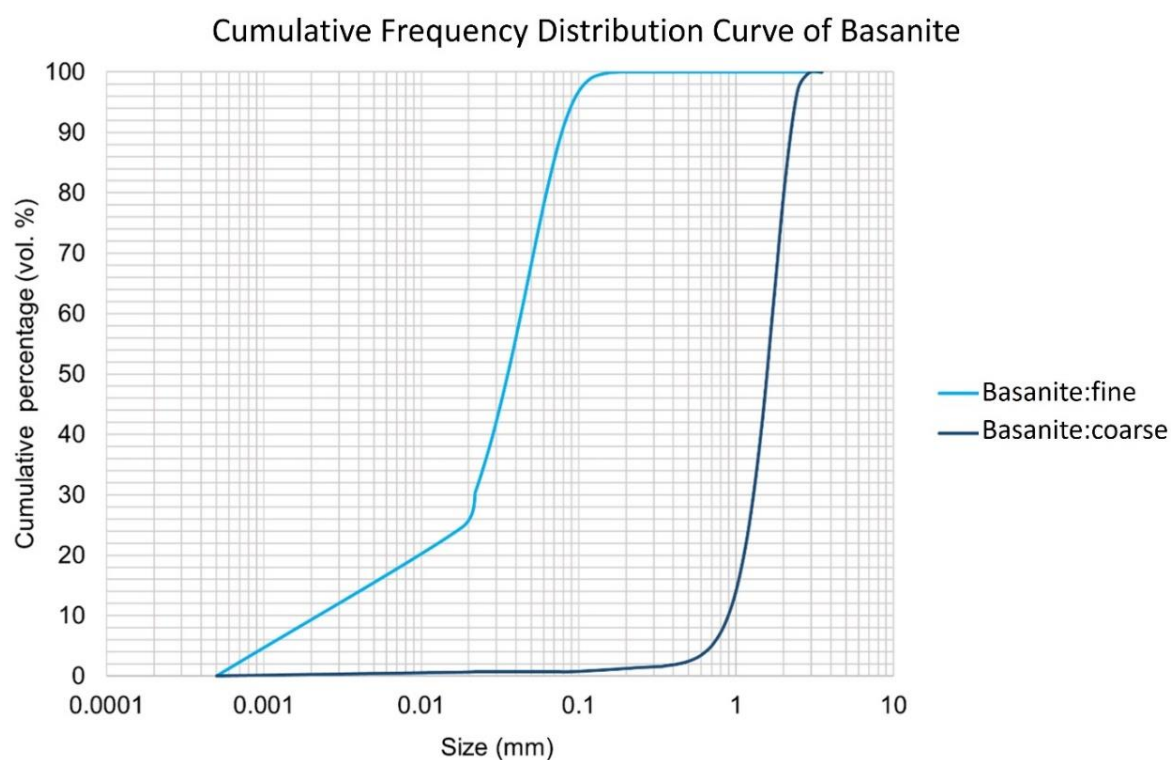
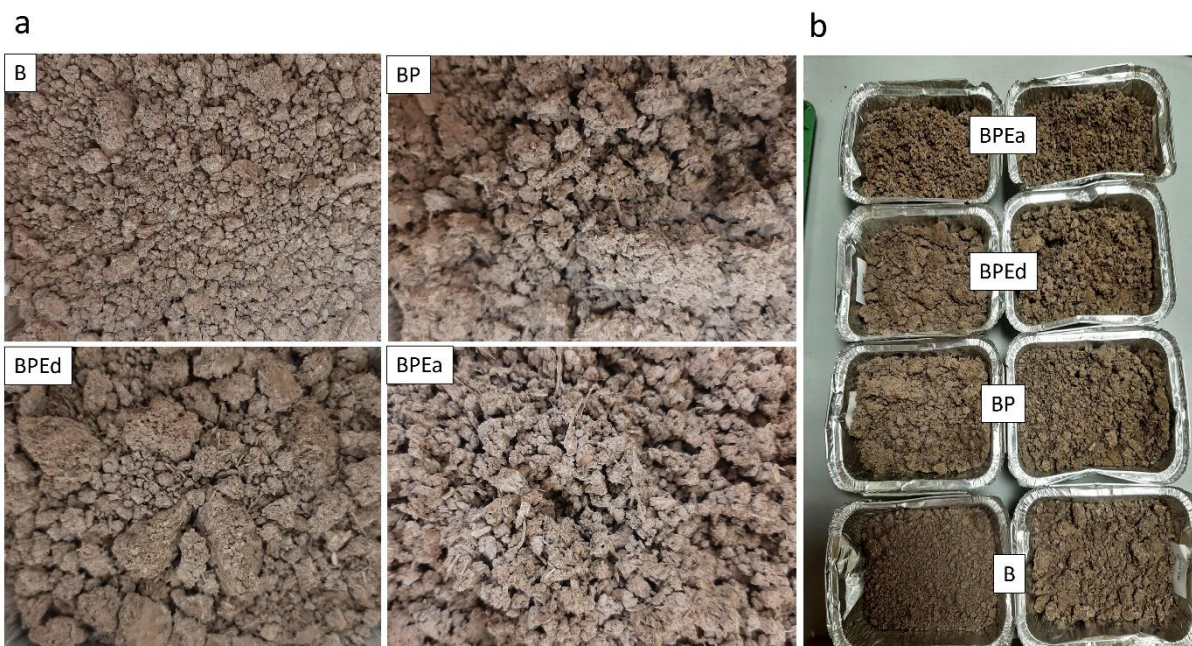


Supplementary information

To the manuscript “Alive and dead earthworms capture carbon during mineral weathering through different pathways”



Supplementary Figure 1 Relative cumulative frequency distribution of the two grain sizes of basanite.

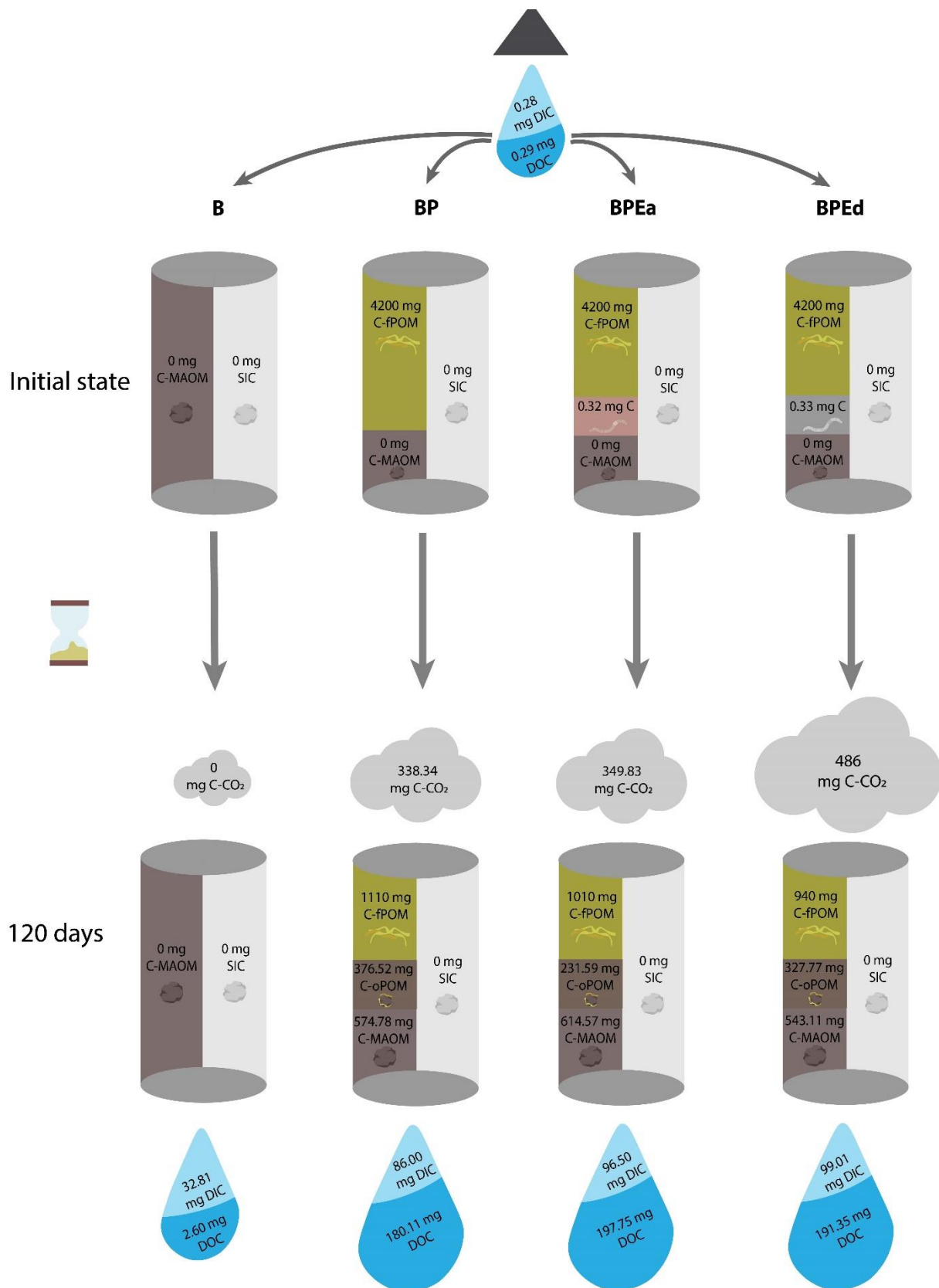


Supplementary Figure 2 Close-up (a) and two-paired replicates (b) pictures of the organo-mineral mixture according to each treatment after 60 days. B = treatment with only basanite; BP= treatment with basanite and pea straw; BPEd = treatment with basanite, pea straw and earthworms introduced dead; BPEa = treatment with basanite, pea straw and earthworms introduced alive.

Supplementary Table 1 PLFA and NLFA peaks assigned to different soil microbial groups by MIDI Sherlock Software v.6.3B (Shimadzu, Kyoto, Japan).

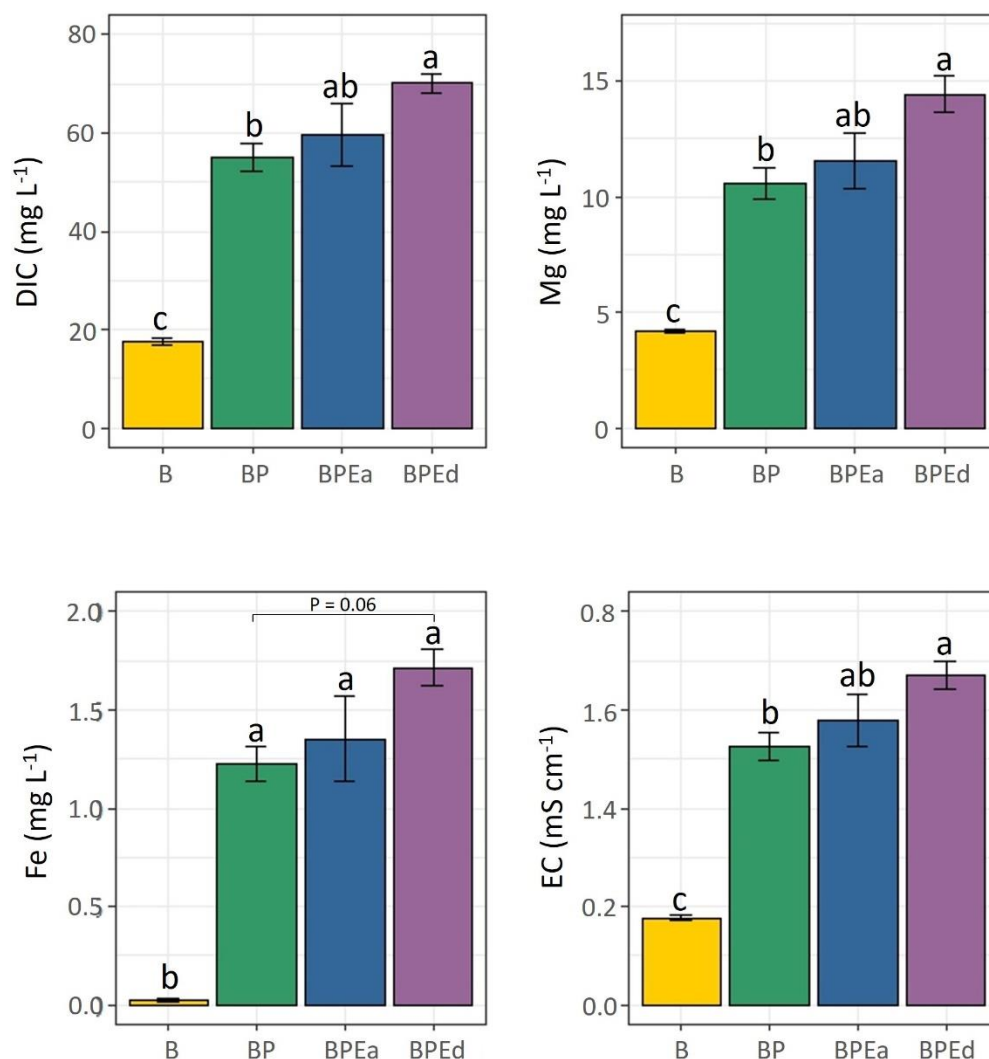
Microbial groups	Peaks
Gram -	10:0 2OH, 10:0 3OH, 12:1 w8c, 12:1 w5c, 13:1 w5c, 13:1 w4c, 13:1 w3c, 12:0 2OH, 14:1 w9c, 14:1 w8c, 14:1 w7c, 14:1 w5c, 15:1 w9c, 15:1 w8c, 15:1 w7c, 15:1 w6c, 15:1 w5c, 14:0 2OH, 16:1 w9c, 16:1 w7c, 16:1 w6c, 16:1 w4c, 16:1 w3c, 17:1 w9c, 17:1 w8c, 17:1 w7c, 17:1 w6c, 17:0 cyclo w7c, 17:1 w5c, 17:1 w4c, 17:1 w3c, 16:0 2OH, 18:0 cyclo w6c, 18:1 w8c, 18:1 w7c, 18:1 w6c, 18:1 w5c, 18:1 w3c, 19:1 w9c, 19:1 w8c, 19:1 w7c, 19:1 w6c, 19:0 cyclo w7c, 19:0 cyclo w6c, 20:1 w9c, 20:1 w8c, 20:1 w6c, 20:1 w4c, 20:0 cyclo w6c, 21:1 w9c, 21:1 w8c, 21:1 w6c, 21:1 w5c, 21:1 w4c, 21:1 w3c, 22:1 w9c, 22:1 w8c, 22:1

	w6c, 22:1 w5c, 22:1 w3c, 22:0 cyclo w6c, 24:1 w9c, 24:1 w7c, 11:0 iso 3OH, 14:0 iso 3OH, 17:0 iso 3O
Gram +	11:0 iso, 11:0 anteiso, 12:0 iso, 12:0 anteiso, 13:0 iso, 13:0 anteiso, 14:1 iso w7c, 14:0 iso, 14:0 anteiso, 15:1 iso w9c, 15:1 iso w6c, 15:1 anteiso w9c, 15:0 iso, 15:0 anteiso, 16:0 iso, 16:0 anteiso, 17:1 iso w9c, 17:0 iso, 17:0 anteiso, 18:0 iso, 17:1 anteiso w9c, 17:1 iso w10c, 17:1 anteiso w7c, 18:1 w9c, 19:0 cyclo w9c, 19:0 iso, 19:0 anteiso, 20:0 iso, 22:0 iso
Eukaryotes	15:4 w3c, 15:3 w3c, 16:4 w3c, 16:3 w6c, 18:3 w6c, 19:4 w6c, 19:3 w6c, 19:3 w3c, 20:4 w6c, 20:5 w3c, 20:3 w6c, 20:2 w6c, 21:3 w6c, 21:3 w3c, 22:5 w6c, 22:6 w3c, 22:4 w6c, 22:5 w3c, 22:2 w6c, 23:4 w6c, 23:3 w6c, 23:3 w3c, 23:1 w5c, 23:1 w4c, 24:4 w6c, 24:3 w6c, 24:3 w3c, 24:1 w3c, 18:4 w3c
Anaerobes	12:0 DMA, 13:0 DMA, 14:1 w7c DMA, 14:0 DMA, 15:0 iso DMA, 15:0 DMA, 16:2 DMA, 17:0 DMA, 16:1 w9c DMA, 16:1 w7c DMA, 16:1 w5c DMA, 16:0 DMA, 18:2 DMA, 18:1 w9c DMA, 18:1 w7c DMA, 18:1 w5c DMA, 18:0 DMA, 19:0 cyclo 9,10 DMA
Actinomycetes	16:0 10-methyl, 17:1 w7c 10-methyl, 17:0 10-methyl, 22:0 10-methyl, 18:1 w7c 10-methyl, 18:0 10-methyl, 19:1 w7c 10-methyl, 20:0 10-methyl
Saprophytic fungi	18:2 w6c

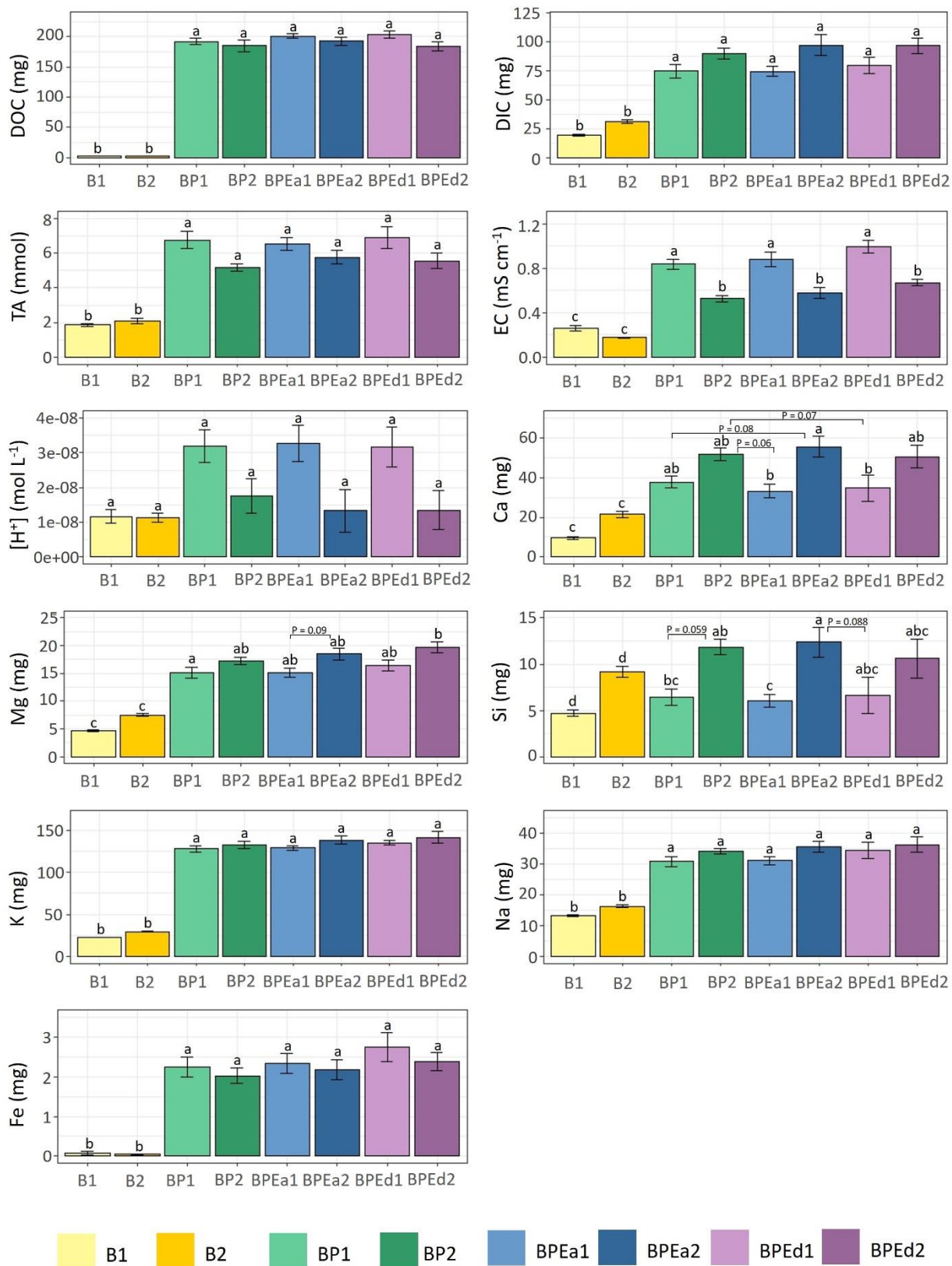


Supplementary Figure 3 Graphical representation of the carbon balance according to the different treatments after 120 days. Larger icons indicate significant differences ($P < 0.05$) compared to smaller

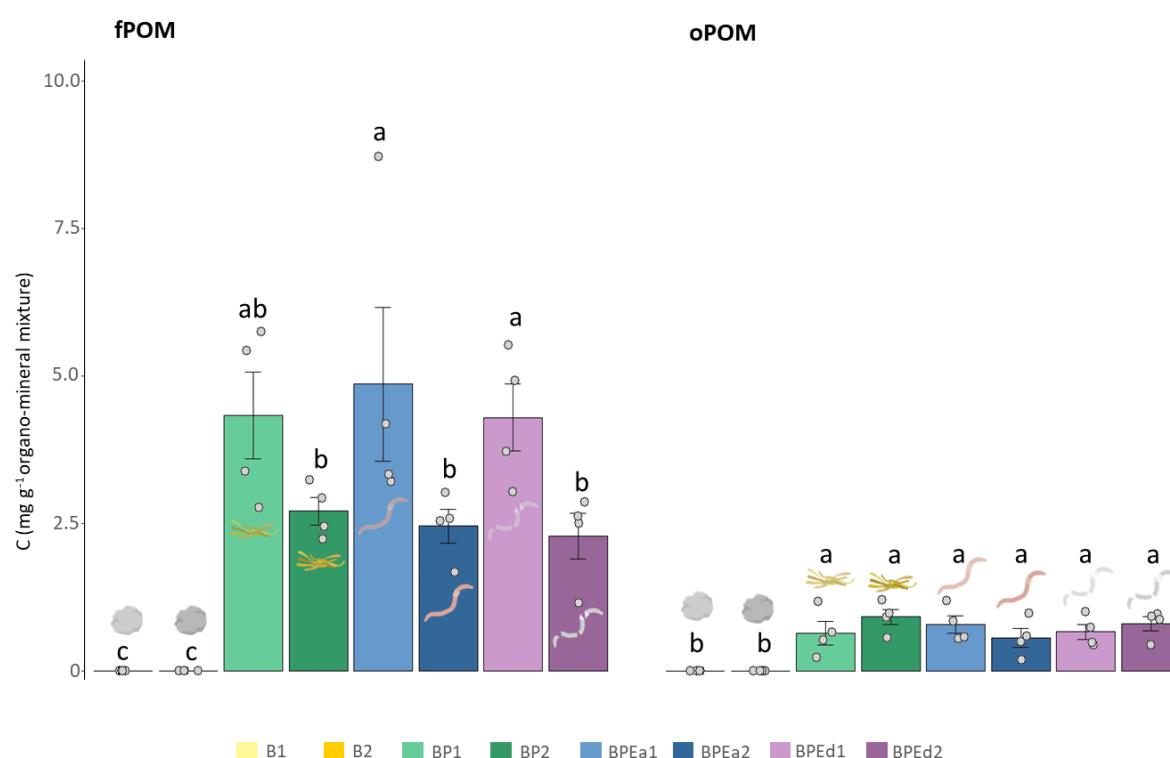
ones. *B* = treatment with only basanite; *BP* = treatment with basanite and pea straw; *BPEa* = treatment with basanite, pea straw and earthworms introduced alive; *BPEd* = treatment with basanite, pea straw and earthworms introduced dead.



*Supplementary Figure 4 Dissolved inorganic carbon (DIC), Magnesium (Mg) and Iron (Fe) concentrations and electrical conductivity (EC) measured in the leachate according to treatment after 120 days. Values for DIC, Mg and Fe are expressed in mg L⁻¹ while EC is expressed as mS cm⁻¹. Values indicate the mean and the bars the standard error for five independent replicates. Different letters indicate significant differences between treatments (P < 0.05). *B* = treatment with basanite; *BP* = treatment with basanite and pea straw; *BPEa* = treatment with basanite, pea straw and earthworms added alive; *BPEd* = treatment with basanite, pea straw and earthworms added dead.*



Supplementary Figure 5 Total amounts of the different weathering indicators measured in the leachate at 60 and 120 days. Values indicate the mean and the bars the standard error for five independent replicates. Different letters indicate significant differences between treatments ($P < 0.05$). DOC = dissolved organic carbon; DIC = dissolved inorganic carbon; TA = Total Alkalinity; EC = Electrical Conductivity. B1 = treatment with basanite after 60 days; B2 = treatment with basanite after 120 days; BP1 = treatment with basanite and pea straw after 60 days; BP2 = treatment with basanite and pea straw after 120 days; BPEa1 = treatment with basanite, pea straw and earthworms added alive after 60 days; BPEa2 = treatment with basanite, pea straw and earthworms added alive after 120 days; BPEd1 = treatment with basanite, pea straw and earthworms added dead after 60 days; BPEd2 = treatment with basanite, pea straw and earthworms added dead after 120 days.



Supplementary Figure 6 Carbon (C) content in free particulate organic matter (fPOM) and occluded particulate organic matter (oPOM) according to treatment and sampling time. Values are expressed as mg C·g⁻¹ organo-mineral mixture. Values represent the mean and the bars the standard error for four independent replicates. Different letters indicate significant differences between treatments ($P < 0.05$). Statistical significance was analysed using ANOVA followed by a post hoc Tukey's test. B1 = treatment with basanite after 60 days; B2 = treatment with basanite after 120 days; BP1 = treatment with basanite and pea straw after 60 days; BP2 = treatment with basanite and pea straw after 120 days; BPEa1 = treatment with basanite, pea straw and earthworms added alive after 60 days; BPEa2 = treatment with basanite, pea straw and earthworms added alive after 120 days; BPEd1 = treatment with basanite, pea straw and earthworms added dead after 60 days; BPEd2 = treatment with basanite, pea straw and earthworms added dead after 120 days.