Scouting Options and Methods

There are essentially three options available when scouting your greenhouse crops for insect/mite pests. 1- No scouting performed with pesticides being applied on a calendar timetable. 2- Simply scouting for pest occurrence with pesticides applied when presence is observed. 3- Scouting crop and making pesticide application decisions based on pest counts and action thresholds. The third option is part of an integrated pest management (IPM) approach that has been promoted throughout the green industry the past few decades.

Greenhouse pest populations are measured by trapping or direct plant inspection and both involve determining pest numbers. Counting pests and using action thresholds requires time and knowledge, but results in less pesticide use and can improve plant quality. It is important to remember that trapping (e.g. yellow or blue sticky cards) improves the efficiency when scouting your greenhouse, but does not replace the actual inspection of individual crop plants. This is particularly the case when scouting for aphids and mites.

Benefits of Counting Pests

The scouting and counting of insects/mites helps to detect when they are first present. Therefore treatments are made before large populations build up, but not before it becomes necessary. Tracking pest numbers over a period of time allows for the use of action thresholds, or when pest density levels threaten crop salability and economic loss. When pest densities and damage are low, it is not efficient to spend 95% of your time controlling the last 5% of the pest.

The use of biological controls (e.g., beneficial insect/mite augmentation) is most effective when pest numbers are low, and scouting helps to know their density and location so that natural enemy release can be targeted. When using biological controls, pest count estimates are required in order to determine how many beneficials to release per target management area.

Finally, instead of guessing, scouting and estimating pest counts makes it possible to evaluate the effectiveness of pest control interventions after they are applied.

SEE PEST COUNTS ON PAGE 2
**Pest Count from Page 1**

**Using Sticky Cards to Trap Adults**

Generally one (1) sticky card is placed within each 1,000 sq. ft. area and also near greenhouse vent and door openings. Ideally the card should be placed at the level of the crop canopy or slightly below to effectively trap many of the major adult pests found in the greenhouse. Each of the sticky cards should be examined at least once per week. Using stakes and double clothespins to support the traps is effective. Also, be certain to number and date each trap card to a specific location. When pest counts are low it is acceptable to re-use the trap card for additional weeks.

**Counts and Action Threshold for the Primary Greenhouse Pests**

**Western Flower Thrips:**

There are no universally accepted thresholds for the western flower thrips (WFT) because of numerous variables that cause the threshold number to change. A general guideline to start with might be **15 thrips** per yellow sticky card per week per 1000 sq. ft. This arbitrary number is only a suggested starting point and it may often be necessary to refine your own action thresholds with experience.

If releasing predatory mites for biological controls it may be necessary to begin when as few as **2 thrips/wk/1000sqft** are observed. Plants that are sensitive to thrips damage such as African violet and streptocarpus crops may have a threshold of **less than 10 adult thrips** captured on sticky traps per week per 1000 sq. ft. Alternatively, moderately sensitive plants such as impatiens, rose, gerbera, mum, and glxinia crops may have action thresholds ranging as high as between **18 to 30 thrips/trap/wk/1000sqft**. (If tospoviruses (INSV or TSSV) are present within a crop, then thrips thresholds are essentially one (1)). A poinsettia crop has a low sensitivity to thrips damage and can have an action threshold of **40 or more adults** captured per trap/wk/1000sqft.

When these various threshold guidelines are reached it should be a signal to begin examining individual crop plants more closely, especially those plants closest to the sticky traps. However, the distribution pattern of the Western Flower Thrips in the greenhouse is random. Therefore, the thrips could potentially be found anywhere throughout the greenhouse. Some methods to scout for thrips on plants include the following: 1- Tapping the plant (especially flowers) over a piece of white paper to dislodge the thrips. 2- Exhaling carbon dioxide on the flowers in order to agitate the thrips and coerce them to leave their cryptic hiding places. 3- Pulling-back and closely examining the nectar producing flower organs with a hand lens to detect thrips presence.

**Aphids:**

It is probably not possible to use action thresholds to manage aphid populations. If winged aphids are found on sticky cards, then populations are usually already high. As a result, plant inspections are the only reliable way to scout for aphids. To simplify scouting efforts attempt to group aphid-susceptible plant species together. (e.g., chrysanthemum, sunflower, gazania, portulacca, pepper, and others).

The distribution pattern of aphids in the greenhouse is typically spotty, with clumped populations (e.g., Melon aphids). On the other hand, Green Peach aphid species have a greater tendency to sometimes move throughout the crop. This behavior forces scouting to be more widespread. Look for plant symptoms such as distorted, discolored terminal tissue and for various aphid signs such as honeydew, sooty mold, cast skins and the actual aphids themselves.

**Fungus Gnats:**

When using yellow sticky traps to capture adult fungus gnats it is most effective to place traps horizontally (flat) near the root medium. Sticky traps placed in this position typically increases catch by 50% over traps set-up in the traditional vertical position at canopy level. Adult fungus gnats are weak flyers and generally will not be found in high numbers around the tops of crop canopies. Yellow traps should also be placed under benches if the floor is not cement.

Potato disks or wedges placed within the medium to attract fungus gnat larvae can determine density counts. The disks are typically 1 to 2 inches in diameter and are pressed ½ inch into the root medium. The wedges (French fry shape) are approximately ½ inch square and 1.5 to 2 inches long. The disks are best used in propagation areas while the wedges are best used with more established, deeper-rooted crops. Place the disks every 100 sq. ft. in propagation areas and the wedges every 1000 sq. ft. in production areas. Count fungus gnat larvae feeding on potato 48 hours after placement in media. It has been shown that after 72 hours the potato pieces may dry-out and lose their drawing capabilities. Or worse yet, the pieces may begin to rot, promoting a breeding ground for the larvae.

Some action thresholds have been determined for fungus gnat larvae when using the potato disks. Within propagation areas as few as **3-5 larvae per disk** (after 48 hours) can cause significant damage to the small, shallow root systems. Alternatively, when using the potato wedges in a 6-inch pot, it may require as many as **15-20 larvae per disk** (after 48 hours) before any meaningful root damage occurs.

**Whiteflies:**

Although the use of yellow sticky traps can improve scouting efficiency, when scouting for whitefly it is especially important to also inspect crop foliage. It is critical to start scouting early so whitefly populations are not allowed to build-up. High populations of whiteflies are one of the more difficult pests to suppress in the greenhouse.

*See Whiteflies on Page 3*
Typically on infested plant foliage a consistent top to bottom distribution of whitefly growth stages can be observed. For example, adults will usually be found on the undersides of the upper canopy leaves. When inspecting for eggs, concentrate on the undersides of lower adjacent leaves just below the upper canopy. Smaller scales (1st/2nd instar nymphs) are then found on the undersides of foliage below the leaves containing eggs. Larger scales (3rd/4th instar nymphs) are found on the undersides of the next level of lower/older foliage. Finally, whitefly adults will be emerging from pupae found on the lowest/oldest leaves closest to the soil media.

Similar to aphids, whiteflies often produce sticky honeydew with the corresponding growth of the black sooty mold fungus. If this becomes readily visible, then it is certain that high whitefly infestations are already present within the crop.

When using biological controls (e.g., Encarsia formosa (parasitic wasps)) it is necessary to estimate counts of whitefly scales (nymphs) within a pest management unit in order to determine how many beneficials to release. How to rapidly estimate the total number of whitefly scales in your greenhouse will not be discussed in this article. Nevertheless, it has been determined a release ratio of 30:1 (scale to wasp) will prevent a population build-up of whiteflies. An even smaller release ratio of 150:1 (scale to wasp) will only be required if most of the scale nymph counts are early 1st/2nd instars. When using any kind of biological control tactic, it is crucial to start releases early before high pest levels are reached.

**Two spotted Spider Mites on Ivy Geraniums:**

Obviously, since spider mites are unable to fly during any life stage they will not be observed on sticky traps. Hence, when scouting for mites it is necessary to inspect individual plants within the crop. Looking for symptoms and signs such as leaf stippling and webbing help to indicate which plants to inspect more closely with a 15x magnifying hand-lens.

Some specific thresholds of two-spotted spider mites on ivy geraniums have been determined through research. It was shown that action thresholds of 7 mites per leaf are reached on plants greater than 5 weeks in production. Alternatively, action thresholds of only 2 mites per leaf are reached on plants less than 5 weeks in production. Estimated pest mite counts are required when releasing beneficial predatory mites (e.g., Phytoseilus persimilis). Release one (1) predatory mite for every 4 to 10 twospotted mites counted.

*Adapted from presentations delivered by J. Nechols & K. Williams (Kansas State Univ. Research & Ext.) at the OFA Short Course (July, 2003).*
Diseases of Rose
Ann B. Gould, Ph.D., Specialist in Plant Pathology

Roses grown in nurseries, greenhouses, and landscapes are prone to diseases caused by all kinds of biotic and abiotic disease agents. Growing roses is not for the faint of heart. Diseases that commonly affect this popular ornamental include black spot, powdery mildew, downy mildew, stem and branch canker, rose mosaic, and Botrytis blight.

Black spot

Black spot, caused by the fungus Diplocarpon rosae (the imperfect stage of this fungus is Marssonina rosae) is the most commonly recognized disease of roses. The disease can cause damage all season long in temperate climates where leaf tissue remains wet for extended periods. Plants chronically affected by black spot become unthrifty and are prone to winter injury.

Black spot is most troublesome early in the growing season. In the spring, fungal spores are produced and disseminated from lesions on canes and leaves infected the previous year. These spores infect young leaves (6- to 14-days old) when a 7-hour period of continuous leaf wetness occurs. Disease development is greatest at temperatures of 75 to 85°F with greater than 85% relative humidity. Symptoms appear as black leaf spots (0.1- to 0.5-inch) on the upper leaf surface within 3 to 16 days following infection. These spots have feathery edges and are accompanied by yellow “halos” of leaf tissue. Spores produced in these spots continue to infect newly expanding leaves and canes throughout the summer. Black spots may also form on the lower leaf surface about a month following infection. On first-year canes, irregular, raised, red-purple blotches appear that become blackened and blistered.

Diplocarpon produces a toxin that causes affected leaves to turn yellow and defoliate prematurely. Indeed, heavily infected plants lose much of their carbohydrate reserves, and as mentioned above, grow poorly as a result and become more susceptible to winter injury and other stresses. Since the fungus overwinters on diseased leaves and canes, rake old leaves and prune diseased and damaged canes before spring. Avoid overhead watering and excessive shade, and when planting, space plants to avoid excessive humidity. Disease management before the growing season begins is critical; control is difficult once black spot is established in a planting. Resistance to black spot varies among the different types of roses. Floribunda, shrub, and climbing roses tend to be more tolerant to this disease, whereas hybrid tea, grandiflora, and miniature roses are more susceptible.

For best results, spray fungicides after budbreak (mid-May) and repeat at intervals specified on the label.

Compounds labeled for black spot control include Armada, Bacillus subtilis, calcium polysulfide (dormant) captan, chlorothalonil, Concert (outdoors only), ConSyst, copper (Badge, hydroxide, metallic, salts, sulfate), fenamidone, mancozeb, mane, myclobutanil, neem oil, paraffinic oil, propiconazole (outdoor use only), Spectro, Sporan, sulfur (dusting, elemental, flowable, wettable), SysStar, thiophenate-methyl, trifloxystrobin, ziram, and Zyban. Use a surfactant to enhance fungicide coverage if this practice is listed on the fungicide label, and rotate classes of chemicals to reduce the likelihood that fungal resistance to compounds will develop. Pay close attention to spray practices during wet periods, especially when caring for roses that are highly susceptible to this disease.

Powdery mildew

Another very common disease of roses is powdery mildew, caused by the fungus Podosphaera (formerly Sphaerotheca) pannosa. This widely distributed disease of landscape, nursery, and greenhouse roses occurs wherever species of Rosa are grown. Symptoms of powdery mildew include discrete, white-to-buff patches of powdery spores on leaves, flowers, and shoots. In spring, new leaves and shoots are infected by spores that are released from previously infected material and dormant buds. Disease development is favored by temperatures of 70 to 80°F and high (90 to 100%) relative humidity. Within 7 days of infection, the characteristic powdery patches first appear on lower leaf surfaces, to be soon followed by symptoms on upper leaf surfaces and canes. Young tissue infected by the powdery mildew fungus is frequently distorted and twisted, and infected flowers can be of poor quality. Although the fungus most often does little physiological harm to the plant, the market value of heavily affected roses can be reduced.

To manage powdery mildew, rake old leaves, prune shoots infected the previous growing season, and take measures to reduce humidity such as spacing out plants and increasing air circulation. Apply fungicides according to label timing and rates: Armada, azoxyystrobin, Bacillus subtilis, calcium polysulfide, copper (Badge, hydroxide, metallic, salts, sulfate), fenamidone (field and landscape only), hydrogen dioxide, Junction, mancozeb, mane, myclobutanil, neem oil, paraffinic oil, propiconazole (outdoor use only), Spectro, Sporan, sulfur (dusting, elemental, flowable, wettable), SysStar, thiophenate-methyl, trifloxystrobin, triadimefon, triflumizole, ziram, and Zyban.

Downy mildew

Another fungal disease called downy mildew (caused by Peronospora sparsa) may appear as red-to-black spots on leaves, petals, and stems, especially when conditions are cold and wet. These spots are often

See Diseases of Rose
DISEASES OF ROSE FROM PAGE 4

“angular” in appearance because leaf veins can restrict fungal growth. The disease is most likely to occur during cool (65°F), fairly humid (85%) weather when fungal spores from previously infected tissue infect new growth. As infection progresses, leaves lose color and fall prematurely. Under conditions conducive to disease development, “downy” tufts of spores associated with leaf lesions may appear on lower leaf surfaces. Fungal development ceases when weather becomes dry and warmer than 80°F for 24 hours.

All rose cultivars are susceptible to this disease, although the severity of disease may vary. In greenhouses, management of downy mildew includes reducing relative humidity to less than 85% and raising temperatures to 80°F during the warmer parts of the day and during evening hours. In outdoor production, preventive fungicides should be used when conditions are conducive to disease development. Apply Armada, azoxystrobin during period of active plant growth and prior to dormancy, copper (sulfate), dimethomorph (hybrid tea, miniature), fosetyl-Al, kresoxim-methyl, phosphite, Stature (cut, potted, miniature rose), or trifloxystrobin according to label instructions.

Stem and branch canker

This problem is more common than you’d think. In established rose plantings outdoors, stem and branch cankers begin on branch stubs or on wounded tissue. These cankers, with characteristic brown margins, progress from the stub or wound to the base of the plant. Severely compromised canes must be completely removed.

Pruning during wet weather with contaminated shears seems to predispose roses to this disease. Although not all of these cankers are caused by the same fungi, adequate control can usually be obtained by pruning diseased canes several inches below discolored wood, maintaining plant vigor, and removing large branch stubs. For best results, always prune plants during dry weather, and surface-sterilize shears with alcohol or household bleach diluted to 10% (between cuts) to limit disease spread. Spray plants as for black spot.

Rose mosaic

Characteristic symptoms of rose mosaic, caused by Prunus necrotic ringspot virus (PNRV) and Apple mosaic virus (AMV) in greenhouse and nursery stock include chlorotic, white line “oak leaf” patterns, ring spots, mottling, and necrosis. Infected plants tend to be less vigorous than healthy stock and are more sensitive to winter injury. Symptoms, which vary with the cultivar and time of year, are most evident in the spring. Disease transmission only occurs through grafting and cannot be spread by pruning. To control, remove infected plants and use virus-indexed stock for propagation.

Botrytis blight

Botrytis blight (or gray mold), caused by Botrytis cinerea, is a very common disease of many landscape, nursery, and greenhouse ornamentals. This widely-distributed disease attacks many different species of plants. Symptoms on roses include spotted or decayed flower petals, drooping buds that fail to open, twig dieback, and lesions on canes. Under conditions of high humidity (> 85%), the fungus produces a characteristic gray, fuzzy mycelium on infected tissue.

To manage gray mold on roses, manage the moisture and practice good sanitation to remove potential sources of fungal inoculum. Keep relative humidity low (by adequately spacing plants to promote good air circulation) and avoid any type of overhead watering, especially in beds where Botrytis has been a problem in the past. When the weather is dry, remove infected blossoms and other plant parts as part of your regular sanitation program—senescent and dead plant tissues are readily colonized and may serve as a “base” from which the fungus spreads to healthy tissue.

Products labeled for control of Botrytis blight on roses include Bacillus subtilis, captan, chlorothalonil, ConSyst, copper (sulfate), diconate, fenhexamid, ferbam, fludioxonil, iprodione (also for storage rot), junetion, mancozeb, Quali-Pro TM/C WDG, Spectro, Sporan, Stature (cut, potted, miniature rose), SysStar, thiophanate-methyl, trifloxystrobin, triflumizole, or Zyban. Check label for hosts, timing, and rates.

NOTE: Although compounds containing thiophanate-methyl or iprodione are registered for control of Botrytis blight or gray mold, isolates of Botrytis that are resistant to these compounds may be present. If a treatment applied as per label recommendations is not effective, shortening the interval or increasing the rate will not improve disease control. As a result, another fungicide should be used. To reduce the possibility of fungal resistance in the future, avoid the sole use of any fungicide for extended periods of time when other reliable products are available.

Fungicide usage notes for Roses

DO NOT use neem oil (Triact) without prior testing for sensitivity. Zyban has caused some injury on the varieties Red Empress, Blossom Time, and Golden Showers. Check for phytotoxicity before large-scale use of copper fungicides, and DO NOT spray plants with copper. Junetion (contains copper), mancozeb compounds just before selling season to prevent residues on commercial plants. DO NOT use captan in combination with, immediately before after, oil sprays. Lime, lime-sulfur, and Bordeaux will reduce the efficacy of captan. DO NOT apply phosphite to roses that are moist or heat stressed.
Weekly Weather Summary

Keith Arnesen, Ph.D., Agricultural Meteorologist

Temperatures averaged much above normal, averaging 76 degrees north, 77 degrees central and 77 degrees south. Extremes were 96 degrees at Canoe Brook on the 11th, and 62 degrees at Freehold and Cape May Courthouse on the 14th and 16th. Weekly rainfall averaged 1.06 inches north, 0.41 inches central, and 0.87 inches south. The heaviest 24 hour total reported was 1.51 inches at Belvidere on the 13th to 14th. Estimated soil moisture, in percent of field capacity, this past week averaged 74 percent north, 60 percent central and 80 percent south. Four inch soil temperatures averaged 74 degrees north, 75 degrees central and 77 degrees south.

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* missing some data

WES KLINE -- GDD BASE 40 PINEY HOLLOW
LAST WEEK  238 (Ending 8/10/09)
THIS WEEK  258 (Ending 8/17/09)
TOTAL UNITS BASE 40 FOR FEBRUARY=55
Mulch Plastic and
Drip Irrigation Tape
Recycling Available

N
ew Jersey growers may participate in a new
program to recycle mulch plastic (black, white,
clear or color) and plastic drip irrigation tape.

To recycle these materials, they must be properly prepared:

• Once the drip irrigation tape and mulch film is
removed, shake it to remove the contaminants
(soil, plant material, mulch plastic, twine). Exces-
sive contaminants could cause the material to be
rejected at the collection site.

• Growers have a choice: 1) Bundle the drip tape
separately from the mulch film OR 2) the drip
tape and mulch film can be commingled. If you
choose to recycle the materials separately, the drip
tape should be rolled up and tied with ONLY drip
tape. Mulch film should be rolled up and tied with
mulch plastic. DO NOT use twine, wire, etc. to tie
the bundles. If any other material is used to tie the
bundle, the load will be rejected.

• Store the drip irrigation tape and mulch film so it is
not exposed to sunlight that will further degrade the
material.

• Keep the material as dry as possible. If the material
cannot be stored indoors, cover it with a sheet of
plastic.

• Keep the plastic as clean as possible.

New Jersey growers generate thousands of tons of
plastic each year at a cost of more than $50 per ton to
dispose of the material at a landfill. Recycling these
materials can reduce disposal costs and is better for the
environment.

The New Jersey Department of Agriculture and
Cumberland County Improvement Authority conducted
a pilot recycling program for these materials in 2005.
During the pilot program, five tractor trailer loads of
material were collected from South Jersey growers and
participants saved almost 50 percent in landfill tipping
fees. Unfortunately, the mulch film recycling program
had to be terminated when there no longer was a mar-
ket for the material.

The Department has facilitated a year-round nursery
and greenhouse film collection and recycling program
since 1997. In addition, the Department also offers
plastic pesticide container recycling.

To find out more about the new recycling opportu-
nity and other agricultural recycling programs, call Karen
Kritz at 609-984-2506 or visit the New Jersey Department
of Agriculture Agricultural Recycling webpage at:

Ten Commandments of
Customer Service
Scott Guiser, Penn State Cooperative Extension

Reprinted from The Vegetable & Small Fruit Gazette,
August 2009, Volume 13, No. 8, The Pennsylvania State
University.

J
ohn Berry, Penn State Extension Educator, recently
completed a Retail Farm Market School. His refer-
ence packet contained the following “10 command-
ments of Customer Service”. I googled “10 Command-
ments of Customer Service” and see that, in this realm,
many Moses’ received many messages. Do a search
yourself, and you will find lots of good advice. Some
very successful businesses are willing to share pearls of
wisdom.

Below is a list that all employees interacting with
customers need to think about.

1. The customer is never an interruption to your work!
The customer is your reason for being in business. Chores can wait.

2. Greet every customer with a friendly smile. Custom-
ers are people and they like friendly contact. They
usually return it.

3. Call customers by name. Make a game of learning
customers’ names. See how many you can remem-
ber.

4. Remember, you are the company! As an owner or
employee, the way you represent yourself to your
customer is the way your business will be perceived
by that customer.

5. Never argue with customers. The customer is always
right (in his or her eyes). Be a good listener; agree
where you can, and do what you can to make cus-
tomers happy.

6. Never say “I don’t know”. If you don’t know the
answer to the question, say “That’s a good question.
Let me see if I can find an answer.”

7. Remember, every dollar you earn comes from you
customers’ pockets. Treat them like the boss.

8. State things in a positive way. It takes practice, but
will help you become a better communicator.

9. Try to get customers to remember a good experience
with your business.

10. Always go the extra mile! Always do just a little
more than the customer expects.

Here are a few other ideas I gleaned from the doz-
ens of lists I found on-line. These are things managers
should think about.
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Pesticide User Responsibility: Use pesticides safely and follow instructions on labels. The pesticide user is responsible for proper use, storage and disposal, residues on crops, and damage caused by drift. For specific labels, special local-needs label 24(c) registration, or section 18 exemption, contact RCE in your County.

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