Supplementary Materials

Site-specific response of sediment microbial community to supplementation of polyhydroxyalkanoates as biostimulating agents

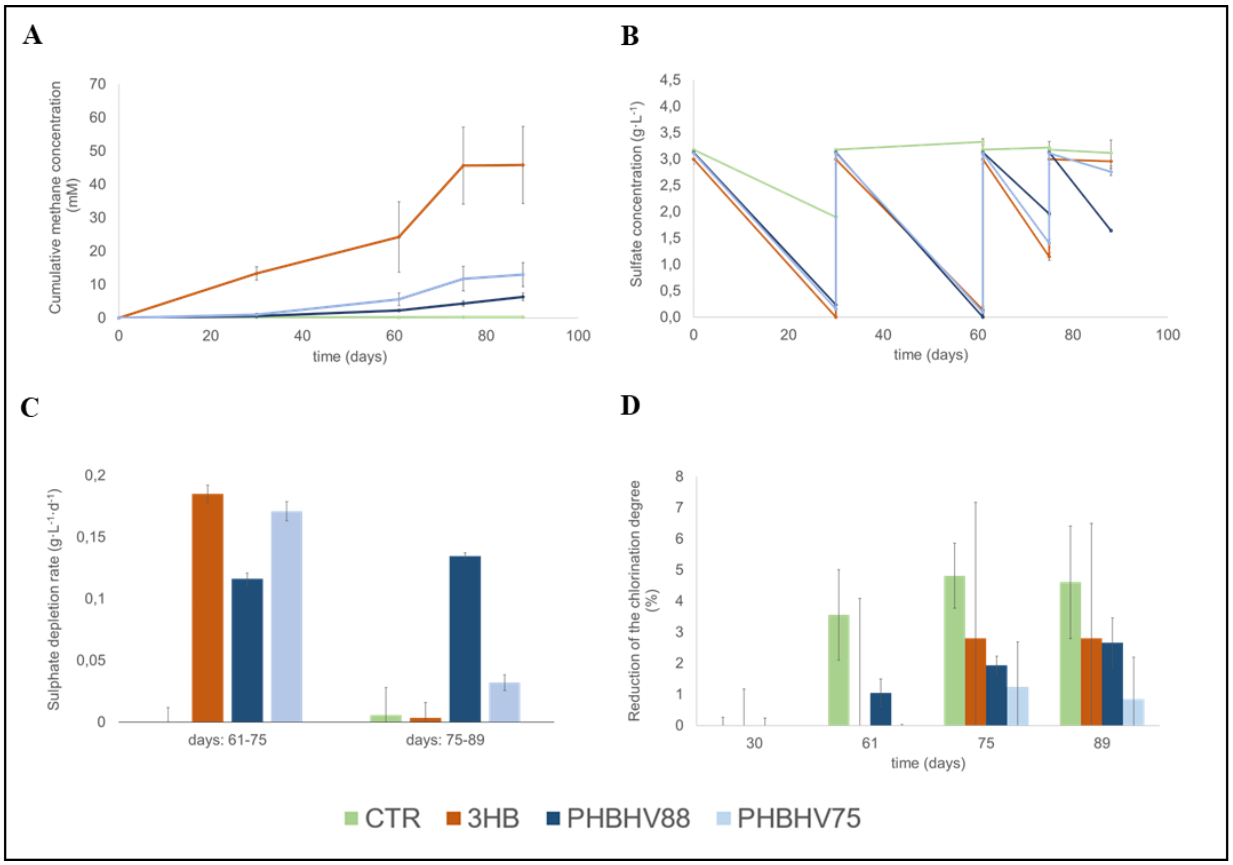
Botti Alberto†, Musmeci Eliana†, Negroni Andrea, Capuozzo Rosaria, Fava Fabio, Biagi Elena*, Zanaroli Giulio

Dept. of Civil, Chemical, Environmental and Material Engineering (DICAM), Alma Mater Studiorum University of Bologna, Via Terracini 28, 40131 Bologna, Italy

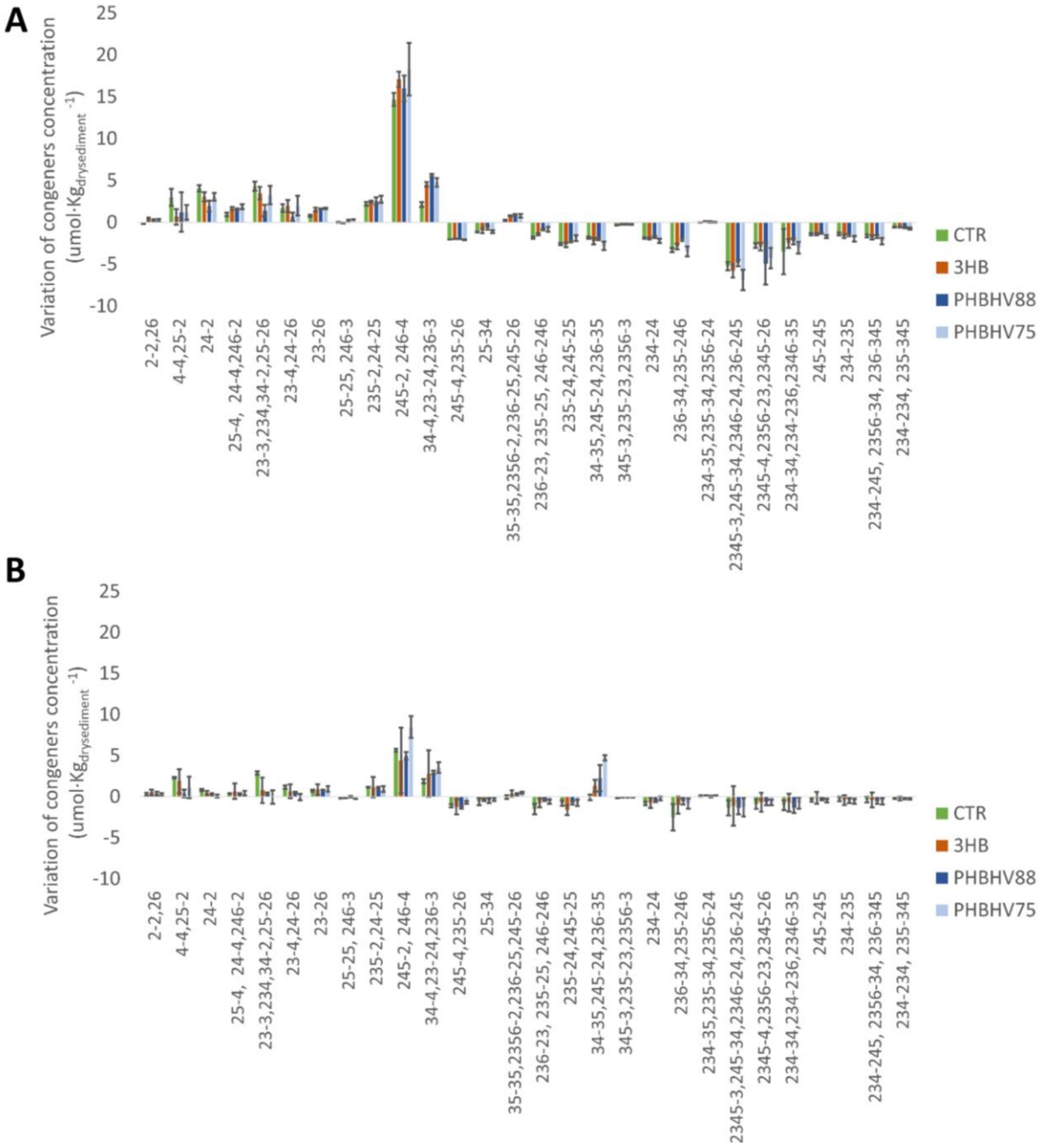
†Equal contribution

*Corresponding author

Supplementary Figures



Supplementary Figure S1. Assessment of anaerobic metabolisms in microcosms assembled using sediments from Mar Piccolo, Taranto. (A) Cumulative methane concentration (mM) measured in the microcosms' headspace gas. **(B)** Profile in time of the sulfate concentrations in the aqueous phase. Sulfates were replenished on days 30, 61 and 75. **(C)** Sulfate depletion rates measured in microcosms between 61-75 days and 75-89 days of incubation. **(D)** Percentage of reduction of the chlorination degree of the PCB mixture during incubation. For all panels, values were measured in unamended microcosms (CTR, green) and in those amended with monomer (3HB, orange) and PHAs (PHBHV75 and PHBHV88, in light and dark blue, respectively) and are expressed as mean value ± standard deviation. Color legend for the four panels is displayed at the bottom.



Supplementary Figure S2. Variations of the concentration of PCBs congeners in the studied sediments. (A) Variation of the concentration of PCBs congeners for the microcosms containing sediment from Pialassa della Baiona, Ravenna **(B)** Variation of the concentration of PCBs congeners for the microcosms containing sediment from Mar Piccolo, Taranto. For all panels, values were measured in unamended microcosms (CTR, green) and in those amended with monomer (3HB, orange) and PHAs (PHBHV75 and PHBHV88, in light and dark blue, respectively) and are expressed as difference between the initial (0 days) and final (89 days) concentration of the congeners or mixture of congeners. Color legend for the four panels is displayed at the right.

Supplementary Tables

Supplementary Table S1. Summary of the main chemical-physical parameters reported in the literature for the studied sediments.

Reference	pH	TOC (%)	TN (%)	Sand (%)[e]	Mud (Clay and Silt) (%)[f]	Permeability (k) $m \cdot s^{-1}$
Pialassa della Baiona (Ravenna)						
Fabbri et al., 2006		10-25[c]			44.3[a]	
Guerra et al., 2009		4-16[c]			16-81	
Ponti et al., 2009				12-90		
Ponti et al., 2011		3.5-2.5[c]		12-90		
Guerra, 2012		2.81[a, d]			41[a]	
Guerra et al., 2013		0.76-3.45[d]	0.1-0.48			
Guerra et al., 2014		5.4[c]			33	
Borghesi et al., 2016		5.2[c]				
Sfriso et al., 2020	7.4	1.2[d]				
Guerra et al., 2022		2.3[d]				
Mar Piccolo (Taranto)						
Quero et al., 2015		20.1[a, c]		29[a]	70[a]	
Vitone et al., 2016				23[a]	76[a]	10^{-12}-10^{-8}
Di Leo et al., 2016	7.87	4.06[, d]		10	89.9	
Mali et al., 2017	7.26	2.57[b]		19.5	77	
Todaro et al., 2019		16.7[a, c]				
Sollecito et al., 2019		9-18[c]				
Todaro et al., 2020		21.3 [a, c]		8.5 [a]	91.5 [a] (< 75 µm)	
Mali et al., 2020		2.5[d]	0.22	19.5	77	
Sollecito et al.,2021				9[a]	90[a] (< 75 µm)	10^{-10}-1
Dominik et al., 2023		2.3[d]	0.2	10	90	

[a] value presented as average of the data reported in the article
[b] method used to determine TOC is not specified
[c] TOC determined via EPA 160.4 as loss of ignition (LOI)
[d] TOC determined with elemental analyzer
[e] particles diameter 2 mm – 63 µm
[f] particles diameter < 63 µm

Supplementary Table S2. Summary of the concentrations of heavy metals and polycyclic aromatic hydrocarbons (PAH) reported in the literature for the studied sediments, expressed as mg·Kg$_{drysediment}^{-1}$.

Reference	Al	As	Cd	Cr	Cu	Fe	Hg	Mn	Ni	Pb	V	Zn	PAH
Pialassa della Baiona (Ravenna)													
Ponti et al., 2011							0.1-41						
Guerra, 2012	46300			160	47	24700	46					270	14[a]
Guerra et al., 2014				84	38	21580	4	428	43			123	
Borghesi et al., 2016	13257	7	0.4		47	22943	5	546	51	21	31	141	
Pignotti et al., 2018					42		2		71		104	167	
Mar Piccolo (Taranto)													
Quero et al., 2015	24660[a]	14[a]	0.4[a]	57[a]	93[a]	28029[a]	3.9[a]	350[a]	41[a]	84[a]		261[a]	1.8[a]
Bellucci et al., 2016	26636[a]	15[a]	0.5[a]	61[a]	100[a]	30156[a]	4.2[a]	366[a]	44[a]	89[a]		281[a]	1.8[a]
Mali et al., 2017	31938	13	0.4	56	48	28823	2.5		50	63	56	168	1.1
Todaro et al., 2019		12	0.4		40		3.8		39	63	52	94	
Mali et al., 2020	31901	10	0.3	56	34	28791	0.9		47	47	56	2	
Todaro et al., 2020		44[a]	1[a]	75[a]	124[a]		14[a]		51[a]	247[a]	95[a]	440[a]	5.1[a]
Cotecchia et al., 2021													3.9[a]

[a] value presented as average of the data reported in the article.

Supplementary Table S3. Metabolic activities (methane production, sulfate depletion rate, and percentage of reduction of the chlorination degree of the PCB mixture) measured in microcosms assembled using sediments from Pialassa della Baiona, Ravenna (PB) (Botti et al., 2023) and Mar Piccolo, Taranto (MP) (this study).

	Methane production[a] (mM, mean ± standard deviation)		Sulfate depletion rate[b] ($g \cdot L^{-1} \cdot d^{-1}$, mean ± standard deviation)		Reduction of the chlorination degree[a] (%, mean ± standard deviation)	
	PB	MP	PB	MP	PB	MP
CTR	0.3 ± 01	0.3 ± 0.2	0.00 ± 0.00	0.01 ± 0.02	14.4 ± 1.7	4.6 ± 1.8
3HB	53.1 ± 7.9	31.0 ± 16.4	0.11 ± 0.12	0.10 ± 0.10	14.0 ± 2.0	3.3 ± 2.9
PHBHV88	14.0 ± 6.1	6.4 ± 1.9	0.12 ± 0.06	0.13 ± 0.01	12.4 ± 1.1	2.7 ± 0.8
PHBHV75	16.4 ± 3.9	13.0 ± 6.3	0.11 ± 0.05	0.10 ± 0.08	15.4 ± 2.3	1.0 ± 1.2

[a] measured at the end of the experiment (89 days)

[b] monitored during the third month of the experiment

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