MLIS/1/CT/02
Unit 3:
BIOLOGICAL FACTORS

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IOLOGICAL FACTORS

Almost all book components, be it paper, pulp or straw board used for binding, textiles and leather of varied colours and varieties used as covering materials are prone to attacks by groups of micro-organisms, insects and rodents. Very often library collections are damaged by pests, and the phenomenon is generally known as bio-deterioration.

A tropical climate which is hot and humid is congenial for the growth and propagation of pests, fungus, insects like silverfish, cockroach, psocid, bookworm, termite etc. They breed in the buildings housing public, institutional or special libraries. There is perhaps no library which at sometime or the other has not suffered the ravages of these agents of biodeterioration.

This problem has been studied in depth and the species that thrive specifically on book components have been identified. Their breeding cycles have been examined with a view to exterminate them and to apply effective control and remedial measures to check their incidence, thus preventing susceptibility of damage to library collections.

MMON BOOK PESTS

Agents of Bio-deterioration include micro-organisms and insects, which are active living organisms found in normal housing environment. They sustain themselves with food derived from paper, board, binding cloth and leather. Sizing material in paper and binding textiles and vegetable tanning material in leather, e.g., starch, glues and gums are their special food.

Micro-organisms

group of fungi or moulds which include Alternaria, Aspergillus, Penicillium, Mucor, Fusarium etc. grow in er. These organisms are present in the environment in every habitat. They remain in a dormant state for long iods. But they appear as brown/ black vegetative growth on paper. This and leather in favourabte conditions of mate, high relative humidity (above 65 per cent) and high temperature (in the range of 27°-35° C) are ducive for their growth and propagation. Besides, other conditions which favour their growth are rugged dusty faces, stagnant air, damp materials and availability of food for sustaining their life.

e common fungus consists of a reproductive mycelium and a vegetative mycelium. The former extends into the and is responsible for spore production, while the latter burrows into the substrate digesting and absorbing it.

sides fungi, bacteria also play a role in decomposing cellulose in paper and binding textiles. These are known aerobic cellulose decomposing bacteria, e.g., Cytophaga, Cellvibrio, Cellfascienla and Myscobacteria. These ng about discoloration and staining of books and other allied materials.

Insects

mmon insects that are responsible for attacking and damaging paper and other book components are Silver h, Book lice (Psocid), Cockroach, Termite, Book Worm (Gastrallus Indicus). These insects are recognised by ir characteristic appearance.

lver Fish (Lepisma Saccharina)

It is a wingless, silvery or pearly grey, carrot shaped insect measuring 8 to 10 mm in length. It has two hairy antennae, and its body tapers like a fish from head to tail. The mouth part of this insect is adapted for biting. This insect makes damp walls, dingy corners of a room as its habitat. The female lays 10-50 eggs at a time and hatch in 6-10 days. The young ones closely resemble the adult. A temperature of 18°-25°C and relative humidity above 55 per cent is ideal for their growth. This insect is a surface feeder having an affinity for glue, gelatin, starch and other materials, pastes and other adhesives of vegetable origin.

Cockroach (Blatta-Orientalis)

s a brown or blackish brown, shing flat bodied, foul smelling insect. It has two protruding antennae which p it feel objects. This insect is nocturnal, lives and hides in corners which are damp and dingy, crevices and avages in walls and floors, behind and beneath almirahs and shelves in wooden cupboards. It is a very mmon household insect breeding in kitchen drains and garbage. It is an omnivorous insect feeding on paper, rd, binding textiles, leather, especially attracted by binding glues.

e female lays eggs in pouch (cocoon) containing 6 to 10 eggs, mostly in April-May to October. The young es hatching out from eggs are called nymphs and these mature as fully winged insect adult. Moist air, rmth and darkness form most favourable condition for their breeding and growth.

Book-Lice (Psocids)

e insect is greyish white to brown in colour as long as the width of a pinhead (1 mm to 2.5mm). It is almost nsparent with thread like antennae and mouth part. Its occurrence is noticed in dust laden and fungus ected materials. Dampness and warmth are the essential requirements for its rapid growth.

Termite (White-ant)

s insect is most destructive of the wood or cellulose feeding insects. It is a social insect living in a mmunity which includes male, reproductive female (queen) and sterile workers. The workers are soft lied, white or grey, wingless forms, and devote their energy to nest building and feeding the community. oadly speaking this insect is of two groups:

ubterranean termites, so called because they maintain their contact with the soil.

Non-subterranean termites, require no contact with the soil. They can exist in the wood they infest. These also known as dry wood borers and are found in a tropical climate.

bterranean termites travel in mud, covered runways, bore into poor masonry structure with bad quality of cks and cement, reaching their food. They damage paper, board, wooden furniture, textiles and leather.

Book Worm or Book Beetle (Coleoptera)

e Indian book worm has been identified as Gastrallus Indicuss Reitter and it has varied ges of growth e.g., egg, larva, pupa and adult beetle. A beetle is small slender and brown colour and measures 2-3 mm in length and 1 mm in width. It lays eggs in joints of ding boards, and these eggs hatch out in 5-1 0 days as larva in summer. The larva is ite, cylindrical and semicircular in shape, the head being retraced into the front segment the body when at rest. They remain in pupa stage for 15 days or so at the end of which emerge as full grown insects. The larvae eat their way into the book and are responsible major damage. The adult beetle flies out from infested material to build new nests and s spreads infestation.

Rodents

ce (Linnaeus) and Rats (Rathus) find their way into buildings through dry drains and enings in doors and windows. These foraging animals gnaw, eat and soil anything made paper, board, textiles, leather, glue, gelatin etc. All rodents possess chisel like incisor th. These are cunning animals, swift to move, hiding in dark corners weak plastered nts in walls and floors. They move in darkness, and cause damage. Once they enter a m their eradication becomes difficult.

ENTIFICATION OF DAMAGE

mage caused by fungus or bacteria, and that which is caused by insects, is specific with each species. Often, the nature, ent and manifestation of damage make it possible to identify the damaging biological pest, making it convenient to apply ropriate control measures.

gus causes the following Damages:

rowth of black/brown patches which eat into the paper, textiles etc.

tinking smell.

Discoloration.

Staining due to acidic secretion reacting with iron and copper salt present as impurities in paper.

Surface feeders like *Cockroach* and *Silver fish* make their damage manifest in the form of discoloration accompanied by identification scratches appearing as patch work. The damage is mostly at the spine extending on the covers.

Subterranean Termites incise irregular tunnels starting from binding, penetrating deep in the text of the book. The edge of the tunnel are characterised by dusty margin due to dust and soil carried by these species.

Their emergence in a room is visible in the form of mud runways on walls, wooden furniture etc.

Bookworm or Book beetle travels in its larva or pupa stage from top to bottom of the text pages in the form of pinholes or narrow galleries running deep down. The damage usually

starts from the back side.

Rodents leave a good amount of blackish excreta at the site they frequent and leave a good amount of cutting at the site. They leave irregular incision or cutting marks on paper, textiles etc.

Control Measures

Good House Keeping and General Hygiene

Use of Chemical Repellents

Use of Poisonous Dusts and Liquid Insecticides

Use of Fumigants

EANING AND STAIN REMOVAL

Books and other library collections get soiled or develop stains due to bio-deterioration e.g. fungus growth and foxing. Cleaning of these materials is necessary after thle infested materials have been fumigated. At times localised bleaching of the stain is necessary.

Cleaning

ew simple techniques of cleaning are:

emoval of mud or hard crust of dust mechanically with brush or blunt knife.

Removal of foreign deposits with cotton moistened with water.

Removal of fungus spores with cotton dipped in ethanol.

Use of mild steam jet to soften hardened crust.

Drying damp materials under air current in shade (direct sunlight not to be used).

Reference

http://egyankosh.ac.in

THANKS