RUTGERS COOPERATIVE EXTENSION AT THE NEW JERSEY AGRICULTURAL EXPERIMENT STATION

PLANT & PEST ADVISORY

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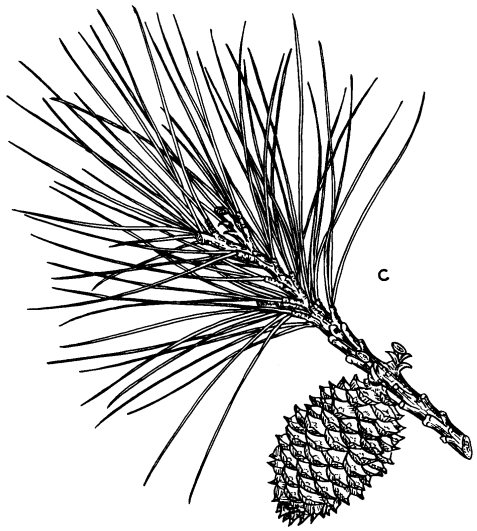

INSIDE

Rotate Your Herbicide Program: It Makes Sense

Albert O. Ayeni, Ph.D., Weed Science

Some of Rutgers Cooperative Extension clients I have interacted with in landscape, nursery, and turf/lawn production and maintenance seem to limit their herbicide use to a rather narrow set of herbicides over several years. They have very strong reasons for adopting this practice and the leading one, of course, is herbicide cost. Some other reasons include convenience of use: namely, no need to worry about changing application procedures and equipment due to change in herbicide formulation, the same cleanup of application equipment is repeated as a routine, etc.

Cost considerations and operational logistics at the peak of activities are obviously strong reasons for trying to limit variables in the herbicide program. However, it is well known that continuous use of the same herbicide in the same system over many years leads to accumulation of the compound in the system, which may reach the level that could cause some environmental concerns. Also the weeds that are normally controlled may develop resistance to the herbicide. In addition, the microbial ecology of the soil may be adversely affected to the point of causing significant reduction in soil or media productivity.

In the long run, these problems add up to cost much more than adopting some alternative herbicide programs which might initially appear more expensive or inconvenient than your "traditional" program. We suggest you adopt a practical herbicide rotation scheme (PHRS) which will ensure a sustainable production system. In the RCE Plant and Pest Advisory: Landscape, Nursery and Turf edition of May 7, May 21, and June 4, 1998, we gave herbicide options for turf, nursery, and landscape respectively. We advise that you use these herbicide options to guide your choice of herbicides for your production system.

For most of the common weed problems, there are at least two effective herbicides you can use. No one PHRS can be recommended for all the circumstances the grower or maintenance supervisor encounters. As a general guide, we suggest you rotate your herbicide program every two to three seasons and include as many herbicide formulations in your program as are applicable to your weed problems. Seek the assistance of your RCE County Agent or herbicide vendor to work out a

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PHRS that fits your production schedule.

For instance, if a container nurseryman has bittercress, common groundsel, and *Oxalis* as major weed problems, the herbicide options include gallery, **Ronstar G, Snapshot TG, or OH2 (Ornamental Herbicide II**). All of these herbicides at label rates control these weeds effectively. Given that all of these herbicides are safe on the container stock, a good PHRS would include the use of any of them for two to three seasons, then change to another one for another two or three seasons. In other words a grower who starts with any one of these products in 1999 and uses it for two seasons may not return to the same product until 2007 (or eight years later).

This type of rotation will not allow any of the herbicides to accumulate in the nursery environment, permit the weeds to develop resistance, or adversely affect the microbial ecology of the production system. A similar program can be developed for field nursery, landscape or turf/lawn situations. For additional information on this subject, contact your RCE County Agent. ❑

Coming Events

Grape Expectations — A Viticultural and Enological Symposium

Saturday,
March 13, 1999
Forsgate Country Club
Jamesburg, NJ

Contact Dr. Joseph Fiola at (609) 758-7311 for more info.

Turf Expo

December 3-10, 1998
Trump Taj Mahal Casino/Resort

This is an excellent opportunity to receive the latest turf management information from nationally renowned speakers.

Contact Bea Devine (732) 821-7134 for more info.

Greenhouse Growers: Get Ahead of Thrips Now!

by Jim Wilmott, Camden County Agricultural Agent

Following poinsettias, most greenhouse growers have a break before starting spring crops. If you're one of many that struggled with thrips last spring, now's the time to get ahead of "greenhouse enemy number one"! Waiting until spring is a mistake. Warmer temperatures along with developing flowers and pollen fuel thrips populations. Considering their propensity for resisting chemical control, **growers must emphasize preventative strategies prior to spring production.**

If you suffered serious problems last spring, consider a "fallow period". The following is suggested in Cornell University's *1998 Recommendations for the Integrated Management of Greenhouse Florist Crops*. Remove all plant material from greenhouses. First eliminate weeds which not only serve as hosts for thrips, but also tospoviruses (INSV and TSWV). Next remove all other plants including hanging baskets and "pet plants". Once emptied of plants, heat greenhouses until soil temperatures reach 60ºF. Maintain this for 3 weeks. Warm soil temperatures will promote thrips emergence from pupal stages in about 2 weeks – less time if warmer temperatures are used. Without plants, thrips will starve within a week. To further enhance the kill, apply registered smoke or aerosol insecticides after the second week. Depending on fuel source, heating system type and greenhouse heat retention, the fallow period treatment will cost from 5 to 15 cents/f2. Floor heating will be least, while overhead heating will be most costly.

Even if you have not been troubled by thrips, make rigorous efforts to prevent problems by excluding them from your production facilities. Thrips are so widespread that most growers will eventually face them. Train workers to identify thrips and symptoms of feeding damage. Thoroughly inspect all incoming plants including vegetative material and plugs. While growers focus on key plants such as New Guinea impatiens, almost any species of plant can be infested. Isolate incoming plants from existing crops, monitor with yellow stick cards and continue inspecting plants for thrips and damage symptoms.

Marginal Leaf Necrosis (Burn) on Poinsettias

Several growers in the Northeast have reported marginal leaf burn on poinsettias. Some associate the injury to applications of Adept an insect growth regulator used to control fungus gnats. Injury symptoms occurred 4 or more weeks after application. Could Adept cause this injury or was it due to something else?

The most common causes of marginal leaf burn are nutritional including high salts, molybdenum deficiency and boron toxicity. Media tests can reveal high salts, but by the time testing occurs, salt levels often decline – especially later in the crop as growers reduce fertilizer concentrations. Salt injury also results in root damage. Observe roots for browning – especially on root hairs and tips. Root injury often leads to infection by *Pythium spp.,* which results in rotting. Molybdenum deficiency or boron toxicity can only be confirmed through foliar analysis.

According to the Adept label, it may injure poinsettias if misapplied. Application instructions are very specific and emphasize the

importance of precise application rates and frequency. The suggested drench application for a six-inch pot is 3 oz of solution (prepared from 1 oz of Adept added to 100 gal of water). This is a small drench volume for a six-inch pot, which can take up to a pint of liquid. It seems likely that growers applied too much Adept. For example, if the proper amount of Adept and water was mixed and then 15 ozs of solution was applied to six-inch pots; the rate of Adept would be five times what is recommended. Or, if 9 ozs were applied, the rate would be three times too high. **Note that the label states**: "drench volumes recommended are less than those commonly used for application of other soil pesticides, as the volume of final solution applied need only be enough to wet the top 2 inches of potting media. **Exceeding label rates, volumes and number of applications may result in injury, especially to poinsettias**…"

Conserve SC Receives Federal Label for Greenhouse Crops.

In early November, Dow Agrosciences received a Federal label for use of Conserve SC on greenhouse ornamental crops – **not** vegetables, herbs or other edibles. The active ingredient is spinosad, a fermentation derivative of naturally occurring soil bacteria. Conserve effectively controls many insect pests including Western flower thrips (WFT). Several University researchers have demonstrated good to excellent control of WFT. Richard Lindquist, of Ohio State, reported Conserve SC nearly eliminated WFT on garden mums within three days of a single application. Dan Gilrein, Long Island Research Laboratory, also reports excellent control along with good crop safety.

Conserve will soon be available in most states. Labels will specify instructions to reduce the risk of pest resistance including:

- target early pest life stages when possible
- rotate to a different chemical class and or mode of action after the completion of a single pest generation
- if unsure of generation time or cycle, apply no more than three consecutive applications
- avoid continuous use beyond 30 days
- do not apply more than 10 times in a 12 month period
- use no more of no less than the label rate
- practice IPM which includes pest exclusion, sanitation, monitoring and biological controls ❑

Cleanup and Cleanout of Herbicide Sprayers

Albert O. Ayeni, Ph.D., Weed Science

We are at the end of another season of weed control activities, and the herbicide sprayers must be stored properly to keep them in good working condition for future use. It is also important to note the procedures for cleaning your sprayers in-season to minimize exposure to herbicides and avoid injury to crops and environmental pollution. Reproduced below is an article by Bill Johnson, *et al*, of the University of Missouri and published by MU Extension (Article #G4852) on "Cleaning Field Sprayers to Avoid Crop Injury." It is a good guide on what you need to do to operate safely and get the best out of your sprayers.

General Sprayer Cleanup Procedures

Pesticides can settle to the bottom or cause rapid corrosion in the spraying system and thus should be washed from the whole system immediately after use. One should always try to end the workday with an empty tank. If you will be using the same agrichemical the next day, thoroughly flushing the sprayer tank and sprayer with clean water is sufficient and will help prevent drying and hardening of pesticide residues. If a different agrichemical will be used, then a more comprehensive procedure is recommended immediately after use.

When cleaning a sprayer, select a location where any spilled rinsate will not contaminate water supplies, streams, crops or other plants and where puddles will not be accessible to children, pets, livestock or wildlife. Preferably the area should be impervious to water and have a wash rack or cement apron with a sump to catch contaminated wash water and pesticides. If such a facility is not available, catch or contain the rinsate and spray the rinse water or the cleaning solution on a field in a manner consistent with the intended use of the agrichemical. Avoid discharging all cleaning solution in a small area.

The quickest and easiest way to rinse a tank and spraying equipment and dispose of waste safely is to carry a 50- to 100-gallon drum of fresh water with the spraying equipment. When spraying is finished, flush the system in the field and spray the rinsate on the field in a manner consistent with the products intended use.

If spray material is spilled on the sprayer during loading or mixing, wash the outside of the sprayer immediately. As a general rule, plastic or polyethylene tanks and hoses tend to require more extensive cleaning than stainless steel tanks. Screens and strainers should also be cleaned or replaced frequently, as they can be a major source of contamination. Residues can also

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accumulate in checked or cracked hoses. Inspect the inside of hoses and replace if necessary. Pay special attention to the following areas that may be missed or difficult to clean:

Sprayer surfaces or components where buildup might occur due to repeated coats of spray followed by drying

- ✔Sprayer sumps and pumps
- ✔Inside the top of the spray tank and around baffles
- ✔Irregular surfaces inside tanks caused by baffles, plumbing fixtures, agitation units, etc.
- ✔When switching between crops, follow the procedure described below to clean out sprayers.

Sprayer Cleanout Procedure Between Crops

This procedure is recommended for all herbicides unless the label specifies a different cleanout procedure.

Add one-half tank of fresh water and flush tanks, lines, booms and nozzles for at least 5 minutes using combination of agitation and spraying. Rinsate sprayed through the booms is best sprayed onto cropland to avoid accumulation of pesticide-contaminated rinsate. Thoroughly rinse the inside surfaces of the tank, paying particular attention to the surfaces around the tank fill access, baffles and tank plumbing fixtures. The use of a 360-degree nozzle, such as the TeeJet Model 27500-E-TEF rinsing nozzle, permanently installed to the spray system can automate the thorough cleaning of tops and sides of the tanks. Several nozzles may need to be positioned carefully to clean tanks with baffles. Pressure sprayers are useful for removing caked-on internal and external residues. Hot water can increase penetration of dried residues, but the addition of hot water rinsing may cause unacceptable health hazards due to the vapors produced. Carefully review labeled safety precautions for the agrichemicals and cleaning products used.

Fill the tank with fresh water and add one of the cleaning solutions listed below or a commercially available tank cleaner and agitate the solution for 15 minutes. Add one of the following to each 50 gallons of water to make a cleaning solution

2 quarts of household ammonia (let stand in sprayer overnight for growth regulator herbicides such as 2,4-D, Banvel, etc.).

4 pounds of trisodium phosphate cleaner detergent.

Operate the spray booms long enough to ensure that all nozzles and boom lines are filled with the cleaning solution. Let the solution stand in the system for several hours, preferably overnight. Agitate and spray the solution onto an area suitable for the rinsate solution.

Add more water and rinse the system again by using a combination of agitation and spraying. Remove nozzles, screens, and strainers and clean separately in a bucket of cleaning agent and water.

Rinse and flush the system once again with clean water.

Sprayer Cleaning Agents

Cleaning agents should be selected based on the herbicide and formulation to be cleaned (read the herbicide label). Cleaning agents should penetrate and dissolve pesticide residues and allow them to be removed when the rinsate is removed from the sprayer. The functions of cleaning agents are dilution, solubilization and de-activation. Commercial tank cleaning agents and detergents help remove both water- and oil-soluble herbicides and are recommended on many pesticide labels. The commercial tank cleaning agents usually perform better than household detergents and can de-activate some herbicides in addition to making them more easily soluble.

Some tank cleaning agents and ammonia solutions also raise the pH of the rinsate solution, making some products such as sulfonylurea herbicides more water soluble and thus easier to remove from internal sprayer parts. Chlorine bleach solutions will accelerate decomposition of sulfonylurea and some other herbicides into inactive compounds. However, **chlorine is less effective at dissolving and removing sulfonylurea herbicide residues from spray tanks than ammonia solutions. Chlorine bleach should never be added to ammonia or liquid fertilizers containing ammonia because the two materials react to form toxic chlorine gas, which can cause eye, nose, throat and lung irritation.** Fuel oil or kerosene is effective for removing soil-soluble herbicides such as esters and emulsifiable concentrates. The fuel oil or kerosene should be followed by a detergent rinse to remove the oil residue.

Final Note

All sprayer components, including the tank, pump, hoses and nozzles, must be thoroughly cleaned to avoid contamination. The lowest point of the spray system should have a drain and all sprayer plumbing should gravity drain to that point. **If the system does not allow all of the solution to drain out, the effectiveness of cleaning agents is greatly reduced and may be useless.** Any contaminated solution remaining trapped in the sprayer system must be diluted and flushed out of the system with repeated rinses. Once the tank and all circulation lines have pure water, the spray valve to the nozzles should be opened and remain activated until all nozzles are spraying pure water. The sprayer must be thoroughly clean and flushed before the new herbicide mixture is added to the tank, or contamination will occur. ❑

Reduce Diseases by Managing the Greenhouse Environment

by Jim Willmott, Camden County Agricultural Agent

Management of the greenhouse environment is key to maximizing crop health and minimizing infectious disease problems. Too often we focus on pathogens, but fail to address underlying significant contributing factors to disease such as light, temperature and relative humidity.

Disease outbreaks require not only the pathogen, but also susceptible hosts and favorable environments. Often, environmental factors that favor pathogens are unfavorable for their host plants. Keep in mind that infectious diseases are promoted by certain greenhouse environmental conditions. First let's consider light.

light is essential for energy production in plants. Deficiencies result in reduced vigor and increased height or stretch. Excess light can be equally harmful and either extreme can predispose plants to damage from infectious pathogens and other pests. Light is a more complicated variable than many realize. Most are familiar with intensity, but we are just beginning to understand light qualities and how to apply them for improved plant growth. However, there are some considerations that many growers overlook. The following are some helpful tips: Always understand light preference of the plants that you grow. Optimum light intensity is relative to plant species and greenhouse temperatures. Consider ivy and zonal geraniums. Most zonals require light intensities, which yellow ivies. However, ivies will tolerate higher intensities provided that leaf surface temperatures are cool.

During the fall and winter, light is a limiting production factor in the northeastern states. This may be obvious, but why do so many greenhouses still have shade on for a good portion of the fall? Even more incredible are structures located in wooded areas. Even after leave fall, trees still significantly reduce light. I can recall three greenhouse operations that would benefit from tree removal.

Finally, how are your greenhouse coverings? Be sure that they are clean. Particulates from industrial pollution, tree pollen and other deposits reduce light. Also, don't overlook inside surfaces. Most coverings lose light transmission qualities with age. In recent years, there have been excellent technological advances. Some coverings not only increase the quantity, but also the quality of light. When replacing, consider investing in those that maximize transmission of photosynthetically active radiation (PAR) while, at the same time, minimizing infrared light. By reducing infrared light spectra, greenhouse temperatures will also be reduced. This brings us to the next important environmental factor: temperature.

All plants have optimal temperature ranges for growth. Sometimes growers fail to accommodate the needs of different plant species. For example, vincas like relatively warm temperatures. Often temperatures are too low during the spring bedding season and vincas succumb to Pythium. On the other hand, an unusual hot spell may predispose an impatiens crop to Rhizoctonia. Growers should do everything that they can to optimize temperatures for specific crops. The key is to provide uniform temperatures in the microclimate surrounding plants - including their rootzones. Bottom heat technology is becoming increasingly common. It not only allows for better control of crop microclimate, it is more energy efficient.

Many greenhouses have pockets of warm and cool temperatures. In such cases, crop growth is not uniform. Furthermore, specific plants are more prone to disease problems. Efforts to adjust temperatures are limited to the capabilities of heating and cooling systems. Despite limitations, most greenhouses can make improvements. Are you sure that your system is designed properly? If so, be sure to follow recommended maintenance practices that insure proper function of furnaces, fans and vents. Now let's consider another key environmental variable in disease development: relative humidity (RH).

Greenhouse structures, especially airtight poly houses, are prone to problems with high RH. Relative humidity is moisture that is held in the air. At higher temperatures, greater amounts of moisture can be held than at lower temperatures. As surfaces, including plant foliage, begin to cool, RH condenses on them to form a film of moisture. Wet plant surfaces are necessary for most infectious diseases. Typically high RH presents the greatest troubles late in the day as the sun begins to set. The loss of radiant energy results in cooling of surfaces – often too quickly for adequate heating. Problems can also occur at any other time when there is a sudden temperature drop or where there are pockets of cool air. The advice to heat greenhouse air and then ventilate is an excellent disease management tactic and well worth heeding. Several cycles of heating and venting, just prior to sunset will reduce RH, condensation and infectious diseases. Also, be sure to water early in the day and avoid overwatering. Standing water on or under benches, on walkways, or anywhere else, will add to high RH problems. Consider new irrigation technology that optimizes water use. Finally, many growers have installed horizontal air flow (HAF) fans. Properly designed HAF systems reduce cool air pockets by promoting uniform temperatures throughout greenhouses. Combined with good crop spacing, this results in fewer problems with infectious diseases.

Environmental factors including light, temperature and RH can interact to complicate cultural decisions and disease problems. Growers must understand their crops and conditions that favor growth. Learn about and invest in technological advances that allow for greater environmental control than ever before. Efforts to gain better control will help you to get the upper hand on infectious diseases!

Diseases of Turfgrass

Bruce B. Clarke, Ph.D., Turfgrass Pathology

Pink Snow Mold

This disease, caused by the fungus *Microdochium nivale* (Fusarium nivale), is present on greens and tees. Apply Banner, Chipco 26019, Cleary 3336, Curalan, Fungo, Heritage, Touche, or Vorlan to stop current infections. For best results, apply any of these fungicides (or PCNB) in early to mid-October and then repeat in late-January if the snow cover recedes. Do not reapply PCNB after January 15 due to the possibility of phytotoxicity during warm weather.

Take-All Patch

This disease, caused by the root and crown infecting fungus *Gaeumannomyces graminis* var. avenae, is apparent on **bentgrass** greens and fairways in central New Jersey. Although this disease is most prevalent April through June, late-summer and fall outbreaks are not uncommon. Infection takes place during cool, wet weather and symptoms are most striking after stress. Infected grass first appears bronze to reddish-brown in color and then fades to a dull brown. Patches are usually circular or ring-shaped and range in size from several inches to two feet or more in diameter. The centers of affected turf are frequently colonized by bluegrass (*Poa* spp.), fescue (*Festuca* spp.), or weed species. Upon close examination, decaying roots and leaf sheaths appear black and dark strands of mycelium often develop parallel to the root axes. The disease is enhanced by poorly drained, light textured, and high pH soils. Although **take-all** is difficult to control, best results have been achieved through the use of acidifying fertilizers (e.g., ammonium sulfate) and preventive applications of Banner, Bayleton, Heritage, or Rubigan in October, November, and April. If the disease has been particularly severe , fungicides should be reapplied twice next spring at 21 to 28-day intervals beginning in early April. Chemicals should be irrigated into the root zone (1/8 to 1/4" of water) for maximum effectiveness. Maintain soil pH at approximately 6.0 for best results.

Turf Expo

This year's Turf Expo will be held at the Trump Taj Mahal Casino/Resort on December 8-10, 1998. This is an excellent opportunity to receive the latest turf management information from nationally renowned speakers. For additional information please contact Bea Devine (732) 821-7134. ❑

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Pesticide User Responsibility: Use pesticides safely and follow instructions on labels. The user is reponsible for the proper use of pesticides, residues on crops, storage and disposal, as well as damages caused by drift. For specific labels, special local-needs label 24(c) registration, or section 18 exemption, contact Rutgers Cooperative Extension in your County.

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