



# On-farm storage – getting it right

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## IN A NUTSHELL

- Planning is the first step to successful storage. Critically assess your current system and site. Can it meet market expectations? Can you plan for expansion?
- Successful grain storage relies on an integrated quality management approach, combining grain hygiene, sealed gas-tight storage and aeration.
- The preservation of phosphine as an insect control tool, through correct use in gas-tight sealed storages, is critical to maintaining grain quality during long-term storage.

*This article has been adapted from a paper presented at the GRDC irrigation updates at Griffith and Moama, 2010.*

***On-farm storage of grain has been increasing during the past 10 years for a variety of reasons: harvest buffer, feed storage for livestock, and marketing purposes. Growers will typically use and have a variety of storages at their disposal. While each should work well for its intended purpose, it is worth considering the pros and cons of each type of storage, particularly in regard to the ease of insect and quality control for the expected period of storage.***

The key to success is to know the target outcome for the grain and to match the storage system to that end. It is pointless storing grain for the long term in a system that is intended for short-term storage.

The other major consideration is increasing levels of resistance in insects of stored grain to the contact treatments used in unsealed storage. This is making insect control more difficult. Investing in gas-tight sealed storage or having at least a proportion of storage as gas-tight sealed storage enables successful fumigation to kill insects.

### Plan for success

Having a plan is essential to ensure successful grain storage. Know where your grain is, determine suitable protection periods for specific storages, record treatments, determine quality specifications and know when to check the grain.

Often a storage site will increase in size over time and planning for expansion is essential (for example, to ensure access to power for future aeration). Also ensure any storage facility is easy to access and use. When considering new storages plan for the end goal.

### Storage periods

For short-term storage, growers can use 'ground dumping' and silo bags. Clearly, grain stored on the ground should be moved

or used as quickly as possible (within six weeks). Silo bags offer better protection from the elements and are particularly good for managing harvest pressure.

For medium-term storage growers can use unsealed silos, sheds, silo bags and gas-tight sealed silos. The longer the storage period required, the greater the potential for infestation. It is difficult to control insects in sheds (even when grain is treated) and options for killing insects if grain becomes infested are limited. Silo bags are typically not treated and require nil insect levels when loaded.

### Use protectants

Although we presume there are no insects in grain when being loaded into storage, we generally treat the grain using protectants, or fumigate in gas-tight sealed storage. When using protectants always read and follow label directions, calibrate, mix and apply chemicals correctly and always wear the recommended safety gear.

Unsealed storage, when managed well, can yield clean grain – but always treat grain in unsealed storages with a protectant. Aeration is increasingly common and also can help manage insects and quality in unsealed storages.

Increasingly growers are storing grain for up to 12 months. To do this the storage system needs to be able to kill insects effectively and maintain grain quality. Gas-tight sealed and aerated storage is the best way to do this. Fumigating the grain kills any insects present and the aeration maintains grain quality.

In a gas-tight sealed silo grain can be fumigated effectively providing quick, inexpensive and long-lasting insect control. Market flexibility is greatly enhanced because grain is stored residue-free. When considering new storage, consider gas-tight sealed storage as an option. Like any piece of equipment on the farm gas-tight sealed silos need to be well maintained to work efficiently. Check seals before each filling and replace if worn or damaged. Always pressure test the silo to ensure it is sealed.

## Keep it clean

Whatever the system, there are always basic principles to follow, the most important is to have excellent grain hygiene – prevention is better than cure. Clean up any grain spills immediately wherever they may be, but particularly around the storage area. To help this process, spray out or remove any weeds around the storage area. Silos mounted on a slab are easier to clean and keep clean.

Clean up all grain spills around the farm and storage area, ensure all harvesting and storage equipment is clean and treated with a structural treatment. Inert dusts (for example, Dryacide®, Absorba-Cide®, Cut 'N Dry™ and Perma-Guard®) can be used to treat the header, storages and handling equipment for residual control. Always read and follow label directions.

## Keep grain safe

Always use a mixture of an organophosphate (for example, Fenitrothion®, Actellic® or Reldan®) with methoprene (for example, IGR® and Diacon®,) either by mixing them together or bought as a 'twin pack' such as Reldan Plus®, to protect grain during storage. Resistance in the lesser grain borer to methoprene is increasing, making it difficult to control the borer in unsealed storages. Regularly monitor grain to detect any problems that may arise. Inspect storages fortnightly during summer and monthly during winter. Early insect detection prevents increasing numbers and potential reinfestation of other sites.

Insect infestations are not evenly distributed throughout a silo. Insects seek out the most favourable places, such as the grain peak and around hatches, where moisture can get in. If insects are found, or damage is detected it is important to treat the infestation.

Any grain with holes in it indicates that primary pests, such as the lesser grain borer or the grain weevil have infested the grain. Correct insect identification is important to determine a suitable control tactic. In unsealed storages, dichlorvos is used to treat existing insect infestations. Unfortunately the lesser grain borer is commonly resistant to dichlorvos, however the chemical is effective on the other insect pests.

In sealed gas-tight storage, phosphine will control all pests when used at correct label rates and fumigation periods.

## Making phosphine last

Phosphine resistance is a serious threat to the grain industry. While resistance is right in our face, it really is a symptom of a larger problem – phosphine use in structures that are not gas-tight, or use at off-label rates and or insufficient fumigation periods.

Ensuring phosphine use only in gas-tight structures at label rates and for recommended fumigation periods will enable the industry to prolong the use of this important insect-control tool. The first step for growers is to ensure existing and new storages are gas-tight. Gas tightness is determined by a standard pressure test.

A new national standard for gas-tight sealed grain storages will provide growers with a benchmark for testing existing silos and a reference point when buying new ones. The standard is based

on a five-minute half life pressure test. For a storage to comply with the new national standard for sealed silos the oil levels in the pressure relief valve must take at least five minutes to fall from 25 mm to 12.5 mm. After the silo has been tested and has met the pressure test it is important to follow label directions when using phosphine.

Correct dose rates are essential as are the correct fumigant exposure periods. The exposure period is determined by temperature and are:

- recommended minimum exposure period:
  - 7 days when warmer than 25°C
  - 10 days at 15–25°C
- ventilation period:
  - 24 hours with fans
  - Up to 5 days without fan
- withholding period:
  - 2 days after the ventilation period (human or stockfeed).

## Maintaining quality

High moisture and temperature can affect grain in many ways – insect activity increases, spoilage can occur due to moulds and fungi and seed viability can be affected. Always aim to store grain at a moisture content of 12% and at 25°C or less. Harvest temperatures are often 30°C or higher and during summer, temperatures in silos can exceed 40°C. This makes keeping grain cool a challenge.

When harvesting, target cool grain to be stored on-farm. This may mean harvesting when moisture can be high, a moisture meter can be used to ensure moisture limits are not exceeded. Installing an aeration system will further assist in cooling grain.

## What should you consider now

In most cases it would be impractical to replace all storage with new sealed storage. You should have a proportion of sealed storage in your system to fumigate grain. Where storage is to be increased, good quality sealed storage should be purchased. Existing unsealed storage can be fitted with aeration. Grain fumigated in sealed storage can be transferred to aerated storage, monitored and confidently stored until needed. Careful planning, understanding your market's needs, and investing in good quality storage will allow growers to have a quality product. When growers can manage their on-farm system in this way, on-farm storage can be a valuable marketing tool.

## Keep the market in mind

Above all, work with grain end-users to ensure any delivered grain meets receival expectations. A system that allows easy grain storage while maintaining quality will ensure growers can deliver grain that meets market expectations.

For further grain storage information go to:  
[www.storedgrain.com.au](http://www.storedgrain.com.au) 

## Further information

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