



*Research article*

## Diversity of duckweed (*Lemnaceae*) associated yeasts and their plant growth promoting characteristics

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### Supplementary

**Table S1.** Duckweed samples and number of isolated yeast strains in this study.

Date of sampling	Sample code	Province	GPS coordinates	Genus of duckweed	Number of yeasts isolated	Yeast strain code
6/2/2021	DW1	Bangkok	13°50'39.9"N/100°34'15.6"E	<i>Lemna</i>	3	DW1-1,2,3
15/2/2021	DW2	Bangkok	-	<i>Spirodela</i>	1	DW2-1
15/2/2021	DWW1	Bangkok	-	<i>Lemna</i>	2	DWW1-8,9
15/2/2021	DWW2	Bangkok	-	<i>Wolffia</i>	4	DWW2-1,2,3,4
20/2/2021	DW3	Samutsongkhram	13°28'04.6"N/99°53'38.4"E	<i>Lemna</i>	8	DW3-1,2,3,4,5,7,8,9
4/3/2021	DW4	Bangkok	13°51'31.1"N/100°40'31.4"E	<i>Lemna</i>	2	DW4-1,2
11/3/2021	DW5	Bangkok	13°50'58.0"N/100°34'07.7"E	<i>Lemna</i>	0	-
14/3/2021	DW6	Suphanburi	14°25'43.0"N/100°00'28.8"E	<i>Spirodela</i>	0	-
14/3/2021	DW7	Suphanburi	14°25'39.0"N/100°00'50.4"E	<i>Lemna</i>	1	DW7-1
14/3/2021	DW8	Suphanburi	14°25'35.7"N/100°00'53.5"E	<i>Lemna</i>	3	DW8-2,3,4
26/3/2021	DW9	Bangkok	13°52'36.8"N/100°40'55.3"E	<i>Spirodela</i>	0	-
26/3/2021	DW11	Pathumthani	13°55'52.2"N/100°44'49.5"E	<i>Spirodela</i>	0	-

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Date of sampling	Sample code	Province	GPS coordinates	Genus of duckweed	Number of isolated yeasts	Yeast strain code
26/3/2021	DW12	Pathumthani	13°55'52.2"N/100°44'49.5"E	<i>Spirodela</i>	0	-
26/3/2021	DW13	Pathumthani	13°55'52.2"N/100°44'49.5"E	<i>Wolffia</i>	0	-
26/3/2021	DW14	Pathumthani	13°55'51.1"N/100°44'45.4"E	<i>Lemna</i>	0	-
26/3/2021	DW15	Pathumthani	13°55'46.6"N/100°43'58.3"E	<i>Lemna</i>	2	DW15-1,2
26/3/2021	DW16	Bangkok	13°54'01.5"N/100°41'33.9"E	<i>Lemna</i>	0	-
2/4/2021	DWW14 S	-	-	<i>Spirodela</i>	8	DWW14 S- 1,2,3,4,5,6,7,8
5/4/2021	DWW14 W	-	-	<i>Wolffia</i>	4	DWW14 W-1,2,3,4
25/8/2021	DW18	Bangkok	13°51'03.3"N/100°34'38.1"E	<i>Spirodela</i>	2	DW18-1,2
3/9/2021	DWW3	Chumphon	10°32'37.3"N/99°11'53.1"E	<i>Spirodela</i>	8	DWW3- 1,2,3,4,5,6,7,8
3/9/2021	DWW4	Chumphon	10°32'37.3"N/99°11'53.1"E	<i>Lemna</i>	8	DWW4- 1,2,3,4,6,7,8,9
3/9/2021	DW20	Bangkok	13°50'53.2"N/100°33'59.8"E	<i>Spirodela</i>	0	-
19/9/2021	DWEN21	Bangkok	13°77'53.8"N/100°75'88.6"E	<i>Lemna</i>	2	DWEN21-1,2
19/9/2021	DWEN22	Bangkok	13°77'54.3"N/100°75'95.6"E	<i>Lemna</i>	8	DWEN22- 1,2,3,4,5,6,7,8
19/9/2021	DWEN23	Bangkok	13°78'02.6"N/100°76'11.8"E	<i>Lemna</i>	9	DWEN23- 1,2,3,4,5,6,7,8, 9
19/9/2021	DWEN24	Bangkok	13°78'03.6"N/100°76'11.4"E	<i>Lemna</i>	0	-
4/10/2021	DWW5	Prachuap Khiri Khan	12°07'31.3"N/99°54'20.4"E	<i>Lemna</i>	11	DWW5- 1,2,3,4,5,6,7,8, 9,11,12
4/10/2021	DWW6	Prachuap Khiri Khan	12°07'31.3"N/99°54'20.4"E	<i>Spirodela</i>	1	DWW6-1
4/10/2021	DWW11	Prachuap Khiri Khan	12°07'31.3"N/99°54'20.4"E	<i>Wolffia</i>	2	DWW11-1,2
18/10/2021	DWEN25	Bangkok	13°46'33.5"N/100°46'06.6"E	<i>Lemna</i>	0	-
18/10/2021	DWEN26	Bangkok	13°46'33.0"N/100°46'07.8"E	<i>Lemna</i>	7	DWEN26- 3,4,5,6,7,9,10
18/10/2021	DWEN27	Bangkok	13°46'43.9"N/100°46'41.1"E	<i>Lemna</i>	2	DWEN27-1,2
3/11/2021	DWW7	Prachuap Khiri Khan	12°14'00.9"N/99°55'40.2"E	<i>Landotia</i>	1	DWW7-1
4/11/2021	DWW8	Prachuap Khiri Khan	12°14'37.1"N/99°55'57.0"E	<i>Lemna</i>	1	DWW8-1
5/11/2021	DWW9	Prachuap Khiri Khan	12°23'03.0"N/99°59'01.9"E	<i>Lemna</i>	1	DWW9-1

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Date of sampling	Sample code	Province	GPS coordinates	Genus of duckweed	Number of isolated yeasts	Yeast strain code
6/11/2021	DWW10	Prachuap Khiri Khan	12°56'52.7"N/99°55'55.3"E	<i>Lemna</i>	3	DWW10-2,3,4
12/11/2021	DWEN28	Bangkok	13°51'13.0"N/100°40'26.9"E	<i>Lemna</i>	2	DWEN28-1,2
12/11/2021	DWEN29	Bangkok	13°52'07.9"N/100°41'28.2"E	<i>Lemna</i>	12	DWEN29-1,2,3,4,5,6,7,8,9,10,11,12
12/11/2021	DWEN30	Bangkok	13°51'36.1"N/100°40'32.6"E	<i>Lemna</i>	16	DWEN30-1,2,3,4,5,6,7,8,9,10,11,12,13,14,15,16
15/11/2021	DWEN31	Pathumthani	13°57'03.1"N/100°49'07.0"E	<i>Lemna</i>	3	DWEN31-1,2,3
15/11/2021	DWEN32	Pathumthani	13°56'59.2"N/100°48'48.6"E	<i>Spirodela</i>	3	DWEN32-1,2,3
15/11/2021	DWEN33	Nakornnayok	14°06'53.6"N/100°59'09.3"E	<i>Lemna</i>	6	DWEN33-1,2,3,5,6,8
15/11/2021	DWEN34	Prajnaburi	13°58'29.4"N/101°08'56.9"E	<i>Lemna</i>	6	DWEN34-2,3,4,5,6,7
15/11/2021	DWEN35	Sa Kaew	13°26'25.8"N/102°08'00.6"E	<i>Spirodela</i>	4	DWEN35-1,2,3,4
16/11/2021	DWEN36	Trad	12°11'10.3"N/102°29'10.2"E	<i>Lemna</i>	8	DWEN36-1,2,3,4,5,6,7,8
16/11/2021	DWEN37	Rayong	12°47'54.8"N/101°39'52.8"E	<i>Lemna</i>	10	DWEN37-1,2,4,5,6,7,8,9,10,11
17/11/2021	DWEN38	Chonburi	13°13'22.4"N/100°58'02.7"E	<i>Landotia</i>	8	DWEN38-1,2,4,5,6,7,8,9
17/11/2021	DWEN39	Chachoengsao	13°33'49.2"N/100°59'49.6"E	<i>Lemna</i>	6	DWEN39-1,2,3,4,5,6
17/11/2021	DWEN40	Chachoengsao	13°35'12.5"N/101°04'04.1"E	<i>Lemna</i>	0	-
9/4/2022	DWEN41	Bangkok	13°51'51.8"N/100°45'32.6"E	<i>Landotia</i>	4	DWEN41-1,2,3,4
15/4/2022	DWEN42	Bangkok	13°47'19.8"N/100°49'36.2"E	<i>Landotia</i>	1	DWEN42-1
15/4/2022	DWEN43	Bangkok	13°46'57.5"N/100°49'46.9"E	<i>Landotia</i>	2	DWEN43-1,2
15/4/2022	DWEN44	Bangkok	13°46'57.2"N/100°49'47.0"E	<i>Landotia</i>	0	-
15/4/2022	DWEN45	Bangkok	13°45'33.7"N/100°50'19.5"E	<i>Landotia</i>	1	DWEN45-1
15/4/2022	DWEN46	Bangkok	13°45'27.1"N/100°50'19.9"E	<i>Spirodela</i>	0	-
15/4/2022	DWEN47	Bangkok	13°45'30.0"N/100°50'19.8"E	<i>Landotia</i>	1	DWEN47-1
15/4/2022	DWEN48	Bangkok	13°45'15.6"N/100°50'21.6"E	<i>Lemna</i>	0	-
15/4/2022	DWEN49	Bangkok	13°45'25.6"N/100°50'19.9"E	<i>Lemna</i>	2	DWEN49-1,2
24/4/2022	DWEN50	Kanchanaburi	14°03'45.5"N/99°52'77.6"E	<i>Lemna</i>	1	DWEN50-1
24/4/2022	DWEN51	Kanchanaburi	14°03'44.9"N/99°52'78.1"E	<i>Lemna</i>	0	-

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Date of sampling	Sample code	Province	GPS coordinates	Genus of duckweed	Number of isolated yeasts	Yeast strain code
24/4/2022	DWEN52	Kanchanaburi	14°03'40.4"N/99°52'81.4"E	<i>Lemna</i>	0	-
3/5/2022	DWEN53	Nonthaburi	13°99'59.6"N/100°30'11.2"E	<i>Landotia</i>	5	DWEN53- 1,2,3,4,5
3/5/2022	DWEN54	Nonthaburi	14°00'00.3"N/100°27'43.1"E	<i>Lemna</i>	3	DWEN54-2,3,6
3/5/2022	DWEN55	Nakhon Pathom	14°01'08.5"N/100°25'98.3"E	<i>Lemna</i>	5	DWEN55- 1,2,3,4,6
3/5/2022	DWEN56	Nakhon Pathom	14°00'78.9"N/100°24'32.6"E	<i>Lemna</i>	9	DWEN56- 1,2,3,5,6,7,9,10 ,11
3/5/2022	DWEN57	Nakhon Pathom	14°01'53.9"N/100°19'28.9"E	<i>Landotia</i>	0	-
3/5/2022	DWEN58	Nakhon Pathom	14°01'36.0"N/100°15'75.2"E	<i>Lemna</i>	0	-
3/5/2022	DWEN59	Nakhon Pathom	14°01'35.2"N/100°15'75.7"E	<i>Lemna</i>	8	DWEN59- 1,2,3,4,5,6,7,8
3/5/2022	DWEN60	Nakhon Pathom	14°01'33.8"N/100°15'69.4"E	<i>Spirodela</i>	5	DWEN60- 1,2,3,4,5
3/5/2022	DWEN61	Nakhon Pathom	14°01'25.2"N/100°15'73.1"E	<i>Spirodela</i>	4	DWEN61- 1,2,3,5
3/5/2022	DWEN62	Nakhon Pathom	14°00'91.6"N/100°23'68.9"E	<i>Lemna</i>	13	DWEN62- 1,2,3,4,5,6,7,8, 9,10,11,12,13

-; Data not available

**Table S2.** Number of strains, relative frequency and frequency of occurrence of yeasts isolated from duckweed samples.

Yeast taxa	No. of yeast strains from duckweed genera				RF (%)	FO (%)	
	<i>Landotia</i>	<i>Lemna</i>	<i>Spirodella</i>	<i>Wolffia</i>			
Phylum Ascomycota					139		
Subphylum Saccharomycotina							
Debaryomycetaceae							
<i>Candida albicans</i> ( <i>Candida/Lodderomyces</i> clade)	nd	1	nd	nd	1	0.4	1.4
<i>Candida jaroonii</i> ( <i>Yamadazyma</i> clade)	nd	1	nd	nd	1	0.4	1.4
<i>Candida metapsilosis</i> ( <i>Candida/Lodderomyces</i> clade)	nd	1	nd	nd	1	0.4	1.4
<i>Candida orthopsilosis</i> ( <i>Candida/Lodderomyces</i> clade)	nd	nd	nd	4	4	1.6	1.4
<i>Candida palmioleophila</i> ( <i>Candida glaebose</i> clade)	nd	5	nd	nd	5	2	2.8
<i>Candida parapsilosis</i> ( <i>Candida/Lodderomyces</i> clade)	nd	9	nd	nd	9	3.6	5.6
<i>Candida tropicalis</i> ( <i>Candida/Lodderomyces</i> clade)	1	16	1	nd	19	7.5	15.3
<i>Candida</i> sp. group 1 (closely related to <i>C. tropicalis</i> in <i>Candida/Lodderomyces</i> clade)	nd	1	nd	nd	1	0.4	1.4
<i>Debaryomyces singareniensis</i>	1	nd	1	nd	1	0.4	1.4
<i>Lodderomyces elongisporus</i>	nd	1	nd	nd	1	0.4	1.4
<i>Meyerozyma caribbica</i>	2	7	2	nd	11	4.4	9.7
<i>Meyerozyma carpophila</i>	nd	4	1	nd	5	2	5.6
<b>Metschnikowiaceae</b>							
<i>Candida pseudointermedia</i> ( <i>Candida/Metschnikowiaceae</i> clade)	nd	3	nd	nd	3	1.2	4.2
<i>Candida</i> sp. group 2 (closely related to <i>C. suratensis</i> in <i>Candida/Metschnikowiaceae</i> clade)	nd	2	nd	nd	2	0.8	1.4
<i>Kodamaea ohmeri</i>	2	3	2	nd	5	2	4.2
<i>Metschnikowia koreensis</i>	nd	1	nd	nd	1	0.4	1.4
<i>Metschnikowia saccharicola</i>	nd	nd	2	nd	2	0.8	1.4

Yeast taxa	No. of yeast strains from duckweed genera				RF (%)	FO (%)	
	<i>Landotia</i>	<i>Lemna</i>	<i>Spirodella</i>	<i>Wolffia</i>			
<b>Phaffomycetaceae</b>							
<i>Candida</i> sp. group3 (closely related to <i>Candida yuanshanica</i> in <i>Candida/Wickerhamomyces</i> clade)	nd	nd	1	nd	1	0.4	1.4
<i>Cyberlindnera fabianii</i>	nd	2	nd	nd	2	0.8	1.4
<i>Cyberlindnera jadinii</i>	nd	nd	1	nd	1	0.4	1.4
<i>Cyberlindnera subsufficiens</i>	nd	nd	2	nd	2	0.8	1.4
<i>Starmera stellimalicola</i>	nd	1	nd	nd	1	0.4	1.4
<b>Pichiaceae</b>							
<i>Candida ethanolica</i> ( <i>Candida/Pichia</i> clade)	nd	3	nd	nd	3	1.2	1.4
<i>Candida pseudolambica</i> ( <i>Candida/Pichia</i> clade)	nd	5	2	nd	7	2.8	8.3
<i>Candida</i> sp. group 4 (closely related to <i>Candida pseudolambica</i> in <i>Candida/Pichia</i> clade)	nd	1	nd	nd	1	0.4	1.4
<i>Ogataea thermomethanolica</i>	nd	1	nd	nd	1	0.4	1.4
<i>Pichia kluyveri</i>	nd	nd	1	nd	1	0.4	1.4
<i>Pichia kudriavzevii</i>	nd	12	2	1	15	6	12.5
<i>Pichia manshurica</i>	nd	nd	1	nd	1	0.4	1.4
<i>Pichia occidentalis</i>	nd	nd	1	nd	1	0.4	1.4
<b>Saccharomycetaceae</b>							
<i>Kluyveromyces marxianus</i>	nd	2	nd	nd	2	0.8	1.4
<i>Kluyveromyces starmeri</i>	nd	2	1	nd	3	1.2	2.8
<b>Saccharomycetales incertae sedis</b>							
<i>Candida nonsorbophila</i> ( <i>Candida/Saccharomycetales</i> clade)	nd	1	nd	nd	1	0.4	1.4
<i>Crinitomyces flavificans</i>	1	8	2	1	12	4.8	16.7
<i>Diutina rugosa</i>	1	1	nd	nd	2	0.8	2.8

Yeast taxa	No. of yeast strains from duckweed genera				RF (%)	FO (%)	
	<i>Landotia</i>	<i>Lemna</i>	<i>Spirodella</i>	<i>Wolffia</i>			
<i>Sporopachydermia lactativora</i>	nd	1	nd	nd	1	0.4	1.4
<i>Starmerella</i> sp. (closely related to <i>Starmerella caucasica</i> )	nd	1	2	nd	3	1.2	2.8
<b>Saccharomycodaceae</b>							
<i>Hanseniaspora opuntiae</i>	nd	1	nd	nd	1	0.4	1.4
<b>Trichomonascaceae</b>							
<i>Wickerhamiella infanticola</i>	nd	3	nd	nd	3	1.2	4.2
<i>Wickerhamiella martinezcruzae</i>	nd	1	nd	nd	1	0.4	1.4
<i>Zygoascus</i> sp. (closely related to <i>Zygoascus polysorbophila</i> )	nd	1	nd	nd	1	0.4	1.4
<b>Phylum Basidiomycota</b>					<b>113</b>		
<b>Subphylum Agaricomycotina</b>							
<b>Filobasidiaceae</b>							
<i>Naganishia liquefaciens</i>	1	nd	nd	nd	1	0.4	1.4
<b>Cryptococcaceae</b>							
<i>Kwoniella heveanensis</i>	nd	1	nd	nd	1	0.4	1.4
<b>Rhynchogastremaceae</b>							
<i>Papiliotrema aspenensis</i>	nd	1	nd	nd	1	0.4	1.4
<i>Papiliotrema laurentii</i>	5	41	7	2	55	21.8	25
<i>Papiliotrema rajasthanensis</i>	nd	1	nd	nd	1	0.4	1.4
<i>Papiliotrema ruineniae</i>	1	nd	nd	nd	1	0.4	1.4
<i>Papiliotrema</i> sp. (closely related to <i>Papiliotrema laurentii</i> )	nd	2	3	nd	5	2	6.9
<b>Trichosporonaceae</b>							
<i>Apiotrichum loubieri</i>	nd	1	nd	nd	1	0.4	1.4
<b>Subphylum Pucciniomycotina</b>							
<b>Sporidiobolaceae</b>							
<i>Rhodosporidiobolus fluvialis</i>	nd	nd	2	2	4	1.6	2.8
<i>Rhodosporidiobolus ruineniae</i>	nd	6	nd	nd	6	2.4	1.4

Yeast taxa	No. of yeast strains from duckweed genera				RF (%)	FO (%)	
	<i>Landotia</i>	<i>Lemna</i>	<i>Spirodella</i>	<i>Wolffia</i>			
<i>Rhodotorula mucilaginosa</i>	4	12	nd	nd	16	6.3	13.9
<i>Rhodotorula paludigena</i>	nd	1	nd	nd	1	0.4	1.4
<i>Rhodotorula taiwanensis</i>	1	9	1	nd	11	4.4	8.3
<i>Rhodotorula diobovata</i>	nd	2	nd	nd	2	0.8	1.4
<i>Rhodotorula</i> sp. (closely related to <i>Rhodotorula toruloides</i> )	nd	1	nd	nd	1	0.4	1.4
<b>Subphylum Ustilaginomycotina</b>							
<b>Ustilaginaceae</b>							
<i>Moesziomyces antarcticus</i>	nd	1	3	nd	4	1.6	4.2
<i>Pseudozyma churashimaensis</i>	nd	2	nd	nd	2	0.8	1.4

RF; Relative frequency (%) was calculated as the number of isolates of a particular species as a proportion of the total number of strains.  
FO; Frequency of occurrence (%) was calculated as number of samples, where a particular species was observed as a proportion of the total number of samples.  
nd; not detected.





Taxa	No. of strain	Strain DMKU-	D1/D2 GenBank accession no. of closest species	Similarity to closest species (%)	No. of sample
<i>Lodderomyces elongisporus</i>	1	DWW1-9	KY108330	100	1
<i>Meyerozyma caribbica</i>	11	DWEN23-1, DWEN23-9, DWEN34-2, DWEN34-4, DWEN34-5, DWEN34-6, DWEN43-1, DWEN53-2, DWEN60-3, DWEN61-2, DWEN62-11	NG054806	100	7
<i>Meyerozyma carpophila</i>	5	DWW3-4, DWW4-1, DWW4-9, DW3-1 DWEN39-4	NG069408	99.64-100	4
<b>Metschnikowiaceae</b>					
<i>Candida pseudointermedia</i> ( <i>Candida/Metschnikowiaceae</i> clade)	3	DWEN30-1, DWEN34-7, DWEN62-8	NG055407	99.8-100	3
<i>Candida</i> sp. group 2 (closely related to <i>Candida suratensis</i> in <i>Candida/Metschnikowiaceae</i> clade)	2	DW3-4, DW3-8	AB500863	98.80-99.20	1
<i>Kodamaea ohmeri</i>	5	DWEN23-3, DWEN23-5, DWEN38-6, DWEN38-9, DWEN50-1	MK394144	99.79-100	3
<i>Metschnikowia koreensis</i>	1	DWEN23-3	NG058340	99.6	1
<i>Metschnikowia saccharicola</i>	2	DWEN35-1, DWEN35-3	AB697755	99.57	1
<b>Phaffomycetaceae</b>					
<i>Candida</i> sp. group 3 (closely related to <i>Candida yuanshanica</i> in <i>Candida/Wickerhamomyces</i> clade)	1	DWEN35-4	NG057184	98.67	1
<i>Cyberlindnera fabianii</i>	2	DWEN28-1, DWEN28-2	NG055731	100	1
<i>Cyberlindnera jadinii</i>	1	DWW14 S-2	NG056278	99.41	1
<i>Cyberlindnera subsufficiens</i>	2	DWW3-2, DWW3-8	NG059002	99.76-99.82	1

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Taxa	No. of strain	Strain DMKU-	D1/D2 GenBank accession no. of closest species	Similarity to closest species (%)	No. of sample
<i>Starmera stellimalicola</i>	1	DWEN23-2	NG060829	100	1
<b>Pichiaceae</b>					
<i>Candida ethanolica</i> ( <i>Candida/Pichia</i> clade)	3	DWEN62-10, DWEN62-12, DWEN62-13	NG055105	100	1
<i>Candida pseudolambica</i> ( <i>Candida/Pichia</i> clade)	7	DWW3-1, DWW10-2, DWW10-4, DWEN26-3, DWEN35-2, DWEN39-3, DWEN49-2	NG060822	99.45-99.81	6
<i>Candida</i> sp. group 4 (closely related to <i>Candida pseudolambica</i> in <i>Candida/Pichia</i> clade)	1	DWEN34-3	NG060822	99.06	1
<i>Ogataea thermomethanolica</i>	1	DWW4-8	AB200285	99.42	1
<i>Pichia kluyveri</i>	1	DWEN38-8	NG055122	99.82	1
<i>Pichia kudriavzevii</i>	15	DWW10-3, DWW11-1, DWEN26-7, DWEN54-3, DWEN56-7, DWEN56-11, DWEN59-4, DWEN59-5, DWEN59-6, DWEN59-8, DWEN60-1, DWEN61-1, DWEN62-2, DWEN62-5, DWEN62-7	NG055104	100	9
<i>Pichia manshurica</i>	1	DWEN59-7	KY108860	99.82	1
<i>Pichia occidentalis</i>	1	DW1-1	NG055110	100	1
<b>Saccharomycetaceae</b>					
<i>Kluyveromyces marxianus</i>	2	DWW5-1, DWW5-11	JQ689023	100	1
<i>Kluyveromyces starmeri</i>	3	DW2-1, DWEN26-4, DWEN26-5	KT853036	100	2
<b>Saccharomycetales incertae sedis</b>					
<i>Candida nonsorbophila</i> ( <i>Candida/Saccharomycetales</i> clade)	1	DWEN26-9	NG055173	100	1

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Taxa	No. of strain	Strain DMKU-	D1/D2 GenBank accession no. of closest species	Similarity to closest species (%)	No. of sample
<i>Crinitomyces flavificans</i>	12	DWW3-3, DWW3-6, DWW4-7, DWW5-3, DWW5-6, DWW5-8, DWW5-9, DWW5-12, DWW7-1, DWW8-1, DWW11-2, DW1-3	MH873011	99.80-100	7
<i>Diutina rugosa</i>	2	DWEN26-6, DWEN53-3	GU246244	99.77-88.78	2
<i>Sporopachydermia lactativora</i>	1	DWW5-7	NG042647	100	1
<i>Starmerella</i> sp. (closely related to <i>Starmerella caucasica</i> )	3	DWEN31-1, DWEN32-2, DWEN32-3	NG058407	97.26-97.42	2
<b>Saccharomycodaceae</b>					
<i>Hanseniaspora opuntiae</i>	1	DWEN27-1	NG055312	100	1
<b>Trichomonascaceae</b>					
<i>Wickerhamiella infanticola</i>	3	DW1-2, DW3-3, DWEN30-12	NG058278	99.53-100	3
<i>Wickerhamiella martinezcruzae</i>	1	DWEN62-4	KM246828	99.45	1
<i>Zygoascus</i> sp. (closely related to <i>Zygoascus polysorbophila</i> )	1	DW7-1	NG064312	99.03	1
<b>Phylum Basidiomycota</b>					
<b>Subphylum Agaricomycotina</b>					
<b>Filobasidiaceae</b>					
<i>Naganishia liquefaciens</i>	1	DWEN47-1	NG057655	100	1
<b>Cryptococcaceae</b>					
<i>Kwoniella heveanensis</i>	1	DWEN33-2	NG057655	100	1
<b>Rhynchogastremaceae</b>					
<i>Papiliotrema aspenensis</i>	1	DWEN36-2	NG060109	100	1

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Taxa	No. of strain	Strain DMKU-	D1/D2 GenBank accession no. of closest species	Similarity to closest species (%)	No. of sample
<i>Papiliotrema laurentii</i>	55	DWW1-8, DWW9-1, DWW14 S-1, DWW14 S-2, DWW14 S-3, DWW14 S-8, DWW14 W-2, DWW14 W-3, DW8-3, DW15-1, DW15-2, DWEN21-1, DWEN21-2, DWEN21-3, DWEN21-4, DWEN22-5, DWEN22-6, DWEN22-7, DWEN22-8, DWEN29-2, DWEN29-4, DWEN29-5, DWEN29-6, DWEN29-7, DWEN29-8, DWEN29-9, DWEN29-10, DWEN29-11, DWEN29-12, DWEN31-1, DWEN31-2, DWEN31-3, DWEN36-1, DWEN36-3, DWEN36-4, DWEN36-5, DWEN36-6, DWEN36-7, DWEN36-8, DWEN37-1, DWEN37-4, DWEN37-7, DWEN37-8, DWEN37-9, DWEN37-10, DWEN38-4, DWEN38-5, DWEN38-7, DWEN41-1, DWEN41-2, DWEN41-4, DWEN54-6, DWEN55-1, DWEN60-2, DWEN60-4, DWEN61-3	NG056281	99.60-99.83	18
<i>Papiliotrema rajasthanensis</i>	1	DWEN30-11	NG058366	100	1
<i>Papiliotrema ruineniae</i>	1	DWEN53-4	LK023764	100	1
<i>Papiliotrema</i> sp. (closely related to <i>Papiliotrema laurentii</i> )	5	DWW14 S-6, DWEN29-3, DWEN55-2, DWEN60-5, DWEN61-5	NG056281	99.46-99.49	5
<b>Trichosporonaceae</b>					
<i>Apiotrichum loubieri</i>	1	DWEN27-2	KY106133	100	1
<b>Subphylum Pucciniomycotina</b>					

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Taxa	No. of strain	Strain DMKU-	D1/D2 GenBank accession no. of closest species	Similarity to closest species (%)	No. of sample
<b>Sporidiobolaceae</b>					
<i>Rhodosporiobolus fluvialis</i>	4	DWW14 S-4, DWW14 S-7, DWW14 W-1, DWW14 W-4	NG042341	99.62	2
<i>Rhodosporiobolus ruineniae</i>	6	DW8-2, DWEN26-10, DWEN33-1, DWEN33-5, DWEN33-6, DWEN33-8	KY108979	99.81-100	3
<i>Rhodotorula mucilaginosa</i>	16	DW3-5, DW3-7, DW4-1, DW4-2, DWEN22-1, DWEN22-2, DWEN39-6, DWEN42-1, DWEN43-2, DWEN53-1, DWEN53-5, DWEN56-3, DWEN56-6, DWEN56-9, DWEN59-1, DWEN62-3	KY109056	99.82-100	10
<i>Rhodotorula paludigena</i>	1	DWW4-6	NG042383	99.8	1
<i>Rhodotorula taiwanensis</i>	11	DWW5-5, DWW14 S-5, DWEN37-2, DWEN37-5, DWEN37-6, DWEN37-11, DWEN41-3, DWEN55-3, DWEN55-4, DWEN55-6, DWEN56-5	KY109163	99.79-100	6
<i>Rhodotorula diobovata</i>	2	DW3-1, DW3-9	NG042340	99.81	1
<i>Rhodotorula</i> sp. (closely related to <i>Rhodotorula toruloides</i> )	1	DWEN59-2	KY109167	99.43	1
<b>Subphylum Ustilaginomycotina</b>					
<b>Ustilaginaceae</b>					
<i>Moesziomyces antarcticus</i>	4	DWW3-5, DWW3-7, DWW4-3, DWW6-1	KY108571	100	3
<i>Pseudozyma churashimaensis</i>	2	DWW5-2, DWW5-4	AB548955	100	1

