Storages

On Farm Series | November 2010 | Produced by Cotton Catchment Communities CRC

ON-FARM WATER STORAGE LOSSES IN THE COTTON INDUSTRY: PRELIMINARY RESULTS

The Cotton CRC Project "Measurement to improve the water efficiency of on-farm storages in the cotton industry" has been providing assessments of seepage and evaporation from water storages across the industry. These assessments have been conducted by consultants using the Irrimate™ Seepage and Evaporation Service.

Analysis of the first 70 evaluations has been completed by the National Centre for Engineering in Agriculture and the results are included here. It must be noted that these results are preliminary and that approximately 70 further evaluations will be completed over the life of the project, thus the range of results may change over this time.

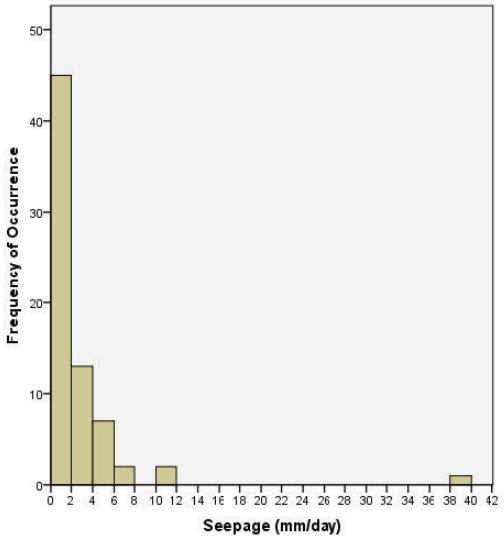
Table 1 – Summary of principal results

	Mean	Min	Max
Seepage (mm/day)	2.59	0.5	38
Seepage (m/year)	0.95	0.18	13.9
Evaporation m/year	1.97	1.87	2.39
Storage Size (ML)	1665	110	8000
Water Depth (mm)	3607	1000	9120

Seepage

Figure 1 shows the distribution of seepage results obtained. Most storages had less than 2mm/day of seepage (730mm/year).

Figure 1 – Distribution of seepage results



Whilst some storages had medium to high seepage rates (4mm/day to 12mm/day), only a single storage had extremely high seepage (36mm/day). This storage was known to leak badly and had not been used for over 6 years. The water was distributed as soon as possible so that water for approximately 6 weeks in total.

Interestingly, 12% of the growers who believed they had low seepage before measurement, in fact had a seepage rate that could be considered medium or high (more than 4mm/day).

Evaporation

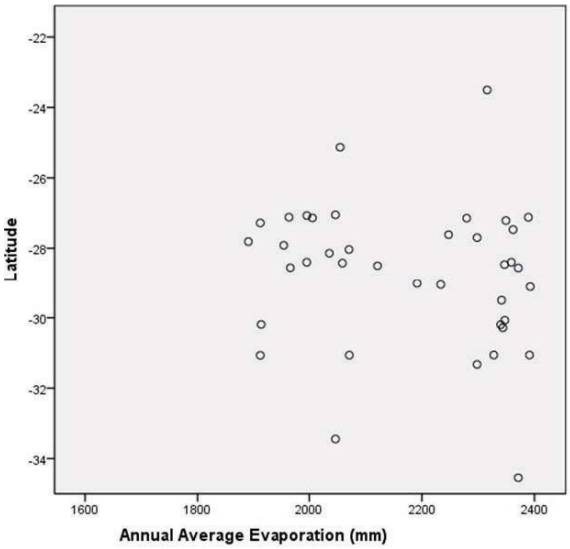
Evaporation is driven predominantly by climatic variables. Some local differences such as water temperature, water depth, wind breaks, etc. can result in differences between storages, even those located near to each other. These differences are reflected in a 'dam factor' which is specific to a particular storage.

The range of annual evaporation for all storages, after taking account of 'dam factors', is included in Figure 2. This data is based on readily available SILO ET data. The range of annual evaporation is as expected, and the variation in evaporation appears to be due to storage specific characteristics, rather than location (in this case, latitude).

Australian Government
National Water Commission

Cotton Catchment Communities CRC

Figure 2 – Annual evaporation for each storage



Volumetric Losses

Actual volumetric losses for an individual storage will depend on the storage dimensions, how the storage is used and when it contains water. The seepage and evaporation ready reckoner www.readyreckoner.ncea.biz can be used to determine these losses.

Two examples have been included below to give a feel for the likely losses that might be encountered.

The examples include:

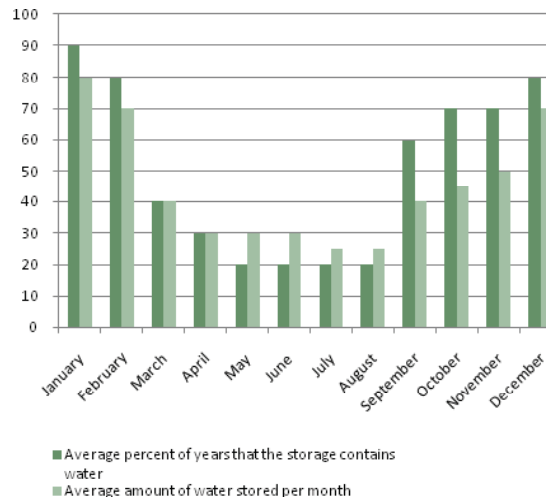
- An estimate of the 'typical water holding pattern' for each storage.
- The location and size of each storage.
- The volume of water lost to evaporation (assumes dam factor = 1).
- The volume of water lost to seepage for a range of different seepage rates. Highlighted row indicates actual measured seepage for these storages.

Figure 3 – Small storage in Emerald

Small Storage in Emerald

5.6 ha

180 ML



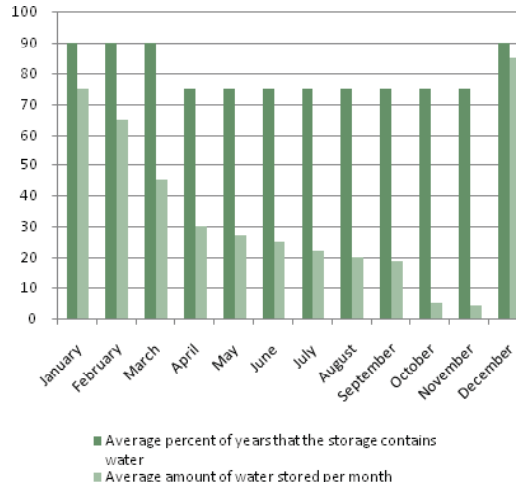
Evaporation	67ML
Seepage	
1mm/day	17ML
2mm/day	33ML
3mm/day	50ML
5mm/day	83ML
10mm/day	165ML

Figure 4 – Medium/large storage in Dalby

Medium/Large Storage in Dalby

27 ha

1500 ML



Evaporation	423ML
Seepage	
1mm/day	89ML
2mm/day	178ML
3mm/day	267ML
5mm/day	445ML
10mm/day	890ML

Highlighted rows indicate actual measured losses for this storage.

The Cotton CRC Storages Project is funded by the National Water Commission through its Raising National Water Standards Program. This program supports the implementation of the National Water Initiative by funding projects that are improving Australia's national capacity to measure, monitor and manage its water resources.

For further information please contact : David Wigginton, Project Manager - Cotton Storages Project

P: (07) 4631 1711 M: 0438 667 835 E: david.wigginton@usq.edu.au