

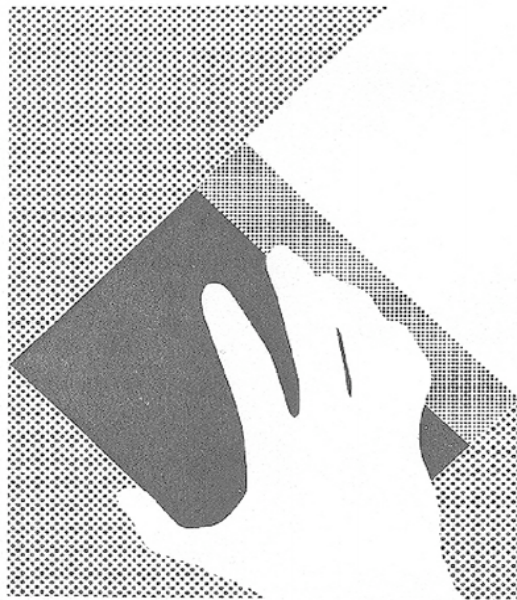
HOW TO PREVENT AND REMOVE MILDEW

WHAT IS MILDEW?

Mildew is a thin, usually black, sometimes white, growth produced on many surfaces by molds. Molds are simple plants belonging to the fungi group. Though molds are always present in the air, those that cause mildew need moisture and warm temperatures in order to grow. These molds grow on anything from which they can get food. In homes, mildew develops most often on natural fibers, leather, wood and paper.

Molds that cause mildew flourish wherever it is damp, warm, poorly lighted, and/or where air is not circulated—in cellars, crawlspaces of houses without basements and clothes closets; on draperies and rugs in basement rooms and on shower curtains. They commonly grow in humid summer weather, especially in houses that are closed. Molds are also likely to grow in new homes because of moisture in the building materials.

Mildew can cause considerable damage—decay, discoloration and rot—and leave musty odors.



HOW CAN MILDEW BE PREVENTED?

Moisture in the air is the major cause of mildew on interior surfaces. Removing moisture from the air will usually solve mildew problems. A relative humidity of 55% or less is necessary to avoid mold growth.

1 CONTROL CAUSES OF DAMPNESS

Aside from humid weather, the causes of dampness in homes are restricted ventilation in damp crawl spaces or basements, exterior walls which are not watertight, household activities which generate moisture and location of the house in a damp area.

Some moisture problems occur primarily in the summertime:

- Water coming in from the outside due to heavy rains. Reduce the seepage. Fill in soil next to the house so that the surface slopes away from the house for 10 to 12 feet. Be sure gutters and downspouts do not leak. If downspouts dump water on the ground, add enough pipe so that water is directed away from the house and does not drain back to the house foundation.

- Moisture condensation in the basement. To differentiate between moisture condensation on the walls and moisture seeping through the walls from outside, test a foundation wall below ground level. Fasten a piece of plastic, vinyl flooring or other floor tile 16 to 18 inches square to the wall with tape. After several muggy days, remove the patch. If moisture is found under the patch, water is seeping through the wall. If the patch area is dry, but the area around it is damp, the moisture is caused by condensation on the cool basement wall. Moisture-laden air can be removed from the basement by ventilation or drying the air.

2 DRY THE AIR

Moisture in the air is removed by air conditioners and dehumidifiers. Keep windows and doors closed when using these appliances. Remove condensed water from dehumidifiers on a regular basis to insure continuous operation.

In non-air conditioned homes or those having no air conditioning in the basement, a dehumidifier effectively removes moisture by drawing in damp air, then condensing the moisture on refrigerated coils. The water from the de-humidifier is drained off either to a pan which must be emptied regularly or with a garden hose which is connected to a cellar drain or to an outside drain.

Heating a non-air conditioned house during damp or rainy periods will effectively reduce the humidity. After heating the house, open doors and windows to let out warmed air that has taken up the extra moisture; an exhaust fan will force it out more quickly. However, the inside air should be replaced with outside air only when the latter is less humid than the inside air.

Drying the closets and other small areas can be accomplished by continuously running a 60 to 100 watt electric light in them. Keep the closet door shut to conserve the heated air. Be sure that the light bulb is a sufficient distance from clothing to avoid the danger of fire.

Silica gel, activated alumina, anhydrous calcium sulfate, and Molecular Sieves may be used to absorb moisture from the air. These chemicals may be found in some stores, at chemical or industrial suppliers or at building suppliers. Place open containers in closets or other small areas. These chemicals may be reused after drying in an oven at 300-350°F for several hours.

Another chemical which absorbs moisture from the air is anhydrous calcium chloride. This product cannot be reused. One pound will last two weeks to two months, depending on the humidity. Place calcium hydroxide in a non-rusting mesh container which is suspended over an enamel pan. Liquid drips from the calcium hydroxide into the container. When only liquid is left, discard the liquid and renew the calcium hydroxide.

3 PROVIDE ADEQUATE VENTILATION

Ventilation and circulation with outdoor air is a major moisture control strategy. Passive ventilation is important for crawlspaces and attics and other unconditioned spaces, and mechanical ventilation is needed in kitchens, baths and other areas of the home. In extremely tight homes mechanical whole-house ventilation with an air-to-air heat exchanger is advised.

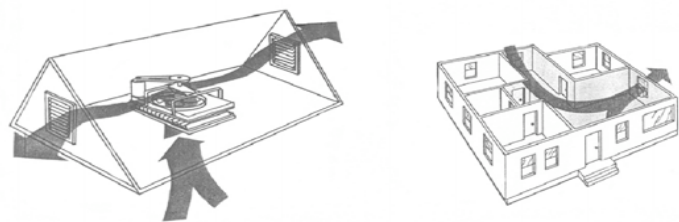
During warm, humid weather, ventilation with outdoor air can cause condensation in basements and crawlspaces. And, sometimes dehumidification is necessary, either mechanically or with chemicals.

Ventilate the house during warm sunny days when the outside air is drier than the air inside the house. Run an electric fan in places that are not exposed to outdoor breezes. The fan should be of adequate size and type to circulate the air. It may be placed in a window, set in a wall or ducted to a fan in the attic.

Remove the excessive moisture generated in the bathroom and kitchen by use of exhaust fans. Leave closet doors and dresser drawers open occasionally to keep moisture from gathering and to move the enclosed air. Use a small fan in a closet to circulate air. Hang clothes loosely so that air can circulate around them. Be sure that clothes are not damp from rain or perspiration when putting them away.

Install an exhaust fan in the attic. The fan does not dehumidify the air, but it does remove *moist air* from the attic, including moist air drawn into the attic from elsewhere in the house. Another method of removing air from the attic is the use of a roof ventilator.

For fans or ventilators to exhaust air from the house, they must either draw air from ducts that go through the house or draw air directly through the ceiling. The attic must have sufficient vents or louvers to permit air to get out of the attic and to prevent back drafts. Some attic fans are placed in the gable ends of the house where there are louvers to the outside.



DETERMINE VENTILATION NEEDS

The basic rule-of-thumb is that an unconditioned space shouldn't be underventilated: when in doubt, go to the next larger vent size. These spaces should be ventilated with passive vents that are located to promote good air circulation. The following recommendations reflect *minimum* vent requirements, given current practice.

Vent sizing depends on four factors: area to be vented, type of vent obstructions (screens or louvers), where the vents are placed and whether a vapor retarder is used.

1. Calculate area to be vented. Area equals length times width.
2. Multiply this number by either .0067 (no vapor retarder) or by .0034 (vapor retarder in place).
3. Note what type of obstruction is covering the vents and multiply by the appropriate number to obtain total gross vent area needed.
4. Determine where vents should be located.

SIZING VENTS WITH OBSTRUCTIONS

Type of Obstruction in Vents: Screens or Louvers	To Determine Total Gross Area of Vent, Multiply Area in Square Feet by:
1/4" mesh hardware cloth	1
1/8" mesh screen (8 mesh screen)	1 1/4
#16 mesh insect screen (with/without plain metal louvers)	2
Wood louvers and 1/4" mesh hardware cloth	2
Wood louvers and 1/8" mesh screen	2 1/4
Wood louvers and #16 mesh insect screen	3

FOR EXAMPLE: You have a 595 square foot attic to be ventilated and no vapor retarder is used. Multiply 595 times .0067 equals 3.99 square feet of vent needed. If a 1/8 inch mesh screen is used to cover the vent, multiply 3.99 by 1.25 equals 4.98. Rounded up to the nearest foot, 5 square feet of vent area would be the minimum needed in this case. Then, the vent area would be divided (depending on the design of the house and attic) between several vents located to promote good cross-ventilation and circulation.

4 INHIBIT MOLD GROWTH WITH CHEMICALS

Volatile chemicals will inhibit the growth of mold. Paradichlorobenzene may be used to protect fabrics during storage. Use about 1 pound of para-dichlorobenzene crystals per 100 cubic feet of airspace. Replace the crystals when they have vaporized. Para-dichlorobenzene damages some plastics. Use wooden or metal hangers and wrap crystals in tissue paper, if necessary.

Paints which contain a fungicide can be used on interior and exterior surfaces. The fungicide may be premixed in a primer or mixed directly into the finish paint or stain prior to application.

HOW CAN MUSTY ODORS BE ELIMINATED?

Musty odors, which indicate mold growth, are sometimes noticeable in basements and bathrooms. Usually musty odors disappear if the area is well heated and dried. If the odor remains, additional treatment may be necessary.

On cement floors and tiled walls and floors in bathrooms, get rid of mustiness by scrubbing with a dilute solution of chlorine bleach. Use one-half to 1 cup of household chlorine bleach to a gallon of water. Rinse with clear water and wipe dry. Keep windows open until walls and floors are thoroughly dry. Quaternary ammonium compounds, available in janitorial supply houses, may be used on floors and walls. Aerosol sprays for cleaning and sanitizing bathroom walls are also available.

Musty odors in washable, household fabrics can be eliminated by adding 1/2 cup household chlorine bleach to each load of white wash or 1/2 cup pine oil disinfectant to each load of colored wash.

HOW CAN MILDEW BE REMOVED FROM HOUSEHOLD ITEMS?

Walls and Floors—Scrub with a dilute solution of chlorine bleach. Use one-half to 1 cup of household chlorine bleach to a gallon of water. Rinse with clear water and wipe dry. Keep windows open until walls and floors are thoroughly dry.

Washable Fabrics—Wash article at once in detergent and water if brushing, airing and sunning do not remove mildew stain. Rinse well and dry in the sun. If any stain remains, bleach by using a mixture of lemon juice and salt, oxygen bleach and water, or chlorine bleach and water.

Mattresses, Upholstery, Rugs and Carpets—Brush and vacuum outdoors, if possible, to avoid spreading mildew spores. Dry article in the sun or with an electric heater or fan. If mildew remains, sponge item with thick detergent suds, wipe with damp cloth, dry. A dilute solution of cool water and chlorine bleach (1 teaspoon bleach to 1 quart water) may be used on white or colorfast fabrics. A solution of half denatured or rubbing alcohol and half water may be used on colored items.

Leather Goods—Wipe article with solution of half denatured or rubbing alcohol and water. Dry in an airy place. If mildew remains, wash with saddle soap or a soap containing a fungicide. Shoes contaminated with fungus growth may be fumigated by placing the leather goods in a container with crystals of paradichlorobenzene. Close the container tightly and allow the crystals to vaporize.

Wood—Use heat and ventilation to dry out wood which is mildewed. Then scrub wood with a solution of 4 to 6 tablespoons trisodium phosphate to a gallon of water; or a pine oil disinfectant. Rinse well with clear water and allow to dry.

Paper and Books—If paper is damp, dry it first in an airy place, if possible. Remove dry, loose mold with a clean, soft cloth. If necessary, wipe wallpaper with thick detergent suds or a solution of 1 teaspoon chlorine bleach to 1 quart water. Rinse with clear water. Books should be aired in sun, if possible. If book is very damp, sprinkle cornstarch or talcum powder between pages to absorb moisture. Brush off after several hours.

Prepared by Marilyn B. Lopes, Extension Educator.

Adapted from USDA Home and Garden Bulletin #68, *How To Prevent and Remove Mildew*. U.S. DOE Bulletin 15095-4, *Moisture and Home Energy Conservation*. Cornell Cooperative Extension, *How To Remove Mildew* by Constance C. Adams. Cornell Cooperative Extension, *How To Remove Mildew* by E.W. Foss.

Cape Cod Cooperative Extension
Deeds and Probate Building
PO Box 367

Barnstable, MA 02630-0367

508-375-6690

508-362-4518 fax

www.capecodextension.org

