

# Stored-grain insects: a threat to food security

Challenge accepted ✓

In the food industry, **grain storage** is a critical stage. Every year, tons of grain crops are destroyed during this phase as a result of **insect infestations**. This is nothing new: we've known for centuries that where there is food, there may be insects. But when left uncontrolled, a small number of stored-grain pests can cause serious infestations within a very short amount of time.

**Species identification** is the first step in the fight against those insects.

## How to identify them

### Primary storage pests

Infest the whole grain by laying eggs inside



#### Wheat Weevil (*Sitophilus granarius*)

3- to 5-mm body, blackish-brown colour (only occurs in storage settings)

##### Damaged products

- All small grains (especially wheat, maize, rye and oats)
- Sometimes pasta, flour and other cereals

##### Signs of infestation

- Increased moisture and heat on the surface
- Holes in the grains



#### Lesser Grain Borer (*Rhyzopertha dominica*)

small (2.5-3 mm) cylindrical body, reddish-brown colour

##### Damaged products

- Almost all cereals (especially wheat, barley, sorghum and rice)
- Seeds, dried fruit, mushrooms, wood and paper products

##### Signs of infestation

- Tunnels and irregularly-shaped holes in foodstuffs
- Sweetish odour emanating from the grain



#### Angoumois Grain Moth (*Sitotroga cerealella*)

smaller than other moths (5-10 mm body, wingspan of 10-15 mm), yellowish-brown colour

##### Damaged products

- All types of cereals

##### Signs of infestation

- Warmth inside the product
- Irregular holes in the grains

Primary insects damage grains and increase both temperature and humidity, therefore enabling the development of secondary pests, fungi and mites.

### Secondary storage pests

Develop in damaged (broken or rotten) grain, flour, grain dust...



#### Confused Flour Beetle (*Tribolium confusum*)

3-4 mm body, narrow and elongated shape, bright dark-red colour

##### Damaged products

- All kinds of cereals, flour, animal feed, sunower, millet...

##### Signs of infestation

- Cereals become mouldy and warm
- Pungent, putrid odour
- Pinkish colour



#### Saw-toothed Grain Beetle (*Oryzaephilus surinamensis*)

2.5- to 3-mm body, reddish-brown colour

##### Damaged products

- Flour and other flour products
- Dried fruit, dried tobacco, dried vegetables...

##### Signs of infestation

- Easily visible because they live in large groups



#### Indianmeal Moth (*Plodia interpunctella*)

large body (9-mm-long on average, wingspan of 18 mm) and yellow-red wings

##### Damaged products

- Cereal products
- Oilseeds
- Cocoa and chocolate
- Spice

##### Signs of infestation

- Silk webs and faeces (formed by the larvae)

## Risk factors

### Silo characteristics and maintenance

- ✓ Metal silos
- ✓ South-facing silos (higher temperatures)
- ✓ Dusty silos
- ✓ Damaged walls and roofs
- ✓ Flat storage (poor ventilation, high temperatures and high humidity rate)

### Grain characteristics

- ✓ Low grain quality
- ✓ High humidity rate
- ✓ High impurity rate

### Suspected or confirmed presence of insects

- ✓ in the silo during the previous year
- ✓ in other silos of the same site
- ✓ in other batches of the same delivery

### Other factors

- ✓ High outside temperature
- ✓ Prolonged storage

## Risks for the food industry

### Up to 30% of product loss

Stored-grain insects produce mould, generate internal warmth and putrefaction in the infested product

### Decrease in product value

They leave residues and dirt that damage products and lessen their quality

### Impact on nutritional value

They hinder germination and lower the grain's weight and protein content

### Sanitary risks

Their droppings, sheddings and dead bodies pose a health risk to both humans and animals

+ Damaged grain is prone to contamination by mycotoxins and bacteria

## Deterioration of the industry's image

## Each year

**20 to 40%**

of the global crop production

**\$220 billion**

worth of grain

are destroyed by stored-grain insects worldwide\*

Insect infestations damage both grain quality and quantity. Beyond income reduction, these events have devastating effects on the food industry and its ability to meet rising food demand worldwide. Grain is one of the main staples of the human diet: this is why Envu is helping farmers and silo owners to protect post-harvest crops, whose quantity and quality are more crucial than ever.