

# In-depth research for less evaporation

By Gary Alcorn

Growers facing restricted water access and potentially lower allocations under imminent regulations from various authorities don't want to see their precious stored resource disappear into thin air.

Is evaporation a major concern? Storage losses from a free water surface by evaporation — ranging from 30–50 per cent — across, for example, Queensland's grain production areas would suggest it is.

To slash this loss the Qld Department of Natural Resources and Mines commissioned the National Centre for Engineering in Agriculture (NCEA) to undertake an Evaporation Control Project (ECP) as part of the state-wide Rural Water Use Efficiency Initiative.

This project will assess the performance of evaporation mitigation products (EMPs) in protecting a vital resource and assess their potential role in on-farm water management.

The 20-month program will determine whether EMPs or storage cover materials are capable of significantly cutting moisture losses — some claiming by as much as 80 per cent — and at what cost.

Research agricultural engineer Andrew Brier has established demonstration sites from Cubbie Station near Dirranbandi in the south of the state to Peak Downs in the Central Highlands from his base at the



NCEA engineer Andrew Brier prepares this unique water pressure measuring kit to check evaporation control under EvapCap bubble wrap on 10 metre evaporation tanks.

NCEA in Toowoomba.

“These EMPs have been developed both here and overseas. We will look at their performance efficiency, cost-effectiveness, environmental biophysical aspects, impact on water quality, and their mechanical

structural ability under different climatic conditions,” Andrew said.

This project has caught the imagination of producers and service industries across the state with project players offering storages and equipment or providing EMPs at reduced cost. Grower groups are also actively backing the research effort.

The ECP aims to define losses from both evaporation and seepage in covered and uncovered storages to enable landholders to decide which EMP is the most cost-effective for their situation.

But how do you measure these losses accurately when dealing with water surfaces up to 120 hectares? A literature search by NCEA's Dr Ian Craig revealed precise measurement of these losses was difficult and variable.

Typical of Australia's role as a world innovator in agricultural engineering, the NCEA has blended imported instrumentation with local inspiration to design and build a very high-accuracy water depth sensor believed to be unique at this time.

“These packages built by Jason Stone at NCEA comprise a submersible Druck PMP4030A pressure transducer which

## RESEARCH SITES AND PRODUCTS USED

- Andrew and Jeff Moon, Moonrocks, St George — EvapCaps installed by Darling Downs Tarpaulins. EvapCaps is a lightweight, impervious, black and white, polyethylene ‘bubble wrap’ style of floating plastic cover.
- Renardo Andreatta, Stanthorpe — Netpro, a 300 gm/sq m black, monofilament shade cloth suspended from a high tensile, webbed cable structure that is secured by deep screw anchors around the perimeter of the storage.
- Barossa Valley — Fabtech SA, a lightweight, floating plastic cover that forms a complete seal over the surface of the storage and is ballasted to keep the cover taut and aid in the collection of rainwater.
- Peak Downs Shire Council Water supply at Capella and Cubbie Station — Water\$aver is a self-spreading chemical solution which forms a one-molecule thick layer of a fatty alcohol compound across the water surface. The product has been designated as environmentally sound technology by the United Nations' international environment program.
- Ciba Specialty Chemicals — a smaller scale trial will be undertaken to evaluate the effectiveness of polyacrylamide (PAM) in reducing evaporation.

The performance of these materials is being monitored using 10 metre wide ring tanks with no seepage losses as benchmark treatments at the University of Southern Queensland.

has a stated accuracy of 0.04 per cent,” says Andrew. “This is linked by cable to matched data loggers powered by a small solar panel. We are developing the software to enable fast analysis of each situation.

“The transducer senses very small changes in water pressure as losses occur through evaporation and/or seepage then the software algorithms calculate the amounts,” he said.

Andrew sees the final kit as a consultant’s tool where the sensor is lowered into a water storage for a week or so to gather data which is downloaded to a laptop and then analysed to pinpoint both seepage and evaporation losses.

### **What are the likely savings for growers wanting to use EMPs?**

“That will depend very much on what you are growing. A horticultural grower may be better off with a floating cover to save as much water as possible.

“It comes down to dollars per megalitre at the end of the day. With horticulture, costs of around \$400 per megalitre saved for a floating cover might be reasonable, whereas the potential for a monolayer to save water for around \$150 per megalitre might be acceptable for broadacre grain and cotton situations,” Andrew said.

Andrew emphasises this information should be used as part of a whole farm



**A monolayer may be affordable in broadacre situations.**

approach to efficient water management.

He suggests growers look at opportunity costs and what extra reliability and crop production can be gained to optimise value from EMPs.

“One of the things we will identify in the project is the actual cost of these EMPs and then apply it to any situation. For example let’s say St George has 1.8 metres of evaporation and we know we can save 78 per cent of this. If it costs say \$380 per

megalitre to achieve this saving, then growers can make their decisions from there.

“We’ll do the basics and give examples of what the performance of these products might mean for some specific situations, but it really does come down to individual landholders and what each megalitre saved could be worth to their enterprise.”

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