Managing Bedding Plants

BY AARON PALMATEER

Pests, diseases and weeds present numerous challenges to successful plant production. What effective strategies can you implement to ensure you produce vibrant and healthy plants?

Managing pathogens in bedding plants can be one of the most difficult challenges for greenhouse growers. In fact, bedding plants have succumbed to some of the most devastating diseases yet to attack the industry. Gardening impatiens, for example, are super susceptible to downy mildew. To date, there is no known resistance in *Impatiens walleriana*, so growers must rely on strict and timely fungicide regimens to ensure their impatiens are downy mildew free and healthy. Since the widespread outbreak of impatiens downy mildew throughout the U.S. several years ago, many growers have opted out of producing impatiens and have found alternative plants, such as SunPatiens and New Guinea impatiens, which are not susceptible to impatiens downy mildew.

The example of downy mildew on impatiens is rather extreme and, fortunately, there are not many diseases that have had as great an impact on the bedding plant industry. Regardless, there are plenty of everyday challenges brought on by common pests, pathogens and weeds. To be successful, ornamental growers must produce quality plants that appear vibrant and healthy, so effective production management strategies are of paramount importance.

A PROPER DIAGNOSIS

Effective management strategies start with obtaining a proper diagnosis. Knowing the causal agent allows growers to make the best management decisions, which often saves time and money and reduces the stress and frustration that come along with losing plants. Once an accurate diagnosis is obtained, growers should make informed decisions by relying on past management records that were proven effective. For newly introduced pest and pathogens, rely on the expertise of university Extension specialists, private consultants and other individuals with the proper experience.

Throughout the production process, bedding plants are often moved from one growing site to another. This practice comes with great

Photo: Intumescence (physiological disorder) on cuphea.

potential for introducing pests, pathogens and weeds, where these newly introduced populations may be pesticide-resistant, creating yet another management challenge.

With the wide array of bedding plant species currently available, many greenhouse operations are growing a wide range of plants and making it even more difficult to stay informed of all the potential problems. Growers are challenged to develop efficient production plans that incorporate as many tactics as possible to maximize plant health and minimize opportunities for pest and disease outbreaks. To minimize the risk of introducing new problems, production managers should ensure routine and thorough monitoring, taking into account the potential issues for all plant species in the operation.

INSECTS

The approach to identifying plant health problems is often based on process of elimination. One of the first possibilities a grower should consider when confronted with a damaged plant is insects. Many insects, such as caterpillars and maggots, are fairly large and easily spotted. Even smaller insects and related animals (e.g., mites and foliar nematodes) can be readily seen with a 10x power hand lens. One of the reasons to consider insects early in the identification process is the relative ease in finding the culprit associated with the damage.

RULE OUT THE NON-LIVING

Abiotic disorders are factors usually associated with the plants' environment. Some common environmental factors include temperature extremes, moisture extremes, soil pH, air quality, light regime and nutrition. If one or more of these factors goes above or below optimum range for any given plant species, injury might result.

One important piece of evidence in implicating an abiotic cause for injury to plants is the distribution of the damage within the greenhouse. Environmental problems are much more likely to affect all or almost all plants in the greenhouse uniformly. Such as in cases with the onset of a physiological disorder such as edema (buildup of water in plant cells) and intumescence (bump-like protrusions) when the environmental conditions are favorable the symptoms typically affect all susceptible plants.

Disease and insect problems, on the other hand, tend to occur in clumps or hot spots within the greenhouse. For example, if herbicide is sprayed to control weeds next to a row of containerized plants, injury will likely be uniform and all the plants in the affected row will likely show symptoms. A fungal pathogen, in contrast, may produce similar dark discoloration of leaves, but only on one or two plants in the early stages of the epidemic.

Rhizoctonia root and stem rot of *Impatiens walleriana.*

FUNGI AND FUNGAL-LIKE PLANT PATHOGENS

Fungi and fungal-like organisms such as the oomycetes (Phytophthora, Pythium and downy mildews) cause some of the most economically devastating plant diseases. These pathogens can penetrate directly through the cuticle of plants; therefore, they do not need natural openings in the plant or wounds for access. Unfortunately, many of the most popular bedding plants are susceptible to leaf spots and blights, including downy and powdery mildew, rusts, root and crown rots, stem cankers and vascular wilt diseases.

One of the most infamous pathogens of bedding plants is Botrytis. Gray mold or Botrytis blight, is likely the most common disease of greenhouse crops. Losses due to Botrytis reach far beyond the greenhouse where the disease is common on plants and plant products during shipping.

Botrytis cinerea is a fungus that is capable of living on both dead and live plant material, which makes it one of the more challenging plant pathogens to control. It can invade and damage just about any part of the plant, but blight mostly occurs on more tender plant tissues including the flowers, buds and leaves with weakened and damaged tissue being the most susceptible. Botrytis can quickly invade damaged plant tissue, including freshly cut tissue, during pruning, propagation, and handling, which frequently results in stem lesions, dieback and has been reported to inhibit rooting on infected cuttings.

When it comes to effective management of prolific pathogens such as Botrytis, preventative fungicide applications are a must. Numerous

Powdery mildew on gerbera daisy.

fungicides have been developed for use on greenhouse plants for controlling fungal plant pathogens such as Botrytis.

Bayer is working on a new tool for fungicide resistance management. In research trials, Broadform, which contains a unique combination of active ingredients, has shown to be highly effective against Botrytis and many other fungal plant pathogens affecting ornamental plants. Broadform is currently under development by Bayer and is pending EPA registration.

PLANT PATHOGENIC BACTERIA

Though fungi cause more plant diseases, bacterial diseases can be some of the most difficult to manage. Bacteria are single-celled organisms that can be seen only with a powerful light microscope. Though some bacteria do produce spores, those that cause plant diseases do not.

Bacterial diseases of bedding plants include leaf spots and blights, soft rots, vascular wilts, crown gall and cankers. Bacteria cannot penetrate the cuticle of plants, so must enter the plant through a wound or natural opening. Some plants have small natural openings along the leaf margin called hydathodes, which function in the transpiration process of the plant, but when open, they serve as a point of entry for bacteria to enter the plant and subsequently cause disease.

Bacteria are dependent on outside agents for dispersal. Splashing water is the chief means by which bacteria are disseminated. Another important means of dispersal is through human contact. Simply touching an infected plant and then touching a healthy plant can spread many bacterial pathogens.

PLANT PATHOGENIC NEMATODES

Nematodes are animals that are wormlike in appearance, but taxonomically distinct from true worms. Numerous species of nematodes attack and parasitize humans and animals, in which they cause various diseases. Several hundred species, however, are known to feed on living plants, obtaining their food with a spear-like mouthpart called a stylet. Some of the more common nematodes associated with bedding plants include root-knot, stem and bulb and foliar nematodes.

Unfortunately, there are currently few solutions available for controlling outbreaks of nematodes, so growers should practice strict sanitation measures and monitor newly introduced plant material closely for nematode activity. This includes using a hand lens to closely examine the plant canopy for foliar nematodes on the leaf tissue and removing plants from containers and closely examining the roots for nematodes and galls or root swelling, which can be an indication of nematode damage. Once a nematode infestation is discovered, the affected plants should be removed from healthy plants and promptly discarded to avoid further spread within the greenhouse.

PLANT PATHOGENIC VIRUSES

Viruses are the smallest of the three pathogens mentioned here. They can only be seen with an electron microscope. They are not plants or animals; in fact, they may not be alive at all. Viruses are genetic material (RNA or DNA) wrapped in a protein coat. They must have a living host in order to reproduce. Viruses are mostly vectored from diseased to healthy plants by insects. Aphids, thrips and whiteflies are the primary insect vectors for viruses affecting bedding plants.

Although there are numerous viruses currently reported to attack bedding plants, some of the most common include Cucumber Mosaic, Tobacco Mosaic, Tomato Spotted Wilt and Impatiens Necrotic Spot Virus. However, some viruses are extremely capable of persisting outside of insect vectors and plants and can easily be transmitted on pruning tools, in irrigation water and on the hands of workers handling plant material. Similar to nematodes, control options are limited. Virus-affected plants should be removed from healthy plants and promptly discarded to avoid further spread within the greenhouse. gpn

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