Current Situation
Jim Willmott, Rutgers Cooperative Extension

The poinsettia crop generally looks good, but growers are challenged by so many cultivars having different cultural needs. Getting the right height, proper bract expansion and good color requires considerable skill. While many growers adjust for growth retardants, they would do better to segregate crops by differing needs. For example, group early, mid-season and late cultivars separately. Segregating allows for temperature adjustments that are necessary for optimal bract expansion (warm) and coloration (cool).

It’s common to find cultivars such as ‘Strawberries & Cream’, ‘Cortez Burgundy’ and the ‘Winter Roses’ that are too short. These and others that are consistently short would benefit from increasing the difference (DIF) between day and night temperatures. Some growers have been experimenting with Fascination, a growth regulator that promotes stem elongation.

Silverleaf whitefly has been more prevalent than usual this year. Several growers who have successfully used Marathon in the past have had difficulties this year. While some speculate that resistance is the problem, the reasons are not clear. Marathon and other neonicotinyls (Tristar, Flagship and Safari) all have demonstrated excellent efficacy against silverleaf whitefly. However, with media applied systemic formulations, there are too many variables to simply blame resistance. These products are quite soluble. While this is a plus for systemic movement, they are prone to leaching before uptake. This is especially true when frequent wetting and drying of media results in channels through which these insecticides readily flow out of pots. With longer-term crops like poinsettias, channeling is more likely since wetting agent activity declines with time. The addition of wetting agents has been shown to reduce channeling and may not only help reduce loss of soluble systemic pesticides, but also growth retardants and fertilizers.

Endeavor residue applied at 5 ounces per 100 gallons. The addition of a surfactant makes residue less visible.
Photo Jim Willmott
Greenhouse Sanitation: Too Important to Ignore
Steven K. Rettke, Ornamental IPM Program Associate
Rutgers Cooperative Research & Extension

(The following article was developed and adapted from a 90-minute presentation delivered by Dr. Charles Powell (Plant Health Advisory Services, Inc.) @ the OFA Short Course in Columbus, Ohio, 7/12/04)

Basic Sanitation Perspectives:
Start clean – Keep clean – Finish clean
Some growers say, “they are too busy to concern themselves with sanitation, because they are spending time throwing away dead plants!” The problem some growers have with sanitation is that there is no immediate impact and beneficial effects are not readily apparent. It includes extra things that need to be done and the worth is not appreciated. The value of sanitation is appreciated when viewed in the right perspective. Growers should view themselves as plant health care practitioners. As a result, sanitation is not practiced reactively, but rather is practiced proactively. It becomes a mindset or way of growing before problems are observed.

Sanitation Increases Profits:
Although good sanitation is often thought of as expensive and time consuming, it is not. In fact, sanitation is the most important aspect of maintaining profitability in the greenhouse. Good greenhouse sanitation allows for significantly less pesticide applications. For example, not having to apply fungicides for long-term crops (e.g., poinsettias & basket crops) gives tremendous cost savings for growers. Savings are most pronounced with moderate sized greenhouses.

Fundamentals of Sanitation:
Although floors seem to be “dirtier” than benches, both need to be cleaned routinely. Wooden Benches should be avoided in the greenhouse, because they are notorious for becoming infested with pathogens that over-season. As soon as roots reach the bottom of the tray or contact the infested wood the pathogens can enter into the plant. Some
Experiments have been done with wooden benches where problems with sanitation were suspected. Tweezers were used to remove small wooden splinters from the bench and these were placed onto petri dishes containing growing media. After a week or two, the various dishes were successfully growing such pathogens as *Rhizoctonia, Pythium, Phytophthora*, and *Fusarium*. These experiments prove that certain pathogens are present on poorly sanitized benches.

**Sanitizing Wooden Benches:**

![Image of a greenhouse]

Be careful when sweeping the floors! Debris containing crop pathogens can easily contaminate healthy plants.

*Photo: Jim Willmott*

Cuprinol (a copper based wood preserver) can no longer be purchased. This stain was primarily applied to wooden benches and doorframes within the greenhouse and was highly effective for sanitation. Chlorine can be used to sanitize the benches, but it cannot be applied when plants are present because of phytotoxicity concerns. The ability of chlorine dioxide to sanitize wooden benches is being investigated, but it is not presently available for greenhouse use. Chlorine dioxide appears to penetrate wood well and gives good sanitation results. Hydrogen dioxide (Zerotol) is a good sanitizer, but does not nearly have the penetration abilities of chlorine dioxide. Hydrogen peroxide penetrates the wood, but reacts too quickly. QUAT-salts (Greenshield, Physan, etc.) do not penetrate wood adequately.

**Controlling Weeds:**

The use of chemicals is often the most effective method for controlling weeds. Weeds such as oxalis and chickweed grow rapidly from seed and are difficult to maintain by physical removal (e.g., hand-pulling) alone. Herbicides such as Sythe and Reward (diquat) can be used with plants still in the greenhouse as long as appropriate precautions are followed. Round-Up and Finale can be used, but not with plants in the greenhouse. Be certain to close doors/vents and turn-off fans when applying outside greenhouses.

**Screening Vents:**

The use of screening to exclude thrips and prevent certain viruses is a commonly accepted practice. However, occasional wet spots (standing water) outside the greenhouse can be a surprisingly major source of fungus gnats & shoreflies that find their way into the greenhouse. Fungus gnat & shorefly larvae produce wounds to roots that provide entry opportunities for *Pythium* and *Rhizoctonia* pathogens. Once these pathogens begin to proliferate, adult fungus gnats and shoreflies can spread them throughout the crop. Therefore, using screening to exclude insects other than thrips can also be important.

**Recycled Irrigation Water:**

Recycling of greenhouse irrigation water can cause many problems and is a very serious issue in our industry today. Within sensitive regions, recycling may be required by local environmental control agencies in order to maintain the quality of groundwater and surface waters in the area.

*Pythium* is the most common pathogen transported within recycled water. Although no plant is completely devoid of *Pythium*, it still needs to be managed and kept under control. Genetic linking studies have discovered nearly 40 different *Pythiums* that can be pathogens of greenhouse crops. This explains why some fungicides (e.g., Subdue) do not always successfully control *Pythium*. The fungicide (Truban) is more general in its activity, but it also causes more stress to the plants.
Snails & Slugs:
Although pathogens are usually the most serious problem within recycled water, concerns with snail and slug eggs may also occur. Especially when growing perennials, the introduction of snails and slugs into the crop is a dilemma. Although these pest species are usually small in size, they can multiply to nuisance levels and are difficult to control.

Algae Growth:
Excessive algae growth on the growing media can also be troublesome with recycled water. This is especially true when plants are in propagation mist beds for 10 to 12 weeks. An algae cap often grows on the surface of the plug tray and reduces the wetability of the media. In addition, the algae is detrimental to the drainage and aeration of the media. Recycling water typically compounds these problems. Algae control using hydrogen dioxide (Zerotol) and QUAT-Salts can provide reasonably good success.

Recycled Pond Water:
Well and city water usually does not have serious contamination problems. However, pond water usually requires cleaning if recycling is done. Much of the contamination comes in on tiny pieces of particulate matter and most of it should be removed. Filtration is important in combating water contamination and removing particulate matter. The use of at least 100-micron filters is usually sufficient to accomplish adequate particulate removal.

Flood floor systems are particularly challenging. *Pythium* is present in small amounts in the media of nearly all plants. Most flood floor systems have high flow rates that make pathogen control difficult. When flow rates reach 500 to 600 gallons per minute pathogen controls are especially problematical. Typically, 80% of the water used in one flood bay is reused in another flood bay (20% of the water is retained within plant media). It is very difficult to sanitize/filter such large quantities of water in a short period of time (may be only 10 minutes between the flooding of bays).

Chemical Treatment of Irrigation Water:
Copper sulfate is no longer permitted for use in irrigation ponds. It was a highly useful product for suppression of pathogens and algae build-up. The US EPA has made it illegal to use, because it became an environmental insult to public waters when ponds overflowed.

Treating water with chlorine, especially when plastics are involved, is a potentially dangerous situation and should not be attempted. For example, when chlorine comes in contact with organic molecules it will eventually form chloramines (e.g., trichloromethane (chloroform) = carcinogen) as well as other toxic chemicals. These toxic chemicals are also harmful to plants and have forced some greenhouses to use well or city water when their ponds have been contaminated with chlorine byproducts. Some further concerns with chlorine are that it requires 30 minutes of holding to effectively sanitize and hence, storage tanks are required. Also, at least 2-ppm of chlorine is required at hose end to destroy *Pythium*. Horticulturally, the threshold edge for plant damage occurs at 2-ppm of chlorine. Pure chlorination systems are generally not recommended because of these undesirable side effects.

Chlorine dioxide is a new technology that requires pre-filtration. Unlike using straight chlorine, the use of chlorine dioxide does not require the 30 minutes of holding time or the use of storage tanks. Chlorine dioxide will not form toxic byproducts within pond water. Only 3 to 4 parts per million of chlorine dioxide is required to sanitize water that has been pre-filtered. On the other hand, between 50 to 100 parts per million of chlorine dioxide is needed to sanitize water containing significant particulate matter. Pre-filtration is required because using such high dosage rates are not cost effective.

Step Pond Systems typically uses 3 ponds to significantly reduce particulate matter in recycled water. Within each successive pond, the particulate matter settles out to the bottom. The relatively clean water at the surface of the first pond is diverted to the next pond. The same settling out process is allowed to occur again and the cleaner water at the surface is again diverted to the 3rd & final pond. This produces sufficiently clean water to promote healthy plants and reduce potential root rot pathogens to acceptable levels.
Crop Contamination:
Another major challenge facing the greenhouse industry is the fact that plants arrive at the greenhouse already infected with pathogens (INSV, Ralstonia, crown gall, Pythium, Pseudomonas, and others). The contaminated plant problem in our industry has always been a concern, but the purchasing of contaminated plants by growers may be worse today than ever before.

To help reduce this problem, growers need to do a better job of carefully inspecting incoming crops. The use of quarantine areas may need to be increased. If plants appear abnormal, they need to be sent to diagnostic clinics to determine the possible presence of a virus or root rot pathogen. It is the responsibility of the grower to complain to the supplier when infested or infected plant material is discovered. And, when it is possible, do not pay for the affected crop.

Why do suppliers ship a crop that has a known contaminant (infestation or infection)?
1) It reduces the profit margin to control crop contaminations.
2) The supplier hopes that the buyer will not notice the contamination in a timely manner.
3) They supplier is hoping that even if the contamination is observed by the buyer, they will still accept the shipment and not complain. (It has been shown that 75% of rebates are not returned after a product is purchased).

Culture Indexing:
The perceived worth of clean plant material has been diminished over the years. More “culture indexing of plant material” needs to be done to eliminate chronic pathogens of particular crops. This promotes clean cuttings to be produced for our industry. The higher cost is necessary for the health of our industry. As examples, pot mums and garden mums would have been lost to the industry without the use of culture indexing. It eliminated the chronic pathogens that were formerly plaguing these crops. Although culture indexing increases the price of a mum crop, it is important to be aware of why paying the extra money is worth it.

Marathon (& other Imidacloprid Products)
Designated Restricted Use in New York

As of January 1, 2005, pesticides containing imidacloprid have been designated as restricted use by the New York State Department of Environmental Conservation. Marathon and Merit are two widely used insecticide brands containing imidacloprid. Only licensed certified applicators will be able to purchase these products.

Non-professional products will be discontinued including homeowner brands such as Bayer Advanced and Merit. Commercial applicators will still be able to apply imidacloprid products, but only if licensed as certified applicators or if under direct supervision of a certified applicator.

2004 Rutgers Poinsettia Trial

Over 100 cultivars generously provided by the Ecke Ranch, Dummen USA, Fischer Horticultural, and Oglevee Ltd. delighted visitors to this year’s trial. Another great job by Dr. George Wulster, Niki Graf and the rest of the Rutgers greenhouse crew!
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Editor

Comments and suggestions welcomed.

Please contact the editor:

James D. Willmott
Rutgers Cooperative Extension
152 Ohio Avenue
Clementon, NJ 08021
856-566-2900 ext 227
email: willmott@aesop.rutgers.edu

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2004 Rutgers Poinsettia Trial Highlights

Cinnamon Star turned out nice in the trial. It’s certainly deserves recognition for unique color.

For all the weird, chlorotic blotches on the leaves, in the end Marblestar gets the last laugh – one of the best in the trial.

The hazy, dazy impressionistic bract coloration of Monet Twilight is stunning – standing next to it people comment over and over how wonderful it is – still this author’s favorite. All photos: Jim Willmott