

How can insects get into the packaging?

Most often, harmful stored-product insects use existing openings (even very small ones) in the packaging. They are attracted by product odours. In this context, moths and beetles lay their eggs near cracks and joints from which volatile compounds of cereal products, nuts or dried fruit etc. emanate. The hatched, minute juvenile larvae can then migrate e.g. through incompletely sealed seams into a commercial food bag or through the holes of a perforation line into a folded carton.

Which packages are insect-proof?

Insect-proof packages have pores smaller than 0.15mm or have a gas-tight seal (e.g. packaging for coffee, baby food and spices).

How to store? How to prevent?

Store supplies as short as possible, keep site or package cool, dry and insect-proof!

Modern housing usually lacks cool pantries. If supplies are stored in the kitchen, temperature and humidity regularly increase due to cooking. This also increases the humidity in the stored goods and makes them more susceptible and attractive to pests during prolonged storage.

If supplies have to be stored at above 15°C for an extended period of time, the following preventive measures are helpful:

- Use insect-proof containers or jars with screw tops or special seals instead of commercial packaging.
- Make sure the lids close tightly. Metal cookie jars are not insect-proof but were designed to allow aeration/ventilation.
- Rather moist products (e.g. fresh nuts, dried fruits) can be stored in an open jar that is covered with a cotton cloth, held in place by two rubber bands.
- Use stored supplies according to the principle 'first in - first out'.
- Look for intact packaging, already at the time of purchase.
- Clean e.g. the pantry and spice rack regularly.
- Check supplies for frass, boreholes, webbing, and insects.
- As a preventative measure, goods with low water content can be frozen for a few days to kill eggs deposited on the surface of the packaging. This is advisable especially if you recently had an infestation in other goods.
- Nuts may be stored in the refrigerator, generally.

What to do in case of an infestation?

Holes in food packaging usually indicate beetles or migrating moth larvae ready to pupate have made their way out. This requires a close inspection of the storage room as a whole.

- If food is infested with beetles still confined in the package, it is usually sufficient to put everything in tightly sealed bags, freeze overnight and then discard the goods.
- In case of moth infestation, the whitish and worm-like migrating larvae, pupal cocoons and adults must be removed. Larvae often migrate from the supplies and pupate in webbing in cracks and joints of packaging, the cupboard, or up in the corner between wall and ceiling. If not removed, the newly hatched moths mate and lay 300-500 eggs into more products. Commercially available traps use sex attractants to catch some of the males and may help to detect an infestation early on. However, they are not suitable for effective pest control.

Mouldy or heavily infested food or feed should always be disposed of. In case of a persistent mass infestation, it is recommended to contact a professional pest controller who can advise you and, if necessary, carry out control measures to eradicate the pests in a sustainable and effective fashion.

Further information on research and literature on stored-product protection as well as pest profiles can be found at the JKI website (mainly in German language):

- <https://wissen.julius-kuehn.de/vorratsschutz/dd/service/aktuelles/publikationen>
- <https://www.julius-kuehn.de/en/oepv/stored-product-protection>

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Flyer of the JKI: How to best protect stored products

As download you will find the information sheet:

<https://www.julius-kuehn.de/faltblaetter-und-broschueren>



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How to best protect stored products

store short | cool | dry | insectproof

From harvest until processing and consumption, dry products such as grains and nuts are generally at risk from being infested by the following pest organisms:

- Insects
- Mites
- Fungi and other microorganisms
- Rodents and birds

In the context of this leaflet, we will focus primarily on common stored-product pest insects responsible for some 80% of losses.

What are stored-product pest insects?

Stored-product pest insects are mainly beetles, moths, and dust lice. They are specialized to live in and feed on dry plant products. By feeding and mass reproduction these insects pose a risk to food supplies, provided that the stored goods have a residual moisture content sufficient to the pests' life cycle. Once the stored products become infested, product quality decreases. Due to pest metabolism, product moisture content, as well as the temperature increase. This may allow infestation by mites and the development of moulds. Harmful microbial toxins such as mycotoxins may develop. For this reason, heavily infested and spoiled goods should neither be consumed by humans nor fed to animals.

Where do stored-product pest insects come from?

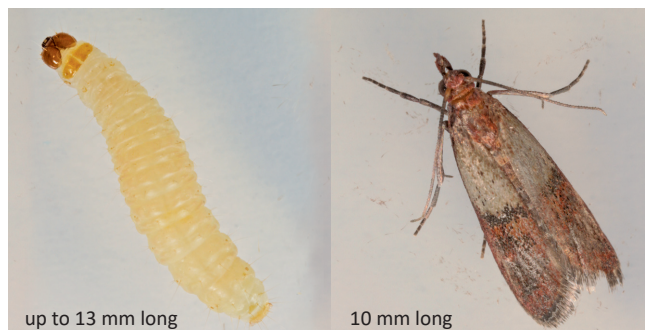
- Introduction with infested food and feedstuff
- Immigration from the outside environment being attracted by odours

Which products of plant origin can be infested?

- Cereals and cereal products (e.g. flours, semolina)
- Processed cereal products (like bakery products, pasta, muesli, animal feed)
- Fatty seeds, nuts, nut products (e.g. nut chocolate)
- Cocoa beans
- Fruit/herbal teas, green coffee beans
- medicinal plants and spices, tobacco
- Dried fruits and vegetables
- Pulses

Which product are usually not affected?

- Oils and fats
- Sugar and products with a high sugar content
- Salt and highly salted supplies
- Smoked goods
- Black tea
- Roasted coffee



Indianmeal moth (*Plodia interpunctella*)

Frequently found in grain, grain products, nuts, dried fruits, seeds, chocolates, animal feed



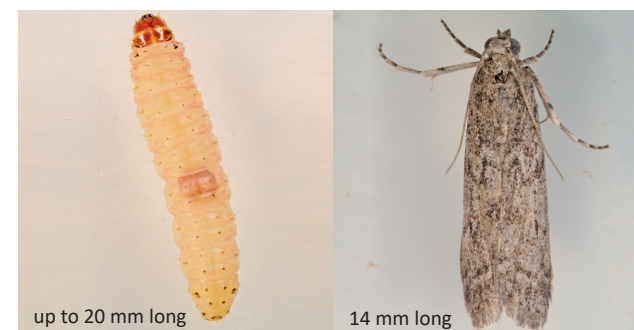
Drugstore beetle (*Stegobium paniceum*)

Frequently found in grain, grain products (e.g. pasta), spices, medical herbs



Flour beetle (*Tribolium spp.*)

Common in grain, flour and grits



Mediterranean flour moth (*Ephestia kuehniella*) * in honour to Julius Kühn

Common in grain, flour, and grits



Lesser grainborer (*Rhyzopertha dominica*), primary pest in cereals & seeds, larval development hidden in grain, thermophilic, now common in Germany



Granary weevil (*Sitophilus granarius*)

Frequently found in grains and pasta. Larval development occurs hidden in the grain, just adults emerge.