

# **INTEGRATED PEST MANAGEMENT POLICY FOR THE NATIONAL CULTURAL HISTORY MUSEUM**

## **INTRODUCTION**

A variety of insects and other pests can attack museum collections. Some insects are attracted to dark places for e.g. in storage areas, and since many materials are handled infrequently, insects and other pests can severely damage these materials before they are discovered.

Museums traditionally relied on pesticides for routine pest prevention. However, pesticides do not prevent infestation, and cannot correct the damage already done. Pesticides have become less attractive because of a growing awareness that the chemicals in pesticides can pose health hazards to staff and damage museum collections. Prevention can be achieved only through strict housekeeping and monitoring procedures.

Preservation professionals increasingly recommend a strategy called *integrated pest management* (IPM). This approach relies primarily on non-chemical means (such as controlling climate, food sources and building entry points) to prevent and manage pest infestation. Chemical treatments are used only in a crisis situation threatening rapid losses or when pests fail to succumb to more conservative methods.

## **INTEGRATED PEST MANAGEMENT STRATEGIES**

Integrated pest management strategies encourage ongoing maintenance and housekeeping to insure that pests will not find a stable environment in the museum. Activities include building inspection and maintenance; climate control; restriction of food and plants; regular housekeeping; proper storage; control over incoming collections to avoid infestation of existing collections; routine monitoring for pests.

## **PEST MANAGEMENT PROGRAMME FOR THE NCHM**

### **Maintenance of building.**

- Fill in a checklist every 3 months for inspection of each floor for sanitation and pest control. (See attached checklist).
- Check all entrance routes into the building.
- Seal all doors and windows tightly. Put rubber strips under doors and roll doors where necessary to keep insects and rodents out.
- Seal openings around pipes and cracks in the walls or foundation. Screen vents to keep out birds and rodents.
- Check all water sources in the building once a month because insects are attracted to damp areas.
- Check pipes in storage areas and other sources of water such as restrooms, kitchens, water fountains and climate-control equipment regularly to guard against water leakage.
- Wrap sweating pipes with insulation tape.
- Close off unused drains or drainpipe openings.
- Inspect for standing water on a roof or in the basement as standing water can raise humidity levels. Frequent inspections are necessary where problems recur.

### **Climate Control**

### Temperature:

- The optimum temperature for many insects is between 20°C - 30°C. Most insects will die if exposed to temperatures below 0°C for a period of time. The ideal temperature for the storerooms is 18°C but this is too cold for staff working all day in these areas. The temperature in storerooms should be 21°C and not higher than 23°C.
- *Monitor the temperature of the storerooms on a weekly basis with a thermohygrograph. Draw up a chart of the readings and compare it with the readings of the previous year.*

### Relative Humidity.

- Relative humidity is the relationship between the amount of water vapour in the air and the amount needed to saturate the air (100%) at a given temperature. The optimum humidity levels for the proliferation of insects are generally between 60% - 80% because they need moisture to survive and some like the silverfish thrive on high humidity. An optimum R.H. of 55% ( not higher than 68%) is ideal for the store rooms. If the R.H. is too high mould will grow, and too low the materials will become brittle.
- *Check and clean the air-conditioner, de-humidifiers, humidifiers and hygrometers on a regular basis.*

### **Restriction of food and plants**

- Maintain a plant free zone of 30cm around the building to discourage insects from entering. Care for plants properly and do not over water them.
- Remove plants and cut flowers from the building. If not possible, the flower boxes at the entrance of the building and in the foyer must be well cared for and kept to a minimum. Flowering plants must be avoided because the nectar and pollen encourage the presence of insects. Avoid over watering and watch plants carefully for signs of infestation and disease.
- Keep food consumption confined to the tearoom on the ground floor or the restaurant and museum shop on the top floor.
- No eating and drinking behind the eastern and western access doors that lead to the storage area including the laboratories and workshops.
- Staff are not allowed to eat in their offices.
- When functions, that include refreshments, are held in the tea room or multi-functional area, leftovers must be tightly sealed and removed. Vacuuming and kitchen clean up must be done as soon as possible. All food for functions must be stored in tightly sealed glass or metal containers or refrigerated. A plastic garbage can with a tight-fitting lid must be provided for food waste.

### **Housekeeping**

- Clean all collection storage areas routinely and thoroughly, at least every 6 months.
- Check all areas for signs of pests at least once a month.
- Check for mould on objects once a month.
- Inspect objects for stains and signs of insect grazing, for e.g. small holes in paper, small piles of dust under wooden objects, loss of hair on leather objects etc.
- Clean all objects annually. If that is not possible at least once every three years.
- Check windowsills; under bookcases and radiators; on and behind shelves; inside boxes and drawers for signs of insect activity.

- Look for dead insect bodies, frass (insect droppings) egg cases, and remove them, because some insects feed on the bodies of other insects.
- Look for rodents (dead or alive) and their droppings.
- Clean up any insect debris immediately, because pests are attracted by debris from human and other animal activities.
- Remove trash daily from the building. Used packaging material should be removed from the building as soon as possible.

### **Storage conditions**

Make sure that storage areas are clean because:

- Insects thrive in dark undisturbed spaces and are attracted to objects that are left undisturbed for long periods in the storerooms.
- Insects also live in quiet spaces like corners, under bookcases and behind furniture.
- Dust and dirt help to provide a hospitable environment for pests and therefore storerooms must be kept clean.
- Packaging material lying around in storerooms makes it difficult to see pests and therefore must be stored in KG49.
- Dead insects or insect debris in storerooms must be removed immediately because they attract other insects.
- Dirt and clutter in store rooms make it difficult to see pests, so a problem may go unnoticed for some time.

### **Biological Pests**

Collections in museums provide food and breeding places for insects and mould. If they are not controlled, insects and mould can severely damage many types of organic materials in the collections. Chemical warfare on insects and moulds can have very serious effects on humans and objects in the collections. Therefore it is very important to know which biological pests pose a threat, so that steps can be taken to control them, but without placing the collection or staff at risk.

<b>INSECTS</b>	<b>WHAT THEY EAT IN MUSEUMS</b>
Cigarette beetle	A wide variety of plant and animal based materials.
Drugstore beetle	A wide variety of plant and animal based materials.
Spider beetle	A variety of plant and animal based materials.
Carpet beetle	Wool, fur, hair, feathers, silk, insect specimens, books and other products of animal origin, e.g. horn.
Powder post beetle	The sapwood of hardwoods.

Furniture beetle	The sapwood of softwoods; will infest some hardwoods.
Common clothes moth	Wool, fur, hair, silk, dead insects, horn and feathers.
Casemaking clothes moth	Wool, fur, hair, silk, dead insects, horn and feathers.
Cockroaches	Will eat just about anything, including leather, hair, skins, paper and books. Also cause damage through regurgitation or by gluing their egg-cases onto objects.
Termites	Timber. Damage can be extensive if left undisturbed or if not discovered.
Booklice	Feed mostly on mould growing on old books or dead insects, but they can also damage the surface of materials.
Silverfish	Paper fabrics - starched or stained material especially - cotton, linen, photographs, book bindings and paste.
Crickets	May chew or damage linen, rayon, furs and paper.
<b>OTHER PESTS</b>	
Birds	Bird droppings can damage collections; their nests can also lead to insect problems.
Rodents	Can cause extensive damage to collections through feeding and stains from their droppings. Their nests also attract insects.

## **Pest Control**

### **Non-toxic control of common pests**

Make the environment undesirable to pests by:

- Physical exclusion - make sure that windows close tightly and put rubber strips under doors and roll doors. Fill all cracks and crevices with a suitable sealant.
- Physical removing - vacuum the area.
- Good housekeeping - keep the environment clean because it will reduce most pest problems.
- Maintaining good environmental conditions - control temperature and humidity, improve

ventilation and air movement.

- Spray cracks and crevices with contact or residual sprays.
- Applying chemicals - e.g. fumigation of the storerooms, only as a last option.

Monitor the building:

- Inspect the building regularly.
- Placing and inspecting insect traps regularly.

If a pest infestation is found:

- Inspect and remove all infested material.
- Also inspect neighboring material.
- Vacuum clean the area and infested material.
- If and where necessary apply pesticides.
- Spray contact or residual sprays into cracks and crevices.
- Use pheromone traps for further monitoring.
- Carry out subsequent inspections.

Inspect incoming material:

- Receive new objects only in the basement. Isolate incoming objects in a store in the basement away from the rest of the collection until processing.
- Examine and treat incoming objects immediately to prevent the introduction of pests into the building.
- Remove all packaging material and look for insects that are alive, insect droppings, larvae or dead bodies. Discard old packaging material.
- Ideally incoming material should be processed and rehoused in the permanent storeroom as soon as possible. Realistically, processing may be delayed.
- Clean the objects by vacuuming them thoroughly through a net. Discard the filter and disposable bag outside the building or in a sealed container that is emptied daily.

Pest Monitoring:

- Effective implementation of a pest management programme requires routine monitoring of pest activities. Use sticky traps to provide information about the type of insects, their entry points, the number of insects, their habitat and why they are surviving.
- Follow these basic procedures for monitoring:
  - 1) Identify all doors, windows, water and heat sources, and furniture on a building floor plan.
  - 2) Identify possible insect routes; mark trap locations on a floor plan.
  - 3) Number and date the traps.
  - 4) Place the traps in the area to be monitored as indicated on the floor plan.
  - 5) Inspect and collect the traps regularly.
  - 6) Refine trap placement and inspection as necessary, according to the evidence collected..
  - 7) Relocate traps.
- If infestation is suspected in a particular area, place traps every 10 metre.
- Be careful that traps do not come into contact with the objects, since the adhesive can cause damage.
- Check the traps after 48 hours to identify the area most seriously infested.
- Inspect traps weekly for at least 3 months and replace them every 2 months when they are full or when they lose their stickiness.

- Document each trap. The number of insects; the type of insects; the stage of growth.
- Note the date and location of each trap replacement.
- Keep a detailed report of any other evidence of activity, such as live or dead insects or their droppings.
- Each insect trapped must be identified to determine what threat they pose to the Museum's collections.

#### Treatment:

- Sighting one or two insects is time for monitoring to determine the extent of the problem but is not necessarily a crisis situation.
- If a serious infestation occurs, chemical and non-chemical treatments are available but non-chemical methods should be used wherever possible.

#### Chemical Treatments

Common chemical treatments include:

- Aerosol sprays.
- Attractants - luring insects into traps (sometimes killing them).
- Baits and pellets - eaten by the insects.
- Contact or residual sprays, e.g. Doom - kill on contact or by absorption when the insect walks through the residue.
- Dust, e.g. boric acid or silica dust - dehydrate insects.
- Fogging concentrates, e.g. Doom Fogger - suspends a pesticide and oil formulation in the air.
- Fumigants, e.g. methyl bromide - expose infected material to a lethal gas.
- Residual or vapor pest strips, e.g. Vapona - don't use them because it will bleed onto the objects.
- Repellents, e.g. mothballs - don't use mothballs in the collection . It poses a health risk to the staff working in the storage areas everyday.

Non-chemical treatments include:

- Controlled freezing - are the most promising and reports on its effectiveness have been largely favourable.
- Heat, gamma radiation and microwaves proved not as successful.

#### **Summary**

Museum collections can be threatened by a variety of pests that damage organic and inorganic materials.

The method of pest control least damaging to collections and staff involves preventive measures and regular monitoring.

If infestation does occur, treatment must be for the specific insect species and for the type of material infested.

Chemical treatments should be avoided except as a last resort.