

## Stored Products Pests-Lecture 6 – stage 3

### 3-Rice moth: *Corcyra cephalonica* (Stainton)(Lepidoptera: Pyralidae)

Adult insects do not feed and live for only 1 or 2 weeks. These are external feeders, which feed on grains by webbing them together. Rice moth is widely used for rearing natural enemies in the laboratory and field against crop pests.

**Distribution and status:** The rice moth is distributed in Asia, Africa, North America, and Europe. In the larval stage, it is an important stored-grain pest in India and Pakistan. Distributed well in all rice-growing areas.

**Host range:** Paddy, rice, wheat, maize, sorghum, millet, dried stored product.

**Damaging stage:** Larva

**Life cycle:**

**Egg:** Eggs are whitish, oval in shape, (0.5) mm long, and have an incubation period of 4-5 days.

**Larvae:** Full-grown larva is pale whitish 15 mm long with short scattered hairs and no markings on the body

**Pupae:** The pupal period is about 10 days but may extend to 40-50 days to tide over winter.

**Adult:** Adults light greyish-brown in color, and 12 mm long. The wing span of about 15 mm.

**Detection:** Larvae cause damage by webbing together grains forming lumps and feeding from inside it. Larvae leave a lot of webbing in the grains before pupation, causing excessive lumping, which reduces the marketing quality of the grains. *C. cephalonica* adults can be seen resting on store surfaces and have a peak of flight activity at dusk. The larvae crawl over the stored food and in the last instar construct cocoons that may be found within the stored food, on sack surfaces and store structures. Infestations cause a bad smell.



**Figure: Rice moth: *Corcyra cephalonica* (Stainton) (Lepidoptera: Pyralidae)**

## **Control of stored Products insects:**

For successful and effective control of stored grain insects, a combination of the following practices has to be followed.

An important method that can help in the safe storage of food grains is

### **A/ Prophylactic control;**

Prophylactic methods are intended to prevent the possible infestation of grains. They are of considerable importance in the war against stored grain pests as they prevent the infestation of stored grains and avoid deterioration in their quality and weight loss. There are many prophylactic methods such as the

**1-Bag storage system.** When using bag storage consideration needs to be given to the following characteristics:

1-The bags should not be stacked higher than 4m and plastic bags are more slippery making the stacks less stable

2-Bags should be stacked under cover e.g., under a roof, in a shed, or under waterproof covers.

3-A one-meter gap should be left between and around stacks and a 1.5-meter clearance between the top of the stack and the roof

4- Bags should be stacked on pallets or on an above-ground structure to avoid the possibility of absorbing moisture from the floor.

5-Bags should be stacked so that fumigation can be undertaken easily.

**2- Bulk storage:** At farm level grain is often stored in bulk in containers made from wood or metal. These storages vary in capacity from 200-1000kg. The large mills and collection houses sometimes use metal or concrete silos. These silos range in size from 20 to 2,000-ton capacity. Silos have the advantage that they can be more easily sealed for fumigation and less grain is wasted.

**3- Storage Hygiene:** it should include the following procedures;

1-Keep storage areas clean. This means sweeping the floor and removing dust after they are emptied.

2-Spraying walls, crevices, and wooden pallets of storage with an insecticide before using them again.

3-Placing traps in storage areas help to control pests.

4- Inspect the storage room regularly to keep it vermin-proof

5-Inspect the stored seeds once a week for signs of insect infestation. When necessary and only under the direction of a trained pest control technician.

#### **4- Use of Abiotic factors:**

These factors prevent infestation or check the development of insects and mites. Such as:

1. Moisture/ is a critical factor in the safe storage of food grains.

Grain stored at around 9% moisture content usually escapes from the attack of insects.

2-Insects and mites are (animals without constant body temperature).

The optimal temperature range for the development of most insect pests is from 25°C to 35°C. cooling and storing grains at 10°C-12°C is one of the important measures.

## **B-Exterminatory controls**

### **1- Physical-mechanical curative control:**

1. The turning disturbance method is adopted for grains stored in bulk. Hot spots developed as a result of insect activity are removed mostly by mixing the cool grain with the heated grain. A high proportion of free-living adults is killed during the turning of the grain.
2. Screening is a physical separation of free-living insects. Broken and cracked grains promote the attack of insect pests. Screening should be done regularly and the screened waste should be destroyed immediately to avoid any re-infestation.
3. A direct method of controlling insect infestation is by removing insects from the infested commodity. Equipment used to remove insects that are outside the seeds. The most extensively used direct means of mechanical control is the Entoleter, which uses centrifugal force to impact seeds containing insects. Entoleter is primarily used in flour mills. Kernel infested with primary feeders such as *Sitophilus Sp.* & *Rhizopertha dominica* break apart and are separated from Kernels.
4. Mixing inert dust with grains can provide an efficient method of killing insects. The insecticidal properties of inert like silica & coal ash and dust are used in this method. Silica powder can be mixed with grain as an alternative to chemicals. Silica leaves no chemical residue and minimizes selection for inert dust applied at 1 kg/tonne of grain.
5. Low-dose radiation completely kills or sterilizes the common grain pests and even the eggs inside the grains. This is ideally suited for large-scale operations.

## **2- Chemical controls;**

Among the existing methods of combating store grain pests, the most widely used is the chemical pesticides.

**Pesticides** are any Chemical substance or mixture of substances intended for preventing, destroying, or repelling any pest.

“Pesticide” includes fungicides, insecticides, rodenticides, or any other substance used to control pests.

Concerning insect pests, chemical pesticides use various

### **1-Insecticides**

The insecticide is a poison that can penetrate the insect cuticle and enter the body tissue.

#### **Advantages of Insecticides.**

Insecticides provide long-term protection against pests.

#### **Disadvantages of Insecticides.**

1-Often the chemical residual remains on food substances.

2- Insect species might produce resistance against these chemicals.

### **-Contact insecticide;**

Insecticides can be used on walls, floors, and ceilings as surface treatment or on jute sacks. This is usually aimed against flying insects but may kill the other insects crawling on the surface.

Malathion 50% E.C. at 0.5% or Pyrethrin 25% EC at 0.02% can be applied on bags but not directly on the grains. Malathion is considered one of the safest organophosphate insecticides as it is not highly toxic to humans or pets and breaks down fast under tropical conditions. Malathion will not penetrate piles of grain. it is legal to treat grain with Malathion at 8 parts per million concentrations. As a grain treatment, Malathion is applied at the time the grain is stored. Treated grain should not be sold for at least 10 days nor eaten within 60 days of treatment. Safety precautions

must be observed when applying Malathion or any other chemical. If thorough cleaning of containers is not possible, the containers may need to be sealed and fumigated with phosphine. All second-hand bags should be examined and where necessary treated with either a fumigant, insecticide, or dipped in boiling water.

## **2-Fumigation;**

**The fumigant** is a chemical gas or vapor that requires temperature and pressure to be taken into the body of an insect through its respiratory system.

After the exhaustion of oxygen and when the tracheal system is saturated with carbon dioxide, the insect would be forced to open the spiracles and allow the fumigants to enter the tracheal system. Then the fumigants diffuse further till they reach the whole body of the insect through hemolymph and paralyze the insect.

1-fumigants prefer to be used in stores because usually do not leave residual effects on grains

2-With the power to penetrate through stocks, killing all insects because the gas can reach the pests in the most remote hiding places.

The range of safe fumigant chemicals that can be used is now restricted to phosphine and carbon dioxide

## **-Phosphine fumigation;**

These tablets and pellets release phosphine gas when they come into contact with humid air. Phosphine is toxic to all insects. stages of development from the eggs, larvae, and pupae to adults are killed. Care must be taken when using phosphine as a gas as it is toxic to humans. Fumigation must take place in an enclosure that can be tightly sealed. Once the exposure time is ended, the grain

must be aerated and the bin checked for residual phosphine gas before entry.

### **-Carbon dioxide fumigation**

Insects need oxygen for respiration. With carbon dioxide fumigation, much of the oxygen in the storage bin is replaced by carbon dioxide that suffocates, dehydrates, and also produces toxic chemicals in the blood of the insects. To be effective, elevated carbon dioxide levels must be maintained until all insects die. The required exposure time depends on the percentage of carbon dioxide and the temperature of the grain.