Supplementary information

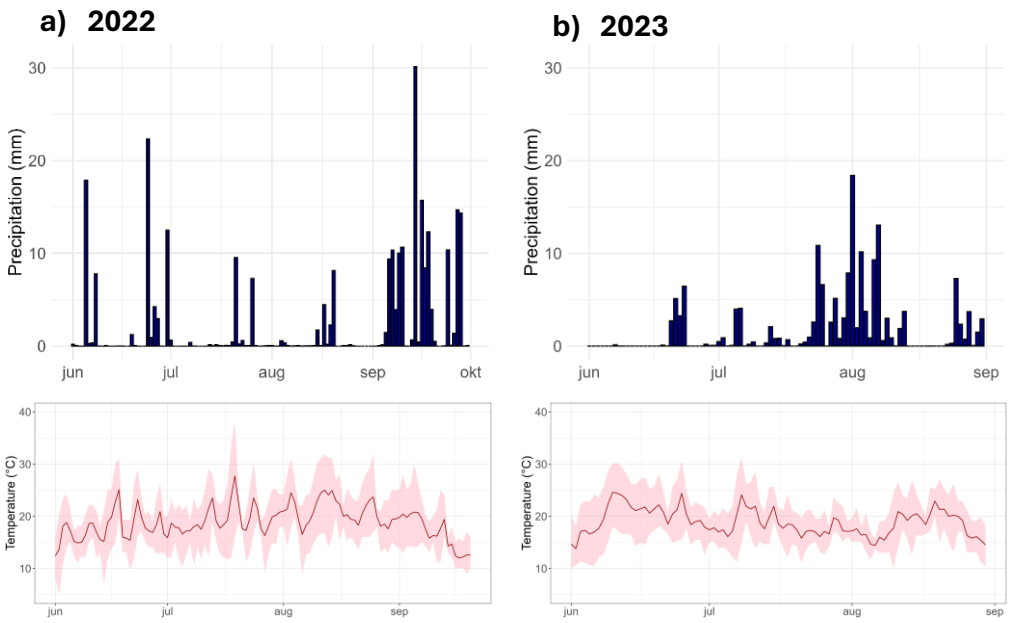

Figure S1: Daily precipitation and average air temperature during the experiment for a) growing season 2022, b) growing season 2023, retrieved from visualcrossing (https://www.visualcrossing.com/). Average air temperature is shown within the range of minimum and maximum air temperature.

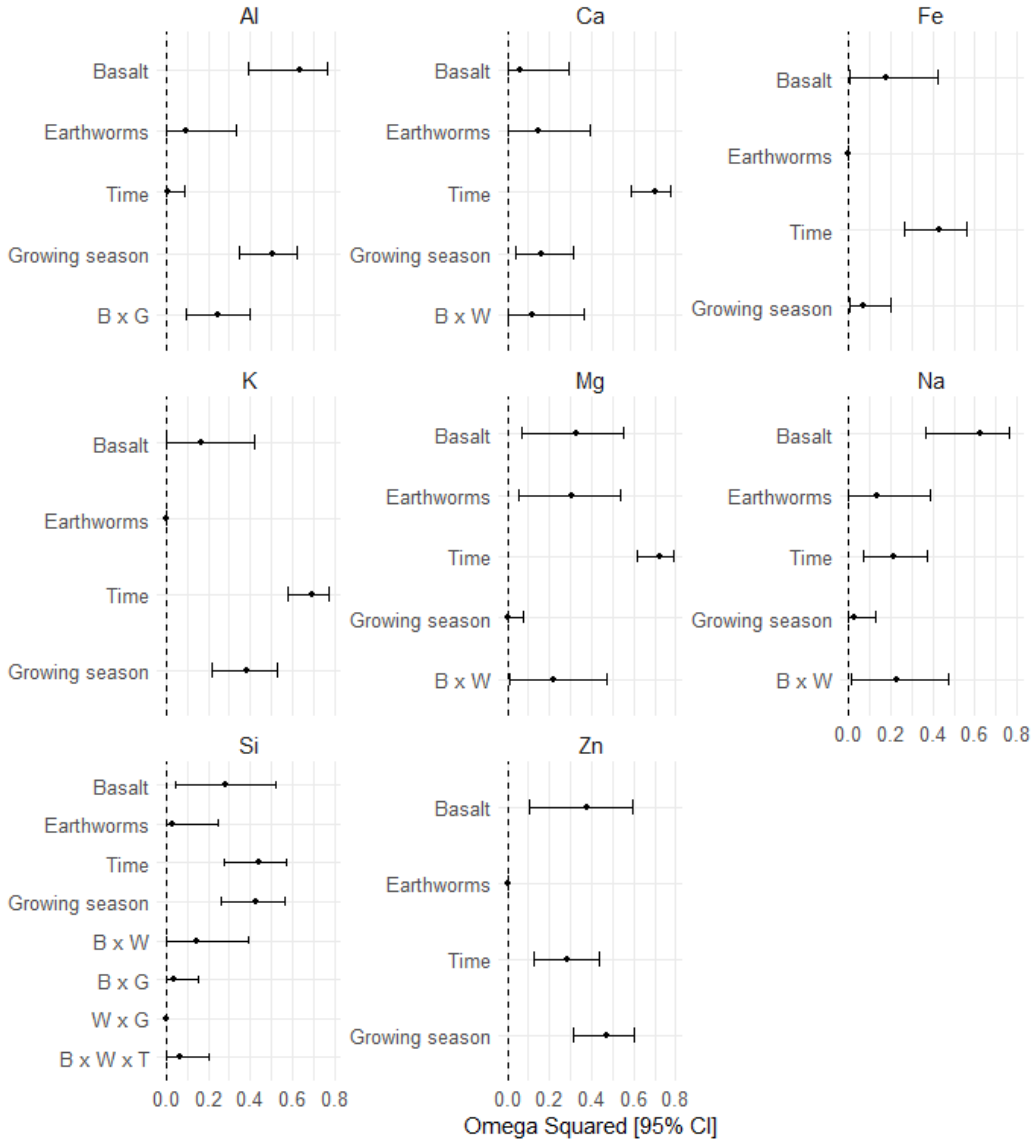

Fig S2: Forest plots of the effect sizes (Ω^2) with 95% confidence interval of basalt (=B), earthworms (=W), time (=T), growing season (=G) and the statistically significant interactions on porewater Al, Ca, Fe, K, Mg, Na, Si, and Zn.

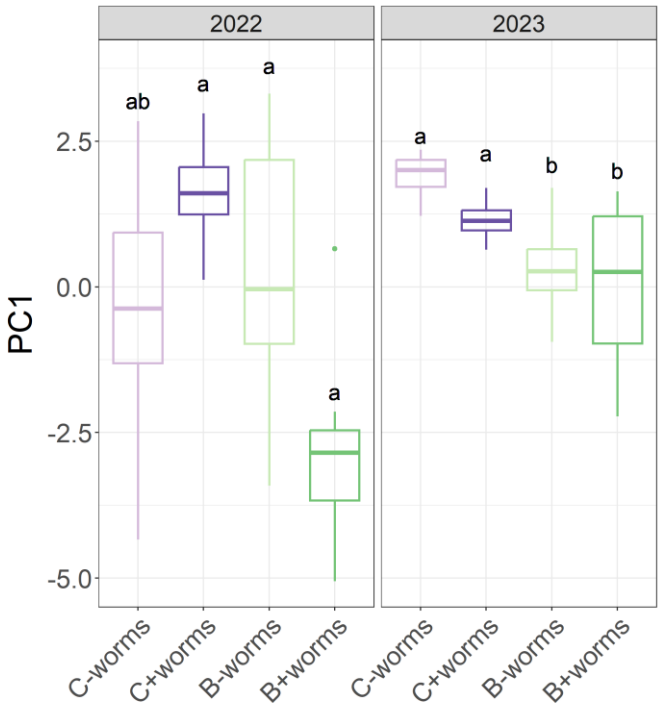

Figure S3: Values of PC1 for the four treatments (C-worms= control without worms, C+worms = control with worms, B-worms = basalt without worms, B+worms = basalt with worms) for both growing seasons. Significant differences are indicated with a different letter, while a similar letter means no differences between those treatments. P-and F values can be found in table 2.

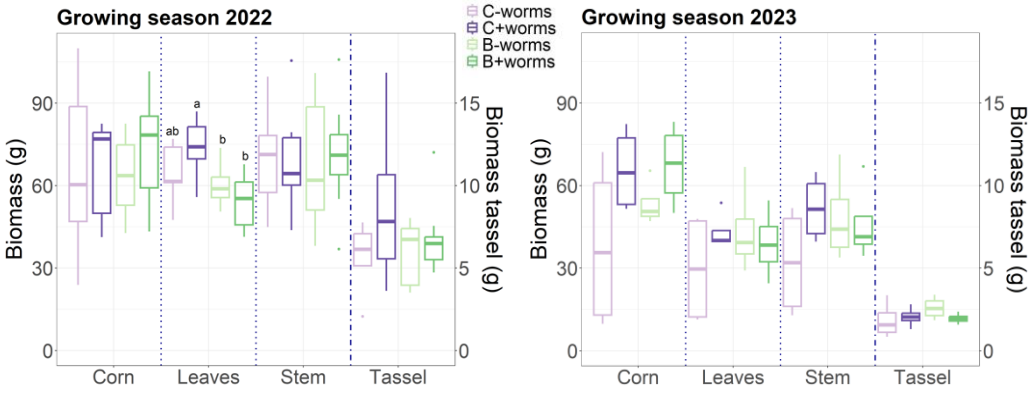

Figure S4: Corn, leaves, stem, and tassel biomass of the four treatments (C-worms= control without earthworms, C+worms = control with earthworms, B-worms = basalt without earthworms, B+worms = basalt with earthworms) for growing season 2022 (a), and 2023 (b). Primary axis shows the biomass of corn, leaves and stems, secondary axis shows the biomass for the tassel. p- and F-values are shown in table 3. Different letters indicate statistically significant differences between treatments.

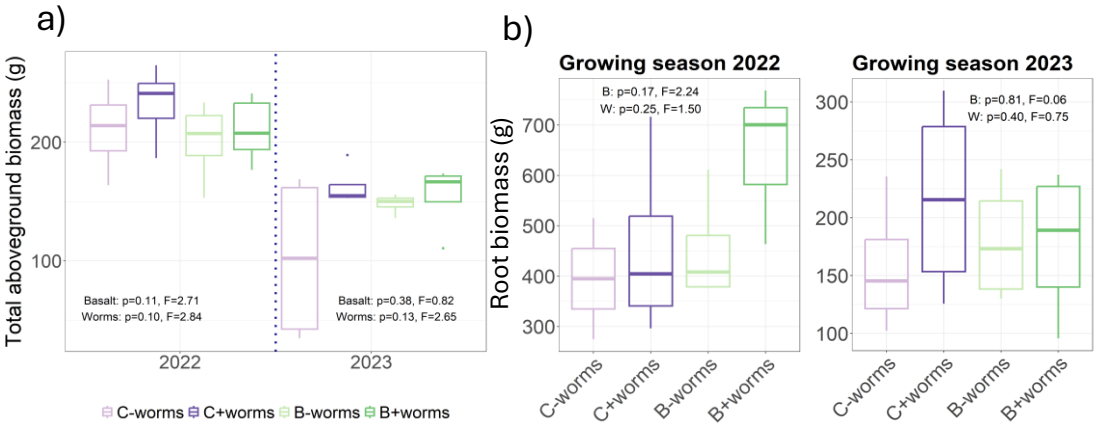

Figure S5: Total aboveground (a) and root (b) biomass of the four treatments (C-worms= control without earthworms, C+worms = control with earthworms, B-worms = basalt without earthworms, B+worms = basalt with earthworms) for growing season 2022 and 2023. p- and F-values are shown from a linear regression analysis with total aboveground biomass (a) or root biomass (b) as fixed effect and basalt (B), earthworms (W), and their interaction as covariables. Interactions were not statistically significant and were excluded from the model.

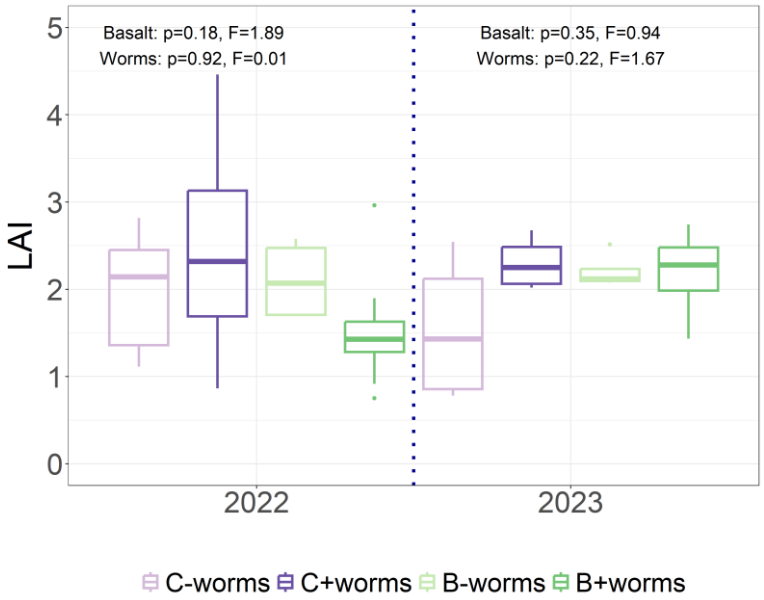

Figure S6: Leaf area index (LAI) of the four treatments (C-worms= control without worms, C+worms = control with worms, B-worms = basalt without worms, B+worms = basalt with worms) for both growing seasons. p- and F-values are shown from a linear regression analysis with biomass as fixed effect and basalt, worms and their interaction as covariables. Interactions were not statistically significant and were excluded from the model.

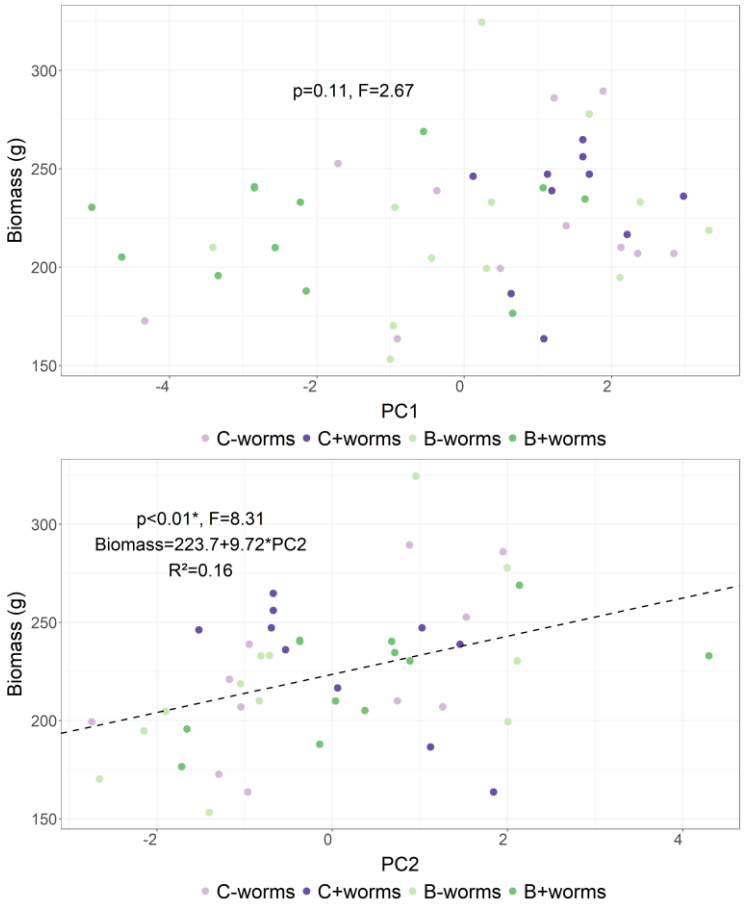

Figure S7: Biomass in function of PC1, which is negatively correlated with Ca, Mg, Si, Ni, Mn, and Na, and PC2, which is positively correlated with porewater Ca, K, N, and Mg concentrations, and negatively with porewater P concentrations, and alkalinity. The four treatments are shown in a different colour (C-worms= control without worms, C+worms = control with worms, B-worms = basalt without worms, B+worms = basalt with worms). p- and F-values are shown from a linear regression analysis with biomass as fixed effect and PC1 and PC2 as covariable. Statistically significant relationships are indicated with an asterisk (*), and the regression line and equation are shown.

2022

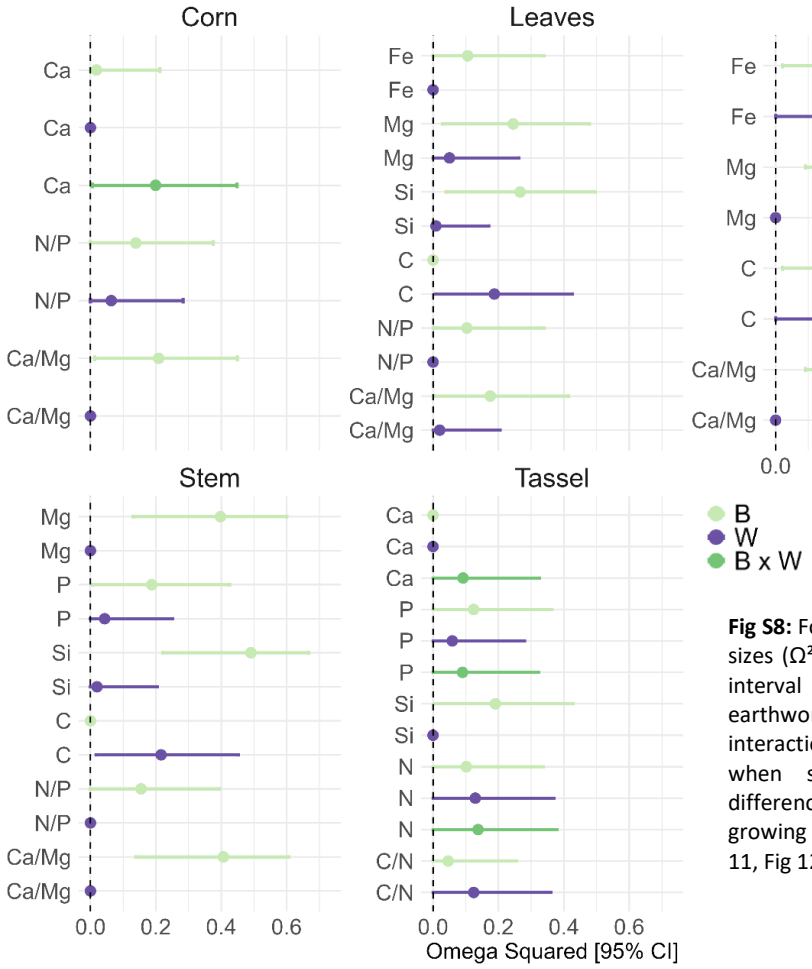

Fig S8: Forest plots of the effect sizes (Ω^2) with 95% confidence interval of basalt (B), earthworms (W) and the interaction on plant nutrients when statistically significant differences were found for growing season 2022 (Fig 9, Fig 11, Fig 12, Table S3).

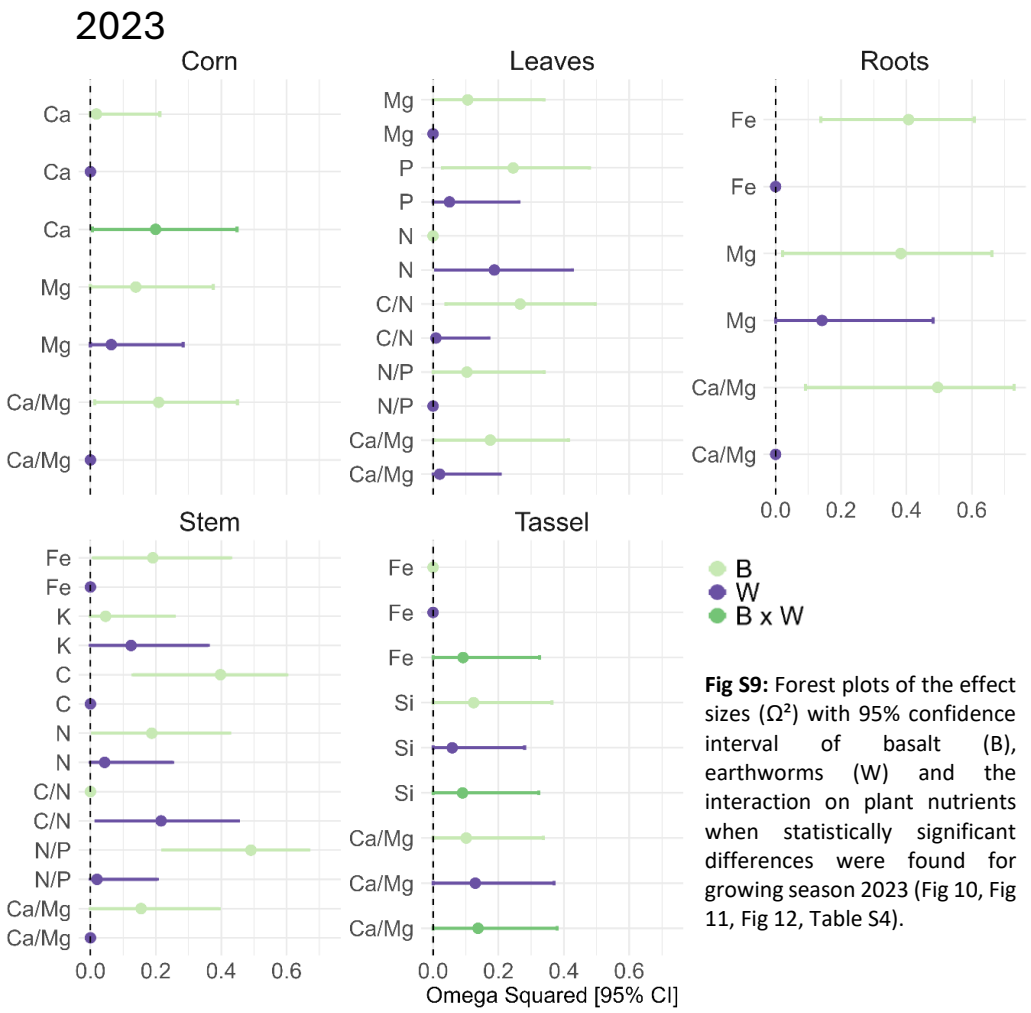

Fig S9: Forest plots of the effect sizes (Ω^2) with 95% confidence interval of basalt (B), earthworms (W) and the interaction on plant nutrients when statistically significant differences were found for growing season 2023 (Fig 10, Fig 11, Fig 12, Table S4).

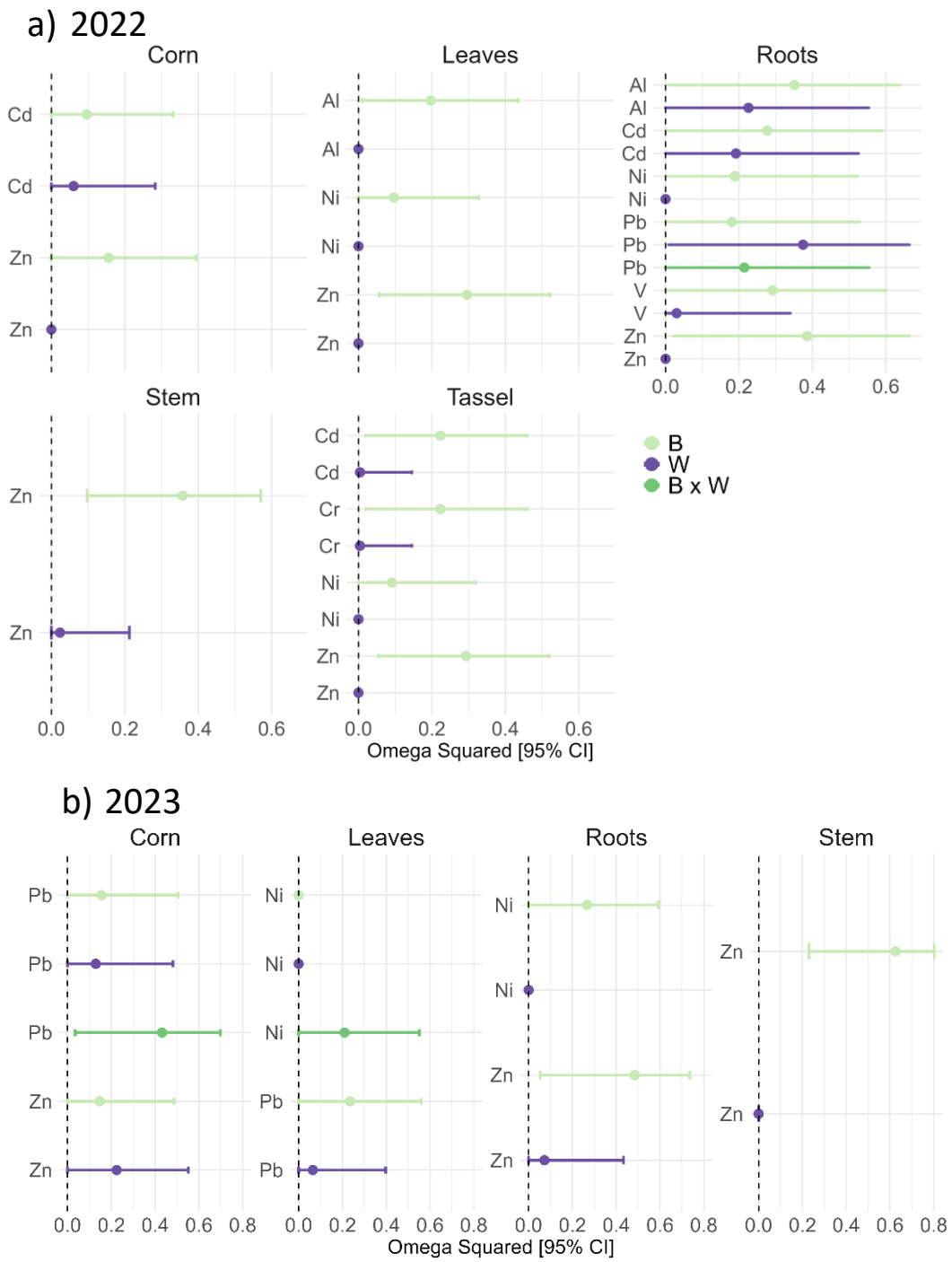

Fig S10: Forest plots of the effect sizes (Ω^2) with 95% confidence interval of basalt (B), earthworms (W) and the interaction on plant heavy metals when statistically significant differences were found for growing season 2023 (Fig 13, Fig 14, Table S5, Table S6).

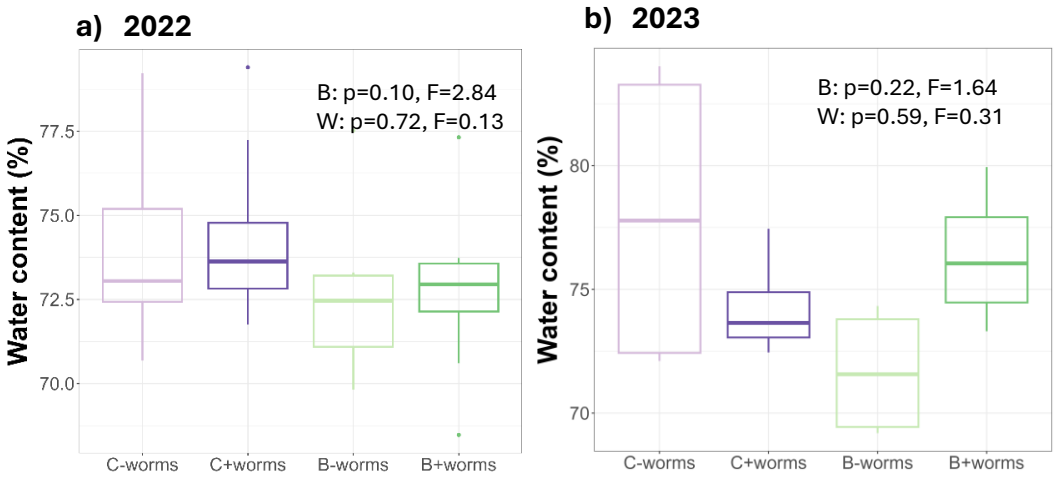

Figure S11: Plant water content at the end of growing season 2022 (a), and 2023 (b) for the four treatments (C-worms= control without worms, C+worms = control with worms, B-worms = basalt without worms, B+worms = basalt with worms). Water content is calculated by subtracting the dry weight from the wet weight, dividing this by wet weight and multiply it by 100 to get the %. P- and F-values are shown from a linear regression analysis with water content as a fixed effect and basalt (B) and earthworms (W) as covariable. Interactions were not statistically significant and are not shown.

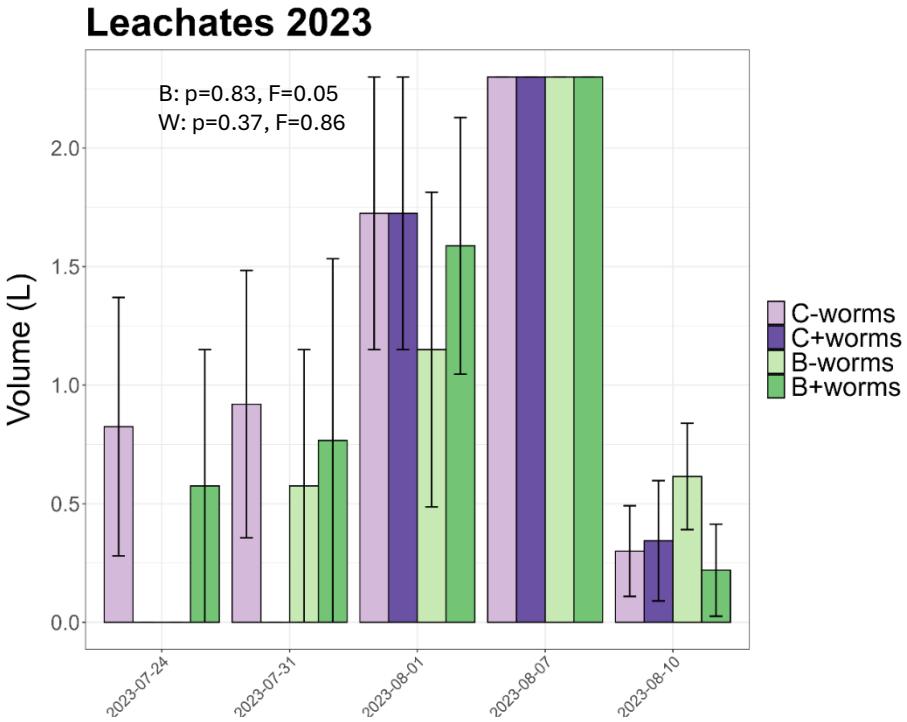

Figure S12: Leachate volumes during the growing season of 2023 for the four treatments (C-worms= control without worms, C+worms = control with worms, B-worms = basalt without worms, B+worms = basalt with worms). Leachate volumes are average of four replicates with standard error. P- and F-values are shown from a linear regression analysis with leachate volume as a fixed effect and basalt (B), earthworms (W), and their interaction as covariable. The interaction was not statistically significant and is not shown.

Table S1: Elemental composition (C=concentration) of basalt.

Element	C (wt%)	Element	C (ppm)	Element	C (ppm)
Si	14.70%	Cl	765 PPM	Zn	103 PPM
Fe	8.58%	Sr	739 PPM	S	93.3 PPM
Ca	6.42%	Ba	559 PPM	Cu	75.2 PPM
Mg	5.88%	Ni	408 PPM	Nb	61.0 PPM
Al	5.16%	Cr	367 PPM	Rb	24.3 PPM
Na	1.87%	V	242 PPM	Y	20.4 PPM
Ti	1.08%	Ce	197 PPM	Co	3.18 PPM
K	0.77%	Zr	150 PPM		
P	0.26%				
Mn	0.15%				

Table S2a: Average number and dry weight with standard error of earthworms found when emptying mesocosms. Earthworms were collected and counted at the end of the growing seasons, and left for three days on wet tissue paper to empty their guts. Hereafter, they were sacrificed by placing them in ethanol. Then, they were dried in the oven at 70 °C for 48h and weighed.

Treatment	*Growing season*	*Number of earthworms*	*Dry weight (g)*
Contorl	1	5.25 ± 0.75	0.079 ± 0.028
Basalt	1	7.00 ± 1.91	0.089 ± 0.026
Contorl	2	15.50 ± 2.33	0.284 ± 0.071
Basalt	2	17.75 ± 3.01	0.351 ± 0.157

Table S2b: p-value, t-value and degrees of freedom (df) of a t-test with number of earthworms, or dry weight of earthworms as dependent variable and treatment (basalt vs control) as independent variable.

	Number of earthworms			*Dry weight of earthworms*		
Growing season	p-value	t	df	p-value	t	df
1	0.45	0.83	4.08	0.71	0.39	5.99
2	0.52	0.68	5.41	0.71	0.39	4.18

Table S3: p- and F-values from a linear regression analysis with nutrient concentration, C/N ratio, N/P ratio or Ca/Mg ratio as fixed effect, and basalt, earthworms and their interaction as covariables for growing season 2022. Interactions that were not significant were excluded from the model. Statistically significant relationships are in bold and indicated by an asterisk (*). When assumptions of normality or heteroscedasticity were not met, a non-parametric kruskal-wallis test is used instead, with treatment as a covariable. P-and chi^2 values are shown. Effect sizes (Ω^2) of statistically significant differences can be found in Fig S8.

	2022	***Stem***		***Leaves***		***Corn***		***Tassel***		***Roots***	
		p-value	F	p-value	F	p-value	F	p-value	F	p-value	F
Ca	Basalt	0.18	1.84	0.68	0.17	0.22	1.56	0.54	0.38	0.82	0.05
	worms	0.60	0.28	0.78	0.08	0.82	0.06	0.48	0.52	0.75	0.11
	B x W	ns	ns	ns	ns	**<0.01***	**8.46**	**<0.01***	**4.23**	ns	ns
Fe	Basalt	0.49	0.49	**0.04***	**4.79**	0.17	0.68	0.81	0.06	**<0.01***	**10.9**
	worms	0.37	0.84	0.63	0.24	0.69	0.41	0.29	1.15	0.08	3.64
K	Basalt	1.57	0.22	0.07	3.42	0.48	0.51	0.56	0.35	0.27	1.34
	worms	0.13	0.72	0.52	0.42	0.90	0.02	0.10	2.90	0.91	0.01
Mg	Basalt	**<0.01***	**22.1**	**<0.01***	**11.4**	0.05	4.14	0.23	1.52	**<0.01***	**16.7**
	worms	0.34	0.93	0.11	2.70	0.66	0.20	0.06	3.97	0.80	0.07
P	Basalt	**<0.01***	**8.38**	0.57	0.33	0.05	4.10	**0.03***	**5.53**	0.66	0.21
	worms	0.13	2.45	0.81	0.06	0.58	0.31	0.09	3.00	0.25	1.48
	B x W	ns	ns	ns	ns	ns	ns	0.05	4.17	ns	ns
C	Basalt	0.69	0.16	0.51	0.44	0.90	0.02	Kruskal.test		0.68	0.18
	worms	**<0.01***	**9.81**	**<0.01***	**8.38**	0.33	0.97	P=0.27	chi^2= 3.88	**0.01***	**9.18**
N	Basalt	0.88	0.23	0.83	0.05	0.35	0.88	**0.02***	**4.61**	0.34	0.97
	worms	0.98	<0.01	0.36	0.88	0.24	1.46	**0.04***	**5.75**	0.39	0.76
	B x W	ns	ns	ns	ns	ns	ns	**0.02***	**6.11**	ns	ns
Si	Basalt	**<0.01***	**31.8**	**<0.01***	**12.6**	0.50	0.47	**<0.01***	**8.54**	0.05	4.47
	worms	0.21	1.66	0.27	1.28	0.80	0.07	0.99	<0.01	0.47	0.56
C/N	Basalt	0.9	0.02	0.82	0.05	0.29	1.16	0.12	2.56	0.58	0.33
	worms	0.85	0.04	0.87	0.36	0.16	2.04	**0.03***	**5.54**	0.05	4.59
N/P	Basalt	**0.01***	**6.86**	**0.04***	**4.58**	**0.02***	**6.15**	0.87	0.03	0.06	4.28
	worms	0.53	0.40	0.97	<0.01	0.09	3.18	0.72	0.13	0.59	0.3
Ca/Mg	Basalt	**<0.01***	**22.9**	**<0.01***	**7.80**	**<0.01***	**9.17**	0.14	2.28	**<0.01***	**28.4**
	worms	0.42	0.66	0.21	1.67	0.33	0.96	0.49	0.50	0.87	0.03

Table S4: p- and F-values from a linear regression analysis with nutrient concentration, C/N ratio, N/P ratio or Ca/Mg ratio as fixed effect, and basalt, worms and their interaction as covariables for growing season 2023. Interactions that were not significant were excluded from the model. Statistically significant relationships are in bold and indicated by an asterisk (*). When assumptions of normality or homoscedasticity were not met, a non-parametric kruskal-wallis test was used instead, with treatment as a covariable. P-and chi^2 values are shown. Effect sizes (Ω^2) of statistically significant differences can be found in Fig S9.

	2023	***Stem***		***Leaves***		***Corn***		***Tassel***		***Roots***	
		p-value	F	p-value	F	p-value	F	p-value	F	p-value	F
Ca	Basalt	0.79	0.07	0.08	3.76	0.91	0.01	Kruskal-wallis test		0.15	2.37
	Worms	0.60	0.29	0.06	4.26	0.74	0.12	P=0.73	chi^2=1.30	0.49	0.51
	B x W	ns	ns	0.07	3.87	**0.046***	**4.95**			ns	ns
Fe	Basalt	**0.04***	**5.50**	0.54	0.39	0.42	0.70	**0.01***	**7.90**	**0.04***	**5.17**
	Worms	0.55	0.37	0.09	3.30	0.70	0.15	0.06	4.15	0.66	0.21
K	Basalt	0.09	3.4	0.13	2.68	0.12	2.85	0.83	0.05	0.09	3.52
	Worms	0.40	0.76	0.37	0.87	0.59	0.31	0.26	1.38	0.34	0.97
	B x W	**0.048***	**4.83**	ns	ns	ns	ns	ns	ns	ns	ns
Mg	Basalt	0.14	2.54	**<0.01***	**17.2**	0.66	0.20	0.34	0.98	**0.02***	**6.87**
	Worms	0.41	0.73	0.13	2.55	**0.04***	**5.14**	0.19	1.91	0.53	0.41
P	Basalt	0.45	0.61	0.25	1.44	0.16	2.18	0.96	<0.01	0.26	1.39
	Worms	0.09	3.29	0.97	<0.01	0.42	0.69	0.12	2.71	0.27	1.33
	B x W	ns	ns	**0.04***	**5.11**	ns	ns	ns	ns	ns	ns
C	Basalt	0.21	1.77	0.97	<0.01	0.62	0.26	0.28	1.26	0.83	0.05
	Worms	0.17	2.09	0.74	0.12	0.41	0.71	0.37	0.86	0.16	2.21
	B x W	**0.02***	**7.61**	ns	ns	ns	ns	ns	ns	ns	ns
N	Basalt	**0.02***	**6.68**	**0.02***	**6.62**	0.07	3.90	0.21	1.77	0.37	0.86
	Worms	0.34	0.97	**0.02***	**7.53**	0.28	1.24	0.18	2.01	0.15	2.40
Si	Basalt	0.78	0.07	0.78	0.08	0.22	1.69	0.42	0.68	ns	0.07
	Worms	0.34	0.99	0.36	0.92	0.38	0.81	0.86	0.03	0.34	0.99
	B x W	ns	ns	ns	ns	ns	ns	**0.04***	**5.04**	ns	ns
C/N	Basalt	**0.03***	**6.27**	0.06	4.21	0.13	0.74	0.28	1.29	0.26	1.40
	Worms	0.44	0.65	**0.02***	**7.08**	0.41	2.60	0.12	2.73	0.10	3.11
N/P	Basalt	0.20	1.82	0.14	2.48	0.19	1.90	0.86	0.03	0.78	0.09
	Worms	**0.04***	**5.01**	**0.02***	**7.05**	0.45	0.59	0.05	4.52	0.14	2.46
Ca/Mg	Basalt	**<0.01***	**10.9**	**0.04***	**5.00**	0.77	0.09	0.65	0.22	**0.03***	**6.80**
	Worms	0.33	1.05	0.86	0.03	0.26	1.37	**0.047***	**4.81**	0.81	0.06
	B x W	**0.047***	**4.91**	ns	ns	**0.048***	**4.83**	ns	ns	ns	ns

Table S5: p- and F-values from a linear regression analysis with heavy metal concentration as fixed effect, and basalt, earthworms and their interaction (B x W) as covariables for growing season 2022 (Fig 15). Interactions that were not statistically significant were excluded from the model. Statistically significant relationships are in bold and indicated by an asterisk (*). When assumptions of normality or homoscedasticity were not met, a non-parametric kruskal-wallis test was used instead, with treatment as a covariable. P-and chi^2 values are shown. Effect sizes (Ω^2) of statistically significant differences can be found in Fig S10a.

2022		***Stem***		***Leaves***		***Corn***		***Tassel***		***Roots***	
		p-value	F	p-value	F	p-value	F	p-value	F	p-value	F
Al	Basalt	0.44	0.62	**<0.01***	**8.86**	0.38	0.80	0.48	0.51	**<0.01***	**9.64**
	Worms	0.34	0.96	0.87	0.03	0.94	<0.01	0.34	0.94	**0.03***	**5.67**
Cd	Basalt	Kruskal wallis test		<LOQ		**0.047***	**4.31**	**<0.01***	**10.2**	**0.02***	**7.13**
	Worms	P=0.42	chi²=2.80			0.09	3.00	0.30	1.13	**0.047***	**4.79**
	B x W					ns	ns	ns	ns	ns	ns
Cr	Basalt	0.87	0.03	<LOQ		0.59	0.29	**0.03***	**5.07**	0.24	1.78
	Worms	0.25	1.38			0.08	3.20	0.74	0.11	0.08	3.52
Ni	Basalt	0.75	0.10	**0.04***	**4.42**	0.48	0.51	**0.049***	**4.20**	**0.049***	**4.72**
	Worms	0.61	0.27	0.59	0.30	0.11	2.66	0.55	0.37	0.34	0.96
Pb	Basalt	0.64	0.23	0.44	0.60	0.12	2.61	0.24	1.42	0.05	4.53
	Worms	0.82	0.05	0.89	0.02	0.79	0.08	0.95	<0.01	**<0.01***	**10.6**
	B x W	ns	ns	ns	ns	ns	ns	ns	ns	**0.04***	**5.37**
V	Basalt	0.35	0.91	<LOQ		<LOQ		0.18	1.89	**0.02***	**7.58**
	Worms	0.38	0.79					0.58	0.31	0.24	1.50
Zn	Basalt	**<0.01***	**18.8**	**<0.01***	**14.5**	**0.01***	**6.93**	**<0.01***	**14.3**	**<0.01***	**11.0**
	Worms	0.19	1.77	0.65	0.21	0.94	<0.01	0.63	0.23	0.46	0.59

Table S6: p- and F-values from a linear regression analysis with heavy metal concentration as fixed effect, and basalt, earthworms and their interaction (B x W) as covariables for growing season 2023. Interactions that were not statistically significant were excluded from the model. Statistically significant relationships are in bold and indicated by an asterisk (*). When assumptions of normality or homoscedasticity were not met, a non-parametric kruskal-wallis test was used instead, with treatment as a covariable. P-and chi^2 values are shown. Effect sizes (Ω^2) of statistically significant differences can be found in Fig S10b.

2023		***Stem***		***Leaves***		***Corn***		***Tassel***		***Roots***	
		p-value	F	p-value	F	p-value	F	p-value	F	p-value	F
Al	Basalt	0.30	1.18	0.54	0.40	0.24	1.53	0.70	0.15	0.24	1.52
	Worms	0.40	0.76	0.49	0.50	0.28	1.26	0.42	0.70	0.40	0.77
Cd	Basalt	<LOQ		0.66	0.21	1.73	0.21	<LOQ		Kruskal wallis test	
	Worms			0.23	1.58	0.68	0.43			P=0.97	chi²=0.25
Cr	Basalt	0.31	1.13	0.13	2.63	0.20	1.83	0.73	0.13	0.76	0.10
	Worms	0.18	2.02	0.39	0.78	0.66	0.20	0.09	3.32	0.41	0.54
Ni	Basalt	0.21	1.74	**0.03***	**5.92**	0.86	0.03	0.49	0.52	**0.03***	**6.46**
	Worms	0.31	1.12	0.17	2.11	0.07	3.94	0.31	1.12	0.64	0.23
Pb	Basalt	0.22	1.68	0.96	<0.01	0.18	2.00	0.83	0.05	0.75	0.11
	Worms	0.77	0.09	0.99	<0.01	0.09	3.52	0.71	0.14	0.70	0.15
	B x W	ns	ns	**0.04***	**5.25**	**<0.01***	**10.3**	ns	ns	ns	ns
V	Basalt	<LOQ		0.21	1.74	0.18	2.00	<LOQ		0.21	1.80
	Worms			0.59	0.30	0.28	1.25			0.54	0.40
Zn	Basalt	**<0.01***	**27.7**	0.49	0.51	0.07	3.75	0.14	2.41	**<0.01***	**14.15**
	Worms	0.46	0.58	0.49	0.51	**0.03***	**5.65**	0.24	1.52	0.18	2.09

Table S7: European standards for Ni, Pb and Cd concentrations in corn (mg kg^{-1} ww) and average concentrations found in our study for the four treatments with standard error. Concentrations are converted from mg kg^{-1} dw to mg kg^{-1} ww by multiplying the dry weight (dw) concentration with the dry matter factor (dw ww^{-1}). For Pb, all samples were below the limit of quantification (LOQ) (=0.1 mg kg^{-1} dw), and for Cd, almost all samples were below LOQ (=0.015 mg kg^{-1} ww). For these samples, the LOQ was used to calculate the concentration in mg kg^{-1} ww.

	Ni	***Pb***	***Cd***
European guidelines	0.80 mg/kg	0.2 mg per kg	0.1 mg per kg
Source	European Comission (2024)	European Commission (2023)	European Commission (2023)
2022			
Control	0.114 ± 0.042	0.05+/-0.015	0.041+/-0.006
Control + earthworms	0.157 ± 0.024	0.064+/-0.019	0.049+/-0.013
Basalt	0.142 0.074	0.055+/-0.014	0.045+/-0.007
Basalt + earthworms	0.152+/-0.08	0.056+/-0.023	0.053+/-0.025
2023			
Control	0.019 +/- 0.012	0.004+/-0.004	0.015+/- 0.009
Control + earthworms	0.017+/- 0.013	0.003+/-0.003	0.018 +/- 0.008
Basalt	0.030+/-0.018	0.002+/-0.001	0.020 +/-0.004
Basalt + earthworms	0.018+/-0.013	0.007+/-0.005	0.021+/- 0.005

Table S8: volume of leachates on June 20, 2022. For the other mesocosms, no leachates could be collected.

Mesocosm	***Volume (L)***	***Treatment***
7	0.3	Basalt - worms
15	0.12	Control - worms
17	0.12	Basalt - worms
19	0.25	Basalt + worms
23	0.23	Basalt + worms
59	0.35	Basalt - worms
60	0.975	Basalt + worms

Method S 1: Model selection and statistical output for porewater pH, alkalinity, nutrients, and heavy metals, starting from the model: lme(fixed variable ~ growingseason x Basalt x worms+Daysafterplanting x basalt x worms, random=~1|Pot, data=rhizon_pH). Emimination of interactions is done based on the least significant interaction.

Rizon pH

Lm1<-lme(pH ~ growingseason+Basalt x worms+Daysafterplanting, random=~1|Pot, data=rhizon_pH)

	numDF	denDF	F-value	p-value
(Intercept)	1	101	12836.631	<.0001
growingseason	1	101	1.820	0.1803
Basalt	1	26	11.824	0.0020
worms	1	26	4.714	0.0392
Daysafterplanting	1	101	143.318	<.0001
Basalt:worms	1	26	3.360	0.0783

Alkalinity:

Lm1<-lme((Alkalinity)~worms+Basalt+growingseason+Daysafterplanting x Basalt, random=~1|Pot, data=outlierAlka)

	numDF	denDF	F-value	p-value
(Intercept)	1	97	127.77455	<.0001
worms	1	25	4.75011	0.0389
Basalt	1	25	4.97976	0.0348
growingseason	1	97	37.23405	<.0001
Daysafterplanting	1	97	143.81040	<.0001
Basalt:Daysafterplanting	1	97	19.55091	<.0001

NH4

Lm1<-lme(log(NH4)~worms+Basalt+Daysafterplanting x Basalt, weights=varIdent(form=~1|Daysafterstart), random=~1|Pot, data=rhizon_NH4)

	numDF	denDF	F-value	p-value
(Intercept)	1	91	212.31707	<.0001
worms	1	26	2.18497	0.1514
Basalt	1	26	0.04151	0.8401
Daysafterplanting	1	91	94.44213	<.0001
Basalt:Daysafterplanting	1	91	6.63892	0.0116

NO3:

Lm1<-lme(log(NO3)~worms+Basalt+Daysafterplanting+growingseason, weights=varIdent(form=~1|Daysafterstart), random=~1|Pot, data=rhizon_N03)

	numDF	denDF	F-value	p-value
(Intercept)	1	89	642.9575	<.0001
worms	1	26	21.4193	0.0001
Basalt	1	26	0.2186	0.6440
Daysafterplanting	1	89	310.0035	<.0001
growingseason	1	89	12.5211	0.0006

NO2:

Outliers removed:

rhizon_N02<-rhizon_N02[rhizon_N02$NO2<=0.013,]

Lm1<-lme(log(NO2)~worms+Basalt+growingseason, random=~1|Pot, data=rhizon_N02)

	numDF	denDF	F-value	p-value
(Intercept)	1	91	5972.207	<.0001
worms	1	26	0.864	0.3611
Basalt	1	26	0.316	0.5787
growingseason	1	91	7.684	0.0068

Total N:

Lm1<-lme(log(TotalN)~Daysafterplanting+Basalt+growingseason+worms, random=~1|Pot, data=rhizon_totalN)

	numDF	denDF	F-value	p-value
(Intercept)	1	89	54.8669	<.0001
Daysafterplanting	1	89	333.4203	<.0001
Basalt	1	26	5.9762	0.0216
growingseason	1	89	2.4073	0.1243
worms	1	26	3.3894	0.0771

PO4: remove outlier:

outlierPO4<-rhizon_PO4[rhizon_PO4$PO4<=0.5,]

Lm1<-lme((PO4)~Daysafterplanting+Basalt+worms+growingseason, random=~1|Pot, data=outlierPO4)

	numDF	denDF	F-value	p-value
(Intercept)	1	77	160.28378	<.0001

```
Daysafterplanting     1    77   4.80732  0.0314
Basalt                1    25   6.83486  0.0149
worms                 1    25   4.39875  0.0462
growingseason         1    77   4.11182  0.0460
```

Al:

Lm1<-lme(log(Al)~worms+growingseason x Basalt+Daysafterplanting, random=~1|Pot, data=rhizon_Al)

```
                     numDF denDF  F-value p-value
(Intercept)              1    73 378.1859  <.0001
worms                    1    27   4.0345  0.0547
growingseason            1    73  77.5927  <.0001
Basalt                   1    27  51.5444  <.0001
Daysafterplanting        1    73   1.5502  0.2171
growingseason:Basalt     1    73  25.5985  <.0001
```

Ca:

Lm1<-lme(log(Ca)~worms x Basalt+growingseason+Daysafterstart, random=~1|Pot, data=rhizon_Ca)

```
                   numDF denDF   F-value p-value
(Intercept)            1    74 2194.2979  <.0001
worms                  1    26    5.7247  0.0242
Basalt                 1    26    2.8128  0.1055
growingseason          1    74   15.4502  0.0002
Daysafterplanting      1    74  178.6418  <.0001
worms:Basalt           1    26    4.6967  0.0396
```

Fe:

Lm1<-lme(sqrt(Fe)~worms+Basalt+growingseason+Basalt+Daysafterplanting, random=~1|Pot, data=rhizon_Fe)

```
                   numDF denDF   F-value p-value
(Intercept)            1    74 288.29570  <.0001
worms                  1    27   0.28926  0.5951
Basalt                 1    27   7.25678  0.0120
growingseason          1    74   6.66754  0.0118
Daysafterplanting      1    74  57.82147  <.0001
```

K:

Lm1<-lme(log(K)~worms+growingseason+Basalt+Daysafterplanting, random=~1|Pot, data=rhizon_k)

```
                  numDF denDF  F-value p-value
(Intercept)           1    74 581.6011  <.0001
worms                 1    27   0.3015  0.5875
growingseason         1    74  48.8012  <.0001
Basalt                1    27   6.9567  0.0137
Daysafterplanting     1    74 175.1362  <.0001
```

Mg:

Lm1<-lme(log(Mg)~worms x Basalt+growingseason+Basalt+Daysafterstart,weights=varIdent(form=~1|Daysafterstart), random=~1|Pot, data=rhizon_Mg)

```
                   numDF denDF  F-value p-value
(Intercept)            1    74 462.5216  <.0001
worms                  1    26  13.4138  0.0011
Basalt                 1    26  14.5219  0.0008
growingseason          1    74   1.2795  0.2617
Daysafterplanting      1    74 199.6502  <.0001
worms:Basalt           1    26   8.9633  0.0060
```

Mn: assumption of heteroscedasticity not met, statistical analysis not possible.

Na:

Lm1<-lme(log(Na)~Basalt x worms+growingseason+Daysafterplanting,weights=varIdent(form=~1|Daysafterplanting), random=~1|Pot, data=rhizon_Na)

```
                   numDF denDF   F-value p-value
(Intercept)            1    73 2178.9206  <.0001
Basalt                 1    26   47.6338  <.0001
worms                  1    26    5.3581  0.0288
growingseason          1    73    2.8397  0.0962
Daysafterplanting      1    73   21.6642  <.0001
Basalt:worms           1    26    9.1558  0.0055
```

Ni: 74 of 106 samples <LOQ/detection limit.

Si:

Lm1<-lme(sqrt(Si)~Basalt x worms x growingseason+Daysafterplanting,weights=varIdent(form=~1|Daysafterstart), random=~1|Pot, data=rhizon_Si)

	numDF	denDF	F-value	p-value
(Intercept)	1	71	1429.1004	<.0001
Basalt	1	26	12.2200	0.0017
worms	1	26	1.9577	0.1736
growingseason	1	71	55.9469	<.0001
Daysafterplanting	1	71	58.5596	<.0001
Basalt:worms	1	26	5.6738	0.0248
Basalt:growingseason	1	71	3.6448	0.0603
worms:growingseason	1	71	0.9141	0.3423
Basalt:worms:growingseason	1	71	6.3567	0.0139

Zn:

Lm1<-lme(sqrt(Zn)~worms+Basalt+Daysafterplanting+growingseason, weights=varIdent(form=~1|Daysafterstart),random=~1|Pot, data=outlierZn)

	numDF	denDF	F-value	p-value
(Intercept)	1	73	385.4254	<.0001
worms	1	27	0.0193	0.8907
Basalt	1	27	18.7150	0.0002
Daysafterplanting	1	73	30.5216	<.0001
growingseason	1	73	68.6082	<.0001