CONTROLLING BACTERIAL DISEASES OF ORNAMENTALS

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Management of bacterial diseases relies upon the use of all available information on production of the crop as well as control of the pathogen. One of the most important pieces of information is what diseases occur on your crop. When you know the problems you might encounter on each crop it is easier to recognize their symptoms and apply control treatments before the disease reaches epidemic proportions. Start a collection of educational materials (including color slides or photographs) of the diseases which occur on your crops and make these available to your employees for their personal use. Training should continue at organizational or University meetings.

When a problem is discovered samples must be sent to a diagnostic laboratory for culturing or indexing since this is the only reliable way to determine the cause of the problem. Since there are no really effective bactericides available you must discard all symptomatic plants using a very critical eye. When a bacterial pathogen is isolated from a plant do not jump to the conclusion that is causing the disease without further proof. Check in your records, the literature and with extension personnel or other disease experts to make sure that the bacterium has been demonstrated to cause of disease of your plant. Unfortunately, the isolation procedures used in most labs allow recovery of many bacteria, which are not pathogens as well as those known to cause serious losses in your crop.

Cultural Controls

1. Know the time of year when each disease is most likely to occur. In general, Pseudomonas leaf spot is more severe during the cooler months while Erwinia blight is worst during the hottest periods of the year. Scouting for diseases only at times when temperatures are favorable allows for better management of personnel resources.
2. Use pathogen-free cuttings and seeds whenever possible. Several prominent diseases caused by Xanthomonas are known to be seed-borne (Ranunculus, Zinnia).
3. Eliminate overhead irrigation and exposure to rainfall when possible. Splashing water moves bacteria and allows than to infect new leaves.
4. Irrigate when the leaves will dry quickly.
5. Scout crops as they are received and once a week afterward.
6. Remove plants with symptoms at least once a week.
7. Have problems diagnosed by a laboratory.

Bactericides

Apply bactericides as a last resort or in a totally preventative fashion. Copper products have been shown to be slightly more effective than antibiotics for control of Pseudomonas and Xanthomonas leaf spots, while antibiotics (streptomycin sulfate) work a little better for Erwinia diseases. In our tests, Phyton 27 has proven somewhat more effective than other copper in side by side comparisons. There are no known bactericides, which can provide complete protection of a plant from a bacterial infection. Neither can they eradicate an infection that has occurred. At best, bactericides used preventatively reduce spread of bacteria from one plant to the next and development of the disease in the original plant.

Conclusions

It is always best to have a plan of control before disease occurs. The plan should include use of pathogen-free plant materials and an irrigation system that does not wet the leaves. These are the first levels of defense in controlling bacterial diseases and are critical in applying an integrated approach to bacterial disease control. Scouting the crop should be a routine procedure by the same person at least once a week. It is very important to critically examine all new plant materials as they come into the greenhouse. Before a problem develops you should know which laboratory or expert can confirm your diagnosis, how to submit samples and/or what information the "expert" will require. Finally, emergency procedures should include removing symptomatic plants from each crop at least twice a week and destroying them promptly. Placing infected plants in a cull pile near production areas simply promotes the continued spread of the disease in your crop.

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Table 1. Some bacterial diseases of ornamentals.

Plant	Disease
Basil	Leaf spot (*Pseudomonas cichorii*)
Bougainvillea	Leaf spot (*Pseudomonas andropogonis*)
Calla Lily	Soft rot (*Erwinia* spp.)
Chrysanthemum	Leaf spot and blight (*Pseudomonas=Ps.*)
Coreopsis	Pseudomonas leaf spot (*Ps. cichorii*)
Delphinium	Leaf spot (*Pseudomonas* and *Xanthomonas*)
Echinacea (cone flower)	Pseudomonas leaf spot (*Pseudomonas*)
Geranium species	Pseudomonas leaf spot (*Ps. cichorii* and *Acidovorax*) Southern wilt (*Ralstonia*) Blight (*Xanthomonas campestris* pv. *pelargonii*)
Gerber daisy	Pseudomonas leaf spot (*Ps. cichorii*)
Hedera helix (English ivy)	Leaf spot (*Xanthomonas campestris* pv. *hederae*)
Hibiscus	Leaf spot (*Ps. cichorii, Ps. syringae* and *Xanthomonas campestris* pv. *malvacearum*)
Impatiens species	Pseudomonas leaf spot (*Ps. cichorii* and *Ps. syringae*)
Marigold (*Tagetes*)	Pseudomonas leaf spot (*Ps. syringae*)
Primula	Pseudomonas leaf spot (*Pseudomonas*)
Ranunculus	Leaf spot and Blight (*Xanthomonas campestris*)
Snapdragon	Pseudomonas leaf spot (*Pseudomonas*)
Stock (*Matthiola*)	Blight (*Xanthomonas campestris*)
Zinnia	Leaf spot (*Xanthomonas campestris* pv. *zinniae*)