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Floral Notes Newsletter

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On the next page you'll find the program for the UConn Greenhouse Biological Control Conference on June 20. Then learn latest on controlling Basil Downy Mildew. Check out the calendar of events of interest to greenhouse operators. Get some tips on how to manage weeds in growing field-grown cut flowers. Next consider the review of how to effectively water plants. Finally, consider the potential of surface-applied granular organic fertilizers for geraniums and other potted plants.

Have lots of sunny weather and plenty of customers in May and June! Doug Cox

Greenhouse Biological Control Conference

June 20, 2018

WB Young Bldg. Room 100

University of Connecticut, Storrs, CT

8:45 - 9:15 **Registration, Coffee available**

9:15 – 10:15 **Developing an Effective, Integrated Control Program Michael Oleykowski, Syngenta** Today's control strategies continue to evolve. How to effectively integrate chemistries into a biologically based strategy will be discussed.

10:15 - 10:30 **Break**

10:30 – 11:30 **Biofungicides and Their Fit into Your IPM Program** Debbie Palumbo- Sanders, Technical Services Specialist, Bioworks, Victor, NY. Biofungicides offer a variety of modes of action and we will cover the diversity of products available and how they can be incorporated for success in disease management programs.

11:30 – 12:30 **Implementing Our Biological Control Program** Kerri Stafford, Head Grower & Greenhouse Manager, Cavicchio Greenhouses, Sudbury, MA. Kerri will discuss how they use biologicals in their wholesale greenhouse production with specific tips and techniques that have worked for them.

12:30 - 1:30 **Lunch provided**

1:30 - 2:30 **Top Plants for Attracting Pollinators: Natives and Beyond** Annie White, Adjunct Professor, University of Vermont, and Owner/Principal Designer, Nectar Landscape Design Studio, Burlington, VT. Based on years of field science and observations, Annie will discuss what makes a flower pollinator friendly and will highlight top perennials and annuals for attracting pollinators to New England gardens.

2:30 - 3:30 **Plants Talk Biocontrol: How to Use Plants to Manage Pests** Carol Glenister, IPM Laboratories, Locke, NY. Use your plant observations and knowledge to direct biocontrol planning, decisionmaking, and actions.

3:30 – 3:45 **Questions and Discussion**

A registration fee of $40 is due by **June 14** payable by ***check only*** to the University of Connecticut. Included in the cost of admission: coffee, continental breakfast, lunch, informational handouts and parking.

Leanne Pundt at leanne.pundt@uconn.edu or call 860.626.6855 or visit the website: http://ipm.uconn.edu/pa_greenhouse/

Basil Downy Mildew Update

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In the past decade, great strides have been made in understanding the biology and epidemiology of *Peronospora belbahrii*, the causal agent of **basil downy mildew**. Researchers have been busy assessing the efficacy of both cultural and chemical management techniques in the greenhouse and in the field, and some new tools are now available. Plant breeders have produced a few sweet basil cultivars with reduced susceptibility to the pathogen, and continue to work toward the development of true genetic resistance. While much progress has been made, downy mildew management remains an issue of concern for basil growers.

What follows is an updated review of current management practices for basil downy mildew.

Cultural Management

The most important environmental factors favoring disease development are high humidity and extended leaf wetness. These factors can be reduced by:

- Heating and venting the greenhouse toward evening, especially when warm days are followed by cool nights.
- Improving horizontal air flow by the use of fans.
- Running fans at night. Fans may be connected to sensors that will turn them on when the RH reaches 70% and turn them off when RH drops below 65%.
- Reducing plant canopy density by spacing to speed leaf drying.
- Watering in the morning, or using drip irrigation rather than overhead watering.
- In the field, planting in well drained sites with good air drainage and orienting rows with the prevailing winds.
- Controlling weeds. Weeds can lead to increased humidity levels.
- Harvesting early. The risk of downy mildew development increases as the season progresses.
- Growing tolerant cultivars. Classic sweet (Genovese) types of basil are highly susceptible to downy mildew. No truly resistant cultivars are yet available; ‘Eleonora’, ‘Everleaf’ (AKA ‘Pesto Party’), ‘Tuscany’, and ‘Caesar’ are tolerant.
- Exposing infected plants to red light (λ 575-660 nm) for several hours at night to inhibit spore production. While sporangiophores can be formed in light or darkness, spore production requires a period of darkness. Some crop loss may be incurred, as sporangiophores can still emerge from the leaves; however, the reduction in spore production can help prevent the pathogen from spreading to uninfected plants. This is most effective on young plants as direct leaf exposure to light is needed.

Chemical Management

Few fungicides are labeled for herb plants and there are differences in registrations for field grown plants versus greenhouse plants. Always check the labels on individual products. Currently labeled products are listed below. Ranman and Revus have the advantage of being labeled for use against

downy mildew on both basil and spinach. Many organic products in addition to those listed here are labeled for use on basil, but efficacy data is lacking. Milstop and Actinovate are among the best performing OMRI labeled products in research trials, though efficacy can be inconsistent. Both conventional and organic products should be used in a preventative manner to protect plants from infection, as few have any curative properties. Chemical management must be used in conjunction with cultural management techniques for best results. Rotate active ingredients (FRAC groups) to prevent resistance development. For further information, consult the New England Vegetable Management Guide at http://nevegetable.org/ (link is external)

- Cyazofamid (Ranman, FRAC group 21): labeled for field and greenhouse use.
- Mandipropamid (40): Revus is labeled for field use, Micora for greenhouses with permanent flooring.
- Phosphorus acids (K-Phite, Fosphite, 33): recommended use at a low rate in combination with a conventional fungicide.
- Oxathiapiprolin (Orondis Ultra B, U15): labeled for basil downy mildew in field and greenhouse.
- Azoxystrobin (Quadris, 11): registered for field use on basil, though not for downy mildew specifically.
- Fenamidone (Reason, 11): now labeled specifically for basil downy mildew in field and greenhouse; note that it is in the same FRAC group as azoxystrobin.
- Copper (Cueva *et al*, M1): greenhouse and field.
- Potassium bicarbonate (MilStop): greenhouse and field.
- *Streptomyces lydicus* (Actinovate): greenhouse and field.

Save the Date!

Some events of interest to Mayflower and Floral Notes readers.

June 19. UMass Extension Respirator Workshop, Marlborough, MA www.umass.edu/pested.

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.

Weed Management Options for Field-Grown Cutflowers

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Editor's Note: This article was originally published as "Weed Management Options for Field-Grown Cutflowers on Long Island" in the June 2017 issue of Agricultural News, a publication of Cornell Coop. Ext. of Suffolk County, NY. Consult the New England Greenhouse Floriculture Guide 2017-2018 for proper use of chemicals in accordance with local pesticide regulations.

The first opportunity for weed management often occurs the season before the crop is planted. It is possible to avoid planting on land that is seriously infested with difficult-to-control weeds if the grower knows what to look for. Creeping perennial weeds such as yellow nutsedge, mugwort and hedge bindweed are very difficult to control once a flower crop is planted. If it is not possible to avoid such a site, then it is important to manage these weeds the season before planting. Repeated applications of a systemic, non-residual herbicide such as glyphosate or repeated disking or harrowing will usually be very effective in bringing the perennial weed populations down to a more manageable level.

Chemical soil fumigation in the fall or spring prior to planting is one option that some growers consider. Fumigation should be considered if there are other serious soil pests that can only be controlled in this manner or if no other chemical means of weed control are being considered. Fumigation is expensive and usually very effective in controlling seed-propagated weed species but often poor in controlling creeping perennial weeds.

Pre-emergence herbicides are sometimes applied preplant, but usually applied post-plant or post-transplant and always preemergent to the weed. They are generally active on germinating weeds and usually need either incorporation by cultivation or water (irrigation or rain) to activate and move the chemical into the zone in the soil where the weed seeds are germinating. Some can be applied prior to transplanting, although usually cutflower safety is enhanced by having the transplant roots well below the herbicide layer. A few cutflower species are direct seeded. The larger seeded species such as zinnia and sunflower can usually tolerate registered herbicides. However, most of the smaller

seeded cutflower species are very susceptible to injury if they are direct seeded and then immediately exposed to a preemergence herbicide. It is always essential to read the label before buying or applying any herbicide to be sure that the crop and weed are listed, as well as for information on proper dosage and timing. When considering the possibility of using a pre-emergent herbicide, in general, safety to the flower crop increases with:

- • Larger transplants
- • Applying the lowest labeled rate
- • Delayed application after planting for better root establishment
- • Granular formulations if a choice exists versus a spray
- • Directed sprays to the base of the plants-not spraying the entire plant

Some post emergence herbicides are very selective in controlling only the grassy weeds that have emerged. Sethoxydim (Segment, Poast), and clethodim (Envoy & others) have now been labeled for over-top application in several cutflower species. Injury symptoms on the weeds usually take 7-10 days to be visible and they are effective in controlling grasses only (not sedges or broadleaves) but can be a valuable rescue tool if grassy weeds are a problem. For more information about which herbicides to use, consult the 2017-18 Cornell Pest Management Guidelines for Greenhouse Crops and Perennials.

Another important component of an effective weed control strategy consists of nonchemical methods and practices which, either alone or in combination with herbicides, can help prevent weed infestations from becoming economically damaging. Among these are proper fertility and placement, irrigation, and pH management and selection of cutflower species or cultivars which are well adapted to the site. Weeds are great opportunists and will take advantage of any condition which tends to stress the crop. Mulches, either organic or plastic, can be a very effective and practical means of controlling weeds, particularly with transplants in a multi-crop, low acreage operation. Controlling harmful insects and diseases allows the crop to be a better
competitor. Hand weeding or rogueing escaped weeds before they disperse their seed will help alleviate next year’s problem. Narrower in-row and between-row spacing allows the crop to cover the bare ground more quickly, thus shading out the weeds more effectively.

In summary, it is important that the grower develops a rational strategy well before the start of the growing season using all or some of these tools to economically manage weeds.

Watering Plants

Over-watered Plants: Stunted plants may be a sign of over-watering. Plants can be easily over-watered during overcast, cloudy weather, when plants with different water needs are grouped together or by an inexperienced waterer. Over-watering deprives roots of oxygen and increases susceptibility to root diseases such as *Pythium* and also leads to algae growth and infestations of fungus gnats and shore flies. Check roots regularly for signs of over-watering by gently removing plants from their containers. Plants that have been watered too frequently will have roots that are long and thin with few root hairs. If plants continue to be over-watered, roots will eventually turn brown and rot.

Determining When to Water: There are many things to consider before watering including: The pot size; the stage of the crop; the current weather and tomorrow's weather; the time of day and moisture level of the media. Use several criteria to decide when to water and refrain from following a set schedule.

The weight of containers is commonly used to determine the moisture level of the media and when to water. Pick up individual containers and if it feels heavy, even though the surface is dry, then do not water. If containers are light in weight, even though the surface looks wet, investigate further to make sure the water is thoroughly wetting the media. Train new waterers to remove the pot and inspect the moisture level throughout the entire profile to become familiar with the weight of containers in relation to the moisture level. A scale is also a useful tool when training new employees.

Some growers successfully use a water gauge that measures how much water is used. This can be a container placed among the pots, or if a drip system is used, a container with an emitter placed it. Experience will dictate how much water is needed to thoroughly saturate a container.

Some growers use their finger to feel the media in shallow containers (the surface can be dry, while wet deep in the pot, especially large containers).

Moisture sensors may be an option (primarily used to automate irrigation in drip irrigation systems). They vary in cost and reliability. Some moisture sensors are sensitive to electrical conductivity and temperature.

Hand-watering Tips: For most applications, use a simple breaker with a valve behind the breaker and adjust the pressure to deliver a gentle flow of water out of the breaker in a uniform manner. Avoid using too high water pressure or large droplets that can wash out the media, compact the media (which then holds too much water) and damage plants. This is especially important for newly transplanted crops.

Train employees to water by lowering the breaker down near the soil surface of the pot and move from pot to pot, watering each plant individually (rather than to hold the wand high overhead like a shower). This allows the waterer to control the amount of water that goes into each pot by holding the breaker at each pot for a consistent 1-2-3 count (depending on the size of the pot). This minimizes the amount of foliage that gets wet and water and fertilizer is directly delivered into the pot efficiently.

When watering, bring the substrate of the entire crop to container capacity (the point where the substrate cannot hold any more water against the pull of gravity). This will encourage deep root growth and help to minimize spot watering. Let the soil partially dry between watering, but avoid drying down to wilt.

Resources

Master the Art of Watering, Greenhouse Grower

Water Management More of An Art than a Science, E-Gro bulletin

Have You Thought About Your Greenhouse Watering Strategies Lately? Michigan State University Extension

Too Wet or Too Dry, Grower Talks

Back Pocket Grower (click training): 5 Point Moisture Scale for Irrigation of Seedling Plugs and Cuttings

Save Water with Automation and Sensors, Greenhouse Grower

Tina Smith, UMass Extension with input from Leanne Pundt, UConn Extension

Surface Application of Granular Organic Fertilizers

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I've have written a number articles about my experiments with organic fertilizers as alternatives to traditional water-soluble chemical fertilizers. I've worked with several types of soluble organic fertilizers manufactured from plant extracts like sugar beets and granular fertilizers made from poultry waste and other agricultural byproducts. Not surprisingly, because of their differences in the makeup, success in growing acceptable greenhouse crops has been variable. However, one thing does seem clear: organic fertilizer combinations work better than relying on one type alone. My recommendations on how to use organic fertilizers, based on my work can be found at this link: https://ag.umass.edu/greenhouse-floriculture/fact-sheets/organic-fertilizers

Several granular organic fertilizers, Sustane 8-4-4 and Eco-Vita 7-5-10, mixed with the growing medium prior to planting and then irrigated with water-soluble Nature's Source 3-1-1 have shown good results for short-term flowering bedding plants and other transplants. Granular organics can also be surfaced-applied after planting but I have not had a chance to study this approach until now. This article reports the results of surface application used to fertilize 'Yours Truly' geranium.

How the plants were grown

On 12 February 2018 unrooted cuttings of 'Yours Truly' geranium were stuck in 4" pots of Pro-Mix HP and placed under intermittent mist. When roots appeared the plants were irrigated several times with a dilute solution of 100 ppm N periodically for about 3 weeks. On 3 March the plants were removed from mist and fertilizer treatments were started: Plantex (20-2-20), Nature's Source (3-1-1), surface application of Sustane, and surface application of Eco-Vita. The liquid fertilizers were applied at 200 ppm N twice a week. Three times during the growth of the plants granular fertilizers were applied to the growing medium surface at the rate of 1/4 tsp. per pot (the rate was based on the amount mixed with the growing medium in earlier trials).

Plants were measured and harvested for shoot dry weight determination on 23 April.

Results

Plant appearance and growth. In general, plants in all treatments were generally normal in appearance (Figure 1). However, plants fertilized with Plantex were darker green and taller than plants in the other treatments. The Nature's Source plants were the smallest and the leaves were chlorotic. Plants treated with surface-applied granular fertilizers were intermediate in size compared to Plantex and Nature's Source plants and they were less chlorotic than Nature's Source.

Plantex plants were taller (as measured from the pot rim to the top of the foliage), larger in diameter, and greater in dry weight than plants in the other fertilizer treatments (Table 1). No difference was apparent between treatments in flower height (as measured from the flower stalk's point of attachment to the stem to the top of the flower cluster) and flower cluster diameter.

Figure 1. 'Yours Truly' geraniums fertilized Plantex, Nature's Source, Sustane granular, and Eco-Vita granular.

Results of using Sustane and Eco-Vita granular organic fertilizers as surface-applied sources of nutrients for potted plants like geranium demonstrates the potential of this way of using fertilizer. The performance of the surface-applied granular fertilizers would likely be improved using a higher rate or by applying them in combination with regular applications of a water-soluble organic fertilizer like Nature's Source. The efficacy of combining different types of organic fertilizers was demonstrated in my earlier trials when the same granular fertilizers were mixed in the growing media preplant and Nature's Source was applied at regular intervals postplant.

Table 1. Growth of 'Yours Truly' geranium as affected by different types of fertilizer.

Treatment	Plant foliar hgt. (cm)	Flower hgt. (cm)	Plant dia. (cm)	Flower cluster dia. (cm)	Dry weight (gm)
Plantex 20-2-20	26.3a	23.3^{ns}	30.4a	6.7^{ns}	16.9a
Nature's Source 3-1-1	18.9b	20.1	22.2b	7.4	10.9b
Sustane 8-4-4	16.2c	21.9	21.3b	8.7	10.6b
Eco-Vita 7-5-10	19.9b	21.2	21.5b	7.1	12.0b

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