

Supplementary material

Field trial and modelling of different strategies for remediation of soil salinity and sodicity in the Lower Murray irrigation areas

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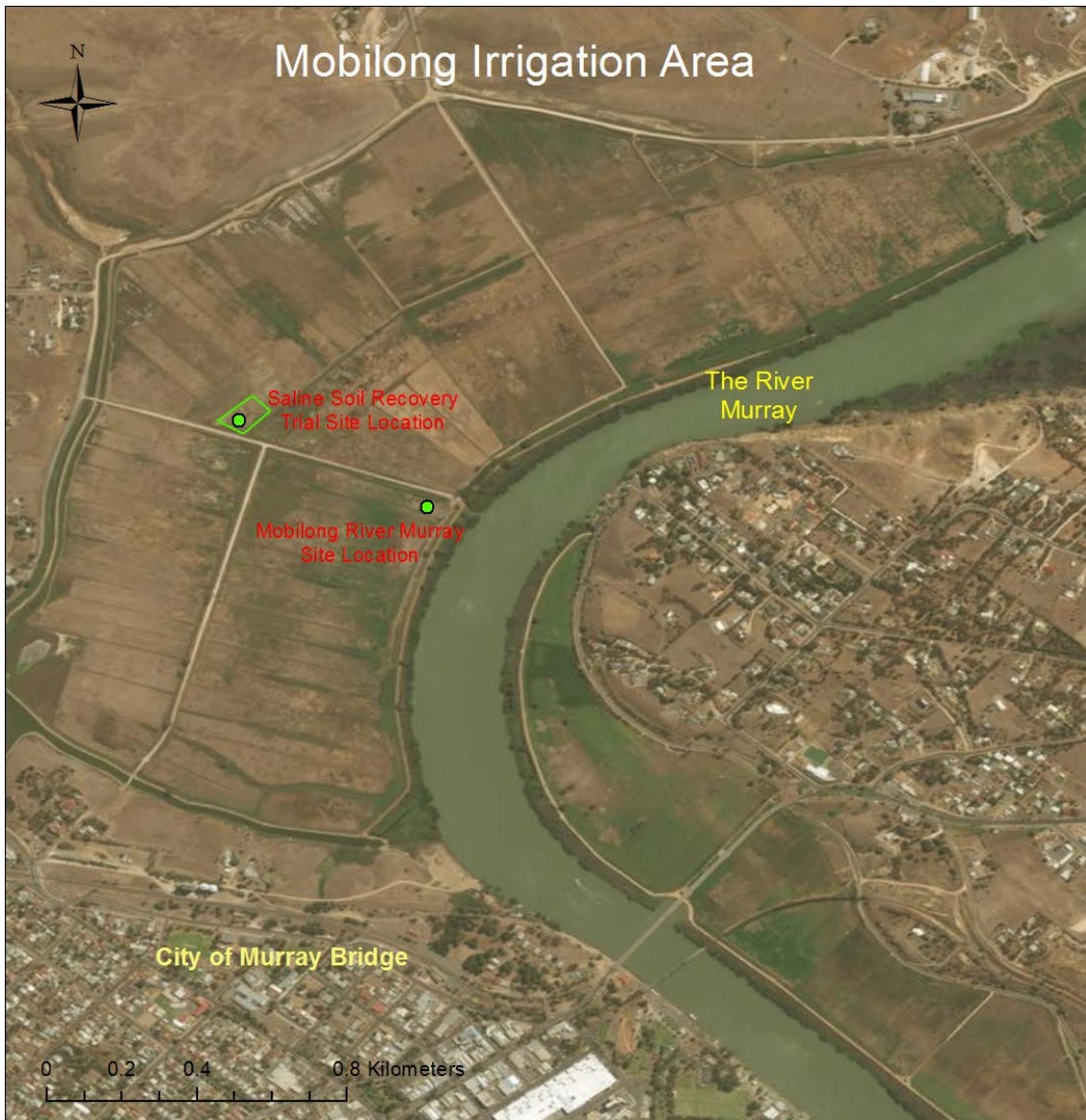


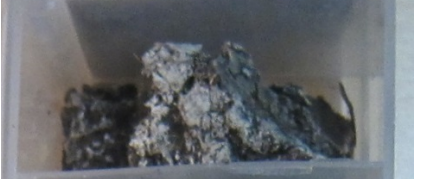








Fig. S1. Map showing location of the Mobilong saline soil recovery trial site where the sodic clay soil (Sodic Epiaquet) profile was sampled on 16 November 2015.

S2. Soil profile description and classification at the Mobilong trial site location

Sample ID Depth cm Horizon	Morphology	Chip-tray photograph
MPa01.1 0-1 Ayzp	Very dark brown (10YR 2/2) when moist; very dark greyish brown (10YR 3/2) when dry; distinct layers of fine/ powdery white gypsum crystals; peaty clay; medium, platy, breaking to very fine granular with high organic matter content in layers; many fine roots and fine rootlets; few decomposing roots, sharp boundary.	
MPa01.2 1-5 Bt1	Pale brown (2.5Y 7/3) when moist, pale brown (2.5Y 8/3) when dry; peaty clay, weak granular; with high organic matter content; many fine roots and fine rootlets; many decomposing roots, sharp boundary.	
MPa01.3 5-10 Bss2	Black (2.5Y 2.5/1) when moist; very dark grey (2.5Y 3/1) when dry; heavy clay, diffuse wavy boundary; weak slickensides comprising moderate, fine, wedge-shaped peds (with long axis tilted 20 to 40° from horizontal); clear, wavy boundary. NOTE—sporadic white salt efflorescences on the tips of surfaces of peds when dried in chip tray (see adjacent photograph)	
MPa01.4 10-20 Bss3	Black (2.5Y 2.5/1) when moist; very dark grey (2.5Y 3/1) when dry; heavy clay, diffuse wavy boundary; strong slickensides comprising moderate, fine, wedge-shaped peds (with long axis tilted 20 to 40° from horizontal); clear, wavy boundary. NOTE—sporadic white salt efflorescences on the tips of surfaces of peds when dried in chip tray (see adjacent photograph).	
MPa01.5 20-35 Bss4	Black (2.5Y 2.5/1) when moist; very dark grey (2.5Y 3/1) when dry; heavy clay, diffuse wavy boundary; strong slickensides comprising moderate, fine, wedge-shaped peds (with long axis tilted 20 to 40° from horizontal); clear, wavy boundary. NOTE—sporadic white salt efflorescences on the tips of surfaces of peds when dried in chip tray (see adjacent photograph).	
MPa01.6 35-55 Bssg5	Black (2.5Y 2.5/1) when moist; very dark grey (2.5Y 3/1) when dry; heavy clay, diffuse wavy boundary; strong slickensides comprising moderate, fine, wedge-shaped peds (with long axis tilted 20 to 40° from horizontal); clear, wavy boundary. NOTE—sporadic white salt efflorescences on the tips of surfaces of peds when dried in chip tray (see adjacent photograph).	
MPa01.7 55-75 Bssg6	Black (5Y 2.5/1) when moist; very dark grey (5Y 3/1) when dry; heavy clay, diffuse wavy boundary; strong slickensides comprising moderate, fine, wedge-shaped peds (with long axis tilted 20 to 40° from horizontal); clear, wavy boundary. NOTE—sporadic white salt efflorescences on the tips of surfaces of peds when dried in chip tray (see adjacent photograph).	
MPa01.8 75-85 Bssg7	Dark grey (10YR 4/1) when moist; grey (10YR 6/1) when dry; heavy clay; soft and sticky when wet, clear wavy boundary; strong slickensides comprising moderate, fine, wedge-shaped peds (with long axis tilted 20 to 40° from horizontal); clear, wavy boundary.	
MPa01.9 85-100 Bssg8	Dark grey (10YR 4/1) when moist; grey (10YR 6/1) when dry; heavy clay; soft and sticky when wet, clear wavy boundary; strong slickensides comprising moderate, fine, wedge-shaped peds (with long axis tilted 20 to 40° from horizontal); clear, wavy boundary.	

Soil Classification

Australian acid sulfate soil classification (Fitzpatrick 2013; Fitzpatrick et al. 2008)

Not applicable.

Australian Soil Classification 2nd ed. (Isbell and National Committee on Soils & Terrain, 2016)

Epihypersodic-Endoacidic, Crusty, Black Vertisol

Soil Taxonomy (Soil Survey Staff, 2014)

Sodic Epiaquert

World Reference Base (IUSS Working Group WRB, 2014)

Sodic, Pellic Vertisol (Gilgaic, Hyposulfidic Gleyic)



Fig. S2-1. Views of Mobilong saline soil recovery trial site looking from: (a) west to north-east towards the River Murray of short grassed strip in foreground where the soil profile is located in the short grass strip adjacent to field trial bays and (b) east to west towards the saline wetlands background in foreground where the soil profile is located in the strip adjacent to field trial bays.



Fig. S2-2. View looking from south to north showing a close-up view of a field trial bay on the foreground and in the background where the soil profile is located in the short grass strip adjacent to field trial bays.

S3. Mean and standard deviation in Exchangeable Dispersion Percentage (EDP) in the six treatments at the end of the field trial (0–10 cm layer)

Treatment	Statistic	EDP
Drainage only	Mean	45.7
	SD	8.9
Irrigation only	Mean	23.7
	SD	3.7
Gypsum	Mean	27.1
	SD	5.2
Limestone	Mean	28.4
	SD	1.5
Seawater	Mean	33.9
	SD	2.0
Acid	Mean	32.9
	SD	2.1

S4. Exchangeable K and cation exchange capacity (CEC)

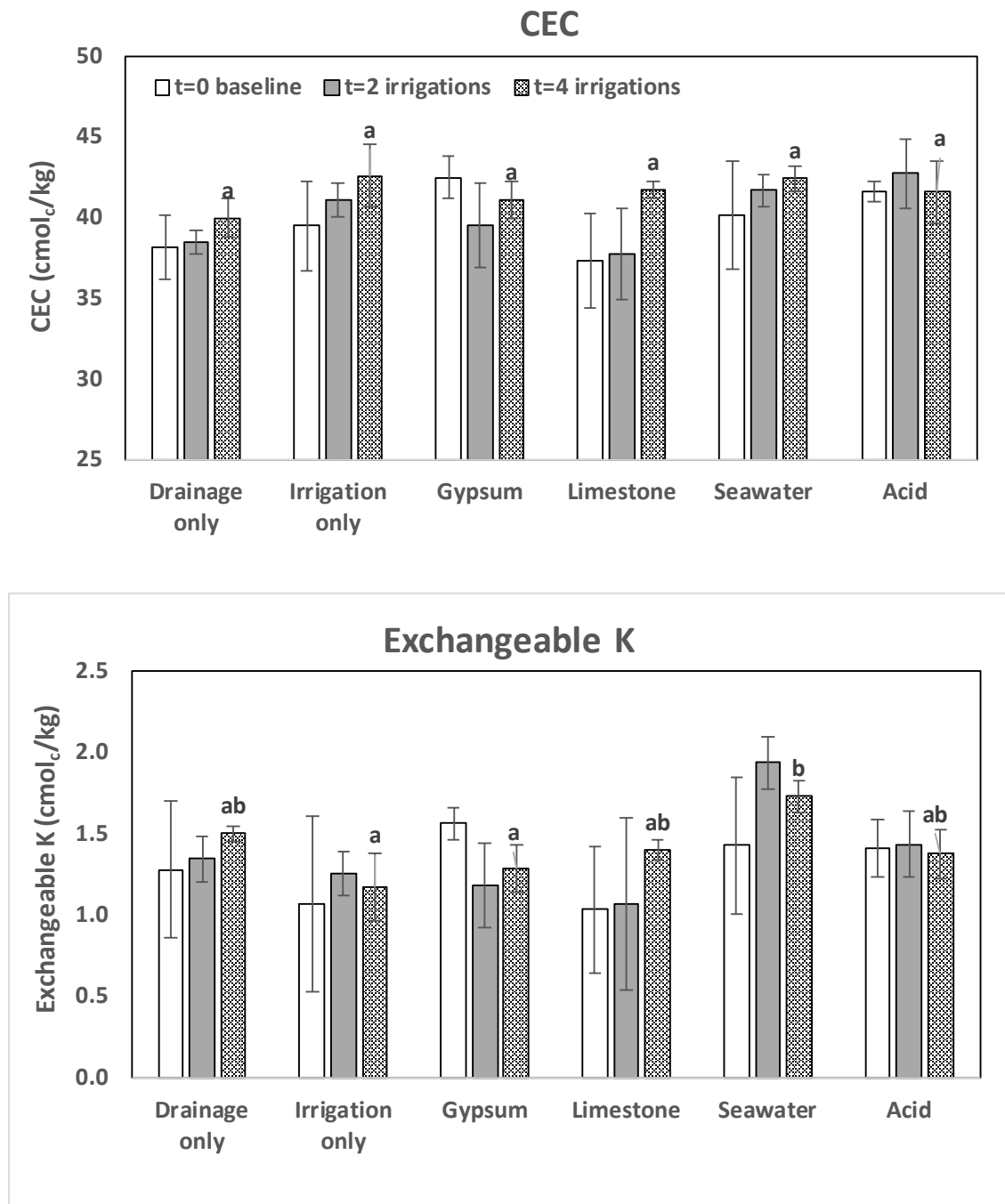


Fig. S4. Exchangeable K and Cation exchange capacity (CEC) at t= 0 baseline, and after 2 and 4 irrigations on the different treatment plots. Error bars show the standard deviation (n=3). Note: the drainage only treatment did not receive any irrigation but samples were taken at the same time as the other treatments. The first irrigation in the acid and seawater treatments was with acidic drainage (pH 3) and seawater respectively. All other irrigations were conducted with River Murray water.

S5. Simulated soil profiles for the seawater treatment

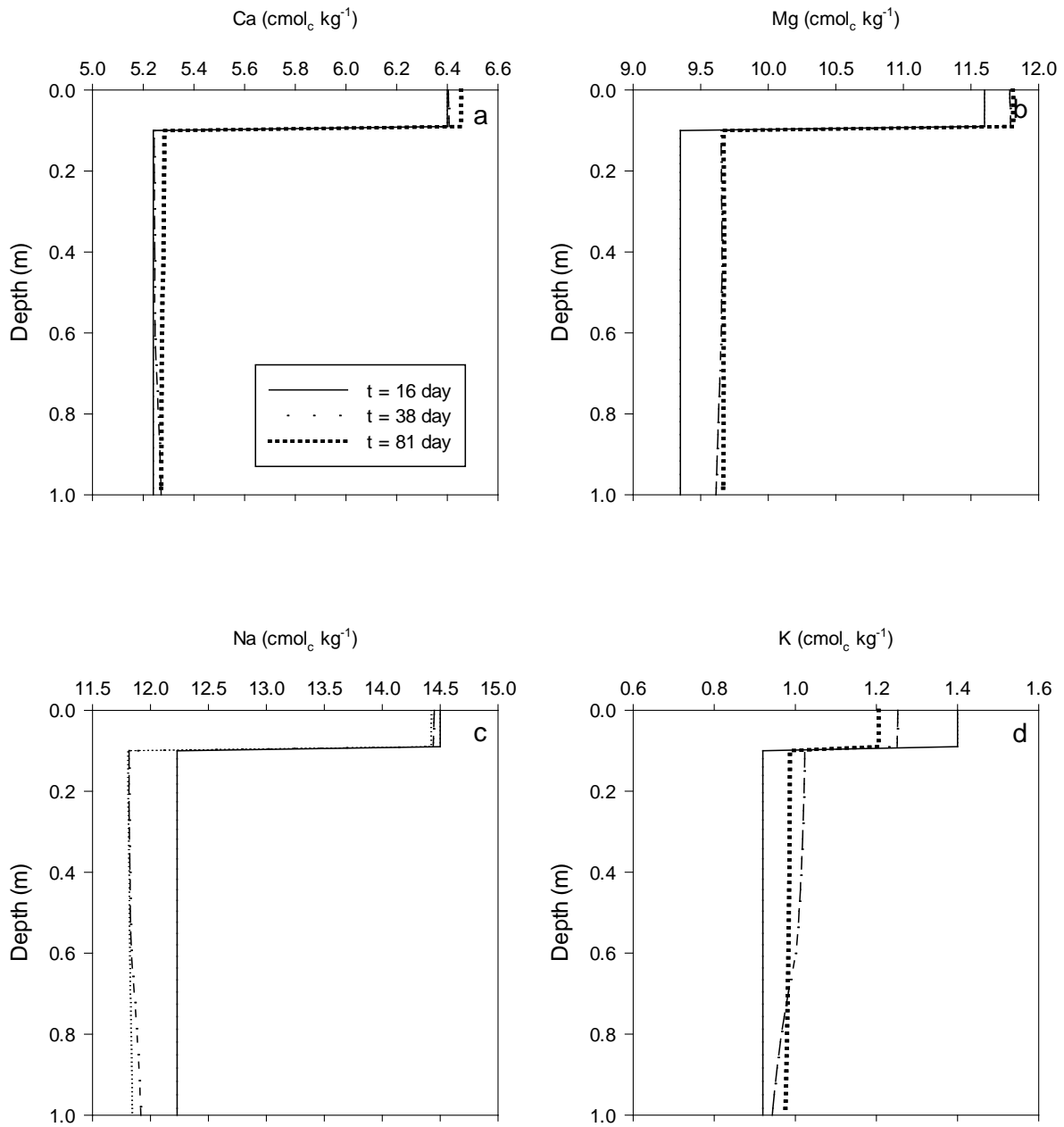


Fig. S5. Simulated soil profiles of the cations a) Ca, b) Mg, c) Na and d) K at the three sampling times of 0, 24 and 67 days for the seawater treatment.

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