

Vegetative annual crops can be affected during production by several different diseases, some of which can be devastating. Recently, two types of pathogens have been problematic for calibrachoa, New Guinea impatiens, petunia and verbena: *Botrytis*, an ubiquitous fungus known as gray mold; and tospoviruses, Impatiens Necrotic Spot Virus ("INSV") and Tomato Spotted Wilt Virus ("TSWV"). Here are some tips for managing *Botrytis* and tospoviruses in the greenhouse. To prevent *Botrytis*:

- Remove and discard severely affected plants and clean diseased plant parts (e.g., senescing leaves) from healthy plants. Bag and remove from the greenhouse.
- Practice thorough sanitation in the greenhouse, especially debris removal from below the bench and aisles, and daily garbage can removal and cleaning. This will ensure *Botrytis* is not sporulating on any plant tissues or debris and prevent it from spreading to otherwise healthy plants.
- Avoid injury to plants.
- Avoid excess nitrogen.
- Prevent high humidity conditions by providing sufficient plant spacing and air circulation, and by reducing overhead watering. *Botrytis* spores need a film of water to germinate, so keeping the leaves as dry as possible reduces the chances of *Botrytis* being able to thrive.
- Use appropriate fungicides. Please note that ignoring cultural controls for *Botrytis* and depending solely on fungicide control is not a good idea. For the most effective control, first manipulate environmental conditions to be unfavorable to *Botrytis*, and then use appropriate fungicides.
- Some fungicides that are effective for controlling *Botrytis* include: **Daconil ULTREX**® fungicide (chlorothalonil), **Medallion**® fungicide (fludioxonil), OHP 26 GT®-0 fungicide (iprodione), Decree® fungicide (fenhexamid), **Heritage**® fungicide (azoxystrobin) and **Palladium**® fungicide (cyprodinil and fludioxonil). Please be aware that resistance to iprodione and, more recently, fenhexamid, has been reported.

Impatiens necrotic spot virus ("INSV") and tomato spotted wilt virus ("TSWV") are transmitted by western flower thrips ("WFT"), so the best way to control these viruses is to control the thrips, which are considered one of the most serious pests on ornamental crops. In addition to vectoring the tospoviruses, WFT damage plants directly by feeding. Generally, INSV is a more frequent problem in greenhouses than TSWV. Key information to prevent tospoviruses:

- Thrips can pick up the virus only as immatures, but immature thrips cannot transmit tospoviruses. Thrips can transmit the virus only as adults, but adult thrips cannot acquire tospoviruses. So, tospoviruses are transmitted by thrips only when immature thrips acquire the virus, pupate and emerge as viruliferous adults.
- All stages of thrips must be controlled to control tospoviruses. Control of thrips pupae in the growing medium is best accomplished by drench applications.
- Tospoviruses are actually difficult to mechanically transmit. It's highly unlikely that tospoviruses will spread by normal handling of plants in greenhouses. The risk of spreading tospoviruses is higher on cutting knives or pruning equipment because sap transmission is possible.

In a greenhouse, all symptomatic plants should be removed and/or destroyed, and daily scouting should be conducted to remove any plants with further development of symptoms. This must be accomplished while spraying rigorously to control all stages of WFT.

Other diseases of the vegetative annuals include:

- Calibrachoa: Phytophthora crown and stem rot and Tobacco Mosaic Virus ("TMV")
- New Guinea Impatiens: Alternaria leaf spot, Rhizoctonia web blight, Septoria and Pseudomonas leaf spot
- Petunia: Phytophthora crown rot, Powdery mildew, Rhizoctonia web blight, Sclerotinia crown rot and Tobacco Mosaic Virus ("TMV")
- Verbena: Alternaria, Cercospora and Corynespora leaf spots, Powdery mildew, Rhizoctonia root and crown rot, Thielaviopsis root rot, Potyvirus (Poty) and Bidens Mottle Virus ("BiMoV")

Scout your crops regularly for problems and get a head start on disease issues by dealing with them from the start. It is much better to prevent problems and keep them under control rather than suffer the losses they can cause.

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