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Leaf Spotting Fungi in Cattleyas
Part 1- The New Anthracnose

by Sue Bottom, sbottom15@gmail.com

"There are more things in heaven and earth, Horatio, than are dreamt of in your philosophy." - *Hamlet* (1.5.167-8), Hamlet to Horatio

1. Fungus often grow undetected until the fruiting body emerges.

Fungi are a very odd life form. Scientists used to believe there were two kingdoms of living things and fungi belonged in the Plant Kingdom. However, fungi do not contain chlorophyll like plants, they have chitin cell walls like animals and are so fundamentally different from other living things that they are now grouped into their own Fungi Kingdom that includes yeasts, rusts, smuts, mildews, molds and mushrooms. The mycelium, the body of a fungus, is composed of a web of tiny filaments called hyphae. The fungi grow from the tips of hyphae and digest organic matter externally before absorbing it into their mycelia. These fungal webs often live unseen in their hosts until their fruiting bodies form.

Some of my cattleyas have an odd leaf spotting that was suspected to be fungal in origin, although the symptoms are a little different on each plant. None of the orchid pest and disease reference books contains a description that matches the symptoms my cattleyas exhibit. In days gone by, I sent plant leaf samples to different laboratories to try to identify pathogens, with no success. Then one day, thanks to the reach of the internet, I noticed that Dr. Robert A. Cating had joined the Oregon State University Agricultural Experiment Station working with plant pathology diagnoses. I knew Robert while he was obtaining his doctorate from the University of Florida, having read his excellent articles on orchid diseases and heard his orchid CSI talk. We reconnected and he volunteered to assist in the diagnosis.

The leaf samples shown in these pictures were sent to him for identification. His initial assessment based on visual inspection was the leaf spotting was likely caused by *Pseudocercospora odontoglossi.* His efforts to culture the fungus were unsuccessful so he resorted to sequencing the fungal DNA in order to identify the pathogens. His results indicate a leaf spotting fungi not previously known to affect orchids was present.

2. Anthracnose with its typical alternating bands of dead tissue.

Anthracnose. Anthracnose is a name given to fungal infections caused by *Colletotrichum* and *Glomerella* species. Many fungi reproduce both sexually and asexually, and each stage produces different fruiting bodies and spores. Typically the asexual stage is more important in the spread of the disease. The pathogen usually associated with Anthracnose is *Colletotrichum gloeosporioides* (asexual stage). The sexual stage is known as *Glomerella cingulata*. We often recognize Anthracnose caused by this pathogen by the alternating lines of dead tissue with little tan dots that extend down

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from the leaf tip. Simone and Burnett describe Anthracnose from *Colletotrichum gloeosporioides* as follows:

> *The first symptom is a brown discoloration on leaves and pseudobulbs which is round or irregular in shape, more or less sunken, yellow to light green and rather sharply defined. As the disease progresses, fruiting bodies develop in large numbers in the dead areas. When this happens there is a distinct line of demarcation between the diseased and healthy tissue."*

Cating used molecular testing (DNA) to identify the leaf spotting fungus *Colletotrichum theobromicola,* not before reported as an orchid pathogen. This pathogen causes a chlorotic mottling on the upper surface of the leaf, with corresponding patches of fine tiny spots occurring on the leaf underside. There is an occasional sunken or necrotic spot. The upper surface chlorotic leaf mottling with patches of fine spots underneath is the key diagnostic for this pathogen.

Colletotrichum theobromicola causing Anthracnose leaf spotting

Entire Plant	Leaf Upper Surface	Leaf Under Surface
		
3a. C. Pittiae, moderate vigor.	3b. Chlorotic mottling, sometimes with a fine dotting pattern.	3c. Irregular blotches of fine brown dots; the densest blotches occur under the upper surface chlorosis.
		
4a. C. Astraea 'Ginny', a vigorous grower.	4b. Chlorotic mottling where the chlorosis aligns with most serious under leaf spotting.	4c. Brown blotchy splotches where fine dark spots coalesce, occasional sunken spots.

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Entire Plant	Leaf Upper Surface	Leaf Under Surface
		
5a. Lc. Issy x C. Mrs. Mahler, a vigorous grower.	5b. Chlorotic mottling, some areas turning necrotic.	5c. Patches of fine spotting matching the upper chlorotic mottling.
		
6a. Lc. Allen Condo 'Joe's Beauty', a vigorous grower	6b. Chlorotic mottling, no necrosis	6c. Patches of fine spotting corresponding to chlorotic patches
		
7a. Blc. Lawless Walküre, a vigorous grower.	7b. Chlorotic mottling, some circular purple markings	7c. Patches of fine spotting covering same areas as upper chlorosis
		
8a. C. Heathii x Lc. Diana Rehfield, soon after repotting.	8b. Chlorotic mottling with an occasional necrotic spot.	8c. Patches of fine spotting, not present on all chlorotic leaves.

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For control of Colletotrichum, Chase (2011) recommends the relatively affordable fungicides Daconil Ultrex (chlorothalonil), Pageant (pyraclostrobin and boscalid) and Spectro 90WDG (chlorothalonil and thiophanate methyl). In addition, mancozeb (i.e., Dithane and Pentathlon) or copper (Phyton 27) are very effective when used preventively, but of course you do not want to apply copper to dendrobiums or plants in bloom.

The problem with relying on fungicides is the fungal hyphae in the leaf are beyond their reach, so the spores spreading the disease will continue to form. While fungicides will help prevent the spores from spreading onto uninfected leaves, cutting away diseased tissue is the best way to prevent the spores from forming in the first place.

Acknowledgements: Many thanks to Dr. Robert Cating, who identified the new Colletotrichum fungus in the samples he analyzed. As always, thanks to Dr. Courtney Hackney for his technical review and suggestions for improvement.

Citations and Additional Reading:

Chase, A. R. 2011. Colletotrichum is a Common Disease. *Greenhouse Management*, October 14, 2011. Accessed online 9/19/2017; http://www.greenhousemag.com/article/gm1011-colletotrichum-common-plant-disease/

Leonhardt K, Sewake K, editors. 1999. Growing Dendrobium orchids in Hawaii: production and pest management guide. Honolulu (HI): University of Hawaii. p. 55.

McMillan Jr, R.T., 2011. Efficacy of Fungicides for Control of *Colletotrichum gloeosporioides* on Dendrobiums. In *Proc. Fla. State Hort. Soc* (Vol. 124, pp. 314-316).

Simone, Gary W. and Burnett, Harry C. 2002. Diseases Caused by Bacteria and Fungi, pp 50-70. In: *Orchid Pests and Diseases.* Rev. Ed., T.J. Watson editor, American Orchid Society, Delray Beach, Florida.