

Asthma Triggers - Dust Mites

What Are Dust Mites?

Dust mites are tiny animals you cannot see. Every home has dust mites. They feed on skin flakes and are found in mattresses, pillows, carpets, upholstered furniture, bedcovers, clothes, stuffed toys, and fabric or other fabric-covered items. Body parts and feces of dust mites can trigger asthma in individuals with an allergic reaction to dust mites. Exposure to dust mite allergen can cause asthma in susceptible children.

Actions You Can Take

- Wash bedding (such as sheets, bedcovers, and blankets) once a week in hot water.
- Choose washable stuffed toys, wash them often in hot water, and dry thoroughly. Keep stuffed toys off beds.
- Cover mattresses and pillows in dust-proof (allergen-impermeable) zippered covers.
- Maintain low indoor humidity ideally between 30-50% relative humidity. Humidity levels can be measured by hygrometers which are available at local hardware stores.

<http://www.epa.gov/iaq/asthma/triggers/mites.html>

Mite Management

Physical Methods

1. Encasings

Physically encasing bedding and pillows are effective and commonly recommended. Impermeable rubber or vinyl plastic and vapour-permeable material which "breathe" are commonly used.

2. Washing

a. hot water washing

Washing at 60 degrees C or higher is effective. Hot water (130 degrees C) has been shown to kill all mites.

b. cold water washing

Cold water washing removes about 90% of the mites

3. Dry cleaning

Dry cleaning kills all mites. It is also very effective at physically removing dust from items such as bedding.

4. Heating

Heat may be applied in different ways:

- as superheated steam to treat carpets
- tumble-drying washing
- direct sunlight exposure
- autoclaving
- dry heating with electric blankets

<http://members.ozemail.com.au/~lblanco/6mites.htm>

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University of Nebraska Cooperative Extension in Lancaster County

444 Cherrycreek Road, Suite A, Lincoln, NE USA 68528-1507 • lancaster@unl.edu



Educational Resource Guide #13 

House Dust Mites

by Barb Ogg, Ph.D., Extension Educator

This educational resource guide, based on Chapter 10, "Mites," in *Common-Sense Pest Control* by Olkowski, Daar and Olkowski, will discuss biology of dust mites and will emphasize non-chemical control tactics. An allergist, a medical doctor specially trained to treat allergies, should be consulted for proper diagnosis and treatment of allergies.

Unlike some other kinds of mites, house dust mites are not parasites of living plants, animals, or humans. House dust mites primarily live on dead skin cells regularly shed from humans and their animal pets. Skin cells and scales, commonly called dander, are often concentrated in lounging areas, mattresses, frequently used furniture and associated carpeted areas, may harbor large numbers of these microscopic mites.

For most people, house dust mites are not harmful. The medical significance of house dust mites arises because their microscopic cast skins and feces are a major constituent of house dust that induces allergic reactions in some individuals ([Figure 1](#)).

For those individuals, inhaling the house dust allergen triggers *rhinitis allergica* or *bronchial asthma*. People with allergies to house dust usually also have allergic reactions to house dust mite fecal material and cast skins. Studies have shown that the most potent house dust allergens can be extracted from the organic debris produced by dust mites. Other important allergen-producing organisms that are found in house dust are found in [Figure 1](#).



Biology

There are two species of house dust mites, belonging to the genus *Dermatophagoides*, that are found in North America. These mites are so tiny that they are virtually invisible without magnification. They pass through six developmental stages, and the adult form may also molt once. Adult female mites lay cream-colored elliptical eggs coated with a sticky fluid that helps them adhere to the substrate. Under optimal conditions, the cycle from egg to adult mite takes about one month.

Both species of house dust mites feed on human skin scales, pollen, fungi, bacteria, lepidopteran (moth and butterfly) scales, animal dander, and skin scales of birds. Human, cat, dog, and horse dander have been used to raise these species in a laboratory. Dust mites do not drink free water, but they absorb water from the air and the environment. The food consumption of these mites and development increases at higher relative humidities. Mites survive best at relative humidities of 70-80% and temperatures of 75-80 degrees F. House dust mites do not survive well at low relative humidities, especially at higher

temperatures. Temperatures of 140 degrees F for one hour is lethal to these mites.

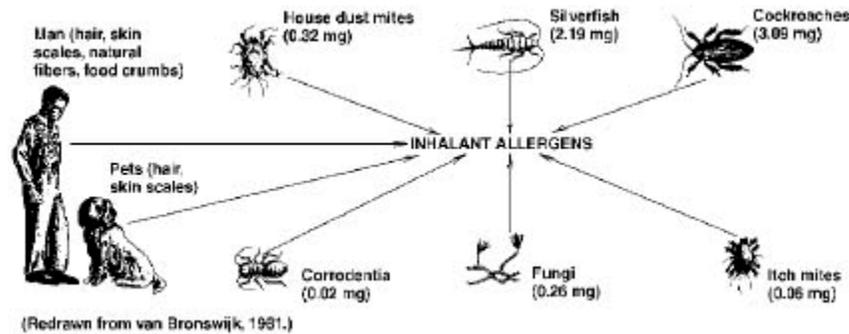
Integrated Dust Mite Management

Integrated pest management (IPM) means that several tactics should be used at the same time to alleviate a pest problem. Complete elimination of house dust mites is not a realistic goal, but integrated mite management should revolve around reducing human exposure to allergens as well as making the environment inhospitable to house dust mites. Sleeping areas deserve the most attention.

Select appropriate furnishings. Avoid furniture that collects dust, like overstuffed furniture made of fuzzy textiles. Also avoid wool fabrics/rugs, because wool shed particles and is eaten by other insects. Use washable curtains or blinds that can be vacuumed and small rugs that can be washed instead of wall-to-wall carpeting. Keep surfaces free of clutter and knickknacks that collect dust. Enclosing mattresses in plastic covers decreases populations of mites in the bed. Replace feather pillows and down quilts with synthetic fibers.

Avoid Furry or Feathered Pets. Pets that have fur or feather contribute dander to the dust and increase the food source for mites. If you are a pet lover, locate their sleeping quarters as far from yours as possible and furnish their sleeping quarters so they can be cleaned easily. Hardwood or vinyl floors with washable area rugs are ideal.

Organisms Found in House Dust



This drawing shows the important allergen-producing organisms and relative amounts of their body parts and by-products found in one gram of house dust.

Constituents of House Dust: ash, cigarette; ash, incinerator; combustion products; fiber, synthetic textile; fibers: wool, cotton, paper and silk; fingernail filings; food crumbs; glass particles; glue; graphite; hair, human and animal; insect fragments; oil soot; paint chips; plant parts; pollen; polymer foam particles; salt and sugar crystals; skin scales, humans; skin scales, pets; soil; spores, fungal; stone particles; tobacco; wood shavings

*Drawn primarily from van Bronswijk, 1981.

Control Other Insect Pests. Other insect pests in the home may contribute to allergies and mite populations so suppressing populations of fleas, cockroaches, and silverfish will minimize additional allergens in the home. Store grains and crackers in glass containers with good rubber seals that close by pressure. You may wish to store these containers in the freezer. Information on these pests and their

control can be obtained by contacting the Lancaster County Extension Office.

Low Humidity. The humidity in the house should be kept below 70%. During humid times of the year, it might be useful to run dehumidifiers in bedrooms and/or particularly damp areas of the home. In addition, bathroom and laundry rooms can be vented to remove humid air to the outside with a fan.

Reducing Air Infiltration. Airing out the house with open windows allows the entry of pollen, which is another major allergen for many people as well as a food source for dust mites. Minimize incoming air by caulking cracks around windows, doors and other openings like you would weatherize your house.

Dust Management: Getting rid of allergy-inducing dust mites and other allergy-inducing constituent of dust is related to eliminating dust from the environment. The most important tool for managing house dust mites is the vacuum cleaner. Regular, thorough vacuuming of carpets, furniture, textiles and other home furnishings such as draperies will help keep dust mite populations low. Avoid wet-mopping because it increases moisture in the air. Where wet-mopping is necessary, as in kitchens and bathrooms, vacuum thoroughly first. Vacuums with a water filter are preferable to those with a disposable paper bag because a water vacuum removes a greater range of particle sizes than paper-bag types. There are a number of vacuums with highly efficient filters designed for use by people with allergies to dust. It is better to vacuum thoroughly once a week rather than lightly on a daily basis. Vacuum mattresses and padded furniture thoroughly; 20 minutes for each mattress is not too long. Dust furniture before you vacuum so the dust has time to settle on the floor, where it can be picked up by the vacuum. Special dust cloths or other cleaning implements that are treated chemically to hold rather than scatter dust may be helpful. You may also wish to use an electrostatic precipitator to help reduce small particles in the air.

Cleaning/Heat Treatments. Shampoo, steam clean, or beat non-washable carpets once a year. This removes large particles missed by the vacuum cleaner. Wash sheets in soapy water at 140 F every one or two weeks to kill all mites. Take blankets to the dry cleaner, hang them outdoors once a year, or wash them frequently. In the wintertime in Nebraska, the house, furniture (mattresses, overstuffed furniture), or bedding can be exposed to the outside cold for one or two days to kill the dust mites. Alternatively, a study has shown that using an electric blanket for eight hours every day reduced mites in mattress by 50% in one month. Another study documented that heating blankets in a clothes dryer for several hours killed mites. If this is done each month with one annual dry cleaning or wash, house dust mites can be held to a minimum.

According to *Common-Sense Pest Control*, cleaning and nontoxic approaches listed above should give adequate control, except in humid, tropical regions of the world. For more information, the following references contain technical information on house dust mites that may be of interest:

Alexander, J.O. 1984. *Arthropods and human skin*. Berlin: Springer-Verlag. 442 pp.

Bronswijk, J.H., van. 1981. *House dust biology, for allergists, acarologists and mycologists*. Zeist, The Netherlands: NIB Publishers, Box 144, 3700 AC Zeist, The Netherlands.

Olkowski, W., S. Daar, and H. Olkowski. 1991. *Common-sense pest control*. The Taunton Press, Newtown, CT.

updated March 27, 2001

<http://lancaster.unl.edu/enviro/pest/factsheets/013-97.htm>

Taking Steps to Reduce Moisture

Moisture control is the key to mold control. Respond to water damage within 24-48 hours to prevent mold growth.

Mold growth can be reduced if relative humidity near surfaces can be maintained below the dew point. This can be done by: 1) reducing the moisture content (vapor pressure) of the air, 2) increasing air movement at the surface, or 3) increasing the air temperature (either the general space temperature or the temperature at building surfaces).

Either vapor pressure or surface temperature can be the dominant factor in a mold problem. A vapor pressure dominated mold problem may not respond well to increasing temperatures, whereas a surface temperature dominated mold problem may not respond very well to increasing ventilation. Understanding which factor dominates will help in selecting an effective control strategy.

If the relative humidity near the middle of a room is fairly high (e.g., 50% at 70° F), mold or mildew problems in the room are likely to be vapor pressure dominated. If the relative humidity near the middle of a room is fairly low (e.g. 30% at 70° F), mold or mildew problems in the room are likely to be surface temperature dominated.

Vapor Pressure Dominated Mold Growth

Vapor pressure dominated mold growth can be reduced by using one or more of the following strategies:

- use source control (e.g., direct venting of moisture-generating activities such as showers to the exterior)
- dilute moisture-laden indoor air with outdoor air at a lower absolute humidity
- dehumidify the indoor air

Note that dilution is only useful as a control strategy during heating periods, when cold outdoor air contains little total moisture. During cooling periods, outdoor air often contains as much moisture as indoor air.

Surface Temperature Dominated Mold Growth

Surface temperature dominated mold growth can be reduced by increasing the surface temperature using one or more of the following approaches:

- raise the temperature of the air near room surfaces
- raise the thermostat setting
- improve air circulation so that supply air is more effective at heating the room surfaces
- decrease the heat loss from room surfaces
- add insulation
- close cracks in the exterior wall to prevent "wind washing" (air that enters a wall at one exterior location and exits another exterior location without penetrating into the building)

<http://www.epa.gov/iaq/schools/tfs/guideh.html#Condensation,%20Relative%20Humidity,%20and%20Vapor%20Pressure>