



Preventing and controlling mites in stored cereals

Mites as pests

At least twelve mite species infest UK stored grain. The most common are species of *Acarus*, *Tyrophagus* and *Lepidoglyphus*.

Mites can cause direct damage by eating out the germ and can taint produce. The most serious effects potentially result from allergens that mites contain or produce.

Mites may also transmit fungal spores and act as vectors of human pathogens.

Living and dead mites have been found in foods ranging from biscuits to baby food. Such contamination is causing increasing concern.

Mites can survive inside grain and populations build up quickly. Since mites respire through their outer surface, they are very vulnerable to moisture loss. Free-living mites are usually crushed during conveying. They can be removed physically by grain cleaners, but these do not remove all allergens.

Detection

Mites are just visible to the naked eye and are seen as white moving specks or as a moving pink dust on the grain surface or in sievings. They may accumulate in traps at the surface or in bait bags, mite traps and floor traps in empty stores. Mite identification is a task

for a specialist using a low power microscope.

HGCA-funded R&D is developing an immunoassay-based 'pocket diagnostic' kit to detect *Acarus siro* and other common species in processed cereal products.

Preventing mites in store

Drying cereal grain to less than 14.5% moisture content (mc) is the key to preventing mite problems. This level is in equilibrium with air at a relative humidity (rh) of 65% at 25°C.

Low mc is critical for mite control. At temperatures below 5°C most storage insects die; mites merely stop breeding.

HGCA-funded R&D has shown how damp ambient air above the bulk can moisten the surface layers of dried grain during winter. Increasing surface temperatures can result in both insects and mites proliferating.

If grain is stored below 13% mc, moisture uptake is considerably limited, effectively preventing mites breeding (Figure 1).

Control

Currently only organophosphorus (OP) compounds are approved for admixture to grain.

Action:

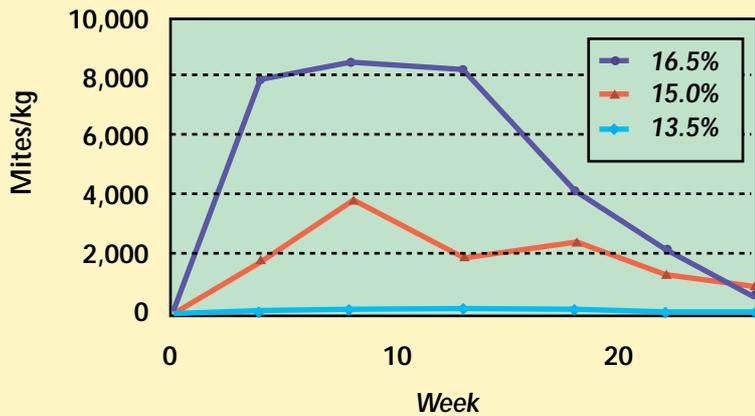
- Dry grain to below 14.5% mc to prevent mites developing in bulk and to less than 13% mc for long-term storage to limit surface populations caused by moisture uptake in winter.
- Cool grain to below 5°C, using aeration, to prevent mite increase and to kill insects.
- Monitor mite populations in stored grain by examining sievings from grain samples, particularly from the surface or by examining the contents of traps.
- Monitor mite populations in empty stores using mite traps or bait bags.
- Combine a top dressing of DE with normal cooling and drying regime to prevent surface infestations of mites.

If you are unsure about any of the suggested actions, or want them interpreted for your local conditions, consult a professional agronomist.

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Figure 1. Numbers of *Lepidoglyphus destructor* mites at the grain surface in bins of malting barley



Source: EU/DEFRA-funded project

In cereals, mites can be discouraged by accurate application to the bulk of a liquid OP at recommended rates. Treatment of existing infestations is more difficult as they are not very susceptible to OPs and there is little margin for error. Dust formulations are no longer available and shortly will not be approved for admixture to grain.

An HGCA-funded project therefore assessed several alternatives to OPs, particularly for mite control at the grain surface. Diatomaceous earth (DE), a siliceous dust, was effective.

Unlike a conventional pesticide, DE acts in effect by physical control by desiccating insects and mites. However, DE may limit grain flow if the entire bulk is treated so it can only be incorporated at effective

application rates to the grain surface.

DE application will only give longer-term control when combined with an effective drying and cooling regime.

To prevent mites occurring at the surface of grain, rake DE into the top 0.3 m at 200 g/m² (1 g/kg). To deal with existing surface infestations treat with 600 g/m² (3 g/kg).

The effect of DE is to limit population growth. Control of the least susceptible pests, grain weevils, could take several weeks.

A current HGCA project is investigating the use of DE for fabric treatment to reduce residual mite populations in grain stores.

Summary

Mites are found in over 80% of grain stores. They feed on cereal germs, taint and reduce animal feed palatability and may contaminate grain and its products with allergens.

Mites proliferate in moist conditions when grain is in equilibrium with air at over 65% rh (14.5% mc). To prevent mites, grain should be dried to below 14.5% mc before cooling.

Surface infestation can be discouraged by lowering the bulk mc below 13% mc where possible or by applying a diatomaceous earth (DE) to the surface of dried, cool grain.

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