



Fusarium in Phalaenopsis

by Sue Bottom, sbottom15@hotmail.com

I wish I were at the point in my orchid growing career where I have learned all the hard lessons. Alas, apparently there are still more mistakes ahead of me. It all started in January when we got back from the Tamiami Show late and I went out to check the greenhouse, smelled gas and saw the furnace repeatedly try to start up and then poof a flame and shutdown. I went into the house and said "Houston, we have a problem" and of course Terry figured out a quick fix setting up propane and electric heaters for the rest of the night. But the damage had been done, the temperatures had dropped into the mid 40's which was not a happy event for the phalaenopsis. Soon afterward, I noticed sunken spotting on some of the phalaenopsis that I attributed to cold water damage caused by condensation. Prior to that, the phal leaves had been beautiful, better than they ever had been before. Oh well I thought, there is always next year.



1. These flowers were a lot prettier and would have lasted a lot longer if they could have been left on the plants for another two months. The flower spikes were cut so the plants could recover their strength rather than expending all that energy holding the flowers.

Not doing a thorough prewinter check on the furnace is not the only mistake I came to regret. As the weeks passed, the sunken cold water damage spots became larger areas of leaf discoloration and the problem spread to adjacent plants. When people came into the greenhouse and saw the phals, they kept asking why I had not separated those plants from the others to prevent spreading the problem. I would blithely say, oh that is just cold damage, I am waiting for the new leaves to grow out. Denial, that is the mistake you cannot afford to make. Perhaps it started with cold water damage, but a secondary disease invaded the damaged tissue and was causing much more severe damage that I refused to acknowledge.

The final straw was the discoloration on the flower spikes that lost their strength, bent easily and dropped their flowers. Searching around for information, the discussion and pictures of



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Fusarium stem and root rot on the German website <http://hark-orchideen.com> educated me on what fusarium looks like in phals, answering a lot of questions:

Biology. The main pest on Phalaenopsis and Paphiopedilum is Fusarium oxysporum Schlecht. The fungus forms its fungal spores on the usually whitish to pinkish spore hymenia (sporodochiae). They are either long and sickle-shaped and serve to survive (macro conidia), or they are small, globose to oval (micro conidia). The conidia spreads the infection in the stand and infests further host plants. Most parasitic Fusaria are vascular parasites, they obstruct the conducting tissue and cause wilt diseases. They are typical secondary parasites, the reasons for infestation can be too high a salt concentration, low ground temperatures, gnawing by organisms in the ground and inappropriate substrates that are too wet or contain too much peat. Fusaria and other fungi multiply particularly quick in sterile plant substrates with a high percentage of peat, because in those materials there are no other micro-organisms as natural antagonists.

Damage. Infections caused by Fusarium on Phalaenopsis and similar hybrids are characterised by small yellow-brown lesions on the roots. The coloured areas increase in size as patches of dry rot appear with its typical constrictions. At the neck of the root the tissue turns hard and black with dry rot. With increasing infestation the dry rot areas at the base of the leaves become larger and in high humidity pink hymenia form on the dry rot areas. The youngest leaves of Phalaenopsis become extremely reddish, there is chlorosis formation and finally the leaves fall off and the plant begins to die. Older leaves often become coriaceous (leathery) and dry out. In some varieties, Fusarium can also damage the flower stalk producing sunk-in, dry rotten spots, the blossoms fall off prematurely. In Paphiopedilum, infection often affects the root insertion places and the leaf basis. Watery rot appears, the individual leaves can then often be pulled out of the leaf sheath. The disease progresses relatively slow. A stand can be infested for several months without any plants dying. The healthy part of the plant often forms a lot of new roots. But usually marked growth depressions are a sure sign of a Fusarium infection.

Control. Fusarioses on roots are often detected too late, because the plants do not show that their roots are in a bad state in the early stages. They are typical secondary parasites. Plants with retarded growth due to too extensive fertilisation, exceedingly wet substrates or extremely low ground temperatures can easily be infested. Gnawing of the roots by ground organisms also offers favourable infestation conditions for that fungus.

- *Control should be prophylactic by improving the respective cultivation methods.*
- *Severely infested plants should be destroyed or at least planted elsewhere and all dead roots have to be removed carefully.*
- *Watering with fungicides like Carbendazim, Thiophanate-methyl and Prochloraz are not effective enough and can negatively influence the growth of the plants. In the case of Fusarium infestation at the base of the leaves, spraying with Cyprodinil + Fludioxonil (Switch) can be useful to stop it spreading in the stand and get the infestation under control.*



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From Cold Water Damage to an Out of Control Fusarium Infection



2. Maybe it started with cold water damage, but the sunken spots are starting to enlarge and merge.



3. When the problem could be ignored no longer, plants were gathered for repotting or memorial services.



4. Hard to believe this *Phal. schilleriana* had perfectly beautiful leaves two months earlier.



5. No sunken spots from the cold, but the fusarium must have spread to adjacent plants from splashing water.



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6a. and b. Top and bottom of a leaf showing the sunken depressions and enlarging chlorotic streaking.



7. Sunken spots coalesce and merge, and some leaf reddening occurs.



8. The tissue at the base of the plant turns black with dry rot and the roots in the mix are severely rotted.



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9. The flower stems have dry sunken spots that eventually lead to spike collapse or early flower drop.



10. The Fusarium moves up the flower spike from the stem of the plant and the roots rot below the stem.

The time for action was long overdue. Some plants had to be discarded, they were simply too far gone where the infection had clearly entered the growing heart of the plant. Others required radical surgery removing severely damaged tissue. The hardest part was removing all the flowers, knowing the plant would need all its energy to grow fresh new roots and could not afford to hold the flowers any longer.

The survivors were repotted. The more severely infected plants had the most root rot, damage that was not evident during the early part of the disease cycle. If the aerial part of the plant had less damage, the roots were likewise not as severely compromised. Regardless, the majority of the roots and basal stems were removed until the tissue was clearly healthy. The plants were dropped in pots about half filled with Styrofoam for extra aeration and then backfilled with ProMix HP/sponge rock potting mix and a top dressing of Purely Organic fertilizer and cypress mulch. Then for the chemicals, a protective Banrot drench was applied followed by a second drench with the biofungicide Cease to introduce some good microorganisms (*Bacillus subtilis*) to the root zone. Then the plants were sprayed with the easily available and very effective fungicide Daconil, while awaiting delivery of the



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specialty fungicide Switch recommended by Hark-Orchideen to spray the aerial parts of the plants. For drenches, Daconil, Heritage and Empress are highly rated in treating Fusarium.



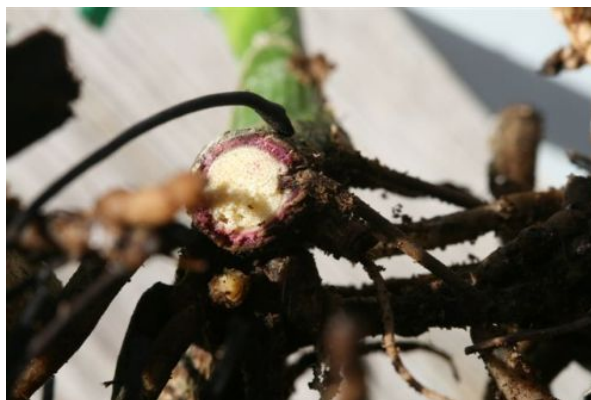
11. The plants do not look great, but maybe they will survive this cultural error and return to their former glory.

So what lessons do you take away from a experience like this? First, when your plants have been subjected to stress, they are more susceptible to disease pressure. If they get too cold, get sunburned, are subject to uncontrolled rainy weather, get mechanical damage, are repotted, etc., they have been stressed. Think about using a protective fungicide and/or bactericide effective for a variety of orchid diseases to handle their post-traumatic stress disorder. Second, once a month take a critical look at your plants. Assume your most respected orchid guru is coming over to walk through your growing area and look at your plants through his (or her) eyes rather than your own. If you see one you would be embarrassed for your guru to see, you are also seeing a plant that may not be around next year unless you take care of whatever problem is ailing it. You could probably take a third lesson away from this experience; have a backup plan in the event of equipment failure. My back up plan is Terry, who always seems to have the right tools and equipment on hand to respond to any mechanical problems that might occur.

Fusarium in Cattleyas Looks Very Different Than in Phalaenopsis



12. When the plant has been infected for many months, the leaves become leathery and wilted because the Fusarium blocks the vascular tissue.



13. When cutting through the rhizome, you may notice a bright reddish purple ring. Keep cutting with a sterile tool until there is no evidence of discoloration.



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Citations and Additional Reading:

Nennmann, Holger. LWK Nordrhein-Westfalen, Fusarium Stem and Root Rot

<http://hark-orchideen.com/CD/EN/Pflanzenschutz/uebersicht.html>, accessed February 24, 2016