



Preservation and Conservation (PAC) Programme Frequently Asked Questions

Treating Mould and Insects

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MOULD

Q: What is mould?

A: Moulds are neither plants nor animals, but fungi which live on and derive their food from dead or living organic matter. There are several species of moulds. They feed on the surface on which they grow (substrate), by secreting digestive enzymes to break down organic compounds into the necessary nutrients for absorption.

Q: How can I distinguish between mould and dust?

A: The fuzzy appearance of heavy dust can often be mistaken as mould. Unlike dust, which tends to rest just on the surface, mould grows into surface of the item. Gravity will cause dust to mostly accumulate on the top of a horizontal surface. If you see a fuzzy spot on the underside of an item, it is more than likely mould rather than dust. Another tell-tale sign is the characteristic musty or earthy smell of mould. Only a microbiological test can conclusively confirm the presence of mould.

Q: What damage can mould cause to my library/archival collection?

A: The digestive enzymes secreted by mould to breakdown their substrate can be very damaging to items of a library/archival collection. Paper, cloth and leather can be irreversibly weakened and stained by mould. Mould can also pose a major health risk to library staff and users.

Q: Can my health be affected by handling mouldy library/archival items?

A: The reactions to mould can vary from person to person and depends on the species of mould, amount of mould, exposure time and an individual's susceptibility to mould. Individuals with allergies, respiratory problems or reduced immune systems should not handle mouldy items. The health effects for even healthy individuals can range from irritation, allergic reaction, toxic response and infection. Take the necessary steps to limit exposure to mould. Effective personal protective equipment (PPE) should be worn when handling mouldy library/archival items.

Q: Are gloves and a dust mask enough protection against mould?

A: For a small-scale mould contamination, the following is recommended as the minimum personal protection:

- For respiratory protection use a N95 or N100 (FFP2 or FFP3 rating) disposable particulate respirator
- Protect your hands with close-fitting vinyl or nitrile gloves
- Wear safety goggles to protect your eyes

For more extensive contamination, full-face respirators and protective clothing with head and boot coverings (e.g. Tyvek® suit) are needed to provide additional protection.

Consult with a health and safety expert for guidance on selecting appropriate PPE.

Q: Is cleaning enough to prevent mould growth in my library/archival collection?

A: Mould is everywhere. It is impossible to completely remove mould spores from our collections.

The most effective strategy is to implement environmental conditions which inhibit mould growth. This strategy can include:

- Reducing mould spores: Limit the amount of spores entering by closing windows and using air-conditioning and filtration.
- Controlling nutrient sources: Dust contains both mould spores and nutrients. So it is important to clean and maintain the collection. An effective housekeeping programme ensures that collections and the surrounding space are regularly cleaned.
- Controlling Moisture: The risk of mould growth on collection items increases from extended exposure to high relative humidity (RH) and depends on the how much water vapour items absorb. Ensure that the dehumidification controls of any air conditioning units keep the RH to below 60%.
- Air Circulation: Maintaining good air circulation helps eliminate pockets of moist stagnant air. Increased air flow also reduces the quantities of mould spores landing on collection items.
- Temperature: Lower temperatures (with low RH) will benefit collections.

Q: Are Lysol®, bleach and other household cleaning agents effective in cleaning mould on books and documents?

A: Though these household cleaning agents are good for sanitizing solid surfaces, they are not recommended for treating library/archival collections. These chemicals can be damaging to the inks, paper, textiles and leather contained in our collections. One effective way to remove inactive dry mould from the surface of the collection item is by vacuuming. Use a vacuum outfitted with a HEPA filter and accessories to prevent recirculation of the mould spores and

particles. This best done outdoors or in a fume hood/cupboard designed to capture the mould spores and fragments.

INSECTS

Q: What type of insects are harmful to our library/archival collections?

A: A variety of insects and other pests attack binding materials, adhesives and other substances in library/archival collections. Though some insects feast on the cellulose fibre of paper and board, most are attracted to the added compounds like the adhesives and starches. The most common of insects which attack library/archival materials in a tropical region are:

- Drugstore beetles (often called bookworms, this tiny reddish-brown beetle produces a yellow larva which eats through board and paper);
- Termites (which eat all cellulosic materials beyond wood including paper, binding cloth and board);
- Silverfish; and
- Cockroaches (which both favour starch and items containing starch).

Q: What are the signs of an insect infestation?

A: Early detection of insect presence allows for effective remedial action in safeguarding a library/archive collection. Look for the following signs of insect activity:

- Dead or alive insects;
- Insect parts, wings or frass (droppings, which often matches the colour of the collection item being eaten); and
- Holes, chewing or grazing marks on collection items.

Q: How do I treat with an insect infestation in my library/archive?

A: When an insect infestation is discovered the following steps are recommended:

- Isolate and bag any infested items. This serves to quarantine the items so that other materials of the library/archive will not be affected.
- Decide on a method to treat and clean the infested items. Chemical pesticides or fumigants can cause irreversible damage to collection items. Remnants of the chemicals after treatment can be toxic to persons accessing collection items and spaces. Alternatives to chemical fumigation are considered in Q. 12.
- The items must be monitored after they are treated to ensure that the insects have been eliminated.
- The environmental conditions must be improved by implementing an Integrated Pest Management programme. See Q. 11 for information about IPM strategies.

Q: Are bug traps enough for preventing an infestation in my library/archive?

A: The best defence against pests is to monitor and change the conditions which encourage them to flourish. We can make our library/archive collections pest-free by engaging in activities which create inhospitable conditions for them. While using sticky traps can be useful for monitoring insect presence, it is not a standalone method for controlling and preventing an infestation. These must be used in conjunction with an Integrated Pest Management programme. Consider implementing the following IPM strategies at your library/archive:

- Improve the building exterior: All windows and doors should be tightly sealed. Doors should not be propped open regularly. Openings around pipes, drains and holes for electrical/telephone cables should be sealed.
- Improve climate control: Insects thrive in temperatures between 20-30°C and in humidity levels between 60-80%RH. Maintain a cool and dry climate to help control insects.
- Check water sources: Regularly inspect pipes and other sources of water in restrooms, kitchens and around air-conditioning equipment. Wrap pipes or vents which 'sweat' with insulating material. Under and around refrigerators and appliances that combine heat and moisture should be regularly cleaned.
- Control food sources: Keep food consumption and preparation areas separate from collection areas. Clean up should be done immediately. All food should be stored in tightly sealed containers or refrigerated. Trash should be removed from the building daily.
- Ensure regular housekeeping: Collection areas should be cleaned routinely and thoroughly. Dust provides an ideal habitat and food source for insects. Regular cleaning and inspection also allows you to look for signs of insect activity.

1. Is it safe to use a bug spray/insecticide to treat my infested library/archival collection?

Traditional chemical insecticides can cause irreversible damage to library/archival items. Remnants of the chemicals after treatment can be toxic to persons accessing collection items and spaces. Given the health and environmental risks of using toxic fumigants, several libraries and archives have considered the following alternatives:

- Freezing: Most paper-based items can be safely frozen. This allows the insects contained in the collection items to be exposed to sub-zero temperatures at which their bodily fluids crystallize. A household or commercial freezer able to maintain a low temperature of -20°C can be used for this process. See (Raphael, 1994) for details of the freezing procedure.
- Modified atmospheres: This insect extermination method replaces the air around the infested item with various inert gases, such as nitrogen, carbon dioxide, or argon. This creates an anoxic (low oxygen) environment which kills insects by suffocation and dehydration over a period of days. See (Burke, 1999) for guidelines on creating anoxic microenvironments.

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