

Evolution of the Organic World

Green = Biomolecules & Agents

Blue = the world of living



V = Viruses; B = Bacteria; F = Fungi

FUNGI

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Fungi are well evolved micro-organisms, members of the eukaryotic group that includes unicellular (yeasts and molds) as well as multicellular micro-organisms (fungi). The group is very diverse and of great economic importance. Fungi have their own kingdom.

The discipline devoted to the study of fungi is called “**mycology**” (**Mycologia = The Study of Fungi**); **myco** (from Greek μύκης =fungus); **logy** (from Greek Λογος = Talk, Study).

Fungi play an essential role in the decomposition of dead organic matter and the re-cycling and exchange of nutrients, and can be found everywhere, air, water, soil, land and on or in plants and animals. They can be tiny, micro-size or huge and extend for many Hectares. Most don't realize that Fungi are the largest living organisms on our planet and there are individual fungi plants known the size of Tasmania. Some 100,000 species have been identified studied and described. The real number of existing species can be as high as 5 million.

Many people argue that Fungi are plants and in the past the study of Fungi was regarded as a branch of botany. Those days, the reasons given were: Like plants, fungi are immobile and have similarities in general morphology and growth habitat. Fungi mostly grow in soil and some form conspicuous fruit bodies (mushrooms) which may resemble plants, such as mosses; however, **the differences between Fungi and Plants are substantial:**

- Fungi don't produce, have or need **chlorophyll**.
- Fungi are **heterotrophic**. Release digestive enzymes that decompose and turn things around them into food and then take their nourishment mostly through absorption.
- Fungi have an **undifferentiated** body. Fungi have no roots, stem and leaves.
- Unlike plants, the Fungi cell walls contain **chitin**.

Fungi have more in common and are more closely related to animals, than to plants.

Fungi and Orchids:

Most fungi have an excellent symbiotic relationship with other life forms, including orchids. The relationships can be described are “**Mutualistic**” or “**Antagonistic**”; however, some relationships show neither an advantage nor a disadvantage to the host.

Symptoms: Fungi markings can be black, brown, yellow or red, of varied shapes and sizes and are very similar to those of Viruses. There are three differences: Fungi grow near or above the surface or inside. The Fungi markings are asymmetrical, symmetry (lines, circles, etc.) always point to viruses. Fungi don't need Vectors. When the time comes the fruiting part will extrude and the “spores” will release on the surface (atmosphere), often living behind a hole.

Diseases: There are about 120 fungi known to attack orchids. Diseases caused by fungi are; Blight, Rust, Smut, Rot (Leaf, Stem, Crown, Pseudo blub), Anthracnose, Necrosis & Chlorosis.

Treatment: Fungal diseases, unless in a very advanced stage, can be easily controlled through the use of fungicides. Systemic fungicides are good to use. Old fashion, traditional fungicides do a very good job and are eco-friendly. It is wise to use a variety of fungicides, each with different active constituents. Overusing the same one may result in the creation of new, fungicide resistant, fungi strains.

Mycorrhizal fungi

The symbiosis between orchids and mycorrhizal fungi is known and very significant. Orchids produce tiny seeds with limited nutrient reserves. After the germination of the seeds, mycorrhizal fungi help the embryos, and later the adult plants, to increase their uptake of nutrients such as nitrates and phosphates from the soils especially from soils with low concentrations of the nutrients.

The mycorrhizal fungi may also invade roots, grow within cells and form protective “coils”. These coils have limited life. When dead, the coils degenerate and leave behind nutrients to be absorbed by the plant. Many orchids do not grow without the symbiotic fungi or mycorrhizae that inhabit their roots and supply them with the essential nutrients. Knowledgeable growers, recognize the importance of mycorrhizal fungi and the benefits they provide and assist them by supplying them with their favorite food, sugar. A spoon of sugar near the roots of terrestrial plants (**Never Honey**) helps the fungi to grow. (**HONEY IS A FUNGICIDE**)

Usefulness of Fungi in everyday life:

- Entomopathogenic fungi are used as biological pesticides to control weeds, plant diseases and insect pests.
- Fungi are used in the production of antibiotics such as penicillin, etc.
- Enzymes produced by Fungi are used in detergents and also have other Industrial uses. Mushrooms, truffles, morels are popular food as is bread. The bubbles in champagne and beer are also welcome.

POTASSIUM

A study, carried out by the International Potash Institute, reviewed more than 2000 studies, found that Potassium is a very important nutrient.

- **The beneficial effect of K was most obvious for fungal and bacterial diseases** where 70% and 69% of the studies reported a **decrease of disease incidence**.
- A **decrease of insects and mites** was reported in 63% of the studies.
- By contrast **viral infections were more frequent** in plants with high K status.
- **K application was found to be most beneficial for resistance against fungi** with 110 of 155 cases finding a **decrease in fungal disease with increasing K**.

K application tends to diminish the incidence of fungal and bacterial diseases as well as insect pests in crops; however, it is also clear that in many cases the opposite can be true when viruses are concerned.

The most common Orchid Fungi. Some species exist under two different Genera.

| Genus | Species | Symptoms |
|-----------------------|-------------------------|---|
| Aecidium | <i>graebnerianum</i> | |
| Alternaria | <i>spp</i> | Bloom shoot Necrosis; Blossom flecks |
| Bipolaris | <i>setariae</i> | Blossom flecks |
| | <i>sorokiniara</i> | Blossom flecks |
| Botryodiplodia | <i>oncidii</i> | Dieback |
| Botryotinia | <i>fuckeliana</i> | Grey mould; Floral spot; Floral & Petal blight; |
| Botrytis | <i>cinerea</i> | Soft rot |
| Capnodium | <i>citri</i> | Sooty mould |
| Cephaleuros | <i>virescens</i> | Algal spot |
| Cercospora | <i>angreci</i> | Leaf spot |
| | <i>cyripedii</i> | Leaf spot |
| | <i>dendrobii</i> | Leaf spot |
| | <i>epipactitis</i> | Leaf spot |
| | <i>odontoglossi</i> | Leaf spot |
| | <i>peristeriae</i> | Leaf spot |
| Chaetodiplodia | <i>spp</i> | Leaf spot |
| Colletotrichum | <i>bletae</i> | Anthracnose "Bletia" |
| | <i>coccodes</i> | Anthracnose |
| | <i>crassipes</i> | Anthracnose |
| | <i>dicheae</i> | Anthracnose |
| | <i>gloeosporioides</i> | Anthracnose |
| | <i>orchidearum</i> | Anthracnose |
| | <i>rosealum</i> | Anthracnose "Bletia" |
| Coniothyrium | <i>sp</i> | Leaf spot |
| Corynespora | <i>cassiicola</i> | Leaf Spot |
| Curvularia | <i>sp</i> | Leaf Necrosis |
| Diplodia | <i>bulbicola</i> | Leaf spot |
| | <i>Laelio-cattleyae</i> | Leaf spot; Stem decay; |
| | <i>paraphysaria</i> | Leaf spot |
| | <i>sobrali</i> | Leaf spot |

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|-----------------------|---------------------|---|
| Fusarium | <i>cattleyae</i> | Fussarium wilt. |
| | <i>moniliforme</i> | Soft rot. |
| | <i>oxysporum</i> | Root & bulb rot |
| Gloeodes | <i>pomigena</i> | Sooty blotch |
| Gloeosporium | <i>affine</i> | European anthracnose |
| | <i>cattleyae</i> | Anthracnose |
| | <i>epdidendrii</i> | Anthracnose |
| | <i>laeliae</i> | Anthracnose |
| | <i>oncidii</i> | Anthracnose |
| | <i>pallidum</i> | Anthracnose |
| | <i>stanhopeae</i> | Anthracnose |
| Gloesporioides | <i>sp</i> | Anthracnose |
| Glomerella | <i>cincta</i> | Leaf died-back (American Anthracnose) |
| | <i>cingulata</i> | Anthracnose |
| Guignardia | <i>spp</i> | Leaf spot |
| Hemileia | <i>oncidii</i> | Rust |
| Lasiodiplodia | <i>thebromae</i> | Leaf blight |
| Macrophoma | <i>cattleyicola</i> | Leaf blight |
| | <i>oncidii</i> | Rust |
| Nectria | <i>behnickiana</i> | Rust |
| | <i>bolbophyli</i> | Rust |
| | <i>bulbicola</i> | Dry rot |
| Phoma | <i>spp</i> | |
| Phyllosticta | <i>capitalensis</i> | Leaf spots & lesions; Chlorotic spots. |
| | <i>pyriformis</i> | Yellow leaf spot |
| Phyllostictina | <i>pyriformis</i> | Leaf spot |
| Physalospora | <i>cattleyae</i> | Leaf spot; Anthracnose |
| | <i>orchidearum</i> | Anthracnose |
| Phytophthora | <i>cactorum</i> | Black, Leaf, Crown, Stem, bulb & Root rot |
| | <i>cinnamoni</i> | Leaf, Stem, bulb & Root rot |
| | <i>nicotianae</i> | Leaf, Stem, bulb & Root rot |
| | <i>palmivora</i> | Root & Black rot |

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|-------------------------|------------------------|---|
| Pleospora | <i>orchidearum</i> | Fungal (Never seen; No pictures available) |
| Pseudocercospora | <i>spp</i> | |
| Puccinia | <i>cyripedii</i> | |
| Pythium | <i>splendens</i> | Leaf & Crown rot |
| | <i>ultimum</i> | Black, Leaf & Crown rot |
| Rhizoctonia | <i>solani</i> | Root & Stem rot |
| Schizothyrium | <i>perexiguum</i> | Flyspeck |
| | <i>pomi</i> | Flyspeck |
| Sclerotinia | <i>fuckeliana</i> | Petal blight |
| | <i>orchidearum</i> | Leaf, Basal & Stem rot |
| Sclerotium | <i>rolfsii</i> | Southern blight |
| Septoria | <i>selenophomoides</i> | Leaf spot; Stem decay |
| Sphenospora | <i>kevorkianii</i> | Rust |
| | <i>mera</i> | Rust |
| | <i>saphena</i> | Rust |
| Stibella | <i>bulbicola</i> | |
| Tubercularia | <i>cattleyicola</i> | |
| Uredo | <i>behnickiana</i> | Rust |
| | <i>epidendri</i> | Rust |
| | <i>quacae</i> | Rust |
| | <i>nigropuncta</i> | Rust |
| Volutella | <i>albido-pila</i> | Fungal stem decay |
| | <i>concentrica</i> | Leaf spot |
| | <i>pachusandra</i> | Volutella blight |
| Zynthia | <i>nepenthis</i> | |
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| | | Bulbs syn. Pseudo bulbs. |
| | | Anthracnose = Black coloured markings & stains |
| | | Flyspeck = Area with numerous tiny black spots. |