Fungal Black Rot of Orchids

Most orchid growers will have witnessed the devastating effect of 'black rot'. Unfortunately, 'black rot' covers a multitude of infections, some caused by bacteria and some caused by fungi and their close relatives. Both types of infections can be similar in appearance and equally devastating in their effect. On this occasion I shall deal specifically with 'black rot' caused by the water moulds, *Phytophthora* and *Pythium*. These pathogens belong to a special group of fungi (the Oomycetes). Because they are different to other fungi, direct treatment to control the diseases they cause requires different fungicides to those used to control other fungal diseases. Both *Phytophthora* and *Pythium* are widespread and, given favourable conditions, can infect orchids of all ages and genera.

Disease Symptoms

Phytophthora can infect the roots, stems or leaves of the orchid plant. Infection produces dark brown to black lesions depending on the particular host. With Vandas, infection may start on new leaves as a soft, dark brown to black rot. The infection then spreads down the stem, which becomes dark brown in appearance. Conversely, infection may start at the base of the stem and work upwards. With Cattleyas, infection that starts in new growths turns them black and soft. Unless treated, the infection can spread along the rhizome to the next growth causing the same symptoms. Unless effective action is taken the disease will continue to spread rapidly throughout the entire plant, which is then impossible to save. Leaves may initially be infected on one side only but as the infection spreads the entire leaf is engulfed with a soft, black rot. Because of the way *Phytophthora* grows and reproduces, lesions are soft and uniform in appearance and without any clearly defined rings or lines of fruiting bodies. This differentiates infection with *Phytophthora* from infection by other fungi, such as *Glomerella,* that also cause a 'black rot'. However, it is almost impossible to distinguish infections caused by *Phytophthora* from those caused by *Pseudomonas* and *Erwinia*, bacteria that also cause diseases commonly called 'black rot'. Both types of organisms produce water-soaked lesions that do not show any fruiting bodies, both types of lesions spread rapidly, and both types of lesions can be similar in colour. About the only distinguishing feature is that the ooze produced in the bacterial lesions has quite an offensive smell.

Pythium is characterised by infection that occurs at or below the surface of the medium. Leaves are rarely infected. Infection that starts in the roots or rhizome progresses up the pseudobulb as a soft brown rot that has a clearly defined border. There are no obvious signs of fruiting bodies. These features differentiate infection with *Pythium* from those caused by other root-rot fungi. For example, infection with *Rhizoctonia* results in hard, dry, brown bases of the pseudobulbs. While it is less pathogenic than *Phytophthora, Pythium* can still have equally devastating effects. Newly de-flasked plants in particular can succumb to 'damping off', the result of infection with *Pythium* that causes a soft brown rot that girdles the entire stem adjacent to the medium. Adult plants growing in poorly drained or stale media are also susceptible to infection. Unless effective action is taken, the infection will continue to spread through the roots, along the rhizome and up into each pseudobulb. The infection almost always spreads from the base upwards.

Control

As is always the case, effective disease control depends on adopting practices that minimize the chances of introducing the disease to your collection and always following correct cultural practices. I shall not repeat these messages here. Rather, I shall deal briefly with the situation where disease becomes established.

The motile zoospores of both fungi are readily spread by water splash. Hosing an infected plant can therefore spread the disease to adjacent plants. It is therefore particularly important to remove any infected plants from the general collection as soon as infection is noticed. This will help to minimize further spread of the disease. Ideally, infected plants should be treated and fully restored to health before they are returned to the collection. All infected parts should be cut away and the plant and all cut surfaces treated with an effective fungicide. Realistically, by the time infection is noticed, spores will have already been spread to neighbouring plants. Treatment of these plants will generally be required to prevent further disease outbreaks. Fortunately, there are a number of effective fungicides that are available to hobby growers. Contact fungicides such as mancozeb are generally totally ineffective. However, the contact copper-based fungicides, such as copper oxychloride or Kocide Blue, kill the spores and do provide some protection against initial infection. Unfortunately, they have no curative action once the disease is established. To be fully effective, the copper-based fungicides must be used repeatedly and this may result in phytotoxic effects particularly in some of the Dendrobiums. Aliette has very effective systemic activity against *Phytophthora* but is less effective against *Pythium.* Ridomil is equally effective against *Phytophthora* but is more effective than Aliette against *Pythium.* Fongarid controls both fungi and has both protective and curative properties. All three of these fungicides have a systemic effect and may control both *Phytophthora* and *Pythium* for up to 6 weeks after treatment. Unfortunately, none of these fungicides will control diseases caused by other fungi. Thus, other fungicides are required to control leaf-spotting diseases or root rots caused by fungi such as *Fusarium* or *Rhizoctonia*. Phosphorous acid based fungicides such as Fosject, Agrifos or Phosacid, provide some measure of both protective and curative action against *Phytophthora*. There is some evidence that these fungicides may also stimulate the natural resistance of the plant. They have very low toxicity and can therefore be used as a prophylactic treatment. However, as is always the case, if you have to use any fungicides, read the label carefully and follow all directions.

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