

SUPPLEMENTARY INFORMATION

Effects of soil surface chemistry on adsorption and activity of urease from a crude protein extract: Implications for biocementation applications

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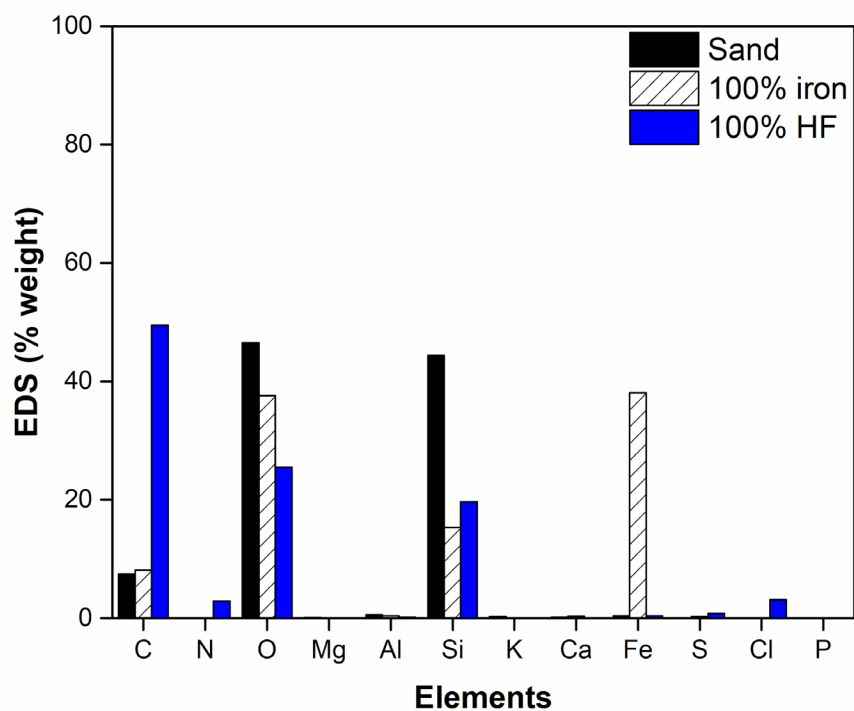


Figure S1. Elemental analysis obtained with an Oxford Aztec energy-dispersive spectrometer (EDS) for sand, 100% HF and 100% iron samples.

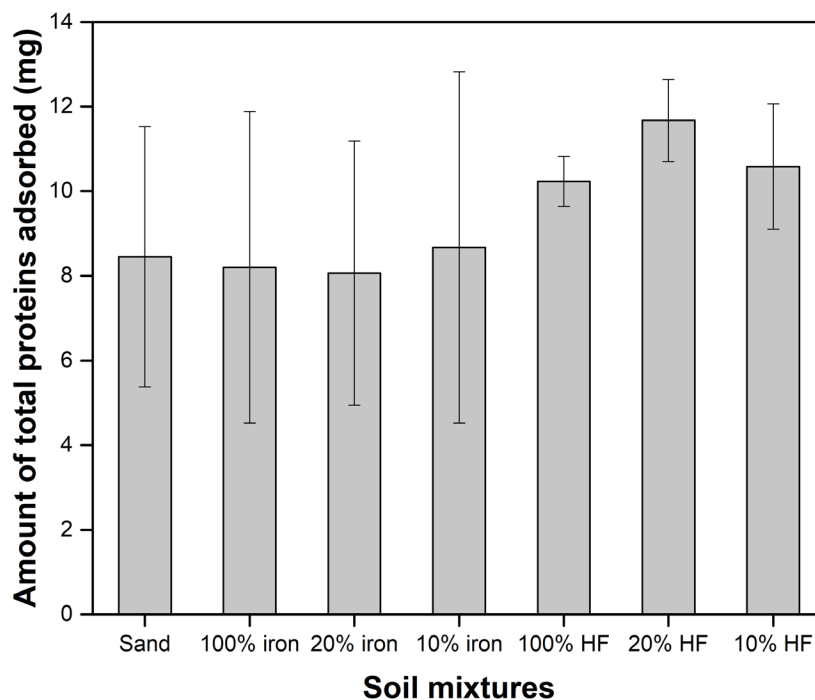
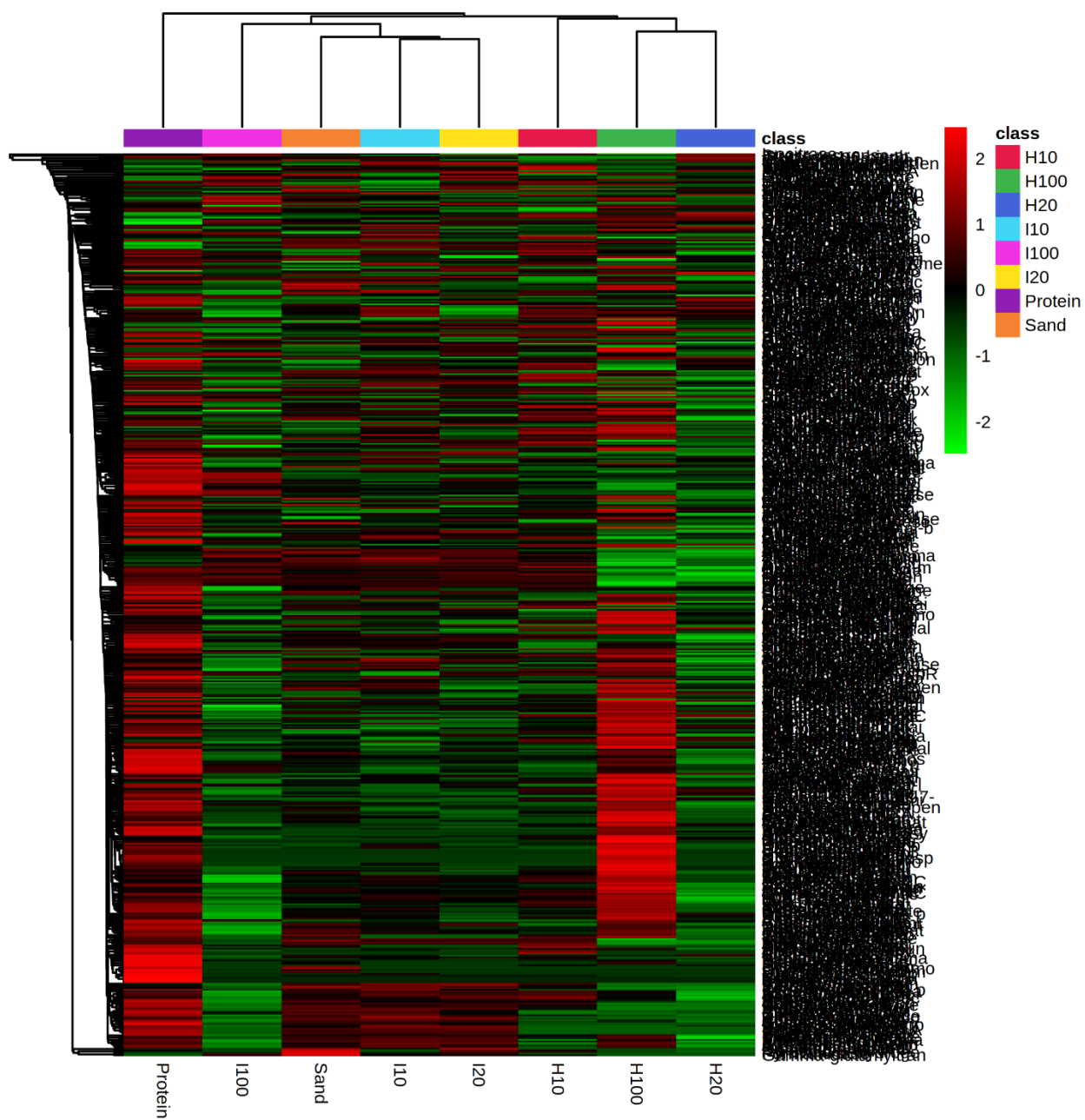


Figure S2. Total amount of protein adsorbed in the soil portion of each sample shown in mg. Values shown are averages of three replicates and error bars represent standard error. Iron=iron-coated sand; HF=hydrophobic-coated sand.

(A)



(B)

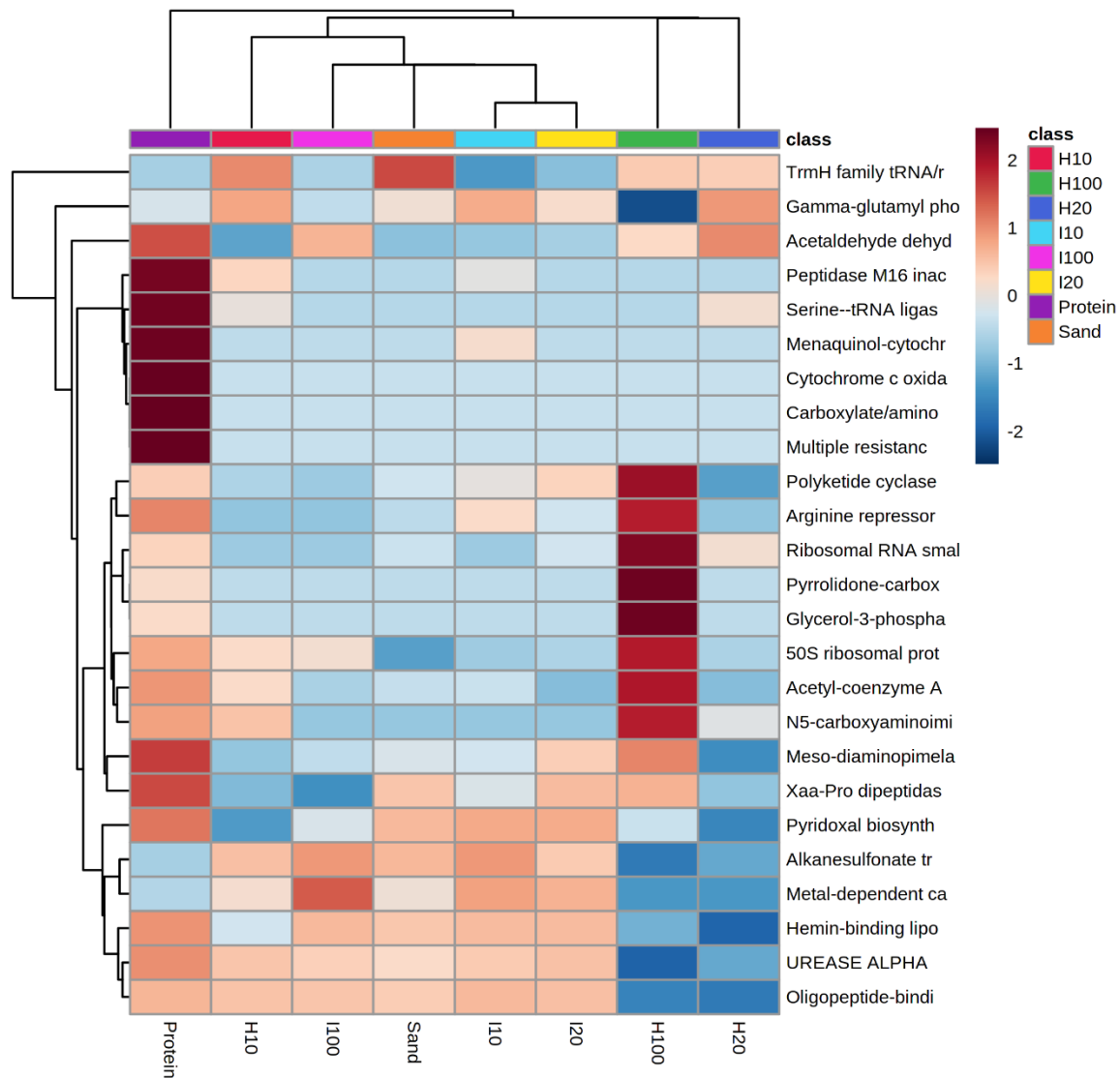


Figure S3. Heatmaps showing all (A) and top 25 (B) proteins present in the initial total protein extract and in the supernatant samples following adsorption onto soil mixtures. Results shown are averages from three independent experiments. The colors/values indicate relative abundances. Clustering analysis was performed in the MetaboAnalyst online tool. Distance measure calculated using the Pearson algorithm with single linkage clustering. Prior to analysis data was normalized with the auto-scaling feature (mean-centered and divided by the standard deviation of each variable.) and log transformed. Sand=uncoated sand; Protein=initial protein sample; I10, I20, I100=10, 20, 100% iron-coated sand, respectively; H10, H20, H100=10, 20, 100% hydrophobic sand, respectively.

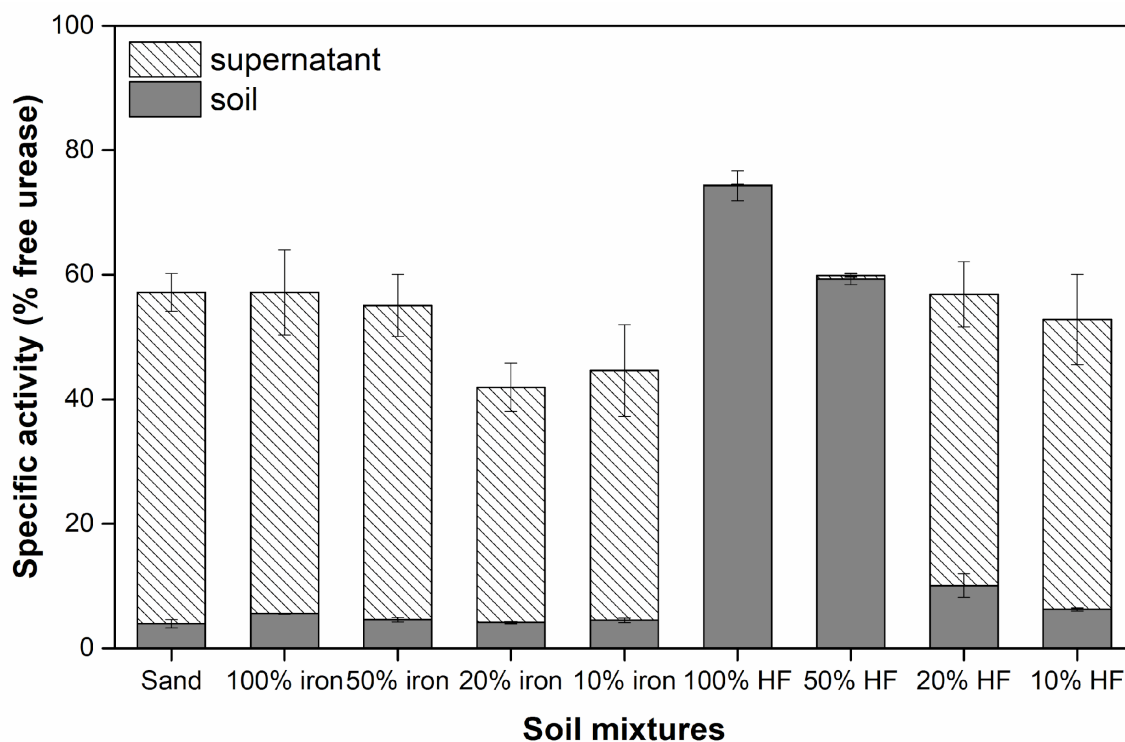


Figure S4. Urease activity in supernatant and soils portions upon adsorption as a percentage of the activity of the free urease enzyme in the initial total protein extract. Data show represents averages of three independent experiments with errors bars indicating standard error.

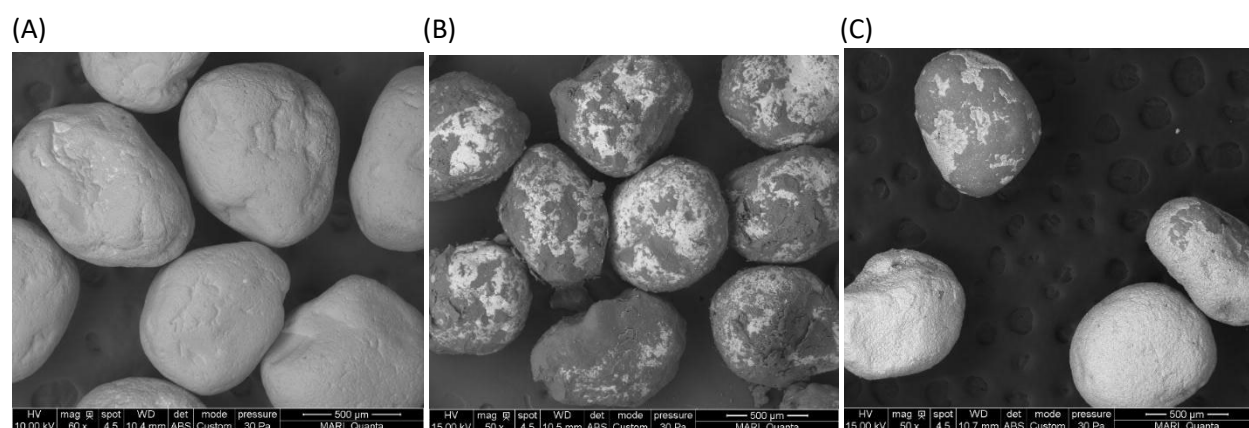


Figure S5. SEM pictures of (A) uncoated Ottawa silica sand, (B) 10% HF hydrophobic coated sand, (C) 10% iron oxide coated sand

Table S1. Surface areas of each soil mixture measured using BET N₂ physisorption analysis

Specific Surface Area (m ² /g)			Total Surface Area (m ²)	Standard Deviation (m ²)
Sample ID	average	std		
Sand	0.25	0.003	0.50	0.007
100% iron	8.03	0.067	16.05	0.134
20% iron	1.76	0.014	3.51	0.029
10% iron	0.92	0.005	1.85	0.009
100% HF	0.05	0.003	0.10	0.006
20% HF	0.07	0.002	0.14	0.003
10% HF	0.07	0.001	0.14	0.002

Table S2. Label-free proteomics analysis data (see Excel file).**Table S3.** K_M and V_{MAX} parameters obtained from Michaelis-Menten kinetic experiments in soil portions of each samples following batch adsorption experiments. Displayed values are averages of three independent experiments.

Sample ID	K _M (mM)	V _{MAX} (mM urea/min)	V _{MAX} /K _M (1/min)
Sand	28.41	0.04	0.0013
100% iron	19.71	0.03	0.0016
100% HF	11.82	0.05	0.0045