

## Supplementary materials

### Comparative fatty acid compositional profiles of *Rhodotorula toruloides* haploid and diploid strains under various storage conditions

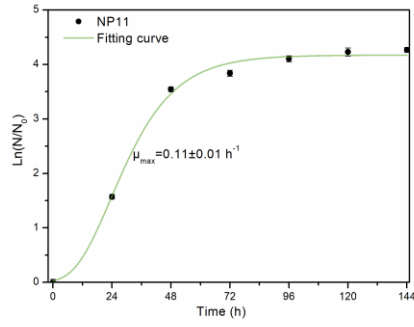
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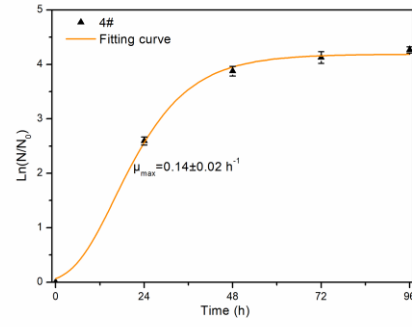
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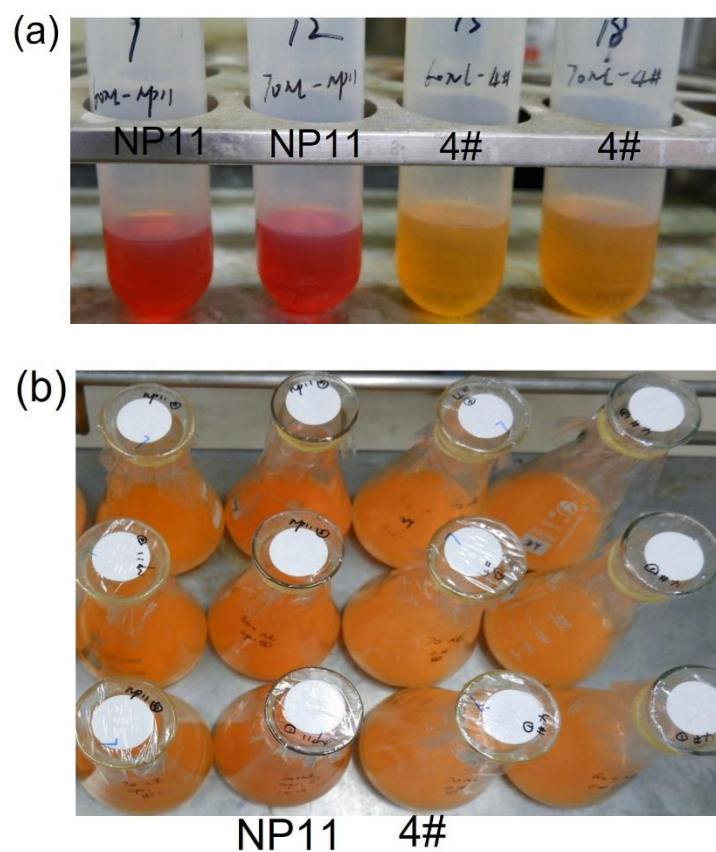


(a)



(b)

**Figure S1.** The growth curves fitting of *R. toruloides* NP11 and *R. toruloides* 4# in nitrogen-limited cultivation. (a) The specific growth rate ( $\mu_{\max}$ ) of the haploid strain NP11 growth curve was  $0.11 \pm 0.01 \text{ h}^{-1}$  in nitrogen-limited culture. (b) The specific growth rate ( $\mu_{\max}$ ) of the diploid strain 4# growth curve was  $0.14 \pm 0.02 \text{ h}^{-1}$  in nitrogen-limited culture. The growth curve fitting was performed according to the models described in the previous report [1] by software Origin 8.5.



**Figure S2.** The lipid extract and culture broth of the haploid strain *R. toruloides* NP11 and the diploid strain *R. toruloides* 4#. (a) Lipid extraction of NP11 and 4# from left to right by the classical acid heat method. (b) Culture broth of NP11 and 4# from left to right after fermentation for 96 h.

**Table S1.** *p*-value of OD<sub>600</sub> and residual glucose comparison between the haploid strain *R. toruloides* NP11 and the diploid strain *R. toruloides* 4# at different time by statistical analysis. \*\*\*, *p* < 0.001 (*p*-value); \*\*, *p* < 0.01 of one-tailed Student's t-test. All data are presented as mean ± SD of biological triplicates.

Time (h)	P-value of OD <sub>600</sub> comparation	P-value of residual Glucose comparation
	NP11 & 4#	NP11 & 4#
24	2.66E-06***	0.1214
48	1.86E-06***	1
72	0.0007***	7.07E-05***
96	0.0373**	0.0001***

**Table S2.** *p*-value of some strain parameters comparison between the haploid strain *R. toruloides* NP11 and the diploid strain *R. toruloides* 4# by statistical analysis. \*\*\*, *p* < 0.001; \*\*, *p* < 0.01 of one-tailed Student's *t*-test. All data are presented as mean ± SD of biological triplicates.

parameters	P-value
	NP11 & 4#
Glucose consumption rate	0.0038**
Cell mass titer	0.0001***
Lipid titer	0.0029**
Lipid content	0.0015**
Lipid yield	1.88E-07***
Cell mass yield	1.88E-05***
Lipid productivity	0.0007***
Cell mass productivity	1.02E-05***

**Table S3.** *p*-value and FDR of FAMES composition of NP11 under different preservation conditions compared by statistical analysis. \*, *p* < 0.05 of one-tailed Student's t-test. FDR, False Discovery Rate, was the correction of P-value after multiple comparison, \*, FDR < 0.05.

Fatty acids	4 °C 1 h		4 °C 1 h vortex		-20 °C 17 h	-20 °C 17 h vortex	RT 24 h	RT 72 h	RT 2 months	
	<i>p</i> -value	FDR	<i>p</i> -value	FDR	<i>p</i> -value	<i>p</i> -value	<i>p</i> -value	<i>p</i> -value	<i>p</i> -value	FDR
C6:0	0.7488	4.1184	0.9898	1.0369	0.7757	0.7235	0.7800	0.9501	0.2462	0.6017
C7:0	0.7447	5.4612	0.7716	8.4877	0.7083	0.7246	0.8863	0.8107	0.6519	1.1952
C8:0	0.9467	1.3885	0.9266	1.4560	0.9128	0.8551	0.9937	0.8647	0.8032	1.2621
SCFA	0.8542	2.3491	0.9935	0.9935	0.9325	0.9481	0.9071	0.8822	0.5553	1.1105
C9:0	0.9212	1.8423	0.8802	1.9364	0.9905	0.9957	0.9434	0.8289	0.9076	1.0509
C12:0	0.7816	2.8657	0.8399	3.0797	0.3740	0.7664	0.6474	0.7743	0.1153	0.6342
MCF	0.9451	1.4851	0.8746	2.1379	0.9220	0.9811	0.9866	0.8684	0.8205	1.1282
C14:0	0.9344	1.7130	0.8548	2.3506	0.9978	0.8273	0.7690	0.6150	0.8820	1.0780
C15:0	0.9674	1.1202	0.8500	2.6713	0.9130	0.7646	0.9963	0.6855	0.9908	0.9908
C16:1	0.6758	7.4335	0.9382	1.2900	0.3283	0.4448	0.1848	0.4840	0.4425	0.9735
C16:0	0.9719	4.1184	0.9866	1.0852	0.9908	0.9108	0.9225	0.9739	0.6733	1.1393
C17:1	0.0234*	0.5149	0.0111*	0.2443	0.8579	0.9728	0.8903	0.8504	0.2338	0.7348
C17:0	0.9821	5.4612	0.9833	1.1386	0.8675	0.9303	0.6949	0.7031	0.8718	1.1283
C18:2	0.9575	1.1703	0.9449	1.2229	0.8637	0.8500	0.8010	0.9876	0.8163	1.1973
C18:1	0.9151	2.0132	0.9127	1.5445	0.9864	0.9792	0.9856	0.9751	0.9129	1.0042
C18:0	0.7630	3.3572	0.7809	5.7264	0.8560	0.8632	0.9920	0.7609	0.9539	0.9993
LCFA	0.9380	1.5874	0.9278	1.3607	0.9074	0.7688	0.8559	0.8024	0.2154	0.7897
C20:0	0.8793	2.1494	0.9748	1.1914	0.4868	0.3395	0.3355	0.5715	0.1018	0.7462
C22:0	0.9548	1.2356	0.9120	1.6720	0.3487	0.7263	0.4569	0.3597	0.0199*	0.4368
C23:0	0.8090	2.5424	0.7815	4.2983	0.5489	0.1736	0.3115	0.4385	0.2377	0.6536
C24:0	0.9700	1.0670	0.8098	3.5630	0.7861	0.8032	0.6360	0.5945	0.1836	0.8080
VLCF	0.9477	1.3031	0.9092	1.8183	0.8207	0.5289	0.6168	0.7257	0.0506	0.5568

## Reference

1. Zwietering, M. H., Jongenburger, I., Rombouts, F. M., and Riet, K. v. t. Modeling of the Bacterial Growth Curve. *Appl. Environ. Microbiol.* **1990**, 56, 1875-1881.