



IT'S ALL IN THE SEAL

By Gio Braidotti

REPLACING OXYGEN IN grain storage silos with nitrogen has proven an effective way to remove insects at all stages of their life cycle, leaving stored grain – be it wheat or canola – preserved, residue-free and subject to no withholding periods.

Nitrogen is also the preferred storage option, says Western Australia grower Doug Clarke, who is the earliest adopter of the technology in its on-farm form.

Mr Clarke made the switch five years ago on his Lake Grace property, and has made his silos available to Murdoch University researchers led by stored-grain expert Professor YongLin Ren, with support from the GRDC.

Mr Clarke has hosted visitors over the years, including overseas buyers, and says he has learnt the extent to which insecticide-free grain is preferred by buyers.

While he says the system is performing well, he is committed to continuous improvement.

However, one challenge is that there is currently no price signal favouring residue-free grain to compensate for the investment and the extra work associated with nitrogen-based storage.

In relation to the technology itself, Mr Clarke has no issue with existing oxygen-purging systems. He says the nitrogen generator needed to purify nitrogen



PHOTO: NICOLE BAXTER

Doug Clarke, Lake Grace, WA, checks the oxygen content of his silos using a handheld meter.

from the atmosphere and pump it into a silo is a machine developed by the oil industry, which is widely available.

“At a rate of 30 cubic metres an hour, it costs about \$5 worth of diesel to purge a silo of oxygen all the way down to 0.05 per cent total content,” he says. “Best of all, insects never acquire resistance.”

Another challenge relates to infrastructure: silos leaking.

“The standards for sealed silos are too low for nitrogen storage of grain,” Mr Clarke explains. “The accepted level on the seals for a silo is the loss of half an inch (12.7 millimetres) of water pressure in three minutes.”

The oxygen in the silo needs to be purged long enough to kill all insects. Mr Clarke has identified a relationship between eradication time (for all stages in an insect’s life cycle) under

nitrogen and grain temperature.

The eradication time is as low as one week at high temperatures, at 20°C it blows out to three weeks, and below that temperature he says it does not work.

It is these circumstances that have created resistance to insecticides and an interest in the latest sealing technology.

“What I am saying is that the better the seal, the better control you have under any fumigant. We need to be looking to the latest sealing technology, including polymers and 3D printers,” he says. “The area that now needs improving is the silo manufacturing.” □

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RESEARCH TESTED

By Rebecca Jennings

GRDC-FUNDED RESEARCH THROUGH the Plant Biosecurity Cooperative Research Centre (CRC) is being put to the test by growers and bulk handlers at five sites across Australia.

Plant Biosecurity CRC grains coordinator Dr David Eagling says the impact sites are a partnership with industry to work through implementation issues. Each site has different industry partnerships and a different focus:

- in central New South Wales, the impact site at the GrainCorp facility in Temora focuses on testing a new paint-based product to control storage pests;
- in southern Australia, research at the

Viterra facility at Bowmans, South Australia, includes insect monitoring to complement Plant Biosecurity CRC investments in grain insect ecology;

- in the west, the focus has been at the CBH facilities at the grain port of Kwinana, where the team has been putting low-oxygen/nitrogen technology through its paces;
- in the northern Western Australian grain region, the impact site is a partnership with the Mingenew–Irwin Group (MIG), with various activities located directly on grower’s farms (a particular focus over the past 18 months has been the deployment of aeration technology developed jointly by the GRDC and the Plant Biosecurity CRC); and
- in southern Queensland, the site has been a partnership with GrainCorp with an assessment of sulfurlyl

fluoride across various locations.

“The Plant Biosecurity CRC is conscious that research needs to be implemented into existing grower and bulk-handler processes and management to be successful,” Dr Eagling says.

“We are working on the best way to do this, as well as looking at the benefits of bringing together multiple research findings that can be integrated in a systems approach, rather than each one in isolation.

“The industry impact sites assess how a range of research outcomes fit together in the day-to-day operations on-farm, at ports and in bulk-handling facilities.”

He says the impact sites provide researchers with a central point for field testing and involve growers and bulk-handlers in deciding what research to test and how to go about evaluating the research findings.