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Miticide Market Report

In our exclusive research, North American growers reveal how they battle mites and which ones are most problematic.

ALSO INSIDE:
Arm your team with a proper scouting plan and learn how to properly ID certain mite pests.

AKARAWUT | ADOBE STOCK

Envu: Supporting the industry with science-driven solutions

Over the past year, Envu has expanded our portfolio to better meet the evolving challenges faced by growers of ornamental plants — from Abelia to Zamiocalcus. With more than 50 years of expertise, Envu remains hyper-focused on solving customers challenges.

Don't let mites take you by surprise. Tiny but destructive, mites can silently wreak havoc on crops — causing stunted growth, distorted leaves, bronzing and plant death before you realize they're even there. Early detection and accurate identification are critical for staying ahead of an infestation, and prophylactic applications of miticides are often essential for successful crop management.

For example, products effective against two-spotted spider mites (*Tetranychus urticae*) may offer little to no control against broad mites (*Polyphagotarsonemus latus*), which often target tender new growth and cause leaf curling or russeting. Likewise, cyclamen mites (*Phytonemus pallidus*) thrive in cool, humid environments and can devastate crops like African violets and begonias, while eriophyid mites — such as rose rosette mite (*Phyllocoptes fructiphilus*) — can transmit rose rosette virus with irreversible effects. Flat mites (e.g., *Brevipalpus*, *Cenopalpus*, *Raoiella*, etc.), often overlooked, can cause rough, corked, scabby or pock-marked foliage in orchids, palms and tropical foliage.

Precise identification of the mite pest afflicting plants helps ensure the right miticide is chosen to effectively interrupt the pest's life cycle. At Envu, we believe products work best in rotation with other products. To take the guesswork out of mite management, Envu has developed an easy-to-use identification poster. It helps pinpoint what mite be the issue, includes a list of commonly used miticides (from Savate® and Kontos® insecticides to our new offerings like Floramite® SC and Shuttle® SC miticides) with their insecticide resistance action committee (IRAC) code and REI to aid in rotation, and provides example miticide rotation strategies for more effective, sustainable control.

At Envu, our commitment goes beyond products. We collaborate closely with growers, researchers and industry experts to shape solutions that truly address your day-to-day challenges. Our innovations are rooted in real-world insight, so you can protect your crops with confidence and clarity while continuing to grow — beautifully.

Janna Beckerman, Ph.D.
Ornamentals Technical Specialist
Green Solutions Team

envu™ Ornamentals

PHOTO: ENVU

The great MITE FIGHT

Most growers have suffered losses due to mites, but many opt not to have an IPM program.

BY PATRICK ALAN COLEMAN

It's a telling statistic that more than 80% of growers have suffered a loss due to mite infestation of their crops, according to data from *Nursery Management* magazine's 2025 Miticide Market Report survey. Nearly 10% of respondents reported those losses to be significant. Clearly, mite control remains an issue for growers, whether their production is under cover or outdoors.

But despite those issues, there remains some confusion in the growers' ranks when it comes to managing mites. Nearly 40% of growers do not engage in an IPM program, and about a quarter are unsure which mites are their biggest problem. When it comes to scouts in growing operations, confidence is better than average but not terribly high.

The data tell the tale of a green industry undoubtedly affected by the tiny arachnid pests but unaligned on the best management practices.

INTROVERTIA; ANGIEC | ADOBE STOCK

SURVEY METHODOLOGY:

Nursery Management and sister publication *Greenhouse Management* surveyed more than 100 growers and operators with production under cover or outdoors in July 2025.

Editor's note: Not all percentages add up to 100% due to rounding, non-responses and some questions allowing respondents to select multiple answers. A base is provided for questions that received fewer than 100 responses.

Patrick Alan Coleman is editor of Greenhouse Management *magazine. Contact him at* ***pcoleman@gie.net****.*

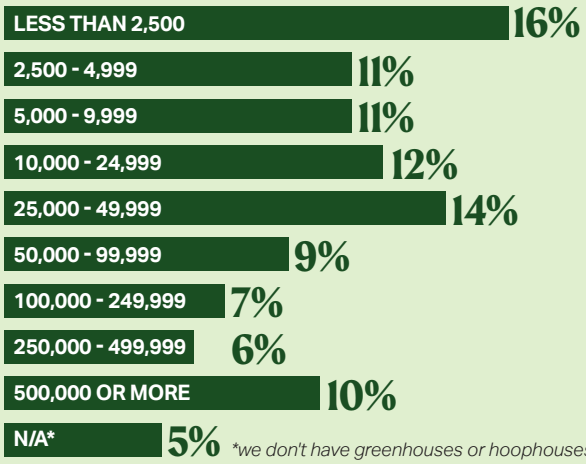
Who took our survey?

NEARLY HALF OF the responding growers are in three regions: the Southeast, Great Lakes and Far West. The rest are relatively evenly distributed across the United States and Canada. Most growers with any capacity under cover grow in an area smaller than 50,000 square feet.

About 80% of growers who grow under cover also have outdoor growing capacity. Half of respondents with outdoor growing capacity have under 10 acres in production. About 20% grow under cover exclusively, while a smaller minority of 5% do not grow in hoophouses or greenhouses, likely meaning exclusively outdoor production.

A strong majority (86%) have experienced losses due to mite activity. Of those, 30% say those losses are moderate to significant. A very lucky few (14%) have not seen any losses due to mite activity.

How many square feet is your location's total growing capacity under cover (if applicable)?



*we don't have greenhouses or hoophouses

Where is your primary operation located?

19% **Southeast**
AL, AR, FL, GA, KY, LA, MS, NC, SC, TN, VA, WV

14% **Great Lakes**
IL, IN, MI, OH, WI

10% **Far West**
AK, CA, HI, NV, OR, WA

8% **Canada**

7% **Mideast**
DE, MD, NJ, NY, PA

6% **Plains**
IA, KS, MN, MO, NE, ND, SD

5% **Southwest**
AZ, NM, OK, TX

3% **New England**
CT, ME, MA, NH, RI, VT

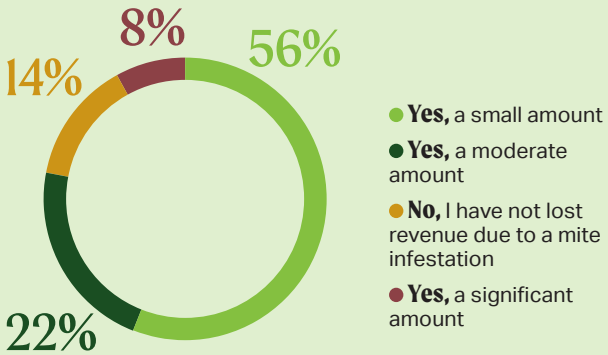
2% **Rocky Mountain**
CO, ID, MT, UT, WY

1% **Mexico**

If applicable, how many acres of outdoor growing space are currently under production?

1,000 OR MORE	3%
500-999	2%
350-499	2%
200-349	3%
100-199	5%
50-99	3%
25-49	7%
10-24	5%
LESS THAN 10	50%
N/A, *we grow strictly under cover*	21%

Have you ever experienced loss of revenue due to mite pest infestations?



Menacing mites

THE MOST PROLIFIC of the problematic mites by far is the two-spotted spider mite. Twice the percentage of respondents reported these arachnids as the biggest issue (77%) compared to the broad mite, which was the second most reported problematic mite (33%).

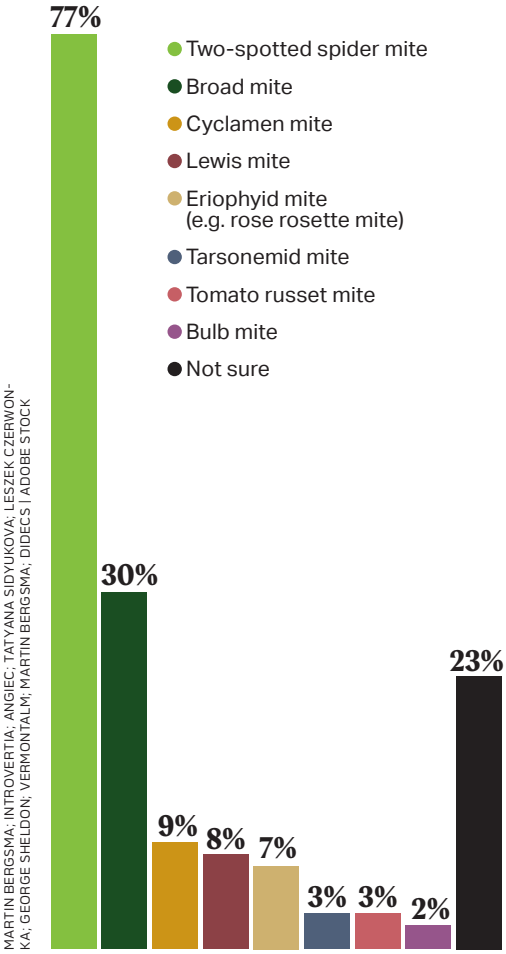
Looking specifically at the two-spotted spider mite, the crop most likely to be reported as "most affected" was perennials, followed by bedding plants and woody ornamentals. Hidden within the "other" responses, 17% of respondents reported two-spotted spider mite issues with tropical foliage.

Things change when looking specifically at the broad mite. Those respondents who primarily called out this pest report annuals and woody ornamentals as the crops most likely to be affected by infestations.

Top areas reporting broad mites as problematic, in order, are Florida, Michigan and Pennsylvania. Looking at geographic reports of two-spotted spider mites, the top areas, in order, are Canada, Michigan and Florida.

It's notable that nearly a quarter of respondents reported that they were not sure which mite was most problematic.

Which mite pests are most problematic at your operation?
(Select all that apply.)



Which crops are most affected by mite infestations? *(Select all that apply.)*

36% Bedding plants

36% Perennials

29% Woody ornamentals

17% Herbs

13% Mums

6% Poinsettias

0% Bulbs

36% Other

Other answers include mandevillas, fruit and tropical foliage plants.

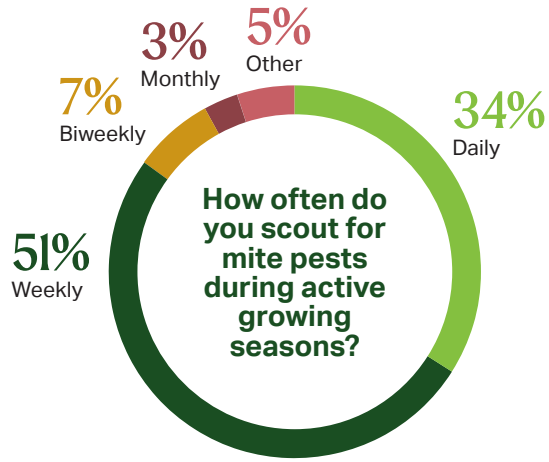
MARTIN BERGSMA; INTROVERTIA; ANGIEC; TATYANA SIDYUKOVA; LESZEK CZERWONKA; GEORGE SHELDON; VERMONTALM; MARTIN BERGSMA; DIDECS I ADOBE STOCK

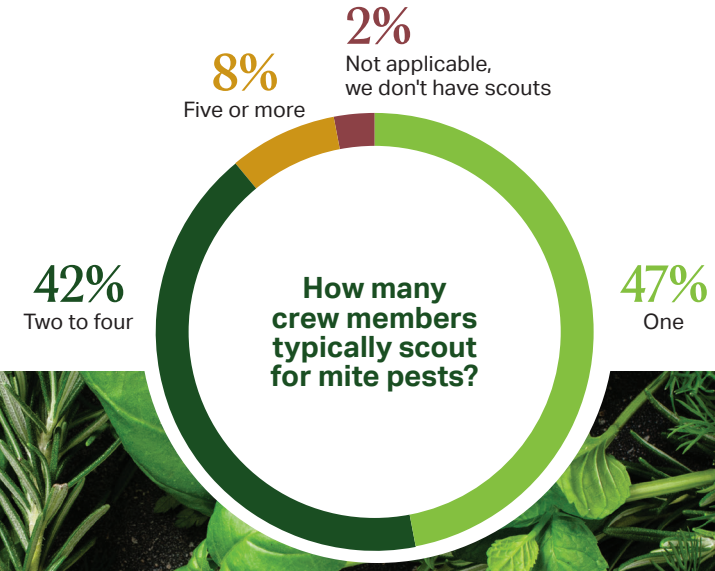
Scout's honor

THE FACT THAT NEARLY A QUARTER OF RESPONDENTS aren't certain which mite is their biggest issue may be linked to the score regarding confidence in who is scouting for mites. On a scale of zero to 100, most respondents are more confident than not that the appropriate team member identifies mite pests, but that confidence is measured and cautious, with a score of 76.

Most of those who are scouting do so on a weekly basis. Fewer (34%) opt to scout on a daily basis, and "other" responses suggest that scouting may occur seasonally (spring and summer) or reactively when problems are spotted, or as one respondent put it: "At our farm ALL staff scout all the time for the presence of any pest."

The majority of respondents have scouting teams of two or more, though within that group, teams of two to four are most common. Scouting team size increases with the size of the operation. For the entire group, only 8% have the largest teams of five or more. But for operations of 50,000 square feet or more, that percentage increases to 25% and remains consistent when only looking at operations with 100 acres or more of outdoor production.





Mite-y management

MOST RESPONDENTS HAVE AN IPM PROGRAM, though the percentage of those reporting the practice is less than three-quarters of all who took the survey. However, a majority of those say their miticide application is both preventive and curative.

Those who report their approach to miticide application is preventive are much more likely to have an IPM program (81%) compared to the main group, while those who take a curative approach are less likely to use IPM as a strategy (51%) and more likely to not have an IPM program compared to the main group (49%).

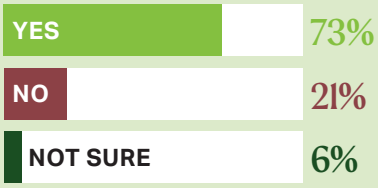
Nearly three-quarters of respondents are rotating miticides with different modes of action. And of those, nearly two-thirds are rotating three or more modes of action in a season.

The top cultural practices for managing mites are water management and weed control. But the majority of those who submitted an "other" reply noted using predatory mites or beneficial insects for mite control.

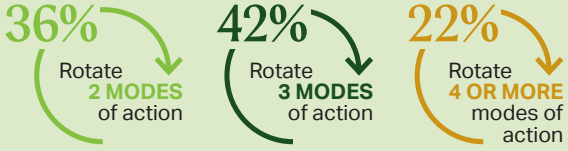
Finally, the most reported go-to source of information on mite pests is miticide manufacturers.

Do you have an Integrated Pest Management (IPM) program?

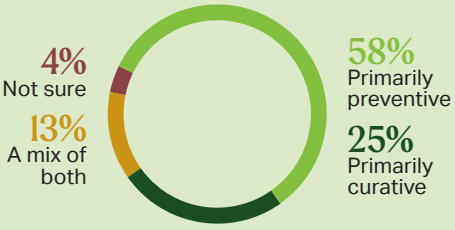
Are you rotating miticides with different modes of action?



If you are rotating miticides with different modes of action, how many modes of action do you typically use in a season?



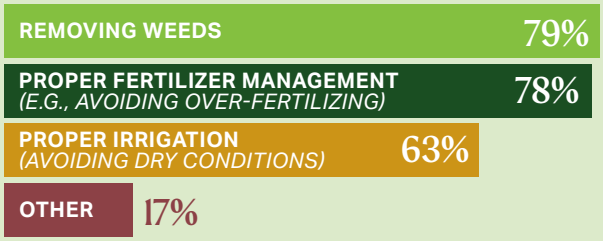
How would you describe your typical approach to miticide applications?



Where do you find information regarding mite pests (e.g., identification) and mite control? *(Select all that apply.)*

PEST CONTROL PRODUCT MANUFACTURER *(e.g., website, newsletter, sales rep)*	73%
TRADE MAGAZINES	57%
UNIVERSITY EXTENSION	55%
FELLOW GROWERS	50%
OTHER	15%

What type of cultural controls have you adopted to help with mite pest management?



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envu™ Ornamentals

Stop mites at every stage. Protect beauty at every turn.

When mites stand in your way, stop them with Shuttle® and Floramite® miticides. With unique modes of action that deliver rapid knockdown and long-lasting protection, these solutions control mites at every life stage – from egg to adult – breaking the cycle before it can restart, so you can keep moving forward.

Sign up to receive a free poster with our top tips on controlling mites.

Our growing portfolio of miticides is built to give you confidence at every turn — stopping mites at all life stages and helping you stay ahead of resistance.

SHUTTLE®

Mite control that goes the distance
Shuttle® SC miticide provides long-term residual control of multiple mite species – including broad mites – at every life stage, from egg to adult.

FLORAMITE®

Knock down mites quickly at any stage.
Stop spider mites with the outstanding control of Floramite® SC miticide. With quick knockdown power and long residual control, it keeps mites in check no matter their life stage.

SAVATE®

Mighty control for all stages of mites
Get excellent knockdown and residual control of all stages of mites – including eggs and immature stages – with Savate® insecticide.

KONTOS®

Mites don't stand a chance
The long-lasting, fully systemic formulation of Kontos® insecticide provides highly effective, broad-spectrum control of damaging mites and sucking insects.

Envu Earnings

The **Envu Earnings Early Order Program** helps you finish the year strong while getting a head start on next season. Take advantage of competitive savings and rebates on our expanded ornamental solutions for mite control.

Scan to learn more about the Envu Earnings Early Order Program.

Two-spotted **spider mite**

DESCRIPTION

Two-spotted spider mites suck the contents of plant cells, causing bleached, stippled or otherwise discolored foliage. They also make silken strands on plant parts, especially when populations are high. The mites have globular bodies that are 1/50 inch (0.5 mm) or less in diameter. Adults have two dark blotches on the body and overall coloration that varies from gray to green or yellowish. Overwintering females may turn pink to orange during fall to early spring.

LIFECYLE

Spider mites develop through five life stages. Females lay round eggs that hatch into six-legged larvae. Larvae develop into eight-legged protonymphs, then deutonymphs and then adults. Spider mites have many generations per year, and their abundance can increase rapidly when temperatures are warm. Egg to adult development takes five to 20 days, depending on temperatures.

HOST PLANTS

Two-spotted spider mites can feed on more than 300 different species of plants. Common nursery crop hosts include Arborvitae, azalea, rose, spruce, camellia,hydrangea, citrus, hollies, ligustrum, pittosporum, pyracantha and viburnum. Many herbaceous perennials including hollyhock, monarda, columbine, daylily, butterfly bush, primula, scabiosa, verbena and salvia are also prone to mites. Herbs such as lemon balm, lemon verbena, lemon grass, oregano and mints can also be favored hosts. Greenhouse vegetables including cucumbers, tomatoes and beans are susceptible to mites. Weeds such as chickweed, oxalis, pigweed and henbit found in and around nurseries and greenhouses can be sources of continuing infestations.

DAMAGE

Two-spotted mite feeding initially causes tiny, pale specks (stippling) on leaves. As feeding continues foliage can become pale green, yellowish, or whitish in large patches. Leaves may eventually turn brownish in large patches or overall and drop prematurely. Their pale cast skins and webbing may be visible on the underside of leaves where mites generally feed. This also reduces crop aesthetic quality. Plants may grow slowly or remain undersized if heavily infested. Plants that are severely infested when young may die.

Broad **mite**

DESCRIPTION

Adult broad mites are almost microscopic (less than 0.2 mm long). They are translucent and colorless to pale brown. There are four pairs of legs; the last pair in the female ends in a long hair; the last pair on the male ends in a strong claw. The egg is elliptical, translucent, colorless, about 0.08 mm long and is covered by 29 to 37 whitish bumps. Larvae have three pairs of legs and are whitish due to minute ridges on the skin. They are about 0.1 mm long.

LIFECYCLE

Female broad mites lay 30 to 76 eggs on the leaf surface over an 8- to 13-day oviposition period. Unmated females lay male eggs; mated females usually lay four female eggs for every male egg. The larvae hatch in two or three days and emerge from the egg to feed. Larvae are slow moving and do not disperse far. In two or three days, the larvae develop into a quiescent larval stage. Quiescent female larvae become attractive to the males which pick them up and carry them to the new foliage. Males and females are very active, but the males apparently account for much of the dispersal of a broad mite population in their frenzy to carry the quiescent female larvae to new leaves. When females emerge from the quiescent stage, males immediately mate with them. Males live five to nine days; females live eight to 13 days.

HOST PLANTS

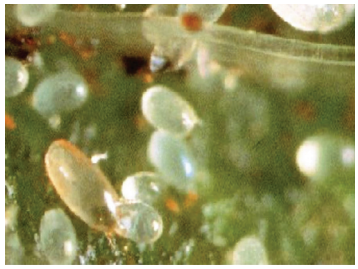
Broad mites infest African violet, ageratum, azalea, begonia, dahlia, gerbera, gloxinia, ivy, jasmine, impatiens, lantana, marigold, peperomia, snapdragon, verbena and zinnia.

DAMAGE

Leaves curl downward and turn copper or purplish. Internodes shorten and lateral buds break more than normal. This new growth may also be stunted or killed, which forces out additional shoots. Flowers are distorted and fail to open normally. Unless controlled, broad mites usually destroy the commercial value of infested ornamental crops.

PHOTOS: CORNELL UNIVERSITY AND USDA

Cyclamen mite



DESCRIPTION
The adult female mite is yellowish brown, with hind legs reduced to slender threadlike structures. The male is approximately 75% the size of the female. On the adult males the fourth pair of legs is modified and used to transport the pupae or adult females.

The eggs are elliptical, opaque, smooth and nearly twice as long as wide. The larvae are opaque white with a peculiar triangular enlargement at the posterior end of the body. The pupae are non-motile.

They are sometimes confused with the broad mite but that pest is broader, smaller and moves much faster.

LIFECYCLE
One to three eggs are laid per day in clusters, with a total of 12 to 16 eggs per life span. The duration of the egg stage is three to seven days, one to four days for the larvae, two to seven days for resting pupae or one to three weeks per generation.

HOST PLANTS
Cyclamen, African violet, begonia, gerbera, ivy, chrysanthemum, geranium, fuchsia, larkspur, petunia, snapdragon and other greenhouse grown plants.

DAMAGE
Infested plants may have a streaked and/or blotched appearance, distorted leaves with small, distorted flowers, fewer flowers than normal, or complete abortion of flower buds. Also look for irregular folding of leaves, thickening of leaves or shortening of petioles.

Lewis mite

DESCRIPTION
Lewis mites are approximately 0.3 mm in length at mature size and range from green to yellowish in color as immatures, but develop to a light orangish color as they mature. Unlike two-spotted spider mites, Lewis mites lack the (proportionally) large, dark-colored spots on their abdomen. Due to their size, magnification is necessary to scout for Lewis mites effectively.

Eggs start off clear in color but develop to a milky white color before they hatch.

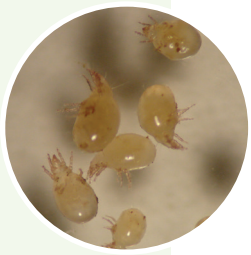
LIFECYCLE
Lewis mites have one larval and two nymphal stages before they mature into adults. They can complete their life cycle in about 14 days at an average daily temperature of around 77° F. Adults lay 60 to 90 eggs per month. The comparatively slow life cycle of Lewis mites contributes to why populations often go undetected until crops are mature.

HOST PLANTS
Primarily poinsettia.

DAMAGE
Lewis mites tend to congregate along leaf veins or edges as populations grow. Eggs are laid on the undersides of leaves. Stippling damage caused by Lewis mites is often faint in the early stages of an outbreak and mimics mild chlorosis in poinsettias. Since feeding is frequently concentrated along veins as populations grow, many growers mistake these symptoms for mineral nutrient deficiency symptoms. Once populations reach a critical mass, webbing is visible, and damage is severe, affected plants may be unsalable.

PHOTOS: CORNELL, UNIVERSITY OF CALIFORNIA AND WASHINGTON STATE UNIVERSITY

Bulb mite



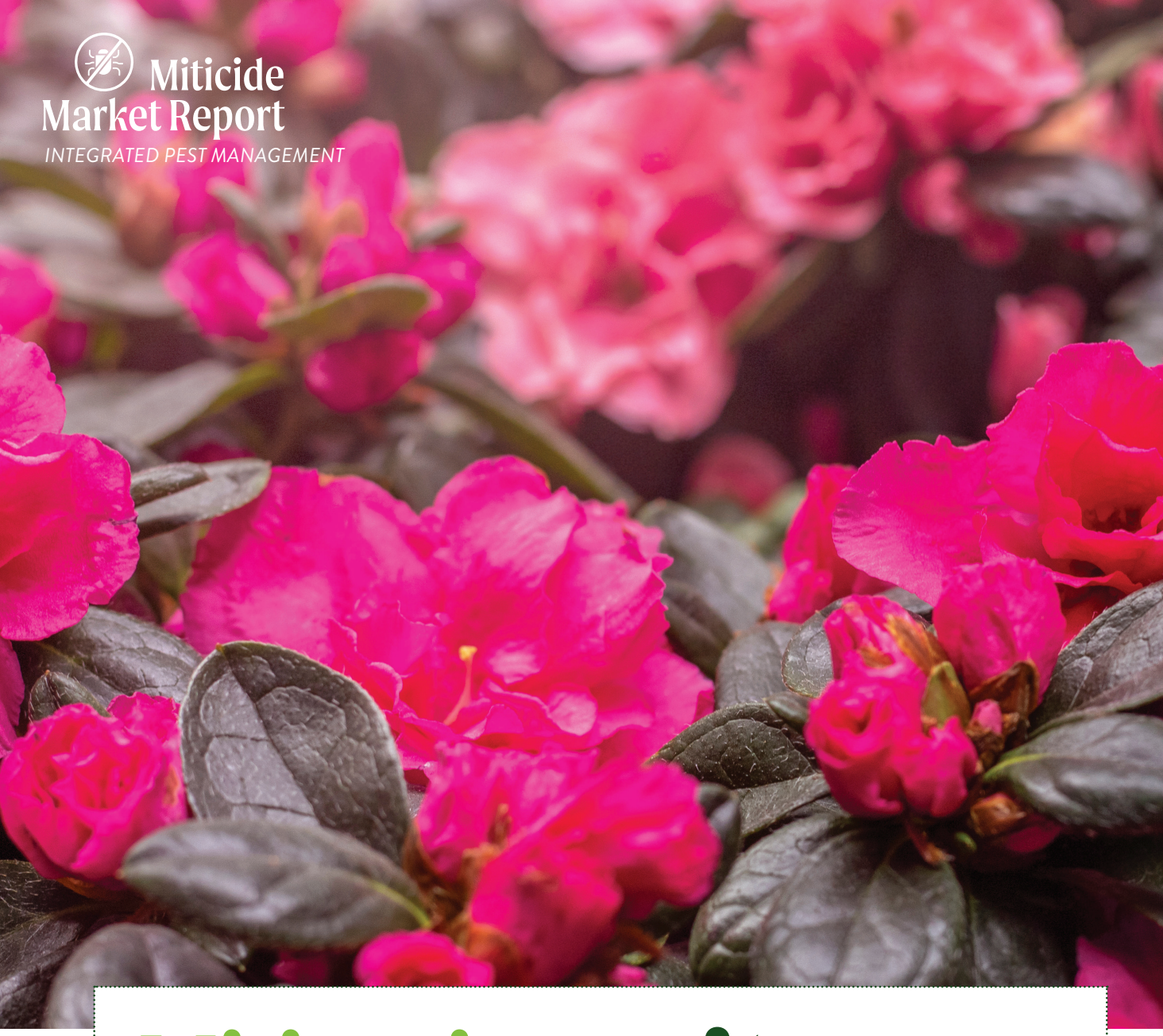
DESCRIPTION
Bulb mites are 1/50 to 1/25 inch long with eight legs. They are shiny white to translucent with two brown spots on their body, with short reddish-orange legs. These extremely small, slow-moving mites are usually found in clusters underneath bulb scales or at the base of the bulb.

LIFECYCLE
Each female bulb mite lays up to 100 eggs during her lifespan. The life cycle takes up to 40 days to complete depending upon relative humidity, temperature and host plant. For example, at 77° F, the life cycle takes approximately 12 days. They do not undergo a resting stage or diapause.

HOST PLANTS
Amaryllis, crocus, freesia, gladiolus, hyacinth, lily, Dutch iris, narcissus and tulip, as well as garlic and onion bulbs.

DAMAGE
Visible signs of damage are typically not apparent until bulb mite populations are extensive. Infested bulbs may rot with new growth stunted and distorted. Bulb mites are secondary pests commonly associated with bulbs already injured from fungus gnat larvae and/or root rot pathogens. They infest bulbs and corms by penetrating the basal plate or outer skin layers. Infested bulbs decay and turn rotten. Bulb mites may feed in Easter lily stems causing the stems to become brittle. Infested lilies are shorter with fewer stem roots. Look for stunting with low mite populations to failure of bulbs to produce new growth with heavy infestations. Leaves will be stunted, distorted and turn yellow. Flowers will not develop. Infested bulbs show reddish-brown discoloration and may rot after planting.

Sources: University of Florida, University of California Agriculture and Natural Resources, University of Minnesota, University of Connecticut, University of Kentucky, Ball Seed



Mitigating mites

Integrated pest management plans provide a strategic playbook that keep plants and profits healthy.

A solid integrated pest management (IPM) plan is a vital tool in a grower's toolbox. It provides a structured, often proactive approach to pest control while protecting plant quality and saving inputs.

IPM strives to keep pests and their damage at an acceptable threshold using several techniques:

- Prevention (including proper cultural practices)
- Scouting, trapping and monitoring
- Pest identification
- Action thresholds
- A combination of control measures (mechanical, biological and chemical controls)

IPM plans protect plant quality by emphasizing early detection through scouting and preventive practices. IPM helps reduce costs and increase efficiencies when applications are made only when needed and allows labor to concentrate on other tasks.

CONTINUED ON S14

SERHII | ADOBESTOCK

Insect screening acts as an important pest management tool.

By John W. Bartok, Jr.

When designed and installed properly, insect screens can help provide pest exclusion. This can reduce pesticide use, lessen employee exposure to chemicals and provide higher quality plants.

Screens work best with exhaust fan ventilation systems. The positive airflow from exhaust fans gives a constant pressure difference. With a natural ventilation system, the airflow is dependent on buoyancy and wind for movement and varies considerably. This requires a greater amount of screen area.

Mesh A common method of identifying insect screening is by mesh. The U.S. system is to count the number of openings in one linear inch. For example, a 50 mesh would have 50 openings. The screening may have different mesh between the horizontal and vertical direction. The greater the mesh, the smaller the openings and the smaller insect that can be excluded. Depending on the material and thread diameter, the porosity and therefore air movement will vary.

Airflow The airflow through screen material varies with the size of the openings. This is determined by the smallest insect you are trying to exclude. The openings for thrips are less than 0.006 inches, whereas openings for flies can be 0.040 inches. The smaller the openings, the greater the amount of screen needed to provide adequate airflow.

To provide adequate airflow for ventilation, the area of the screen that covers the vent/shutter opening has to be increased. This is usually done by providing a frame or structure over the intake that will support additional material. For a greenhouse with fans on one endwall and a vent or shutters on the opposite endwall, adding an extra hoop covered with screen material to the intake end will provide the extra area. For greenhouses with fans along one sidewall and vent on the opposite side, a lean-to structure or box frame over the vent will usually be adequate. Pleated screens are also available that attach to existing motorized vent windows.

Sizing The calculations for determining the amount of screen material needed is fairly complex and best determined by computer. Contact the manufacturer or supplier to get the size needed. Factors that affect the amount of screen area include:

Location – Greenhouses in the south require more ventilation due to greater thermal load. The solar load may be 25% greater in Arizona as compared to a location in Michigan. Clouds and smog also affect this.

Existing greenhouse shading – Less ventilation and therefore less screen material is needed if a thermal screen, exterior shade material, whitewash or evaporative cooling is in place.

Existing ventilation system – The number and size of fans, their output and air inlet size. After closing all openings except the intake shutters or vents, a monometer should be used to get the pressure drop (inches of static pressure) of the existing system before the screen is installed.

Size of the greenhouse – Floor area and height.

Resistance of screen material – The opening size for thrips is much smaller. The screen area needed can be from two to ten times the shutter or vent opening.

Shrinkage – Allow for 1 to 2% shrinkage when installing the screen.

Maintenance Keeping the screen system in good condition requires proper maintenance.

1. All openings (doors, gaps under baseboards) other than the screened vents should be closed to reduce access to insects.
2. Dust, dirt and pollen can plug up the tiny screen openings quickly. Washing with water from a hose and nozzle from the inside out works well. Do it on a warm day so that the screen dries quickly. Do not use high pressure from a leaf blower or water nozzle as it may tear the material or alter the hole size.
3. A check on the operation of the system can be made by monitoring and recording the static pressure drop across the screen. When it increases above 0.4 inches of water it probably should be cleaned.

John Bartok Jr. is an agricultural engineer, author, consultant, emeritus extension professor at the University of Connecticut and a regular contributor to sister publication Greenhouse Management. *Contact him at* ***jbartok@rcn.com.***

PHOTO: JOHN W. BARTOK, JR.

Scouting 101

Pathogens, insects, weeds and other pests negatively impact ornamental plant production (greenhouse, nursery, landscape). Integrated pest management (IPM) strategies are used to prevent (ideally) or mitigate damage to ornamental crops. IPM strategies of ornamentals include practices such as proper plant choice for the site, incorporation of resistant varieties when available, the use of pesticides to manage problems, and an acceptance that certain levels of damage may be necessary.

Scouting consists of systematically moving through the nursery, greenhouse or landscape looking for pathogens and pests, quantifying damage and evaluating thresholds. Scouting allows for the early identification of potential problems, providing more management options that can be implemented prior to a critical threshold, thereby reducing the control costs and crop losses. Since pest and pathogen populations vary, spraying without scouting (or spraying and praying) first may result in unnecessary or insufficient pesticide applications. A grower can use pesticides more effectively by knowing what pathogens are in a nursery, greenhouse or landscape, anticipating problems, and treating them before significant losses result.

The tools

- Hand lens – 10x or 15x. To correctly use a hand lens, place it directly in front of your eye and bring the sample toward the lens until it comes into focus.
- Knife – good for cutting into stems or root tissue
- Pruning shears – disinfect blades between samples
- Soil sampling tube and trowel to sample soil or examine roots
- Newspaper or plastic bags to house samples and indelible marker to label
- Record-keeping sheets
- Phone camera (or digital camera) for documentation
- Agdia test strips for viral and disease testing purposes

How to scout There are innumerable pests (insects, diseases and weeds) common to the nursery, greenhouse and landscape, and all of these can be monitored by field scouting.

When scouting for pathogens or pests, it is important to get a random sample. However, the scout also needs to observe and note any high population areas (foci) in the field. Scouts should walk through the area in a "V," "X" or "W" pattern to get a random sample of pest populations. Anywhere from 25-100 plants should be randomly selected for examination, depending on the size of the greenhouse, nursery or landscape.

Random selection of plants is the key to an accurate indication of a pest or pathogen population. This doesn't mean ignoring problems that you might see while scouting that don't conform to your pattern. Remember the goal is to identify any problems early, not walk in a pattern.

Stick to scouting patterns while noting any areas of unusual plants or problems

CONTINUED FROM S12

A good IPM plan also reduces resistance risks by rotating modes of action. IPM also provide data-driven decisions through scouting records and monitoring.

Cultural practices

Starting with consistent cultural practices is a key part of prevention.

Maintain good sanitation practices by removing debris around the nursery and from inside greenhouses. Mites and other pests often overwinter in debris. Make sure crews understand the importance of sanitation and have the right tools to make it a priority.

Disinfect benches and floors post-production. Sterilize growing media when appropriate.

Maintain weed-free zones around production areas, including under benches and in the cracks of walkways in greenhouses.

Set up a regular scouting routine. (See the scouting sidebar on this page for detailed tips.) Scout weekly to catch outbreaks before they become infestations.

Environmental management is a key piece of good cultural practices. Avoid plant stress. Mites and other pests thrive on stressed plants due to nutrient issues or improper watering techniques, for example.

If you utilize greenhouses for any stage of production, remember that insects and other pests may enter the space from outside, on incoming plants or through cracks and other openings in the structure. Make sure vents are properly screened. (See insect screening sidebar on page S13 for additional help.) And always inspect plant material and quarantine suspect plants to prevent the

[e.g., areas of high pathogen or pest population]. Take care to prevent insect or pathogen foci from skewing the results — these areas may warrant separate treatment plans, eradication or additional applications of pesticide.

Scouting is different depending upon how plants are propagated. In the greenhouse, cuttings should be examined prior to being stuck, with any spotted, distorted or discolored cuttings discarded. For seed-propagated plants, begin scouting for all pests (insects and diseases) at germination. This is especially important if there is a history of problems with damping-off, cutting rots, botrytis, downy mildew, and root rots, particularly *Phytophthora* and *Pythium*. When examining individual plants, observe the top, middle, and bottom canopy, as well as the main stem and roots, if present. Pots should be tipped sideways for inspection of the underside of the leaves where downy mildew is often first visible (and insects often hide).

Record keeping Without proper records, scouting will be ineffective. The greatest value derived from scouting is the record of what plants have problems and when they occur so you can be proactive in future years and prevent these problems from happening. The best way to do this is to keep and regularly review detailed records.

Records and maps of nursery blocks and greenhouse ranges provide a history of past problems and provide a leg-up on future diagnoses, showing where, when and what crops have had problems. Information should be compiled weekly and then examined at the end of the season to prepare for next year's scouting and pest and disease management. All of this is more easily said than done, but commitment to the process will provide dividends later, with improved yield, quality and plant health leading to happier clients.

It's worth the work When performed proactively, IPM saves growers money on chemical costs and reduces losses. It is the difference between planning and being proactive versus responding reactively to big losses. Developing a new IPM routine is hard and requires effort and intention. Begin by blocking a regular time to scout every week and allow time to record your efforts. Recognize that other demands in the nursery or greenhouse will compete with this time, so prioritize it by setting an alarm in your phone or setting up a team approach so it isn't the responsibility of just one person. Keep in mind that this is process that will require repeated practice, but it is one that will pay dividends in better plant health and a better bottom line.

Source: Purdue University, Janna Beckerman
Editor's note: See this piece in its entirety here: ***bit.ly/Purdue-Scouting101***
Beckerman spent 20 years as an extension specialist at Purdue prior to joining Envu.

Basic Scouting Information			
Client:	Location:	SubLocation:	
Date:	Scout:		
Crop and Pest Information			
Host Crop and Stage	Pest, Disease, Disorder	How field was scouted	Notes (fertilizer, pesticides applied)
		Measurements: #Plants Sampled: #Samples/location: #Locations:	
		Measurements: #Plants Sampled: #Samples/location: #Locations:	
		Measurements: #Plants Sampled: #Samples/location: #Locations:	
		Measurements: #Plants Sampled: #Samples/location: #Locations:	
		Measurements: #Plants Sampled: #Samples/location: #Locations:	

Cultural controls for mite management

Strategy	Actions
Sanitation	Remove debris/weeds, clean and sterilize surfaces and tools
Monitoring/scouting	Weekly inspections with hand lens; shake tests
Environment management	Maintain humidity, avoid plant stress, promote air circulation
Exclusion	Quarantine new plants; screen greenhouse openings
Mechanical control	Use water sprays
Plant health	Proper spacing for reduced pest pressure

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spread of mites and other insect pests.

Depending on the crop and your greenhouse setup, consider using mechanical suppression such as high-pressure water sprays or overhead irrigation to wash mites off foliage.

Pay attention to spacing. Good airflow is important to plant health, which helps prevent some insect infestations. It also aids in scouting.

Sources: University of Tennessee, Oklahoma State University, University of Missouri, Texas A&M University Extension

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