

Floral Notes *Newsletter*

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July-August 2018

In This Issue

Be sure to check out the next page for information on the **2018 MFGA Summer Trials and Educational Program** to be held at Cavicchio Greenhouses on August 14. Then learn more about the use of liquid and granular organic fertilizers in combination for greenhouse crops, heat savings with infra-red plastics, and root diseases of greenhouse crops. On the next to last page see the calendar of upcoming events of interest to greenhouse operators. Doug Cox



2018 MFGA Summer Meeting

For Greenhouse Growers and Garden Retailers
Cavicchio Greenhouses Inc.,
110 Codjer Lane, Sudbury, MA.

Tuesday August 14, 2018 8:30 am -12:30pm (Lunch included)

Come join us for our **MFGA Summer Trials and Educational Program** at Cavicchio Greenhouses. This year we will have a morning program that will include a presentation on the use of biological controls, where we will see, hands on, how Bio controls are used in a Poinsettia crop (1 pesticide Credit). We will also have a presentation on Perennials. Tim Anderson, Walters Gardens Inc., will talk about New and existing perennial varieties that you should be growing and offering customers. After the talks, we will tour and review the new annual varieties being grown in the enlarged Cavicchio plant trialing garden.

Take this opportunity to see how annuals and perennials are performing in the landscape and containers to help decide when selecting plant material for next season

Allied Trade Exhibit tables-come and visit with your greenhouse plant and supply vendors. Pick up the new 2019 catalogs.

8:30-9:00 Implementing a Successful Biocontrol Program

Kerri Stafford, Head Grower/Greenhouse Manager, Cavicchio Greenhouses and Gregory Bryant, IPM Technical specialist Bioline AgroSciences

Kerri will give a hands-on walk about tour on the use of biological pest control on poinsettia and other greenhouse plants. She will highlight specific tips and techniques that have made their program successful. Together with Greg, they will discuss essential strategies and common mistakes to avoid. (1 pesticide recertification credit)

10:00-11:00 Perennials What's New and what's best in Perennials

Tim Anderson, Regional Product Director, Walters Gardens Inc.,

Tim will review New Varieties and highlight the key perennials you should be selling to your customer for successful sales.

11:00-12:00 2019 Annual Trials: Kerri Stafford, Cavicchio Greenhouses

We will tour the annual trial gardens at Cavicchio Greenhouses and see the new introductions for next year from many companies. This will give you a good look at the new varieties and how they perform. Plant vendors will also provide comments on these new introductions.

12:00 noon Lunch is provided with registration

For more information contact: Bob Luczai, MFGA – (781)275-4811 or Geoffrey Njue (781)891-0650 x12, UMass Extension Greenhouse Crops and Floriculture Program

<http://www.umass.edu/umext/floriculture/> or <http://www.massflowergrowers.com/> Note:

Registration at the door (day of the meeting) is available but the lunch may not be guaranteed. We will try to accommodate as many people as possible.

Plant Response to Different Combinations of Nature's Source and Eco-Vita Organic Fertilizers. I. Marigold

Douglas Cox
Stockbridge School of Agriculture
University of Massachusetts
Amherst



Organic greenhouse fertilizers interest growers producing bedding plants, edible crops like herbs, and vegetable transplants. I have been evaluating liquid and granular organic fertilizers for some years and my recommendations based on this work can be found here: <http://ag.umass.edu/greenhouse-floriculture/fact-sheets/organic-fertilizers-thoughts-on-using-liquid-organic-fertilizersdocument>

The current article reports the results of a recent trial with 'First Lady' marigold fertilized by combining two organic fertilizers together. Different levels of Eco-Vita granular fertilizer were incorporated in the growing medium pre-plant and followed up by post-plant liquid Nature's Source applications. In combination the levels of the two fertilizers were adjusted to supply the same amount of nitrogen as provided by single fertilizer treatments alone.

How the plants were grown

'First Lady' marigold plugs were potted 26 August in 4½-inch pots of Fafard 3B soilless mix. Pots were suspended through the lids of larger containers to collect leachate for N analysis at 10 day intervals to determine the total amount of nitrogen leached during the experiment.

Plants were fertilized with 250 ppm N from Plantex (20-2-20) chemical fertilizer or Nature's Source (3-1-1) liquid oil seed extract fertilizer. In other treatments, Eco-Vita 7-5-10 granular fertilizer (bone meal, soybean meal, cocoa shell meal, feather meal, and fermented sugar cane and sugar beat molasses) was incorporated in the growing medium before planting to supply 100, 75, 50, or 25% of the total N applied to the plants during the experiment. In the 100% Eco-Vita treatment 7.2 gm/pot (11.4 oz./cu.ft.) of fertilizer was applied. All fertilizer treatments in this trial supplied 500 mg N/pot during the course of the experiment whether the fertilizers were applied as liquids alone. In the Eco-Vita treatments Nature's Source was applied to equalize the amount of N in each treatment. During the experiment all plants were watered with same volume of water or liquid fertilizer.

At the end of the experiment, 12 November, recently-matured leaves were collected from the plants in each treatment for elemental analysis and the remaining portions of the shoots were harvested for dry weight determination. Growing medium was also sampled for pH and soluble salts determination.

Results

Plant growth, nitrogen leaching, and growth medium pH and salts. Plants in all treatments were nearly the same height and shoot dry weight (Table 1). Flowering was not affected by fertilizer treatment. Plants fertilized with Nature's Source, Eco-Vita, or a combination of both were lighter green in color than Plantex plants. Overall the plants in all treatments were acceptable in growth and appearance.

Table 1

Fertilizer treatment	Shoot dry weight (gm)	Plant height (cm)	N leached (mg N /pot)	Medium EC	Medium pH
Plantex 20-2-20	14.9 ^{ns}	27.4b	28.8b	0.45 ^{ns}	6.38c
Nature's Source 3-1-1	13.2	29.3a	8.6c	0.46	6.46c
100% Eco-Vita 7-5-10	12.4	26.1b	67.2a	0.41	6.90a
75% Eco-Vita	13.6	26.3b	49.6a	0.35	6.66b
50% Eco-Vita	13.9	27.2b	12.6c	0.41	6.61b
25% Eco-Vita	13.8	27.1b	37.9b	0.38	6.61b

Nitrogen leaching levels differed quite a bit with treatment. Total N leached (mg N/pot) was determined by analyzing the leachate for NO₃-N and NH₄-N and adding the totals. N leaching was greatest in the 100%, 75%, and 25% Eco-Vita and Nature's Source combination treatments. The least N leaching occurred in the Nature's Source alone, and 50% Eco-Vita, and Plantex treatments.

Soluble salts in all treatments were low and did not differ significantly among treatments. Probably low salts level was the result of the fairly large volume of water or liquid fertilizer (~500ml/pot [17 fl. oz.]) applied during the term of the experiment. Growth medium pH, did not differ greatly among the treatments and was acceptable for growing marigolds.

Elemental leaf analysis. Leaf analysis is a measure of the fertilizer treatments' ability to provide adequate plant nutrition. Plantex fertilization resulted in the highest level of N in the leaves (Table 2). N level in the leaves of plants grown in the other five treatments was below 4.00% which probably explains the appearance of mild N foliar deficiency symptoms in these treatments.

Table 2

Fertilizer treatment	N (%DW)	P (%DW)	K (%DW)	Ca (% of DW)	Mg (% DW)
Plantex 20-2-20	4.67a	0.51a	2.38 ^{ns}	2.12b	0.41b
Nature's Source 3-1-1	2.91b	0.53a	1.78	2.74a	0.71a
100% Eco-Vita 7-5-10	3.58b	0.21b	2.55	2.63a	0.36b
75% Eco-Vita	3.63b	0.34b	2.40	2.63a	0.42b
50% Eco-Vita	2.87b	0.45b	1.68	2.72a	0.54b
25% Eco-Vita	3.13b	0.56	1.86	2.59a	0.58b

Phosphorus content was greatest in the leaves from plants fertilized with Plantex or Nature's Source. K was highest in the leaves with Plantex and the 100% and 75% Eco-Vita treatments. Ca was lowest in leaves from plants fertilized with Plantex and was at about same level in the other

treatments. Leaves from Nature's Source fertilized plants contained more Mg than the other treatments.

With the exception of N, the levels of other elements were not at or near deficiency levels and none of the elements were present in excess.

Conclusions

In general, 'First Lady' marigold plants grew well and flowered normally with the fertilizer treatments provided them during the experiment. The only visible abnormality was the somewhat lighter green color of plants fertilized Nature's Source, Eco-Vita, and the combination of the two. The symptoms were mild but did suggest the onset or existence of N deficiency which could have impacted growth and flowering if left unchecked. N leaching was the greatest in these treatments and the N content of the leaves was lowest. Both NO₃-N and NH₄-N leaching were high when Eco-Vita was the fertilizer, however N leaching was lowest with Nature's Source.

Leaf content of P, K, Ca, and Mg were all normal for marigold. Growth medium soluble salts (EC) were rather low in all treatments, but pH was normal.

Results show that organic fertilizers applied alone or in combination can be successful in growing a typical bedding plant. However, routine monitoring of nutrients especially N and soluble salts level followed by fertilizer adjustment, if necessary, would be advisable.

In the next issue of *Floral Notes* another article will report on the results of a similar trial with 'Ultra Red' petunia.



Carmen Johnston will be keynote speaker at the Northeast Greenhouse Conference and Expo (NEGC)

The Northeast Greenhouse Conference and Expo is thrilled to announce that Carmen Johnston, nationally renowned garden lifestyle expert and founder of Carmen Johnston Gardens, will keynote their 2018 Conference and Expo.

Carmen, who specializes in commercial and residential landscape and garden design, is also an authority in event and wedding design. Carmen is a Southern Living Garden Lifestyle Expert, and she regularly contributes to the magazine as well as others such as Real Simple, etc.

During this exciting session, Carmen will forecast the latest gardening trends and discuss one of the most important aspects of the business: social media.

In the ever-expanding world of digital media, to be successful, growers and retailers, alike, have to utilize social media. Not only is social media necessary from a business perspective, but it is also dictating the trends in gardening. These days, the ideas clients bring to the table are often those they have found while scrolling through Facebook or Instagram. In this exciting session, Carmen Johnston, nationally renowned garden lifestyle expert, will share the secret to social media success and illustrate how it is forecasting the future of gardening.

Save Heat with Infrared Greenhouse Film

John W. Bartok, Jr.
Extension Agricultural Engineer
University of Connecticut

In talking with greenhouse suppliers, it is surprising how many growers are still not taking advantage of infrared (IR) plastic film on their greenhouses. In one example, the low cost of purchasing IR plastic, a grower could expect a payback of less than one month or about 2500% return on investment.

Why is this material better than a conventional plastic? Energy from the sun enters through the greenhouse glazing as short wave radiation and is converted to heat when the waves strike the plants, floor or benches. This energy is then trapped by the glazing and the greenhouse warms up. This is the greenhouse effect.

At night the reverse occurs. Heat provided by the heating system is lost by conduction, convection and radiation through the glazing and infiltration of cold outside air through the cracks and openings in the skin of the glazing. Heat loss can be slowed by using double glazing, installing a thermal blanket and sealing up the cracks.

The radiation component of the total heat loss is usually about 12%. Glass is opaque to radiation losses but polyethylene will allow it to go right through unless some barrier is present. This can be a layer of moisture that has condensed on the inside plastic or can be an additive that has been placed in the formulation.

Plastic manufacturers have found that mineral based additives, such as ethyl vinyl acetate (EVA), calcined kaolin clay and special polymers can be added to reduce this radiation loss. With the development of three-layer coextruded film, material with different properties can be combined into a single sheet. Generally, films that reduce the long wave radiation to less than 20% are referred to as infrared or thermal films. This is sometimes referred as the thermicity value. The thinner the plastic, usually the less the thermicity as there is less additives that can be incorporated.

Also affecting the radiation loss from the greenhouse is the condition of the sky which the greenhouse is radiating to. A clear sky is much colder than a cloudy sky and therefore radiation losses are greater. IR film is therefore more valuable on a clear cold night.

Research in 1982 by Bill Roberts and his team at Rutgers University showed that savings of up to 35% could be achieved with IR film under clear sky conditions when compared to conventional films. They concluded that over a heating season the savings might average out to 15 to 20%. This will vary somewhat depending on where in the U.S. your greenhouses are located and the amount of clear nights that you get.

Today most film plastic glazing manufacturers produce an IR film. Based on the work at Rutgers, the normal recommend is that the IR plastic be installed as the inner layer. As most IR films also include a wetting agent to reduce moisture dripping, the inside location is best.

Some of the mineral fillers used to reflect the radiation back into the greenhouse also diffuse the light. This spreads the light evenly inside the greenhouse reducing shadows and allowing more light to reach lower into the plant canopy. It also helps to average out leaf temperatures at the top of the plant canopy requiring less shading.

Research has also shown that leaf temperatures under the IR film especially on clear, cold nights were warmer. This may also result in a slightly earlier crop.

When IR film first came out, it was considerably more expensive than convention film. Today, as manufacturing techniques have improved and more growers use it the cost has dropped to a differential of about 2 cents/sq ft. This makes the payback shorter. Here is an example of payback.

Assume:

30' x 96' (2,880 sq ft) hoophouse covered with double poly on the roof and polycarbonate structured sheet on the endwalls. The greenhouse is located in Connecticut and is operated at 60 deg F. at night. Fuel is #2 oil purchased at \$2.00/gallon.

We will compare replacing the inside layer of conventional copolymer film (48' x 100' sheet) and the outside with a layer of IR film. Both films have a 4 year life. Savings with the IR film averages 12% for the season.

Cost for the inside layer of IR film = \$660.

Cost for the outside layer of conventional film - \$575.

Additional cost of the IR film = \$660 - \$575 = \$85.

Additional cost/year = \$85/4 yr. = \$21.

Assume the fuel usage in the conventionally covered greenhouse is 1.25 gallons/sq ft of floor area for the heating season. This is based on about 6,500 heating degree- days.

Heat cost for the heating season for the greenhouse with the conventional plastic = 2,880 sq ft x 1.25 gal/sq ft x \$2.00/gal. = \$7,200.

Heat cost for the greenhouse with IR film = \$7,200 - 12%(\$7,200) = \$7,200 - \$684 = \$6,516 (assumes a 12% savings/yr.)

Savings = \$7,200 - \$6,516/year = \$684

$$\text{Payback} = \frac{\text{Extra film cost} \quad \$21}{\text{Savings in fuel} \quad \$684} = \frac{\quad}{\quad} = 0.030 \text{ years or } \mathbf{11 \text{ days}}$$

Using this technique, you can calculate the payback for your own greenhouses.

Although there are many growers using the IR film, there are also many that are not. With a very short payback, we can conclude that most growers should be using the IR film. Additional benefits may be a shorter growing period and warmer leaf surfaces reducing disease potential.

Root Rot Disease Management for Greenhouse Crops

Angela Madieras

UMass Plant Diagnostic Laboratory

Amherst, MA

Root rot can be a serious issue in spring greenhouse crops. Because roots are hidden from view, the first symptoms of root rot are often observed in the aerial parts of the plant. Symptoms include wilting despite adequate water, stunting, chlorosis, necrosis, and plant collapse. Roots are discolored and the root system may be stunted. Abiotic issues such as excess soluble salts, ammonium toxicity, nutrient deficiency or toxicity, and suffocation (lack of oxygen in saturated media) can all produce symptoms like those described above, but pathogens can also be responsible for root rot. *Pythium*, *Rhizoctonia*, and *Thielaviopsis* are three of the most common pathogens associated with root rot in the greenhouse.

There are several **cultural management techniques** that will help prevent root disease in the greenhouse:

- Exclusion. inspect incoming plants immediately upon arrival and do not bring any plants that appear unhealthy into the greenhouse.
- **Make root inspections part of your scouting routine.** Turn a few well-rooted plants over in your hand and remove the pot to examine the root ball.
- **Sanitation, sanitation, sanitation!** Clean work spaces- Several disinfectants available. Keep flats and pots and watering nozzles off the floor. Do not re-use pots or flats- most root pathogens form tough-walled spores and other structures designed to survive for long periods in the soil. If you need to re-use containers, they must be carefully cleaned. See our fact sheets for information on greenhouse cleaning products:
www.ag.umass.edu/greenhouse-floriculture
- **Control weeds.** they can harbor pathogens and insects that may spread to greenhouse crops.
- Good water management: Use well-drained potting medium and don't over-water. *Pythium* especially loves wet medium. Overwatering also encourages fungus gnats, which can contribute to the spread of root pathogens.
- **Avoid overfertilizing.**
- **Add biofungicides to media before potting.** Biofungicides are based upon the action of beneficial microbes that inhibit pathogens. Many of these products are certified for organic use.
- **Accurate diagnosis is key!** If you are to make the best management choices, you must know the cause of the problem. An accurate diagnosis is also important because most fungicides effective for other pathogens are not effective for *Pythium*. For information submitting samples to our Plant Diagnostic Lab, please see
www.ag.umass.edu/services/plant-diagnostics-laboratory
- **Discard infected plants, and protect healthy plants from infection.** For more information on both conventional and organic fungicides labeled for use on greenhouse crops, see the New England Greenhouse Floriculture Guide: www.ag.umass.edu/greenhouse-floriculture

The Usual Suspects

Pythium has a very wide host range and is perhaps the most common of root rot pathogens. In geraniums it causes black leg, so called because of the black stem lesions that characterize the disease. There are well over one hundred species of *Pythium*, but not all are pathogenic to plants, and only a handful are common in greenhouse settings. *P. aphanidermatum* is one of the most common species and also one of the most virulent. The optimum temperature for disease development depends on the species present. Several products are available for *Pythium* management. Be aware that many isolates of *Pythium* in greenhouses are resistant to mefenoxam (Ridomil).

Thielaviopsis (Black Root Rot) has a very wide host range. Petunia, calibrachoa, pansy, viola, and vinca are among its favorites. Symptoms include wilting and stunting. The symptoms tend to be unevenly distributed in a flat. Dark patches on roots may be observed with a hand lens.

Thielaviopsis thrives when the medium pH is greater than 5.6 and temperatures are 55-65°F. Lowering pH to 5.4-5.6 if possible (petunia group) and increasing temperatures to >72°F will help mitigate this pathogen. Preventative fungicides include thiophanate-methyl (Clearys), triflumizole (Terraguard), fludioxonil (Medallion).

Rhizoctonia: R. solani is the most common species in greenhouses. Under the right conditions it also causes damping off, stem cankers, web blight. *Rhizoctonia* likes temperatures 70-90°F and moist but not wet conditions. It may also form stem lesions at soil line. Decreasing humidity to <93% by increasing air circulation and/ or heating and venting can decrease disease severity. Several fungicides are registered, including fludioxonil (Medallion), polyoxin D (Affirm), pyraclostrobin & boscalid (Pageant Intrinsic), thiophanate-methyl (Clearys), and Trichoderma (Root Shield). Always rotate fungicide groups to prevent resistance development. Follow label directions.

Save the Date!

Some events of interest to Mayflower and Floral Notes readers.

July 26. Down to Earth: Annual Summer Conference and Trade Show, MNLA, Register www.MNLA.com

October 5-6 Stockbridge School Alumni celebrate the 100th Anniversary of the founding of the Stockbridge School. Campus Tours, Tree Walk, Guest Speakers, and Farm-to-Table Banquet.

November 7-8. Northeast Greenhouse Conference and Expo, Boxborough, MA. Registration begins in August.

e-GRO Launches Nutritional Monitoring of Floriculture Crops Website

e-GRO, a collaborative team of university floriculture specialists and educators, launches a nutritional monitoring website for greenhouse, floriculture and vegetable crops.

Nutritional disorders are among the many challenges greenhouse growers encounter during crop production. Nutritional disorders often occur when substrate pH or soluble salts, referred to as electrical conductivity (EC), drifts above or below optimal ranges for plant uptake. To assist greenhouse growers in addressing nutritional disorders, the collaborative group of greenhouse and floriculture specialists and educators, e-GRO, has launched a Nutritional Monitoring of Floriculture Crops website, www.fertdirtandsquirt.com, led by W. Garrett Owen of Michigan State University Extension and Brian Whipker of North Carolina State University.

The Nutritional Monitoring of Floriculture Crops website, sponsored by the American Floral Endowment, will assist growers in establishing an in-house monitoring program and serve as an information and education center. The website is accessible by computer, tablet or mobile device.

The Nutritional Monitoring of Floriculture Crops website provides growers crop-specific nutritional factsheets of seven annual bedding plants including marigolds, geraniums, petunia, calibrachoa, gerbera, New Guinea impatiens, and dahlias. In the future, it will also provide nutritional factsheets for perennials, potted flowering plants, edible and herb crops. These crop-specific nutritional factsheets provide the optimal crop-specific fertility requirements, pH and EC values reported by the 1:2 Dilution, Saturated Media Extraction (SME) and PourThru methods, fertility management, corrective procedures for high and low pH and EC, and nutritional disorder photos .

The new website will also provide growers with instructional “How To” videos and guides. For instance, instructional “How To” videos and guides for determining substrate pH and EC by either 1:2 Dilution, Saturated Media Extraction (SME) and PourThru methods will be available. Sampling methods to determine pH and EC of annual bedding and perennial plants, plugs, liners, flats, pots and hanging baskets will be posted. Other videos and guides include properly collecting plant tissue for analysis, sampling irrigation water and injector calibration.

As a continuous effort to provide growers with nutritional information, please check the Nutritional Monitoring of Floriculture Crops website, www.fertdirtandsquirt.com, for updates and new postings of crop-specific nutritional factsheets, videos and guides.

The e-GRO team would like to thank the American Floral Endowment for support. {This article was originally published by Michigan State University Extension; http://msue.anr.msu.edu/news/egro_launches_nutritional_monitoring_of_floriculture_crops_website.}

UMass Greenhouse Crops and Floriculture Extension Program

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