

Natural Habitats Soil • Decaying vegetation Suitable Substrates in the Indoor Environment

Often found in stored grains • Other foods

Water Activity Unknown

Mode of Dissemination Wind

Allergenic Potential Recognized as an allergen

Potential Opportunist or Pathogen In immunocompromised patients pulmonary invasions, the meninges (brain or spinal chord), and kidney infections can result from Absidia exposure • Absidia may also cause zygomycosis in immunocompromised patients (AIDS) **Industrial Uses** Unknown

Potential Toxins Produced Unknown

Other Comments Absidia often causes food spoilage







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Natural Habitats Soil • Plant debris • Indoor air environment **Suitable Substrates in the Indoor Environment:** • Grows on a wide range of substrates indoors • Prevalent in water damaged buildings

Water Activity Aw=0.75-0.82.

Mode of Dissemination Wind

Allergenic Potential Allergic bronchopulmonary aspergillosis (ABPA) which is common in asthmatic and cystic fibrosis patients • Aspergillus sinusitis • Invasive aspergillosis in immunocompromised patients

Potential Opportunist or Pathogen *Aspergilloma and chronic pulmonary aspergillosis in people with lung disease*

Industrial Uses *A.* oryzae is used in soy sauce production • *A.* terreus produces mevinolin which is able to reduce blood cholesterol • *A.* niger produces enzymes used to make some breads and beers and is also used in plastic decomposition. • *A.* niger and *A.* ochraceus are used in cortisone production.

Potential Toxins Produced Secalonic acid D • Aflatoxin B • Aflatoxin G • Aflatoxin M1 • Aflatrem (alkaloid) • Aflatrem (indole alkaloid) • Aspertoxin • Brevianamide A

- Chiedwindin, Chinnin Cyclopiazonic actu runnaginin runnigaciavine
- Ochratoxin & Ochratoxin C Penicilic acid Phinioic acid Patulin Springorung
 Sterigmatocystin Terrein Terreic acid Terretonin Territrem A Versicolorin A
 Verruculogen Viomellein

Other Comments It is the second most common opportunistic pathogen following Candida.









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Suitable Substrates in the Indoor Environment Paper • Sheetrock • Wallpaper Water Activity Aw>0.90 Mode of Dissemination Wind • Insects • Water splash Allergenic Potential Type I (asthma and hay fever) Potential Opportunist or Pathogen Onychomycosis Industrial Uses Cellulase production • Textile testing Potential Toxins Produced Chaetomin • Chaetoglobosins are produced by Chaetomium globosum • Sterigmatocystin

Natural Habitats *Dung* • *Seeds* • *Soil* • *Straw*



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Suitable Substrates in the Indoor Environment Foods (blue mold on cereals, fruits, vegetables, dried foods) • House dust • Fabrics • Leather • Wallpaper • Wallpaper glue Water Activity Aw=0.78-0.86

Mode of Dissemination *Wind* • *Insects*

Allergenic Potential Type I (hay fever, asthma) • Type III (hypersensitivity)

Potential Opportunist or Pathogen Penicilliosis

Industrial Uses *P. chrysogenum for the antibiotic penicillin* • *P. griseofulvum for the antibiotic* griseofulvin a • P. roquefortii for Roquefort cheese • P. camemberti for Camembert cheese • Brie, Gorgonzola, and Danish Blue cheese are also the products of Penicillium • Used to cure ham and salami • Production of organic acids such as fumaric, oxalic, gluconic, and gallic

Potential Toxins Produced Citrinin • Citreoviridin • Cyclopiazonic acid • Fumitremorgen B

- Grisiofulvin Janthitrems Mycophenolic acid Paxilline Penitrem A Penicillic acid
- Ochratoxins Roquefortine C Secalonic acid D Verruculogen Verrucosidin
- Viomellein
 Viridicatumtoxin
 Xanthomegnin

Other Comments Penicillium is one of the most common genera of fungi







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Suitable Substrates in the Indoor Environment Stored fruits and vegetables

Water Activity Aw=0.93

Mode of Dissemination Wind

Allergenic Potential *Type I* (hay fever, asthma) • *Type III* (hypersensitivity)

Potential Opportunist or Pathogen Causal agent of zygomycosis in immunocompromised, malnourished or severely burned people **Industrial Uses** Used to ferment rice into miso • Used to ferment sovbeans to tempeh and sufu

Potential Toxins Produced *Rhizopus oryzae produces agroclavine* (an ergot alkaloid toxic to mammals)









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Suitable Substrates in the Indoor Environment

Indoors near condensation (window frames, showers) • House dust (in carpets and air) • Also colonizes building supplies, computer disks, cosmetics, leather, optical instruments, paper, sewage, stone monuments, textiles, wood pulp, and jet fuel

Water Activity *Aw* = 0.85-0.88

Mode of Dissemination Wind

Allergenic Potential Type I allergies (hay fever, asthma) • Type III (hypersensitivity pneumonitis) Potential Opportunist or Pathogen Phaeohyphomycosis {causing cystic granulomas in the skin and subcutaneous tissue} • In immunocompetent patients, Alternaria colonizes the paranasal sinuses, leading to chronic hypertrophic sinusitis

Industrial Uses *Biocontrol of weed plants* • *Biocontrol of fungal plant pathogens*

Potential Toxins Produced Alternariol (AOH) • Alternariol monomethylether (AME) • Tenuazonic acid (TeA) • Altenuene (ALT) • Altertoxins (ATX)

Other Comments Alternaria spores are one of the most common and potent indoor and outdoor airborne allergens. Additionally, Alternaria sensitization has been determined to be one of the most important factors in the onset of childhood asthma. Synergy with Cladosporium or Ulocladium may increase the severity of symptoms

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Natural Habitats Decaying wood • Dead leaves • Soil

Suitable Substrates in the Indoor Environment *Paper* • *Textiles* • *Wood (wet)*

Mode of Dissemination *Insects* • *Water splash* • *Wind*

Allergenic Potential Type I allergies (hay fever, asthma) • Type III (hypersensitivity)

Potential Opportunist or Pathogen Has occasionally been associated with disease in immunocompromised individuals

Industrial Uses Biocontrol agent against a variety of plant pathogens • Biproducts of T. viride are used to make beer and wine

Potential Toxins Produced *Gliotoxin* • *Isocyanides* • *Trichothecene* • *Trichodermin* • *T-2 toxin*





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U o c l a d i u m





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Natural Habitats Soil • Plant materials • Soil, dung, paint, grasses, fibers, wood, decaying plant material, paper, and textiles

Suitable Substrates in the Indoor Environment Gypsum board

Water Activity Aw=0.89

Mode of Dissemination Wind

Allergenic Potential Type I (hay fever, asthma)

Potential Opportunist or Pathogen Unknown

Industrial Uses Unknown

Potential Toxins Produced Unknown

Other Comments Alternaria sensitive allergy sufferers have a



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- Natural Habitats Common on live or dead grass Seeds Soil Suitable Substrates in the Indoor Environment Unknown
- Water Activity Unknown
- Mode of Dissemination Forcibly ejected
- Allergenic Potential Type I allergies (hay fever, asthma)
- Potential Opportunist or Pathogen Keratitis Skin lesions
- Industrial Uses Unknown
- **Potential Toxins Produced** Unknown metabolite reported with some toxic properties









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Mode of Dissemination Wind

Allergenic Potential Type I (hay fever, asthma) • Type III (hypersensitivity)

Potential Opportunist or Pathogen *P. variotii causes paecilomycosis* (symptoms include keratitis, cellulitis, and alveolitis). • Corneal ulcers, keratitis, and endophthalmitis can occur after extended contact lense use or eye surgery due to Paecilomyces infection

Industrial Uses *Paecilomyces fumosoroseus is currently marketed as a biocontrol insecticide*

Potential Toxins Produced *Byssochlamic acid* • *Ferrirubin* • *Fusigen* • *Indole-3-acetic acid* • *Paecilotoxins* • *Patulin* • *Variotin* • *Viriditoxin*

Other Comments *P. crustaceus and P. variotii can grow well at temperatures as high as 50°C*

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Natural Habitats Soils • Plant leaf and stem tissue • Wood • Fresh Water • Plant Debris **Suitable Substrates in the Indoor Environment** Damp areas including kitchens, bathrooms, grout, and shower curtains • Painted interior surfaces and textiles • Skin and nails of people

Water Activity Grows well where moisture accumulates (88.5 RH on woodchip wallpaper) Mode of Dissemination Water droplets, rain • Wind when spores become dry Allergenic Potential Type I (asthma and hay fever) • Type III (hypersensitivity) • Skin irritant causing dermatitis

Potential Opportunist or Pathogen *Keratomycosis* • *Phaeohyphomycosis* • *Pulmonary mycosis with sepsis*

Industrial Uses *A. pullulans produces pullulan which is used for packaging food and drugs.* **Potential Toxins Produced** *Unknown*





Aureobasidium EMS

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Natural Habitats *Plant pathogen responsible for causing gray mold* (B. cinerea) on grapes, strawberries, *raspberries, blackberries*, *low bush blueberries, lettuce, cabbage, and onion*

Suitable Substrates in the Indoor Environment *Houseplants • Fruits • Vegetables*

Water Activity Unknown

Mode of Dissemination Wind

Allergenic Potential Type I (asthma and hay fever)

Potential Opportunist or Pathogen Hyalohyphomycosis

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Industrial Uses Biocontrol agent of insects

Potential Toxins Produced Unknown





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Natural Habitats Decaying plant materials • Soil

Suitable Substrates in the Indoor Environment

Water damaged building materials such as: ceiling tiles, gypsum board, insulation backing, sheet rock, and wall paper • Paper • Textiles

Water Activity Aw=0.94

Mode of Dissemination Insects • Water • Wind

Allergenic Potential Type I (hay fever, asthma)

Potential Opportunist or Pathogen Unknown

Industrial Uses Unknown

Potential Toxins Produced Cyclosporins • Macrocyclic trichothecenes: roridin E, satratoxin F, G & H, sporidesmin G, trichoverrol, verrucarin J • Stachybotryolactone

Other Comments Stachybotrys may play a role in the development of sick building syndrome. The presence of this fungus can be significant due to its ability to produce mycotoxins. Exposure to the toxins can occur through inhalation, ingestion, or skin exposure





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Natural Habitats Plant saprobe and pathogen to cereal plants • Soil

Suitable Substrates in the Indoor Environment *Paper* • *Wood products*

Water Activity Unknown

Mode of Dissemination Wind

Allergenic Potential Type I (asthma and hay fever) • A relatively common cause of allergic fungal sinusitis

Potential Opportunist or Pathogen In immunocompromised patients: Cerebral abscess • Endocarditis • Mycetoma • Ocular keratitis • onychomycosis • pneumonia • sinusitis

Industrial Uses Unknown

Potential Toxins Produced Cytochalasin B







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Natural Habitats Soil • Plant pathogen causing root rot, stem rot, and wilt of many ornamental and crop plants.

Suitable Substrates in the Indoor Environment Often found in humidifiers • Wet, cellulose-based building materials

Water Activity Aw=0.86-0.91

Mode of Dissemination Insects • Water droplets, rain • Wind when spores become dry **Allergenic Potential** Type I allergies (hay fever, asthma)

Potential Opportunist or Pathogen Esophageal cancer is believed to happen after consumption of F. moniliforme infected corn • Keratitis • Endophthalmitis • Onychomycosis • Cutaneous infections • Mycetoma • Sinusitis • Pulmonary infections • Endocarditis • Peritonitis • Central venous catheter infections • Septic arthritis • Neurological disease in horses after consumption of F. moniliforme infected corn • Respiratory disease in pigs after consumption of F. moniliforme infected corn

Industrial Uses Biological Weapon

Potential Toxins Produced Trichothecenes • Zearalenone • Fumonisins

Other Comments Major plant pathogen









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Natural Habitats Dung • Seeds • Soils • Woody plant tissue Suitable Substrates in the Indoor Environment Unknown Water Activity Unknown Mode of Dissemination Beetles when mitosporic state of Ophiostoma ulmi

Allergenic Potential Unknown

Potential Opportunist or Pathogen Unknown

Industrial Uses R135402, a compound with antifungal activity against Candida albicans and Cryptococcus neoformans, has been isolated from a fermentation broth of Graphium putredinis

Potential Toxins Produced Unknown

Other Comments There have not been any reports of human infections with Graphium species, however, it is a mitosporic state of Pseudoallescheria boydii which causes subcutaneous mycoses in man



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Natural Habitats Plant materials • Soil Suitable Substrates in the Indoor Environment Paper • Sheetrock • Wood Water Activity Suspected to be above 0.90 Aw Mode of Dissemination Wind Allergenic Potential Unknown Potential Opportunist or Pathogen Unknown Potential Toxins Produced Dechlorogriseofulvin Epidechlorogriseofulvin • Griseofulvins • Memnopeptide A Trichodermol • Trichodermin. Other Comments Griseofulvin used an anti-dermatophyte drug and is commercially available.

Image: Constraint of the state of







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Suitable Substrates in the Indoor Environment Dairy products • Fruit • Grain • Meat • Paper • Wood

Mode of Dissemination Wind

Allergenic Potential Type III (hypersensitivity)

Potential Opportunist or Pathogen *Onychomycosis in toe nails* • *Skin lesions* • Mycetoma • Keratitis • Endophthalmitis, invasive sinusitis, pulmonary infections, endocarditis, and brain abscess typically only afflict immunocompromised patients

Industrial Uses Unknown

Potential Toxins Produced *Scopulariopsis brevicaulis produces arsine gas from* arsenate dyes found in wallpaper covered with Paris Green





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