

Verbenas & Powdery Mildew



Verbenas' innate vigor helps protect them against some diseases that require a debilitated host. (Photos: Margery Daughtrey)

New research from Michigan State and Cornell identifies which verbenas varieties are resistant to powdery mildew.

By Margery Daughtrey
and Mary Hausbeck



Powdery mildew colonies may develop on the upper leaf surface.

Verbenas have a key position among bedding, hanging basket and container crops. They provide pure, bright colors or delicate, pastel shades and generally grow like gangbusters. This innate vigor protects them from some of the disease problems that require a debilitated host. Yet, there is one pathogen group that takes advantage of perfectly healthy plants, those that are not stressed in any way: the powdery mildews (PM). Because PM caused by *Podosphaera xanthii* has been especially troublesome to manage on verbenas in recent years, we have focused on it in an American Floral Endowment-funded research project that aims to improve PM management for ornamentals.

Powdery Mildew Overview

Podosphaera xanthii (previously known as *Sphaerotheca fuliginea*) is a PM with the ability to infect more than one kind of plant. It is most familiar as a disease of cucurbits, the group of vegetables that includes cucumbers, squash and pumpkins. In those crops, PM is harmful because of the deleterious effects on the foliage — when heavily infected, leaves may turn brown and shrivel on the vine, leading to substandard, sunburned fruits. Growers who produce cucurbit transplants as well as verbenas should be especially careful to separate these two crops. Verbenas overwintered in the greenhouse have been observed to introduce PM to seed-grown squash and cucumbers that would otherwise not have

Verbena Susceptibility To Powdery Mildew

'Aztec Grape Magic'	Low	'Quartz Blue'	High
'Aztec Lilac Picotee'	Low	'Quartz Burgundy with Eye'	High
'Aztec Magic Purple'	Low	'Quartz Magenta'	High
'Aztec Peach'	High	'Rapunzel Hot Rose'	Low
'Aztec Silver Magic'	Low	'Rapunzel Orchid'	Low
'Aztec Wild Rose'	Low	'Sparkler Deep Blue/White'	High
'Babylon Blue'	High	'Sparkler Purple/White'	High
'Babylon Carpet Blue'	High	'Sparkler Red/White'	High
'Babylon Light Blue'	High	'Sparkler Sky Blue/Red'	High
'Babylon Purple'	High	'Spitfire Violet/White'	High
'Babylon Red'	High	'Superbena Coral Red'	High
'Babylon White'	High	'Superbena Dark Blue'	Low
'Fuego Apricot'	High	'Superbena Large Lilac Blue'	Low
'Lanai Blue'	High	'Superbena Pink Shades'	Low
'Lanai Blush White'	High	'Temari Burgundy Improved'	High
'Lanai Royal Purple with Eye'	Low	'Tukana Scarlet'	High
'Napoleon Purple'	High	'Tukana White'	High
'Napoleon Red'	High	'Wildfire Purple Improved'	High

Figure 1. Verbena cultivars show varying susceptibility to powdery mildew, even within a series. The above, tested varieties will assist growers in selecting varieties to trial.

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pests & diseases



PM may develop on stems as well as verbena leaves.

encountered infection until after several months of field cultivation.

Of course, carrying some plants over from the previous season may introduce PM to spring crops of verbena as well. And each cutting source may inadvertently share some powdery mildew inoculum: Traces of PM can hitchhike unnoticed from onshore or offshore production sites along with cuttings. Although PM is obvious when it is well established, it can reside in small colonies on the undersurfaces of leaves that are not detectable until conditions allow the development of an epidemic that magnifies the visible signs of the disease.

Powdery mildew on verbena typically begins as thin, whitish patches on the underside of lower leaves. Eventually these leaves show the ill effects of the disease by developing a yellow or purplish cast. Leaves with this appearance should be turned over to check for PM underneath. The symptoms can easily be mistaken for nitrogen deficiency.

This ability of PM to be unobtrusive until temperature and humidity conditions trigger dramatic spread is the reason why monitoring your crop is so critical. Inspecting incoming cuttings and the growing crop on a regular basis is important to catch the first signs of an infestation. Fungicides work most effectively as protectants, preventing successful establishment of new fungal colonies. The highest crop quality is maintained when fungicides are used before the PM has spread significantly.

Current Research

After noting that growers saw a great deal of variation in the amount of PM

Controlling Powdery Mildew

A.R. Chase

Even with careful variety selection, chemical control of powdery mildew often becomes necessary. Results of national trials for chemical control of powdery mildew are summarized in the table below. Eight researchers from Michigan, New York, Alabama and California performed trials on powdery mildew on rosemary, aster, miniature rose, sedum, poinsettia, phlox, monarda, crape myrtle, azalea, hydrangea, salvia, gerbera, dogwood, scabiosa, verbena, zinnia and ranunculus.

Product	Results
Banner MAXX	Very good to excellent
BAS500	Very good to excellent
Bayleton	Good
Biophos	Very good
Camelot	Some
Compass O	Very good to excellent
Cygnus	Very good to excellent
Daconil Ultrex	Very good to excellent
Decree	Some to good
Domain	Poor to excellent (resistance concerns)
Fungo	Excellent
Heritage	Very good to excellent
Immunox	Very good
Kaligreen	Very good
Milsana	Some to good
Milstop	Good to excellent
Phyton 27	Good to excellent
Pipron	Very good to excellent
Rhapsody	Very good
Rubigan	Good
Spectro	Poor to some
Strike	Good to excellent
SunSpray	Good
Systhane (Eagle)	Very good to excellent
Terraguard	Very good to excellent
Triact	Good to excellent
Zyban	Poor to excellent (resistance concerns)
3336	Poor to very good (resistance concerns)

A.R. Chase is president and pathologist at Chase Research Gardens, the industry's premier independent chemical screening and diagnostic company. Additional information about powdery mildew and other diseases can be found at www.chaseresearchgardens.com.

damage on different cultivars, we decided to explore the genetic variation in some of the verbenas available in the trade today. We have conducted three trials to date, two in greenhouses and one in a garden setting. These experiments have allowed us to observe the disease susceptibility of 125 cultivars in at least one set of environmental conditions.

Just as growers have noted, we have seen wide variation in the performance of different culti-

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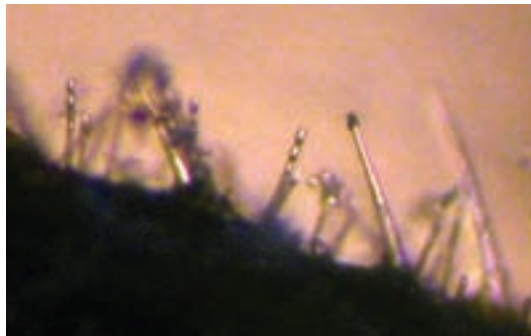
vars. We have not yet accumulated enough information to give each cultivar a specific rating relative to the others available in the trade. However, we have observed that some cultivars appear to be especially prone to PM and develop unsightly foliage under normal growing conditions. The cultivars that have shown a high level of symptom development in at least one of our trials are listed in Figure 1, page 34

Growers who choose to grow these cultivars should anticipate that PM is likely to develop. They should either scout these cultivars very carefully for the first symptoms, paying attention to the undersides of lower leaves, or consider using fungicides preventively.

We certainly have not tested cultivar performance enough times in enough different environments to be confident that any verbenas cultivar is entirely resistant to PM. However, a number of cultivars that have been tested at least twice have thus far shown very low susceptibility to PM (see Figure 1, page 34).

Our studies have convinced us there is a wealth of genetic variation available in verbenas, such that no grower should need to be burdened by intensive disease management for a highly PM-susceptible cultivar year after year. Often plants within the same series may show different PM susceptibility, so judge each cultivar on its own merits. Fungicide application frequency can be significantly reduced by choosing to grow plants that are less susceptible to disease. **GPN**

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Chains of conidia are produced among the leaf hairs on verbenas.

Combining Bonzi And Fertilizers

Many growers have become experienced doing a drench by injecting Bonzi into irrigation water with a portable fertilizer injector and running it through drip tubes, boom irrigation, subirrigation or a water hose. So, it is not unexpected that many Bonzi users are now asking if they can combine Bonzi and fertilizer in the same application. In many situations, this would provide a labor savings.

Bonzi is combatable with most fertilizers in both the concentrate tank and irrigation water. While combining Bonzi and fertilizer is possible, it has not been promoted because users must pay attention to an increased number of factors.

The critical factor with drench applications of Bonzi is controlling the volume applied so the amount of chemical is uniform from plant to plant and from one application time to another. Often, uniformity of application volume is not as critical in fertilization. Growers may not be as precise in the methods employed for fertilization. Thus, if the two are applied together, the user should approach the procedure as a Bonzi drench to which fertilizer is added. This will emphasize the level of care required with the application techniques.

It is suggested that fertilizer should not be combined with Bonzi in spray applications. Again, the procedures for a Bonzi spray are considerably more exacting than for "foliar feeding." Also, Bonzi has a wide margin of environmental safety on most ornamental plants, but phytotoxicity problems from foliar fertilization are not uncommon.

It is a good practice to have separate equipment and not apply growth regulators with equipment used to apply fertilizers, fungicides or insecticides. This applies to measuring cups, concentrate tanks, spray tanks and injectors. This is similar to the situation with herbicides; having separate equipment protects from potential problems on sensitive crops like begonias and pansies.

Experienced Bonzi users who want to test combining Bonzi and fertilizers should read the Bonzi label for additional directions on applying it through irrigations systems. Users should do several tests with this combination on small numbers of plants before applying it to entire crops.

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