GRAIN STORAGE
FACT SHEET

GRDC
Grains Research & Development Corporation
Stored Grain Project

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Hygiene and structural treatments for grain storages

When it comes to controlling pests in stored grain — prevention is better than cure. Grain residues in storages or older grain stocks held over from last season provide ideal breeding sites. Meticulous grain hygiene combined with structural treatments, such as inert dusts and slurries, can play a key role in reducing the number of stored grain pests.

KEY POINTS

- Effective grain hygiene requires complete removal of all waste grain from storages and equipment.
- Be meticulous with grain hygiene – pests only need a small amount of grain for survival.
- Structural treatments, such as inert dusts and slurries, can be used on storages and equipment to protect against grain pests.
- Check delivery requirements before using chemical treatments and avoid using with pulses and oil seeds.

Keep it clean

A bag of infested grain can produce more than one million insects during a year, which can walk and fly to other grain storages where they will start new infestations.

Meticulous grain hygiene involves removing any grain that can harbour pests and allow them to breed.

It also includes regular inspection of seed and stockfeed grain so any pest infestations can be controlled before pests spread.

Where to clean

Removing an environment for pests to live and breed in is the basis of grain hygiene, which includes all grain handling equipment or storages.

Grain pests live in dark, sheltered areas and breed best in warm conditions.

Common places where pests are found include:

- Empty silos and grain storages
- Aeration ducts
- Augers and conveyers
- Harvesters
- Field bins and chaser bins
- Left-over bags of grain
- Trucks
- Spilt grain around grain storages
- Equipment and rubbish around storages
- Seed grain
- Stockfeed grain

Successful grain hygiene involves cleaning all areas where grain gets trapped in storages and equipment.

Grain pests can survive in a tiny amount of grain, so any parcel of fresh grain through the machine or storage becomes infested.

PHOTOS: CHRIS WARRICK, KONINN GROUP

Prevention: Successful pest management starts before grain goes into storage.

Harvesting equipment: Clean out harvesters and grain handling equipment thoroughly with pressurised air.

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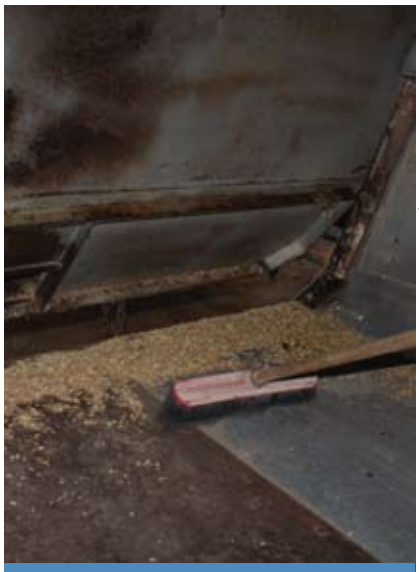
Silo sweep-out: An extended broom handle makes sweeping out silos easer.



Trucks: Grain left in trucks is an ideal harbour for grain pests to breed. Keep trucks, field bins and chaser bins clean.

PHOTOS: CHRIS WARRICK, KONDININ GROUP

All-over clean: Clean silos, including the silo wall, with air or water to provide a residue-free surface to apply structural treatments.

PHOTO: BEN WHITE, KONDININ GROUP

A clean site: A concrete slab under silos makes cleaning easier.

PHOTO: CHRIS WARRICK, KONDININ GROUP

When to clean

Straight after harvest is the best time to clean grain handling equipment and storages, before they become infested with pests.

A trial carried out in Queensland revealed more than 1000 lesser grain borers in the first 40 litres of grain through a harvester at the start of harvest, which was considered reasonably clean at the end of the previous season.

It is well worth the effort to clean out harvesters thoroughly at the end of each harvest and discard the first few bags of grain at the start of the next harvest. Discarding a small amount of the first batch of grain at the start of each harvest stops any pests surviving in the equipment from infesting grain storages — a common occurrence. However, this alone is no substitute for thorough cleaning.

How to clean

The better the cleaning job, the less chance of pests harbouring. The best ways to get rid of all grain residues use a combination of:

- Sweeping
- Vacuuming
- Compressed air
- Blow/vacuum guns
- Pressure washers
- Fire-fighting hoses

Using a broom or compressed air gets rid of most grain residues, a follow-up wash-down removes grain and dust left in crevices and hard-to-reach spots.

Choose a warm, dry day to wash storages and equipment so it dries out quickly to prevent rusting.

When inspecting empty storages, look for ways to make the structures easier to keep clean.

Seal or fill any cracks and crevices to prevent grain lodging and insects harbouring.

Bags of left-over grain lying around storages and in sheds create a perfect harbour and breeding ground for storage pests.

After collecting spilt grain and residues, dispose of them well away from any grain storage areas.

PHOTO: CHRIS WARRICK, KONDININ GROUP

Harbouring pests: Air ducts provide a perfect harbour for grain pests so thorough cleaning is essential.

PHOTO: CHRIS WARRICK, KONDININ GROUP

Be gone: Remove spilt and left-over grain and burn or bury it well away from the grain storage site.

Structural treatments

After cleaning grain storages and handling equipment treat them with a structural treatment.

While most grain buyers accept small amounts of residue on cereal grains from chemical structural treatments, avoid using them if handling and storing oilseeds and pulses.

It is always safer to check with the grain buyer's delivery standards for maximum residue level (MRL) allowances before using grain protectants.

An inert dust, such as diatomaceous earth (DE) (amorphous silica), commonly known as Dryacide®, can be applied either as a dust or a slurry to treat storages and handling equipment for residual control.

Dryacide (DE) acts by absorbing the insect's cuticle (protective exterior), causing death by desiccation (drying out).

If applied correctly with complete coverage in a dry environment, inert dusts such as Dryacide (DE) can provide up to 12 months protection — killing most species of grain insects and with no risk of building resistance.

Applying inert dust

Inert dust requires a moving air-stream to direct it onto the surface being treated.

Throwing it into silos by hand will not achieve an even cover so will not be effective.

For small grain silos and bins a hand-operated duster, such as a bellows duster, is suitable.

Larger silos and storages require a powered duster operated by compressed air or a fan.

If compressed air is available it is the most economical and suitable option for on-farm use — connected to a venturi duster such as the Blovac BV-22.

The application rate is calculated at two grams per square metre of surface area treated.

Although inert, breathing in excessive amounts of dust is not ideal, so use a disposable dust mask and goggles during application.

Silo application

Apply inert dust in silos starting at the top (if safe) by coating the inside of the roof then working your way down the silo walls, finishing by pointing the stream at the bottom of the silo.

TABLE 1

STORAGE CAPACITY (t)	DUST QUANTITY (kg)
20	0.12
56	0.25
112	0.42
224	0.6
450	1
900	1.7
1800	2.6

If silos are fitted with aeration systems, distribute the inert dust into the ducting without getting it into the motor, where it could potentially cause damage.

Machinery application

Calculation of surface areas of machinery is not normally possible.

For augers, conveyors and grain handling equipment, use a blow/vac to apply a steady dust stream into accessible openings, coating all the internal surfaces as much as possible.

Continue until a dust stream emerges from the exit/discharge points of the equipment.

For an average harvester the recommended quantity of inert dust is about 2.5 kilograms.

Applying inert slurry

With the right equipment, diatomaceous earth can also be applied in a slurry form.

PHOTO: CHRIS WARRICK, KONDININ GROUP

Ready, aim, fire: A blow/vac or air venturi gun is the best applicator for inert dust.

A little more involved than applying dust, the slurry needs to be mixed in a mixing tank then sprayed on through a flat fan nozzle capable of at least five litres per minute. Mix the diatomaceous earth with water at a rate of 10-20 per cent to form a slurry and apply at six grams per square metre (dry basis).

The aim is to apply the slurry to give complete coverage but ensure it doesn't run off the walls of storages and equipment.

An inline filter with 1000 micron (one millimetre) mesh and a recirculation hose will help prevent nozzle blockages and keep the slurry mixed during application.

Impeller pumps are most suitable — typically a fire-fighting pump with a 3.7 kilowatt (five horsepower) motor.

Do not use positive displacement pumps, such as gear or piston pumps, as they will block easily.

If applying a lot of slurry regularly, use a designated, older pump as pumping slurry will reduce a pump's working life.

Apply the slurry in the same order as the dust — start at the top of the silo or storage and work down the walls applying an even coat, avoiding runs from spraying too close or too much slurry.

A solid pipe extension on the application hose will enable a more even coating on hard-to-reach areas such as silo walls.

PHOTO: CHRIS WARRICK, KONDININ GROUP

Preparation: Inert dust (DE) is available in more than one brand and may need to be ordered in from your local rural supplier.

POST-HARVEST CHECKLIST

- ✔ Sweep or blow out all empty grain storages and equipment.
- ✔ Wash down with water on a warm, dry day.
- ✔ If not storing oilseeds or pulses, apply structural treatment.
- ✔ Monitor all stored grain fortnightly during summer, monthly during winter

Monitoring storages

Grain kept for seed or stockfeed is a common breeding ground for pests so monitor all grain storages every two weeks during warmer periods of the year and at least monthly during cool periods of the year.

Use grain insect sieves and traps to monitor for pests in all stored grain and regularly check grain handling equipment during the off season.

Finding grain pests early allows them to be identified, treated appropriately and removed before they spread and become a much larger problem, which may be more difficult to treat.

Useful resources:

GRDC Grain storage extension project		www.storedgrain.com.au
Grain Trade Australia		www.nacma.com.au

Grain storage specialists

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