Table S1: Results of an informal survey among 51 soil testing laboratories where laboratories were asked to provide a method for soil sieving (i.e., initial homogenization) of bulk soils. Participants remain anonymous. NAPT is an acronym for the North American Proficiency Testing program.

Lab ID	NAPT certification	Sieving procedure	Lab ID	NAPT certification	Sieving procedure
A	Yes	no specification	AH	Yes	unspecified
AO	No	NA	AS	Yes	Dynacrush flail grinder
AN	Yes	Hammermill grinder	K	Yes	unspecified
AG	No	AgVise grinder	AP	Yes	Dynacrush flail grinder
AQ	No	Dynacrush flail grinder	L	Yes	unclear "very fine"
E	Yes	Flail grinder	BD	Yes	Dynacrush flail grinder
F	Yes	Flail grinder	O	Yes	Flail grinder
G	Yes	Customized grinder	AW	Yes	Dynacrush flail grinder
B	Yes	Customized grinder	AM	Yes	Dynacrush flail grinder
H	Yes	Dynacrush flail grinder	P	Yes	Dynacrush flail grinder
I	Yes	Dynacrush flail grinder	AX	Yes	Custom grinder
AU	Yes	Flail grinder	AZ	Yes	Grinder unspecified
C	Yes	NASCO grinder	Q	Yes	unspecified
D	No	Mortar & pestle	R	Yes	unspecified
AD	Yes	Mortar & pestle	S	Yes	Grinder - manual
AC	Yes	Grinder unspecified	T	Yes	Grinder unspecified
BC	Yes	AgVise grinder	AR	Yes	Dynacrush flail grinder
J	Yes	Dynacrush flail grinder	AY	Yes	Dynacrush flail grinder
AT	Yes	unspecified	U	Yes	Grinder unspecified
AI	Yes	Dynacrush flail grinder	W	Yes	Hammermill grinder
BB	Yes	Dynacrush flail grinder	X	Yes	Grinder unspecified
AB	Yes	Hammermill grinder	AE	Yes	AgVise grinder
AJ	Yes	unspecified	Y	Yes	Hammermill grinder
AV	Yes	unspecified	Z	Yes	unspecified
AK	Yes	unspecified	AA	Yes	unspecified
BA	Yes	Dynacrush flail grinder			

Table S2: The external service laboratory methods outlined for sieving, fine grinding, and drying for the measurements of % total carbon (TC), % soil inorganic carbon (SIC), and % soil organic carbon (SOC). The quantification methods for % TC, SIC, and SOC are presented where EA stands for dry combustion by elemental analyzer.

Lab ID	Sieving	Fine grinding	Drying	TC quantification	SIC quantification	SOC quantification
I	Mechanical grinder to 2 mm	no	air-dried	EA	TC-SOC	acidify EA
II	Mechanical grinder to 2 mm	no	45 °C	EA	TC-SOC	acidify EA
III	Mechanical grinder to 1 mm	no	air-dried	EA	TC-SOC	acidify EA
IV	Mechanical grinder to 2mm	no	air-dried	EA	TC-SOC	acidify EA
V	8 mm + mortar and pestle to 2mm	Ball mill	air-dried with moisture correction	EA	Pressure transducer	TC-SIC
VI	Mechanical grinder to 2mm	no	air-dried with 1-2 % moisture correction	EA	Pressure transducer	TC-SIC
VII	Mortar and pestle to 2mm	no	105 °C	EA	EA	EA
VIII	Mortar and pestle to 2mm	no	air-dried	EA	gravimetric	TC-SIC

Table S3: The absolute difference (Δ) reported for % total carbon (TC), % soil inorganic carbon (SIC), and % soil organic carbon (SOC) for soil samples B, C, J, and D sent to the eight external service soil testing laboratories calculated by subtracting the field moist soil sample from the air-dried soil sample sent. The laboratories are identified by a roman numeral with the true directional difference reported in paratheses.

Soil	Lab	(Δ TC)	(Δ SIC)	(Δ SOC)
B	I	3.67, 4.07 **(-0.40)**	0.45, 0.86 **(-0.41)**	3.22, 3.21 **(+0.01)**
C	I	1.23, 1.43 **(-0.16)**	0.02, 0.16 **(-0.14)**	1.25, 1.27 **(-0.02)**
J	I	3.37, 3.37 **(0.00)**	0.09, 0.01 **(+0.08)**	3.28, 3.36 **(-0.08)**
D	I	1.55, 1.66 **(-0.11)**	0.72, 0.83 **(-0.11)**	0.83, 0.83 **(0.00)**
B	II	2.60, 2.73 **(-0.13)**	0.54, 0.28 **(+0.26)**	2.06, 2.45 **(-0.39)**
C	II	1.11, 1.36 **(-0.25)**	0.22, 0.32 **(-0.10)**	0.89, 1.04 **(-0.15)**
J	II	7.57, 2.95 **(+4.62)**	4.12, 0.06 **(+4.06)**	3.45, 2.89 **(+0.56)**
D	II	1.45, 1.43 **(+0.02)**	0.76. 0.60 **(+0.07)**	0.77, 0.83 **(-0.05)**
B	III	4.52, 2.63 **(+1.89)**	0.46, 0.01 **(+0.45)**	4.07, 2.62 **(+1.45)**
C	III	1.32, 1.21 **(+0.11)**	0.08, 0.06 **(+0.02)**	1.24, 1.15 **(+0.09)**
J	III	3.37, 3.16 **(+0.21)**	0.00, 0.02 **(-0.02)**	3.37, 3.13 **(+0.24)**
D	III	1.53, 1.54 **(-0.01)**	0.73, 0.74 **(-0.01)**	0.80, 0.80 **(0.00)**
B	IV	6.51, 4.72 **(+1.79)**	1.72, 0.59 **(+1.13)**	4.79, 4.13 **(+0.66)**
C	IV	1.22, 0.92 **(+0.30)**	0.14, 0.00 **(+0.14)**	1.08, 1.39 **(-0.31)**
J	IV	2.99, 2.89 **(+0.10)**	0.00, 0.00 **(0.00)**	3.38, 2.97 **(+0.41)**
D	IV	1.66, 1.02 **(-0.36)**	0.52, 1.41 **(-0.89)**	1.14, 0.61 **(+0.53)**
B	V	3.17, 2.94 **(+0.23)**	0.56, 0.53 **(+0.03)**	2.61, 2.40 **(+0.21)**
C	V	1.34, 1.16 **(+0.18)**	0.03, 0.03 **(0.00)**	1.32, 1.14 **(+0.18)**
J	V	4.03, 3.67 **(+0.36)**	0.04, 0.02 **(+0.01)**	3.99, 3.65 **(+0.35)**
D	V	1.53, 1.69 **(-0.16)**	0.80, 0.80 **(0.00)**	0.73, 0.89 **(-0.16)**
B	VI	2.98, 3.06 **(-0.08)**	0.41, 0.40 **(+0.01)**	2.57, 2.66 **(-0.09)**
C	VI	1.24, 1.20 **(+0.04)**	0.00, 0.00 **(0.00)**	1.24, 1,20 **(+0.04)**
J	VI	3.34, 3.32 **(+0.02)**	0.00, 0.00 **(0.00)**	3.34, 3.32 **(+0.02)**
D	VI	1.52, 1.52 **(0.00)**	0.78, 0.06 **(+0.72)**	0.74, 1.46 **(-0.72)**
B	VII	3.03, 3.45 **(-0.42)**	0.52, 0.94 **(-0.42)**	2.51, 2.51 **(0.00)**
C	VII	1.31, 1.36 **(-0.05)**	0.00, 0.00 **(0.00)**	1.31, 1.36 **(-0.05)**
J	VII	3.36, 3.31 **(+0.15)**	0.00, 0.00 **(0.00)**	3.36, 3.31 **(+0.15)**
D	VII	1.71, 1.57 **(+0.14)**	0.53, 0.52 **(+0.01)**	1.18, 1.05 **(+0.13)**
B	VIII	4.08, 4.05 **(+0.03)**	0.68, 1.03 **(-0.35)**	3.40, 3.02 **(+0.38)**
C	VIII	1.25, 1.22 **(+0.03)**	0.18, 0.29 **(-0.11)**	1.07, 0.93 **(+0.14)**
J	VIII	3.25, 3.78 **(-0.53)**	0.28, 0.17 **(+0.11)**	2.97, 3.61 **(-0.64)**
D	VIII	1.54, 1.59 **(-0.05)**	1.02, 1.19 **(-0.17)**	0.52, 0.40 **(+0.12)**

Table S4: Data averages and standard error for % plant material and % rocks removed for each sieving procedure, including P0 (8 + 2 mm), P1 (4 mm), P2 (2 mm with rolling pin), and P3 (mechanical grinder). Significance by ANOVA is indicated by asterisks (*). Soils are lettered and significant differences for each soil*procedure combination are indicated by the superscript.

	Method Test	Procedure	Procedure ID	A	B	C	D	E	F	G	H	I	J	K	L	Significance levels	
% plant material	Sieving	8+2 mm	P0	0.22 ± 0.03 A	0.35 ± 0.04 A	0.31 ± 0.05 A	0.04 ± 0.01 A	0.25 ± 0.04 A	0.15 ± 0.02 A	0.38 ± 0.03 A	0.99 ± 0.04 A	0.12 ± 0.03 A	0.04 ± 0.01 A	0.04 ± 0.01 A	0.05 ± 0.02 A	S	***
		4 mm	P1	0.26 ± 0.04 A	0.34 ± 0.05 A	0.28 ± 0.07 A	0.08 ± 0.05 A	0.12 ± 0.01 AB	0.09 ± 0.02 AC	0.29 ± 0.03 AC	0.92 ± 0.17 A	0.07 ± 0.05 AC	0.13 ± 0.08 A	0.03 ± 0.01 A	0.05 ± 0.05 A	P	***
		2 mm	P2	0.17 ± 0.03 A	0.34 ± 0.11 A	0.15 ± 0.04 AB	0.11 ± 0.08 A	0.03 ± 0.01 B	0.03 ± 0.01 BC	0.13 ± 0.03 BC	1.15 ± 0.14 A	0.01 ± 0.01 BC	0.05 ± 0.03 A	0.01 ± 0 A	0.02 ± 0.02 A	S*P	**
		Grinder	P3	0.12 ± 0.03 A	0.12 ± 0.04 B	0.06 ± 0.02 B	0.02 ± 0.01 A	0.05 ± 0.02 B	0.01 ± 0.01 B	0.07 ± 0.02 B	0.33 ± 0.12 B	0.04 ± 0.04 BC	0.09 ± 0.09 A	0 ± 0 A	0 ± 0 A		
% rocks	Sieving	8+2 mm	P0	1.13 ± 0.15 AC	0.31 ± 0.13 A	4.73 ± 0.58 A	0.13 ± 0.05 A	0.14 ± 0.14 A	4.1 ± 0.68 A	0.85 ± 0.09 A	12.02 ± 0.79 A	0.03 ± 0.02 A	0.07 ± 0.04 A	1.14 ± 0.56 B	0.98 ± 0.22 A	S	***
		4 mm	P1	0.32 ± 0.14 BC	0.21 ± 0.13 A	2.03 ± 0.45 B	0.16 ± 0.07 A	0 ± 0 A	2.89 ± 0.43 A	0.13 ± 0.08 B	5.78 ± 0.54 B	0 ± 0 A	0 ± 0 A	0.57 ± 0.2 B	0.23 ± 0.04 AB	P	***
		2 mm	P2	1.81 ± 0.54 A	0.11 ± 0.06 A	5.64 ± 0.53 A	0.31 ± 0.12 A	0 ± 0 A	4.06 ± 0.6 A	0.73 ± 0.24 AC	14.38 ± 1.34 A	0.03 ± 0.02 A	0.04 ± 0.04 A	3.78 ± 1.93 A	0.8 ± 0.15 A	S*P	***
		Grinder	P3	0.33 ± 0.25 B	0 ± 0 A	2.28 ± 1.26 B	0.39 ± 0.29 A	0 ± 0 A	2.32 ± 0.48 A	0.21 ± 0.14 BC	11.58 ± 0.98 A	0 ± 0 A	0 ± 0 A	0.72 ± 0.61 B	0 ± 0 B		

Table S5: Data averages and standard error for % total carbon (TC) for each sieving procedure, including P0 (8 + 2 mm), P1 (4 mm), P2 (2 mm with rolling pin), and P3 (mechanical grinder). Significance by ANOVA is indicated by asterisks (*). Soils are lettered and significant differences for each soil*procedure combination are indicated by the superscript.

	Method Test	Procedure	Procedure ID	A	B	C	D	E	F	G	H	I	J	K	L	Significance levels	
% Total C	Sieving	8+2 mm	P0	4.26 ± 0.14 A	3.11 ± 0.16 A	1.31 ± 0.04 A	1.7 ± 0.02 A	1.1 ± 0.02 A	1.07 ± 0.02 A	1.38 ± 0.04 A	7.21 ± 0.02 A	1.41 ± 0.05 A	3.3 ± 0.07 A	2.5 ± 0.09 A	2.98 ± 0.13 AB	S	***
		4 mm	P1	4.31 ± 0.15 A	3.35 ± 0.31 A	1.27 ± 0.04 A	1.68 ± 0.02 A	1.13 ± 0.03 A	1.02 ± 0.01 A	1.33 ± 0.03 AB	7.05 ± 0.06 A	1.4 ± 0.04 A	3.23 ± 0.03 A	2.55 ± 0.05 A	3.19 ± 0.08 A	P	***
		2 mm	P2	4.39 ± 0.08 A	3.09 ± 0.08 A	1.31 ± 0.03 A	1.69 ± 0.01 A	1.09 ± 0.02 A	1.02 ± 0.01 A	1.32 ± 0.03 AB	7.28 ± 0.15 A	1.42 ± 0.02 A	3.38 ± 0.09 A	2.44 ± 0.09 AB	3.05 ± 0.07 A	S*P	*
		Grinder	P3	4.15 ± 0.26 A	3.3 ± 0.21 A	1.31 ± 0.02 A	1.62 ± 0.02 A	1.07 ± 0.03 A	0.88 ± 0.04 B	1.2 ± 0.07 B	7.05 ± 0.37 A	1.46 ± 0.07 A	3.48 ± 0.24 A	2.2 ± 0.05 B	2.7 ± 0.12 B		
	Fine grinding	Roller Table	P0	4.26 ± 0.14 A	3.11 ± 0.16 A	1.31 ± 0.04 A	1.7 ± 0.02 A	1.1 ± 0.02 A	1.07 ± 0.02 A	1.38 ± 0.04 A	7.21 ± 0.02 A	1.41 ± 0.05 A	3.3 ± 0.07 A	2.5 ± 0.09 A	2.98 ± 0.13 A	S	***
		Ball mill	P4	4.17 ± 0.05 A	3 ± 0.17 A	1.19 ± 0.02 B	1.71 ± 0.01 A	1.1 ± 0.01 A	0.98 ± 0.01 B	1.22 ± 0.02 B	7.37 ± 0.04 A	1.38 ± 0.02 A	3.37 ± 0.06 A	2.16 ± 0.02 B	2.71 ± 0.02 B	P	***
		None	P5	3.73 ± 0.06 B	3.12 ± 0.24 A	1.28 ± 0.03 AB	1.63 ± 0.03 A	1.14 ± 0.07 A	0.95 ± 0.02 B	1.35 ± 0.03 A	7.11 ± 0.17 A	1.36 ± 0.03 A	3.16 ± 0.11 A	2.12 ± 0.07 B	2.71 ± 0.12 B	S*P	***
	Drying	105 C	P0	4.26 ± 0.14 A	3.11 ± 0.16 A	1.31 ± 0.04 A	1.7 ± 0.02 A	1.1 ± 0.02 A	1.07 ± 0.02 A	1.38 ± 0.04 AB	7.21 ± 0.02 A	1.41 ± 0.05 A	3.3 ± 0.07 A	2.5 ± 0.09 A	2.98 ± 0.13 A	S	***
		60 C	P6	4.38 ± 0.08 A	3.11 ± 0.09 A	1.2 ± 0.03 A	1.7 ± 0.02 A	1.08 ± 0.02 A	1.01 ± 0.01 A	1.5 ± 0.04 A	7.09 ± 0.03 A	1.42 ± 0.03 A	3.17 ± 0.06 A	2.36 ± 0.08 A	3.22 ± 0.15 A	P	**
		air-dried	P7	4.08 ± 0.13 A	2.86 ± 0.15 A	1.3 ± 0.04 A	1.63 ± 0.04 A	1.08 ± 0.03 A	1.02 ± 0.03 A	1.35 ± 0.1 B	7.07 ± 0.06 A	1.43 ± 0.02 A	3.11 ± 0.07 A	2.34 ± 0.06 A	3.01 ± 0.13 A	S*P	.

Table S6: Data averages and standard error for % soil inorganic carbon (SIC) for each sieving procedure, including P0 (8 + 2 mm), P1 (4 mm), P2 (2 mm with rolling pin), and P3 (mechanical grinder). Significance by ANOVA is indicated by asterisks (*). Soils are lettered and significant differences for each soil*procedure combination are indicated by the superscript.

	Method Test	Procedure	Procedure ID	A	B	C	D	E	F	G	H	I	J	K	L	Significance levels	
% SIC	Sieving	8+2 mm	P0	0.68 ± 0.02^{A}	0.56 ± 0.05^{A}	NA	0.86 ± 0.01^{A}	NA	NA	NA	4.86 ± 0.19^{A}	NA	NA	0.17 ± 0^{A}	0.43 ± 0.04^{A}	S	***
		4 mm	P1	0.72 ± 0.03^{A}	0.65 ± 0.02^{A}	NA	0.86 ± 0.01^{A}	NA	NA	NA	4.6 ± 0.08^{A}	NA	NA	0.16 ± 0.02^{A}	0.49 ± 0.01^{A}	P	*
		2 mm	P2	0.77 ± 0.03^{A}	0.66 ± 0.02^{A}	NA	0.92 ± 0.01^{A}	NA	NA	NA	4.73 ± 0.22^{A}	NA	NA	0.18 ± 0.01^{A}	0.53 ± 0.02^{A}	S*P	
		Grinder	P3	0.67 ± 0.04^{A}	0.63 ± 0.01^{A}	NA	0.84 ± 0.01^{A}	NA	NA	NA	5.2 ± 0.18^{A}	NA	NA	0.17 ± 0.01^{A}	0.52 ± 0.04^{A}		
	Fine grinding	Roller Table	P0	0.68 ± 0.02^{A}	0.56 ± 0.05^{A}	NA	0.86 ± 0.01^{A}	NA	NA	NA	4.86 ± 0.19^{A}	NA	NA	0.17 ± 0^{AB}	0.43 ± 0.04^{A}	S	
		Ball mill	P4	0.68 ± 0.03^{A}	0.63 ± 0.01^{A}	NA	0.86 ± 0.01^{A}	NA	NA	NA	4.73 ± 0.05^{A}	NA	NA	0.2 ± 0.01^{A}	0.48 ± 0.01^{A}	P	
		None	P5	0.68 ± 0.02^{A}	0.63 ± 0.04^{A}	NA	0.83 ± 0.01^{A}	NA	NA	NA	4.85 ± 0.22^{A}	NA	NA	0.17 ± 0.03^{B}	0.47 ± 0.01^{A}	S*P	
	Drying	105 C	P0	0.68 ± 0.02^{A}	0.56 ± 0.05^{A}	NA	0.86 ± 0.01^{A}	NA	NA	NA	4.86 ± 0.19^{A}	NA	NA	0.17 ± 0^{AB}	0.43 ± 0.04^{B}	S	***
		60 C	P6	0.76 ± 0.03^{A}	0.65 ± 0.01^{A}	NA	0.91 ± 0.02^{A}	NA	NA	NA	5.07 ± 0.09^{A}	NA	NA	0.19 ± 0.02^{A}	0.54 ± 0.02^{A}	P	***
		air-dried	P7	0.73 ± 0.03^{A}	0.63 ± 0.02	NA	0.9 ± 0.01^{A}	NA	NA	NA	4.9 ± 0.12^{A}	NA	NA	0.15 ± 0.02^{B}	0.46 ± 0.02^{AB}	S*P	

Table S7: Data averages and standard error for % soil organic carbon (SOC) for each sieving procedure, including P0 (8 + 2 mm), P1 (4 mm), P2 (2 mm with rolling pin), and P3 (mechanical grinder). Significance by ANOVA is indicated by asterisks (*). Soils are lettered and significant differences for each soil*procedure combination are indicated by the superscript.

	Method Test	Procedure	Procedure ID	A	B	C	D	E	F	G	H	I	J	K	L	Significance levels	
% SOC	Sieving	8+2 mm	P0	3.58 ± 0.12^{A}	2.55 ± 0.2^{A}	1.31 ± 0.04^{A}	0.85 ± 0.02^{A}	1.1 ± 0.02^{A}	1.07 ± 0.02^{A}	1.38 ± 0.04	2.34 ± 0.2^{A}	1.41 ± 0.05^{A}	3.3 ± 0.07^{A}	2.33 ± 0.08^{A}	2.55 ± 0.12^{AB}	S	***
		4 mm	P1	3.6 ± 0.15^{A}	2.7 ± 0.33^{A}	1.27 ± 0.04^{A}	0.82 ± 0.02^{A}	1.13 ± 0.03^{A}	1.02 ± 0.01^{A}	1.33 ± 0.03	2.46 ± 0.13^{A}	1.4 ± 0.04^{A}	3.23 ± 0.03^{A}	2.39 ± 0.05^{A}	2.7 ± 0.08^{A}	P	**
		2 mm	P2	3.62 ± 0.06^{A}	2.43 ± 0.09^{A}	1.31 ± 0.03^{A}	0.77 ± 0.02^{A}	1.09 ± 0.02^{A}	1.02 ± 0.01^{A}	1.32 ± 0.03	2.55 ± 0.33^{A}	1.42 ± 0.02^{A}	3.38 ± 0.09^{A}	2.26 ± 0.09^{A}	2.52 ± 0.07^{AB}	S*P	
		Grinder	P3	3.48 ± 0.28^{A}	2.67 ± 0.21^{A}	1.31 ± 0.02^{A}	0.78 ± 0.02^{A}	1.07 ± 0.03^{A}	0.88 ± 0.04^{A}	1.2 ± 0.07	1.86 ± 0.45^{B}	1.46 ± 0.07^{A}	3.48 ± 0.24^{A}	2.03 ± 0.05^{A}	2.18 ± 0.1^{B}		
	Fine grinding	Roller Table	P0	3.58 ± 0.12^{A}	2.55 ± 0.2^{A}	1.31 ± 0.04^{A}	0.85 ± 0.02^{A}	1.1 ± 0.02^{A}	1.07 ± 0.02^{A}	1.38 ± 0.04^{A}	2.34 ± 0.2^{B}	1.41 ± 0.05^{A}	3.3 ± 0.07^{A}	2.33 ± 0.08^{A}	2.55 ± 0.12^{A}	S	***
		Ball mill	P4	3.49 ± 0.07^{AC}	2.37 ± 0.18^{A}	1.19 ± 0.02^{A}	0.85 ± 0.02^{A}	1.1 ± 0.01^{A}	0.98 ± 0.01^{AB}	1.22 ± 0.02^{B}	2.64 ± 0.04^{A}	1.38 ± 0.02^{A}	3.37 ± 0.06^{A}	1.95 ± 0.02^{B}	2.23 ± 0.02^{B}	P	***
		None	P5	3.05 ± 0.06^{BC}	2.49 ± 0.26^{A}	1.28 ± 0.03^{A}	0.8 ± 0.04^{A}	1.14 ± 0.07^{A}	0.95 ± 0.02^{B}	1.35 ± 0.03^{AB}	2.26 ± 0.24^{B}	1.36 ± 0.03^{A}	3.16 ± 0.11^{A}	1.95 ± 0.06^{B}	2.23 ± 0.11^{B}	S*P	***
	Drying	105 C	P0	3.58 ± 0.12^{A}	2.55 ± 0.2^{A}	1.31 ± 0.04^{A}	0.85 ± 0.02^{A}	1.1 ± 0.02^{A}	1.07 ± 0.02^{A}	1.38 ± 0.04^{AB}	2.34 ± 0.2^{A}	1.41 ± 0.05^{A}	3.3 ± 0.07^{A}	2.33 ± 0.08^{A}	2.55 ± 0.12^{A}	S	***
		60 C	P6	3.62 ± 0.07^{A}	2.46 ± 0.09^{AB}	1.2 ± 0.03^{A}	0.79 ± 0.04^{AB}	1.08 ± 0.02^{A}	1.01 ± 0.01^{A}	1.5 ± 0.04^{A}	2.02 ± 0.1^{B}	1.42 ± 0.03^{A}	3.17 ± 0.06^{A}	2.17 ± 0.08^{A}	2.68 ± 0.14^{A}	P	***
		air-dried	P7	3.35 ± 0.14^{A}	2.23 ± 0.17^{B}	1.3 ± 0.04^{A}	0.73 ± 0.04^{B}	1.08 ± 0.03^{A}	1.02 ± 0.03^{A}	1.35 ± 0.1^{B}	2.17 ± 0.16^{AB}	1.43 ± 0.02^{A}	3.11 ± 0.07^{A}	2.18 ± 0.05^{A}	2.54 ± 0.14^{A}	S*P	.

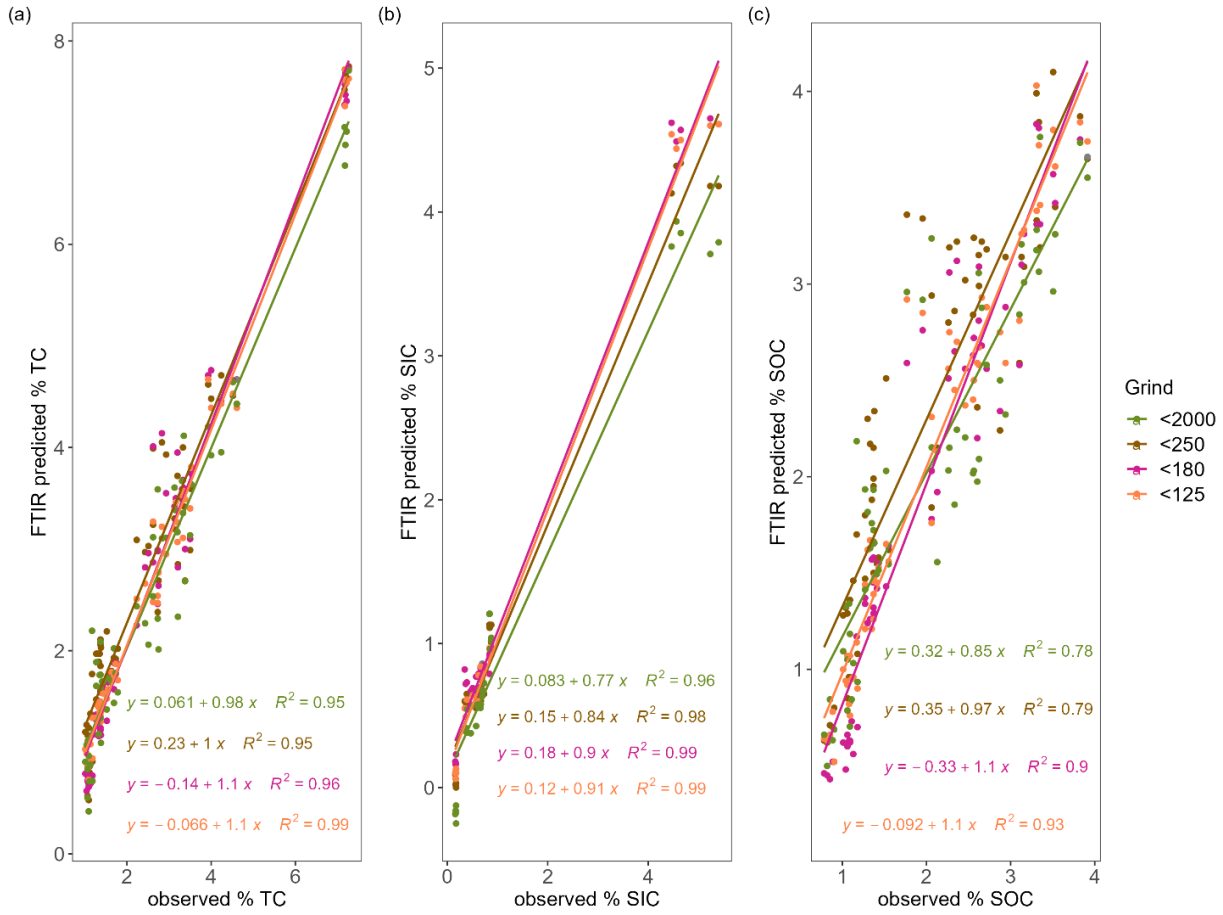

Figure S1: Fine grinding comparisons for predictions of % soil total carbon (TC) panel a, % soil inorganic carbon (SIC) panel b, and % soil organic carbon (SOC) panel c using Fourier transformed infrared spectroscopy (FTIR) where the FTIR predicted values are regressed against the observed values using dry combustion by an Elemental Analyzer (EA) for % TC, a pressure transducer (PT) for % SIC, and % SOC is calculated by EA-PT. The units for grind size are in µm. All p-values are < 0.001.

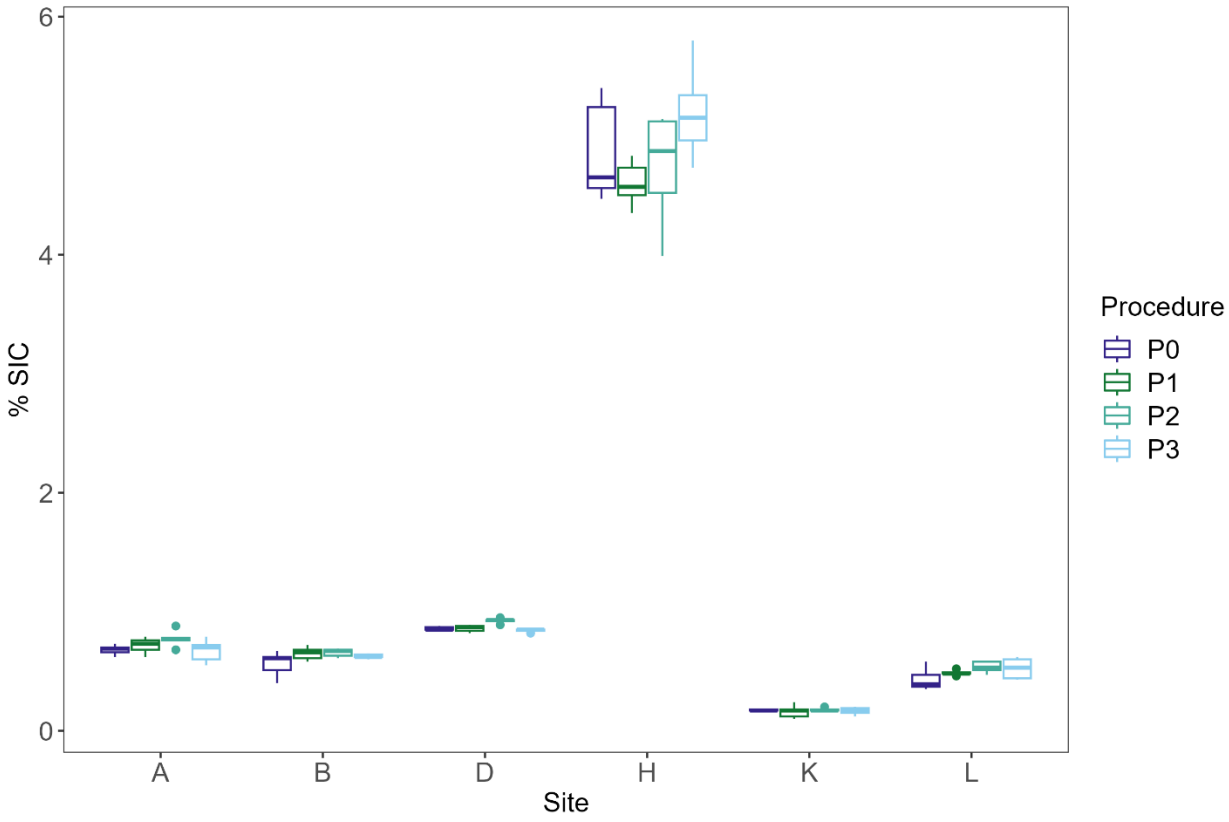

Figure S2: The % soil inorganic carbon (SIC) distribution shown with a boxplot for P0 (8 + 2 mm), P1 (4 mm), P2 (2 mm with rolling pin), and P3 (mechanical grinder) sieving procedures for each soil with SIC.

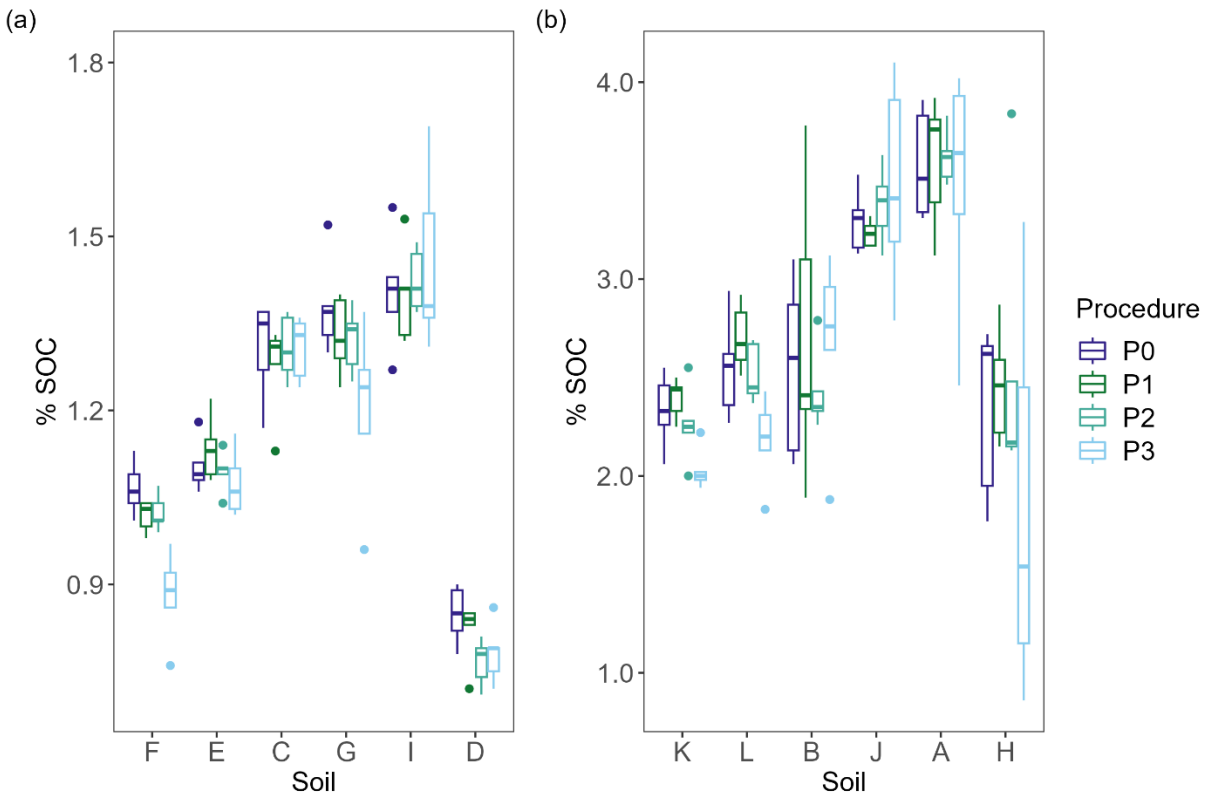

Figure S3: The % soil organic C (SOC) distribution shown with a boxplot for P0 (8 + 2 mm), P1 (4 mm), P2 (2 mm with rolling pin), and P3 (mechanical grinder) sieving procedures. Panel a (left) represents the soils with % SOC between 0 and 2 %; Panel b (right) represents the soils with % SOC between 2 and 4 %.

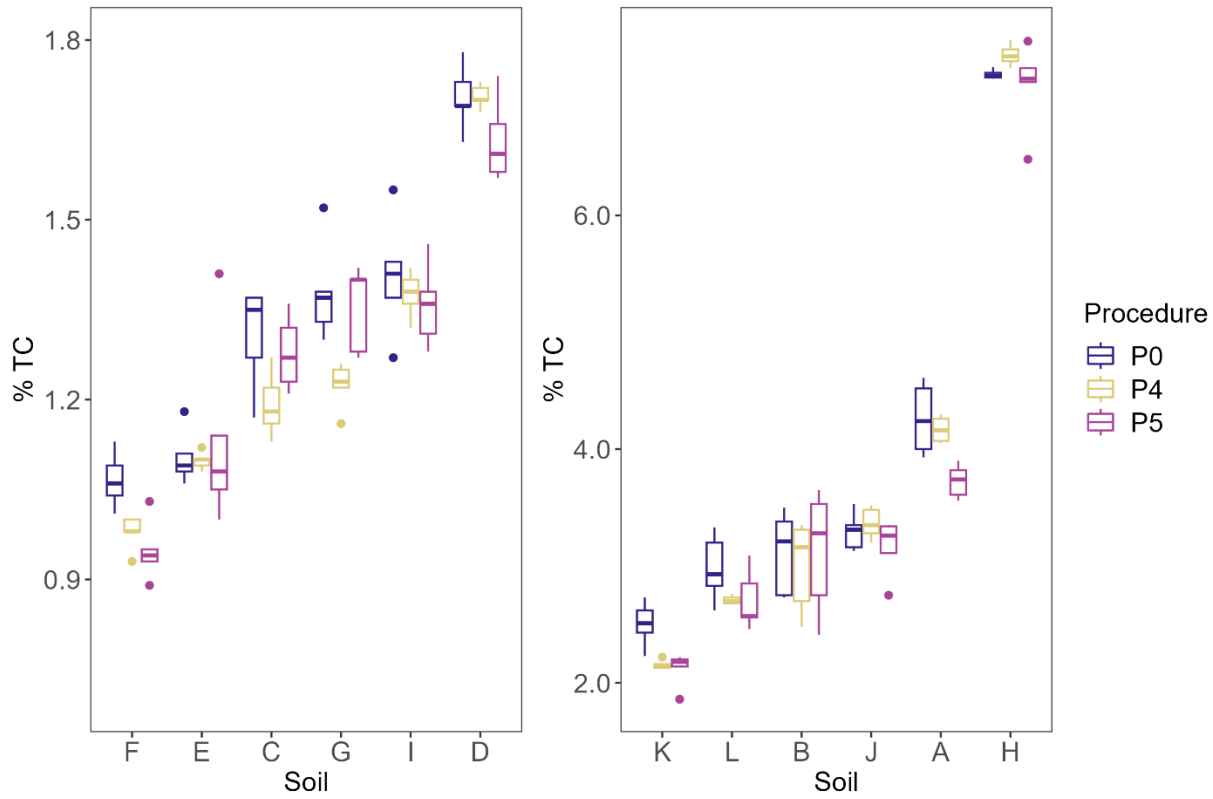

Figure S4: The % total C (TC) distribution shown with a boxplot for P0 (roller table grind to < 250 µm), P4 (ball mill to < 125 µm), and no grind (< 2000 µm) grinding procedures. Panel a (left) represents the soils with % TC between 0 and 2 %; Panel b (right) represents the soils with % TC between 2 and 8 %.

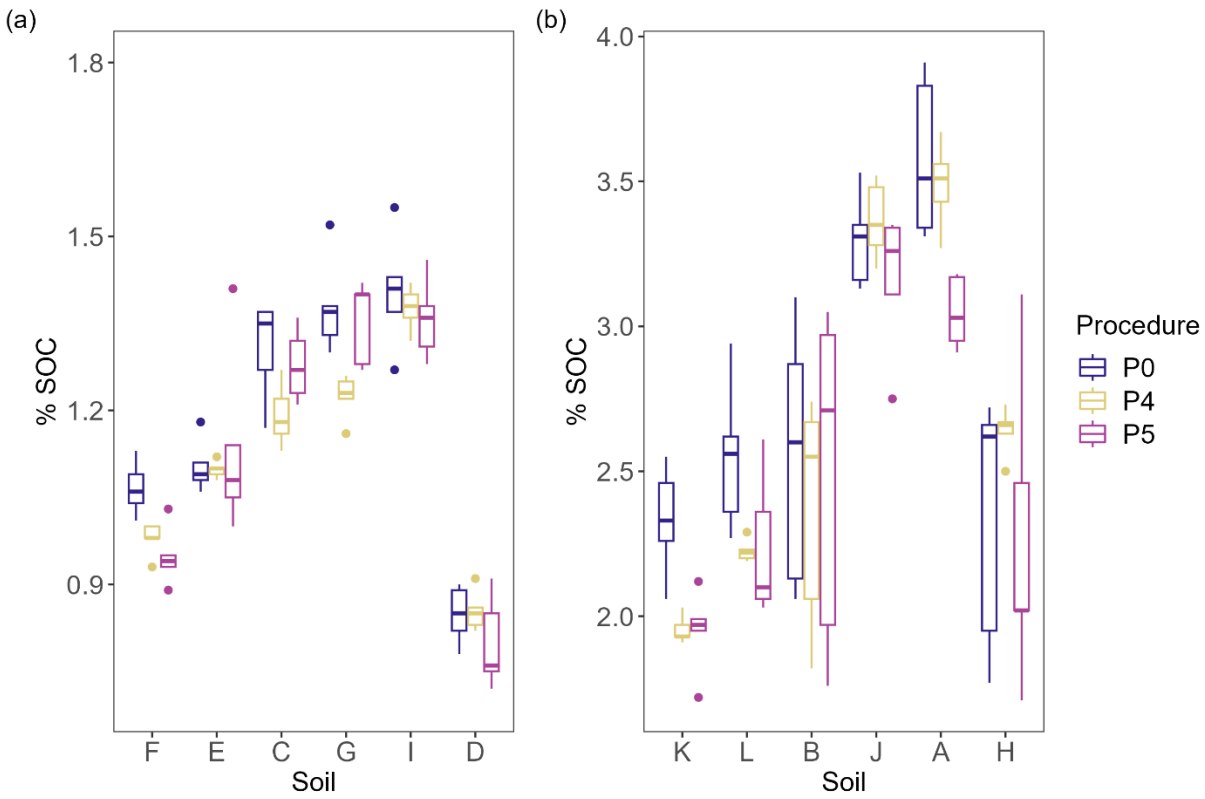

Figure S5: The % soil organic C (SOC) distribution shown with a boxplot for for P0 (roller table grind to < 250 µm), P4 (ball mill to < 125 µm), and no grind (< 2000 µm) grinding procedures. Panel a (left) represents the soils with % SOC between 0 and 2 %; Panel b (right) represents the soils with % SOC between 2 and 4 %.

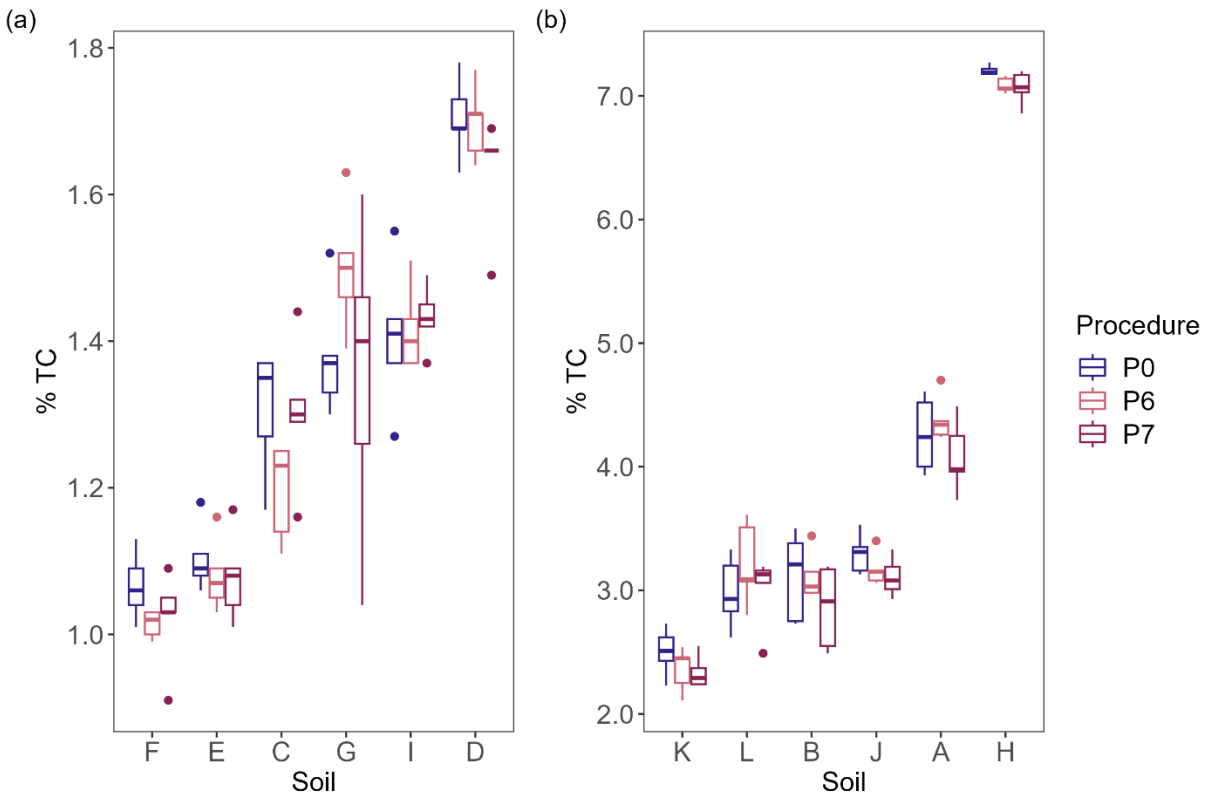

Figure S6: The % total C (TC) distribution shown with a boxplot for P0 (105 °C), P6 (60 °C), and P7 (air-dried only) drying procedures. Panel a (left) represents the soils with % TC between 0 and 2 %; Panel b (right) represents the soils with % TC between 2 and 8 %.

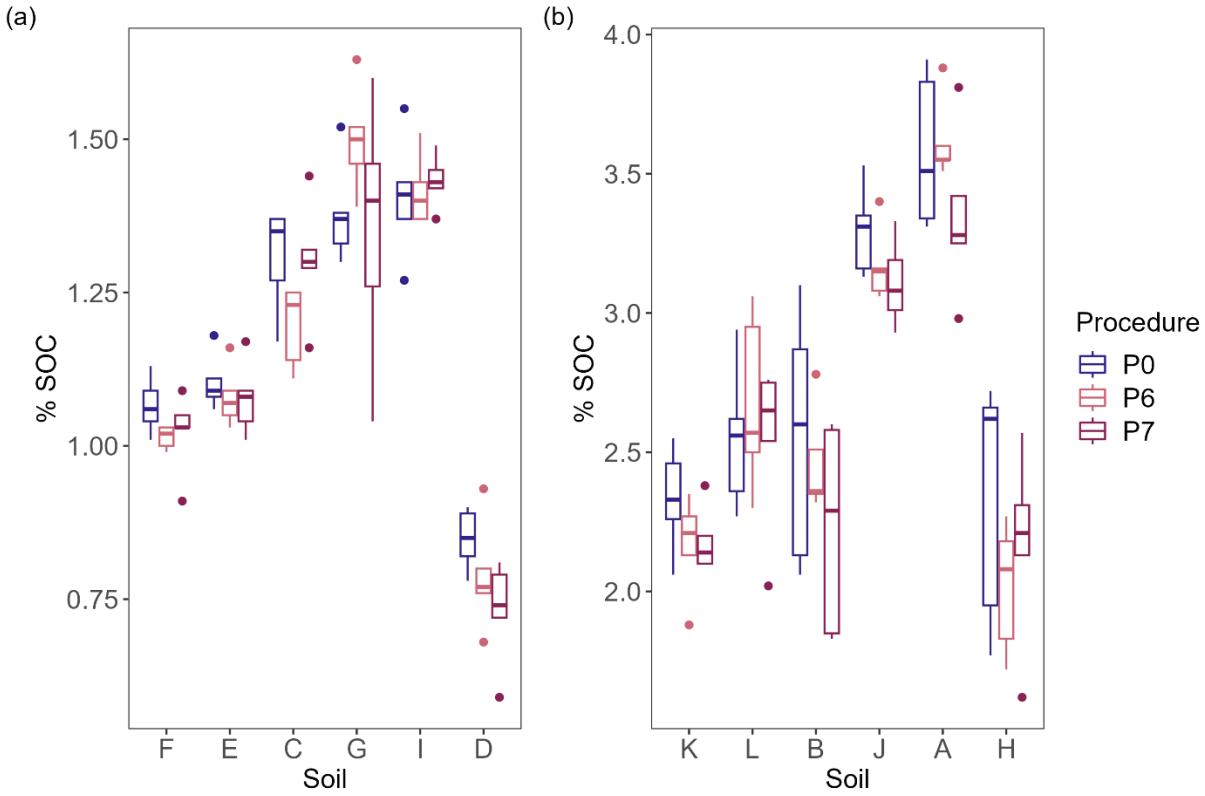

Figure S7: The % soil organic C (SOC) distribution shown with a boxplot for P0 (105 °C), P6 (60 °C), and P7 (air-dried only) drying procedures. Panel a (left) represents the soils with % SOC between 0 and 2 %; Panel b (right) represents the soils with % SOC between 2 and 4 %.

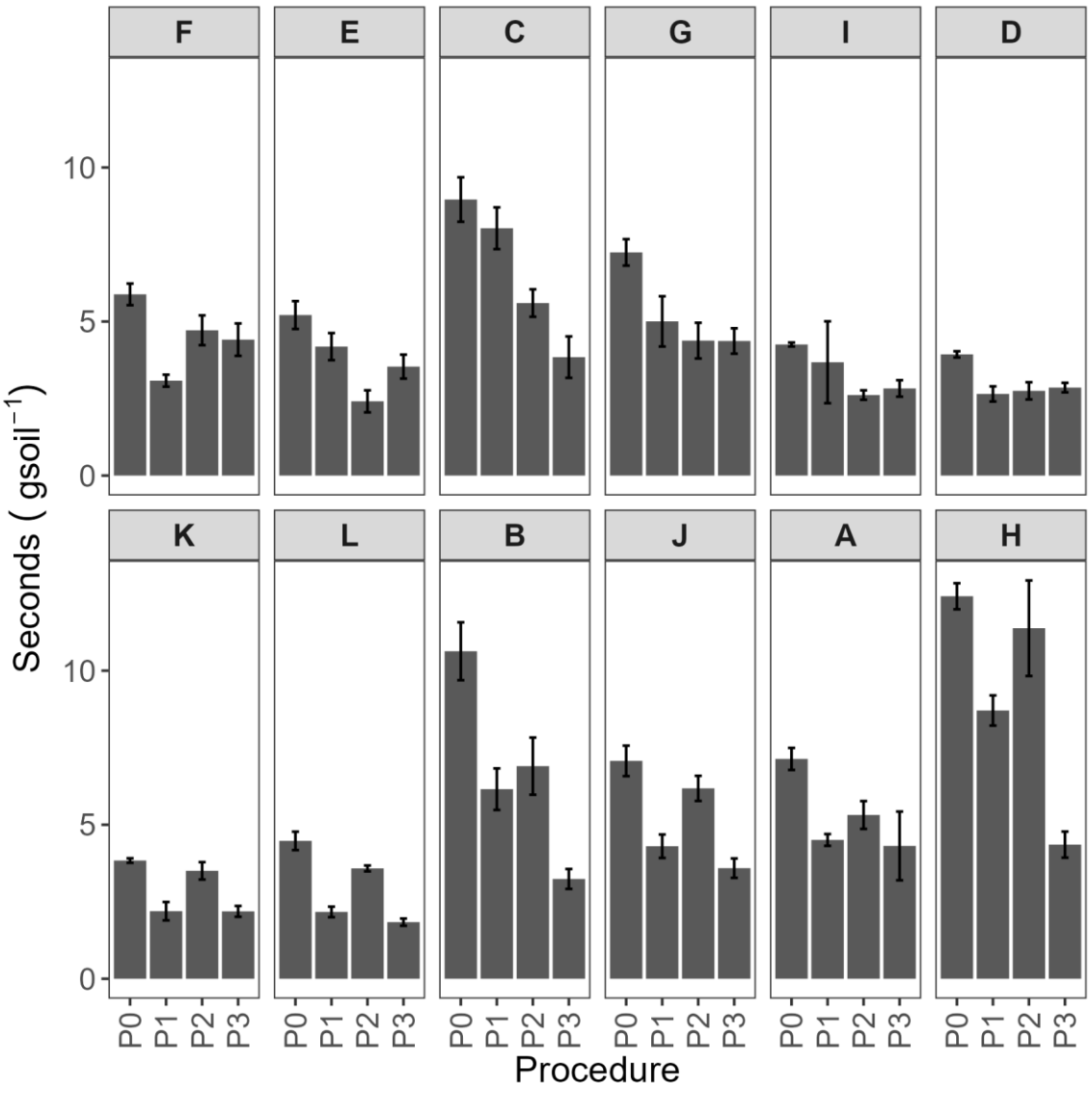

Figure S8: The time taken to process soils in seconds per gram of soil using for the P0 (8 + 2 mm), P1 (4 mm), P2 (2 mm with rolling pin), and P3 (mechanical grinder) sieving procedures. Lettered panels represent the soil in ascending order of % total carbon.

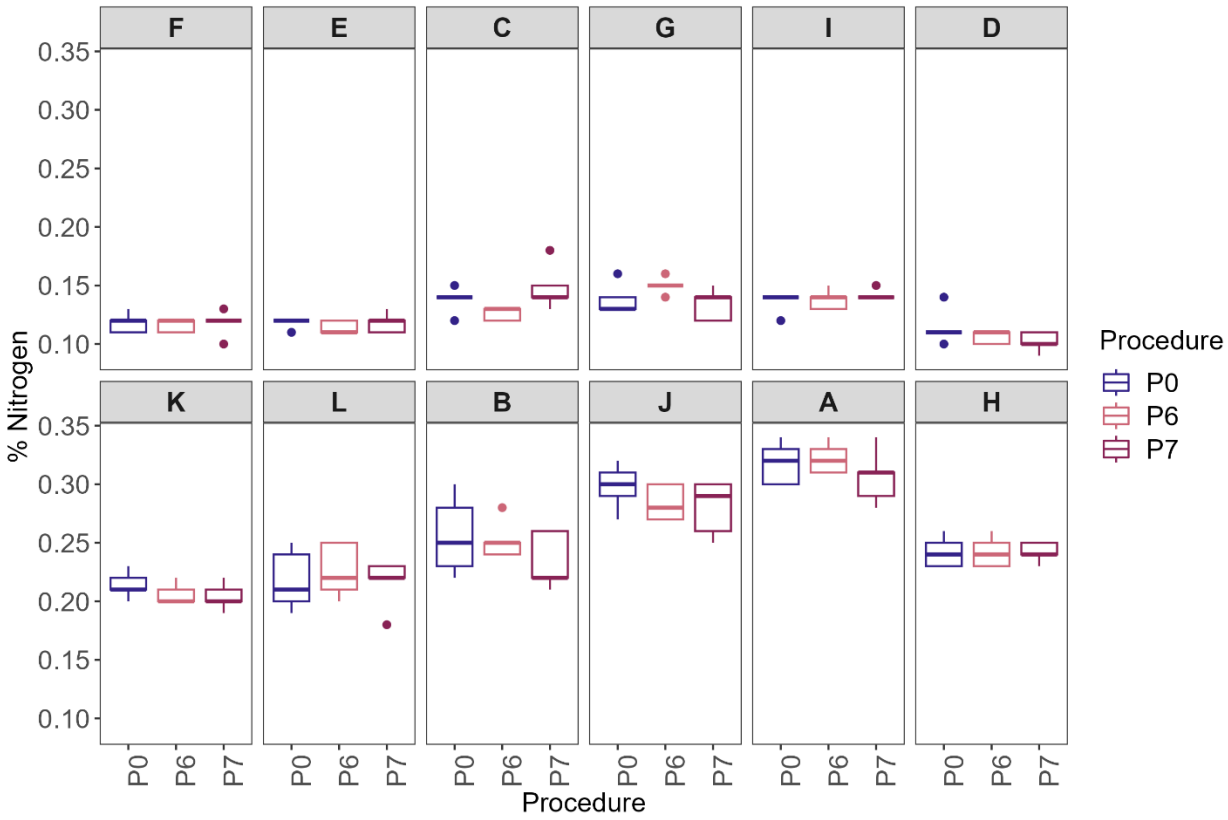

Figure S9: The % nitrogen distribution shown with a boxplot for P0 (105 °C), P6 (60 °C), and P7 (air-dried only) drying procedures. Lettered panels represent the soil in ascending order of % total carbon. All soils were sieved and finely ground using the same method.