Soil Research 2018 **56**, 829–845
doi:10.1071/SR18047_AC

Supplementary material for

The effect of soil physical amendments on reclamation of a saline sodic soil: simulation of salt leaching using HYDRUS-1D

Mandana Shaygan[A,E], *Thomas Baumgartl*[B], *Sven Arnold*[C] *and Lucy Pamela Reading*[D]

[A]Centre for Water in the Minerals Industry, Sustainable Minerals Institute, University of Queensland, Brisbane, Australia.

[B]Geotechnical and Hydrological Engineering Research Group, Federation University, Australia.

[C]CDM Smith Consult GmbH, Senftenberg, Germany.

[D]School of Earth, Environmental and Biological Sciences, Queensland University of Technology, Brisbane, Australia.

[E]Corresponding author. Email: m.shaygan@uq.edu.au

Table S1. The results of statistical analyses for the agreement between the observed and predicted soil water potentials for the second run

NSE: nash-sutcliffe co-efficient; *d*: index of agreement; RMSE: root mean square error; *n*: sample size as well as time series for the measured and simulated soil water potentials

Soil depth	Statistical analyses	Non-amended column (n = 11815)	Wood chip-amended column (n = 12448)	Fine sand-amended column (n = 7714)
35 mm	NSE	0.56	0.54	0.76
	d	0.92	0.92	0.95
	RMSE (kPa)	0.83	0.62	0.41
120 mm	NSE	0.93	0.92	0.92
	d	0.98	0.98	0.98
	RMSE (kPa)	0.30	0.25	0.23
250 mm	NSE	0.96	0.69	0.81
	d	0.98	0.90	0.93
	RMSE (kPa)	0.12	0.45	0.25

Table S2. The results of statistical analyses for the agreement between the observed and predicted soil water potentials for the third run

NSE: nash-sutcliffe co-efficient; *d*: index of agreement; RMSE: root mean square error; *n*: sample size as well as time series for the measured and simulated soil water potentials

Soil depth	Statistical analyses	Non-amended column (n = 12610)	Wood chip-amended column (n = 4961)	Fine sand-amended column (n = 13450)
35 mm	NSE	0.83	0.82	0.93
	d	0.96	0.96	0.98
	RMSE (kPa)	0.45	0.28	0.23
120 mm	NSE	0.71	-0.09	0.95
	d	0.93	0.67	0.98
	RMSE (kPa)	0.57	0.98	0.19
250 mm	NSE	0.81	0.33	0.87
	d	0.95	0.77	0.95
	RMSE (kPa)	0.30	0.48	0.23

Table S3. The results of statistical analyses for the agreement between the observed and predicted cations' concentrations, EC (Electrical Conductivity) and SAR (Sodium Adsorption Ratio) for the second run

RMSE: root mean square error; MAE: mean absolute error; RE: relative error (%); *n*=sample size

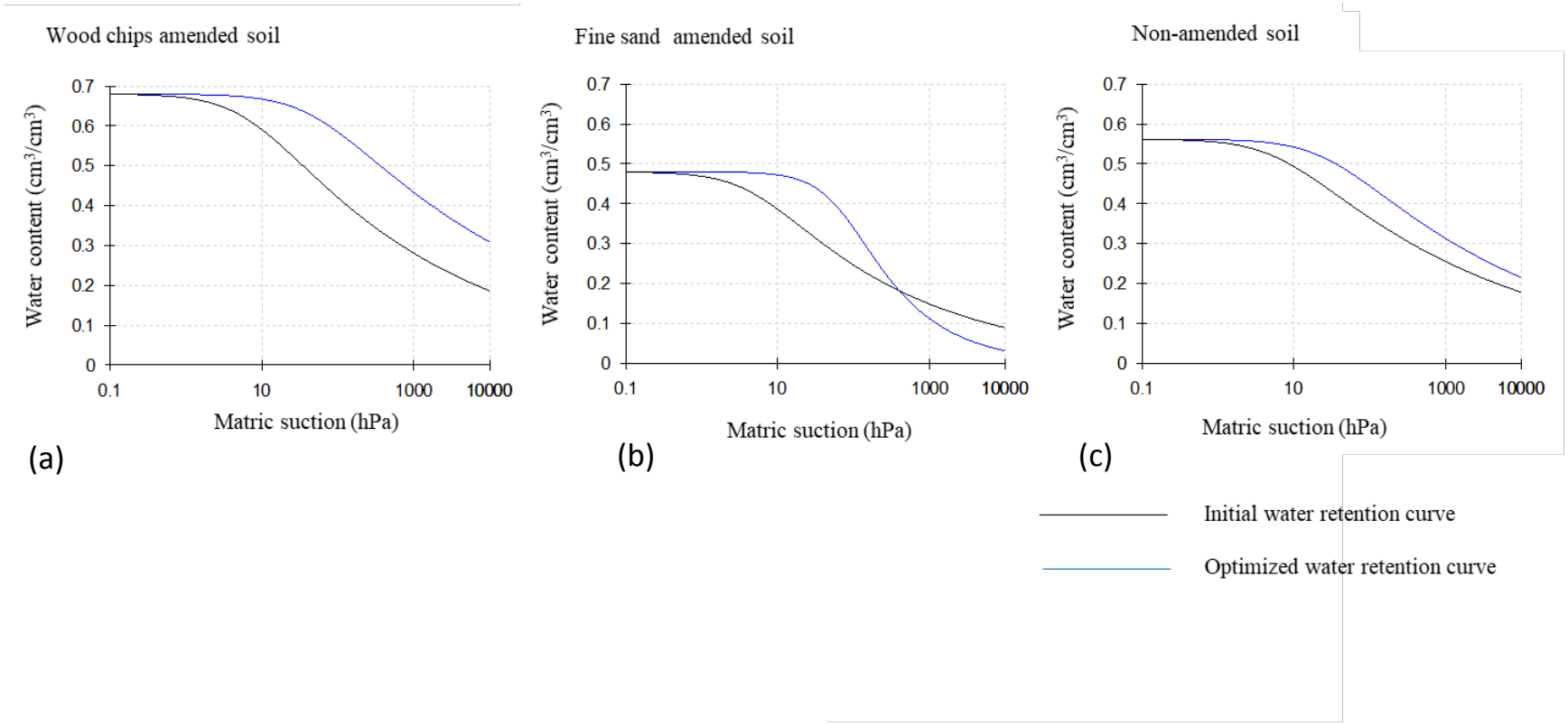
Soil columns	Statistical analyses	EC (dS/m)	SAR $(mmol_{(c)}\ L^{-1})^{0.5}$	Major cations (mmol/L)			
				Ca^{2+}	Mg^{2+}	Na^{+}	K^{+}
Non-amended column (n = 3)	RMSE	1.009	2.23	1.09	0.90	8.61	0.07
	MAE	0.92	2.07	0.94	0.86	7.00	0.07
	RE	5.62	7.39	9.63	6.25	5.59	4.94
Fine sand-amended column (n = 3)	RMSE	0.90	2.45	0.34	0.82	7.78	0.02
	MAE	0.74	2.02	0.27	0.74	6.26	0.02
	RE	5.41	7.72	3.30	7.41	5.199	1.99
Wood chip-amended column (n = 3)	RMSE	1.025	2.18	0.27	1.44	13.92	0.07
	MAE	0.96	1.92	0.24	1.35	12.61	0.07
	RE	6.17	7.24	2.69	10.66	9.32	4.81

Table S4. The results of statistical analyses for the agreement between the observed and predicted cations' concentrations, EC (Electrical Conductivity) and SAR (Sodium Adsorption Ratio) for the third run

RMSE: root mean square error; MAE: mean absolute error; RE: relative error (%); *n* = sample size

Soil columns	Statistical analyses	EC (dS/m)	SAR $(mmol_{(c)}\ L^{-1})^{0.5}$	Major cations (mmol/L)			
				Ca^{2+}	Mg^{2+}	Na^{+}	K^{+}
Non-amended column (n = 3)	RMSE	0.85	2.12	0.97	0.49	7.61	0.10
	MAE	0.82	1.63	0.84	0.49	6.96	0.05
	RE	4.67	6.94	8.62	3.34	4.85	5.52
Fine sand-amended column (n = 3)	RMSE	0.93	1.24	0.47	0.411	6.44	0.05
	MAE	0.86	1.05	0.42	0.37	6.0	0.05
	RE	5.62	4.04	4.35	3.80	4.34	3.81
Wood chip-amended column (n = 3)	RMSE	0.86	2.02	0.39	1.19	12.57	0.04
	MAE	0.78	1.36	0.29	0.86	9.0	0.03
	RE	5.29	6.83	3.64	7.97	8.63	2.29

Fig. S1. Water retention curves of (a) wood chip-amended soil, (b) fine sand-amended soil and (c) non-amended soil



Text S1. The equations for statistical analyses; *Oi* and *Pi* are observed and simulated values respectively, *N* is the number of observations and $\bar{O} = \frac{1}{N}\sum Oi$

$$\text{(a) } RMSE = \sqrt{\frac{\sum_{i=1}^{N}\left(Pi - Oi\right)^2}{N}}$$

$$\text{(b) } NSE = 1 - \frac{\sum_{i=1}^{N}\left(Oi - Pi\right)^2}{\sum_{i=1}^{N}\left(Oi - \bar{O}\right)^2}$$

$$\text{(c) } d = 1 - \frac{\sum_{i=1}^{N}\left(Oi - Pi\right)^2}{\sum_{i=1}^{N}\left(\left|Pi - \bar{O}\right| + \left|Oi - \bar{O}\right|\right)^2}$$

$$\text{(d) } MAE = \frac{1}{N}\sum_{i=1}^{N}\left|Oi - Pi\right|$$

$$\text{(e) } RE = \frac{RMSE}{\bar{O}} \times 100$$