Fig. S1 Particle size distribution for basalt, concrete fines and steel slags. P80= 80% of the particles having a diameter less than or equal to this size.

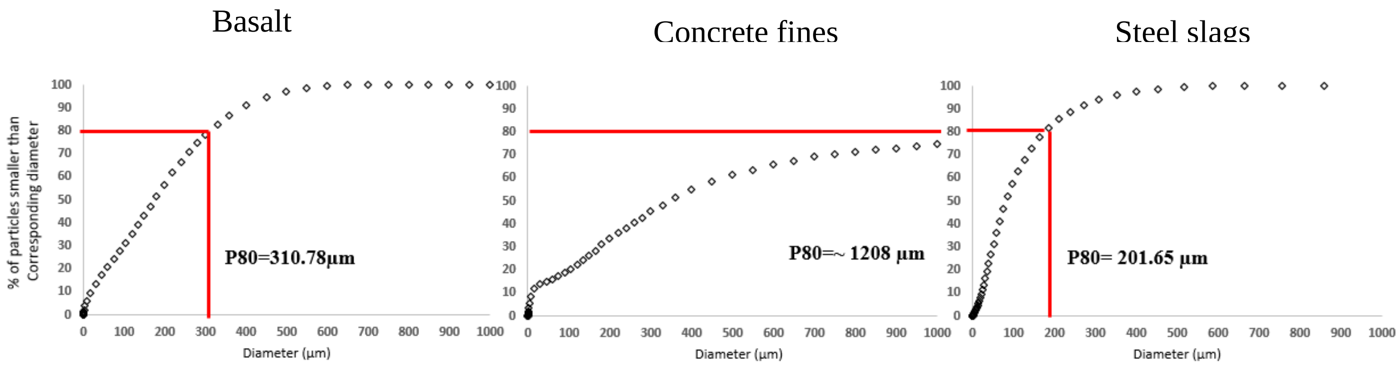

Fig. S2 Soil water content during the experiment of the mesocosms for the different application rates of basalt, concrete fines and steel slags. Data retrieved from Cambell Scientific sensors (CS616).

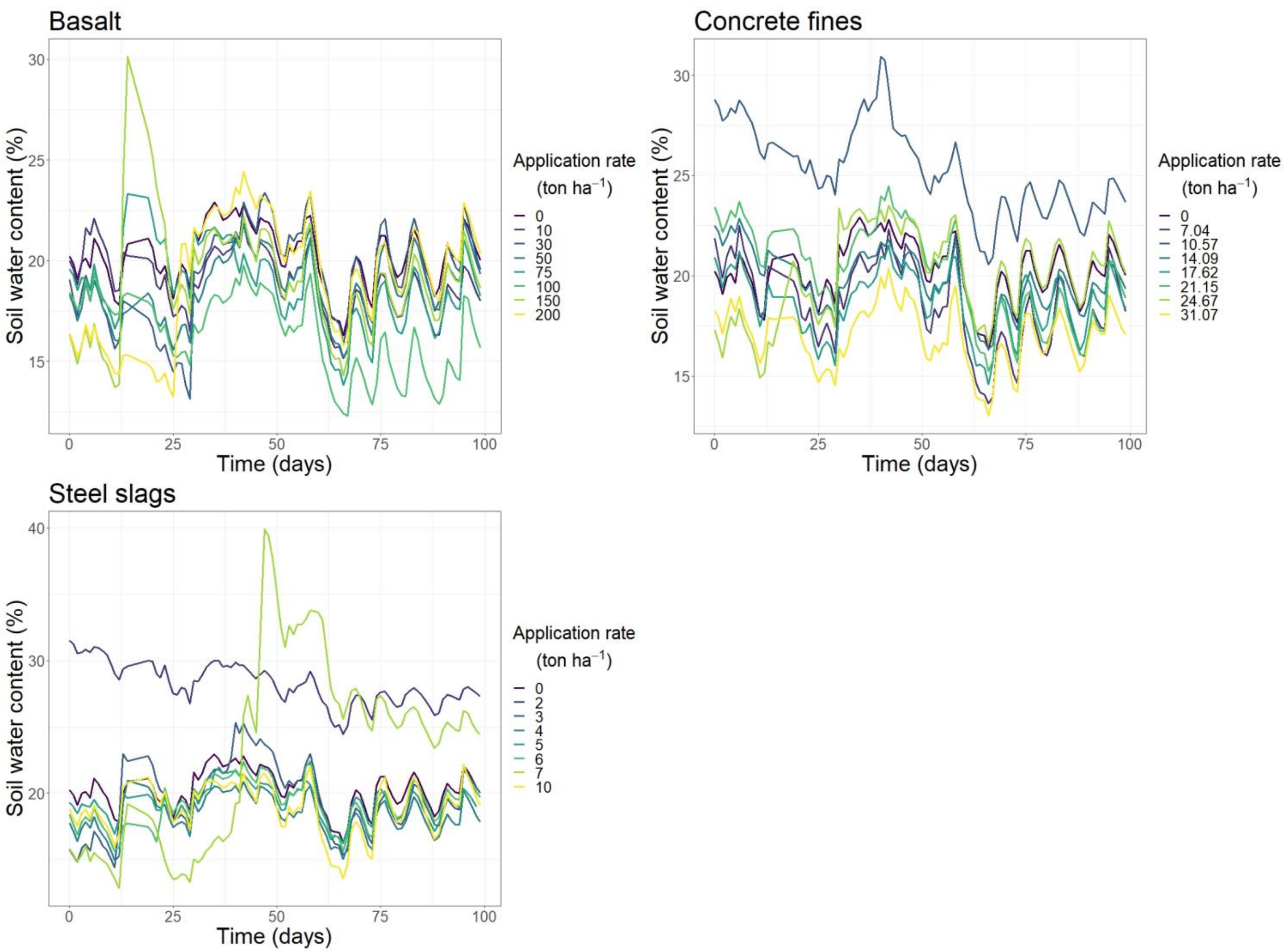

Fig. S3 Daily precipitation and average air temperature during the experiment retrieved from visualcrossing (https://www.visualcrossing.com/). Average air temperature is shown within the range of minimum and maximum air temperature.

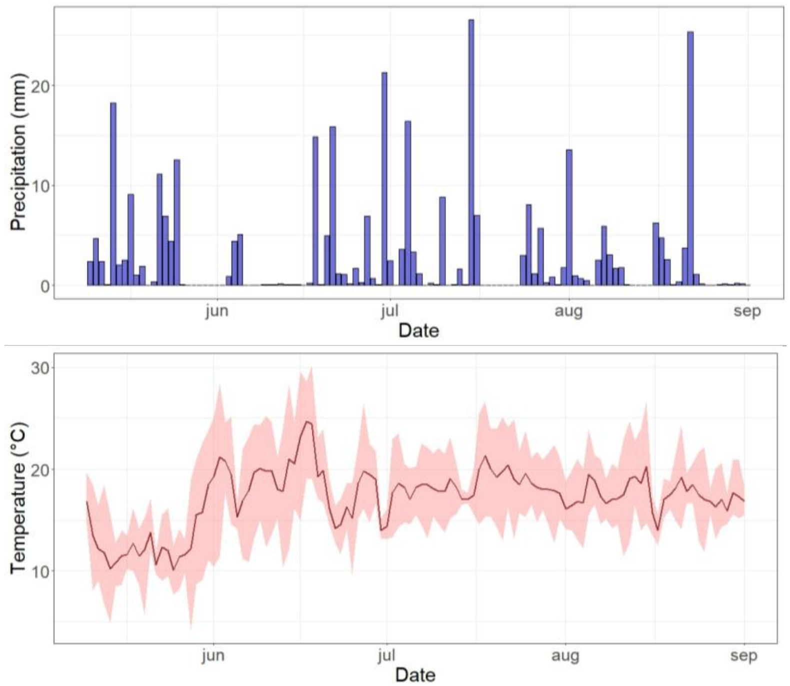

Fig. S3 Plant nutrient availability retrieved from PRS probes on two occasions during the experiment for the application amount of the silicate (B = basalt, CF = concrete fines, S = steel slags). Data of 0 and 50 ton ha-1 of basalt are average of five replicates with standard error. Note that in some cases, the error bars are smaller than the symbol. The other treatments have one measurement each. P-and F values are shown of a linear mixed model with nutrient availability from the PRS probes as response variable and application amount of the silicate material (=A), burial date (=D), and the interaction (A*D) as covariable. Interactions are only shown when significant ($p<0.05$).

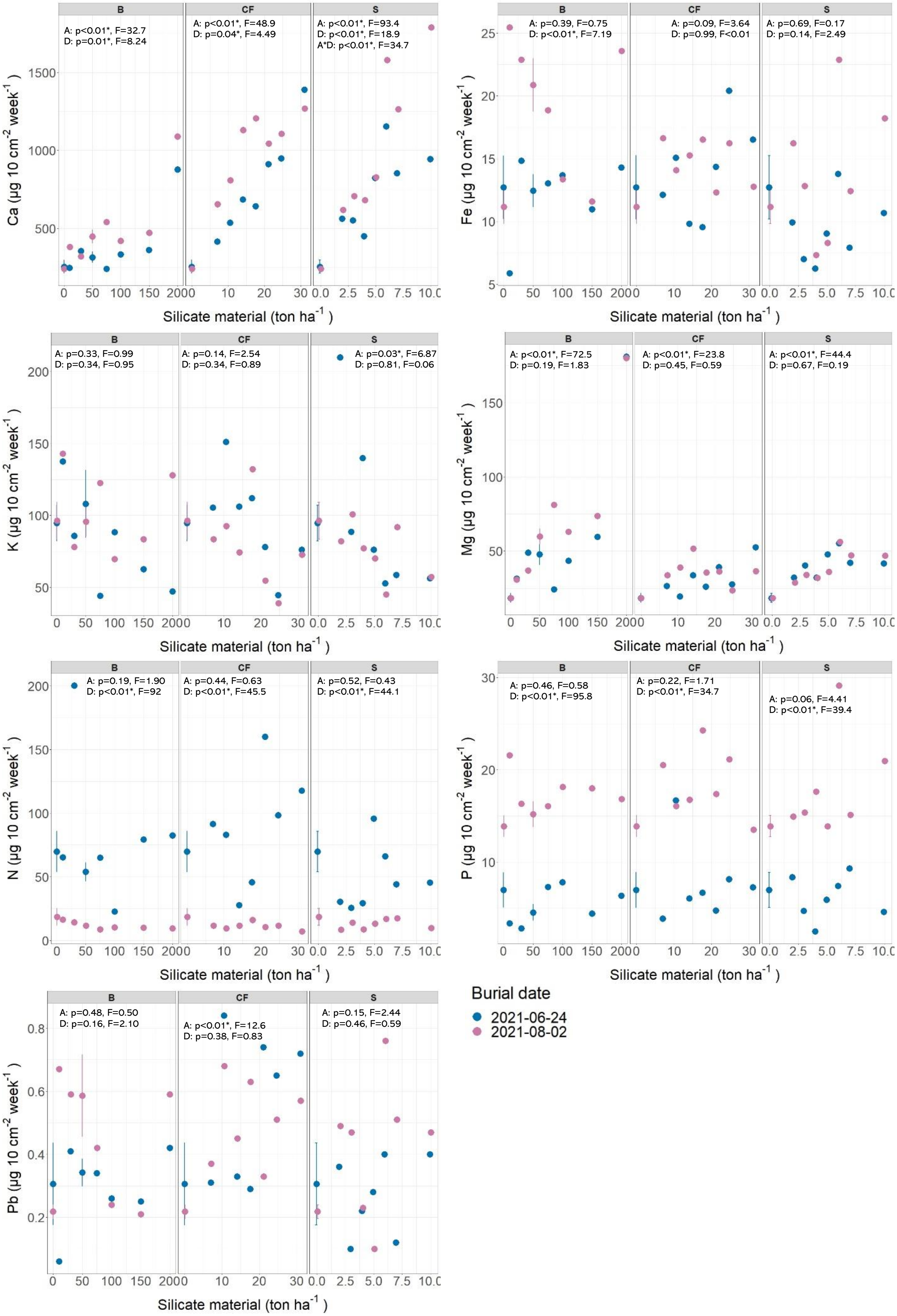
B
CF
S
A: p<0.01*, F=32.7
D: p=0.01*, F=8.24
A: p<0.01*, F=48.9
D: p=0.04*, F=4.49
A: p<0.01*, F=93.4
D: p<0.01*, F=18.9
A*D: p<0.01*, F=34.7
Ca (µg 10 cm-2 week-1)
A: p=0.39, F=0.75
D: p<0.01*, F=7.19
A: p=0.09, F=3.64
D: p=0.99, F<0.01
A: p=0.69, F=0.17
D: p=0.14, F=2.49
Fe (µg 10 cm-2 week-1)
A: p=0.33, F=0.99
D: p=0.34, F=0.95
A: p=0.14, F=2.54
D: p=0.34, F=0.89
A: p=0.03*, F=6.87
D: p=0.81, F=0.06
K (µg 10 cm-2 week-1)
A: p<0.01*, F=72.5
D: p=0.19, F=1.83
A: p<0.01*, F=23.8
D: p=0.45, F=0.59
A: p<0.01*, F=44.4
D: p=0.67, F=0.19
Mg (µg 10 cm-2 week-1)
A: p=0.19, F=1.90
D: p<0.01*, F=92
A: p=0.44, F=0.63
D: p<0.01*, F=45.5
A: p=0.52, F=0.43
D: p<0.01*, F=44.1
N (µg 10 cm-2 week-1)
A: p=0.46, F=0.58
D: p<0.01*, F=95.8
A: p=0.22, F=1.71
D: p<0.01*, F=34.7
A: p=0.06, F=4.41
D: p<0.01*, F=39.4
P (µg 10 cm-2 week-1)
A: p=0.48, F=0.50
D: p=0.16, F=2.10
A: p<0.01*, F=12.6
D: p=0.38, F=0.83
A: p=0.15, F=2.44
D: p=0.46, F=0.59
Pb (µg 10 cm-2 week-1)
Silicate material (ton ha-1)
Burial date
2021-06-24
2021-08-02

Fig. S4 C and N % in corn, tassel, stem and top leaf of the silicate treatments (basalt, concrete fines, steel slags). Data of 0 and 50 ton ha-1 of basalt are average of five replicates with standard error. Note that in some cases, the error bars are smaller than the symbol. The other treatments have one measurement each. P and F-values are shown from a linear model with C and N % in the plant parts as response variable and application amount of the silicate material as covariable. Significant relationships are indicated with an asterisk (*), with equation and regression line.

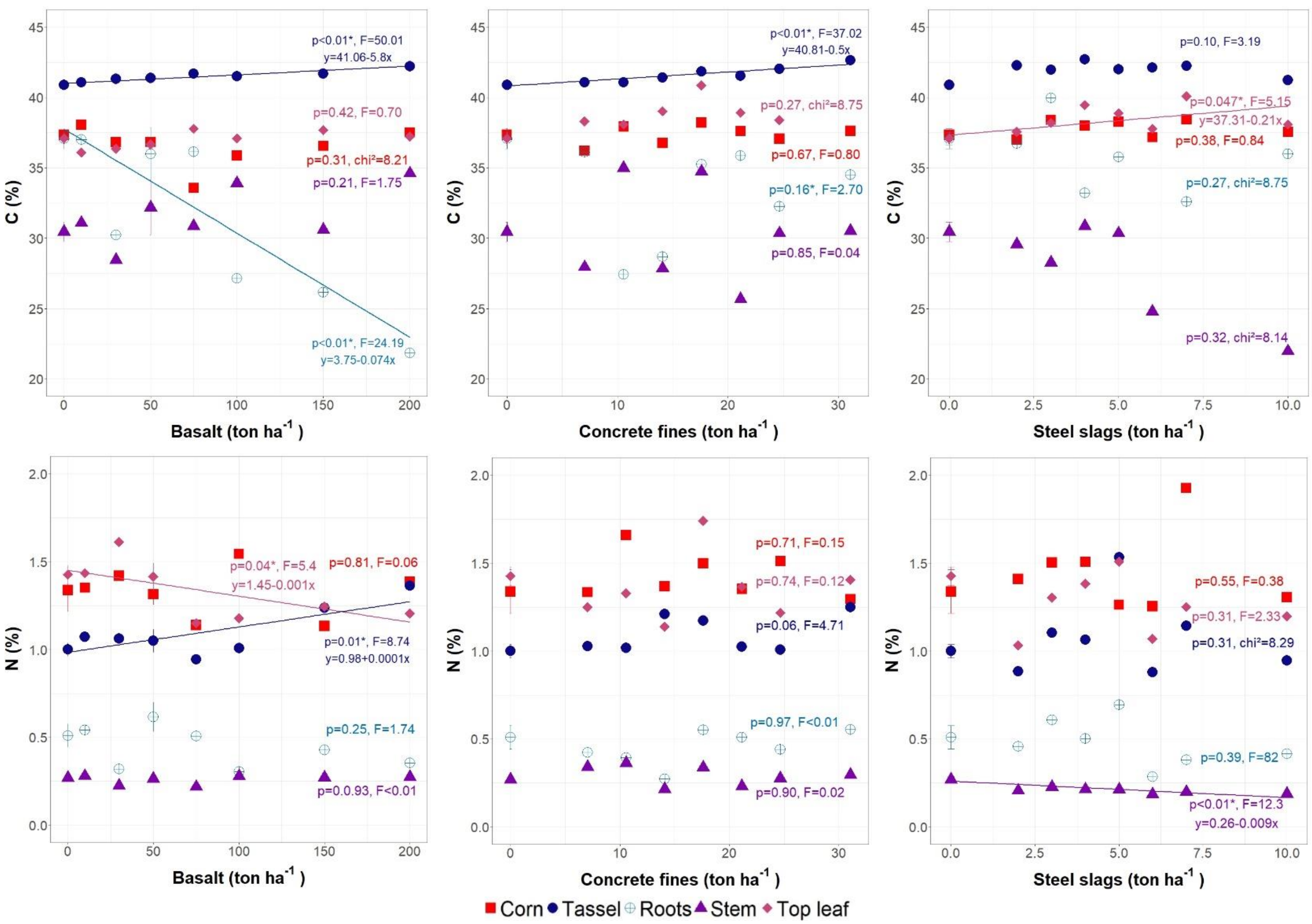

Fig. S5 : C and N stocks in maize for the three silicate treatments (basalt, concrete fines, steel slags). Data for the control treatment (0 ton ha-1) and for 50 ton ha-1 of basalt are average of five replicates with standard error. Note that in some cases, the error bars are smaller than the symbol. The other treatments each have one replicate. P and F-values are shown of the linear model with C or N stocks as response variable and relative addition (RA) as covariable. P-and F-values for the silicate treatments separately of a linear model with C or N stock as response variable and silicate concentration as covariable are shown as well. Significant relationships are indicated with an asterisk (*), with equation and regression line.

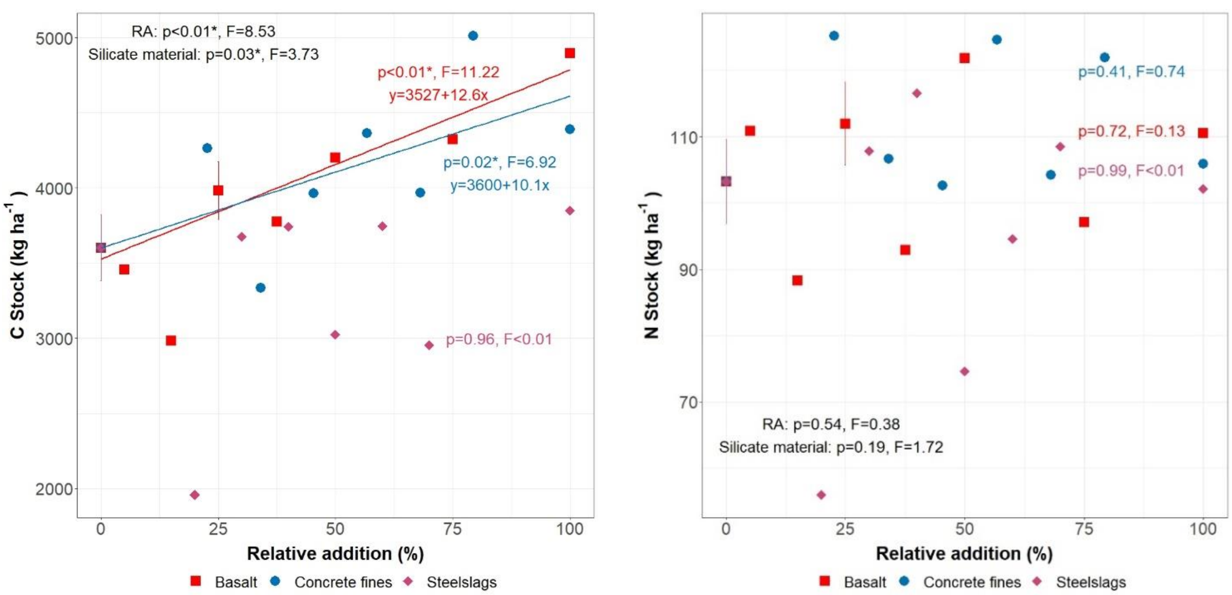

Fig. S6 Ca:Mg ratio in the pore water during the experiment for the silicate treatments (basalt, concrete fines, steel slags). Data of 0 and 50 ton ha-1 of basalt are average of five replicates with standard error. Note that in some cases, the error bars are smaller than the symbol. The other treatments have one measurement each. P and F-values are shown of a linear mixed model with Ca:Mg ratio as a response variable and silicate application amount, time and the interaction as covariables. Interactions were not significant (p>0.05) and are therefore not shown here.

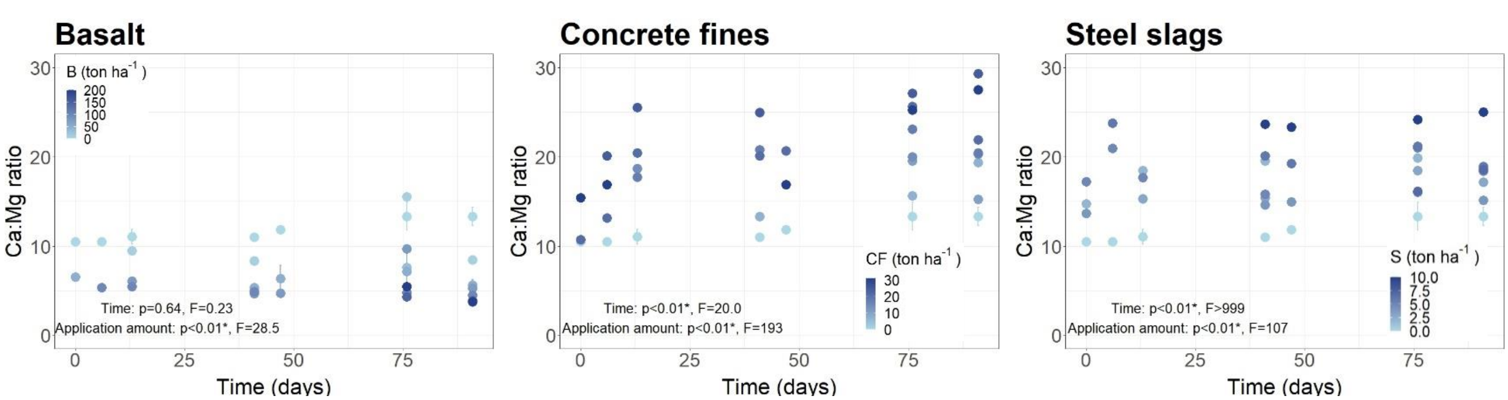

Table S1 XRD of basalt, steel slags and concrete fines used in this study.

Basalt		Seel slags		Concrete fines	
Mineral phase	**Mass %**	**Mineral phase**	**Mass %**	**Mineral phase**	**Mass %**
Clinopyroxene	21.22	Srebrodolskite	8.36	Quartz (SiO2)	73.42
Enstatite	0.66	Magnetite	1.81	Calcite (CaCO3)	17.89
Pigeonite	2.36	beta-C2S	7.06	Corundum (Al2O3)	2.57
Forsterite	14.45	Bredigite	4.41	Aluminium Iron Oxide (Al2O3 with 10% of the Al substituted by Fe)	6.16
Hedenbergite	6.98	Wuestite	3.93		
Ankerite	0.18	Portlandite	2.38		
Grossmanite	1.29	Calcite	8.66		
Albite	1.29	Hematite	0.27		
Labradorite	5.7	Quartz	1.11		
Analcime	0.93	Periclase	1.92		
Quartz	0.07	Lime	0.00006		
Magnetite	2.73	Iron	0.62		
Amorphous phase	42.14	Amorphous phase	59.46		

Table S2 The amount of water that was added manually during the experiment. For the control treatment and 50 ton ha-1 of basalt, the experiment had 5 replicates. It is indicated how many of these replicates got the amount of water in the column 'Water added (L)'. From the 31 of May onwards, each mesocosm received the same amount of water.

Date	Water added (L)	treatments	application rates (ton ha^{-1})
17/May	4	Control	5x0
		Basalt	10, 30, 4x50, 75, 100, 150, 200
		Concrete fines	7.04, 10.57, 14.09, 17.62, 21.15, 24.67, 31.07
		Steel slags	2, 3, 4, 6, 7, 10
	5	Basalt	1x50
		Steel slags	5
25/May	4	Control	3x0
		Basalt	10, 3x50, 150, 200
		Concrete fines	31.07

		Steel slags	4, 7
	4.5	Basalt	30
		Concrete fines	10.57, 14.09
		Steel slags	2, 10
	5	Control	2x0
		Basalt	1x50, 75, 100
		Concrete fines	7.04, 17.62, 21.15, 24.67
		Steel slags	3, 6
	5.5	Basalt	1x50
	6	Steel slags	5
31/May	6.5	All	All
7/Jun	1.5	All	All
10/Jun	2	All	All
14/Jun	2	All	All
23/Jun	1	All	All
28/Jun	1	All	All
6/Jul	1	All	All
13/Jul	1	All	All
22/Jul	2	All	All
26/Jul	2	All	All
2/Aug	2	All	All
9/Aug	2	All	All

Table S3 The p and F-values from a linear mixed model with nutrient concentration in the pore water as response variable and concentration of the silicate material (basalt, concrete fines, steel slags), time (days after sowing) and the interaction as covariable (Fig 3). Ns=not significant, significant relationships are indicated with an asterisk (*)

	Basalt		**Concrete fines**		**Steel slags**	
Ca	**p-value**	**F-value**	**p-value**	**F-value**	**p-value**	**F-value**
Application rate	<0.01*	12.1	<0.01*	974	<0.01*	165.3
time	<0.01*	9.27	<0.01*	56.34	<0.01*	28.74
application rate:time	0.04*	4.45	ns	ns	ns	ns
Mg	**p-value**	**F-value**	**p-value**	**F-value**	**p-value**	**F-value**
Application rate	<0.01*	8.22	<0.01*	286.7	<0.01*	65.3
time	<0.01*	22.7	<0.01*	133.07	<0.01*	20.6
application rate:time	<0.01*	3.16	0.04*	4.62	<0.01*	11.7
Si	**p-value**	**F-value**	**p-value**	**F-value**	**p-value**	**F-value**
Application rate	0.09	3.06	<0.01*	14.96	<0.01*	10.22
time	<0.01*	961.3	<0.01*	106.1	<0.01*	69.26
application rate:time	<0.01*	15.34	<0.01*	16.46	0.03*	5.45
Fe	**p-value**	**F-value**	**p-value**	**F-value**	**p-value**	**F-value**
Application rate	0.76	0.1	0.03*	6.46	0.87	0.03
time	0.2	1.3	<0.01*	26.19	<0.01*	10.14
application rate:time	ns	ns	ns	ns	ns	ns
K	**p-value**	**F-value**	**p-value**	**F-value**	**p-value**	**F-value**
Application rate	0.57	0.34	<0.01*	26.67	0.11	3.09
time	0.05	4.25	0.3	1.13	0.57	0.33
application rate:time	ns	ns	0.2*	5.86	ns	ns

Table S4 The p-and F-values of a linear mixed effect with dissolved inorganic carbon (DIC), pore water pH, soil pH and pore water nutrients or heavy metal concentration as response variable and silicate material, relative addition (RA) and the interaction as covariable. For DIC, pore water pH and soil pH, the interaction with time (day) is also incorporated in the model. RA is used to allow for comparison among the silicate types (Fig 2, 3, 4).

	DIC		**pH**		**Soil pH**		**K**	
	p	*F*	*p*	*F*	*P*	*F*	*p*	*F*
Silicate	<0.01*	8.02	0.06	2.84	0.01*	18.7	0.54	0.59
RA	<0.01*	169.3	<0.01*	165	<0.01*	77.4	0.12	2.59
RA *silicate	0.01*	4.91	0.04*	3.79	0.04*	3.5	ns	ns
Silicate*day			ns	ns	0.057	2.91		
RA*silicate*day			ns	ns	0.01*	4.61		
	Ca		**Fe**		**Mg**		**Si**	
	p	*F*	*p*	*F*	*p*	*F*	*p*	*F*
Silicate	0.01*	4.97	0.82	0.2	0.81	0.21	0.80	0.23
RA	<0.01*	13.30	0.02*	5.99	0.70	0.16	0.19	1.76
RA *silicate	<0.01*	7.82	ns	ns	ns	ns	ns	ns
	Cr		**Ni**		**Pb**		**V**	
	p	*F*	*p*	*F*	*P*	*F*	*p*	*F*
Silicate	0.01*	4.88	<0.01*	38.1	<0.01*	8.44	<0.01*	31.84
RA	0.15	2.18	0.01*	7.09	<0.01*	25.8	<0.01*	58.13
RA *silicate	<0.01*	9.14	<0.01*	12.2	<0.01*	8.29	<0.01*	23.86

Table S5 The p-and F values from a linear mixed model with plant availability of Ca, Fe, K, Mg, total N, P and Pb retrieved from PRS probes as response variable and the relative addition (RA) of the different silicate materials (basalt, concrete fines and steel slags), burial date and the interaction between RA and silicate treatment as covariable. Significant relationships are indicated with an asterisk (*)

PRS probes	**Ca**		**Fe**		**K**		**Mg**		**Total N**		**P**		**Pb**	
	p-value	F	p-value	F	p-value	F	p-value	F	p-value	F	p-value	F	p-value	F
RA	<0.01*	133.1	0.20	1.74	0.01*	7.36	<0.01*	38.92	0.37	0.83	0.13	2.42	0.048*	4.3
Treatment	0.01*	4.63	0.10	2.41	0.96	0.04	<0.01*	6.42	0.59	0.54	0.47	0.78	0.46	0.8
Burial date	<0.01*	15.46	<0.01*	7.49	0.50	0.46	0.06	3.80	<0.01*	204.4	<0.01*	173	0.27	1.23
RA*T	<0.01*	6.64	ns	ns	ns	ns	<0.01*	10.21	ns	ns	ns	ns	ns	ns

Table S6 Table of Cd in pore water and Pb concentrations in plant stems that were above LOQ (for Cd = 0.0015 mg L-1, for Pb = 0.1 mg kg-1). For the other treatments, Cd and Pb concentrations were below LOQ.

Treatment	Application amount (ton ha^{-1})	Cd	Medium
Control	0	0.00032	Pore water (mg L^{-1})
Control	0	0.00023	
Basalt	30	0.00023	
Basalt	50	0.00022	
Basalt	150	0.00076	
Control	0	0.03	Corn (mg kg^{-1})
Basalt	50	0.03	
Concrete fines	21.14	0.03	
		Pb	
Basalt	10	0.21	Stem (mg kg^{-1})
Basalt	30	0.20	
Basalt	50	0.22	
Steel slags	2	0.21	

Table S7 The P-and F-values obtained from a linear model with leaf area index (LAI) or aboveground:belowground ratio (A:B ratio) as response variable and silicate application amount as a covariable. LAI was measured on two occasions during the experiment.

Day	**LAI day 43**		**LAI day 70**		**A:B ratio**	
Silicate	*p*	*F*	*p*	*F*	*P*	*F*
Basalt	0.13	2.54	0.98	7*e-04	0.18	2.02
Concrete fines	0.35	0.98	0.16	2.36	0.28	1.34
Steel slags	0.43	0.67	0.17	2.28	0.19	2.06

Table S8 The P-and F-values of a linear model with total biomass, biomass of the different plant parts or aboveground:belowground ratio (A:B ratio) as response variable and type of silicate material (basalt, concrete fines or steel slags) and relative addition (RA) as covariables. Significant differences are indicated by an asterisk (*). The interaction between silicate type and RA was also incorporated in the model, but were all not significant and are therefore not shown.

	Total biomass		**Corn**		**Stem**		**Leaves**		**Tassel**		**Roots**		**A:B ratio**	
	p	F	p	F	p	F	p	F	p	F	p	F	p	F
Silicate type	0.03*	3.92	0.09	2.56	0.21	1.62	0.17	1.86	0.49	0.73	0.95	0.05	0.81	0.22
RA	<0.01*	7.94	0.67	0.18	<0.01*	7.78	0.07	3.46	<0.01*	34.2	<0.01*	12.67	0.01*	6.69

Table S9 The p-and F values of a linear model with nutrient (Ca, Mg, Si, K, P) concentrations or the C:N ratio in the plant parts as response variable and relative addition (RA), type of silicate material (basalt, concrete fines, steel slags) and the interaction as covariables. Significant relationships are indicated with an asterisk (*). Non-significant interactions are shown as ns and are removed from the model. For leaves and tassel, no significant interactions were found.

	Ca		**Mg**		**Si**		**K**		**P**		**Fe**		**C:N ratio**	
	p	**F**	**p**	**F**	**p**	**F**	**p**	**F**	**p**	**F**	**p**	**F**	**p**	**F**
Stem														
Silicate	<0.01*	19.2	<0.01*	12.8	0.78	0.37	0.26	1.43	0.94	013	0.11	2.36	0.08	2.51
RA	0.26	1.33	0.14	2.27	0.02	6.35	0.19	1.82	0.46	0.55	0.31	1.08	0.60	0.28
Corn											ns	ns		
Silicate	0.83	0.30	0.60	0.64	<0.01*	15.9	0.13	2.08	0.59	0.34			0.48	0.84
RA	0.32	1.04	0.14	2.36	<0.01*	79.0	0.46	0.56	0.51	0.29			0.67	0.13
Leaves											0.74	0.3		
Silicate	0.06	2.75	<0.01*	4.07	<0.01*	14.9	0.05	2.94	0.68	0.51	0.03*	4.62	0.41	0.99
RA	0.93	<0.01	<0.01*	9.04	<0.01*	17.2	0.28	1.23	0.02*	5.79			<0.01*	10.2
Tassel											0.88	0.13		
Silicate	0.32	1.22	0.48	0.90	0.08	2.50	0.69	0.49	0.73	0.44	0.02*	6.16	0.82	0.31
RA	0.04*	4.89	<0.01*	26.5	0.04*	4.63	0.71	0.14	0.03*	5.55			0.13	2.43
Roots														
Silicate	0.03*	3.52	<0.01*	6.94	0.14	2.09	0.92	0.16	0.28	1.36	0.35	1.09	0.74	0.42
RC	<0.01*	13.2	0.12	2.66	0.34	0.97	0.67	0.19	0.26	1.35	0.16	2.1	0.60	0.28
Silicate*RA	ns	ns	<0.01*	7.87	ns	ns	ns	ns	ns	ns			ns	Ns

Table S10 The p-and F values of a linear model with heavy metal (Cd, Cr, Fe, Ni, Pb, V) concentrations in the plant parts as response variable and relative addition (RA), type of silicate material (basalt, concrete fines, steel slags) and the interaction as covariables. Significant relationships are indicated with an asterisk (*). Non-significant interactions are shown as ns and are removed from the model. For corn, leaves and tassel, no significant interactions were found.

	Cd		**Cr**		**Ni**		**Pb**		**V**	
	p	**F**	**p**	**F**	**p**	**F**	**p**	**F**	**p**	**F**
Stem										
Silicate	0.01*	5.27	0.29	1.27	0.49	0.73	<LOQ	<LOQ	0.64	0.45
RA	<0.01*	8.53	0.14	2.26	0.02*	6.22	<LOQ	<LOQ	0.49	0.49
Silicate* RC	0.04*	3.54	ns	ns	ns	ns	<LOQ	<LOQ	ns	ns
Corn										
Silicate	<LOQ	<LOQ	0.99	41.4	0.01	5.22	<LOQ	<LOQ	0.85	0.17
RA	<LOQ	<LOQ	<0.01*	<0.01	<0.01*	17.12	<LOQ	<LOQ	0.06	3.82
Leaves										
Silicate	0.97	0.03	0.78	0.25	0.61	0.26	0.5	0.7	0.9	0.11
RA	<0.01*	7.47	0.85	0.04	0.61	0.5	0.23	1.47	<0.01*	9.45
Tassel										
Silicate	0.7	0.37	0.13	2.14	0.16	1.95	0.44	0.84	0.64	0.89
RA	<0.01*	27.2	0.11	2.68	0.47	0.54	0.19	1.77	0.56	16.6

Methods S1 Statistical analysis to investigate differences in influence among the three types of silicate materials on soil and plant variables.

Due to the differences in application amounts of the three silicate materials, direct comparison among the types of silicate material was not possible. Nonetheless, in an attempt to standardize across silicate materials, the application amounts were expressed as a percentage of the highest added amount, hereafter referred to as relative additions. A two-way ANOVA was employed to analyse the influence of silicate material type, relative addition, and their interaction on plant biomass, plant nutrient and metal concentrations, metal concentrations of the soil pore water, and CEC of the soil. The 'area under curve' method was utilized to assess the overall effect of silicate material type, relative addition, and their interaction on soil pH and soil pore water pH, DIC, and nutrient concentrations in the soil pore water over the growing season.