A Publication of the UMass Extension Greenhouse Crops & Floriculture Program

Floral Notes Newsletter

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In This Issue

2012-2013 New England Greenhouse Floriculture Guide

A Management Guide for Insects, Diseases, Weeds and Growth Regulators

The **New England Greenhouse Floriculture Guide** is for commercial production of greenhouse ornamentals and has information on current pest management and growth regulators. Recommendations include IPM and biological control information for greenhouse crops.

This manual is a compilation of input from the members of the New England State University Extension Systems and Raymond Cloyd of Kansas State University.

- 270 pages of up-to-date recommendations for nonchemical and chemical management of greenhouse insects, mites, diseases, weeds and algae, plus recommendations for using plant growth regulators
- Guidelines specific to New England, in a durable plastic comb binding.
- Expanded information about using natural enemies to manage insects and mites.
- Details about how to use pesticides safely and effectively, and how to mitigate development of pesticide resistance.

The Guide is designed to provide commercial growers with technical information on pest management (weeds, diseases and insects) and growth regulators. Because this is a publication written by professionals from throughout New England, and rewritten every two years, it reflects the current collective knowledge for greenhouse crops for this region. Published by New England Floriculture, Inc., sponsor of the Northeast Greenhouse Conference. **$40 (includes Mail Media shipping), order on-line through the** UMass Extension Bookstore

2013 Summer Field Day

Tower Hill Botanic Garden July 25, 2013

Sponsored by Green Industry associations - MFGA and MNLA.

8 AM Registration & Trade Show Open, Coffee/Tea/Juice/Fresh Fruit/Pastries, Lunch 11:30-1:00

Session A 8:30AM – 9:20AM

Making Sense of Soil Tests for Landscapes, Nurseries and Greenhouses *Dawn Pettinelli, UConn*

Bringing Back the Bees -Conserving Pollinators in our Horticulture Businesses (1 pesticide credit)*Dr. Anne Averill, Environmental Conservation, University of Massachusetts*

Tours: Tower Hill/Carey Awards or Underutilized Perennials *Joann Vieira, Horticulture Director Tower Hill Botanic Garden*

Session B 9:30 – 10:20

9:30 – 9:55 Hemlock Wooly Adelgid and Resistant Hemlocks (0.5 pesticide credit) *Dr. Rick Harper, Environmental Conservation, UMass Extension*

10:00 – 10:20 Fertilizers: BMPs and Pending Regulations *Mary Owen, UMass Extension*

9:30 – 10:20 A Splash of Color - New Annual Plants and How to Use them in Landscapes *Valerie Locher, Valerie Locher Horticulturists Inc.*

Tours: Tower Hill/ Carey Awards or Edible Landscapes Tour *Dawn Davies, Tower Hill*

Session C 10:30 –11:30

10:30 – 10:50 USDA Risk Management Tools for the Nursery Industry
Tom Smiarowski, Paul Russell, Risk Management Program, University of Massachusetts

10:50 – 11:40 Sustainable Water Management Initiative (SWMI) and what it means for your business. *Beth Card, Assistant Commissioner, Bureau of Resource Protection; Duane LeVangie, Chief of the Water Management Program, Massachusetts Department of Environmental Management* MassDEP

10:30 – 11:30 Creative Marketing - Panel Style*Steve Corrigan, MCH Mountain View Landscapes and Lawncare Inc.; Karen Howard, Howard Garden Design, Sylvia Czech, Randall's Farm and Greenhouse; Paul Waxman, Mahoney's Garden Center*

Tour of Tower Hill/ Carey Awards

IPM Walk about: Insects, Diseases and Weeds (1 Pesticide credit) *Bob Childs, Extension Entomologist, Randall Prostak, UMass Extension; Nick Brazee, UMass Extension*

11:30 – 1:30 Vendor networking and lunch

1:30 - 2:30 Keynote: Climate Change and Implications for Massachusetts Horticulture (0.5 pesticide credit) *Dr. Bethany Bradley, Environmental Conservation, University of Massachusetts*

Register online MNLA website: http://www.mnla.com/

Short Notes ……

New Green Industries Specialist

Geoffrey Njue will start July 1 as UMass Extension's Green Industries Sustainability Specialist, housed at the Cranberry Station in Wareham. He currently is a commercial horticulture field specialist at South Dakota State University Cooperative Extension and has significant experience with Extension and the agricultural and green industries. Welcome Geoffrey!

In the meantime, a search is underway for Extension Assistant Professor of Sustainable Landscape Horticulture. Hopefully success will occur soon.

Breaking New Ground with Old Friends

Against the backdrop of a picture perfect spring day and coinciding with the University's 150th Anniversary, a groundbreaking ceremony was held for UMass Amherst's new Agricultural Learning Center on April 25 on the former Adams-Wysocki field at the north end of the campus. The guests included farmers, students, university officials, legislative representatives, neighbors, current and former staff and agricultural dignitaries from across the state.

A steady increase in interest in UMass's agricultural programs has led to the creation of this new hands-on learning laboratory. Nearly 60 students now study Sustainable Horticulture alone. The field will evolve and transform over time to include fruit trees, landscape plants and shrubs, a modular ecological cropping design, sports turf with a 2-hole golf area, woody and herbaceous landscape plants, bee forages, solar panels for electricity and, eventually, the move of the horse barn to the site. The horse barn is the last remaining barn on campus from the early days of Massachusetts Agricultural College.

A Great Honor for the Stockbridge School

Recently we were informed by Katherine Macdonald, President of the Massachusetts Horticultural Society, that at this year's awards banquet, the Mass. Hort. Society will present the Stockbridge School of Agriculture with its Gold Medal in recognition of our history in support of agricultural education and our bright future. For the first time SSA will offer its new students the choice of a B.S. degree in Sustainable Horticulture, Sustainable Food and Farming, or Turfgrass Management as well as the current 2-year A.S. degrees.

Looking for Greenhouse Space

Robert Lussier is would like to rent a greenhouse for commercial hydroponic operation, or to partner with a greenhouse operation for additional hydroponics. Contact Robert at (781)642-0842 or robert.lussier@verizon.net

Future Educational Programs

Aug.14-15 Griffin Greenhouse Supply Open House; October 16 (tentative) MFGA-sponsored educational program at Pioneer Gardens, Deerfield, MA; Nov. 6, Biocontrol Program at the Publick House, Sturbridge, MA (UMass Extension).

Response of 'Ringo 2000' Seed Geraniums to Plant Extract and Granular Organic Fertilizers

Douglas Cox
Stockbridge School of Agriculture
University of Massachusetts
Amherst

In recent years I've have written articles about my work with organic fertilizers as alternatives to traditional water-soluble chemical fertilizers. These organic fertilizers included fish fertilizer, Daniels Pinnacle, alfalfa pellets, and combinations (Cox, 2010; Cox and Eaton, 2011; Eaton, et al., 2013). Not surprisingly, because of their differences in the makeup, success in growing acceptable greenhouse crops has been variable.

Working with organic fertilizers one thing does seem clear: organic fertilizer combinations work better than relying on one type alone. Combination treatments seem to take advantage of the best chemical and physical characteristics of each fertilizer.

Recently, I've worked with several types of soluble organic fertilizers manufactured from extracts of sugar beets. I've also evaluated a granular fertilizer made from poultry waste materials. The characteristics of these fertilizers are discussed in the next section.

Very little information is available on plant response, nutrient supplying power, and the environmental effects of nutrient leaching of the fertilizers reported on in this article. So the objective of this project was to learn about the effects of these fertilizers on the growth, nutrient uptake, and nitrogen leaching by a typical potted greenhouse crop. The project was supported by grants from New England Floriculture, Inc., Massachusetts Flower Growers' Association, and the New England Florist Credit Endowment.

Fertilizers tested in trials

Two organic water-soluble, plant extract fertilizers were "Bombardier" 8-0-0 and "Espartan" 2.0-3.03-2.6 manufactured by Agroindustrial Kimitec of Almeria, Spain and distributed in the U.S. by American Clayworks and Supply Co. of Denver, CO (product donor). Both fertilizers are made from fermented sugar beet molasses and, in the case of Bombardier, fermented glucose syrup. The methods of manufacture account for the differences in nutrient analysis and the amount of organic matter and fulvic acid each fertilizer contains. Each liquid has the dark color and consistency of molasses, but both fertilizers are quite soluble in water. Both Bombardier and Espartan are acceptable for organic production according to USDA/NOP.

The granular fertilizer tested was Sustane 8-4-4, 45-day slow release fertilizer. Sustane is made by Sustane Natural Fertilizer, Inc. of Cannon Falls, MN from aerobically composted turkey litter, hydrolyzed feather meal, and potassium sulfate. Sustane fertilizers have been studied fairly extensively and have been found to be suitable for nursery crop and bedding plant production. Sustane 8-4-4 has been certified by OMRI for organic use.

How the plants were grown

Experiment 1. Seeds of 'Ringo 2000' seed geranium were sown 30 January 2013 and plugs were potted on 9 April 2013 in 4½-inch pots of Fafard 3B soilless mix. Plants were fertilized at every watering with 225 ppm N from Plantex (20-2-20) chemical fertilizer, Bombardier (8-0-0), or Espartan (2.7-3.03-2.6) plant extract fertilizers.

Days to flower from seeding was recorded when the first floret of the first flower cluster opened. Foliar height (height measured to the top of the foliage), flower height (height measured to the top of the first flower cluster) was measured and the plants were harvested for shoot dry weight determination on 18 April.

Experiment 2. 'Ringo 2000'seed geranium plugs were potted on 9 April 2013 in 4½-inch pots of Fafard 3B soilless mix. Pots were suspended through the lids of larger containers to collect the leachate for ammonium (NH_4-N) and nitrate (NO_3-N) analysis at 10 day intervals as the plants grew.

Plants were fertilized with 225 ppm N from Plantex (20-2-20) chemical fertilizer, Bombardier (8-0-0), or Espartan (2.7-3.03-2.6) plant extract fertilizers. Potassium phosphate was added to the Bombardier solution to supply P and K. Sustane (8-4-4) granular fertilizer was incorporated with the growing mix prior to planting at a rate of 7 gm/pot (0.25 oz./pot). In other treatments some fertilizers were applied in combination: Bombardier + Sustane or Espartan + Sustane. Water-soluble fertilizer was applied at every other watering. The same amount of nitrogen (N) was supplied by all six fertilizer treatments. Where combinations were applied, one-half of the N was supplied water-soluble fertilizer and the other half by Sustane. Plants in all treatments were irrigated with the same amount of fertilizer solution or plain water during the experiment.

Days to flower from seeding was recorded when the first floret of the first flower cluster opened. Foliar and flower height was measured and the plants were harvested for shoot dry weight determination 10 June, 62 days after transplanting.

Results of Experiment 1

This small experiment was meant to determine the response of seed geranium to the two plant extract fertilizers Bombardier and Espartan. There was no significant difference in foliar height, flower height or days to flower between fertilizers (Table 1). Plants fertilized with Bombardier weighed less than those fertilized with Plantex or Espartan. The differences in dry weight, however, were not visually discernible but do indicate slightly less growth with Bombardier.

Table 1. Growth of 'Ringo 2000' seed geranium treated with a chemical fertilizer or different types and combinations of organic fertilizer.

Fertilizer	Foliar hgt. (cm)	Flower hgt. (cm)	Days to flower	Dry wt. (gm)
Plantex 20-2-20	22.1^{ns}	31.3^{ns}	91^{ns}	15.6a
Bombardier 8-0-0	19.0	31.3	93	14.0b
Espartan 2.7-3.0-2.6	18.3	30.3	94	15.0ab

The most important difference between fertilizer treatments was the occurrence of leaf interveinal chlorosis when plants were fertilized with Bombardier or Espartan instead of Plantex (Figures 1 and 2). Chlorosis was most pronounced on the leaves of Bombardier plants.

Results of Experiment 2

Plant appearance and growth. Plants fertilized with Plantex and Sustane were normal in appearance with no leaf chlorosis for most of the experiment. However, plants fertilized with Sustane began to show symptoms of mild N deficiency after about 40 days and during the 20 days prior to harvest. Plants fertilized with Espartan or Bombardier alone had leaves exhibiting the interveinal observed in Experiment 1 (Figure 2). Less leaf chlorosis occurred with Espartan and when Espartan and Bombardier were combined with Sustane.

Figure 1 (Left to right). Expt. 1. plants fertilized with Plantex, Bombardier, and Espartan.

Figure 2. Chlorosis occurring on some leaves of plant extract fertilizers.

Days to flower and flower height were not affected by fertilizer treatment. Foliar height was greatest with Plantex and both Espartan treatments (Table 2). Plantex produced the greatest dry weight while Bombardier treatments produced the least.

Table 2. Growth and flowering of 'Ringo 2000' seed geranium treated with a chemical fertilizer or different types and combinations of organic fertilizer.

Fertilizer	Days to flower	Foliar hgt. (cm)	Flower hgt. (cm)	Dry wt. (gm)
Plantex 20-2-20	86^{ns}	27.9a	36.6^{ns}	19.4a
Sustane 9-4-4	88	24.0bc	34.4	16.4bc
Espartan 2.7-3.0-2.6	86	26.5ab	35.4	18.2bc
Espartan + Sustane	87	24.8ab	34.9	18.2bc
Bombardier 8-0-0	89	20.0c	31.9	13.1d
Bombardier + Sustane	88	23.1bc	35.3	15.1cd

Water use and nitrogen leaching. Since the same volume of fertilizer solution and water was applied to each treatment the total leachate volume indicates the water use by the plants in each treatment (Table 3). Leachate volume was lowest for Plantex and significantly higher for the other fertilizers. This reflects the fact that Plantex plants were larger plants with higher dry weight than plants in the other treatments. More water was absorbed by the Plantex plants and less was available for leaching.

Fertilizer type had a great effect on N leaching. The largest amount of total N (NH_4-N + NO_3-N) leached occurred with Espartan alone and the least amount of N leached occurred with Plantex, Sustane, and Bombardier + Sustane. The most NH_4-N leached with Espartan and the most NO_3-N leached with Plantex. Total N and NH_4-N leaching was reduced by combining the plant extract fertilizers with Sustane compared to Espartan and Bombardier alone. Also, combining Bombardier + Sustane resulted in less NO_3-N leaching.

Table 3. Water use and nitrogen leaching by 'Ringo 2000' seed geranium treated with a chemical fertilizer or different types and combinations of organic fertilizer.

Fertilizer	Total leachate vol. (ml)	Total N (mg/pot)	NH_4-N (mg/pot)	NO_3-N (mg/pot)
Plantex 20-2-20	525b	110.6c	14.0d	96.6a
Sustane 9-4-4	990a	105.9c	43.6cd	63.4bc
Espartan 2.7-3.0-2.6	1095a	341.2a	274.6a	66.6b
Espartan + Sustane	934a	222.8b	161.3b	61.6bc
Bombardier 8-0-0	1203a	219.6b	148.0b	71.7b
Bombardier + Sustane	1174a	133.3c	83.0c	50.3c

Conclusions: What does it all mean?

Overall, in terms of plant growth and flowering, the organic fertilizers Sustane, Bombardier, and Espartan plants were very similar to those fertilized with Plantex. However, Plantex plants had more dry weight than plants treated with the other fertilizers.

The greatest shortcoming of the organic fertilizers was the development of foliar symptoms probably due to nutrient disorder(s). Symptoms on Sustane plants were probably caused by N deficiency. The symptoms appeared about 35-40 days after planting, close to the 45-day limit of nutrient release claimed by the manufacturer for Sustane. The leaves of Espartan and Bombardier plants showed interveinal chlorosis characteristic of magnesium deficiency in most plants, but the symptoms were not similar to those pictured in references for geranium culture. Considering the large amount NH_4-N in the leachate “ammonium toxicity” might be the cause of the chlorosis. Recently-mature leaves were collected for nutrient analysis to, hopefully, find out the cause of the chlorosis and I will report the test results in a future issue of *Floral Notes*.

Combining soluble Espartan or Bombardier with granular slow-release Sustane in Experiment 2 had several benefits. First, total N and NH_4-N leaching was significantly reduced by combining the fertilizers. Second, combining organic fertilizers prevented the N deficiency symptoms which occurred with Sustane and reduced the intensity of interveinal chlorosis caused by the application of Espartan and Bomdardier. Growers trying organic fertilizers of any type should consider using a combination of two different types rather than relying on one alone. It is my experience that positive and complimentary effects may result from using two different types.

References

Cox, D.A. and T. Eaton. 2011. Organic fertilizer use leads to different growth response, nutrient use, and nitrogen leaching by marigold ‘First Lady’. *Floral Notes*. 24(1):5-8.

Cox, D.A. 2010. Calibrahoa response to chemical and organic fertilizers. *Floral Notes*. 23(1):2-4.

Eaton, T.E., D.A. Cox, and A.V. Barker. 2013. Sustainable production of marigold and calibrachoa with organic fertilizers. *HortScience*. 48(5):637-644.

UMass Soil and Tissue Testing

UMass Extension offers a variety of soil test options.

Greenhouse Soil Testing Submission forms and more info:
http://extension.umass.edu/floriculture/services/soil-testing

For forms for other crops and landscapes see: www.umass.edu/soiltest

Here is a summary of options for commercial greenhouse crops and flower growers:

Soilless Media Test $15.00

Includes pH and lime requirement, levels of available plant nutrients, soluble salts, and micronutrients. Recommendations are written on the report by Dr. Doug Cox and mailed to you.

pH Test $5.00

Soluble Salts Test $5.00

pH and soluble salts tests are the same tests performed as part of the soilless media test.

Standard Soil Test for (Outdoor) Field Grown Crops $10.00
Includes pH, levels of available plant nutrients and several micronutrients. $5.00 Soil organic matter.

Water pH and EC $8.00

Soil Sampling for Greenhouse Crops

We have a new video available on soil sampling: http://www.youtube.com/UMassFloriculture

Send soil or tissue samples, with a check made payable to the University of Massachusetts, to:

Soil & Tissue Testing Lab
West Experiment Station
682 North Pleasant Street
University of Massachusetts
Amherst, MA 01003-9302
(413) 545-2311

UMass Greenhouse Crops and Floriculture Extension Program

Douglas Cox Floral Notes Editor dcox@.umass.edu
Tina Smith Outreach Educator tsmith@umext.umass.edu

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