

PROGRESS IN EVAPORATION MITIGATION RESEARCH

Schmidt, E¹, Brink, G¹, Coop, P², Hancock, N¹, Pittaway, P¹, Stuckey, N¹,
Wiggington, D¹

¹*National Centre for Engineering in Agriculture, University of Southern Queensland*

²*Precision Agriculture Research Group, University of New England*

ABSTRACT

Annual evaporation losses from irrigation storage dams and channels are significant and are estimated to be between 1.32GL/yr and 2.88GL/yr from the 2,000,000 farm dams across Australia. Nationally, consideration is currently being given to investment in evaporation mitigation technologies. Floating and suspended covers are proven but involve high capital cost: in contrast, monomolecular chemical films ('monolayers') offer potentially cost-effective evaporation mitigation but are as yet unproven.

Five years of research funded by the CRC Irrigation Futures and others has enabled significant progress in evaporation mitigation research, and in particular the future use of monolayers. In this paper, developments are reported in six areas:

- the development of standardised methods for evaporation and seepage monitoring in storages, including Internet-based calculation tools;
- fundamental understanding of the reasons for seemingly highly-variable performance of monolayers; and from this the formulation of a "Universal Design Framework" for both (i) monolayer economic feasibility assessment, material selection and application design optimisation for a given storage, and (ii) for the optimal real-time management of monolayer deployment on an hour-by-hour basis;
- fundamental understanding of interactions between artificial monolayers, natural water-surface microlayers and water quality;
- the non-laboratory evaluation of alternative monolayer materials;
- the engineering of monolayer application, monitoring and control systems, including patented prototype designs; and
- the development of on-storage evaporation reduction measurement systems for monolayer detection.

Keywords: Evaporation, seepage, evaporation mitigation, monolayer,