



## DE PRODUCTS PUT TO THE TEST

Prevention rather than cure is always the best approach when it comes to grain storage hygiene

By Philip Burrill and Andrew Ridley

LOADING GRAIN INTO an infested silo guarantees problems down the track. On the other hand, diligently cleaning empty storages and grain-handling equipment significantly reduces the number of pest breeding sites on-farm.

The best hygiene results come from physically cleaning out/washing down residues, followed by a diatomaceous earth (DE) treatment. However, grower queries about the effectiveness of different DE products prompted Queensland Department of Agriculture and Fisheries (DAF) researchers to put them to the test.

Queensland DAF researchers in Brisbane tested the efficacy of four commercial DE products: Dryacide®, Permaguard®, Cut'n'dry® and Absorbacide®.

Three of the most common stored grain pests, the lesser grain borer (*Rhyzopertha dominica*), the rice weevil (*Sitophilus oryzae*) and the rust-red flour beetle (*Tribolium castaneum*) were contained on sections of steel treated with label rates of the DE products.



The lesser grain borer.

PHOTO: QUEENSLAND DAF

Dryacide® was the fastest-acting product for all three species tested. The most significant difference between products was their efficacy against the rust-red flour beetle, with only two products showing acceptable results. Product performance from best to worst was – Dryacide®, Permaguard®, Cut'n'dry® and Absorbacide® (Figure 1).

### APPLICATION

DE can be applied to structures and equipment either as a dry dust or added to water to form a slurry. The rate for dust application (straight out of the bag) is two grams per square metre, which is equivalent to one kilogram of DE over 500m<sup>2</sup>. A Blow-Vac gun is one option for application.

DE dust can also be mixed into

water at 120g dust per litre of water and applied at a rate of 5L/100m<sup>2</sup>, giving an application of approximately 6g/m<sup>2</sup> dry basis to the storage structure.

The label specifies a flat fan nozzle with at least 5L per minute flow rating, so an XR11015VK ceramic nozzle would be a suitable choice. The ceramic will withstand the abrasion much longer than a plastic nozzle. At 3-bar this nozzle will flow at 5.9L per minute.

### GRAIN TREATMENT

The label allows for DE's use as a grain treatment. The problem for grain treatments at the label rate of 1kg DE/tonne of grain is that it affects grain flow characteristics and therefore handling. It also has an impact on grain 'angle of repose'.

For this reason most bulk-handling companies and other grain buyers do not accept bulk grain treated with DE.

The presence of DE in grain can also impact on milling quality and there may be other specific market objections to DE dust application to bulk grain.

Always check with buyers before applying it to grain. Current retail cost for DE ranges from \$6 to \$10/kg, making it an expensive treatment for bulk grain.

### NOTES ON USE

DE dust particles kill insects by absorbing some of the waxy layer covering the insect's body. Damage to this outer 'waterproofing wax layer' leads to desiccation and eventual death over several days.

Research in the US indicates DE's impact on the insect's body is both abrasion and

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**DIATOMACEOUS EARTH (DE)** is an inert dust made from the fossil remains of diatom skeletons. Diatoms are a type of green or brown algae that grows in freshwater lakes and marine estuaries. There are many species of diatoms and each has a unique size and shape. The various DE products are produced from different mine sites in Australia and overseas and as such have different properties. The way DE is processed also affects its insecticidal properties.

desiccation. Therefore, DE works best in low-humidity conditions. Stored cereal grains, such as wheat, must be at no greater than 12 per cent moisture content (60 per cent relative humidity) for DE to be effective.

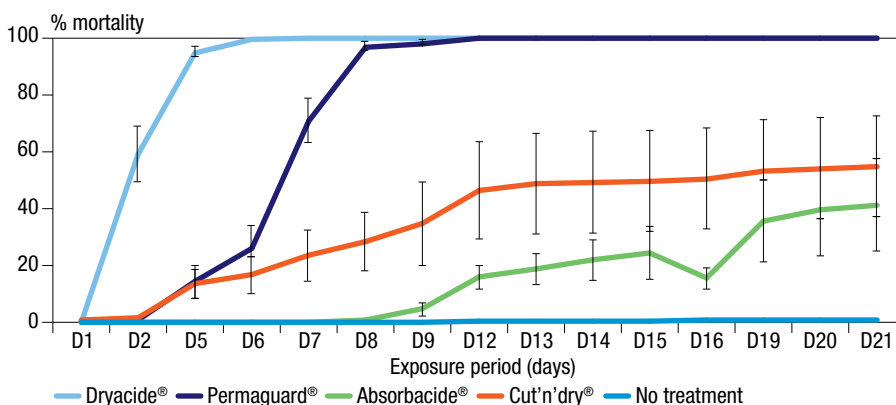
DE is one of the few products available as a structural treatment suitable for all cereal grains, pulses and oilseeds. Chemical insecticides such as fenitrothion can lead to chemical residues on oilseeds and pulses being detected by domestic and export grain buyers if used inappropriately.

The best approach for all storages and equipment is to physically clean and/or water wash all grain residues and dust, then consider using a DE structural treatment to deal with any remaining pests. □

### GRDC Research Code PRB00001

**More information:** 1800 WEEVIL (1800 933 845); [www.storedgrain.com.au](http://www.storedgrain.com.au); Queensland DAF's customer service centre, 13 25 23

**FIGURE 1** Efficacy of four DE products and a no treatment control over three weeks against rust-red flour beetles on steel.



SOURCE: QUEENSLAND DAF