

In This Issue...

A Mold and Mildew Primer

By Chuck Horst

Questions & Answers

What are mold and mildew?

Mold and mildew refer to the visual appearance of various fungi, typically pigmented fungal hyphae, on the surface of organic material such as textiles.

What is the difference between mildew and mold?

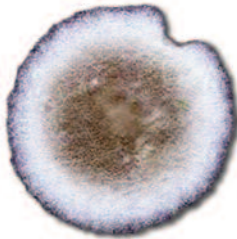
The term mold can be used interchangeably with mildew or can be used to describe the process of becoming mildewed.

What are Fungi?

Fungi are spore-bearing organisms that contain no chlorophyll. They obtain their nutrients from their surroundings and give off a musty odor.

What does mildew look like?

Mildew color ranges from black or gray to orange and red in addition to white. It can look like a white powder on the surface of a fabric. The appearance often takes on an irregularly shaped stain or small splatter-like spots. If permitted to grow it may produce a symmetric cross or star shape as it propagates along the fibers in both the warp and fill directions of the fabric.



How does it smell?

Mildew has a musty odor like a damp basement.

What causes mildew?

Mildew is a fungus that grows on moist textiles when left for a prolonged length of time in a damp, warm condition with little or no air circulation or sun light.

What promotes the growth of mildew?

Temperature, moisture, sunlight, ultraviolet rays, contamination and air circulation all affect microbial growth. The ideal conditions for mildew advancement are as follows: A temperature between 68° and 86°F, relative humidity being 70% or greater, textiles contaminated with unsanitary soils or water, a dark environment absent of sunlight with little or no air circulation.

What conditions restrain the growth of mildew?

Temperatures above 115°F will kill most mildew, but not all microorganisms. Since moisture is necessary for fungi to grow, a dry environment will prevent

mildew growth. Ultraviolet radiation associated with sunlight will also kill mildew.

Will freezing kill the mildew microorganisms?

Mildew fungi are not killed by freezing. They can survive long periods of storage at temperatures below 32°F.

What effect does mildew have on fabrics?

At first mildew grows on the surface of fabrics, staining or discoloring it. An unpleasant odor usually accompanies this growth. Eventually mildew may grow into the fiber and rot or degrade it.

Can anything else cause damage similar to mildew?

Bacteria can also cause fiber discoloration and fiber degradation when fabric is subjected to damp, warm conditions. Water-damaged textiles contaminated by bacteria will have a sour odor in the initial stage of damage. Later, such fabrics will develop a musty odor similar to mildew.

What are bacteria?

Bacteria are small, single cell, microscopic organisms. Under proper growth conditions, bacteria reproduce rapidly.

Are some fabrics more susceptible than others to mildew or bacteria growth?

The most susceptible fabrics are comprised of cellulose fibers such as cotton, linen, ramie, and rayon. Leather, suede and natural rubber are also excellent mediums for the growth of microorganisms. Mildew becomes ingrained in the pores of the leather where it can permanently stain the leather and affect the dyes. Such unconstrained mildew growth can cause thin areas and holes to appear.

Which fabrics are less susceptible to mildew?

Synthetic fabrics such as polyester, acetate, nylon and acrylic are generally resistant to mildew. But under the right conditions, they can also be subject to mildew growth and stains will result. Silk is highly resistant to mildew and will not be damaged except under extreme conditions. Mildew will not form in wool unless the fabric is stored under damp conditions and for an extended period of time.

Can the effects of mildew be reversed?

Depending on the length of time mildew has been allowed to grow and the damage it has caused, complete restoration of mildewed fabrics may not be possible. Even if the stains can be completely removed, the fabric may be weakened and could even fall apart during cleaning or use. Ozone treatment **before** cleaning is the only method to permanently remove the musty smell of mildew. This treatment chemically breaks down and eliminates all organic odors. Once the surface fungus is removed, always perform the ozone treatment before any attempt is made to remove the mildew and its stain.

How can mildew be removed?

Wear gloves when handling items contaminated with mildew or flood water. When handling extremely contaminated items you should not only wear gloves, but also goggles and an organic respirator in order to avoid absorbing fungal hyphae through the skin, mucous membranes or lungs.

Remediation Techniques

Mildew is insoluble and cannot always be removed from fabrics. In an attempt to remove mildew the following procedures may be of assistance:

- Brush off mildew outdoors so the spores do not scatter in the house contaminating other items.
- Sun and air dry fabrics thoroughly. The ultraviolet light of the sun kills the mildew fungi. Be careful not to cause sun fading of colored items. This is difficult to test in advance so the best advice is “do not overexpose!” If direct sun exposure is not feasible, drying in the shade with indirect sun exposure is beneficial.

Ozone

Ozoning is an effective method for destroying odor through oxidation.

- Ozoning stops the growth of microbial organisms.
- Items must be dry before ozoning as ozone reacts with moisture to produce hydrogen peroxide which may damage some colors.
- Ozoning can damage rubber and some dyes especially those used on acetate.

Wet Cleaning

If mildew stains remain or sun exposure was not possible, use wet cleaning procedures for launderable items.

- Wet cleaning is preferred over dry-cleaning to remove the discoloration associated with mildew damage.
- Pre-treat the spots by rubbing a neutral synthetic detergent into the affected area.
- Launder the garment in water as hot as is suitable for the fabric. Completely immerse the soiled article. Use 1/2 ounce neutral synthetic detergent per gallon of water.

- Follow with several clear water rinses.
- Extract the item before bleaching or drying. Use the appropriate bleach, after testing for its colorfastness.



Colorfastness

Colorfastness testing is accomplished by first clipping a small piece of the fabric from an unexposed seam. Apply the bleach that will be utilized to the clipping. Rinse then dry the clipping and compare the color of the clipping to the original garment. If there was no color change the garment is colorfast to the bleach that it was tested for.

Bleach

Chlorine bleach (Sodium hypochlorite) is the preferred bleaching agent if the item is colorfast to this aggressive bleach.

- Chlorine is the only bleach that can actually kill mildew and remove the staining.
- Chlorine can often be used on linen, cotton, ramie and most synthetic fibers.
- Never use chlorine bleach on silk, wool, nylon nor on colored fabrics.
- To make the bleaching bath mix 1 ounce of 5 percent chlorine bleach per gallon of water at 100°F. Immerse the garment for 10 to 30 minutes then soak for several minutes in an antichlor bath. The antichlor bath is formulated with 2 ounces of 28

percent acetic acid and 2 ounces of 1 percent sodium bisulfate in a gallon of water.

- When bleaching, be sure to rinse very thoroughly. Rinse at least 2 full rinse cycles or twice as thoroughly as you would expect required. Then air dry the garment.

Bleach Alternatives

Sodium Perborate

If chlorine bleach is not appropriate, use another agent like sodium perborate. Sodium perborate is safe to use on most silk, wool or nylon items. However, it may not be safe on white fabrics made of silk or wool as it may affect the optical brighteners used to make the fabric white.

Again, be sure to test for color fastness.

- To make the bleaching bath dissolve one tablespoon of sodium perborate powder in a gallon of water at 100°F.
- Immerse the item completely and soak for 8 to 14 hours stirring occasionally to keep the bleach dissolved.
- Rinse completely and neutralize in a bath containing 2 ounces of acetic acid in a gallon of water. Rinse again and air dry. Sodium perborate may not be strong enough to remove the mildew stain and will not kill the fungus.



Hydrogen Peroxide

For the few items that may not be colorfast to sodium perborate, hydrogen peroxide is safe on most fibers and colors. Hydrogen peroxide may be used on white silk and wool. Again, test for color fastness using only the 3 percent solution to test (or dilute a 30 percent solution by 10).

- To make the bleaching bath mix 10 ounces 3 percent (or 1 ounce of 30 percent) in one gallon of water at 100°F. Immerse completely and soak for 1/2 to 3 hours. Rinse thoroughly and air dry.

Hydrogen peroxide is not very strong and may not remove the mildew stain and will not kill the fungus

Other

For dyed fabrics that cannot withstand the use of oxidizing bleaches, wet-clean with a neutral synthetic detergent and ammonia. This will help remove the odor and stain but will not kill the mildew.

Flood Damage

Washables

To kill bacteria associated with flood damaged articles, wet-clean in water between 140° and 158°F with normal bleach concentrations. Tumble dry then expose to the sun if permissible.

Non-Washables

For non-washable items take them to the drycleaner. Drying at 158°F and stem finishing at 356°F under 80 PSI will kill the bacteria. However, dry cleaning may not remove water soluble impurities and items may require full restoration. A discussion on restoration is beyond our attempt here.

Seminars

...available on-site for this
and other topics.
Contact Chuck Horst at
(866) 454-2375

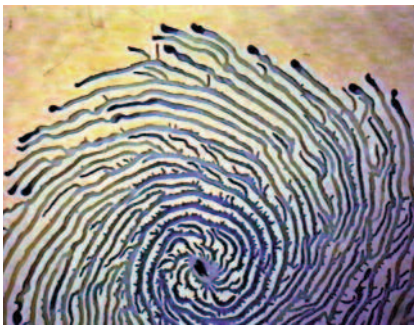
Painted Leather Items

For painted leather items try the following after testing in a discrete area. Wipe the surface clean with a damp cloth. Clean with a diluted alcohol (1 cup denatured or rubbing alcohol to 1 cup water). Dry in air with a fan. If the mildew remains, wash with saddle soap or soap with a fungicide. Again, testing in a discrete area.

How to Prevent Mold & Mildew

The key to preventing mildew is to avoid storing soiled articles in damp conditions.

- Keep closets, dressers, drawers, basements and anywhere mildew is likely to grow, as clean and dry as possible. Good air circulation helps prevent mildew.
- Keep the air as cool as possible. Cool air can hold less moisture than warm air and reduces the relative humidity. In addition to cooling the air, air conditioners remove excess moisture, drying the air.
- Dehumidifiers with condensing coils that collect moisture are often used in basements or large areas or for major humidity control situations. These types of dehumidifiers require draining or periodic emptying. Such dehumidifiers are available at department or hardware stores.



Dyed Leather Items

For dyed leather items we recommend taking them to a dry cleaner that specializes in leather cleaning. An ozone treatment will be beneficial for removing the odor associated with mildew.

- Smaller low wattage dehumidifiers are available for small contained areas, such as closets, which do not have a major humidity problem. These type of dehumidifiers do not require emptying. Margaret's has this type of dehumidifier for sale.
- A salt can type of dehumidifier is also available for small areas that do not have a serious humidity control problem. These require periodic emptying and are available at finer hardware and drug stores. A low wattage or "salt can" type of dehumidifier can assist only in minor humidity control situations.

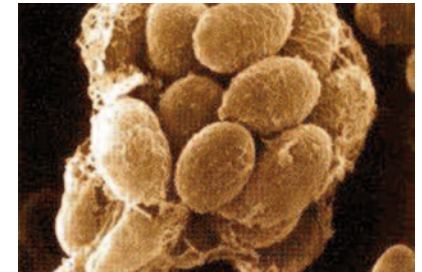
How to Reduce the Humidity of the House

- Maximize the amount of sun that strikes your roof. Keep the trees trimmed so that the sun strikes the roof for as long as possible each day.
- Check that sprinklers are not striking the side of the building.
- Keep shrubs trimmed at least 12" from the exterior wall to increase the air circulation on the wall.
- Assure any sub-ground exterior walls forming a livable area have a proper moisture barrier typically accomplished with a tar coating.

(continued on back)

Preventing Mold & Mildew (continued)

- Keep garments clean and dry as well. Soil on the surface of clothing may create an environment for mildew to start growing.
- Clean all soiled garments thoroughly before storing regardless of fabric type.
- Keep garments dry to prevent mildew growth. Do not let them sit around damp. If a garment becomes damp during wearing, dry the garment in the bedroom before placing away in a closet for storage.
- Also do not leave garments sitting damp in a washer for any length of time before beginning the drying process.
- During periods of high humidity, exposing garments to circulating air and sun (be cautious of sun fading) may help prevent mildew.
- It can also be helpful to open all closet doors when traveling.
- Do not overcrowd closets.
- Do not place shoes and handbags on the floor in a closet. Leather is often the first to begin mildew growth and then spread to other items in the closet.



About FashionableCare™

FashionableCare™ is a publication of Margaret's Cleaners. The purpose of this effort is to provide accurate and needed information to the public and retail garment industry regarding the proper care and use of high fashion garments.

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