

*Supplementary Materials*

# Characterization and Biotechnological Potential of Intracellular Polyhydroxybutyrate by *Stigeoclonium* sp. B23 Using Cassava Peel as Carbon Source

Murilo Moraes Mourão <sup>1,\*</sup>, Luciana Pereira Xavier <sup>1</sup>, Ralph Urbatzka <sup>2</sup>, Lucas Barbosa Figueiroa <sup>3</sup>, Carlos Emmerson Ferreira da Costa <sup>3</sup>, Carmen Gilda Barroso Tavares Dias <sup>4</sup>, Maria Paula Cruz Schneider <sup>5</sup>, Vitor Vasconcelos <sup>2,6</sup> and Agenor Valadares Santos <sup>1,\*</sup>

<sup>1</sup> Laboratory of Biotechnology of Enzymes and Biotransformations, Institute of Biological Sciences, Federal University of Pará, 66075-110 Belém, Pará, Brazil; lpxavier@ufpa.br

<sup>2</sup> Interdisciplinary Center of Marine and Environmental Research—CIIMAR, University of Porto, 4450-208 Porto, Portugal; rurbatzka@ciimar.up.pt (R.U.); vmvascon@fc.up.pt (V.V.)

<sup>3</sup> Laboratory of Oils of the Amazon, Guamá Science and Technology Park, Federal University of Pará, 66075-750 Belém, Pará, Brazil; lucasfigueiroa57@gmail.com (L.B.F.); emmerson@ufpa.br (C.E.F.d.C.)

<sup>4</sup> Laboratory of Materials Processing, Institute of Technology, Federal University of Pará, 66075-110 Belém, Pará, Brazil; cgbtd@ufpa.br

<sup>5</sup> Genomics and Systems Biology Center, Federal University of Pará, 66075-110 Belém, Pará, Brazil; mariapaulacruzschneider@gmail.com

<sup>6</sup> Department of Biology, Faculty of Sciences, University of Porto, 4069-007 Porto, Portugal

\* Correspondence: mouraomurilo@gmail.com (M.M.M.); avsantos@ufpa.br (A.V.S.)

**Citation:** Mourão, M.M.; Xavier, L.P.; Urbatzka, R.; Figueiroa, L.B.; Costa, C.E.F.d.; Dias, C.G.B.T.; Schneider, M.P.C.; Vasconcelos, V.; Santos, A.V. Characterization and Biotechnological Potential of Intracellular Polyhydroxybutyrate by *Stigeoclonium* sp. B23 Using Cassava Peel as Carbon Source. *Polymers* **2021**, *13*, 687. <https://doi.org/10.3390/polym13050687>

Academic Editor: Łukasz Kłapiszewski

Received: 6 February 2021

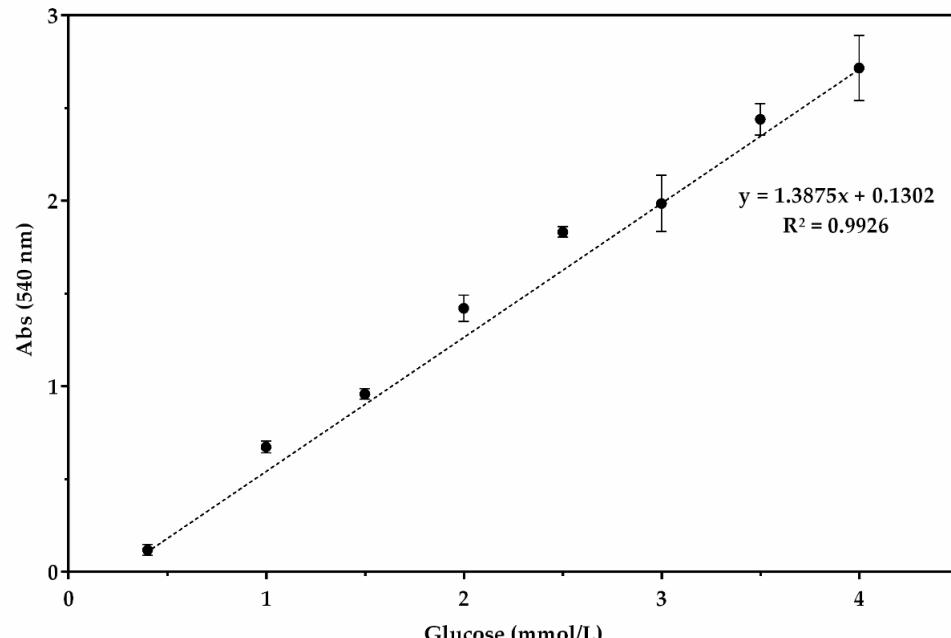
Accepted: 17 February 2021

Published: 25 February 2021

**Publisher's Note:** MDPI stays neutral with regard to jurisdictional claims in published maps and institutional affiliations.



**Copyright:** © 2021 by the authors. Submitted for possible open access publication under the terms and conditions of the Creative Commons Attribution (CC BY) license (<http://creativecommons.org/licenses/by/4.0/>).



**Figure S1.** Standard curve of commercial glucose. UV absorbance 540 nm is plotted as a function of the amount of glucose in mmol/L. Data are the mean ± SD of three replicates.

**Table S1.** ANOVA Table of Calculated Parameter (BMP, PHB and P<sub>PHB</sub>) and Modified Z8 Media of *Stigeoclonium* sp. B23 at the 95% Confidence Level.

	Degrees of Free-dom	Sum of Squares	Mean of Squares	F <sub>calc</sub>	p Value
Interaction	4.0	144.2	36.04	58.83	$p < 0.0001$
Yield parameters	2.0	283.4	141.7	231.3	$p < 0.0001$
Modified Z8 media	2.0	58.07	29.03	47.39	$p < 0.0001$
Residual (error)	18.0	11.03	0.6126		
Total	26.0	496.7			

**Table S2.** Tukey's Post Hoc Multiple Comparisons of Calculated Parameters (BMP, PHB, and P<sub>PHB</sub>) and Modified Z8 Media of *Stigeoclonium* sp. B23. The Mean Difference is Significant at the 0.05 level.

Treatment Comparisons	Mean Difference	95% Confidence Interval		p Value
		Lower Bound	Upper Bound	
<b>BMP (g/L)</b>				
Z8/100%NaNO <sub>3</sub> vs. Z8/25%NaNO <sub>3</sub>	0.7273	0.8090	1.536	0.5039
Z8/100%NaNO <sub>3</sub> vs. Z8/2.5%NaNO <sub>3</sub>	1.008	0.5282	1.536	0.2805
Z8/25%NaNO <sub>3</sub> vs. Z8/2.5%NaNO <sub>3</sub>	0.2808	0.5282	0.8090	0.8996
<b>PHB (%)</b>				
Z8/100%NaNO <sub>3</sub> vs. Z8/25%NaNO <sub>3</sub>	-11.24	12.17	0.9282	< 0.0001
Z8/100%NaNO <sub>3</sub> vs. Z8/2.5%NaNO <sub>3</sub>	-7.977	8.905	0.9282	< 0.0001
Z8/25%NaNO <sub>3</sub> vs. Z8/2.5%NaNO <sub>3</sub>	3.263	8.905	12.17	< 0.0001
<b>P<sub>PHB</sub> (g/L)</b>				
Z8/100%NaNO <sub>3</sub> vs. Z8/25%NaNO <sub>3</sub>	-0.08366	0.09792	0.01426	0.9906
Z8/100%NaNO <sub>3</sub> vs. Z8/2.5%NaNO <sub>3</sub>	-0.03202	0.04628	0.01426	0.9986
Z8/25%NaNO <sub>3</sub> vs. Z8/2.5%NaNO <sub>3</sub>	0.05164	0.04628	0.09792	0.9964