionals' Board of Directors. His election was announced July 8 during OFA's business meeting at the 2006 OFA Short Course in Columbus, Ohio. OFA is an educational association for floriculture industry professionals worldwide.

D.S. Cole Growers is a young plant and pot plant producer. Cole serves as general manager of the 145,000-square-foot operation, and he also oversees new product development and business planning. Cole earned his bachelor's degree in plant science from the University of New Hampshire, and he has worked 18 years in the greenhouse business. He is a New Hampshire Agriculture advisory board member, as well as a former vice president of the New Hampshire Farm Bureau.

OFA is a non-profit, all-industry, educational organization with more than 3,200 members representing the United States and several countries. OFA is a leader in educating professionals in all areas of the industry, including greenhouse growers, garden center operators, interior plantscapers, retail and wholesale florists, allied industry manufacturers and suppliers, and educators, researchers, and students. Each year, OFA sponsors the OFA Short Course, U.S. floriculture's premier educational and trade show event.

Where to find Organic Information

by Tina Smith, University of Massachusetts

"The U.S. Department of Agriculture has put in place a set of national standards for food and plants labeled *organic* to meet, whether grown in the United States or imported from other countries." From: http://www.ams.usda.gov/nop/Consumers/brochure.html

Organic food and plants are produced without using most conventional pesticides, fertilizers made with synthetic ingredients or sewage sludge, bioengineering, or ionizing radiation. Growers of plants (includes dairy and crop farms) and handlers that have more than $5,000 in gross organic sales per year and are marketing their products as "Organic", are required to become certified organic to be in compliance. People who sell or label a product "organic" when they know it does not meet USDA standards can be fined up to $10,000 for each violation.

Before a product can be labeled *organic*, a Government-approved certifier inspects the farm where the plants and food are grown to make sure all the rules are being followed to meet USDA organic standards. If you are considering growing and selling organic products, contact a certifying agency. In Massachusetts, Baystate Organic Certifiers can answer questions about the process. See contact information below.

Information on the National Organic Program and a list of other organic certifying agents can be found on the USDA's website at: www.ams.usda.gov/nop.

Additional Resources on Organic Production

Baystate Organic Certifiers www.baystateorganic.org/

683 River St. Winchendon, MA 01475

Contact: Don Franczyk, 978-297-4171

USDA National Organic Program accredited certifying agent who certifies operations in the Northeast United States. Though their primary operations are in Massachusetts and Connecticut, they will certify Growers, Livestock Producers, Processors or Handlers in the following Northeast states: Massachusetts, Connecticut, Rhode Island, New Hampshire, Maine, Vermont, New York and New Jersey.

Organic Materials Review Institute (OMRI) www.omri.org/

The OMRI is a nonprofit organization that specializes in the review of pesticides and fertilizers for use in organic production, processing, and handling. OMRI provides guidance on the suitability of material inputs under the USDA National Organic Program standards. OMRI does not screen all possible products, only those submitted for review, so there may be other acceptable products not on its list. Suppliers can have products reviewed for a fee. Products that pass review can be labeled "OMRI listed". Some products on the list are regulated and subject to restrictions. In some cases, certain formulations of a product are permitted and others are not. Be sure to check with your certifying agency to be certain that the materials and practices you plan to use are approved.

Northeast Organic Farming Association (NOFA) www.nofa.org

NOFA is an affiliation of seven state chapters. Each chapter is a self-sustaining entity within its state.

Sustainable Agriculture Research and Education (SARE) www.SARE.org

This program of USDA's Cooperative State, Research, Education and Extension Service provides grants and other support for producers to conduct their own trials and explorations into organic and sustainable production.

National Sustainable Agriculture Information Service (NCAT) http://www.attra.org/

ATTRA is funded under a grant from the United States Department of Agriculture's Rural Business-Cooperative Service. It provides information and other technical assistance to farmers, ranchers, Extension agents, educators, and others involved in sustainable agriculture in the United States.

2006 New England Greenhouse Conference and Expo

Information on organic production and retailing organic products will also be presented at The New England Greenhouse Conference and Expo this fall. The conference will be held November 1-3 at the DCU Center in Worcester, Massachusetts with a trade show on November 2nd and 3rd.

On Thursday, November 2nd, there will be a panel on retailing organic lawn and garden products. The session, "Can Organic/Sustainable Lawn and Garden Products and Plants Be a Successful Market for Your Business?" will be moderated by Lois Berg Stack, University of Maine. The panel will include: Greg Trabka, Ball Horticulture; Lew Russell, Russells Garden Center, MA; Sam Jeffries,Organic Sales and Marketing and Don Franczyk, Baystate Organic Certifiers, MA. Learn about consumer interest in all-natural and organic lawn and garden products, where companies are heading and what you need to know to sell organic plants and products.

On Friday, November 3rd, Vern Grubinger, Director of the Center for Sustainable Agriculture at the University of Vermont will speak about organic production of greenhouse crops, using tomatoes as an example. Vern will cover the requirements for organic greenhouse production and discuss details about greenhouse tomato production.

To receive the 2006 New England Greenhouse Conference Program or for more information, contact: Cindy Delaney, Show Coordinator, 1 Main Street, No. 36, Winooski, VT 05404, Phone: 802-655-7769, Fax: 802-655-7769 email: delaney@sover.net or visit: www.negreenhouse.org

15th Annual Mass Flower Growers' Annual Benefit Golf Tournament

On August 8th the Massachusetts Flower Growers' Association held the 15th Annual Benefit Golf Tournament. The course conditions and weather were nearly perfect at the Juniper Hill Country Club in Northboro.

100 plus golfers joined together for a 9 am tee time and finished the day with great meal and awards program. The auction of golf equipment and play time at prestigous Massachusetts Golf Courses raised addtional dollars for the Association Research and Scholarhip program.

A sincere thank you to the golfers and the sponsors of this year's tournament. And a specials thanks to the Farm Bureau Team that donated their winnings to the Association Research and Scholarhip Fund.

The winning team this year, with a score of 15 under par, represented Graziano Garden Center in East Longmeadow. The team members were Chris Graziano, Paul Laflamme, Mark Graziano and David Graziano.

15th Annual MFGA Golf Tournament

1st Place—Graziano Garden Center: Paul Laflamme, Mark Graziano, Chris Graziano, David Graziano

Bob Luczai welcoming the group to Juniper Hill Country Club.

2nd Place – Leonhard's Flower Shop: Doug Lentz, Brant O'Brien, Arthur McCue, Dave Leonhard.

Dick Corazzini and Mike Priest starting off the day.

3rd Place – The Farm Bureau Team: Carl Dematteo, John Connors, Corey Tougas, Alex Dowse.

Paul Mahoney, Bill Carlson, Tom Spence and Tom Mahoney finishing the day in conversaton!

Tournament Sponsors

Amalie Ann George CPA, PC
Arystalife
AT Plastics, Inc.
Ball Seed Company
J.P Bartlett Co., Inc.
S.G Calautti Company
Cavicchio Greenhouses
CDL Printing
D & D Farms, Inc.
D.S. Cole Growers
Dillen Products
Dramm Co.
FAF Growers
Fafard
Fairview Farms
Farm Family Life Insurance Co.
First Pioneer Farm Credit
Joseph Giannino Company
Green & Diminico
Griffin Greenhouse and Nursery Supply
Harris Seeds
Hortica Insurance
K-Pro Supply Co., Inc.
Kane's Flower World
Landmark Plastic Corporation
Larchmont Engineering and Irrigation
Mahoney's Garden Centers
W.H. Milikowski, Inc.
Murtha Cullina, LLP
Netafim USA
Nunan Florist and Greenhouses, Inc.
Nursery Supplies Inc.
Olympic Horticulture
Pan American Seed Company
J.R. Peters, Inc.
Plant Products, Ltd
Premier Horticulture
Quality Instant Printing
Randall's Farm, Inc.
Richard D. Smith & Co., Inc.
Rimol Greenhouse Systems, Inc.
Russell's Garden Center
S & S Associates
Scotts Company

Tournament Sponsors, continued

SePro
Spence Farms
Sun Grow Horticulture
Syngenta
T.O Plastics, Inc.
Team Enterprises
Van De Wetering Greenhouses, Inc.
Westbrook Greenhouse Systems
Whittemore Co. Inc.
Wilson Farms, Inc.

Special Recognition of Members for Additional Contributions to MFGA

Curran Brother Florists & Greenhouse, Danvers
D & D Farms, Inc., Stow
Araujo Farms & Greenhouses, Dighton
E. Cecchi Farms, Feeding Hills
Evergreen Haven Garden Center, Hopkinton
Fine Farms, Attleboro
Hi Hill Farm, Westboro
Kennedy's Country Gardens, Scituate
King Farm, Inc., Townsend
Paisley Farm & Greenhouse, West Boxford
Amalie Ann George CPA PC, Needham
Angel's Garden Center, Hopkinton
Andrew's Greenhouse, Amherst
J. P. Bartlett Co., Inc., Sudbury
Kevin's Greenhouses, Berlin
Pleasant Valley Gardens, Methuen
Stonefield Farm, Acton
Crystal Lake Greenhouses, Carver
FAF Growers, Northfiled
Andrew's Greenhouse, Amherst
Mahoney's Garden Centers, Winchester
Richard Carroll Associates, North Eastham
The Flower Hutch, Townsend
Idylwilde Farm, Inc., Acton
Law Greenhouses & Gardens, Foxboro
Northside Farm, Charlton
Sposato Wholesale Greenhouses, Inc., Worcester
Viale Floral Company, Pittsfield