



Introduction

Water loss by seepage from on-farm channels is extremely variable considerably along the length of the channel and is dependent upon the age of the channel and other factors, which may either reduce or increase seepage in particular soils/situations. Seepage losses can be reduced considerably by sealing or compacting the channel or drains. Accurate diagnosis and location of the problem areas allows targeted treatments to applied in a cost-effective manner.



Fig. 1. Idaho Seepage Meter

Seepage was measured from channels and drains ranging in age of construction from 2-30 years (new and old) in the Murrumbidgee and Coleambally Irrigation Areas. Idaho Seepage Meter (Fig. 1) measurements were used to compare seepage rate distribution along the length of these channels and drains.

Channels in the two age categories show significant differences in seepage rates with less seepage from older channels

Method

Investigations were carried out within selected farms in Coleambally and Murrumbidgee Irrigation Areas in southern NSW during the irrigation seasons of 1997/98 and 1998/99.

The Idaho Seepage Meter was used to take 3 or 4 measurements across each channel and drain at intervals of 50 - 100 m (Fig. 2). The duration of each measurement was 3 minutes, the drop in reservoir level (mm/min)



Fig. 2. Measuring seepage in channel

was recorded and converted to a seepage rate in mm/day. The channel and drain widths, wetted perimeter and water levels were measured throughout the seepage monitoring tests. Measurements could not be taken at some sites due to heavy silt and weeds fouling the meter bell. Seepage rates in drains were measured at those sites where there was sufficient water depth.

Table 1 shows the age and length of channels and drains constructed from 2 to 30 years ago on nine farms.

Table 1: Channel and drain age and length for 9 farms

Farm Location	Age	Channel (m)				Drain (m)	Channel & Drain(m)
		Main	Rice crop	Other crops	Total		
Farm A, Coleambally	20	1400	1300	1100	3800	1100	4900
Farm B, Coleambally	30	1550	800	1350	3700	1400	5100
Farm C, Coleambally	15	1000	1200	1000	3200	-	3200
Farm D, Yanco	2	1300	755	2540	4595	2410	7005
Farm E, Whitton	2	-	2455	4174	6629	1265	7894
Farm F, Coleambally	2	-	950	2755	3705	1020	4725
Farm G, Coleambally	2	-	1716	785	2501	295	2796

Results

Seepage rates ranged from 0 to 50 mm/day in the older channels and drains, to 0 to 160 mm/day in the recently constructed channels and drains. There was significant variability in the average seepage rates between measurement locations along the same channel or drain. Seepage distributions along the length

of the each channel and drain for representative farms (30 years old) and (2 years old) are presented in Fig 3. Total usage per farm per year is presented in Fig 4.

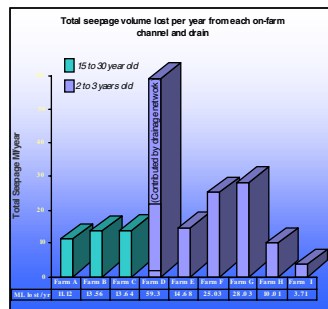


Fig. 3. Distribution of measured seepage rates and volume for selected farms with old and new channel systems .

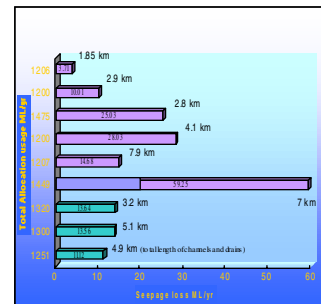


Fig. 4. Total allocation Usage per year

Comparison between new and old channels and drains

Wide ranges of seepage rates from channels and drains were observed in this study. The seepage rates were higher in the newly constructed channels or drains than the 15-30 year old channels and drains. The estimated annual seepage volume for each farm is shown in Table 2.

Table 2: Estimate annual seepage volume from on-farm channels and drains on each Farm (Ml/yr)

Channel use	Farm identifier								
	A	B	C	D	E	F	G	H	I
Rice	2.1	1.4	1.5	9.1	4.6	15.5	3.9	9.6	2.7
Main	6.2	10.7	6.7	4.9	0.3	3.1	1.9	0.0	0.3
Other Crops	0.3	0.8	5.4	1	6.8	2.1	0.6	0.4	0.8
Drain	2.5	0.7	0.0	15	3.0	7.3	-	0.0	-
Recycle Drain	-	-	-	28.9	-	-	18.6	-	-
Total Seepage from Farms	11.1	13.6	13.6	59.3	14.7	28.0	25.0	10.0	3.7
%age loss of Totalseage	1%	1%	1%	4%	1%	2%	1%	1%	1%

* Farms where all channels and drains on farm were used during season of monitoring.

Conclusions

- Seepage measurements of channels and drains in this study identified sites with significant levels of seepage and other sites with very low seepage rates.
- Methods of identifying the extent and likely magnitude of potentially high seepage loss sites along channel and drainage lines need to be developed. One potential methodology in the alluvial landscape of the Riverina is the use of EM-31 surveys.

Recommendations

Before putting resources into seepage control it is necessary to first identify a problem exist, and second to determine the extent and seriousness of that problem.

The decision to conduct an EM survey to indicate sections of farm channels, which may be leaking, may be made on the basis of field observations of the channel (water lays in the channel, water disappears from channel).

The EM readings could be combined with simply observed features e.g. wet soil, plant growth, associated with seepage that could provide the basis of a decision support system identifying significant seepage sites.