



Seed Enterprise Management Institute (SEMI) Course

Seed Drying, Processing and Storage

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Storage (Postharvest) Pests and Control

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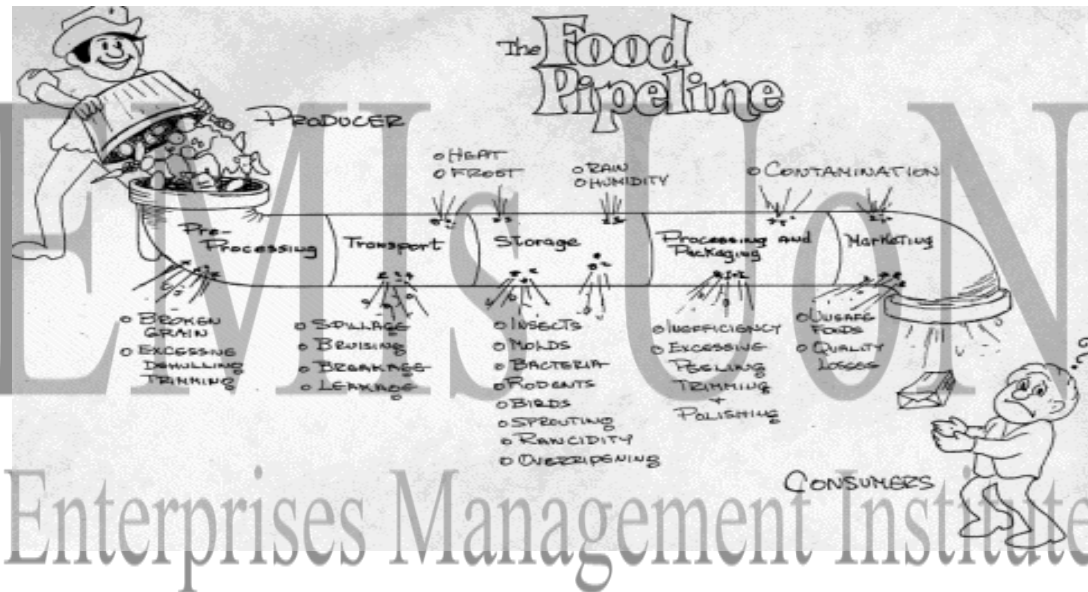
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- Why postharvest

Postharvest period is part in the food life cycle which covers all stages after harvest

cleaning
grading
transportation
storage
processing
packaging
marketing.



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Period when most value is added to the product before it gets to the consumer

Losses affects the livelihoods of all those involved in the supply chain

Introduction

- Factors such as storage duration, prevailing environmental conditions and crop varieties influence insect populations development and losses incurred.
- Inadequate storage methods lead to losses in stored grain sometimes of unacceptable magnitude in SSA.
- These pests inflict both direct and indirect damage to the grain, and the most important ones start in the field.

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Damage caused

Direct damage

- Kernel damage,
- Contamination,
- Grain dust,
- Damage to wooden structures and other containers

Indirect damage

- Dry grain heating and moisture migration in storage
- Lowered germination of seed grains
- Distribution of molds and other organisms through the grain mass
- Insect fragments in cereal products



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THE GRAIN MOTH(*Sitotroga cerealella* (ol.))



- Small straw coloured moth (wing span 10-18mm)
- Able to fly from infested grain in store to the field
- Infests maturing cereals in the field
- Infestation can also occur at store levels.
- Damage:- small circular ‘windows’ and holes on the grain
- Causes severe damage to cereals stored mainly in unthreshed form
- Grain attacked:- maize, sorghum, wheat, paddy & barley.

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SITOTROGA CEREALELLA
(Angoumois Grain Moth)



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MAIZE AND RICE WEEVILS

(*Sitophilus* spp.)



- Dark brown weevils (2.5-4.5mm long)
- Able to fly from infested grain in store to the field.
- Infests maturing cereals in the field
- Infestation can also occur at store level
- Damage: Small circular holes on the surface of the grain
- Causes severe damage to grain stored in both threshed and unthreshed form
- Grain attacked:- maize, millet, sorghum, wheat, barley and rice

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SITOPHILUS spp.
(Maize and Rice Weevils)

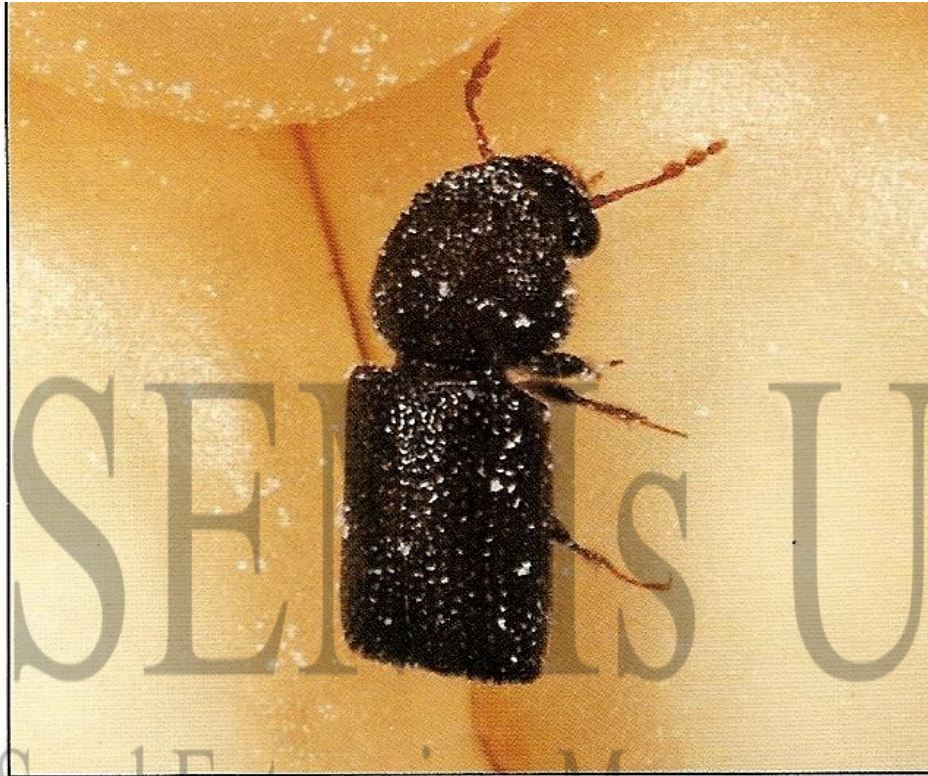
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LARGER GRAIN BORER

(*Prostephanus truncatus*(H.))

- A dark brown cylindrical beetle (3-4.5mm long)
- Able to fly from infested grain in store to the field
- Infests maize in the field before harvest
- Infestation can also occur at store level
- The beetle eats tunnels and holes in the husks, grain and cob.
- Very serious pest that also eats into the wooden store structures
- Also feeds on dried cassava





PROSTEPHANUS TRUNCATUS
(Larger Grain Borer)

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PULSE BRUCHIDS (BEETLES)

- THE BEAN BRUCHID (*Acanthoscelides obtectus* (say)).
- Grey to brown oval beetles (3 – 4.5mm long)
- Able to fly from infested grain the the store to the field
- Infestation can also occur at store level
- Damage:- small dark ‘windows’ and holes on the grain
- Causes serious damage to stored beans



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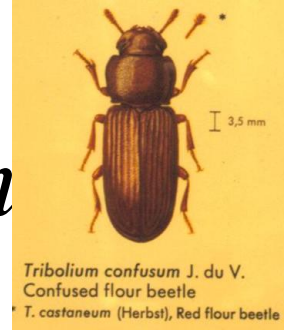
THE COWPEA BRUCHIDS

(*Callosobruchus* spp)

- Light to dark brown beetles (2.0-3.5mm long)
- Able to fly from infested grain in stores to the field
- Infests maturing legumes (cowpea, pigeon peas, chick peas and grains) in the field
- Infestation can also occur at store level
- Small dark ‘windows’ and holes on the grain indicate infestation by the bruchids
- Causes serious damage to stored pulses.



THE FLOUR BEETLE (*Tribolium* spp)



- Reddish brown flat beetles (2.5 – 4.5mm long)
- Infests stored (broken) grain and milled products
- Causes high level of gram contamination
- Presence of reddish brown beetles, cast skins and faecal pellets on damaged grain and milled products indicates infestation by these beetles.
- Serious secondary pests of all stored grain and milled grain products

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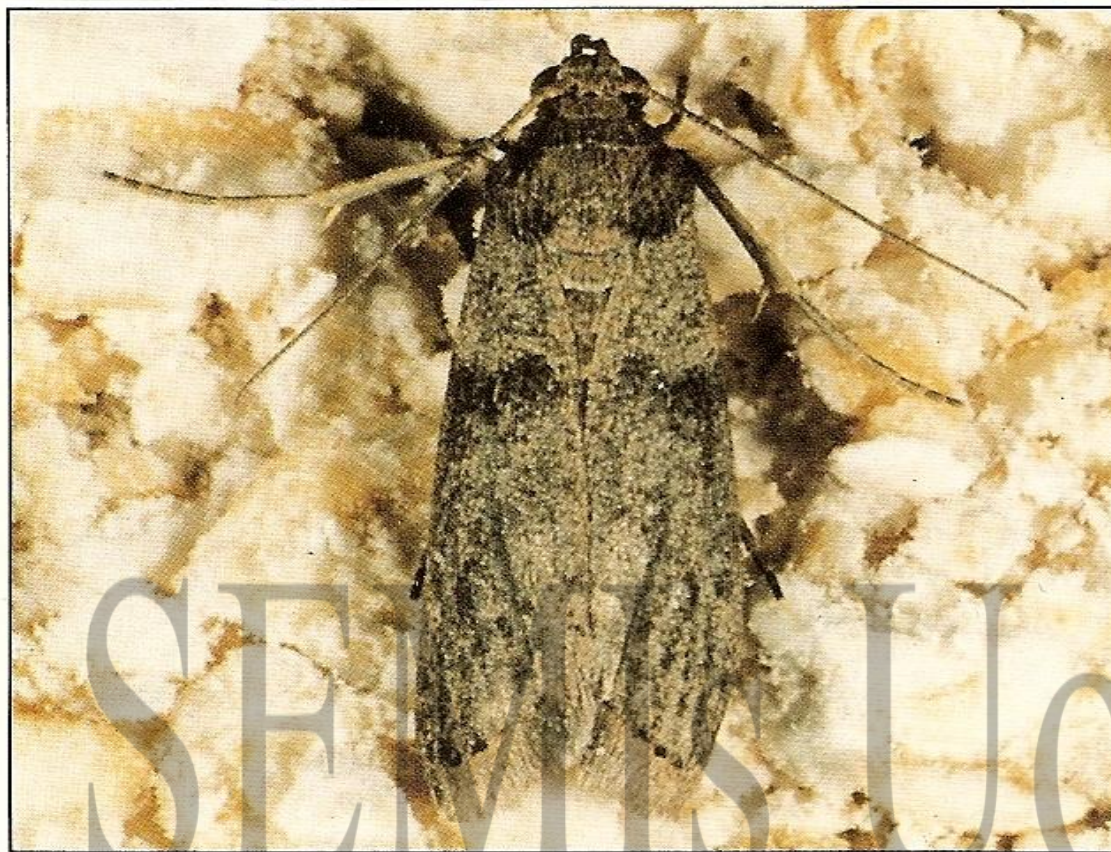


TRIBOLIUM CASTANEUM
(Rust-Red Flour Beetle)

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EPHESTIA spp.

(Tropical Warehouse Moths)

Several species of *Ephestia* may be encountered in tropical stores. They attack a wide range of products particularly damaged or processed cereals, dried fruit, nuts, cocoa and even tobacco. Only the larvae feed. They also leave trails of silk which can form a thick webbing over and in the stored food. Reconditioning food to remove webbing can be very costly.

(Wing span 11-28 mm)

Some Management Practices

Post-harvest Insect pest control should begin before the crop is mature and must definitely begin before it is harvested and put in drying structures.

Proper program for insect control include:

- Select plant varieties with good husk cover and inherent resistance to field and storage pests

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- Repair the store and thoroughly clean before the new crop is mature.
- Clear the surroundings of the store of any waste that can harbor insect pests
- Harvest early to avoid field infestation
- Dry the grain as fast as possible and shell it when dry
- Shell carefully to avoid damage to the kernels
- Treat the dry grain with an appropriate insecticide

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- Carry out regular inspections of the stored grain to detect any infestation and take control measures as necessary
- Carry out principles of good store management , including maintenance, stock rotation and hygiene.

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Rodents as storage pests

- Three most important rodent species in the world are
 1. Black rat or house rat (*Rattus rattus*)
 2. Norway or Common rat (*Rattus norvegicus*)
 3. House mouse (*Mus musculus*)
 4. Multi mammate rat (*Mastomys natalensis*) in Africa and Mid East

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Identification of infestation

- Signs and traces are most useful for deciding where and when to control since most rodents are nocturnal in activity. They include:
- Holes and heaps of soils excavated during burrowing (found around field edges, embankments, raised patches of land, under crop trash or around shrubs)
- Runaways/pathways that the rodents habitually use when moving the nest sites to the feeding areas (are most trodden from the burrows)
- Foot prints and tail marks
- Droppings and urination points that are main signs of infestations in buildings & evidence of gnawing

Signs of rodent infestation

The signs include:

- Live animals seen during daytime
- Droppings shape size and appearance varies with species (banana shape or irregular in shape)
- Runs and tracks
- Foot prints and tail marks
- Tell tale damage
- Burrows and nests
- Urine

Damages observed

- Damage to material and equipment
- Produce leaking out of damaged bags or stored containers
- Bags stacked collapsing due to damage to the lower layers
- Short circuits leading to sparks or fire from cables being chewed
- Storage silos and store buildings may subside or even collapse as a result of being undermined
- Drainage canals around a store may be damaged

Management

Preventive measures

Essential factors for rodent occurrence:

- Sufficient supplies of food
- Protected places for burrows and nests
- Hiding places
- Access to produce

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Storage hygiene and technical measures

- Keep the store absolutely clean.
- Store bags in tidy stacks set up on pellets,
- Store any empty or old bags and fumigation sheets on pallets,
- Keep the store free of rubbish to avoid providing the animals with places to hide
- Keep the area surrounding the store free of weeds to avoid any covers
- Keep the area in the vicinity of the store free of any stagnant water
- Repair any damage to the store immediately

Rodent management cont.

Chemical control using rodenticides such as

- *anticoagulants* (1st and 2nd generations) (causes internal bleeding). Other chemicals include:
- *Alphachloralose* (sedating agent),
- *Bromethalin* (causes oedema changes in the nervous system)
- *Calciferol* (causes excessive mobilization of calcium by intestinal and bone absorption),
- *Sodium fluoroacetate* (blocks energy metabolism causing neurotoxic effects) very toxic to man and NTOs {Therefore its use is very restricted}
- *Zinc phosphide* and other burrow fumigants

Non chemical methods

- Traps
- Rodent barriers such as aluminum sleeves
- Environmental hygiene (clear bushes and clean stores and surroundings)
- Biological control –cats

Control measures only depress the numbers temporarily.

Control must continue or be repeated as a regular operation to keep populations at or below economically culturally acceptable levels



THANK YOU

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