

Mold fungi as a major impediment to cleaning/repairing flooded and rain-damaged homes



INTRODUCTION

Hurricane victims whose homes have been severely damaged by winds and rainfall or by winds and flooding also find themselves confronted with the rapid growth of mold fungi on the wetted interior building components. Unfortunately, hurricanes such as Katrina (2005) often occur during the summer in the hot, humid southern and southeastern United States. The environmental conditions occurring at this time of year also are ideal for the growth of mold fungi, and long-term residents of this region understand that air-conditioning, fans, and ventilation not only make the temperatures in their homes more comfortable but also decrease and the likelihood of mold growth by decreasing the interior moisture. However, following a hurricane, many find the components

of their homes exposed to rain wetting or flooding with no way to decrease their moisture. Such homeowners must recognize that wetted interior walls and flooring mean that all wall and/or flooring components (e.g., wall coverings, insulation, and framing) are wet and will remain so for a protracted period of time and, therefore, are capable of supporting the growth of mold fungi and must be removed as soon as possible.

However, in the days and weeks following hurricanes Katrina and Rita, a reasonable approach to controlling molds was replaced by near hysteria caused by newspaper articles and instant “mold experts” convincing owners of damaged structures that their homes contained “toxic molds” that threatened their lives. This reaction to molds in homes was fueled by earlier media accounts of “sick homes” caused by molds. As this phenomenon continued, some in the media likened the growth of molds in structures to the Black Plague. While some mold control experts with legitimate mycological credentials came to assist homeowners following hurricanes Katrina and Rita, other questionable “mold experts” convinced homeowners that their mold control programs, costing hundreds of dollars, would save them from “toxic molds”. Others convinced homeowners that the only way to control molds was to tear down their homes and remove the building materials from the site. A group of attorneys recognized the occurrence of the “toxic mold” phenomenon and opened a web site called “mold is gold.”



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RESEARCH ADVANCES

The perceived growth of “toxic mold fungi” within the walls of otherwise habitable structures was of concern to many hurricane victims whose homes were either flooded or were wetted by rainfall. What was not made clear to these homeowners was that relatively few mold species are “toxic” to humans, and the probability of these causing medical problems to building inhabitants is extremely low. *Stachybotrys*, a mold that causes toxic responses in humans, can occur on wet building components, but its spores are not airborne and unlikely to be contacted by building inhabitants. The spores of most molds are airborne, and those of some species contain allergens that elicit an allergic response in some individuals exposed to large numbers of spores. These would be similar to allergic responses to tree pollen, ragweed, etc., when these airborne units are inhaled in large numbers.

WHAT ARE MOLD FUNGI?

Before another hurricane makes landfall in the southern United States during the summer months, homeowners must understand what molds are and how they can be controlled. Mold fungi are primitive organisms that obtain their food from various materials on which they grow. Molds growing on wood building components utilize simple sugars and other products stored within specialized wood cells. Molds do not cause structural damage to wood. The reproductive units of molds are called spores, and these can be seen on the surface of materials colonized by them. These small spores are pigmented and, depending on the mold species, may be black, green, red, yellow or other colors. In small quantities, these spores are very unlikely to elicit an allergic response. When present in large numbers, as may occur in flooded or rain-wetted houses along the Gulf Coast, mold spores can trigger respiratory allergic responses in some individuals. Other irritants, such as the dust created when wall coverings such as gypsum sheetrock are removed, also may cause allergic responses. Susceptible individuals should take precautions, such as wearing respirators or dust masks as needed. In most instances, it is unnecessary to spend money on identification of the mold species present. The visual presence of extensive mold growth is sufficient to verify that measures to eliminate molds should be undertaken.

WHY ARE MOLDS GROWING ON BUILDING COMPONENTS AND HOW CAN THEIR GROWTH BE CONTROLLED?

While they are primitive organisms, the factors required for the growth of molds are the same as ours:

1. Air – needed to respire
2. Temperature – Temperatures favored by many mold species are similar to those that are comfortable to humans (60° F - 90° F).
3. Water – molds cannot exist without sufficient water and neither can we. For example, molds cannot grow on wood whose moisture content is less than about 20%. Building components not subject to wetting would be expected to have an average moisture content between 10-15%.
4. Food – molds can obtain nutrients from a variety of building components.

If the growth of mold fungi is to be prevented or controlled, one or more of these four basic factors must be altered (e.g., dry building components to below 20% mc; add mold-inhibiting fungicides to the food source).





FLOODED HOMES

1. First, open all windows for ventilation and remove all carpets, furniture, clothes and other items wetted by flood waters.
2. Remove interior ceiling and wall coverings and insulation in the wall cavities, attics, and between floor joists.
3. Wash the wall cavities and wall framing with an aqueous low-phosphate detergent solution using low to moderate pressure. Phosphate residues remaining following the use of high-phosphate detergents can stimulate the growth of mold fungi on moist surfaces. Several people have advocated using sodium hypochlorite (household bleach) solutions for such operations, but this is not recommended except when small areas or non-porous materials (e.g., tile) are to be cleaned. While sodium hypochlorite is germicidal, it is corrosive and can compromise electrical connections, etc. In addition, large amounts of sodium hypochlorite will be absorbed by building materials. This will cause the gradual loss of chlorine gas into the living space for an extended period of time, a situation to be avoided. Prolonged exposure of wet wood to bleach can result in loosening of wood fibers, essentially pulping the wood surfaces. Sodium hypochlorite is an EPA-registered pesticide, but it is not labeled for treatment of wood or other porous building materials.
4. Spray-treat the framing and wall cavities with a non-volatile antimicrobial that is registered by the EPA for that use. Pesticides not registered (illegal) for use in habitable spaces were used by some "mold control experts". All pesticides should be applied according to label directions. Restricted-use pesticides should be applied by licensed, certified pesticide technicians. Borate products supplemented with a mold-control agent are recommended because borates are biocidal to bacteria and decay fungi as well as insects such as termites and roaches. The mold-control agent must be added to increase the biocidal activity of borates to mold fungi. In addition, borates have low mammalian toxicity, are corrosion inhibitors, and are colorless

CLEANING/CONTROLLING MICROBES IN FLOODED AND RAIN-WETTED HOMES

The interior building materials of structurally sound, flooded homes on the Gulf Coast were wet and very warm for several weeks following hurricane Katrina before repairs were begun. The flood waters likely deposited bacteria in the structures and the warm, wet conditions also resulted in the widespread growth of mold fungi, and in instances where house framing remained wet for prolonged periods of time, wood decay fungi. Anyone with known mold allergies should not attempt to clean these structures. Even those without mold allergies should make provisions for avoiding the inhalation of air-borne materials during cleaning activities (use particulate masks or other respiratory equipment). Light-weight moisture-resistant coveralls should be worn during cleaning operations. These should be washed separately from normal laundry. Finally, good personal hygiene should be practiced. For safety, it should be verified that the electricity and gas have been turned off prior to all cleaning activities.

Research conducted by:
Terry L. Amburgey



For more information
contact:
George M. Hopper
Director
Forest & Wildlife
Research Center
Box 9680
Mississippi State, MS 39762
662-325-2696
Fax: 662-325-8726
ghopper@cfr.msstate.edu
www.fwrc.msstate.edu

Karen Brasher, editor

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and odorless. Two EPA-registered products labeled for use on wood for controlling wood-inhabiting insects and fungi, including molds, are Bora-Care with Mold-Care by Nisus Corporation (www.nisuscorp.com) and Bor-Ram with Mold-Ram by Sostram Corporation (www.sostram.com). These products contain both borate and a mold-control agent. Check with the EPA to determine if additional biocides have been registered for use on porous building materials in habitable spaces.

5. Place fans throughout the structure and open all interior doors to increase ventilation and the rate of drying.
6. When the framing is dry, the electrical connections and plumbing within the walls should be checked by licensed professionals.
7. Replace wall insulation and wall coverings. It is recommended that all closet doors be louvered to increase interior ventilation.

RAIN-WETTED HOMES

All of the points discussed above for flooded homes apply to homes "flooded" by rain water, except for item 3. The wall cavities should be relatively clean when exposed and not require a detergent wash. In most instances, homes wetted by rainfall have experienced roof damage. A priority item should be to make temporary roof repairs to prevent additional wetting of interior materials. In essence, mold fungi are not to be feared, but they should be treated with respect.

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