A Publication of the UMass Extension Greenhouse Crops & Floriculture Program

Floral Notes Newsletter

Volume 23, No. 1 www.umass.edu/umext/floriculture July-August 2010

In This Issue

2010 Northeast Greenhouse Conference to Address Pest Management

The Northeast Greenhouse Conference will be held Wednesday, November 3 and Thursday, November 4 at the DCU Center, Worcester MA.

At this year's conference there will be plenty of opportunity to brush up on pest management for greenhouse crops and in the process, earn pesticide towards pesticide recertification if needed. An entire track is being devoted to pest management during the conference. Topics will include: Thrips and other difficult to manage pests (Dan Gilrein, Cornell Cooperative Extension); Downy mildew and other problem diseases and Diseases of perennials (Margery Daughtrey, Cornell Cooperative Extension); Case studies on biocontrol (Suzanne Wainwright-Evans, Buglady Consulting); Biocontrol panel of experienced growers; and Pest management on greenhouse vegetables and herbs (Rob Wick, UMass and John Sanderson, Cornell Cooperative Extension). For program details and registration information, see: http://www.negreenhouse.org/index.html. Pre-register early to take advantage of discounts!

Calibrachoa Response to Chemical and Organic Fertilizers

Douglas Cox
Plant, Soil and Insect Sciences
University of Massachusetts
Amherst

Interest in organic fertilizers is growing in the greenhouse industry, but experience and trials are not keeping up. There is little information available on how well the new types of fertilizers provide nutrition for plants compared to traditional water-soluble chemical fertilizers. The most widely available "organic" fertilizers for application like traditional water-soluble fertilizers are fish fertilizers and Daniels fertilizers.

Many growers are familiar with fish fertilizers made from waste products of the ocean fish processing industry. The material is a thick, heavy liquid supplying plant nutrients at presumably varying levels of availability. Fish fertilizers probably supply mostly ammonium nitrogen which could be a disadvantage for some plants. Also, fish fertilizers can be a problem to store diluted because they spoil and they can be difficult to inject through some systems. In our area the Neptune's Harvest brand is the most commonly available fish fertilizer and it is OMRI-approved for organic greenhouses.

Daniels 10-4-3 is a liquid, "organically-based" fertilizer currently used with great success by many growers. The organic portion is oilseed extract. Most of the nutrients, however, are derived from inorganic salts and for this reason it cannot be certified as being organic.

Daniels Pinnacle 3-1-1 is a less well-known liquid fertilizer. It is an organic fertilizer, most nutrients are derived from oilseed extract and extra nitrogen is provided by sodium nitrate ("Chilean nitrate"). In my opinion this fertilizer is a great step forward in finding organic fertilizers that can be easily applied by growers using the systems to which they are accustomed. However, Pinnacle spoils after dilution and it does not seem to provide adequate nutrition at the labels rates with the result that growth is reduced and nutrient deficiency symptoms develop.

This objective of this project, supported by a grant from New England Floriculture, Inc., was to determine the response of calibrachoa to several different types of greenhouse fertilizers and to determine by foliar analysis their nutrient supplying ability. In the case of Daniels Pinnacle an explanation of the poor plant results was sought. Calibrachoa makes a good test plant because of its high fertility and acidic pH requirements and its tendency to respond to a variety of nutrient problems by developing leaf chlorosis (Dole, et al., 2010).

How the plants were grown

Rooted liners of calibrachoa 'Million Bells Cherry Red', taken as 2½-inch cuttings on 22 February 2010, were potted on 8 March in 4-inch pots of Fafard FOF30 organic soilless mix. On 22 March, after a two week establishment period, plants were watered as need with solutions supplying 225 ppm N in five fertilizer treatments: Plantex High Nitrate 20-2-20, Daniels 10-4-3, Daniels Pinnacle 3-1-1, Neptune's Harvest Hydrolyzed Fish Fertilizer 2-4-1, or alternating application of Daniels Pinnacle and fish fertilizer. There were 8 plants per treatment. Fertilizer treatments were applied 14 times during the course of the experiment and some plain waterings were done as needed.

On 26 April, after substantial growth was made by the plants, the experiment was ended. Shoot dry weight was determined as a measure of growth. Leaves from the terminal 2-3" of each shoots were harvested for nutrient analysis. Growth medium samples were collected to determine EC and pH.

Results

Plant growth and appearance. Plants fertilized with Plantex produced the greatest shoot dry weight and those with Daniels Pinnacle the least (Table 1). Due to the naturally irregular growth habit of the trailing calibrachoa the only treatment visually distinguishable from the others was Pinnacle which had the smallest plants. The terminal (youngest) leaves and small developing shoots of Pinnacle plants were severely chlorotic and somewhat smaller compared to similar leaves from the other treatments (Figures 1 and 2).

Figure 1. Close-up of chlorosis occurring with Pinnacle fertilizer.

Figure 2. Plantex plant (left) and Pinnacle plant (right).

Table 1. Fertilizer effects on calibrachoa dry weight and growth medium EC and pH.

Fertilizer	Shoot dry wt. (gm)	EC (mmho/cm)	pH
Plantex 20-2-20	9.8a[z]	1.57a	5.22b
Daniels 10-4-3	8.0ab	0.83bc	5.55b
Daniels Pinnacle 3-1-1	6.0c	0.62c	7.22a
Neptune's Fish Fertilizer 2-4-1	7.5bc	1.06b	5.47b
Pinnacle + Fish	8.1ab	1.21a	5.44b

[z]Means followed by different letters are statistically different at P=0.01

EC and pH. Growth medium EC (soluble salts) was significantly lower with both Daniels fertilizers compared to the other treatments (Table 1) suggesting lower fertility, but it's more likely that the organic nutrient sources in these fertilizers were not detected by the EC test. More importantly was the high pH, 7.22, found with Pinnacle. In New England a growth medium pH this high is normally seen only when the irrigation water has high alkalinity or the grower has intentionally made treatments to raise pH. For calibrachoa, a pH between 5.4 and 5.8 is considered optimum due to its susceptibility to iron deficiency. pHs in the other fertilizer treatments were about in this lower, acidic range.

Leaf analysis. Examination of Table 2 shows quite a few significant differences in nutrient content of calibrachoa due to fertilizer type. These differences might be due to the NPK analysis of the fertilizer; the presence, absence, or level of other elements in the fertilizer, or the affect of the fertilizer on pH or other nutrient process in the growth medium. Also, organic fertilizers like fish emulsion can be very complex materials with numerous sources of nutrients. The least difference in nutrient content occurred between Plantex and Daniels 10-4-3; the higher level of potassium (K) with Plantex probably is a reflection of the higher K analysis of this fertilizer. Fertilization with fish emulsion resulted in the highest N, phosphorus (P),

Table 2. Fertilizer effects on the nutrient content of calibrachoa leaves.

Fertilizer	N (%)	P (%)	K (%)	Ca (%)	Mg (%)	B (ppm)	Fe (ppm)
Plantex 20-2-20	5.19a[z]	0.47c	4.06a	1.05b	0.79a	36c	124a
Daniels 10-4-3	5.03ab	0.46c	2.54c	1.11b	0.91a	41bc	100a
Daniels 3-1-1	3.86c	0.35c	4.28a	0.54c	0.48b	47a	80b
Neptune's Fish Fertilizer 2-4-1	5.20a	1.81a	1.61d	1.61a	0.93a	37c	77b
Pinnacle + Fish	4.57b	0.98b	3.46b	0.89b	0.76a	44ab	94a

[z]Means followed by different letters are statistically different at P=0.01

and calcium (Ca) contents and the lowest K of all the treatments. The P level resulting from fish emulsion was unusually high.

Results with Daniels Pinnacle were most interesting. Nitrogen, P, K, Ca, magnesium (Mg), and iron (Fe) were lowest and K and boron (B) were the highest of all fertilizer treatments. Alternating Pinnacle with fish emulsion fertilizer resulted in higher levels of leaf N, P, Ca, Mg, and Fe, but K and B were lower compared to Pinnacle alone.

Conclusions

Fertilization of calibrachoa with Plantex, Daniels 10-4-3, Neptune's Fish Fertilizer, and Pinnacle alternating with fish fertilizer produced plants with similar dry weights without excess soluble salts, about the same acidic pH, and no foliar symptoms of nutrient deficiency. In most cases the nutrients in the leaves (with some notable significant differences in the levels of some elements between certain treatments) met or exceeded the concentrations found in non-deficient controls in an earlier study with calibrachoa (Williams, 2004).

Plant growth was significantly reduced compared to the other treatments, growth medium pH was much higher, and severe chlorosis developed on the leaves and new branches at the stem terminals of calibrachoa fertilized with Daniels Pinnacle 3-1-1.

The concentrations of all the nutrients in the Pinnacle plants, except K and B, were lower than the other treatments, making it tempting to attribute poor growth and chlorosis to a "general" nutrient deficiency. But only B, Ca and Fe deficiency symptoms would normally occur on the terminals of the stems and in calibrachoa the deficiency symptoms of these elements is similar. It's interesting to note that when Pinnacle and fish fertilizer were alternated the dry weight was similar to the other treatments, leaf nutrient levels increased and no deficiency symptoms occurred, and pH was markedly lower.

What is the cause of the growth reduction and severe chlorosis? Boron is not the likely cause because the B concentration equaled or exceeded that in the plants treated with other fertilizers. Calcium and Fe are more likely suspects. Williams (2004) in reported that deficiency symptoms for Ca and Fe showed most quickly in her experiments. Low Ca might be the problem because the level in Pinnacle leaves was so much lower compared to the other treatments and it was close to the initial deficient level of 0.37 % reported by Williams (2004). However, normally Ca deficiency would not be expected at a pH of 7.22 (but what aspect of the Pinnacle fertilizer made the growth medium pH reach such a high level and how Ca might be involved is unknown to me). My results suggest that Fe deficiency was the most likely cause of chlorosis because high growth medium pH favors the occurrence of Fe deficiency, if left uncorrected Fe deficiency causes stunting of calibrachoa, and the Fe level in the leaves of Pinnacle plants was very close to the initial deficiency level reported of 77.5 ppm by Williams (2004).

References

Dole, J.M., A. Williams, J.L. Gibson, B.E. Whipker, P.V. Nelson, B.R. Cleveland and F.R. Walls. 2002. Nutrient deficiencies of calibrachoa. http://www.ces.ncsu.edu/dpts/hort/floriculture/def/calibrachoa.htm

Williams, A.L. 2004. Foliar symptomology and tissue concentrations of five nutritionally deficient floriculture crops. http://www.lib.ncsu.edu/theses/available/etd-03252004-180541/unrestricted/etd.pdf

Baptisia australis: 2010 Perennial Plant of the Year

Baptisia australis is the Perennial Plant Association's 2010 Perennial Plant of the Year. Baptisia, pronounced bap-TEEZ-ee-uh aw-STRAH-lis, carries the common names blue false indigo, wild indigo, and baptisia. Less commonly occurring names are indigo weed, rattleweed, and rattlebrush. This Eastern United States native is member of the Fabaceae family (formerly Leguminosae). The name of the genus, *Baptisia*, is derived from the Ancient Greek word, *bapto*, meaning to dip (dye) or immerse, while the specific epithet, *australis*, is Latin for southern.

Blue false indigo grows 3 - 4' tall and 3 - 4' wide in an upright habit. This exceptional perennial grows across a wide range of zones and is one of the most adaptable native species. Often, when first planted, baptisia has only several stems and appears sparse. However, the clump goes from a slow start to really flourishing within 3 years, when it reaches full size. Because *Baptisia* clumps expand to a diameter of approximately 4' with a shrub-like habit, these dimensions should be considered when plants are placed in the landscape. It grows best in full sun, but can survive in partial shade. If the plant is grown in shade, staking may be in order to prevent flopping. It is drought tolerant once established. It should be noted that this perennial has a tap root and should be placed in a permanent location. Some clumps are 20 years old and have not been divided. This low-maintenance quality is another attractive feature.

Newly emerging shoots produce violet-blue, lupine-like flowers in erect 10 - 12" racemes atop flower stems extending well above the foliage mound of cloverlike, trifoliate, bluish-green leaves. The spring flowers are present for 3 - 4 weeks. The flowers give way to inflated seed pods which turn charcoal black when ripe; flower arrangers consider these to be ornamental. The dried seeds in the pods rattle in the autumn breezes, creating a nice sound effect. In earlier times the pods were popularly used by children as rattles. The common name, blue false indigo, refers to the use of this perennial by early Americans as a dye, albeit an inferior one, similar to the true indigo (genus *Indigofera* of the West Indies).

Baptisia australis is an excellent plant to anchor the back of the border. It is also valuable for cottage gardens, native plant gardens, and native area of prairies and meadows. It is best as a specimen or planted in small groups. Blue false indigo can be used with bulbs and other spring flowering perennials to make interesting combinations. Various *Heuchera* selections can create a skirt with leaf colors either echoing or contrasting the flower color. The purple blue range of *Amsonia* selections also make nice neighbors. Baptisia is a true American beauty that attracts a number of butterfly species to the garden.

There are no serious insect or disease problems. Taller plants may need support, particularly when grown in partial shade. A desirable attribute of blue false indigo is that it is seldom damaged by deer browsing. Baptisia is listed as containing several alkaloids having a bitter taste malting the plant unpalatable to browsing.

Baptisia australis is seed-propagated. Like many other legumes, it has a hard seed coat. Seeds must be scarified when germination occurs in an artificial setting. Seedlings may be transplanted when small; however, dividing large clumps is not advisable due to the tap root structure of this perennial.

Disease Management

Downy Mildew on Basil[z]

Robert L. Wick and M. Bess Dicklow
Plant, Soil, and Insect Sciences, UMass Extension
University of Massachusetts
Amherst

Downy mildew was first reported in Uganda in 1930. The disease did not attract international attention until it recently appeared in several new locations; Italy (2004), France (2005) South Africa (2006), Iran (2007) United States, in Florida (2007) and Argentina (2008). During 2008 and 2009, the disease occurred throughout the east coast in epidemic proportions both in the field and in greenhouses. Considerable economic losses occurred in Massachusetts during that time and we anticipate basil downy mildew will be a major disease of basil in the US in the foreseeable future. Long distance transport from FL to MA might be explained by aerial dispersal of spores but rapid transcontinental transport probably occurred via infested seed sold internationally. Although the downy mildew pathogen has been detected in basil seed; seed transmission is probably a rare event. Air-borne dissemination from infected plants is more likely.

Infected leaves develop diffuse yellowing on the top of the leaf but distinctly vein-bounded patches on the bottom. When spores are produced, a characteristic gray, fuzzy growth on the underside of the leaves is evident. Symptoms of downy mildew on basil can easily be mistaken for a nutritional deficiency. The fuzzy growth of spores on the underside of the leaf looks as if soil had been splashed onto the leaf under-surface.

Management

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

- Toward evening, heat and vent the greenhouse, especially when warm days are followed by cool nights.
- Improve horizontal air flow by the use of fans.
- Reduce plant canopy density by spacing to speed leaf drying.
- Water in the morning, if practical, or water subirrigation rather than overhead.
- In the field, plant in well drained sites with good air drainage and orient rows with the prevailing winds.
- Control weeds and space plants to enhance leaf drying.

Relative susceptibility of basil types

Field trials conducted in southern New Jersey in 2009 determined that commonly-grown sweet basil (*Ocimum basilicum*) cultivars such as 'Poppy Joe' and 'Nufar' were the most susceptible to downy mildew. The least susceptible basils included the lemon and spice types such as *O.* x *citriodorum* and *O. americanum* cultivars , 'Lemon Std', 'Lemon', 'Lime', 'Spice', 'Blue Spice' and 'Blue Spice Fil'.

Chemical control

Few fungicides are labeled for herb plants and there are differences in registrations for field grown plants versus greenhouse plants. Copper products, phosphites, azoxystrobin, and mancozeb are labeled for use on basil. It is the grower's responsibility to read and follow label instructions. The label is the law and any recommendations made here are superseded by the label.

At the University of Massachusetts, we are investigating methods to control this disease with biological control agents. We are interested in collecting live, infected plants from residential gardens, greenhouses and field grown basil. If you think your basil plants are infected, please call or email Rob Wick, Department of Plant Soil and Insect Sciences; (413)545-1045, rwick@pltpath.umass.edu.

[z]Originally published in *Vegetable Notes*, 21(12), July 8, 2010.

Pest Management on Poinsettias

Tina Smith
UMass Extension
Greenhouse Crops and Floriculture Program
Amherst

As more growers use biological control agents to manage pests on poinsettia crops, w*holesale propagators* of poinsettias, are encouraged to use IPM practices and pesticides that are compatible with biological control agents (BCA) or use BCA's during propagation. This helps customers who are planning to use BCA's during production. It would also be helpful to provide a list of pesticides used on the crop to your grower customers. This helps growers who are planning to use biocontrol agents and growers who do use pesticides, to choose products that will limit pesticide resistance.

Pesticides and biocontrol agents

Some pesticides have a two-month residual that would negatively impact biocontrol agents. Some insect growth regulators, microbial pesticides, and feeding inhibitors may be compatible with certain natural enemies. But this varies with the particular product, natural enemy and its life stage. For example, pyriproxyfen (Distance) appears harmless to the whitefly parasitoid, *Eretmocerus eremicus* but is highly toxic to *Encarsia formosa*.

Wet sprays of horticultural oils & insecticidal soaps, and their short term residues are toxic to most natural enemies, especially parasites. However, once the residues have dried, they tend to be less harmful. For example, direct sprays of insecticidal soap are toxic to the predatory mite, *P. persimilis*, but there are no harmful effects with the insecticidal soap application 3 days after release.

To find out if a pesticide is compatible, use one of the on-line searchable side effect data bases available from suppliers listed below. Click on "Side Effects" and enter product and natural enemy to search.

www.biobest.be

www.koppert.com

www.beckerunderwood.com

If you are *buying in cuttings* and plan to use biological control for pest management, know the pesticide history of your cuttings. Last year, some growers had problems with biocontrol for whitefly due to pesticide residue on their cuttings. Pesticide residues negatively affected biocontrol agents for the first 3-4 weeks of the crop after arrival at the finishing growers operations. As a result, biocontrol agents were not able to establish on the first generation of whitefly.

Beginning a biocontrol program for poinsettias

If you are just beginning a biocontrol program, it is best to start on a small scale. Choose a specific crop area and have a weekly scouting program in place. Biological control agents do not work as a clean up strategy. As always, when starting out, begin with a pest-free greenhouse and plants and work closely with your supplier for application rates and pesticide compatibility.

Fungus gnats are a common problem at rooting stage or at planting stage of rooted plants, however they can also damage older plants. Biocontrol agents for fungus gnat include the predatory mite *Hypoaspis miles* the predatory rove beetle *Atheta coriaria* (also effective on shoreflies) as a preventative, and also the parasitic nematode *Steinernema feltiae*.

Two whitefly species are commnly found on poinsettia, the greenhouse whitefly (*Trialeurodes vaporariorum)* and the silverleaf whitefly *Bemisia argentifolii or B. tabaci)*. Greenhouse whitefly adults are more active at temperatures around 75°F and silverleaf whitefly adults prefer tempertures of 80°F or warmer. The whitefly species present can impact the choice of biocontrol agent used. *Encarsi Formosa* is commonly used to manage greenhouse whitefly and *Eretmocerus eremicus* and *E. mundus* used to manage silverleaf whitefly. Both are parasitic wasps that kill whitefly by parasitizing and by feeding on immature stages of whitefly. Other biocontrol agents include the predatory mite *Amblyseius swirskii* that feeds on whitefly eggs, nymphs and thrips and the ladybird beetle, *Delphastus catalinae*. The beetle is not used as often because it usually results in whitefly populations being higher than is acceptable to some growers.

Update -Sanmite: For the upcoming poinsettia season, for the past few years, Sanmite (pyridaben) IRAC Group 21 has worked well for whiteflies on poinsettia, without causing phytotoxicity. It was being used by breeders, rooting stations and growers. As a result of overuse, reports are coming in that resistance seems to be occurring so it may not be dependable this season as a clean-up.

References

Biobest, Crop Info-Sheet: Poinsettia

Cloyd, R. Compatibility conflict: Is the use of biological control agents with pesticides a viable management strategy? http://www.bugwood.org/arthropod2005/vol2/11d.pdf

Cloyd, R. 2007. Impact of fungicides on natural enemies, research finds some biological/fungicide combinations harmful. http://www.greenhousegrower.com/magazine/?storyid=371

2009-2010 New England Greenhouse Floricultural Recommendations. www.negreenhouse.org/index.html pp B.29-B.33.

Wainwright-Evans, S. 2010. Effectively integrating biocontrol agents into pest management. OFA Bulletin. No.9.

Contact UMass Floriculture Extension Staff

Douglas Cox Floral Notes Editor dcox@pssci.umass.edu

Tina Smith Outreach Educator tsmith@umext.umass.edu

Paul Lopes Outreach Educator lopes@umext.umass.edu