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Supplementary material for

Multiple soil element and pH interactions constrain plant performance on tropical soils with a long history of fire

Stan J. Rance [A,B], *David M. Cameron* [A], *Carl R. Gosper* [B,C,E], *and Emlyn R. Williams* [D]

[A]Adjunct Fellow at the School of Environment, Science and Engineering at Southern Cross University, Lismore, NSW 2480, Australia;

[B]CSIRO Land and Water, Private Bag 5, Wembley, WA 6913, Australia;

[C]Biodiversity and Conservation Science, Department of Biodiversity, Conservation and Attractions, Locked Bag 104, Bentley Delivery Centre, WA 6983, Australia;

[D]Statistical Consulting Unit, ANU Canberra ACT 2600, Australia

[E]Corresponding author. E-mail: carl.gosper@dbca.wa.gov.au.

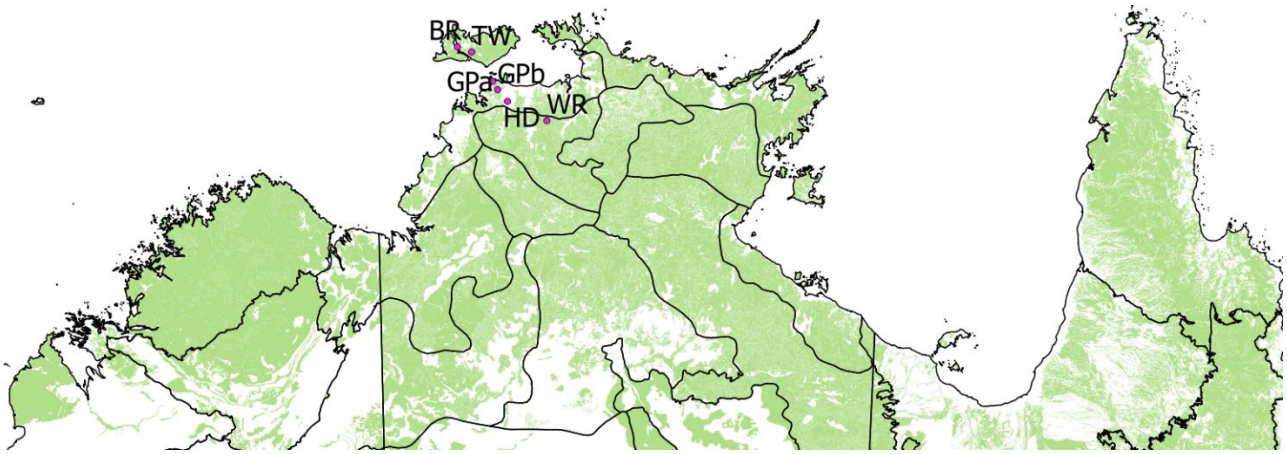

Fig. S1. Location of sites in northern Australia from which soils were obtained (●, TW – Three Ways; HD – Humpty D~~oo;~~ GPa – Gunn Point(a); GPb – Gunn Point(b); WR – Wildman River; BR – Bremer River) in the context of eucalypt savanna vegetation (■, Major Vegetation Groups 3, 5, 11 and 12 of the National Vegetation Information System, https://www.environment.gov.au/land/native-vegetation/national-vegetation-information-system) and IBRA bioregions (, https://www.environment.gov.au/land/nrs/science/ibra).

Fig. S2. Glasshouse experiment with Gunn Point(a) soil and two replications of treatments K_0T_0, K_0T_1, K_1T_0 and K_1T_1 left to right with; (*a*) P basal, (*b*) N + P basal, (*c*) S + P basal, and (*d*) N + S + P basal. The scale was a 31 cm ruler

(*c*)


REP 9 S
REP 10 ST
REP 10 ST
REP 11 SK
12 SK

(*d*)


13 SK
13 SK Rep 2
REP 14 SKT
15 SK
16 SKT
16 SKT

Table S1. Cation exchange capacity and exchangeable cations (Ca, Mg, K and Na) in relation to pH in surface soils in the Northern Territory

Soil	pH[a]	CEC[b]	Exchangeable cations (cmolc kg^{-1})[c]				
		(cmolc kg^{-1})	Ca	Mg	K	Na	%CEC[d]
Blain[e]	6.4	3.0	1.22	0.36	0.18	0.04	60.0
Tindall[f]	6.0	6.6	2.96	0.96	0.43	0.03	66.4
Tuyu-TW[g]	5.2	13.4	0.45	0.98	0.03	0.06	11.3
Three Ways[h]	5.1	5.7	0.23	0.40	0.04	0.02	11.9
Humpty Doo[h]	5.0	9.0	2.07	0.94	0.11	0.03	34.9
Yapilika[g]	4.9	5.2	0.25	0.25	0.02	0.04	10.8
Bremer River	4.8	4.2	0.17	0.18	0.04	0.02	9.8
Bremer River[i]	4.8	5.6	0.17	0.18	0.02	0.04	7.3

[a], pH, - 1:5 water extract of soil; [b], Cation Exchange Capacity – Tucker (1974); [c], Exchangeable cations method 1N NH_4Cl and AAS; [d], Exchangeable cations Ca+Mg+K+Na as per cent of CEC; [e], Sandy red earth, Day 1977; [f], Loamy red earth, Day 1977; [g], Sandy red earth, Wells and van Cuylenberg 1978; [h], Cameron et al. 1982; [i], Garden Point sandy red earth, Wells and van Cuylenberg 1978.