
MOLD BASICS

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Virginia Cooperative Extension has three Fact Sheets to help you deal with **mold** in your home:

- *Mold Basics:* What is mold? How does it grow? What are the health concerns?
- *Mold Prevention:* Can we prevent water problems in the home? How do we keep water problems from becoming mold problems?
- *Mold Remediation:* What do we do if we have mold in our homes?

Why is Mold an Issue Today?

We have always had mold – so why has it become such an issue today? Why do we read about mold in the media, or hear about mold litigation in the courts, or worry about mold affecting our health? There are many different reasons to consider.

- In recent years, changes in building practices have made our homes tighter and reduced natural ventilation in order to make the buildings more energy efficient. However, by limiting ventilation, some of these building practices have the potential to increase moisture problems. If we do not manage these problems, they can lead to moisture and mold problems.
- Many of the building materials that are common in today's homes – paper-faced gypsum drywall, carpet, manufactured wood products, to name a few – are susceptible to mold problems if they get damp or wet.
- Some experts suggest that our buildings have become more standardized and that we have gotten away from regional building styles and practices that were sensitive to local climate. Vernacular style houses, or houses built in the local style, often developed ways to deal with issues such as rain, humidity, or condensation that otherwise might lead to mold problems.
- We are more knowledgeable about the effects of mold on our buildings. We know, for instance, that delayed maintenance of water leaks can lead to mold and that mold can damage or destroy building materials.
- People spend much more time indoors than in the past. Many of us spend 90% or more of our time inside buildings. Therefore, we are more concerned about the conditions of these buildings, and may worry about the effect on our health.
- Medical knowledge about mold has increased in recent years. We know more about the effects of mold on our health, and know that mold could be a threat to anyone's health.

- People today are more aware that the building environment can become a health issue. We look to our living environment to be a healthy place, but also think that environment can be the cause of physical symptoms.
- We live in what can be a litigious society. When some people have problems, such as mold growing in the basement, they may look for someone to blame and seek legal solutions to their problems.
- In some cases, the media has sensationalized mold issues.

What Is Mold?

Mold is a *fungus*. A fungus is an organism that lives by decomposing and absorbing the organic matter on which it grows. Molds, mushrooms, yeasts, smuts, rusts, and mildew are all examples of fungi. There are thousands of varieties of molds.

The term *mildew* is sometimes used interchangeably with mold. Mildew is often used to describe a specific mold fungus that grows on plants and is characterized by a downy, whitish or silvery appearance. Mildew is also sometimes used to describe mold growing on textiles, leather, or building exteriors.



Mold is natural and it is everywhere. Tiny particles of molds exist in both the indoor and outdoor environment. Molds are *saprotropic*, meaning that they gather their food from dead, moist organic matter. Molds play a major role in the ecosystem as they digest organic matter, such as dead leaves, and prevent accumulation of nature's debris. It would be impossible to eliminate molds from our environment.

Molds grow or spread by extending *hyphae*, which are tiny root hairs or filament chains of cells. These hyphae extend and intertwine to form a mass, which is called the *mycelium*. The hyphae can grow through or into a material as well as on the surface, and often much of the mold growth is not visible on the surface of a material.

Molds reproduce by *spores*. The spores, which are microscopic cells, are released into the air. Acting much like seeds, the spores spread the mold colonies. Mold spores can remain dormant for long periods of time, until the right growing conditions are available. Fragments of broken hyphae can also be transplanted to start growing new mold colonies.

Some molds produce *mycotoxins*. A mycotoxin is a toxic substance or poison produced by a fungus. Molds that produce mycotoxins may only produce them under certain conditions, and some experts think the mycotoxins may be a defense mechanism. The mycotoxins are found in the spores.

Molds can produce *volatile organic chemicals* or VOCs. These VOCs are likely responsible for the musty odor associated with mold growth. Research is being conducted on the health effects of VOCs produced by molds.

How Does Mold Grow in Buildings?

Molds will grow if the environmental conditions are right. Molds need:

- Adequate moisture to germinate and then adequate moisture to maintain growth.
- A food source; dead organic material to digest.
- Appropriate temperature range.
- Oxygen.

In buildings, molds are most commonly found on or in cellulosic building materials, such as anything with paper, wood, or natural fiber textiles. The molds eat the sugar and starch from the cellulose. Molds can also grow on non-cellulose materials, such as plastic, metal, or concrete, provided there is a food source, such as a layer of organic dirt, sometimes called a *biofilm*, on the surface of the material. This layer of organic dirt can be things such as residue from skin cells, grease, oils, food waste, or insect droppings. However, molds grow best on damp or wet organic material which can be used for a food source and tend to hold moisture.

Molds require a high moisture level to germinate and begin growing. Most molds require a water content of the material of 70% to 90% to begin growing. Mold spores that have been dormant for years can begin growing if adequate humidity or moisture is provided. If the air is very humid, it can provide adequate moisture for mold to start growing. After the mold has begun growing, many varieties of mold can survive at lower moisture levels, as low as 60%.

The temperature at which molds will grow is somewhat dependent on the type of mold. However, most molds will grow at a temperature range of 40 to 100 degrees Fahrenheit.

Mold can grow very quickly. The spores of some varieties can begin to germinate in as little as 4 to 12 hours, if the environmental conditions are favorable. It can be assumed that when building materials get wet, mold growth is likely to start immediately. In wet porous materials, mold can become extensive within 24 to 48 hours.

What Are the Health Problems Caused by Molds?

There is new research being conducted on the health effects of mold exposure and we are



learning more about the health problems that are -- and are not — caused by molds. Some of the reports of health problems caused by molds are based on scientific research, and some are not, and thus there is often controversy. There are many factors that make it very difficult to study the health effects of mold.

- There are numerous varieties of molds and different types produce different chemicals or biological products that can affect people physically. For example, exposure to one type of mold may make your eyes water; where as another type of mold might not affect you.
- The *amount of exposure* or the *length of time* of exposure will influence the health effects. If you are in a room with a lot of mold, you may experience symptoms, but not if you are in a room with only a little mold.
- Different people have different *sensitivity* to molds. Those people who are most likely to be affected by molds are:
 - Infants and children, as their respiratory systems are less developed and their bodies are smaller.
 - Elderly people, as their bodies may not function as efficiently.
 - Individuals with respiratory conditions, allergies, or known sensitivity to pollutants.
 - Individuals with weakened immune systems, such as chemotherapy patients.
- Mold is a sensitizer. Once you have been exposed to mold, you are sensitized to future exposures. The next time, it may not take as much mold or as long an exposure to produce symptoms.
- It is difficult to measure the mold in an environment to determine the occupant's exposure. One method is to measure the number of mold spores in the air and determine the mold spores a person could be inhaling. However, a person could also be exposed to mold by touching it (through the skin) or ingesting mold colonies (through the stomach and intestines).
- Mold can produce health effects even when it is dead or dormant.
- Homes that tend to have mold problems typically also have dampness and/or water problems. Damp buildings tend to be associated with respiratory problems for the people who live in them. Therefore, the health effects of living in a home with water problems may involve more than just the health effects of living with mold.

Generally, the potential health effects from molds fall into three broad categories:

- *Irritants* -- Most commonly, exposure to mold can cause irritation to eyes, nose, and upper airways. Irritation of various parts of the body by molds can frequently lead to headaches.
- *Allergens* -- Some people are allergic to specific varieties of molds, including some of the molds commonly found in buildings. When exposed to these molds, most commonly by breathing in the mold spores, their bodies will have an allergic response, which can be from mild to severe.
- *Asthma* – The connection between mold and asthma is a concern. People who have asthma may be allergic to one or more molds, and exposure to this mold can trigger an asthma attack. Exposure to mold can aggravate asthma, even if the person does not have a specific mold allergy.

- *Diseases and infections* – Molds have the potential to cause various diseases or fungal infections in people, especially those with compromised immune systems or occupational exposure to mold. However, most of our knowledge of diseases caused by mold fungi comes from research where people have ingested the mold, such as on contaminated grains. Most people who are exposed to molds in buildings are exposed by inhaling mold spores. There is no scientific or medical consensus on whether inhaling even large numbers of mold spores could lead to mold-related diseases, especially in otherwise healthy people.

There is much yet to be learned about the health effects of our exposure to mold while inside buildings. Perhaps the medical evidence is not as frightening as some of the recent media headlines and court cases have suggested. On the other hand, we do know that mold is an irritant and a sensitizer. In large amounts or over an extended time period, it can produce negative physical symptoms. Many people are susceptible to health effects from mold. The prudent action is to protect all of us from unnecessary exposure to mold in our homes.

Who Is Responsible for Mold Damage in a Building?

Generally, the owner of a building is considered to be responsible for the building. However, many homeowners carry insurance to help protect their financial investment in their home and to share the liability in the event of damage to the home.

In recent years, mold has become a “hot button” in the insurance industry. If you have not recently reviewed your homeowner’s insurance, you may be surprised at how mold damage is treated. Many insurance companies now specifically exclude all claims that relate in any way to mold, mildew, or fungus. Some will pay some specified expenses for mold or fungus removal, with a pre-determined limit of liability or dollar amount, only if the claim is part of a claim for water damage.

In evaluating mold related claims, the insurance industry considers very carefully two factors:

- Mold grows quickly. As previously stated, wet building materials will likely get mold within 24-48 hours.
- If wet building materials, water leaks, water damage, or other moisture problems are left unattended or unreported for more than 24 to 48 hours, this could be interpreted as *neglect*. If neglect results in mold problems, the insurance company may challenge their responsibility for the claim for damages.

If you live in rental housing, your landlord may ask you to sign an addendum to your lease that addresses mold concerns. This may cover issues such as reporting water leaks immediately or using exhaust fans when showering. Also, review your renter’s insurance to determine what mold coverage you do or do not have for your personal belongings.

How Can I Learn More About Molds?

Virginia Cooperative Extension has two additional fact sheets on mold that you can read:

- MOLD PREVENTION
- MOLD REMEDIATION

You may also want to consult the following references (current as of 1/09):

- Environmental Protection Agency (EPA) at www.epa.gov/mold. In particular, consult:
 - *A Brief Guide on Mold, Moisture and Your Home*.
 For more detailed information, consult:
 - *Mold Remediation in Schools and Commercial Buildings*
 - *Mold Course: Introduction to Mold and Mold Remediation for Environmental and Public Health Professionals*.
- American Industrial Hygiene Association at www.aiha.org . Select the mold link for:
 - *The Facts about Mold* (consumer brochure)
- Federal Emergency Management Agency (FEMA) at www.fema.gov. This web site has fact sheets and case studies about mold clean-up and prevention after flooding, hurricanes and other weather disasters.
- Building Science Corporation at www.buildingscience.com/resources/mold. Search the data base for detailed information on moisture and mold control in buildings.
- New York City Department of Health and Mental Hygiene: Guidelines on Assessment and Remediation of Fungi in Indoor Environments at: <http://home2.nyc.gov/html/doh/downloads/pdf/epi/epi-mold-guidelines.pdf>. These guidelines are generally considered the standard for remediation and mold clean-up.

photo acknowledgements: <http://www.epa.gov/mold/moldcourse/imagegallery5.html>

Thanks to the following professionals for their review of the Mold Fact Sheets:

Linda Jackson Cole, Extension Agent, Family and Consumer Sciences, Chesterfield, VA
 Johanna Hahn, Extension Agent, Family and Consumer Sciences, Newport News, VA
 Joseph Ponessa, Extension Specialist in Housing and Energy, Rutgers Cooperative Extension (retired)
 Cristin Sprenger, Extension Agent, Family and Consumer Sciences, Verona, VA