

## Automation for peace of mind

MANUAL CONTROL OF AERATORS CAN BE UNRELIABLE, REPORT **KEN BULLEN** AND **PHILIP BURRILL**

IN 2004, QUEENSLAND DPI&F's stored grain development agronomist Philip Burrill worked with graingrowing family Rob and Barbara Piper and their sons John and Andrew at Felton on Queensland's eastern Darling Downs, to confirm the real benefits of automatic aeration controllers.

In reference to their traditional methods of aeration management, John Piper says: "We were manually controlling our aerators – trying to pick cool air for our grain, but not leaving the aerators going in rainy weather. Sometimes I'd get it wrong, or forget about the aerators and end up with a result we didn't want.

"Last season we were reluctant to risk the barley crop by delaying harvest until grain moisture dropped to 12.5 per cent. The growing season here was such that we had a lot of late-maturing grains. We decided to harvest earlier at grain moisture content around 14 to 14.5 per cent, to reduce risk of weather damage in the paddock.

"The grain temperature data clearly indicated that our barley quickly reached temperatures over 40°C in the silo. This was due to the summertime harvest temperatures and in particular the higher grain moisture content. Once turned on, our aerators reduced grain temperature to 20°C in a matter of a day or two. Cooling grain is important in preserving grain quality and in suppressing insects.

"The automatic controller on our aerator certainly assisted us to more easily and reliably manage temperature in our grain. We were able to store the barley for three months over summer and delivered it in excellent condition direct from our silo."

Mr Burrill says that common grain pests can increase rapidly in warm, moist conditions.

"For example, if you took 100 lesser grain borers (a common storage pest in Australia) and placed them in wheat with a moisture content of 13 per cent and a grain temperature of around 30°C, you would have 31,000 grain borers in eight weeks under such favourable breeding conditions," he says. "Likewise, the common rust-red flour beetle under these conditions would mul-

tiple to 24,000 in eight weeks.

"But if the grain temperature was reduced to 18°C, both these pests would stop multiplying. Reduce the temperature below 15°C and all major storage pests stop breeding."

Aeration cooling lowers grain temperature by blowing cool air through it. This can significantly slow the growth of insect numbers and reduce the need for chemical use. The trial on the Pipers' Felton grain farm shows that a standard aeration cooling system, with an automatic control unit, was able to maintain grain temperatures in barley at around 20°C throughout summer.

Cereal grains harvested at moisture content of 14 to 16 per cent plus, or with a high level of green grain, can very quickly heat up to temperatures over 40°C once in a silo with no aeration.

High temperatures can quickly damage grain germination and quality.

An automatic controller is usually more reliable than manual switches or timers in selecting the 'best quality' air. They can be bought and installed for about \$3000 to \$4000. One control unit can be used to manage up to eight silos.

"For reliable aeration management of high-moisture-content grain it is important to upgrade fan and ducting capacity," Mr Burrill says. "So rather than the standard low airflow rates of two litres per second per tonne (L/s/t) associated with aeration cooling, we need to move up to high fan outputs of 10 to 20L/s/t to safely conduct aeration drying."

The Pipers are now working with Alan Andrews, an engineer with Customvac Australia Pty Ltd, Toowoomba, and have recently upgraded one silo with extra fans and ducts to manage moist grain.

John Piper says the experience of working with QDPI&F has resulted in them fitting four manually-controlled 0.5hp aeration fans and extra ducts to one of the 120-tonne wide-based silos with excellent results on grain sorghum.

"We half-load the silo with about 50 tonnes, giving us relatively shallow grain depth. Our sorghum went in at 14 to 14.5 per cent moisture content, aiming for 12.5 per cent moisture for delivery. When it tested 13.5 per cent at the top of the grain, I transferred it to another silo and monitored the moisture. We found what we expected – dryer grain towards the bottom. I'm happy with the results so far."

John says the next challenge is to automatically monitor both moisture and temperature in stored grains to more closely manage grain quality and insect populations. He says the effort put into the hygiene of silos, augers and machinery before harvest is an important first step in reducing the initial insect pest build-up.

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**For more information:**

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**Top: Philip Burrill discussing outcomes of a trial of an automatic aeration controller, with graingrowers Rob, John and Andrew Piper, at Felton on Queensland's Darling Downs.**

**Above: Philip Burrill reports to a graingrowers' discussion group.**