



St. Augustine Orchid Society

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Orchid Disease Control

Part 2 - Bacterial and Fungal Infections

by Sue Bottom, sbottom15@hotmail.com

If you've grown orchids for a while, you have noticed different blemishes on them and wondered what causes the problems. Some genera of orchids just seem prone to certain diseases, like Thai crud on the leaves of vandas, and orchids seem to come under disease pressure during certain times of the year, like botrytis flower blighting during cool weather. You learn, sometimes by the School of Hard Knocks, how to recognize disease symptoms in the types of orchids you grow. Then you have to figure out how to eliminate the disease from your growing area and prevent it from recurring in the future.

Healthy Plants are More Resistant to Disease. With orchid diseases, your primary directive is to prevent disease from occurring. First and foremost, you strive to fine tune your culture to grow the healthiest orchids because vigorously growing plants are more capable of resisting disease via their natural defense mechanisms. Cultural controls go a long way in preventing conditions that favor disease: proper watering to minimize excess leaf wetness, buoyant air movement and adequate plant spacing to keep spores from settling on plant surfaces, well drained potting mixes that are refreshed if organic matter degrades and strict attention to sanitation. Cutting tools and pots should be sterilized between uses, benches and under bench spaces should be kept free of weeds and debris as well as disinfected regularly, decaying flowers and vegetation should be removed promptly to sealed containers and any severely diseased plant tissue should be cut from the plant to eliminate the pathogen from the growing area.

Disease vs. Cultural Problems. The first step in diagnosing a problem is determining whether the problem is cultural in origin or the result of a disease pathogen. There are many physiological problems that new growers chalk up to disease that are in fact the result of some environmental factor, perhaps water is pooling in the crown of a phalaenopsis causing crown rot, or water pockets in the cataphyll around a new cattleya pseudobulb causing localized rot, or the changing sun angle causes rapid cell collapse from sunburn. During the course of your orchid growing career, you will damage or lose plants as a result of improper watering or other cultural errors. It happens to all orchid growers with all levels of experience. Take solace in the fact that the experience will help you recognize the signs of this or that environmental misadventure, so you can adjust your cultural practice and become a better grower as a result.

Responding to Disease Symptoms. To control diseases with fungicides, applications must be made before the fungus enters plant tissue. This is very different from the way you respond to pests in your growing area, where you treat with pesticides to kill the interloper. Most fungicides prevent diseases rather than cure them. Once you notice the symptoms of disease in your growing area, the pathogen is inside the plant and beyond the reach of most chemicals. Your first response after noticing a disease symptom is to sanitize the plant, which means physical removing the infected tissue by using a sterile double edged razor blade or cutting tool. Chemicals can be applied after sanitizing to prevent the spread of disease to other parts of your plant or nearby plants. Keep notes to yourself when disease occurs in your growing area. It may help you anticipate time periods when your plants are subject to increased disease pressure and would benefit from a prophylactic bactericidal or



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fungicidal treatment. There are even computer models to forecast increased disease pressure and optimum fungicide application timing in some crops based on temperature and weather data. Check with your local university extension service, fawn.ifas.ufl.edu in Florida. Always read and follow the label instructions for any chemicals you may use and follow the personal protection guidelines contained therein.

Orchid Diseases. The diseases that befall orchids can be divided into five basic groups, bacterial diseases, bulb, root and stem fungal rots, rots caused by water molds, leaf spotting fungi and the flower blights.

Bacterial Infections. Bacterial infections move quickly, much more quickly than fungal infections. Bacteria can enter the plant through wounds or natural plant openings like stomata. They release enzymes that dissolve plant cells producing large populations quickly, which then can be exuded from rotting tissue and easily spread to adjacent plants. Bacterial infections often have a water soaked appearance and the infected area may be sunken or surrounded by yellow halo. Sanitizers like the household chemical hydrogen peroxide (and the more powerful specialty chemical ZeroTol), quaternary ammonium compounds like Physan 20 (and the more powerful specialty chemical Kleengrow) and the old standby for bacteria, copper fungicides like Kocide or liquid copper (and the more powerful specialty chemical Phyton 27 or 35), can be used as a precaution prior to infection or after sanitizing the leaf to prevent spread of the disease. Dendrobiums and some other genera are sensitive to copper, so a test for phytotoxicity prior to use is wise.

Common Bacterial Diseases in Orchids



1a. Bacterial Soft Rot caused by *Pectobacterium* (syn. *Erwinia*) *cartovora* or *chrysanthemi* on an oncidium



1b. Brown Rot caused by *Pectobacterium* (syn. *Erwinia*) *cyripedii* on a paphiopedilum



1c. Bacterial Brown Spot caused by *Acidovorax* (syn. *Pseudomonas*) *cattleya* on a nodosa hybrid

Bacterial infections are highly contagious, spread easily by plant exudations and splashing water. The pathogens favor warm and wet conditions. If found, quickly remove any diseased tissue and treat with an appropriate chemical to prevent spread of the disease. Keep a spray bottle of hydrogen peroxide handy in your growing area as a topical disinfectant. During hot, humid weather, consider preventative sprays, reducing leaf wetness and increasing air movement to prevent occurrence.



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Fungal Bulb, Root and Stem Rots. Bulb, root and stem rots arise from several soil borne fungal pathogens that cause rots. Fungal infections move much more slowly than bacterial infections but they will ultimately kill the plant if unchecked. *Fusarium* enters the water conducting vascular system and the spores germinate and carry the fungus through the xylem ultimately plugging it. *Rhizoctonia* hyphae enter the roots and the fungus progresses through the rhizome and lower part of the pseudobulb, and can cause damping off, root and stem rots and foliar blights. *Sclerotium* hyphae enter the stem near the medium surface and spread down to the roots and up to the leaves, ultimately producing overwintering bodies called sclerotia that propagate the fungus. These diseases are best controlled by a preventative drench program because they are very difficult to treat even with the pricey specialty fungicides. The infected tissue must be removed and the plant treated with one of the progressively more expensive chemical drenches like Daconil (chlorothalonil), Pageant (pyraclostrobin and boscalid), Heritage (azoxystrobinor), Empress (Pyraclostrobin) and Medallion (Fludioxonil).

Fungal Root, Stem and Bulb Rots in Orchids



2a. *Fusarium* Wilt caused by *Fusarium oxysporum* in a cattleya. *Fusarium* is spread largely by the use of unsterilized cutting tools and pots.



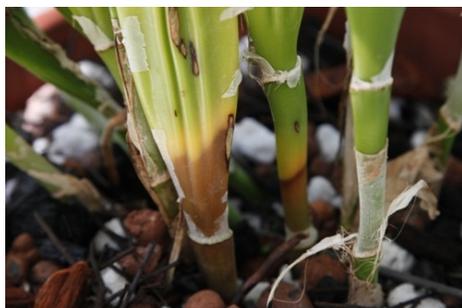
2b. Root Rot caused by *Rhizoctonia solani* in a cattleya. Populations of this fungus can reach high levels in degraded potting mix.



2c. Southern Blight aka Collar Rot caused by *Sclerotium rolfsii* in a phalaenopsis. If the infection reaches the crown of the plant, it will die.

Fungal rots can be slow growing diseases that infect roots, stems and bulbs on orchids, ultimately killing them. After sanitizing the plant by cutting away infected tissue, help prevent spread of the disease by applying drench applications of the relatively affordable Daconil or one of the more specialized and expensive chemicals labeled for these diseases, including Heritage and Pageant.

Water Molds in Orchids



3. Black Rot caused by *Pythium ultimum* and *Phytophthora cactorum* on a cattleya. This fast moving disease requires immediate intervention or the whole plant can be lost. Avoid repotting and excessive wetness during the hot humid weather in which these pathogens proliferate.

Water Molds. There is a very fast moving rot caused by water molds (fungal-like parasites called oomycetes) that results in pseudobulb rots and damping off of seedlings. This group of pathogens causes sudden oak death, downy mildew and the disease that caused the 19th century great potato famine. This



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organism requires water to proliferate and is more prevalent in the South during the hot humid summer months. Precautionary sprays prior to hot, wet weather together with steps during the danger period like avoiding repotting so as not to have pathogen entry points via open wounds and allowing plants to dry thoroughly before rewatering help. If you find Black Rot, act quickly to cut away infected tissue and then treat with hydrogen peroxide or better yet one of the specialty expensive chemicals like Subdue (metalaxyl), Aliette (fosetyl aluminum), Truban (etrizazole) or the dual action Banrot that contains etridazole. Biologicals like RootShield from BioWorks may also be useful for some types of orchids, but must be applied as drenches early in the growing process in an effort to prevent infection, not after the pathogen has attacked the plants.

Leaf Spotting Fungi. The leaf and flower fungal blights are unsightly perhaps, but not life threatening to your plants like many other diseases. There are quite a few leaf spotting fungi and it is less important to be able to identify the name of each fungus than it is to recognize that it is a fungal infection, because the chemicals used to prevent the spread of the different leaf spotting fungi are the same. Precautionary sprays with one of the quaternary ammonium compounds like Physan 20 (and the specialty and more expensive KleenGrow), copper fungicides or thiophanate methyl fungicides can be used, or the chemicals can be sprayed after an infection is noticed to prevent it from spreading further, although the leaves will remain blighted. The fungi propagate from spores and fruiting bodies in the infected part of the leaf, so sanitizing the plant by removing the sporing bodies is an important part of controlling the disease. Sometimes the cure is as bad as the infection though, there is a tradeoff between removing the spores by cutting away infected tissue and creating an open wound on the leaf which is an avenue for additional infection.

Anthracnose and Leaf Spotting Fungi in Orchids



4a. Leaf spotting caused by *Cercospora* species on a cattleya. The leaf spot continues to enlarge and can kill the entire leaf.



4b. "Thai Crud" caused by *Guignardia* on a vanda. Spores are present on the raised diamond shaped lesions that feel like sandpaper. These spores spread the disease.



4c. Leaf dieback or Anthracnose, by *Gleosporium* and *Colletotrichum* species in an stanhopea. Fruiting bodies develop on dead leaf portions leaves spreading the disease.

Leaf spotting fungi penetrate plant openings particularly during periods of warm temperature and leaf wetness. The fungi produce toxins that kill the host cell and the lesion is sometimes surrounded by a yellow halo. The disease is spread from spores on the discolored part of the leaf. Treat affected leaves with copper, quaternary ammonium compounds or other specialty chemicals like thiophanate methyl. If the infection is serious or continues to enlarge, remove the infected leaf to an inch below any discoloration.



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Flower Blight - Botrytis



5. Flower blighting caused by *Botrytis cinerea* on phalaenopsis occurs during cool moist periods.

Flower Blight. The fungus *Botrytis*, also called Gray Mold, can quickly ruin the flowers you have been waiting for all year. The fungus requires cool moist conditions to proliferate, spreading spores quickly to other flowers via air movement or water, and overwinters in decaying vegetative material. Remove infected tissue including afflicted flowers, lessen humidity and increase air movement. Flowers can be sprayed once or twice a week as a precaution with Daconil (chlorothalonil) or some of the pricier fungicides. Plant surfaces and bench surfaces, but not flowers, can be sprayed with Kocide (copper) or quaternary ammonium compounds like Physan. Pool algacide contains similar compounds although it is not labeled for use on plants.

Observe your plants each time you water. If you have a plant exhibiting the symptoms of disease, remove the severely infected tissue and treat the remainder of the plant and any close by plants with an appropriate fungicide. Spend some time considering what environmental conditions might have contributed to the growth of the disease and what precautionary actions might have prevented the disease from gaining a stronghold in your growing area. A healthy, vigorously growing plant is your best defense against orchid diseases.

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