

Micrococcus lylae MW407006 Pigment: Production, Optimization, Nano-Pigment Synthesis, and Biological Activities

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Supplementary data

Table S1. Susceptibility profiles of the tested pathogens to some commonly known antibiotics

Tested pathogens	Ampicillin		Cefazolin		Amikacin		Pipracillin		Colistin		Cefoxitin		Clotrimazole	
	IZ	MIC	IZ	MIC	IZ	MIC	IZ	MIC	IZ	MIC	IZ	MIC	IZ	MIC
<i>Pseudomonas aeruginosa</i>	R	R	R	R	10.0	20.0	10.0	21.0	R	R	11.0	20.0	--	--
<i>Acinetobacter baumannii</i>	R	R	R	R	11.0	21.0	9.0	22.0	R	R	10.0	23.3	--	--
MRSA	R	R	R	R	9.0	22.0	14.0	20.0	R	R	R	R	--	--
<i>Klebsiella pneumoniae</i>	R	R	R	R	10.0	25.0	9.0	23.5	R	R	9.0	21.5	--	--
<i>Proteus vulgaris</i>	R	R	R	R	10.0	23.0	11.0	25.0	R	R	8.0	24.0	--	--

<i>Listeria monocytogenes</i>	R	R	R	R	9.0	26.0	9.0	24.5	R	R	12.0	26.0	--	--
<i>E. coli</i>	R	R	R	R	8.0	29.0	7.0	27	R	R	13.0	25.0	--	--
<i>Salmonella Typhi</i>	R	R	R	R	7.0	28.0	9.0	25.5	R	R	11.0	24.3	--	--
<i>Candida albicans</i>	R	R	R	R	11.0	28.0	8.0	26.8	R	R	9.0	23.2	6.0	1500.0
<i>Staphylococcus aureus</i>	R	R	R	R	9.0	28.0	9.0	26.1	R	R	10.0	29.0	--	--

IZ, inhibition zone (mm); MIC, minimum inhibitory concentration (µg/mL); --, not applicable

Table S2. ANOVA study of the experimental output

Source	Antimicrobial activity*			Biomass production (g/L) *			Pigment production (g/L) *		
	Sum of squares	F-value	p-value	Sum of squares	F-value	P-value	Sum of Squares	F-value	p-value
Model	354.06	2.53	0.0112	28.02	1.98	0.0457	1.73	3.38	0.0014
A— Time	6.99	0.9979	0.3261	0.0878	0.1240	0.7272	0.0699	2.73	0.1090
B— Temp.	8.56	1.22	0.2781	0.2122	0.2998	0.5882	0.0856	3.35	0.0776
C—pH	4.24	0.6058	0.4427	0.2320	0.3278	0.5714	0.0424	1.66	0.2078
D— carbon source	28.45	4.06	0.0532	3.35	4.73	0.0378	0.1072	4.19	0.0498
E— Nitrogen source	86.55	12.36	0.0015	4.01	5.66	0.0242	0.4065	15.90	0.0004
AB	0.6050	0.0864	0.7709	0.0751	0.1061	0.7470	0.0061	0.2367	0.6303
AC	1.44	0.2063	0.6531	0.0621	0.0878	0.7691	0.0145	0.5652	0.4582
AD	0.2450	0.0350	0.8529	0.0185	0.0262	0.8726	0.0025	0.0958	0.7591
AE	0.3613	0.0516	0.8219	0.0102	0.0143	0.9055	0.0036	0.1413	0.7097
BC	4.65	0.6640	0.4218	0.0914	0.1291	0.7220	0.0465	1.82	0.1878
BD	0.1513	0.0216	0.8842	0.0081	0.0115	0.9154	0.0015	0.0592	0.8095
BE	0.1800	0.0257	0.8738	0.0158	0.0223	0.8824	0.0018	0.0704	0.7926
CD	0.9113	0.1301	0.7210	0.0358	0.0505	0.8237	0.0091	0.3564	0.5551

CE	3.65	0.5204	0.4765	0.0102	0.0143	0.9055	0.0365	1.43	0.2421
DE	0.3200	0.0457	0.8322	0.0158	0.0223	0.8824	0.0032	0.1252	0.7261
A ²	184.03	26.27	< 0.0001	16.80	23.74	< 0.0001	0.5829	22.80	< 0.0001
B ²	1.89	0.2704	0.6070	0.0799	0.1128	0.7394	0.0874	3.42	0.0746
C ²	18.85	2.69	0.1117	0.1005	0.1420	0.7091	0.3507	13.72	0.0009
D ²	32.77	4.68	0.0389	2.54	3.60	0.0679	0.1260	4.93	0.0344
E ²	11.69	1.67	0.2066	2.10	2.97	0.0954	0.0798	3.12	0.0878

*, the model is significant

Table S3. Fitting statistics of the RSM design

Antimicrobial activity				Biomass production (g/L)				Pigment production (g/L)			
Std. Dev.	2.65	R²	0.6354	Std. Dev.	0.8413	R²	0.5772	Std. Dev.	0.1599	R²	0.6999
Mean	8.91	Adjusted R²	0.3840	Mean	3.20	Adjusted R²	0.2856	Mean	0.4320	Adjusted R²	0.4930
C.V. %	29.70	Predicted R²	-0.5805	C.V. %	26.28	Predicted R²	-0.9078	C.V. %	37.01	Predicted R²	-0.1374
		Adeq Precision	7.0064			Adeq Precision	6.6002			Adeq Precision	6.6682

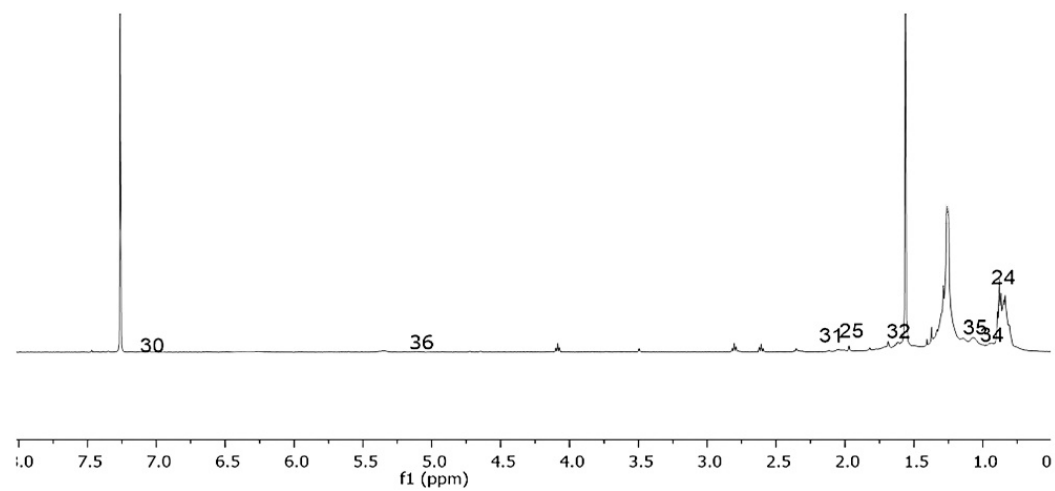


Figure S1. ^1H -NMR spectrum of the extracted pigment (echinenone).