Onsite recycle of saline-alkaline soil washing water by forward osmosis: Techno-economic evaluation and implication

Supplementary Data

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Fig. S1: A side canal used to collect saline-alkaline soil washing water from rice farms (Jilin, China).

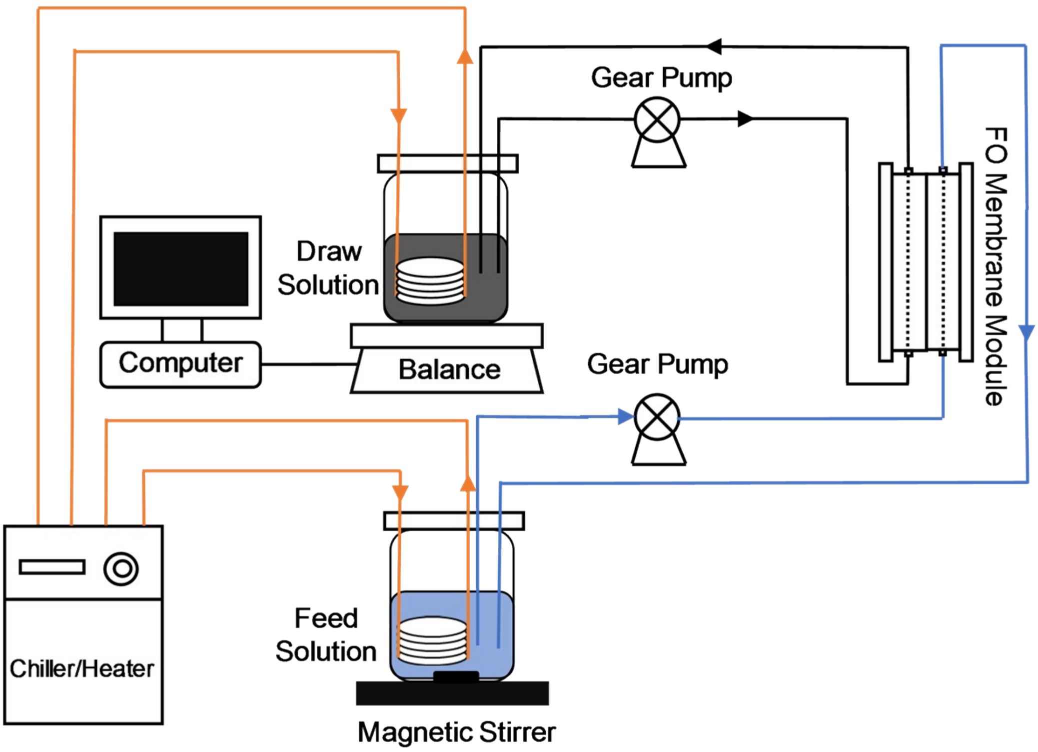

Fig. S2: Schematic diagram of the bench-scale FO system used to recycle saline-alkaline soil washing water in osmotic dilution

Table S1: Input parameters for economic evaluation of fertiliser drawn FO process using HTI and AQ TFC FO membranes.

Parameter		Unit	Value
Plant availability		-	0.95
Interest		%	6
Plant life time		year	20
Plant working days		days	365
Electricity cost		USD $/kWh	0.1
Pump efficiency		%	85
Plant product		m^3/day	1000
FO process operating conditions			
HTI FO process	HTI FO process	%	85
	HTI FO element (*8040 spiral wound)	USD $/element	1000
	HTI membrane area	m^2/element	15
	**J_W@25°C	L/m^2h	8.62
	Specific energy	kWh/m^3	0.158
AQ FO process	AQ FO process	%	86.5
	AQ FO element (*8040 spiral wound)	USD $/element	1100
	AQ membrane area	m^2/element	15
	**J_W@25°C	L/m^2h	11.1
	Specific energy	kWh/m^3	0.138

*8040: 8 inch diameter and 40 inch length.[1]

**J_W was obtained from concentration experiment of saline-alkaline soil washing water (Fig. 5 in manuscript).

Table S2: Hydrated radii of ions measured in this study.[2,3]

Ion	Hydrated radius (nm)
NH_4^+	0.25
K^+	0.34
Na^+	0.36
Mg^{2+}	0.43
Ca^{2+}	0.41
PO_4^{3-}	0.49

Table S3: Pore radii and surface charge of FO membranes.[4-6]

Parameters	HTI	AQP
Estimated membrane pore radius (nm)	0.42	0.30
Zeta potential at pH 8 (mV)	-14.2 ± 0.5	-16.4 ± 2.3

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