



EMSL Analytical Inc.
Department of Microbiology

Some Common Fungi and Yeasts

***Absidia* (Zygomycetes)**

A common contaminant isolated from soil, air, stored grains, foods, and the indoor environment. Reported to be allergenic and a rare cause of human infection called zygomycosis.

***Acremonium* (Hyphomycetes)**

Naturally found in soils, decaying organic matter, and plant debris. Can be found in food and the indoor environment. *Acremonium* is a common allergen, can produce a trichothecene mycotoxin, and volatile organic compounds (VOCs).

***Agrocybe* (Basidiomycetes)**

Medium to large mushrooms growing in grassy areas, on wood mulch, and pine needles. Some species are edible.

***Alternaria* (Hyphomycetes)**

A common saprobe found on decaying wood, decaying plants, food, soil, and outdoor air. Some species are plant pathogens. Indoors, it can be found in house dust, carpet, damp areas around showers and window frames, and anywhere condensation occurs. Because of its abundance and ubiquity, *Alternaria* is one of the most important fungal allergens and is recognized as the chief fungal cause of hay fever. Infection is extremely rare.

***Arthrimum* (Hyphomycetes)**

A cosmopolitan fungus isolated from plant debris and soil. Often isolated from air near grassy places, but rarely found indoors. Not reported to cause human or animal infection.

***Arnium* (Ascomycetes)**

Most commonly isolated from dung. Not generally associated with human disease and is most often considered benign.

Ascomycetes

Constitutes the largest class of fungi characterized by the production of sexual spores in structures called asci. This includes plant pathogens, saprobes, and decomposers. With a few exceptions, most Ascomycetes do not grow in buildings and are seldom agents of wood rot. Ascomycetes are the perfect stages of molds like *Aspergillus* and *Penicillium*. At high levels, Ascomycetes spores may cause allergies.

Since most Ascomycetes are plant pathogens, ascospores are common during the growing season of plants and rare during winter, such as those of the Ascomycetes genera: *Daldinia*, *Hypoxylon*, *Paraphaeosphaeria*, *Phaeosphaeria*, and *Leptosphaeria*.

Ascospores

Sexual spores produced by Ascomycetes.

***Aspergillus* (Hyphomycetes)**

Teleomorph: *Emericella* (Ascomycetes), *Eurotium* (Ascomycetes)
Found in soil, compost piles, decaying vegetation, stored grain, and other kinds of organic matter. Can be found indoors in water-damaged buildings. A few species can cause aspergillosis in humans with compromised or defective immune systems. Most people are naturally immune to this infection of the lung. *Aspergillus fumigatus* is the most common cause of aspergillosis, followed by *A. flavus* and *A. niger*. Some species are able to produce mycotoxins, depending on the strain, substrate, and/or food source. Others species are used in the manufacture of food, such as *A. oryzae* or *A. soyae* for soy sauce.

***Aureobasidium* (Hyphomycetes)**

A common saprobe frequently isolated from soil, plant surfaces, seeds, grains, fruits and other food, human skin, and nails. Common indoors in humid areas such as bathrooms, kitchens, poorly maintained HVAC systems, and window frames. Allergies to *Aureobasidium* are common but infections are rarely reported.

Basidiomycetes

A class of fungi characterized by spores formed on basidia. Includes the mushrooms, toadstools, boletes, wood bracket fungi, and puffballs. Some species are edible, such as *Agaricus bisporus*, the commercially cultivated mushroom. A few species cause wood brown rot, white rot, and dry rot in buildings.

Basidiospores

Sexual spores produced by Basidiomycetes.

***Beauveria* (Hyphomycetes)**

Found in plant debris and soil. Some species are well known parasites of insects. It is also isolated from food materials and indoor environments.

***Bipolaris* (Hyphomycetes)**

A common saprobe and plant pathogen frequently isolated from plant debris and soil. It is also a common cause of leaf spot on golf course turf. A few species are capable of causing disease in humans.

***Botrytis* (Hyphomycetes)**

Teleomorph: *Sclerotinia* (Ascomycetes)

Most species are important plant pathogens, such as *B. cinerea*, which can cause gray mold disease on various plant parts. Can be found in food and indoor environment, particularly on plants, fruits, and vegetables.

***Cercospora* (Hyphomycetes)**

Teleomorph: Mycosphaerellaceae

Widespread plant pathogens that cause leaf spot on many plants.

***Chaetomium* (Ascomycetes)**

A common fungus in soils, dung, decaying organic matter, seeds, and wood or other cellulose-containing materials. Can be found indoors in water-damaged buildings on sheet rock, wallpaper, and other paper products. It is a common cause of food spoilage. Some species are allergenic but rarely cause human infections.

Chromelosporium

Teleomorph: *Peziza* (Ascomycetes)

***Chrysonilia* (Hyphomycetes)**

Teleomorph: *Neurospora* (Ascomycetes)

This genus is widespread; being found in food and indoors. *Chrysonilia sitophila* is popularly referred to as the red bread mold that occurs on breads, baked goods, meat, and fruits.

***Chrysosporium* (Hyphomycetes)**

Teleomorph: Various Ascomycetes

A common soil saprobe occasionally isolated from human or animal skin and nail.

Chrysosporium inops is xerophilic and occurs in food.

***Cladosporium* (Hyphomycetes)**

Teleomorph: *Mycosphaerella* (Ascomycetes)

Widely distributed as plant pathogens and saprobes. It is the most frequently found fungus in outdoor air. Indoors, it usually occurs at low concentrations in damp or humid areas, but may be found in high concentrations in water-damaged building materials. Its ability to sporulate heavily and to get airborne makes it an important fungal allergen. Frequently isolated as a contaminant in foods. Only occasionally associated with disease in humans; one species can cause chronic subcutaneous infection.

Coelomycetes

An artificial class of fungi characterized by asexual spores that are produced within a cavity lined by fungal tissue or fungal and host tissues. Most are saprobes or pathogens on plants, fungi, and lichens.

***Coprinus* (Basidiomycetes)**

These mushrooms are popularly referred to as the inky caps because their gills dissolve into a black inky fluid at maturity. Found on wood, dung, humus, and soil. Some species are edible.

***Curvularia* (Hyphomycetes)**

Teleomorph: *Cochliobolus* (Ascomycetes)

A common saprobe found in soil, plants, cereals, and cellulosic materials such as paper and archives. Some species are plant pathogens but can also occur indoors. It is allergenic and may cause infections in immunocompromised people.

***Dicyma* (Hyphomycetes)**

Teleomorph: *Ascotricha* (Ascomycetes)

Doratomyces

A saprobe commonly found on decaying plant materials, straw, dung, wood, and in soil. It produces dark, sooty colonies. It has the ability to penetrate cellophane and to decompose cellulose. *Doratomyces stemonitis* is suspected to be the causal agent of "speck rot" on potatoes.

***Dreschlera* (Hyphomycetes)**

Mostly plant pathogens that cause leaf spot, seedling blight, leaf stripe, or net blotch.

***Emericella* (Ascomycetes)**

Anamorph: *Aspergillus* (Hyphomycetes)

Usually found in soil, potatoes, grain, citrus, and stored seeds. Can be found in food and the indoor environment. *Emericella nidulans* can produce a sterigmatocystin mycotoxin and can be pathogenic to man and animals.

***Epicoccum* (Hyphomycetes)**

A cosmopolitan saprobe isolated from air, soil, grain, seeds, textiles, paper products, and food materials. Can be a plant pathogen, and is a common cause of leaf spots of various plants. Can be found in indoor environments, where it can grow under conditions of low humidity. It is a known allergen, and is occasionally isolated from human skin and sputum.

***Eurotium* (Ascomycetes)**

Anamorph: *Aspergillus* (Hyphomycetes)

Can be found in stored food, fruit juices, grains, nuts, milled rice, spices, meat products, and peas. Also commonly occurs in indoor environments. *Eurotium herbariorum* may cause keratitis and indigestion in man.

***Exophiala* (Hyphomycetes)**

Widely distributed as a saprobe in soil, water, on plants and decaying wood. It is an occasional contaminant of feet and nails. *Exophiala* infections have also been reported in animals, including fish.

***Fusarium* (Hyphomycetes)**

Soil-borne fungi containing many plant pathogens that cause root rot, stem rot, fruit rot, and vascular wilt. Common on commodities, such as rice, bean, soybean, and other crops. Some species are important mycotoxin producers, and others notably *F. oxysporum*, *F. solani* and *F. moniliforme*, are recognized as opportunistic pathogens of man and animals. The species that can produce three of the five internationally regulated mycotoxins are:

<i>Fusarium</i> sp	Habitat	Trichothecenes	Zearalenone	Fumonisin
<i>F. acuminatum</i>	Food	Can produce	-	-
<i>F. crookwellense</i>	Food	Can produce	Can produce	-
<i>F. culmorum</i>	Food, Indoor	Can produce	Can produce	-
<i>F. equiseti</i>	Food	Can produce	Can produce	-
<i>F. graminearum</i>	Food	Can produce	Can produce	-
<i>F. poae</i>	Food	Can produce	-	-
<i>F. proliferatum</i>	Food	-	-	Can produce
<i>F. sambucinum</i>	Food	Can produce	-	-
<i>F. semitectum</i>	Food	-	Can produce	-
<i>F. sporotrichioides</i>	Food, Indoor	Can produce	-	-
<i>F. verticillioides</i>	Food	-	-	Can produce

***Ganoderma* (Basidiomycetes)**

Large, very hard, woody bracket fungi that grow on living and dead trees. Some species are common on oaks, chestnuts, and conifers such as hemlock, spruce, and pine. Many species are being investigated for possible medicinal uses.

***Geotrichum* (Ascomycetes Yeast)**

Teleomorph *Dipodascus*, *Galactomyces* (Ascomycetes)

Commonly found in soil, water, air, decaying leaves, rotting paper, and textiles. Involved in spoilage of food like bakery products, dairy products, juices, fruits, and vegetables. Can be found in indoor environments with some species producing strong odors.

Hyphomycetes

A group of fungi in which asexual spores called conidia are produced from special conidiogenous cells.

***Helvella* (Ascomycetes)**

A saddle-shaped fruiting body of a fungus found on soil, or sometimes on rotting wood. Occasionally found growing on soil under houses.

***Memnoniella* (Hyphomycetes)**

Mainly isolated from soils and dead plant material in tropical countries but has also been isolated from indoor sources such as paper, wallpaper, and textiles. Exposure to this genus should be avoided as they can produce griseofulvins, a potentially toxic metabolite. Emerging research has proposed that *Memnoniella* species actually belong to *Stachybotrys*.

***Monodictys* (Hyphomycetes)**

Found on dead wood, stem, tree bark, damp linoleum, and paper. Isolated from soil and air.

Myxomycetes

Popularly called slime molds. These are not true fungi taxonomically. Some species are found in the soil, in decaying wood, or other organic matter, where they produce structures full of powdery resting spores.

***Mucor* (Zygomycetes)**

Often found in soil, plants, hay, stored seeds, and manure. They can be found indoors in house dust, HVAC system dust, and poorly maintained carpets. They are rapid growers and can contaminate many kinds of stored food, including fruits and vegetables. A few species have been recovered from well-documented cases of zygomycosis. In general, infections due to members of this genus are rare.

***Nigrospora* (Hyphomycetes)**

Some species are common on plants, particularly in the tropics. Occasionally isolated from soil, air, and foodstuffs.

Paecilomyces (Hyphomycetes)

Teleomorph: *Byssochlamys* (Ascomycetes)

A common saprobe found on dead plants and compost. Some species are insect parasites while others cause food spoilage. It is rarely a human pathogen but can cause infection in animals. However, some species, such as *P. variotii*, *P. marquandii* and *P. lilacinus* are emerging as causative agents of disease in immunocompromised individuals.

Penicillium (Hyphomycetes)

Many species are common contaminants on a variety of substrates. May be found indoors in air samples, carpet dust, or on wallpaper. Some species are able to produce mycotoxins, as summarized below. Human pathogenic species are rare, only limited to *P. marneffeii*, which causes disease in immunocompromised individuals. Some species are used for commercial production, such as *P. chrysogenum* for the antibiotic penicillin, *P. griseofulvum* for the antibiotic griseofulvin, and *P. roquefortii* for blue cheese.

Penicillium	Habitat	Toxic Metabolite
<i>P. aurantiogriseum</i>	Food, Indoor	Can produce
<i>P. brevicompactum</i>	Food, Indoor	-
<i>P. chrysogenum</i>	Food, Indoor	-
<i>P. citrinum</i>	Food, (Indoor)	Can produce
<i>P. commune</i>	Food, Indoor	Can produce
<i>P. corylophilum</i>	Food, Indoor	-
<i>P. crustosum</i>	Food	Can produce
<i>P. digitatum</i>	Food	-
<i>P. expansum</i>	Food	Can produce
<i>P. funiculosum</i>	Food, Indoor	-
<i>P. griseofulvum</i>	Food	-
<i>P. olsonii</i>	Food, Indoor	-
<i>P. oxalicum</i>	Food	Can produce
<i>P. polonicum</i>	Food, Indoor	Can produce
<i>P. roqueforti</i>	Food	-
<i>P. rugulosum</i>	Food, Indoor	-
<i>P. variable</i>	Food, Indoor	-
<i>P. verrucosum</i>	Food	Can produce
<i>P. viridicatum</i>	Food	Can produce

***Peziza* (Ascomycetes)**

Anamorph: *Chromelosporium*

Popularly referred to as cup fungi. They vary in size and color, but are mostly shades of ocher or brown to gray-violet. Most species are commonly found on old straw, compost, peat, leaf litter, rotting wood, damp soil, and other moist substrates. Can be found indoors in wet basements and wet carpets.

***Phialophora* (Hyphomycetes)**

Teleomorph: Ascomycetes

Occurs in nature as a soft rot fungus on wood often causing a distinct blue stain. Can cause diseases in immunocompromised individuals.

***Phoma* (Coelomycete)**

Found in soil and plant materials as saprobes. Will grow on a variety of materials such as butter, paint, cement, and rubber. Occasionally pathogenic to plants and humans, but infection from this fungus is extremely rare.

***Pithomyces* (Hyphomycetes)**

This genus is common in soil and on dead or decaying plant materials. Requires high moisture level for spore germination. Can potentially produce cyclodepsipeptides, sporidesmolides, and sporidesmin.

***Rhinocladiella* (Hyphomycetes)**

Teleomorph: *Capronia* (Ascomycetes)

***Rhizopus* (Zygomycete)**

Frequently isolated from soil and agricultural products, such as cereals and vegetables. Can cause infection in immunocompromised, malnourished or severely burned people.

***Rhodotorula* (Yeast)**

A reddish yeast frequently isolated from air, soil, water, fruit juice, dairy products, and other substrates. Typically found as a saprobe in moist environments indoor such as carpeting, cooling coils, water tanks, humidifiers, and drain pans. Reported to be allergenic. Has been found to colonize terminally ill patients.

Rusts

Obligate parasitic fungi, which belong to Teliomycetes – Uredinales that cause plant diseases.

Scopulariopsis (Hyphomycetes)

Teleomorph: *Microascus* (Ascomycetes)

Mainly soil-borne, but also frequently isolated from wood, grain, fruit, paper, and food such as meat and dairy products. Also isolated from indoor environments. Most species can liberate arsenic gaseous compounds that can lead to arsenic poisoning. Has recently been associated with invasive human infections.

Scytalidium (Hyphomycetes)

Isolated from wood and soil.

Serpula (Basidiomycete)

Wood-attacking fungi. *Serpula lacrymans* is popularly referred to as the dry rot fungus or house fungus.

Smuts (Teliomycetes)

Obligate parasites and pathogens of plants that cause smut on various plant parts such as *Silene* anthers, corn kernels, onion bulbs, and rice grains.

Sordaria (Ascomycetes)

Common on dung. One species, *S. fimicola* is fairly common and is found on other substrates besides dung.

Sporobolomyces (Yeast)

Can be commonly detected in air samples. Frequently encountered indoors in water tanks, humidifiers, drain pans, etc.

Sporoschisma (Hyphomycetes)

Found on rotten wood and dead stems.

Sporothrix (Hyphomycetes)

Teleomorph: *Ophiostoma* (Ascomycetes)

Isolated from soil, live or dead plants, and peat moss. *S. schenckii* is an agent of human sporotrichosis, cutaneous infection, and ocular mycosis, usually in immunocompromised people.

Sporotrichum (Hyphomycetes)

Teleomorph: *Phanerochaete* (Basidiomycetes)

Can get airborne and be inhaled where it can form giant cells in the lungs.

***Stachybotrys* (Hyphomycetes)**

Occasionally isolated as a contaminant from grains, decaying plant materials, textiles, and tobacco. Grows indoors on water-damaged cellulose rich materials, such as sheet rock, paper, ceiling tiles, insulation backing, gypsum board, and wallpaper. The presence of this fungus can be significant due to its ability to produce mycotoxins under certain environmental conditions. Exposure to the toxins can occur through inhalation, ingestion, or skin exposure.

It is possible that *Stachybotrys* may play a role in the development of sick building syndrome, but probably only in conjunction with other factors. Until more information is available on the health risks of environmental exposure to *Stachybotrys*, caution should be taken when dealing with this fungus.

***Stemphylium* (Hyphomycetes)**

A common saprobe typically is found on dead plants and wood. It has been also isolated from air, paper, and cellulosic materials.

***Syncephalastrum* (Zygomycete)**

Often isolated from soil and dung in tropical and subtropical regions. Can also be a persistent laboratory contaminant.

***Taeniolella* (Hyphomycetes)**

Common on dead branches, wood, and senescent leaves. Was isolated from human cutaneous and subcutaneous lesions.

***Tetraploa* (Hyphomycetes)**

Teleomorph: *Massarina* (Ascomycetes)

Found on stems and leaf bases of many plants. *Tetraploa aristata* has been reported to cause keratitis.

***Thermomyces* (Hyphomycetes)**

A thermophilic fungus that grows rapidly at 40°C.

***Torula* (Hyphomycetes)**

Cosmopolitan fungi commonly found on wood, leaves, plant roots, and plant litter. Has also been isolated from air and soil. Some species cause stains in hardwoods.

***Trichoderma* (Hyphomycetes)**

Very common especially in soil and decaying wood, dead leaves, fallen timber, compost heaps, and activated sludge. Can be found indoors in water-damaged buildings. Has occasionally been associated with disease in immunocompromised individuals.

***Trichophyton* (Hyphomycetes)**

Some species are dermatophytes (growing on the skin) of humans or animals.

***Tritirachium* (Hyphomycetes)**

A saprobe commonly isolated from decaying plant materials. Easily gets airborne. Can cause corneal ulcers.

***Ulocladium* (Hyphomycetes)**

Found as a saprobe in soil, plant materials, rotten wood, paper, textiles and cellulose materials. Frequently collected in air and dust samples. Can grow indoors on water-damaged building materials. Has not been associated with disease in humans but can be very allergenic.

***Verticillium* (Hyphomycetes)**

Mostly soilborne, root-inhabiting fungi that cause vascular wilt and other diseases on plants. Some species also infect mushrooms, rusts, and other fungi, as well as nematodes, ticks, mites and other insects. Other species can attack wool and textiles, or can decompose paper.

***Wallemia* (Hyphomycetes)**

A very xerophilic fungus that has been isolated from soil, air, hay, textiles, and food such as jam, salted fish, and milk products. Can cause allergies.

Yeast

A growth form exhibited by some fungi in which the fungus exists as single budding cells.

Zygomycetes

A class of fungi where the asexual spores are mostly formed endogenously in sporangia. The majority of the species are saprobes.

Definitions

Allergen/allergenic

An allergen is an antigen, principally a protein, which can elicit symptoms of allergic disease in a previously sensitized individual. This antigen is specifically recognized by the individual's immune system, with subsequent development of specific antibody and/or cell mediated immunity. Fungi can elicit an allergic reaction ranging from mild to severe, anywhere from a stuffy nose, through hay fever and asthma to pneumonitis. In most cases, the physical condition of the host, the amount of allergen the host is exposed to (spores, fungal hyphae, dust, pollen, etc.) and the degree of sensitization of the individual determines the severity of the reaction. In general, common environmental or indoor air contaminating fungi most often affect humans as irritants that elicit an immune response that we generally associate with allergies (hypersensitivity).

Anamorph

The imperfect stage or asexual state of the fungus produced by mitosis.

Colony

An individual fungal growth on an agar culture plate or natural/manufactured substrate, when the fungus has grown sufficiently to be readily seen with a hand lens or low-power microscope.

Conidia (conidium, singular)

Asexual non-motile spores.

Conidiophore

The specialized hypha or cell on which conidia are produced.

Hyphae (singular hypha)

The individual filament or thread that make up a fungus.

Hyphal Fragment

A portion of the fungal mycelium that does not have any spores or other diagnostic fungal structures, and therefore, could not be identified.

Immunocompromised

Incapable of developing a normal immune response, usually as a result of disease (lupus, HIV), malnutrition, or immunosuppressive therapy (chemotherapy, corticosteroids).

Mycotoxin

Secondary metabolites produced by fungi, which are toxic to human and animals in small quantities. Production of a specific mycotoxin tends to be genus-, species-, or even strain-specific.

No Mold Detected

This result indicates that spores, hyphae, or any fungal structures were not observed from the sample.

Parasite

An organism that requires a living host to survive. It lives in or on the host and derives nutrients or other substances from the host. It is generally not able to live saprophytically, and it may often cause extensive damage to the host.

Pathogen

An organism that can cause a disease on another living organism.

Saprobe

A fungus that feeds by external digestion of dead organic matter, and usually has the ability to adapt rapidly on the substrate.

Spore

An individual reproductive body or propagule of fungi, similar to a seed of plant.

Spore-producing structures

Fungal parts involved in spore production such as hyphae, conidiophores, phialides, and fruiting bodies, among others.

Teleomorph

The perfect stage or sexual state of the fungus involved in producing meiotic or sexual spores.

Xerophilic

Able to grow under dry conditions.

References

De Hoog, G.S., Guarro, J., Gene, J, and Figueras, M.J. Atlas of Clinical Fungi. 2nd Edition. CBS, The Netherlands.