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PURDUE EXTENSION

The Indiana Flower Grower

In This Issue

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Roberto's Message

Message from Roberto

Dr. Roberto G. Lopez

Assist. Professor and Floriculture Extension Specialist

Dear flower growers, businesses, distributors, organizations and colleagues,

Have you always wanted to go to the California Pack Trials (now known as "Spring Trials"), but did not want to deal with all the planning and driving? Join Mark Bridgen of Cornell University, Brian Krug of the University of New Hampshire, Neil Mattson of Cornell University and myself on a bus tour designed specifically for greenhouse growers and floriculture professionals to the 2010 California Spring Pack Trials from April 9 to 13. We have organized an intense, educational trip to several of the key Spring Trial locations.

This group tour to the 2010 California Spring Pack Trials is a new, one-of-a-kind venture for growers of all sizes! All greenhouse growers, floriculture professional and educators are invited to attend. It is an opportunity to meet fellow growers, breeders, Extension specialists and company representatives to share ideas, update your understanding of what's happening in our industry, and travel with trained professionals.

The trip itinerary is jam-packed; the days begin early and continues at a fast pace late into the evening. Attendees should plan to arrive into San Jose International Airport (SJC) on Friday, April 9 and will stay at a designated hotel near the airport. The journey begins at 7 a.m. on Saturday, April 10, when the bus departs from the hotel. That first day, the group will visit Golden State Bulb Growers in Watsonville, Syngenta Flowers/Goldsmith Seeds in Gilroy (Figure 1), Speedling (along with exhibitors Thompson & Morgan, GreenNex USA, Hem Genetics, MasterTag, Plant Source International, and Schoneveld Twello) in San Juan Batista, and Sakata Seed in Salinas (Figure 2). Participants will stay in Salinas on Saturday night.

On Sunday, April 11, the day will begin with a 2 hour bus drive to San Luis Obispo, where the first stop will be Dummen USA (Figure 3). After a short drive to Arroyo Grande, the group will visit Greenheart Farms. The last stop of the day will be in Santa Barbara where we will visit Jiffy along with their exhibitors Northern Innovators, Skagit Gardens, and Florist de Kwakel.

Monday, April 12, will be a busy day beginning with the bus departing at 7 a.m. and driving for an hour to PlantHaven. Following this stop, the group will arrive at Ball Horticultural Co. in Santa Paula where displays of PanAmerican, Kieft Seeds, and Selecta varieties will be featured (Figure 4). In the afternoon, Green Fuse Botanicals in Oxnard will be visited along with GroLink. If time allows, the last stop of the day will be in Somis, CA to visit Suntory.

Participants will spend Monday night in West Hollywood, CA. This hotel is conveniently located midway between the Los Angeles (LAX) airport and the Burbank Airport (BUR). There is a shuttle service and taxi service to both of these airports from the hotel.

This package trip includes the cost of first class hotel accommodations for four nights from April 9 to 12, bus transportation from San Jose on the first day to West Hollywood on the last day, lunches for 3 days, and experienced guides. Participants need to arrange their own transportation into San Jose on April 9 and out of West Hollywood on April 12, and cover their own dinner costs. A travel agency is available to assist with these reservations (go to the website listed below). The cost of the trip will be $450 per person in a double room or $720 per person for a single room. These rates are based on 47 participants and will be adjusted slightly if minimum capacity is not met. The trip is subject to change and may be cancelled if minimum capacity is not met.

Space is limited Register by January 29, 2010 to reserve a seat on this trip. For on-line reservation, go to www.concepts.us.com and click on Event Registration at the bottom left of the site. Be sure to go to the site labeled: Pack Trial Excursion for Greenhouse Growers April 9 to 13, 2010. If you have questions, contact Mark Bridgen at mpb27@cornell.edu; Phone: 631-727-3595 or Roberto Lopez at rglopez@purdue.edu; Phone: 765 496-3425.

Fig. 1. Pack trial display at Syngenta Flower and Goldsmith in Gilroy, CA.

Fig. 2. Research trials at Sakata.

Fig. 3. Colorful Confetti Garden at Dummen.

The Indiana Flower Grower e-bulletin

is an electronic e-bulletin for commercial and advanced flower growers. It provides timely information on pest control, production practices, and other topics likely to be of interest to flower growers. All growers and interested persons are welcome to subscribe. Subsrciption is free of charge.

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Roberto Lopez at: rglopez@purdue.edu

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Fig. 4. 2009 Ball Horticulture Co. "Shops on Main" Pack Trial display.

Indiana Greenhouse Spotlight – Heartland Growers

By Dr. Roberto G. Lopez

Assist. Professor and Floriculture Extension Specialist

Heartland Growers can trace its beginnings to a modest 1 acre facility founded in 1976 by Neil VanWingerden on the south side of Indianapolis. In 1979, Neil moved that business to a new 2 acre facility located at the current Westfield location. The business continued to expand and in November of 1984, the then 10 acre wholesale only business was purchased by James Gapinski and Richard VanWingerden. Today, Heartland Growers prides itself in having 2 generations of the Gapinski family involved in the daily activities as Jim is the president and owner of the business and his son, Nick Gapinski, is the general manager.

As Indiana's largest greenhouse, Heartland Growers encompasses a total of 24 acres of covered and connected greenhouse production space that uses modern technologies and a fully integrated Priva system to produce millions ofplants each year. Twenty acres are under double polyethylene "VanWingerden" gutter connected greenhouses and the remaining 4 acres are glass covered to maximize the daily light integral received by higher value crops such as mums. Within the 28 growing zones, 4 acres have a Dutch moveable table system, high pressure sodium lamps (HPS) and retractable shade system that allows for effective and efficient propagation of seeds and cuttings. Four acres are dedicated to flood floor production that helps reduce the need for over-head watering in specific zones. The entire range including the connecting corridors has Echo hanging basket systems with automatic watering booms.

Sustainability is a key component of production at Heartland. They use energy-efficient heated concrete floors or under bench heating systems to grow all their crops. Water reclamation and recycling occurs from both the gutter systems and the use of 2 retention ponds. In addition, they are using biological controls and alternative media components to reduce their environmental footprint.

Heartland Growers is proud to serve not only large scale retailers such as Lowes, but also local florist, independent garden centers and landscapers. Their crop is predominantly spring annuals which account for over 60% of their business in the months of April, May and June. They also specialize in holiday crops such as Easter Lilies, spring bulbs, garden mums, poinsettias and indoor foliage. For a full list of Heartlands crops visit: http://www.heartlandgrowers.com/index.cfm/fuseaction/plants.main/index.htm

Jim and Nick agree that their greatest asset is their employees that work together in a team effort. The year round workforce is 50 to 60 people with seasonal count peaking at around 140 to 150. It is through this seasoned workforce that they meet the demands of the marketplace and the quality their customers have come to expect.

Fig. 1. Jim Gapinski with his 2009 poinsettia crop.

Fig. 2. Wave petunia production in MX greenhouses.

It's all about Mindshare

Dr. Charlie R. Hall

Professor and Ellison Chair in International Floriculture

An often overlooked principle in highly competitive markets is that of mindshare. Mindshare looks at how well a product (or company) has generated consumer awareness or popularity, usually through its advertising and promotion tactics, and is arguably the main objective of brand marketing. When people think of examples of a product type or category, they usually think of a limited number of brand names. Intuitively, those firms who have successfully differentiated themselves in the marketplace are those who are thought of first in the consumer's mind – in essence, they have captured greater mindshare.

Interestingly, mindshare likely leads to greater market share, but market share may or may not capture mindshare. So which is more important? In a mature, fragmented, hypercompetitive marketplace (which is where we find ourselves now in the floriculture industry), it makes sense for firms to compete for mindshare rather than market share and let the market share chips fall where they may. In other words, focus on mindshare and market share will usually follow.

But how do we do this? We do it by relentlessly focusing on our value proposition in all of our product or service offerings! Please note that I am not talking about simply a list of features and benefits. An effective value proposition describes what you do (or sell) that brings tangible results (solutions) for the customer. However, it's more than a statement of offer or a buy-line. It's a commitment to deliver a specific combination of product-oriented experiences (at a particular price) to a group of specifically-targeted customers, more profitably and better than the competition.

The value proposition for floricultural firms in the future must focus on the unique ways in which quality of life is improved for our customer base. Much has been researched and validated about the benefits of flowers and SAF has been instrumental in this regard (www.aboutflowers.com). In a nutshell, flowers improve emotional health, boost seniors' well being, enhance hospital recovery rates, enhance employee innovation and ideas, strengthen feelings of compassion, decrease worry and anxiety, express feelings of compassion, build stronger communities, mitigate environmental externalities, and improve the value of homes and communities (www.americainbloom.org) – just to name a few of the benefits!

Focusing on these quality of life benefits is imperative in terms of differentiating flowers in the mind of consumers who are choosing among alternative products and experiences. In marketing lingo, differentiation exists when customers (under conditions of competitive supply and a range of product choices) perceive that product offerings do not have the same value and are prepared to dispose of unequal levels of a resource (usually money) in acquiring as many of the available offerings as they wish. In plain talk, if customers perceive your product is different in terms of its value proposition, they are more likely to buy it and pay a higher price for it. In other words, you have captured mindshare.

I cannot overemphasize the importance of this quality of life message in focusing our differentiation strategies in the future. That because of whether you are member of the Boomer, Gen X, or Gen Y generation, quality of life is a "higher order" need that is important to you (see SAF's latest generational research study).

Although the economic downturn has increased anxiety on the part of Boomers about retirement, they are nevertheless proactive in seeking innovative solutions to dealing with age. They view their new stage of life as one of activity and fulfillment rather than idleness. Gen X is the most "time-starved" generation, often juggling career and family obligations, but they maintain a strong commitment to work-life balance in their lives. The Gen Y generation is just beginning their adult lives and facing lots of firsts: their first home, first job, and most importantly, first independent income. They are trying to find the right balance between spending for necessities and spending for entertainment. This generation is concerned not just with function and utility but also style.

All of these generational attitudes come down to one thing – enhancing the quality of their lives. Our industry research shows that there's no better way to do this than through the daily use of flowers. All we have to do now is convince consumers of this.

2009 - 2010 Easter Lily Production Guidelines

By Dr. Roberto G. Lopez

Assist. Professor and Floriculture Extension Specialist

Easter 2009 will be on April 4 – one week earlier than last year. Since this is a mid-date Easter growers will have time to schedule their crop. In terms of energy efficiency, the crops can be grown cool for most of the schedule (Figure 1).

Fig. 1. Easter lily crop.

Growing Media

A good, well-drained and aerated medium (soil or soilless) is required for lilies to prevent root rot. Perlite and superphosphate should

NOT be added to the media to avoid leaf scorch. Medium pH should be maintained between 6.5 to 7.0 for soil-based media and 6.0 to 6.5 for soilless media. The electrical conductivity (EC) of the growing media should be between 1.5 to 2.5 mS/cm and never exceed 3 to 3.5 mS/cm using the saturated media extract (SME). Bulbs should be planted approximately 0.5 to 1 inches from the base of a 'standard' pot to encourage stem roots.

Fertilization

Easter lilies require moderate fertility of 150 to 200 ppm nitrogen. A constant fertilization program throughout the production cycle is required. However, excessive salt levels can decrease plant height and increase the incidence of root rot.

Forcing Temperature

After cooling (vernalization), potted bulbs should be forced at 60 to 65 °F for a mid to late Easter such as this year and at 63 to 65 °F for an early Easter. Easter lilies grown in Indiana at a constant day/night temperature (0 DIF) 64 °F day/night as compared to 70/60 °F day/night (10 °F DIF) produces an acceptable finished height and form. Once flower initiation has occurred, plant development can be controlled by leaf counting and adjusting temperatures (leaf unfolding rate increases linearly with average daily temperature). By counting the number of leaves that have unfolded each week and knowing the number of leaves that are left to unfold, you can determine if the crop is on track for your target visible bud date.

The rate of plant development from visible bud to flowering is only linear between 57 °F and 72 °F. For example, increasing the average daily temperature from 60 °F to 65 °F decreases time to flower by 4 days. An increase in temperature from 75 °F to 80 °F results in only a two-day decrease in time to flower. Table 1 shows the predicted time from visible bud to flower at average daily temperatures ranging from 55 °F to 85 °F. Temperatures above 75 °F should be avoided because flower buds may abort.

Height Control

Easter lily plants will generally double in height between visible bud stage and flowering. For example, if your target height at flower is 22 to 24 inches including the pot, then the height at visible bud should be 14 to 15 inches including the pot. Graphical tracking should be used to monitor crop progress through flowering and height control strategies should be used to regulate stem elongation.

The amount of stem elongation is influenced by the difference between the day and night temperature setpoints (DIF). Stem elongation is promoted when the day temperature is warmer than the night temperature (positive DIF). During the opposite environmental conditions, where day temperature is cooler than the night temperature (negative DIF), stem elongation is inhibited. Growth retarding chemicals can be used to reduce internode elongation, but caution should be exercised once plants have visible buds. Spray or drench applications of A-Rest or Abide (ancymidol) or Sumagic or Concise (uniconizole) can be used for height control of Easter lilies. Application should be made very early (1 to 3-inch stage) to avoid a "palm tree" lily. Early application also helps to even the crop. When used, the second application should be made at the 6-inch stage. Drenches are less active in root medium containing bark; therefore drenches need to be adjusted in such media. A spray treatment is often preferred on lilies grown in bark mixes. The need for lily height control varies greatly among greenhouses. As a general recommendation, 0.25 to 0.50 mg active ingredient A-Rest or Abide per pot as a drench or two spray applications of 50 ppm is recommend. Sumagic or Concise guidelines are 0.25-0.5 mg per pot as a drench or one to two spray applications of 5 to 10 ppm. Several spray applications at lower concentrations always results in a more attractive plant than a single spray at higher concentration. Finally, the longer you wait to space plants, the taller plants will be at finish. Typically, plants should be spaced to their final density at least a week or two before visible bud.

Lower Leaf Yellowing

Lowering leaf yellowing and leaf drop is commonly observed from visible bud to flowering in a tightly spaced crop or one that has been heavily treated with growth regulators (Figure 2). An early-season application of Fascination or Fresco [gibberelins (GA_{4+7}) and cytokinin (Benzyladenine 6BA)] 1 week before and 1 week after visible bud to the lower leaves will prevent lower leaf yellowing. Do not apply to the upper leaves as stem elongation can occur. A late-season application to the foliage and buds is recommended when the largest bud is 8 cm in length to reduce lower leaf yellowing and prolong post harvest life. Plants treated with either Fascination or Fresco maintain green lower leaves. Table 3 has suggested rates of Fascination and Fresco (again, carefully consult the label).

Fig. 2. Easter lily lower leaf yellowing.

Disease Prevention

By Dr. Janna Beckerman

Assist. Professor and Ornamental Plant Pathology Extension Specialist

Easter lilies have the potential for developing root rot during production. Routinely remove plants from their pots and inspect the roots. The roots should have white root tips and any discoloration is likely a root rot pathogen (Figure 3). Preventive fungicides should be used on a regular schedule (every four to six weeks) to prevent Pythium, Phytophthora, and Rhizoctonia, especially late in the crop cycle. It is important to rotate between chemical classes to prevent fungicide resistance. Table 2 includes some recommended fungicide drenches (Always consult labels carefully for exact rates and to see if the material is registered in your state):

Fig. 3. Easter lily with healthy roots (left) and with Pythium root rot (right).

Table 1. Time from visible buds to first open flower at various average daily temperatures.

Average daily temperature (°F)	Days from visible bud to flower
55	42
60	38
65	34
70	31
75	27
80	25
85	24

Table 2. Fungicides for use on Easter lilies.

Fungicide	FRAC CODE	Rate
Banrot	1 + 14	8 oz/100 gal water
Clearys 3336	1	8 oz/100 gal water
Chipco 26019	2	Refer to label
Subdue MAXX	4	1/2 oz/100 gal water
Truban 30 WP	14	3 to 10 oz/100 gal water

Table 3. Suggested rates of Fascination or Fresco to prevent lower leaf yellowing.

Application	Rate (6BA/GA4+7)	Ml or (oz) of Fascination or Fresco per 1 gal. water
Early-season	10/10 ppm	2.1 ml (0.07 oz)
Late-season	100/100 ppm	21 ml (0.71 oz)

2010 Easter Lily Production Guide			
Wks. before Easter	**Week of**	**Case Cooled**	**CTF**
25	Oct 11	Bulbs are shipped	
24	Oct 18	Start cooling of bulbs (41 to 44 °F)	Pot, place at 60 to 63 °F
23	Oct 25	Cooling	Root
22	Nov 1		Root
21	Nov 8		Start cooling (41 to 44 °F)
20	Nov 15		Cooling
19	Nov 22		
18	Nov 29	Plant bulbs and place pots in greenhouse (60 to 63 °F)	
17	Dec 6		
16	Dec 13		Place pots in greenhouse (60 to 63 °F) Fungicide drench (rotate chemical classes)
15	Dec 20		
14	Dec 27	Shoot emergence Fungicide drench (rotate chemical classes)	
13	Jan 3	Shoots 1″ to 3″	
12	Jan 10	Shoots 3″ to 5″	
11	Jan 17	Shoots 5″ to 9″, flower initiation	
10	Jan 24	Shoots 9″ to 12″ Fungicide drench (rotate chemical classes)	
9	Jan 31	Shoots 12″ to 15″, space plants to final spacing,	
8	Feb 7		
7	Feb 14	Feel flower buds, Apply Fascination or Fresco 7 to 10 days before VB (5 to 10 ppm) to lower ½ of plant	
6	Feb 21	Visible bud Fungicide drench (rotate chemical classes)	
5	Feb 28	Apply Fascination or Fresco 7 to 10 days after VB (5 to 10 ppm) to lower ½ of plant	
4	Mar 7		
3	Mar 14	Fungicide drench (rotate chemical classes)	
2	Mar 21	Apply Fascination or Fresco (100 ppm) to entire plant	
1	Mar 28	Ship	
0	Apr 4	Easter	

Dipping Easter lily bulbs in Bonzi to Control Height

Christopher J. Currey, Diane Camberato and Dr. Roberto G. Lopez

Graduate Student, Technician and Assist. Professor and Floriculture Extension Specialist

We are in the final stretches of the 2009 poinsettia season and while you may be focused on finishing up this season, it is time to think about your next crop: Easter lilies. By now you may already have your bulbs, if you are practicing controlled temperature forcing (CTF) or case-cooling your own bulbs, or you may be awaiting the delivery of pre-cooled bulbs. Though you may be prepared with the proper media, containers and fertilizers to produce your crop, have you thought about what strategies or products you'll use for controlling crop height this season? Some of you might be planning on using non-chemical techniques to reduce Easter lily height, such as reducing the difference between the day and night temperatures (DIF). Others may be preparing to apply some sort of chemical plant growth regulator (PGR) application. While many PGRs are commonly applied as a spray and some as a drench, ancymidol (A-Rest or Abide) and uniconazole (Sumagic or Concise) bulb dip or soaks are effective. The process involves placing bulbs in a PGR solution for a specified period before planting. Paclobutrazol (Bonzi or Piccolo) is a compound that is very similar to ancymidol and uniconazole, but its effectiveness as a bulb dip on Easter lilies has not been reported. We are presenting some preliminary data on the use of paclobutrazol as a bulb dip. Our objectives were to determine the impact of dipping Easter lily bulbs in paclobutrazol solutions on final plant height, days to flower, and flower bud number.

On 27 October 2008, 'Nellie White' Easter lily bulbs were delivered to Purdue University and immediately placed in a cooler set at 41 °F for a 6-week vernalization treatment. On 09 December 2008, bulbs were removed from the cooler and placed into solutions containing 30, 60, or 120 ppm Bonzi for 15 min or dipped in water immediately preceding planting. Bulbs were then planted in 6-in standard pots filled with a standard peat and perlite soilless medium. Plants were irrigated as necessary and fertilized at a rate of 200 ppm N from a complete fertilizer (Excel 15-5-15 Cal-Mag) at each irrigation. The greenhouse temperature set point was 64 °F with a 16-hour photoperiod consisting of natural daylengths and day-extension with incandescent lamps. High-pressure sodium lamps delivered 100 $\mu mol \cdot m^{-2} \cdot s^{-1}$ supplemental light when the ambient greenhouse daily light integral was $<10\ mol \cdot m^{-2} \cdot d^{-1}$.

Plant height was measured weekly so that we could graphically track crop height (Fig. 1). Height at flowering was reduced by 15 to 26% compared to control plants as paclobutrazol concentration increased from 30 to 120 ppm. Soaking bulbs in a 120 ppm solution resulted in plants that were 54.7 cm (21.5 in) tall at flowering, which met the target height range of 48 to 56 cm (19 to 22 in) for potted, flowering Easter lilies (Fig. 2). Neither days to flower nor flower bud number were affected by paclobutrazol applications.

Our preliminary results on the impact of paclobutrazol dips on height, flower bud number, and days to flower are in agreement with previous reports that have shown it is an effective PGR when applied to Easter lilies as a spray or dench. Currently, paclobutrazol is not labeled for Easter lily dips and the high rates (120 ppm) required for dips may be cost prohibitive. Growers will want to conduct on-site trials because that duration of the dip, concentration of active ingredient, and cultivar can affect height, days to flower and flower number.

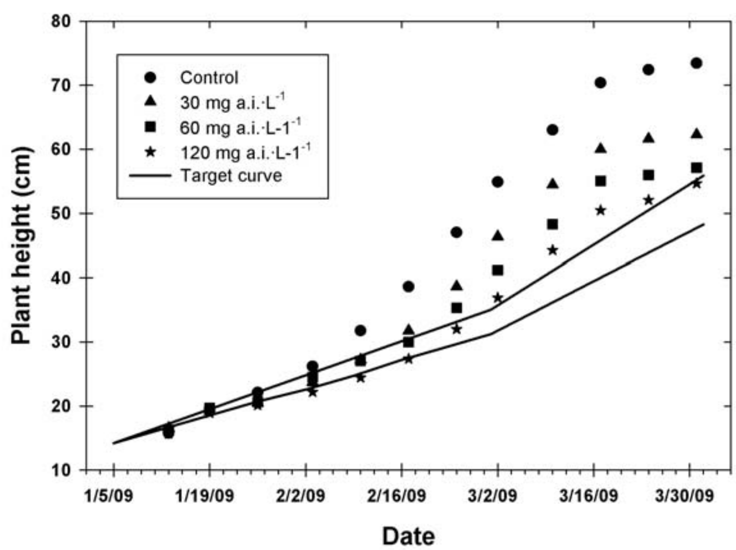

Fig. 1. Graphical tracking displaying the minimum and maximum target heights (solid lines) and weekly average heights of Easter lilies from untreated bulbs or bulbs soaked in Bonzi solutions containing 30, 60 or 120 ppm before planting.

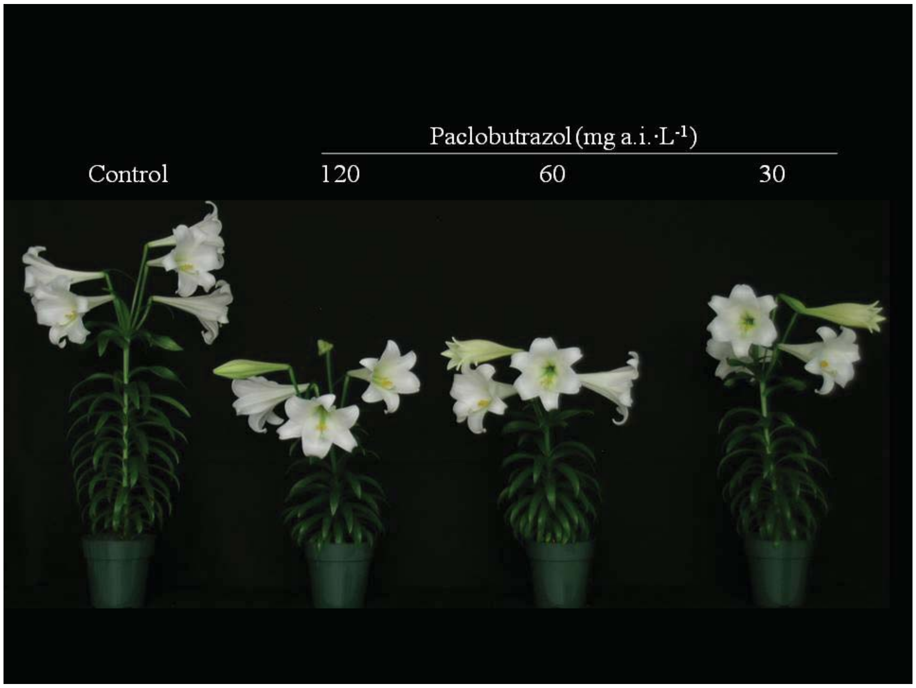

Fig. 2. Flowering 'Nellie White' Easter lilies from bulbs left untreated or soaked in Bonzi solutions containing 120, 60 or 30 ppm before planting.

How Does Water and Spray Solution pH Impact Pesticide Activity?

Dr. Raymond A. Cloyd
Associate Professor of Entomology

When a pesticide such as an insecticide and/or miticide fails to provide control or regulation of an arthropod (insect and/or mite) pest population there is the usual tendency to initially blame resistance; however, there are a number of factors that may be responsible including poor spray coverage, extended application frequencies or intervals between applications (too long between applications), applying the wrong pesticide, using an inappropriate label rate, improper timing of application (applying pesticides when susceptible life stages such as larvae, nymphs, and adults are not present), using an old (>10 years) pesticide, and finally pH of the water or spray solution. Nearly everyone is aware of and understands the importance of pH in regards to water quality and growing medium. The pH (potential hydrogen) refers to a logarithmic scale from 1 to 14. A pH of 7 is neutral whereas a pH above 7 is basic (alkaline) and below 7 is acidic. It is important to understand that pH is a logarithmic scale and the sensitivity of a pesticide to water pH will increase by a factor of 10 for every pH unit. For example, a pH of 6 is 10 times more acidic than a pH of 7, and a pH of 5 is 100 times more acidic than a pH of 7.

Although it is important to assess the pH of the irrigation water and growing medium, what is just as critical and what can influence the management of arthropod pests with pesticides (both conventional and alternative) is the pH of the water or spray solution (Figure 1). In general, a reduction in pesticide effectiveness may be due to hydrolysis, which is a chemical process whereby molecules are cleaved or fractured into several smaller components by the addition of water molecules. The rate of hydrolysis is dependent on 1) pH of water and/or spray solution, 2) pesticide chemical properties, 3) length of time spray solution resides in the spray tank, and 4) water temperature in the spray tank.

Pesticides may undergo alkaline hydrolysis, in which a pH >7 causes chemical degradation of certain pesticides. Alkaline water breaks apart or fragments pesticide molecules resulting in the release of individual ions (electrically charged atoms) that may then reassemble with other ions. These new combinations may not have any insecticidal or miticidal activity thus reducing or compromising the effectiveness of a pesticide spray application. However, some pesticides may undergo acid hydrolysis at a pH <7.0. Furthermore, the length of exposure in an alkaline spray solution is critical. As such, what comes out of the spray nozzle during the first hour of a spray application may be more effective than what comes out in the last hour of a spray application. Additionally, an 18 ºF (10 ºC) increase in the spray solution temperature will double the rate of decomposition. For example, at a pH of 9 and water temperature of 77 ºF (25 ºC), acephate (Orthene) loses 50% of its activity in 1 to 2 days. In fact, doubling the spray solution temperature will expedite the speed of the degradation process two-fold. Exposure of the spray tank to direct sunlight will also influence the rate of hydrolysis. It is important to note that even pesticide mixtures (tank mixes) or combining two or more pesticides together can increase a pesticides' susceptibility to decomposition.

Pesticide manufacturers typically have data associated with the effect of water pH on the half-life of certain pesticides. Half-life is the time required for 50% of the active ingredient to hydrolyze or break down, or is the length of time in which the pesticides' original strength is reduced by 50%. Insecticides, in general, are more susceptible to alkaline hydrolysis than fungicides or plant growth regulators, with insecticides in the chemical classes; organophosphate (acephate and chlorpyrifos), carbamate (methiocarb), and pyrethroid (bifenthrin, cyfluthrin, fenpropathrin, fluvalinate, and lambda-cyhalothrin) the most sensitive to alkaline hydrolysis or "high" pH water solutions. However, some pesticides are not affected by water pH such as fenbutatin-oxide (ProMite). It is important to monitor spray solution pH and adjust accordingly so as to maximize pesticide effectiveness. The "ideal" pH range of most insecticides and miticides is between 5.0 and 7.0; however, a number of insecticides and miticides perform better at or above a pH of 7. Table 1 is a listing of commercially available insecticides and miticides, and their optimum water pH range.

It is possible to adjust the water pH although the process should be performed carefully. The use of pH paper is not the most accurate means of monitoring the pH within 0.5, although because a water pH between 6.0 and 7.0 is generally acceptable, the use of pH paper is valid. So what is the best way to adjust the pH of the water? Acetic acid (vinegar) is readily available and may be added to the spray solution in small increments; being sure to check periodically with pH paper or a pH meter. It is important to avoid adding to much vinegar so as to maintain the spray solution pH around 6.5. Too increase the pH, add household ammonia. Finally, be sure to adjust the water pH prior to adding any pesticides to the spray tank.

You can also adjust the water pH with buffers or water-conditioning agents. These are compounds that reduce the potential for alkaline hydrolysis and modify the spray solution pH so that it is easier to maintain within a range of 5 to 7. Furthermore, these compounds are safer to use in lowering the spray solution pH than materials such as sulfuric acid. However, it is critical to add any buffers to the spray tank before adding pesticides because certain pesticides may begin to degrade as soon as they come-into-contact with an alkaline solution.

The ways to avoid or prevent water pH from reducing the effectiveness of a pesticide spray application include:

1) Follow manufacturer label directions regarding the appropriate water pH. Below are examples from pesticide labels associated with the importance of water or spray solution pH:

* Ornazin (active ingredient = azadirachtin): Product will break down in spray tank mixtures that have pH values exceeding 7.0. The recommended pH range is between 5.5 to 6.5.

* Floramite (active ingredient = bifenazate): Product has been shown to degrade rapidly when mixed and/or stored with alkaline water or high temperatures (122 ºF or 50 ºC). To prevent degradation under alkaline conditions, solutions must be used promptly. Alternatively, a commercially available buffering adjuvant can be added to the solution to reduce the pH to a neutral/acidic range.

* Mavrik (active ingredient = fluvalinate): Buffer spray water pH to 5 to 7, if necessary.

* Mesurol (active ingredient = methiocarb): Performance may be reduced when the spray solution has a pH greater than 7. The pH of the spray solution must be corrected by the addition of a suitable buffering or acidifying agent for optimum activity.

2) Regularly test water pH because the pH of water can change during the growing season. Water samples should be collected in a clean, non-reactive container such as a glass jar. Be sure to collect a water sample that is representative of the spray solution. Allow the water to run long enough so that water standing in the spray hose is flushed-out. Determine the water solution pH immediately after collection using pH paper.

3) Apply spray solution as soon as possible after mixing. It is recommended to use a pesticide spray solution (or mixture) within 6 hours or less to avoid potential problems associated with pH.

4) Adjust water pH with buffers or water-conditioning agents, which are compounds that are designed to suppress the process of alkaline hydrolysis and modify the spray solution pH in order to maintain the pH within the desired range. These compounds are much easier and safer to use than trying to lower the water and spray solution pH with materials such as sulfuric acid. Acetic acid (vinegar) may also be used to acidify water. There are several websites that contain lists of pesticides and their appropriate water pH range. These include the following:

http://floriculture.osu.edu/archive/apr04/SpraySolutionPH.html

http://www.griffins.com/tech_service/bulletins_2003_4_optimum_pesticide_performance.asp

In conclusion, factors other than resistance may be responsible for inadequate control of arthropod (insect and mite) pests such as water and spray solution pH. Routinely monitoring water pH will be helpful in maintaining the effectiveness of pesticides used to control or regulate arthropod pests encountered in greenhouses.

Fig. 1. Always test the pH of your tank spray water or solution.

Table 1. The optimum water pH of certain insecticides and miticides registered for use in greenhouses. Common name is the same as the active ingredient.

Common Name	Trade Name	Optimal Water pH
Abamectin	Avid	6.0 to 7.0
Acephate	Orthene	5.5 to 6.5
Acequinocyl	Shuttle	6.5 to 7.0
Acetamiprid	TriStar	5.0 to 9.0
Azadirachtin	Ornazin	5.5 to 6.5
Bacillus thuringiensis	Dipel/Gnatrol	5.0 to 8.0
Bifenazate	Floramite	6.5 to 9.0
Bifenthrin	Talstar	5.0 to 9.0
Buprofezin	Talus	5.5 to 6.5
Chlorfenapyr	Pylon	5.0 to 7.0
Chlorpyrifos	DuraGuard	5.0 to 9.0
Clofentezine	Ovation	5.0 to 8.0
Cyfluthrin	Decathlon	5.0 to 9.0
Cyromazine	Citation	6.5 to 7.0
Diflubenzuron	Adept	5.0 to 9.0
Dinotefuran	Safari	5.0 to 8.0
Etoxazole	TetraSan	6.0 to 8.0
Fenpropathrin	Tame	5.5 to 6.5
Fenpyroximate	Akari	5.5 to 6.5
Flonicamid	Aria	4.0 to 6.0
Fluvalinate	Mavrik	5.0 to 7.0
Imidacloprid	Marathon II	5.0 to 7.0
Insecticidal soap*	M-Pede	6.5 to 7.5
Methiocarb	Mesurol	6.5 to 7.0
Neem oil**	Triact	5.0 to 7.0
Novaluron	Pedestal	6.5 to 9.0
Pyriproxyfen	Distance	5.5 to 6.5
Pymetrozine	Endeavor	7.0 to 9.0
Pyridaben	Sanmite	5.0 to 8.0
Spinosad	Conserve	6.5 to 7.5
Spiromesifen	Judo	5.0 to 7.0
Thiamethoxam	Flagship	6.5 to 9.0

* Active Ingredient = Potassium salts of fatty acids

** Active Ingredient = Clarified hydrophobic extract of neem oil

Poinsettia Disease Management

Kim S.Chapman and Dr. Janna Beckerman

Graduate Student and Assist. Professor of Plant Pathology

Successful plant health management utilizes all available strategies to minimize the incidence, and severity of any given disease. The use of pesticides is but one available strategy to be incorporated into a broader plan that includes cultural management (site, and zone appropriate plants; proper care; use of resistant varieties when available), sanitation, exclusion, and avoiding problems. Relying solely on fungicides as a disease control strategy will bring about inevitable failure.

When using this table, keep in mind that not all ornamental pesticides are labeled for all ornamental plants. Most pesticide labels have a list of plants on which the product has been tested and determined safe to treat, as well as plants contraindicated for that product. If unsure, treat only a small number of plants to prevent any widespread damage. As always, the label is the law. It is important to note that multiple products contain the same active ingredient, and some products (e.g., Spectro 90, Junction, Pageant) contain more than one chemical.

When applying fungicides, it is important to know if a fungicide has protectant or systemic qualities. Protectant fungicides protect the plant like a coat of toxic paint—fungal spores that contact the "paint" cannot infect the plant. In areas lacking "paint" through poor coverage, or subsequent growth, the plant is not protected. Systemic fungicides move upward within a plant, and are applied as foliar sprays, soil drenches, or tree injections. Translaminar, or mesostemic fungicides, such as the strobilurins, can spread out to the surrounding tissue, and to the underside of the leaf surface, meaning protection is provided in areas that the fungicide had no contact. Systemic fungicides have high risks of resistance associated with them, meaning that the fungi being treated can eventually overcome the fungicide rendering it useless. For this reason, systemic fungicides should be alternated, or tank-mixed with protectant fungicides that are applied to the surface of the plant prior to the fungus, in order to prevent infection from occurring. It is best to use the fungicides listed in the table in combination or rotation with broad-spectrum contact fungicides to delay development of resistance.

No matter what fungicide rotation you use, insufficient coverage is a primary cause of pesticide failure. The plant surface must be thoroughly coated every 10-14 days, or as the label recommends. All fungicides work best when applied to prevent disease, not after symptoms are apparent.

Fig.1. Pythium root rot on poinsettia

Fig.2. Rhizoctonia aerial blight on poinsettia

Fig.3. Rhizoctonia root and stem rot on poinsettia

Fungicides labeled for disease management of Poinsettias.

<table>
<tr><th>Host Common Name</th><th>Diseases/Pathogen</th><th>Chemicals labeled for control</th><th>Frequency and Comments</th></tr>
<tr><td rowspan="6">Poinsettia (Euphorbia pulcherrima Willd. Ex Klotzsch)</td><td>Rhizoctonia aerial blight (figure 2) and root and stem rot (figure 3)
Rhizoctonia sp.</td><td>Medallion
Contrast 70W
Chipco 26GT
Sextant
Cleary's 3336 50 W, 4.5 F
OHP 6672 50 W, 4.5 F
Banrot 40W, 8G
Terraguard
Terraclor 75WP (PCNB)
Domain
Heritage</td><td>These fungicides should be applied on the average every 21-28 days.
To treat for root and stem root soil drenches are most effective.
Sources:1,2</td></tr>
<tr><td>White Mold (Sclerotinia sclerotiorum)</td><td>Medallion</td><td>Reapply every 21-28 days.
Sources: 3</td></tr>
<tr><td>Black root rot
Thielaviopsis basicola</td><td>3336 4.5 F, 50 W
OHP 6672 50 W, 4.5F</td><td>These chemicals should be applied as a soil drench
Reapplication is needed every 21-28 days
Sources: 1</td></tr>
<tr><td>Crown and stem rot (Fusarium spp.)</td><td>Medallion
3336 4.5 F, 50 W
OHP 6672 50 W, 4.5F</td><td>Reapply every 21-28 days.
The best control for this disease is to make sure to use good sanitation practices and dispose of diseased plants.
Sources: 1, 3</td></tr>
<tr><td>Gray mold (Botrytis spp.)</td><td>Phyton 27
Medallion
Chipco 26 GT
Sextant
Cygnus
3336 4.5 F, 50 W
OHP 6672 50 W, 4.5F
Compass O
Exotherm Termil</td><td>Reapply every 7 to 10 days to prevent the onset of gray mold. If disease is present Cygnus provides curative effects, but will need to be applied more frequently and at higher rates
Exotherm Termil can be used to smoke fumigate a greenhouse, but should not be used when poinsettias are in bloom or when temperatures are greater than 75 degrees F.
Sources:1</td></tr>
<tr><td>Leaf spot caused by:
Alternaria
Ascochyta
Cercospora
Curvularia
Drechslera
Myrothecium
Phyllosticta
Melanospor
Stemphylium</td><td>Phyton 27
Cleary's 3336 WP
Domain FL
Zyban WP</td><td>Fungicides should be reapplied every 21-28 days
Source: 2</td></tr>
</table>

	Powdery mildew *Oidium* *Erysiphe* *Microsphaera*	Heritage 50 W 3336 4.5 F, 50 W OHP 6672 50 W, 4.5F Strike 50 W Compass O	Fungicides should be applied at that first sighting of powdery mildew. Sprays should be scheduled every 7 to 14 days to prevent additional disease. Strike has been known to cause shoot elongation suppression. Sources: 1
	Root Rot *Phytophthora, Pythium* sp (figure 1) and bract, flower and leaf blight (*Phytophthora drechsleri*)	Truban 30 W Terrazole 35 W Truban 25 E Banrot 40W Banrot 8G Aliette T/O Subdue MAXX Subdue GR Allude Banol 67S	Apply as a soil drench for control of root rots. This should be done on the average every 30 to 60 days. The plants should be watered immediately after application. To control the foliar pathogen apply chemical as a foliar spray. Source: 1
	Scab (*Sphaceloma poinsettiae*)	Eagle 20 EW Phyton 27	Apply as protectants Reapply every 21-28 days Source: 2

Sources:

[1]Mullen, Jacqueline, and Hagan, Austin. "Poinsettia Disease and Their Control." Alabama Cooperative Extension System. 2008. 10 December 2008. http://www.aces.edu/pubs/docs/A/ANR-1272/

[2]"Disease and Control: Common Disease of Poinsettias." The Texas Poinsettia Producers Guide. 10 December 2008. http://aggie-horticulture.tamu.edu/GREENHOUSE/nursery/guides/poinsettia/disease.html

[3]"Rust Diseases of Ornamental Crops." UMASS Extension. 10 December 2008. http://www.umass.edu/umext/floriculture/fact_sheets/pest_management/rust_ornamentals.htm

Sumagic Sprays for Height Control of Tomato and Pepper Transplants

Dr. Rebecca Schnelle

Assist. Professor and Floriculture Extension Specialist

For years, there have been no plant growth regulators (PGRs) labeled for use on vegetable transplants. Recently, a supplemental label for Sumagic (uniconazole) has been released to allow foliar sprays on some vegetable transplants (tomato, pepper, ornamental pepper, eggplant, tomatillo, ground cherry, and pepino). The new label is rather restrictive, however (http://www.valent.com/Data/Labels/2008-SUM-0011%20Sumagic%20for%20use%20on%20Fruiting%20Veg%20Transplants.pdf). The maximum total allowed application is 10 ppm at 2 quarts per 100 sq ft. This means one 10 ppm spray, two 5 ppm, or four 2.5 ppm sprays and so on are allowed. The last spray must be no later than 2 weeks after the 2 to 4 leaf stage (approximately 4 weeks after sowing). Within these guidelines, we conducted a series of experiments to determine the effects of sumagic rate and application date on height control of peppers and tomatoes. We found that Sumagic is highly active in both peppers and tomatoes. All Sumagic treated plants were shorter than the untreated controls at marketable age (7 weeks after sowing).

Seeds of three cultivars of peppers ('Better Belle', 'Big Bertha', and 'Hungarian Yellow Wax') and three cultivars of tomatoes ('Big Boy', 'Early Girl', and 'Champion II') were sowed into 36 cell trays on 29 May 2009 in greenhouses located in Lexington KY. We sprayed the seedlings with 0, 2.5, 5, or 10 ppm Sumagic at 2, 3, or 4 weeks after sowing. Some plants also received split applications at 2.5 or 5 ppm. We recorded plant heights when the transplants were at a market ready stage at six weeks after sowing (July 10th).

Timing of Spray Effects

In all cases, the sprays applied 2 weeks after sowing produced shorter plants than those applied at 3 or 4 weeks after sowing. This is likely the result of a combination of preventing early stretch and more of the Sumagic absorbing into the media than the foliage. Two weeks after sowing both the peppers and tomatoes were at the 1-2 true leaf stage which left the media mostly exposed to the spray. This makes sense, as we know from previous research that sumagic and other triazoles like paclobutrazol are more active when applied to the media. Figure 1, which shows the final heights of Champion II tomatoes sprayed with 2.5 ppm Sumagic illustrates this effect. It is vital for growers to understand that the earlier the sumagic spray is applied, the greater effect it will have on the final height of the transplants.

If additional height control is required, a split application can be made. The photographs in Figure 2 show 'Big Boy' tomato transplants that were sprayed with 2.5 ppm Sumagic. The initial spray was applied at 2 weeks after sowing then additional sprays were applied one or two weeks later. The additional sprays at 3 or 4 weeks after sowing did provide additional height control. In this case however, the single spray at 2 weeks after sowing produced the most desirable plants for the retail market.

Cultivar and Rate Effects

The three tomato cultivars showed very similar responses to Sumagic with each spray rate (Figure 3). Each rate of sumagic produced plants of similar size at the market ready stage. However, those treated with the higher rate would probably take longer to grow out of the treatment. This could be problematic as both commercial tomato growers and consumers expect tomato plants to grow rapidly immediately after transplant. This will be discussed in more detail in the subsequent sections. I recommend that growers use the lower rate to prevent any post harvest complications. Sumagic has not been tested on enough tomato cultivars to be sure that they will all react similarly. As with any new PGR program, onsite testing of small portions of the crop is recommended before full scale implementation.

In general, the pepper plants show much more sensitivity to Sumagic than tomatoes. The three pepper cultivars varied in their responsiveness to Sumagic sprays. While all were highly sensitive, Hungarian yellow wax pepper plants were less responsive to Sumagic than the two bell pepper varieties, 'Better Belle', and 'Big Bertha' (Figure 4). The photos in Figure 5 show the appearance of 'Better Belle' peppers following sprays of up to 10 ppm. Those treated with 10 ppm were severely stunted and would not be marketable. Given this high sensitivity, I would not recommend that growers use sumagic on pepper transplants until we can investigate the effect of rates lower than 2.5 ppm. In most cases negative DIF or other non-chemical height control measures should be sufficient to produce marketable pepper transplants.

Post Harvest Concerns

There is clearly a risk of undesirable side effects of PGR application to fruiting crops, namely delayed flowering and/or reduced fruit size. Some preliminary work found that sumagic treated tomato plants actually bore fruit earlier than controls in commercial field production with no reduction in fruit size. Although not conclusive, it appears that the treated plants experienced less transplant stress than the controls. This intuitively makes sense to all of us PGR users. We know that PGR treated plants require less water so it only makes sense that they will need less water when first transplanted to the field or garden as well as in the retail environment.   We are planning another set of experiments next spring to look into the effects of sumagic sprays during the transplant stage on fruit timing, size and yield in more detail.

Of course, for many home gardeners the exact timing of the harvest, fruit size and yield are not a major issue. With the recent increase in interest in home food production I think we need to take care to ensure that these new customers have the most gardening success possible. We certainly would not want a rash of unexplained marble-sized tomatoes or an outbreak of "never-grow-again syndrome". With these concerns in mind I conducted a small post harvest screening in my home garden. While certainly not replicated, controlled or in any way scientific I still feel these observations are worth sharing. I planted three each of the control, 2.5, 5, and 10 ppm treated 'Better Belle' pepper plants in my garden on July 15th. I did notice that the treated plants wilted later than the control plants, but all survived transplanting. The 5 and 10 ppm treated plants produced much smaller fruits some of which had a sour flavor. This is exactly what we do not want to see in consumers' gardens. Following this experience, I would encourage growers to avoid Sumagic on sweet bell peppers at this time. Additional research will be needed to confirm these observations and determine the effects of Sumagic on other pepper types.

Conclusions and Recommendations

For production of retail tomato transplants in 6-packs I recommend applying an initial Sumagic spray at 1 to 2.5 ppm 2 weeks after sowing. If additional height control is needed, up to 3 additional applications of 1 to 2.5 ppm can be made at 7 day intervals. Until we know more about the post harvest effects and the range of cultivar sensitivity we recommend growers stay away from the higher rates of 5 or more parts per million. Again I want to emphasize that caution is paramount as Sumagic sprays are implemented in vegetable transplant programs. It doesn't take too many bad experiences for a gardener to decide they must have a brown thumb. With that said I believe Sumagic sprays on tomatoes hold great promise to allow us to produce better quality transplants that have the potential for improved survivability in the retail and home garden settings.

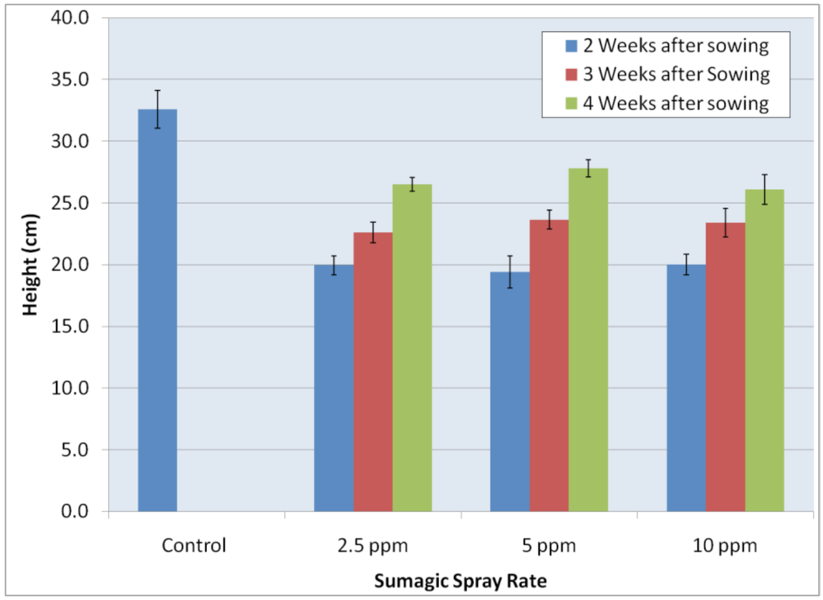

Fig. 1. Average Heights of market ready 'Champion II' tomato transplants treated with 2.5, 5, or 10 ppm Sumagic 2, 3, or 4 weeks after sowing.

Fig. 2. From left to right, (a) control and 'Big Boy' tomatoes sprayed with 2.5 ppm Sumagic at (b) 2 weeks only, (c) 2 and 3 weeks, and (d) 2,3, and 4 weeks after sowing. The photos were taken 6 weeks after sowing.

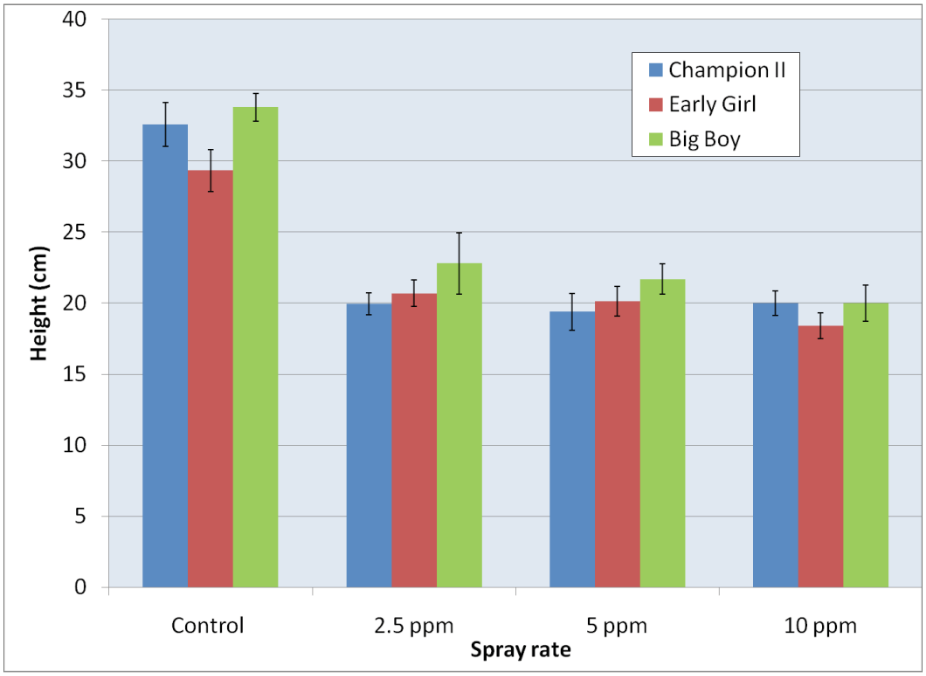

Fig. 3. Average heights of market ready 'Champion II,' Early Girl,' and 'Big Boy' tomato transplants with sumagic sprays of 2.5 to 10 ppm applied 2 weeks after sowing.

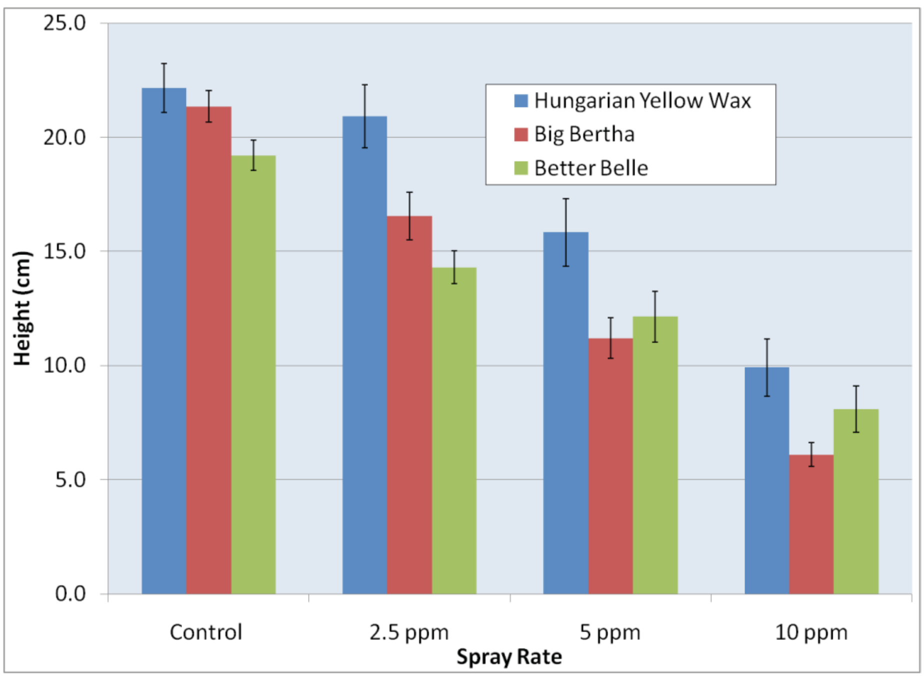

Fig. 4. Average heights of market ready 'Hungarian Yellow Wax, 'Big Bertha,' and 'Better Belle' pepper transplants with sumagic sprays of 2.5 to 10 ppm applied 14 days after sowing.

Fig. 5. From left to right, untreated control and 'Better Belle' pepper plants treated with 2.5, 5, and 10 ppm Sumagic sprays 2 weeks after sowing. The photo was taken 6 weeks after sowing.

National Poinsettia Trials

http://www.poinsettiatrial.org

NCSU
Industry Open House
December 2, 2009
9:00am to 2:00pm
HFL Greenhouse

Purdue University
Grower Open House
December 4, 2009
9:00am to 3:00pm
Research Greenhouses

U. of Florida
Grower Day
December 8, 2009
9:00 AM to 3:00PM
Fifield Hall

***Contact Tammy Goodale (tgoodale@purdue.edu or 765 494-1296) to purchase $5 "A" parking permit.**

Check out the Purdue Poinsettia Cam at: http://hort104.hort.purdue.edu/#

Upcoming 2009 and 2010 Industry and University Events				
Date	*Event*	*Location*	*Speaker/Topic*	*Web site/ Email*
Dec. 4	National Poinsettia Trials	Purdue Research Greenhouse	9 AM – 3 PM	http://poinsettiatrial.org/
Dec. 8 – 10	MI Greenhouse Expo	Grand Rapids, MI	Educational sessions & workshops	http://www.glexpo.com/index.ph
Jan. 6 – 8	Indiana Green Expo	Indiana Convention Ctr, Indy, IN	Trade Show & Education Program	http://www.indianagreenexpo.com/
Jan. 12 – 13	Mid-States Hort Expo	Kentucky Expo Center, Louisville, KY	Trade Show & Spring Buying	http://www.mshe.org
Jan. 13	NIFGA	McNamara at Sandpoint Fort Wayne,IN	TBA	bernie.greenhouse@gmail.com
Jan. 20 – 22	Mid-Am Hort Trade Show	Lakeside Ctr. Chicago, IL	Education, Demonstration	http://www.midam.org
Jan. 19 – 21	Indiana Hort Congress	Adams Mark Hotel, Indy, IN	Educational & Trade Show	http://www.inhortcongress.org/
Feb. 3	NIFGA	Ft. Wayne Botanical Conserv.	TBA	bernie.greenhouse@gmail.com

Indiana GreenExpo

IFGA will co-host the Indiana Green Expo on January 6 to 8, 2010 in Indianapolis.

As an IFGA member you can receive the member rate. Register by December 31st and receive early bird registration rates: http://www.indianagreenexpo.com/.

IGE Sessions of Interest to Greenhouse and Nursery Growers Business/ Marketing

- Relevancy: The single most important factor in marketing a Green Industry business; Frank Zaunscherb, Zaunscherb Marketing
- The most important thing in your business (that no one is talking about); Steve Wills, Lanco & Midwest Landscape Network
- Creativity: The independent garden center's most powerful advantage; Frank Zaunscherb, Zaunscherb Marketing
- Succession planning for the family business; Steve Wills, Lanco & Midwest Landscape Network
- Developing a website for small business; Scott Henderson, Media Sauce
- Internet for business; Scott Henderson, Media Sauce
- Garden center displays and customer service; Jim Mesmer
- Energy conservation in the workplace; Ethan Rogers, Purdue Extension Technical Assistance Program

- Survival in a down economy; Jennifer Dennis, Purdue University
- Getting the most out of your CPA; Bret Hawks, Heman Lawson Hawks LLP
- Employee theft: Precautions to minimize the temptation & risk; Kimberley Morrisette, Huth Thompson
- Government energy grants – how much money you can get?; Roberto Lopez and Jerry Hayes, Purdue and USDA Rural Development Cooperative Specialist

Production

- Getting the most from your wetting agents?; Cale Bigelow, Purdue University
- PGR's - What's new?; Roberto Lopez, Purdue University
- Alleviating plant stress responses; Autumn Nance, Purdue University
- Measuring pH and electrical conductivity in large containers; Ariana Torres, Purdue University
- Topflor Drenches: A new PGR option for poinsettia height control; Christopher Currey, Purdue University
- Your spray water does make a difference; Fred Whitford, Purdue Pesticide Programs
- Doing the right thing — Recycling greenhouse and nursery plastic; Art Cameron, Michigan State Univ.
- What are your plants drinking? Managing water quality to improve plant growth; Tom Fernandez, Michigan State University
- Fertilization; Mike Mickelbart, Purdue Univ.
- Do your plants have a drinking problem? Managing irrigation to improve plant growth; Tom Fernandez, Michigan State University

Insects

- Best management practices for insects and mites in the nurseries and greenhouses Cliff Sadof, Purdue University
- Biological control of insects for nurseries and greenhouses Luis Canas, Ohio State University
- Controlling landscape insects Luis Canas, Ohio State University

Plant Materials

- What's hot, what's not with perennials; Stephanie Cohen, Perennial Diva
- Integrating native plants into the landscape design; Bill Hendricks, Klyn Nurseries
- Art's top herbaceous perennials for sustainable landscapes; Art Cameron, Michigan State University
- Tough plants for tough places; Bill Hendricks, Klyn Nurseries
- Making the cut – Selection process for Proven Winners; John Gaydos, Proven Winners Director of Product Development and Promotion
- 2009 to 2012 Proven Winner introductions; John Gaydos, Proven Winners Director of Product Development and Promotion

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