Deep Drainage Losses from Storages and Distribution Systems

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Relation to other work

This work is primarily focused on improving the whole farm water use efficiency of irrigated cropping in the Northern Murray Darling Basin. This particular component of the broader research program has been directed at the development of monitoring tools and techniques to enable the assessment of losses from storages and distribution channels. These tools are currently being used to measure seepage losses from storages to enable the evaluation of evaporation control practices.

Main findings

Evaluation of on-farm storages in the cotton industry around Goondiwindi found seepage accounted for 1-5% of the stored volume when operated under commercial conditions (ie full for only 1-2 months) (Dalton *et al*., 2001). Seepage losses of 4-30 mm/day have been measured on unlined storages around Toowoomba and in surrounding upland areas. Distribution and tailwater channel seepage rates on heavy clay soils have been found to range from 1-24 mm/day.

Technical issues

Recent trials have been evaluating the ability to use highly accurate (< 1 mm resolution) water depth sensors in conjunction with weather station data to measure seepage and evaporation losses in storages. Preliminary data suggests that changes in water depth are essentially linear during periods of the night coinciding with periods where measured evaporation is zero or negligible. The linear change in water depth during this period could be expected to relate directly to seepage. Assuming seepage over short time intervals is relatively stable (ie temperature & head changes are small), then the calculated seepage rate (measured during periods of linear change and zero evaporation) can be used to calculate evaporation rates over a diurnal period.

Uncertainty

Preliminary trials of evaporation in lined ponds have demonstrated an increase in water levels during the night, possibly due to the effects of condensation/dew. This suggests that under some conditions, the use of this time period to evaluate seepage may require an adjustment due to the atmospheric conditions. Work is currently being conducted to identify the conditions under which this may be an issue and the appropriate adjustment process.

Way forward

There is a need to extend the range of storages on which seepage losses have been quantified. Obtaining a better understanding of commercial storage performance will provide a more accurate assessment of the range of seepage losses experienced within the

industry and enable the targeting of lower performing storages for either retirement or corrective action.

References

Dalton, P., RAINE, S. and K. Broadfoot (2001). Best management practices for maximising whole farm irrigation efficiency in the Australian cotton industry. Final report for CRDC project NEC2C. *NCEA Publication* 179707/2, USQ, Toowoomba. 70pp.