Supplementary data table S2

Revisiting soil fungal biomarkers and conversion factors: Interspecific variability in phospholipid fatty acids, ergosterol and rDNA copy numbers

Camenzind, T, Haslwimmer, H, Rillig, MC, Ruess, L, Finn, DR, Tebbe, CC, Hempel, S, Marhan, S

*corresponding author: TessaC@zedat.fu-berlin.de

This data table provides data from this study and previous ones on biomarker contents in fungal isolates
Short descriptions on fungal growth conditions are given for each study

formula for the calculation of biomarker conversion factors:
conversion factor [fungal C unit^{-1} biomarker] = 1 / average biomarker content [unit g^{-1} fungus] × relative fungal carbon content
relative fungal C content = 0.47

this study

fungal isolates were grown for 2 weeks on malt extract agar (3 repetitions per isolate)

Isolate	Species	Phylum	18:2ω6,9 [µmol g^{-1} fungus]
RLCS21	*Pyrenochaetopsis_leptospora*	Ascomycota	14.90
RLCS23	*Paramyrothecium_sp.*	Ascomycota	7.92
RLCS06	*Chaetomium_angustispirale1*	Ascomycota	13.92
RLCS26	*Tetracladium_apiense*	Ascomycota	8.97
RLCS07	*Truncatella_angustata*	Ascomycota	14.33
RLCS22	*Paraphoma_chrysanthemicola*	Ascomycota	6.30
RLCS28	*Helotiales*	Ascomycota	5.96
RLCS27	*Chaetomium_subspirilliferum*	Ascomycota	30.13
RLCS05	*Fusarium_sp.1*	Ascomycota	12.14
RLCS14	*Nothophoma_sp.*	Ascomycota	11.17
RLCS10	*Alternaria_sp.*	Ascomycota	13.92
RLCS12	*Chaetomium_angustispirale2*	Ascomycota	12.23
RLCS18	*Fusarium_gibbosum*	Ascomycota	14.27
RLCS13	*Fusarium_sp.2*	Ascomycota	1.42
RLCS31	*Cyphellophora_sp.*	Ascomycota	7.58
RLCS30	*Exophiala_sp.*	Ascomycota	15.87
RLCS25	*Gliomastix_sp.*	Ascomycota	2.65
RLCS20	*Purpureocillium_lilacinum*	Ascomycota	14.32
RLCS08	*Fusarium_sp.3*	Ascomycota	4.40
RLCS24	*Metarhizium_marquandii*	Ascomycota	4.19
RLCS17	*Clitopilus_sp.*	Basidiomycota	0.76
RLCS09	*Trametes_versicolor*	Basidiomycota	23.41
RLCS16	*Pleurotus_sp.*	Basidiomycota	0.72
RLCS15	*Mortierella_sp.1*	Mortierellomycota	2.65
RLCS04	*Mortierella_sp.2*	Mortierellomycota	3.10
RLCS11	*Mortierella_alpina1*	Mortierellomycota	2.01
RLCS02	*Mortierella_sp.3*	Mortierellomycota	4.20
RLCS03	*Mortierella_alpina2*	Mortierellomycota	2.25
RLCS19	*Umbelopsis_isabellina*	Mucoromycota	2.79
RLCS01	*Mucor_fragilis*	Mucoromycota	5.87
		n=30	
		mean	8.81
		CV	79.77
		conversion factor [mg fungal C µmol^{-1} 18:2ω6,9]	**53.34**

Klamer & Baath 2004

average values of 12 and 24 days of growth on PDA; 10 isolates from compost, and two additional Basidiomycetes (both lignin degraders)

Species	Phylum	18:2ω6,9 [µmol g^{-1} fungus]
Absidia corymbifera (Cohn)	Mucoromycota	2.77
Acremonium strictum W. Gams	Ascomycota	15.72
Aspergillus fumigatus Fres.	Ascomycota	2.45
Corynascus sepedonium	Ascomycota	10.15
Penicillium piceum Raper	Ascomycota	5.11
Pseudallescheria boydii (Shear)	Ascomycota	5.10
Scopulariopsis brevicaulis	Ascomycota	2.83
Sepedonium chrysospermum	Ascomycota	4.93
Trichurus spiralis Hasselbr.	Ascomycota	8.15
Verticillium psalliotae Treschew	Ascomycota	17.36
Phaenerochaetechrysosporium Burds.	Basidiomycota	2.52
Schizophyllum commune Fr.: Fr.	Basidiomycota	2.25
	n=12	
	mean	6.61
	CV	79.33
	conversion factor [mg fungal C µmol^{-1} 18:2ω6,9]	**71.08**

Baldrian *et al.* 2013

fruiting bodies were collected from a forest for analyses (three repetitions per species)

Species	Phylum	18:2ω6,9 [µmol g^{-1} fungus]
Cantharellus sp.	Basidiomycota	45.94
Cortinarius limonius	Basidiomycota	44.95
Hydnellum sp.	Basidiomycota	9.75
Laccaria laccata	Basidiomycota	33.85
Lactarius rufus	Basidiomycota	35.33
Lactarius tabidus	Basidiomycota	51.86
Russula ochroleuca	Basidiomycota	41.25
Russula paludosa	Basidiomycota	37.72
Russula vinosa	Basidiomycota	23.40
Tricholoma sejunctum	Basidiomycota	65.35
Xerocomus badius	Basidiomycota	45.86
	n=11	
	mean	39.57
	CV	36.91
	conversion factor [mg fungal C µmo^{l-1} 18:2ω6,9]	**11.88**

total mean (all data)	14.70
average CV of studies	65.33
conversion factor including all data [mg fungal C µmol-1 18:2ω6,9]	**31.98**

Study	Isolate	Species	Phylum	PLFA marker contents 18:2ω6,9 [µmol*g Pilz-1]	corrected / relative abundance [% abundance]	weighted abund [µmol*g Pilz-1]
Camenzind et al. 2023	RLCS21	*Pyrenochaetopsis_leptospora*	Ascomycota	14.90	0.0155	0.2307
Camenzind et al. 2023	RLCS23	*Paramyrothecium_sp.*	Ascomycota	7.92	0.0155	0.1226
Camenzind et al. 2023	RLCS06	*Chaetomium_angustispirale1*	Ascomycota	13.92	0.0155	0.2155
Camenzind et al. 2023	RLCS26	*Tetracladium_apiense*	Ascomycota	8.97	0.0155	0.1389
Camenzind et al. 2023	RLCS07	*Truncatella_angustata*	Ascomycota	14.33	0.0155	0.2218
Camenzind et al. 2023	RLCS17	*Clitopilus_sp.*	Basidiomycota	0.76	0.0274	0.0208
Camenzind et al. 2023	RLCS22	*Paraphoma_chrysanthemicola*	Ascomycota	6.30	0.0155	0.0975
Camenzind et al. 2023	RLCS28	*Helotiales*	Ascomycota	5.96	0.0155	0.0923
Camenzind et al. 2023	RLCS27	*Chaetomium_subspirilliferum*	Ascomycota	30.13	0.0155	0.4665
Camenzind et al. 2023	RLCS15	*Mortierella_sp.1*	Mortierellomycota	2.65	0.0163	0.0432
Camenzind et al. 2023	RLCS19	*Umbelopsis_isabellina*	Mucoromycota	2.79	0.0102	0.0285
Camenzind et al. 2023	RLCS04	*Mortierella_sp.2*	Mortierellomycota	3.10	0.0163	0.0506
Camenzind et al. 2023	RLCS05	*Fusarium_sp.1*	Ascomycota	12.14	0.0155	0.1880
Camenzind et al. 2023	RLCS14	*Nothophoma_sp.*	Ascomycota	11.17	0.0155	0.1729
Camenzind et al. 2023	RLCS10	*Alternaria_sp.*	Ascomycota	13.92	0.0155	0.2155
Camenzind et al. 2023	RLCS12	*Chaetomium_angustispirale2*	Ascomycota	12.23	0.0155	0.1894
Camenzind et al. 2023	RLCS18	*Fusarium_gibbosum*	Ascomycota	14.27	0.0155	0.2209
Camenzind et al. 2023	RLCS11	*Mortierella_alpina1*	Mortierellomycota	2.01	0.0163	0.0327
Camenzind et al. 2023	RLCS09	*Trametes_versicolor*	Basidiomycota	23.41	0.0274	0.6420
Camenzind et al. 2023	RLCS02	*Mortierella_sp.3*	Mortierellomycota	4.20	0.0163	0.0686
Camenzind et al. 2023	RLCS13	*Fusarium_sp.2*	Ascomycota	1.42	0.0155	0.0220
Camenzind et al. 2023	RLCS31	*Cyphellophora_sp.*	Ascomycota	7.58	0.0155	0.1174
Camenzind et al. 2023	RLCS30	*Exophiala_sp.*	Ascomycota	15.87	0.0155	0.2458
Camenzind et al. 2023	RLCS25	*Gliomastix_sp.*	Ascomycota	2.65	0.0155	0.0410
Camenzind et al. 2023	RLCS16	*Pleurotus_sp.*	Basidiomycota	0.72	0.0274	0.0198
Camenzind et al. 2023	RLCS01	*Mucor_fragilis*	Mucoromycota	5.87	0.0102	0.0599
Camenzind et al. 2023	RLCS20	*Purpureocillium_lilacinum*	Ascomycota	14.32	0.0155	0.2217
Camenzind et al. 2023	RLCS08	*Fusarium_sp.3*	Ascomycota	4.40	0.0155	0.0681
Camenzind et al. 2023	RLCS24	*Metarhizium_marquandii*	Ascomycota	4.19	0.0155	0.0649
Camenzind et al. 2023	RLCS03	*Mortierella_alpina2*	Mortierellomycota	2.25	0.0163	0.0367
Klamer and Baath 2004		*Absidia corymbifera* (Cohn)	*Mucoromycota*	2.77	0.0102	0.0283
Klamer and Baath 2004		*Acremonium strictum* W. Gams	*Ascomycota*	15.72	0.0155	0.2433
Klamer and Baath 2004		*Aspergillus fumigatus* Fres.	*Ascomycota*	2.45	0.0155	0.0380
Klamer and Baath 2004		*Corynascus sepedonium*	*Ascomycota*	10.15	0.0155	0.1572
Klamer and Baath 2004		*Penicillium piceum* Raper	*Ascomycota*	5.11	0.0155	0.0791
Klamer and Baath 2004		*Pseudallescheria boydii* (Shear)	*Ascomycota*	5.10	0.0155	0.0789
Klamer and Baath 2004		*Scopulariopsis brevicaulis*	*Ascomycota*	2.83	0.0155	0.0438
Klamer and Baath 2004		*Sepedonium chrysospermum*	*Ascomycota*	4.93	0.0155	0.0764
Klamer and Baath 2004		*Trichurus spiralis* Hasselbr.	*Ascomycota*	8.15	0.0155	0.1262
Klamer and Baath 2004		*Verticillium psalliotae* Treschew	*Ascomycota*	17.36	0.0155	0.2688
Klamer and Baath 2004		*Phaenerochaetechrysosporium Burds.*	*Basidiomycota*	2.52	0.0274	0.0691
Klamer and Baath 2004		*Schizophyllum commune* Fr.: Fr.	*Basidiomycota*	2.25	0.0274	0.0618
Baldrian et al. 2013		*Cantharellus sp.*	Basidiomycota	45.94	0.0274	1.2599
Baldrian et al. 2013		*Cortinarius limonius*	Basidiomycota	44.95	0.0274	1.2328
Baldrian et al. 2013		*Hydnellum sp.*	Basidiomycota	9.75	0.0274	0.2673
Baldrian et al. 2013		*Laccaria laccata*	Basidiomycota	33.85	0.0274	0.9283
Baldrian et al. 2013		*Lactarius rufus*	Basidiomycota	35.33	0.0274	0.9689
Baldrian et al. 2013		*Lactarius tabidus*	Basidiomycota	51.86	0.0274	1.4223
Baldrian et al. 2013		*Russula ochroleuca*	Basidiomycota	41.25	0.0274	1.1313
Baldrian et al. 2013		*Russula paludosa*	Basidiomycota	37.72	0.0274	1.0343
Baldrian et al. 2013		*Russula vinosa*	Basidiomycota	23.40	0.0274	0.6418
Baldrian et al. 2013		*Tricholoma sejunctum*	Basidiomycota	65.35	0.0274	1.7922
Baldrian et al. 2013		*Xerocomus badius*	Basidiomycota	45.86	0.0274	1.2576
					n = 53	
					weighted mean	17.5635
					phylogenetically corrected conversion factor [mg fungal C µmol^{-1} 18:2ω6,9]	**26.76**

Phylum	% read abundances reported in Tedersoo et al. 2022	number of isolates included
Basidiomycota	0.44	16
Ascomycota	0.45	29
Mortierellomycota	0.08	5
Mucoromycota	0.03	3

this study

fungal isolates were grown for 2 weeks on malt extract agar (3 repetitions per isolate)

Isolate	Species	Phylum	Ergosterol [mg g^{-1} fungus]
RLCS05	*Fusarium_sp.1*	Ascomycota	0.92
RLCS06	*Chaetomium_angustispirale1*	Ascomycota	4.03
RLCS07	*Truncatello_angustata*	Ascomycota	2.75
RLCS08	*Fusarium_sp.3*	Ascomycota	1.49
RLCS10	*Alternaria_sp.*	Ascomycota	3.37
RLCS12	*Chaetomium_angustispirale2*	Ascomycota	3.84
RLCS13	*Fusarium_sp.2*	Ascomycota	1.31
RLCS14	*Nothophoma_sp.*	Ascomycota	1.06
RLCS18	*Fusarium_gibbosum*	Ascomycota	1.37
RLCS20	*Purpureocillium_lilacinum*	Ascomycota	5.71
RLCS21	*Pyrenochaetopsis_leptospora*	Ascomycota	2.31
RLCS22	*Paraphoma_chrysanthemicola*	Ascomycota	1.64
RLCS23	*Paramyrothecium_sp.*	Ascomycota	4.26
RLCS24	*Metarhizium_marquandii*	Ascomycota	2.38
RLCS25	*Gliomastix_sp.*	Ascomycota	3.33
RLCS26	*Tetracladium_apiense*	Ascomycota	0.90
RLCS27	*Chaetomium_subspirilliferum*	Ascomycota	3.75
RLCS28	*Helotiales*	Ascomycota	1.92
RLCS30	*Exophiola_sp.*	Ascomycota	1.72
RLCS31	*Cyphellophora_sp.*	Ascomycota	3.28
RLCS09	*Trametes_versicolor*	Basidiomycota	3.08
RLCS16	*Pleurotus_sp.*	Basidiomycota	0.13
RLCS17	*Clitopilus_sp.*	Basidiomycota	0.19

Klamer & Baath

average values of 12 and 24 days of growth on PDA; 10 isolates from compost, and two additional Basidiomycetes (both lignin degraders)

Species	Phylum	Ergosterol [mg g^{-1} fungus]
Acremonium strictum W. Gams	Ascomycota	16.393979
Aspergillus fumigatus Fres.	Ascomycota	1.44797125
Corynascus sepedonium	Ascomycota	12.3151175
Penicillium pinum Raoer	Ascomycota	5.33540585
Scedosporium apiospermum	Ascomycota	7.028796
Schizophyllum commune Fr.: Fr.	Basidiomycota	1.50687172
Scopulariopsis brevicaulis	Ascomycota	5.04090305
Sepedonium chrysospermum	Ascomycota	4.79057585
Trichurus spiralis Hasselbr.	Ascomycota	9.19339
Verticillium psalliotae Treschew	Ascomycota	14.479712

Baldrian et al. 2013

fruiting bodies were collected from a forest for analyses (three repetitions per species)

Species	Phylum	Ergosterol [mg g^{-1} fungus]
Cantharellus sp.	Basidiomycota	2.4262674
Cortinarius limonius	Basidiomycota	3.707216
Hydnellum sp.	Basidiomycota	7.2316227
Laccaria laccata	Basidiomycota	2.262208
Lactarius rufus	Basidiomycota	2.8658166
Lactarius tabidus	Basidiomycota	2.4537144
Russula ochroleuca	Basidiomycota	7.558298
Russula paludosa	Basidiomycota	2.602993
Russula vinosa	Basidiomycota	2.162722
Tricholoma sejunctum	Basidiomycota	4.9815702
Xerocomus badius	Basidiomycota	3.4547937

Seitz et al. 1979

average values of different growth duration on malt extract liquid medium

Species	Phylum	Ergosterol [mg g^{-1} fungus]
Alternaria alternata	Ascomycota	4.1
Aspergillus flavus	Ascomycota	2.8
Aspergillus amstelodami	Ascomycota	5.4

	n = 23		n = 10		n = 11		n = 3
	mean	2.38	mean	7.75	mean	3.79	mean	4.10
	CV	59.94	CV	67.17	CV	51.73	CV	31.71
	conversion factor [g fungal C g^{-1} ergosterol]	**197.52**	conversion factor [g fungal C g^{-1} ergosterol]	60.62	conversion factor [g fungal C g^{-1} ergosterol]	123.96	conversion factor [g fungal C g^{-1} ergosterol]	114.63
	total mean (all data)	4.93		0.21				
	average CV of studie	45.79		15.23				
	conversion factor including all data [g fungal C g^{-1} ergosterol]	**95.34**						

Salmanowicz and Nylun 1988

average values of different growth duration of mycorrhizal fungi

Species	Phylum	Ergosterol [mg g^{-1} fungus]
Hebeloma cri	Basidiomycota	3.2075
Laccaria lacc	Basidiomycota	3.146666667
Suillus bovin	Basidiomycota	2.86
Amanita mus	Basidiomycota	3.57
Laccaria lacc	Basidiomycota	3.18
Amanita mus	Basidiomycota	6.69
Inocybe geoti	Basidiomycota	3.75
Tricholoma a	Basidiomycota	2.62

Nemec et al. 1997

24 hours growth on defined liquid medium at 30°C

Species	Phylum	Ergosterol [mg g^{-1} fungus]
Aspergillus n	Ascomycota	15.69698714
Aspergillus n	Ascomycota	13.80229907
Aspergillus fl	Ascomycota	29.14538116
Aspergillus o	Ascomycota	12.05118149
Aspergillus fl	Ascomycota	12.87500522
Aspergillus te	Ascomycota	7.795891998

Montgomery et al. 2000

cultured in optimal growth media for 2-7 days

Species	Phylum	Ergosterol [mg g^{-1} fungus]
Alternaria alt	Ascomycota	3.84
Chaetomium	Ascomycota	3.29
Fusarium oxy	Ascomycota	3.43
Penicillium cl	Ascomycota	3.81
Trichoderma	Ascomycota	3.82

Barajas-Aceves et al. 2002

different fungal strains cultured for 5 days in GMY medium

Species	Phylum	Ergosterol [mg g^{-1} fungus]
Coriolopsis g	Basidiomycota	5.28
Ganoderma c	Basidiomycota	5.24
Trametes ver	Basidiomycota	4.78
Trametes ver	Basidiomycota	6.95
Sporotrichum	Basidiomycota	4.43
Phanerochae	Basidiomycota	4.2
Phanerochae	Basidiomycota	3.07
Phanerochae	Basidiomycota	3.75
Phanerochae	Basidiomycota	5.88
Pleurotus ost	Basidiomycota	7.26
Pleurotus ost	Basidiomycota	8.56
Pleurotus ost	Basidiomycota	2.38
Pleurotus ost	Basidiomycota	5.89
Pleurotus ost	Basidiomycota	5.8
Pleurotus ost	Basidiomycota	5.17
Pleurotus ost	Basidiomycota	3.02
Pleurotus ost	Basidiomycota	6.33
Bjerkandera a	Basidiomycota	9.85
Bjerkandera	Basidiomycota	6.32
Bjerkandera a	Basidiomycota	13.06

	n = 8		n = 6		n = 5		n = 20
	mean	3.63	mean	15.23	mean	3.64	mean	5.86
	CV	35.50	CV	47.97	CV	7.11	CV	42.56
	conversion factor [g fungal C g^{-1} ergosterol]	129.55	conversion factor [g fungal C g^{-1} ergosterol]	30.86	conversion factor [g fungal C g^{-1} ergosterol]	129.19	conversion factor [g fungal C g^{-1} ergosterol]	80.19

Antibus & Sinsabaugh 1993

fungal isolates were grown for 21-22 days in defined growth media

Species	Phylum	Ergosterol [mg g^{-1} fungus]
Amanita rubr	Basidiomycota	15.535
Entoloma ser	Basidiomycota	6.105
Hebeloma cri	Basidiomycota	6.635
Lactarius pub	Basidiomycota	4.97
Scleroderma	Basidiomycota	3.26
Cenococcum	Ascomycota	3.45
Boletus grise	Basidiomycota	11.265
Paxillus involu	Basidiomycota	8.67
Rhizopogon s	Basidiomycota	5.79
Scleroderma	Basidiomycota	6.935
Cenococcum	Ascomycota	3

Brosed et al. 2017

aquatic hyphomycetes grown in defined liquid media; ergosterol

Species	Phylum	Ergosterol [mg g^{-1} fungus]
Alatospora a	Ascomycota	6.383122725
Articulospora	Ascomycota	4.7518O515
Clavariopsis a	Ascomycota	4.210288775
Lemonniera t	Ascomycota	3.68231055
Neonectria lugdunensis	Ascomycota	9.314079325
Tetracladium marchalianum	Ascomycota	3.7364622
Tricladium ch	Ascomycota	3.39801445
Tricladium sp	Ascomycota	4.0952166

Niemenmaa et al. 2008

white-rot and brown-rot fungi cultured in liquid medium

Species	Phylum	Ergosterol [mg g^{-1} fungus]
Phlebia radia	Basidiomycota	0.643
Phanerochae	Basidiomycota	2.109
Physisporinus	Basidiomycota	0.316
Ceriporiopsis	Basidiomycota	1.142
Gloeophyllun	Basidiomycota	2.7
Poria (Postia)	Basidiomycota	0.832872847

Song et al. 2014

isolates were grown in 2% malt extract solution for three

Species	Phylum	Ergosterol [mg g^{-1} fungus]
Gloeophyllun	Basidiomycota	7.25
irpex lacteus	Basidiomycota	3.7

Nurikal et al. 2018

isolates were grown in malt extract liquid medium for 35 days at

Species	Phylum	Ergosterol [mg g^{-1} fungus]
Postia placen	Basidiomycota	0.2947
Schizophyllun	Basidiomycota	0.0984
Serpula lacry	Basidiomycota	0.22226474
Phanerochae	Basidiomycota	0.224342906

	n = 11		n = 8		n = 8		n = 2	n = 2
	mean	6.87	mean	4.95	mean	1.29	mean	5.48	mean	0.21
	CV	54.97	CV	40.36	CV	71.50	CV	45.85	CV	38.88
	conversion factor [g fungal C g^{-1} ergosterol]	68.37	conversion factor [g fungal C g^{-1} ergosterol]	95.02	conversion factor [g fungal C g^{-1} ergosterol]	364.21	conversion factor [g fungal C g^{-1} ergosterol]	85.84	conversion factor [g fungal C g^{-1} ergosterol]	2238.87

this study

fungal isolates were grown for 2 weeks on malt extract agar (3 repetitions per isolate);
primer pair: ITS3f / ITS4R (ITS2)
DNA extraction: E.Z.N.A. Soil DNA Kit (Omega Bio-Tek, Inc., VWR International GmbH, Bruchsal)
qPCR method: SYBR green

Isolate	Species	Phylum	ITS copy numbers [copies g^{-1} fungus]
RLCS05	*Fusarium sp.1*	Ascomycota	2.61E+12
RLCS06	*Chaetomium_angustispirale1*	Ascomycota	8.91E+11
RLCS07	*Truncatello angustata*	Ascomycota	8.22E+11
RLCS08	*Fusarium_sp.3*	Ascomycota	1.29E+12
RLCS10	*Alternaria_sp.*	Ascomycota	6.87E+12
RLCS12	*Chaetomium_angustispirale2*	Ascomycota	1.58E+12
RLCS13	*Fusarium_sp.2*	Ascomycota	2.49E+11
RLCS14	*Nothophoma_sp.*	Ascomycota	4.50E+12
RLCS18	*Fusarium_gibbosum*	Ascomycota	6.78E+12
RLCS20	*Purpureocillium lilacinum*	Ascomycota	5.75E+12
RLCS21	*Pyrenochaetopsis_leptospora*	Ascomycota	7.74E+11
RLCS22	*Paraphoma_chrysanthemicola*	Ascomycota	9.16E+11
RLCS23	*Paramyrothecium_sp.*	Ascomycota	8.95E+10
RLCS24	*Metarhizium_marquandii*	Ascomycota	6.53E+11
RLCS25	*Gliomastix_sp.*	Ascomycota	2.74E+11
RLCS26	*Tetracladium_apiense*	Ascomycota	6.53E+10
RLCS27	*Chaetomium subspirilliferum*	Ascomycota	2.54E+12
RLCS28	*Helotiales*	Ascomycota	1.04E+11
RLCS30	*Exophiala sp.*	Ascomycota	1.08E+12
RLCS31	*Cyphellophora_sp.*	Ascomycota	1.87E+10
RLCS09	*Trametes_versicolor*	Basidiomycota	1.28E+12
RLCS16	*Pleurotus_sp.*	Basidiomycota	1.34E+10
RLCS17	*Clitopilus_sp.*	Basidiomycota	4.88E+10
RLCS02	*Mortierella_sp.3*	Mortierellomycota	7.13E+12
RLCS03	*Mortierella_alpina2*	Mortierellomycota	1.42E+12
RLCS04	*Mortierella_sp.2*	Mortierellomycota	1.18E+12
RLCS11	*Mortierella_alpina1*	Mortierellomycota	9.35E+11
RLCS15	*Mortierella_sp.1*	Mortierellomycota	1.23E+12
RLCS01	*Mucor_fragilis*	Mucoromycota	2.20E+12
RLCS19	*Umbelopsis_isabellina*	Mucoromycota	1.73E+11

n = 30

mean	1.78E+12
CV	121.69
conversion factor [pg fungal C copies^{-1} ITS]	**0.264**

Baldrian et al. 2013

fruiting bodies were collected from a forest for analyses (three repetitions per species);
primer pair: ITS1 /qITS2* (ITS1)
DNA extraction: PowerSoil DNA Isolation Kit (MoBio Laboratories, USA) combined with Geneclean Turbo Kit for DNA cleanup (Biogenic)
qPCR method: SYBR green

Species	Phylum	ITS copy numbers [copies g^{-1} fungus]
Cantharellus sp.	Basidiomycota	1.10E+11
Cortinarius limonius	Basidiomycota	3.05E+11
Hydnellum sp.	Basidiomycota	9.09E+11
Laccaria laccata	Basidiomycota	6.59E+10
Lactarius rufus	Basidiomycota	6.43E+11
Lactarius tabidus	Basidiomycota	6.98E+10
Russula ochroleuca	Basidiomycota	1.57E+11
Russula paludosa	Basidiomycota	7.68E+11
Russula vinosa	Basidiomycota	2.23E+11
Tricholoma sejunctum	Basidiomycota	3.74E+11
Xerocomus badius	Basidiomycota	4.93E+11

n = 11

mean	3.74E+11
CV	78.33
conversion factor [pg fungal C copies^{-1} ITS]	1.256

Song et al. 2014

isolates were grown in 2% malt extract solution for three weeks;
primer pair: isolate-specific ITS primers
DNA extraction: extraction with cetyltrimethylammonium bromide (CTAB) in the presence of β-mercaptoethanol, followed by organic extractions and isopropanol precipitation of the DNA
qPCR method: SYBR green

Species	Phylum	ITS copy numbers [copies g^{-1} fungus]
Gloeophyllum trabeum	Basidiomycota	2.58E+08
Irpex lacteus	Basidiomycota	1.00E+10

n = 2

mean	5.13E+09
CV	134.31
conversion factor [pg fungal C copies^{-1} ITS]	91.636

Lopez-Mondejar et al. 2010

isolates were grown on PDA for 7 days;
primer pair: isolate-specific ITS primers
DNA extraction: individual extraction protocol
qPCR method: TaqMan

Species	Phylum	ITS copy numbers [copies g^{-1} fungus]
Trichoderma harzianum	Ascomycota	1.88E+09

n = 1

mean	1.88E+09
CV	
conversion factor [pg fungal C copies^{-1} ITS]	250.000

Raidl et al. 2005

isolates were grown in 2% malt extract solution for three weeks;
primer pair: isolate-specific ITS primers
DNA extraction: DNA isolation kit (Plant Mini Kit, Quiagen, Hilden, Germany)
qPCR method: TaqMan

Species	Phylum	ITS copy numbers [copies g^{-1} fungus]
Piloderma croceum	Basidiomycota	1.27E+12

n = 1

mean	1.27E+12
CV	
conversion factor [pg fungal C copies^{-1} ITS]	0.370

Klamer M, Baath E. Estimation of conversion factors for fungal biomass determination in compost using ergosterol and PLFA 18 : 2 omega 6,9. *Soil Biol Biochem* **36**, 57-65 (2004).

Baldrian P, *et al.* Estimation of fungal biomass in forest litter and soil. *Fungal Ecol* **6**, 1-11 (2013).

Seitz LM, Sauer DB, Burroughs R, Mohr HE, Hubbard JD. Ergosterol as a measure of fungal growth. *Phytopathology* **69**, 1202-1203 (1979).

Salmanowicz B, Nylund JE. High-performance liquid-chromatography determination of ergosterol as a measure of ectomycorrhiza infection in scots pine. *European Journal of Forest Pathology* **18**, 291-298 (1988).

Nemec T, Jernejc K, Cimerman A. Sterols and fatty acids of different Aspergillus species. *Fems Microbiology Letters* **149**, 201-205 (1997).

Montgomery HJ, Monreal CM, Young JC, Seifert KA. Determination of soil fungal biomass from soil ergosterol analyses. *Soil Biol Biochem* **32**, 1207-1217 (2000).

Barajas-Aceves M, Hassan M, Tinoco R, Vazquez-Duhalt R. Effect of pollutants on the ergosterol content as indicator of fungal biomass. *Journal of Microbiological Methods* **50**, 227-236 (2002).

Antibus RK, Sinsabaugh RL. THE EXTRACTION AND QUANTIFICATION OF ERGOSTEROL FROM ECTOMYCORRHIZAL FUNGI AND ROOTS. *Mycorrhiza* **3**, 137-144 (1993).

Brosed M, Jabiol J, Gessner MO. Nutrient stoichiometry of aquatic hyphomycetes: Interstrain variation and ergosterol conversion factors. *Fungal Ecol* **29**, 96-102 (2017).

Niemenmaa O, Galkin S, Hatakka A. Ergosterol contents of some wood-rotting basidiomycete fungi grown in liquid and solid culture conditions. *International Biodeterioration & Biodegradation* **62**, 125-134 (2008).

Song Z, Vail A, Sadowsky MJ, Schilling JS. Quantitative PCR for measuring biomass of decomposer fungi in planta. *Fungal Ecol* **7**, 39-46 (2014).

Nurika I, Eastwood DC, Barker GC. A comparison of ergosterol and PLFA methods for monitoring the growth of ligninolytic fungi during wheat straw solid state cultivation. *Journal of Microbiological Methods* **148**, 49-54 (2018).

López-Mondéjar R, Antón A, Raidl S, Ros M, Pascual JA. Quantification of the biocontrol agent *Trichoderma harzianum* with real-time TaqMan PCR and its potential extrapolation to the hyphal biomass. *Bioresource Technology* **101**, 2888-2891 (2010).

Raidl S, Bonfigli R, Agerer R. Calibration of quantitative real-time TaqMan PCR by correlation with hyphal biomass and ITS copies in mycelia of *Piloderma croceum* . *Plant Biology* **7**, 713-717 (2005).