

Supplementary material

Table S1. Geolocalization and data of stations sampled in the Gulf of Mexico.

Station	Longitude [Grades]	Longitude [Min]	Latitude [Grades]	Latitude [Min]	Depth (meters)	Temperature (°C)	Salinity (psu)	Dissolved oxygen (mL/L)
A1	95	50.130	25.00	53.700	877.00	5.8	27.5	3.4
A2	95	33.829	25.00	53.913	1792.00	4.2	27.7	4.7
A3	95	14.370	25.00	53.320	1926.82	4.2	27.7	4.7
A4	94	42.601	25.00	53.570	3166.00	4.3	27.7	4.6
B5	96	15.359	25.00	39.639	529.00	8.4	27.2	2.5
B6	95	52.510	25.00	39.620	1006.00	5.3	27.5	3.6
B7	95	35.629	25.00	40.523	1374.00	4.4	27.7	4.5
B8	95	15.870	25.00	39.800	2103.00	4.2	27.7	4.7
B9	94	54.913	25.00	40.095	2962.00	4.3	27.7	4.6
C10	93	18.368	19.00	10.430	728.00	6.7	27.4	2.9
C11	93	30.398	19.00	37.380	857.00	5.7	27.5	3.4
C12	93	46.309	20.00	1.116	1452.00	4.3	27.7	4.5
C13	94	18.500	20.00	36.060	2368.00	4.2	27.7	4.7
C14	94	45.130	20.00	43.980	3200.36	4.3	27.7	4.6
D15	93	36.240	19.00	10.008	600.00	7.2	27.3	2.8
D16	94	0.079	19.00	2.697	696.00	6.5	27.4	3.0
D17	94	5.469	19.00	36.543	1026.00	5.2	27.5	3.7
D18	94	20.510	19.00	55.910	1281.00	4.4	27.7	4.4
N1	96	45.901	24.00	25.702	849.00	6.3	27.4	3.1
N2	96	7.980	25.00	26.270	972.00	5.1	27.6	3.8
N3	95	51.070	24.00	36.380	2474.00	4.3	27.7	4.7
N4	95	52.130	23.00	36.460	2839.00	4.3	27.7	4.7
N5	94	45.010	22.00	45.050	3405.00	4.3	27.7	4.6
N6	94	45.560	24.00	45.200	3465.00	4.3	27.7	4.6

**Table S2.** Sampling stations and locations from where the fungal strains were isolated.

Strain	Station/Zone
<i>Cladosporium halotolerans</i>	C11, Coatzacoalcos
<i>Stemphylium</i> sp.	C12, Coatzacoalcos
<i>Alternaria</i> sp.	N2, Perdido
<i>Penicillium</i> sp. 1	D16, Coatzacoalcos
<i>Penicillium</i> sp. 2	C11, Coatzacoalcos

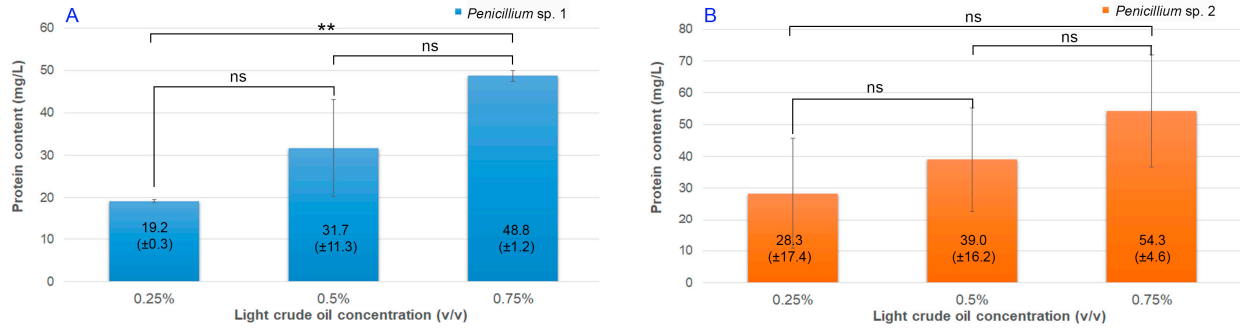
**Table S3.** Reference DNA sequences of the ITS rDNA, 18S and  $\beta$ -tubulin markers used in the phylogenetic analyses. A letter was added after the ID of each isolate to identify each molecular marker; Z for 18S, T for ITS, B for  $\beta$ -tubulin region close to 5' end and LR for  $\beta$ -tubulin region close to 3' end.

OTU	Sequence ID (18S)	NCBI accession number	Hit	Cover	% ID	NCBI accession number
<i>Cladosporium</i> sp.	1Z	MW412481	<i>Cladosporium velox</i>	100	99.8	NG_062725.1
			<i>Cladosporium sphaerospermum</i>	100	100	JN939024.1
			<i>Cladosporium</i> sp.	100	100	MT093347.1
			<i>Cladosporium cladosporoides</i>	100	100	KT582530.1
			<i>Cladosporium halotolerans</i>	100	100	MT000326.1
<i>Stemphylium</i> sp.	3Z	MW412484	<i>Pleospora herbarum/Stemphylium vesicarium</i>	100	99.78	GU238232.1
			<i>Pleospora herbarum/Stemphylium vesicarium</i>	100	99.78	DQ767648.1
			<i>Pleospora herbarum/Stemphylium vesicarium</i>	100	99.78	KY659567.1
			<i>Stemphylium vesicarium</i>	100	99.78	MH050984.1

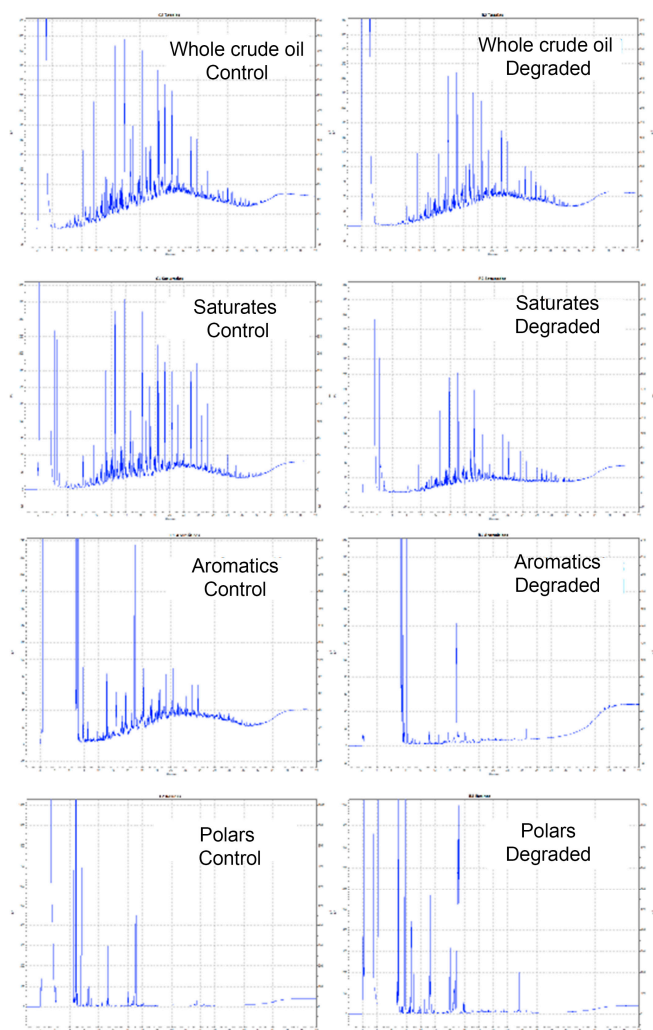
			<i>Stemphylium botryosum</i>	100	99.78	NG_061146.1
			<i>Alternaria</i> sp.	99	99.64	MT649579.1
			<i>Alternaria tenuissima</i>	99	99.64	MN075309.1
<i>Alternaria</i> sp.	4Z	MW412485	<i>Alternaria alternata</i>	99	99.64	MT535855.1
			<i>Alternaria citri</i>	99	99.64	MF989222.1
			<i>Alternaria tomatophila</i>	99	99.64	MK577728.1
			<i>Penicillium</i> sp.	100	100	MT649587.1
			<i>Penicillium chrysogenum</i>	100	100	MN826497.1
<i>Penicillium</i> sp. 1	5Z	MW412482	<i>Penicillium spinulosum</i>	100	100	MF072609.1
			<i>Penicillium commune</i>	100	100	MF072605.1
			<i>Penicillium solitum</i>	100	100	JN642222.1
			<i>Penicillium</i> sp.	100	100	MN906962.1
			<i>Penicillium namyslowskii</i>	100	100	KM096326.1
<i>Penicillium</i> sp. 2	6Z	MW412483	<i>Penicillium corylophilum</i>	100	100	JN938959.1
			<i>Penicillium phialosporum</i>	100	99.9	AF245266.1
			<i>Penicillium limosum</i>	100	99.71	NG_062729.1
OTU	Sequence ID (ITS)	NCBI accession number	Hit	Cover	% ID	NCBI accession number
			<i>Cladosporium halotolerans</i>	100	99.45	MH864391.1
			<i>Cladosporium parahalotolerans</i>	100	99.45	MF473158.1
<i>Cladosporium</i> sp.	1T	MW412494	<i>Cladosporium</i> sp.	99	99.45	KF293975.1
			<i>Cladosporium cladosporioides</i>	100	98.72	EF577236.1
			<i>Cladosporium sphaerospermum</i>	97	99.81	AB572902.1
			<i>Stemphylium vesicarium</i>	100	100	MK713547.1
			<i>Stemphylium eturmiunum</i>	100	100	MK432743.1
<i>Stemphylium</i> sp.	3T	MW412490	<i>Stemphylium</i> sp.	100	100	MG065794.1
			<i>Stemphylium lucomagnoense</i>	100	99.62	MK691703.1
			<i>Stemphylium solani</i>	100	99.62	LC592374.1
			<i>Alternaria</i> sp.	100	100	MF776039.1
<i>Alternaria</i> sp.	4T	MW412491	<i>Alternaria arborescens</i>	100	100	KY484887.1

			<i>Alternaria alternata</i>	100	100	KJ744342.1
			<i>Alternaria tenuissima</i>	100	100	MN495830.1
			<i>Alternaria citri</i>	100	100	EF104220.1
			<i>Penicillium griseoroseum</i>	100	100	MT635309.1
			<i>Penicillium goetzii</i>	100	100	MT558933.1
<i>Penicillium</i> sp. 1	5T	MW412492	<i>Penicillium rubens</i>	100	100	MT558923.1
			<i>Penicillium camemberti</i>	100	100	MT529868.1
			<i>Penicillium vinaceum</i>	100	100	MT482619.1
			<i>Penicillium corylophilum</i>	100	100	MK450687.1
			<i>Penicillium albidum</i>	100	100	MH855058.1
<i>Penicillium</i> sp. 2	6T	MW412493	<i>Penicillium obscurum</i>	100	100	KP016815.1
			<i>Penicillium chloroleucon</i>	100	100	KP016813.1
			<i>Penicillium fagi</i>	100	99.81	MH865721.1
OTU	Sequence ID ( $\beta$ -tubulin)	NCBI accession number	Hit	Cover	% ID	NCBI accession number
			<i>Cladosporium halotolerans</i>	100	99.73	EF101421.1
			<i>Cladosporium halotolerans</i>	100	99.47	EF101423.1
<i>Cladosporium</i> sp.	1B	MZ392424	<i>Cladosporium psychrotolerans</i>	100	89.32	EF101443.1
			<i>Cladosporium langeronii</i>	100	88.48	EF101434.1
			<i>Cladosporium sphaerospermum</i>	100	87.31	KY952176.1
			<i>Stemphylium vesicarium</i>	100	98.41	MT671909.1
			<i>Stemphylium vesicarium</i>	100	97.77	JQ671944.1
<i>Stemphylium</i> sp.	3B	MZ392425	<i>Stemphylium callistephi</i>	100	96.18	JQ671943.1
			<i>Stemphylium</i> sp.	99	95.15	JN105110.1
			<i>Stemphylium solani</i>	99	94.87	JN105109.1
			<i>Penicillium rubens</i>	100	100	MT393580.1
			<i>Penicillium chrysogenum</i>	100	100	MK675757.1
<i>Penicillium</i> sp. 1	5B	MZ392426	<i>Penicillium rubens</i>	100	100	KU896998.1
			<i>Penicillium chrysogenum</i>	100	100	KF225098.1
			<i>Penicillium rolsii</i>	100	100	LT559055.1

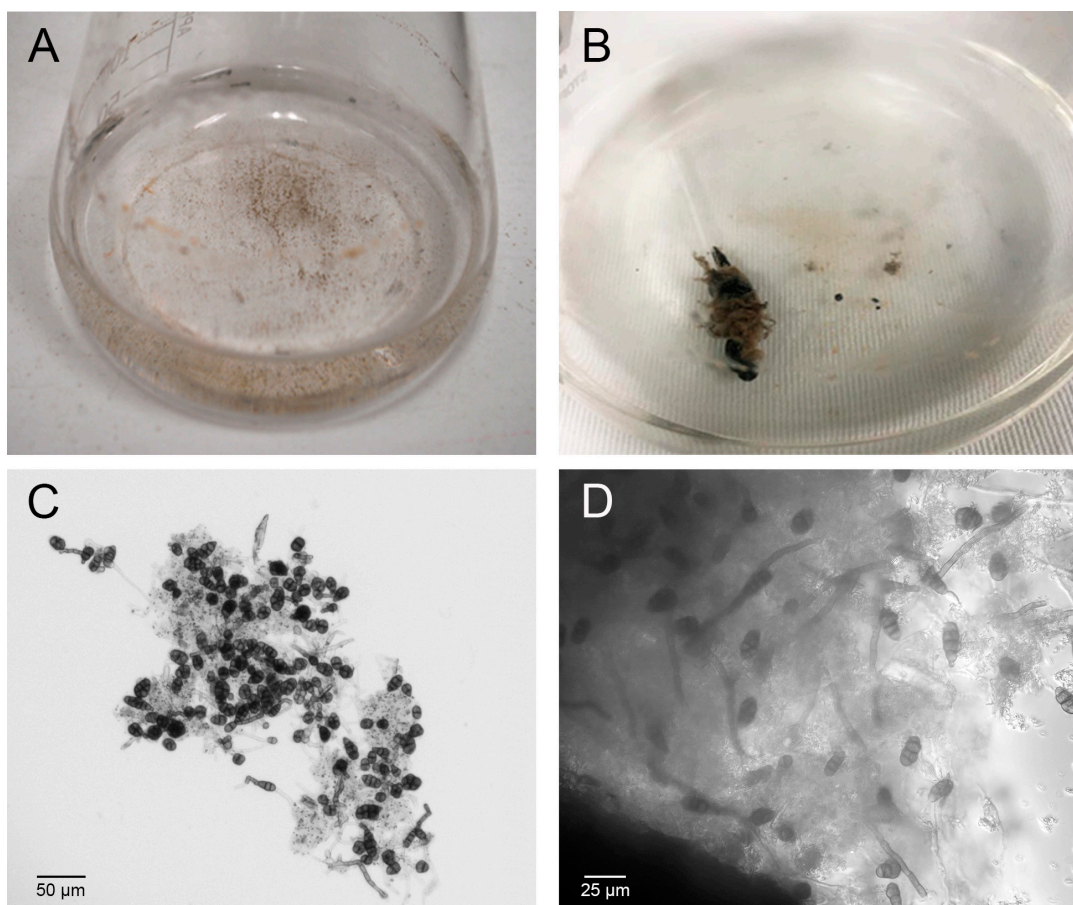
<i>Penicillium</i> sp. 2	6B	MZ392427	<i>Penicillium corylophilum</i>	100	100	MK451126.1
			<i>Penicillium obscurum</i>	100	99.08	JX141068.1
			<i>Penicillium corylophilum</i>	100	99.08	KF225092.1
			<i>Penicillium humuli</i>	98	99.07	KP016756.1
			<i>Penicillium pagulum</i>	100	98.17	JX141132.1
OTU	Sequence ID ( $\beta$ -tubulin)	NCBI accession number	Hit	Cover	% ID	NCBI accession number
<i>Alternaria</i> sp.	4LR	MZ392428	<i>Alternaria alternata</i>	99	99.27	XM_01853319.1
			<i>Alternaria alternata</i>	99	99.27	HQ413316.1
			<i>Alternaria alternata</i>	99	99.48	CP061884.1
			<i>Alternaria lini</i>	99	98.64	Y17082.1
			<i>Alternaria brassicae</i>	99	97.48	Y17074.1
			<i>Alternaria infectoria</i>	99	98.85	Y17083.1
			<i>Alternaria linicola</i>	99	96.96	Y17085.1
			<i>Alternaria solani</i>	99	97.48	MK388240.1
			<i>Alternaria solani</i>	99	97.48	HQ413317.1



**Figure S1.** Protein content (average of three replicates) of *Penicillium* sp. 1 (**A**) and *Penicillium* sp. 2 (**B**) grown under different light crude oil concentrations. The cultures were grown in Czapeck minimal medium with 0.25%, 0.5% and 0.75% v/v light crude oil as the unique carbon source. For *Penicillium* sp. 1 (**A**), Post hoc comparisons using the Tukey HSD test, indicated that the mean score protein content at 0.25% concentration of light crude oil ( $M = 19.2$ ,  $SD = 0.3$ ) was significantly different from that at 0.75% concentration ( $M = 48.8$ ,  $SD = 1.2$ ). In contrast, the content at 0.5% concentration ( $M = 31.7$ ,  $SD = 11.3$ ) did not significantly differ from the content at the other two concentrations. For *Penicillium* sp. 2 (**B**), Post hoc comparisons using the Tukey HSD test indicated that the mean score for protein content at 0.25% ( $M = 28.3$ ,  $SD = 17.4$ ), 0.5% ( $M = 39.0$ ,  $SD = 16.2$ ) and 0.75% concentrations ( $M = 54.3$ ,  $SD = 4.6$ ) did not significantly differ.



**Figure S2.** Chromatograms of whole extra-heavy crude oil and its saturates, aromatics and polars (SAP) fractions. Left column corresponds to abiotic controls and right column to degraded samples. A) Chromatograms from whole crude oil and SAP fractions from abiotic controls B) Chromatograms of whole crude oil and SAP fractions by *Alternaria* sp.



**Figure S3.** *Alternaria* sp. grown with (B,D) or without (A,C) 0.5% w/v of extra-heavy crude oil as sole carbon source after a month of incubation. A brown mass of mycelium surrounding the extra-heavy crude oil can be observed at the bottom of the flask (B). Conidia and some germinated conidia could be seen in the medium without crude oil (C), whereas a mass of hyphae and conidia was observed in the culture with crude oil (D).