

you might miss it

Mites are small. Really small. Infestations are notoriously hard to spot until a site has a massive problem with a large population of mites. Can you confirm if your customer has mites early? Fera is a crop health researcher looking for practical solutions for protecting food stores using science. They've put together an article for PPC to help pest management professionals monitor for these tiny pests.



**...THIS
COSMOPOLITAN,
HIGHLY ALLERGENIC
SPECIES CAN INFEST
ALMOST ANY FOOD
USED BY MAN OR
BEAST.**

Storage mites are important pests for the food and feed industries as they can infest a variety of commodities, especially those based on cereals, at every step throughout the food chain, from raw materials to finished goods.

Mites are typically very small (about 0.5mm), translucent and difficult to detect especially at an early stage of infestation when numbers are low.

Consequently, an infestation often goes unnoticed until numbers have increased dramatically and damage to produce and products become evident. This can happen rapidly as their short development life cycle, at optimum conditions, favours rapid population growth and development.

In addition, many mites can tolerate starvation for long periods by forming hypopi which is a diapause stage. This life stage is almost immobile and very resistant to desiccation. Thus, mites can survive for months under adverse conditions in cracks in floors or walls and in processing and packaging machinery.

The damage caused by a mite infestation can lead to direct financial losses through deterioration of food quality, downgrading of products, end-user complaints and rejection of stock. In addition, storage mites are strongly allergenic and there is growing evidence that mites and their by-

products cause an increase in allergic responses in human and companion animals, and can contribute to poor performance in livestock. There are also reports of anaphylaxis and anaphylactoid reactions due to ingestion of mites from mite-contaminated food.

In the UK, most of Europe and Australia, there is no tolerance of live insects in traded grain, however, thresholds for mites vary and informal limits for many pet foods are below 10 mites per kilogramme. The Codex standard (CODEX STAN 199-1995) for wheat and durum wheat intended for processing for human consumption states that it should be 'free from abnormal flavours, odours, living insects and mites.'



Ecological parameters for some important mite species

| Species | TEMP RANGE °C | TEMP OPTIMUM °C | RELATIVE HUMIDITY MIN(%) | RELATIVE HUMIDITY MAX(%) | FECUNDITY (NUMBER EGGS/FEMALE) | LONGEVITY (DAYS) |
|----------------------------------|---------------|-----------------|--------------------------|--------------------------|--------------------------------|------------------|
| Acarus siro | 2.5-31 | 20 | 63 | 80 | 230 | 30 |
| Lepidoglyphus destructor | 3-34 | 25 | 62 | 90 | 150 | - |
| Tyrophagus putrescentiae | 8.5-36 | 25 | 69 | 85 | 500 | 62 |
| Thyreophagus entomophagus | 3-32 | 20 | 75 | 85 | 156 | 47 |
| Carpoglyphus lactis | 3-35 | 20 | 60 | 80 | 278 | 20 |

Monitoring methods

Early detection and eradication of storage mites are paramount to ensure quality, value and reputation. At Fera, we've developed a package of services tailored to the customers' needs so that pest management companies can make informed decisions to limit the effects of mite infestations and maintain product quality.

MITE TRAP

This trap is specifically designed and developed for monitoring storage mite pests.



It contains an attractant made from non-toxic ingredients, allowing its use in a diverse range of premises and environments.

The trap detects live mites and other storage pests and provides an early indication of problem areas pinpointing hidden mite infestations and refuges. This gives the customer the opportunity to target remedial treatments and resources for best effect. Subsequent routine monitoring of premises for mites allows the effectiveness of control/hygiene measures to be assessed. Traps are supplied 'ready to use' with instructions.

You can then return the monitor to Fera and the numbers and types of mites collected are carefully assessed by our trained personnel. You'll then get sent a detailed report, including guidance on which mites are likely to cause a problem and where remedial action is required.

FLOTATION TEST

The Fera flotation test was developed to identify contaminating matter of animal origin (eg whole or fragmented mites and insects, or rodent hairs) in a wide range of food, feed, veterinary and dust samples and is AOAC accredited.

Mites species in the UK

Four main factors regulate mite numbers in stored products and food processing areas:

- Temperature (3-35°C)
- Moisture content of the medium >12.8%
- Food
- The intrinsic rate or fecundity of the species.

Grain mite (*Acarus siro*)



If the temperature and humidity are favourable this cosmopolitan, highly allergenic species can infest almost any food used by man or beast.

Since it can live on fungi mouldy food can also be infested. Foodstuffs infested with this species can acquire a sickly sweet smell and an unpalatable taste.

Glycyphagid mites (*Glycyphagus domesticus* and *Lepidoglyphus destructor*)

Cosmopolitan species which infest a range of products and are usually the first to invade a probable mite habitat and are therefore an indicator of further infestations to come.

Flour mite (*Thyreophagus entomophagus*)

Commonly infest flour and cereal products.



Mould or cheese mite (*Tyrophagus putrescentiae*)

A cosmopolitan, synanthropic species which is also capable of infesting a wide range of products especially those with a high fat or protein content.

Dried fruit mite (*Carpoglyphus sp.*)

Infest a wide variety of foods - milk products, dried fruits, honey, beer, wine and animal feeds.

Predatory mites

Predatory mites such as those in the family Cheyletidae and Mesostigmata are normally found where there is a well-established infestation of storage mites upon which they feed and as such can be indicators of pest mites.

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It is the single most accurate and effective method of confirming the presence of mites in commodities and can easily differentiate between dead and live mites. The flotation test can be used to assess mite infestations in a diverse array of products such as:

- Fine powders (eg flour, dried milk, yeast)
- Granular materials (eg animal feed, wheatgerm)
- Compacted and pelleted materials (eg animal feed pellets, dairy nuts, pet food)
- Seeds and grain (eg wheat, barley, oilseed rape, maize, soya, rice)
- Dried fruits
- Dust (eg house dust, mattress dust, floor sweepings etc for the detection of house dust mites)
- Plant material (eg hay, straw, wood or paper-based animal bedding)
- Flower bulbs (eg tulips, hyacinths)
- Veterinary samples (eg animal dander).

Samples are suspended in a careful balance of aqueous alcohol, acids and salts before percolating kerosene upwards from the base. Any animal matter present is collected on a filter paper, allowing easy examination away from the bulk sample.

**MITES
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PREFER CEREAL-
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BUT ALSO DRIED
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PACKAGING TESTS

The risk of infestation in packaged commodities is likely to vary according to several factors:

- **The nature and constituents of the product**
Some foods are more prone to infestations than others. Mites generally prefer cereal-based products but also dried fruits and dried plants. However, species such as Tyrophagus also infest products with a high fat and protein content such as linseed, dried egg, groundnuts, cheese and ham.
- **The form of packaging**
Packaging is usually tailored to fit the product and designed to last throughout the storage life of the product. The integrity of the packaging and the materials used are important considerations in preventing infestations. Mites are capable of passing through perforated plastic material with perforations of less than 80 microns in diameter.
- **Storage conditions and length**
The more suitable the conditions for

mite development the more likely the products are at risk. Mites will develop faster at higher temperatures and most infestations are due to prolonged storage under less than optimal warehouse conditions.

- **The product's processing journey**
A product can be infested at any stage from initial raw product to finished goods and during its transit and storage along the way.

Fera can offer packaging penetration tests to help mitigate these risks of infestation. The tests consider the nature of your product, the form of packaging, storage conditions and length of time in storage, with a range of potential pests.

FIND OUT MORE

If you'd like to find out more about Fera's monitoring products contact them directly.

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