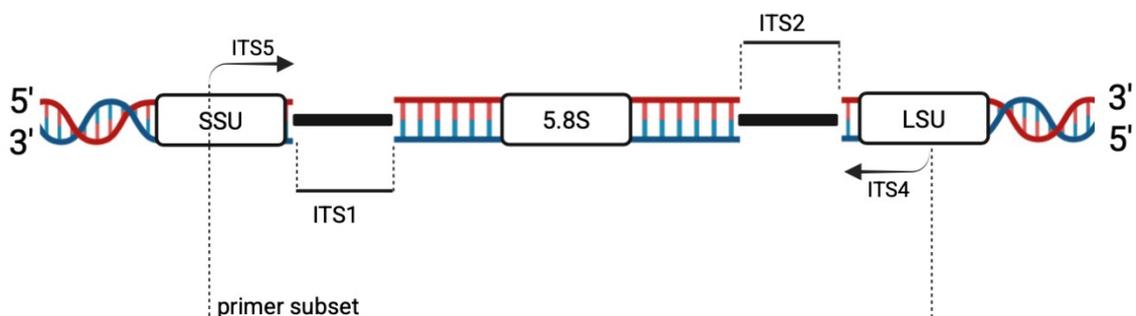
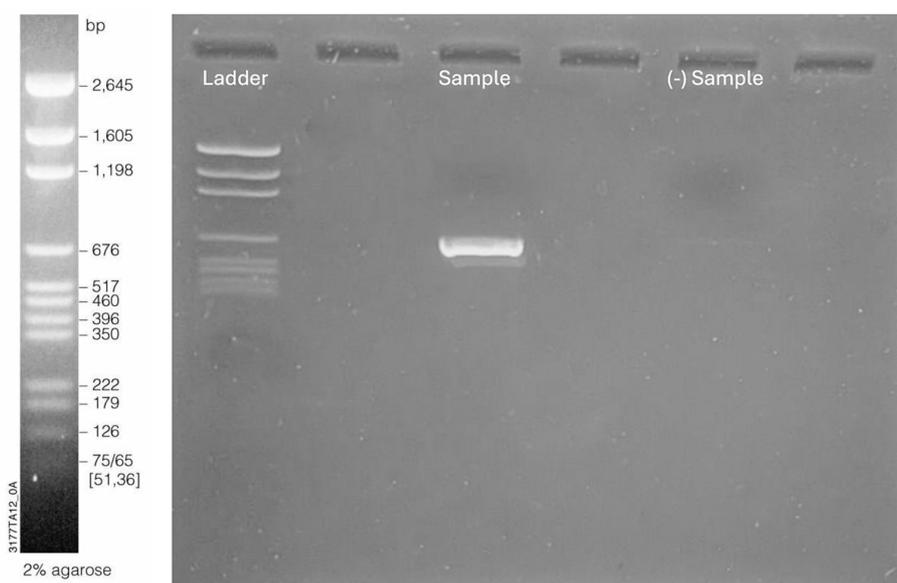


### Supplementary information



**Fig. S1.** A schematic diagram showing the relative location of the primers ITS5 and ITS4 used to amplify the ITS region by PCR (adapted from White et al. <sup>1</sup>; Bellemain et al. <sup>2</sup>).



**Fig. S2.** 1.5% agarose gel, 100bp ladder, Amplified DNA sample, and negative control.



1  Principal Component Analysis (10/10/2025 11:46:58)

Notes

Input Data

Descriptive Statistics

	N analysis	N missing	Mean	Standard Deviation
Carbon	56	0	3.60214	1.80008
Nitrogen	56	0	6.60714	3.35846
Phosphorous	56	0	1.29286	1.2024
Substrate consumption	56	0	6.28027	4.12641
Biomass	56	0	4.60179	3.16393
Protein	56	20	1.0394	1.08277

Observations containing one or more missing values are removed in analysis (listwise).

Correlation Matrix

	Carbon	Nitrogen	Phosphorous	Substrate consumption	Biomass	Protein
Carbon	1	-5.80019E-4	-2.95212E-4	0.84447	0.70371	0.51118
Nitrogen	-5.80019E-4	1	0.43513	-0.12118	0.13011	0.26612
Phosphorous	-2.95212E-4	0.43513	1	-0.17785	-0.09257	-0.06061
Substrate consumption	0.84447	-0.12118	-0.17785	1	0.74655	0.5568
Biomass	0.70371	0.13011	-0.09257	0.74655	1	0.93217
Protein	0.51118	0.26612	-0.06061	0.5568	0.93217	1

Observations containing one or more missing values are removed in analysis (listwise).

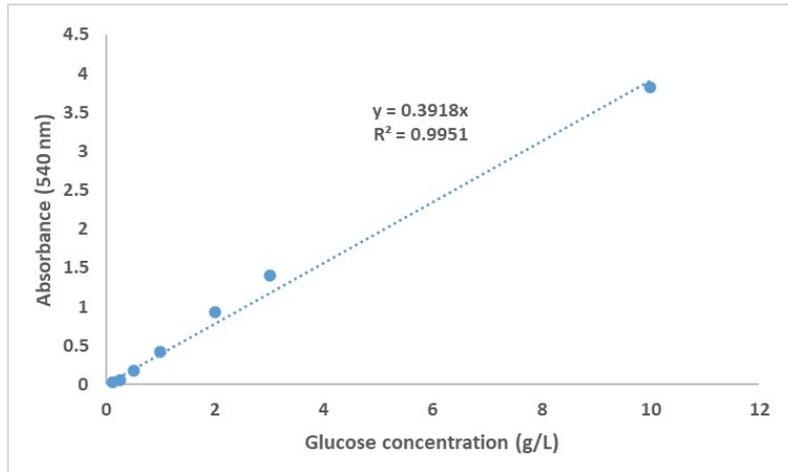
Eigenvalues of the Correlation Matrix

	Eigenvalue	Percentage of Variance	Cumulative
1	3.17229	52.87%	52.87%
2	1.50309	25.05%	77.92%
3	0.76179	12.70%	90.62%
4	0.40236	6.71%	97.33%
5	0.13214	2.20%	99.53%
6	0.02834	0.47%	100.00%

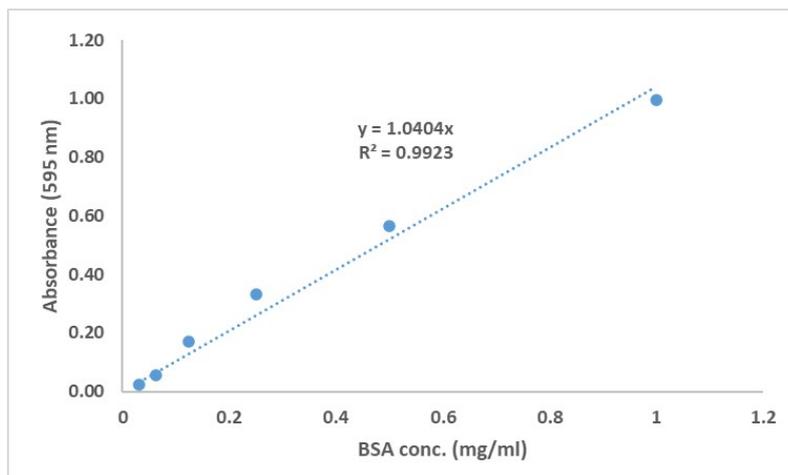
Extracted Eigenvectors

	Coefficients of PC1	Coefficients of PC2
Carbon	0.47937	-0.04016
Nitrogen	0.04953	0.7139
Phosphorous	-0.06699	0.64901
Substrate consumption	0.4962	-0.18164
Biomass	0.5369	0.06321
Protein	0.47832	0.17471

Fig. S5. Multivariant analysis stats table



**Fig. S6.** Standard curve for total sugar estimation using DNS assay.



**Fig. S7.** Standard curve for total protein estimation using Bradford Assay.

**Table S1.** Quartile summary of Box and Whisker plot representing diameter of pellets from mycelium cultures subjected to different inoculum fragmentation levels (Fig. 1B)

Treatment	Mean	Minimum	1st Quartile (Q1)	Median	3rd Quartile (Q3)	Maximum
Control	10.9	2.1	4.1	11.8	16.4	20.7
F1	6.41	0.97	2.49	5.57	9.72	14.2
F2	3.95	1.00	1.78	3.81	5.10	10.2
F3	2.26	0.66	1.56	2.12	2.67	6.94

**Table S2.** Quartile summary of Box and Whisker plot representing diameter of pellets from mycelium cultures grown using different inoculum densities under varying agitation rates (Fig. 4D)

Treatment	Mean	Minimum	1st Quartile (Q1)	Median	3rd Quartile (Q3)	Maximum
150 rpm, 20 mg L <sup>-1</sup>	2.02	0.90	1.43	1.76	2.33	11.4
150 rpm, 40 mg L <sup>-1</sup>	1.85	0.87	1.27	1.59	2.05	9.15
225 rpm, 20 mg L <sup>-1</sup>	1.83	0.87	1.29	1.60	2.15	8.01
225 rpm, 40 mg L <sup>-1</sup>	1.66	0.87	1.22	1.45	1.89	8.93

**Table S3.** Primary experimental data

Carbon source	Carbon g/L C	Nitrogen g/L YE	Phosphorous g/L KH <sub>2</sub> PO <sub>4</sub>	Fragmentation mean um	Inoculation mg/L	Agitation rpm	Substrate consumption g/L	Biomass g/L	Protein g/L
glucose	0.88	5	1	924.5	20	150	2.24	1.3	0.06
glucose	0.88	5	1	924.5	20	150	2.24	2	0.1
glucose	0.88	5	1	924.5	20	150	2.24	1.7	0.09
glucose	3.6	5	1	924.5	20	150	7.39	8.3	1.98
glucose	3.6	5	1	924.5	20	150	7.47	9.5	2.37
glucose	3.6	5	1	924.5	20	150	7.42	8.4	2.09
glucose	6.33	5	1	924.5	20	150	12.70	11	3.41
glucose	6.33	5	1	924.5	20	150	12.31	10.9	3.29
glucose	6.33	5	1	924.5	20	150	12.59	11.6	3.72
lactose	0.88	5	1	924.5	20	150	2.2	0.9	0.02
lactose	0.88	5	1	924.5	20	150	2.19	0.8	0.02
lactose	0.88	5	1	924.5	20	150	2.19	1.3	0.03
lactose	3.6	5	1	924.5	20	150	8.39	4.4	0.58
lactose	3.6	5	1	924.5	20	150	8.39	4.1	0.52
lactose	3.6	5	1	924.5	20	150	8.40	3.9	0.48
lactose	6.33	5	1	924.5	20	150	13.82	6.2	0.98
lactose	6.33	5	1	924.5	20	150	13.87	6	0.92
lactose	6.33	5	1	924.5	20	150	13.84	6.6	1.08
fructose	0.88	5	1	924.5	20	150	2.02	0.6	0.01
fructose	0.88	5	1	924.5	20	150	2	0.6	0.01

fructose	3.6	5	1	924.5	20	150	7.63	3.6	0.45
fructose	3.6	5	1	924.5	20	150	7.52	3.2	0.38
fructose	6.33	5	1	924.5	20	150	13.76	6.05	0.89
fructose	6.33	5	1	924.5	20	150	13.84	6.45	1.02
xylose	0.88	5	1	924.5	20	150	1.66	0.2	0.004
xylose	0.88	5	1	924.5	20	150	1.72	0.3	0.01
xylose	3.6	5	1	924.5	20	150	7.54	1.95	0.239
xylose	3.6	5	1	924.5	20	150	7.49	1.7	0.2
xylose	6.33	5	1	924.5	20	150	13.27	6.05	0.89
xylose	6.33	5	1	924.5	20	150	13.01	6	0.85
oleic acid	0.88	5	1	924.5	20	150	1.14	1.4	0.11
oleic acid	0.88	5	1	924.5	20	150	1.14	1.5	0.12
oleic acid	3.6	5	1	924.5	20	150	4.71	5.2	0.97
oleic acid	3.6	5	1	924.5	20	150	4.71	5.75	1.01
oleic acid	6.33	5	1	924.5	20	150	8.27	8.05	1.86
oleic acid	6.33	5	1	924.5	20	150	8.27	8.6	1.79
glucose	3.6	0.5	1	924.5	20	150	0.93	0.3	0.01
glucose	3.6	0.5	1	924.5	20	150	0.83	0.4	0.01
glucose	3.6	3.5	1	924.5	20	150	3.66	3.1	0.42
glucose	3.6	3.5	1	924.5	20	150	3.15	2.9	0.37
glucose	3.6	6.5	1	924.5	20	150	7.44	7	1.76
glucose	3.6	6.5	1	924.5	20	150	7.47	7.3	1.93
glucose	3.6	9.5	1	924.5	20	150	7.64	7.9	2.56
glucose	3.6	9.5	1	924.5	20	150	7.73	8.3	2.82
glucose	3.6	12.5	1	924.5	20	150	8.97	10	4.08
glucose	3.6	12.5	1	924.5	20	150	8.99	9.6	3.7
glucose	3.6	12.5	0.3	924.5	20	75	7.23	6.2	
glucose	3.6	12.5	0.3	924.5	20	75	7.28	6.4	
glucose	3.6	12.5	0.3	924.5	20	150	8.97	10.2	
glucose	3.6	12.5	0.3	924.5	20	150	8.98	10.7	
glucose	3.6	12.5	0.3	924.5	20	225	7.98	8.6	
glucose	3.6	12.5	0.3	924.5	20	225	8.05	8.8	
glucose	3.6	12.5	0.3	924.5	40	75	7.64	7.9	
glucose	3.6	12.5	0.3	924.5	40	75	7.73	8.2	
glucose	3.6	12.5	0.3	924.5	40	150	8.99	12.6	
glucose	3.6	12.5	0.3	924.5	40	150	8.99	13.2	
glucose	3.6	12.5	0.3	924.5	40	225	8.98	10.7	
glucose	3.6	12.5	0.3	924.5	40	225	8.98	11	
glucose	3.6	12.5	0	924.5	20	150	3.15	3	0.66
glucose	3.6	12.5	0	924.5	20	150	3.30	2.8	0.60
glucose	3.6	12.5	0.3	924.5	20	150	3.93	4.1	1.01
glucose	3.6	12.5	0.3	924.5	20	150	4.34	3.9	0.91
glucose	3.6	12.5	2.3	924.5	20	150	3.61	3.6	0.84
glucose	3.6	12.5	2.3	924.5	20	150	3.52	3.8	0.90

glucose	3.6	12.5	4.3	924.5	20	150	3.72	3.7	0.86
glucose	3.6	12.5	4.3	924.5	20	150	3.21	3.4	0.77
glucose	3.6	12.5	6.3	924.5	20	150	3.36	3.3	0.75
glucose	3.6	12.5	6.3	924.5	20	150	3.16	3.2	0.70
glucose	12	5	1	1110.25	20	150	1.85	2.8	
glucose	12	5	1	1110.25	20	150	1.59	0.8	
glucose	12	5	1	1089.13	20	150	6.09	7.9	
glucose	12	5	1	1089.13	20	150	5.82	10.7	
glucose	12	5	1	1036.37	20	150	10.34	8.3	
glucose	12	5	1	1036.37	20	150	9.69	5	
glucose	12	5	1	924.5	20	150	16.56	13.2	
glucose	12	5	1	924.5	20	150	15.38	12.4	

**Table S4.** Primary data from Mastersizer particle size analyzer in the inoculum fragmentation experiment

Particle size ( $\mu\text{m}$ )	Proportion of sample volume (%)			
	Control	F1	F2	F3
158.5	0	0	0	0
182.0	0	0	0	0
208.9	0	0	0	0.044644
239.9	0	0	0	0.284025
275.4	0	0	0.026361	0.75951
316.2	0	0.036037	0.276784	1.535642
363.1	0	0.323131	0.876545	2.663332
416.9	0.000059	1.091792	1.877945	4.099642
478.6	2.02539	2.353926	3.386862	5.781646
549.5	3.910045	4.189776	5.331316	7.530284
631.0	6.19002	6.501285	7.570903	9.150671
724.4	8.802011	9.033974	9.806408	10.40501
831.8	11.67001	11.40606	11.68133	11.10096
955.0	13.5013	13.15473	12.82295	11.11271
1096.5	14.36002	13.85101	12.94659	10.41956
1258.9	13.70003	13.22702	11.93395	9.093694
1445.4	11.70011	11.26301	9.878539	7.293931
1659.6	8.551002	8.275968	7.104543	5.232988
1905.5	4.61003	4.35011	3.686219	2.84165
2187.8	0.980013	0.942165	0.792754	0.650099
2511.9	0	0	0	0
2884.0	0	0	0	0

**Table S5.** Moisture content of mycelium biomass from different assays†

<b>Fragmentation level</b>	<b>Moisture content (%)</b>
Control	94.37
Control	96.31
F1	95.34
F1	95.35
F2	95.14
F2	95.52
F3	95.38
F3	95.96
<b>Carbon sources</b>	<b>Moisture content (%)</b>
Glucose	91.94
Glucose	90.00
Glucose	93.20
Lactose	95.21
Lactose	93.80
Lactose	94.72

†The moisture content of the mycelium biomass was observed to be consistent within the range of 90.0 – 96.3% for all the experiments reported in the manuscript.

### Supplementary References

1. T. J. White, T. Bruns, S. Lee and J. Taylor, *PCR protocols: a guide to methods and applications*, 1990, **18**, 315-322.
2. E. Bellemain, T. Carlsen, C. Brochmann, E. Coissac, P. Taberlet and H. Kauserud, *BMC Microbiology*, 2010, **10**.