

Supplementary Materials for
Systematic Metabolic Engineering Combined with Iterative SCRaMbLE
Boost Sweetener Thaumatin Production by *Saccharomyces cerevisiae*

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Supplementary Text
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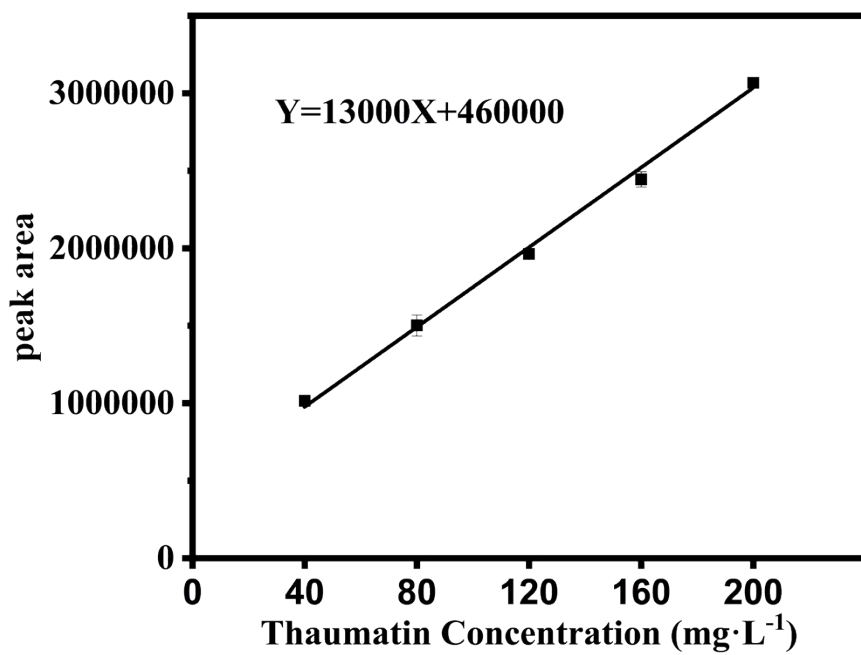


Figure. S1. Standard curve of thaumatin (40-200 mg·L⁻¹) determined by HPLC.

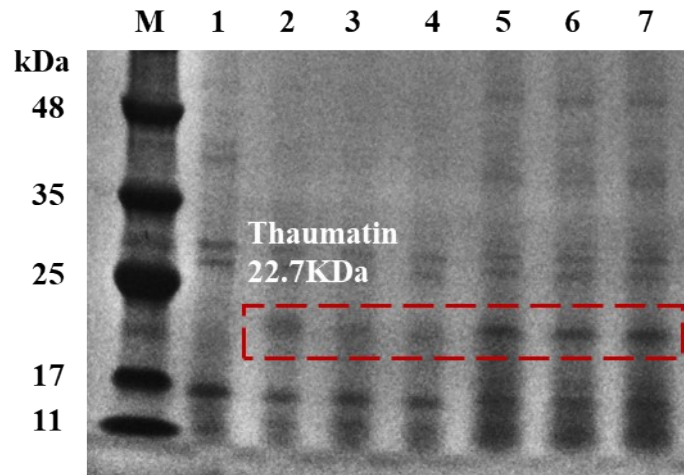


Figure. S2. SDS-PAGE analysis of intracellular and extracellular proteins of the yYPL11 strain. Lane M: protein molecular weight marker; Lane 1: negative control strain (empty vector-transformed strain); Lanes 2, 3, and 4: extracellular proteins (three biological replicates). Lanes 5, 6, and 7: intracellular proteins (three biological replicates). The thaumatin band is highlighted by the red dashed box.

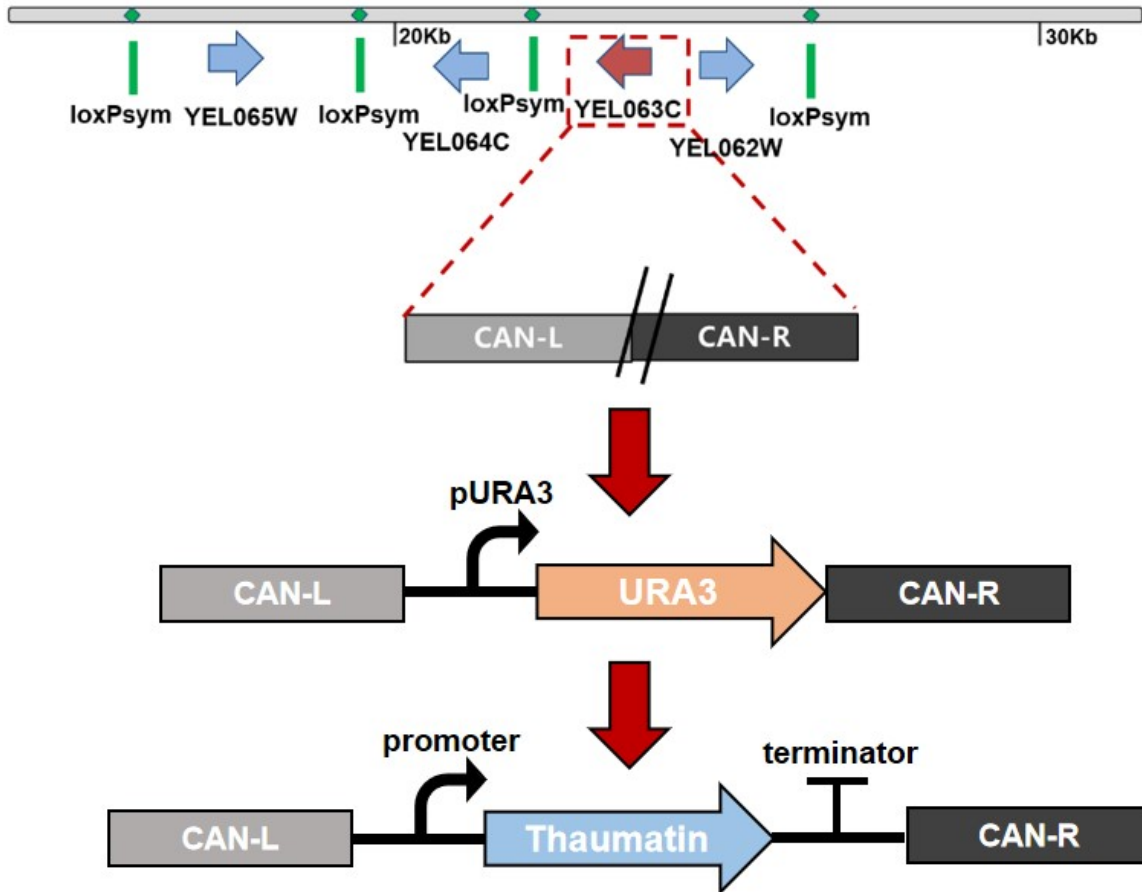


Figure. S3. Genomic Construction of Strains for Thaumatin Expression.

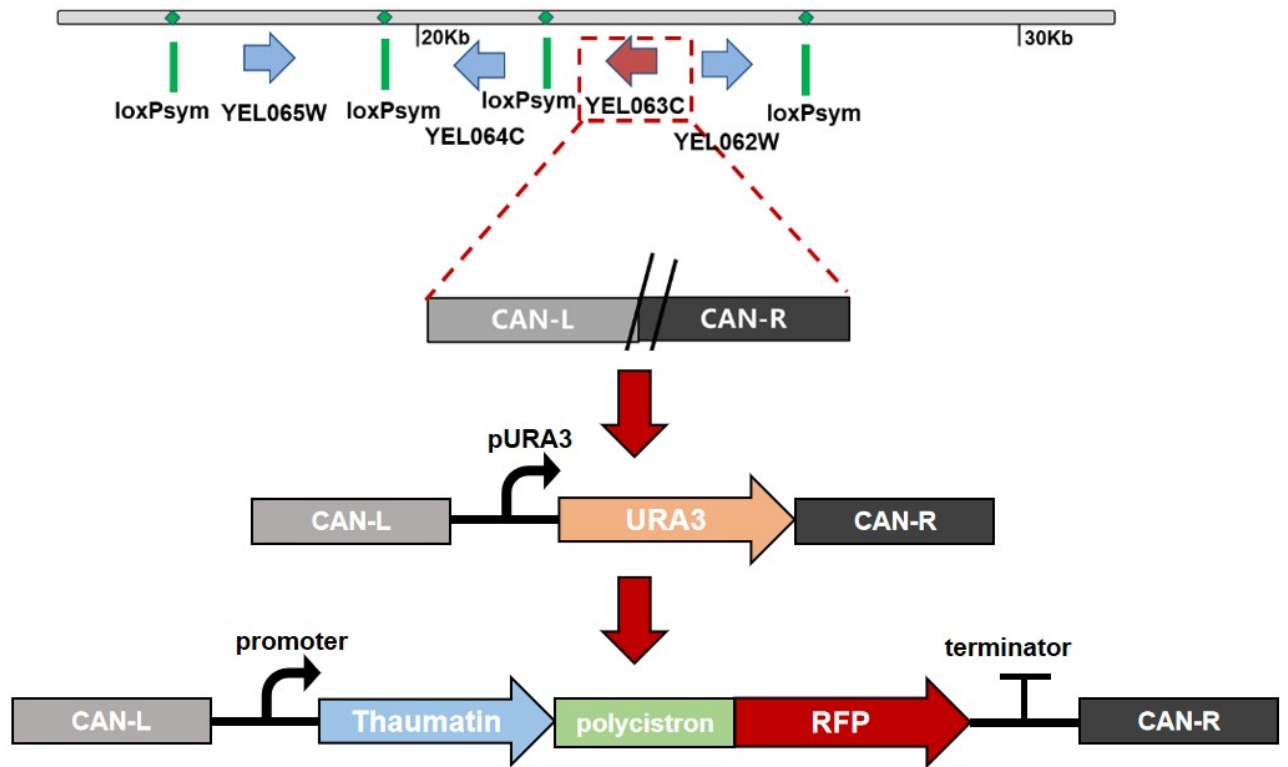


Figure. S4. Construction of SCRaMBLE Strain Producing Thaumatin.

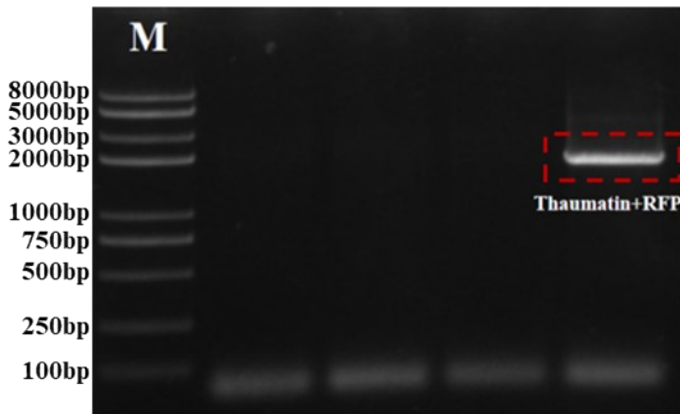
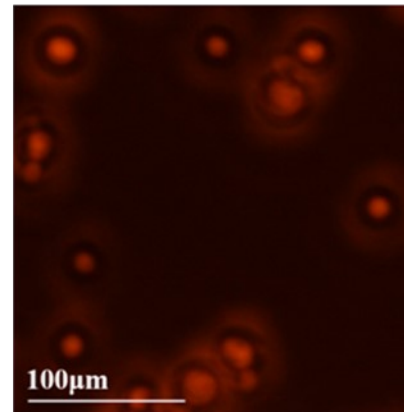
A**B**

Figure. S5. Verification of SCRaMbLE Strain Producing Thaumatoin. (A) Colony PCR validation; (B) Microscopic observation of red fluorescence. Scale bars, 100 µm.

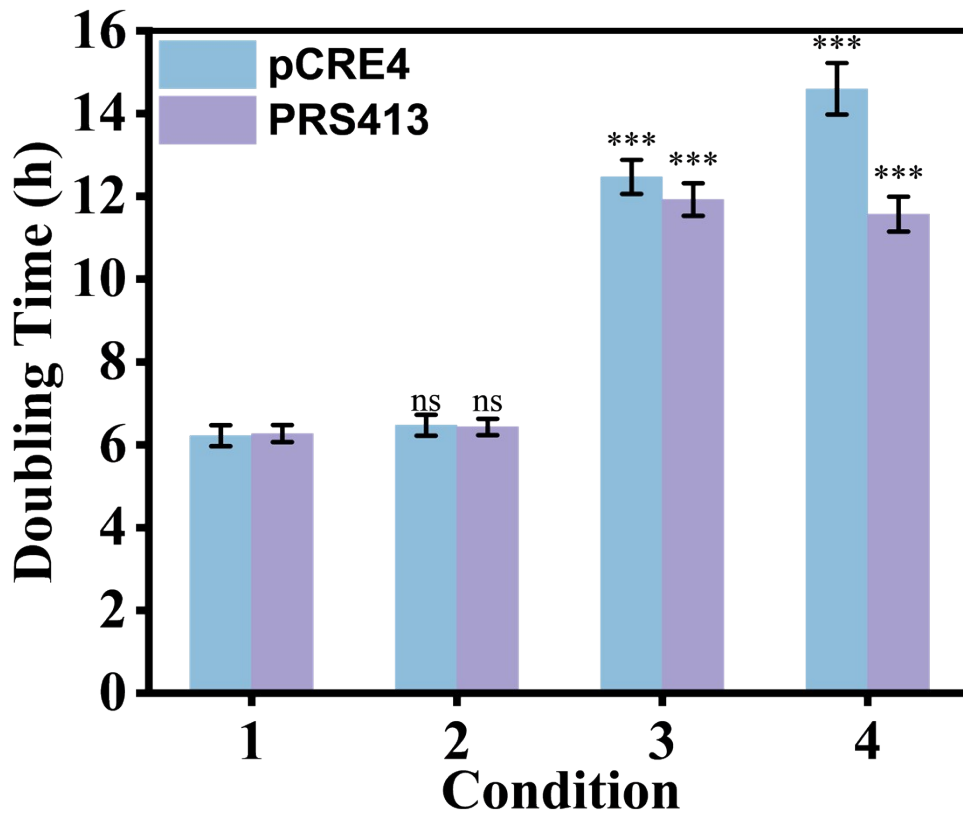


Figure. S6. Comparison of the growth of yYPL0-1 strains containing pCRE4 and pRS413 under four conditions as follows: (1) SC-His medium; (2) SC-His medium with 1 μ M estradiol; (3) SC-His medium with 20 g/L galactose; (4) SC-his Δ -gal-estradiol medium. All data represent the mean \pm SD. Triplicate independent samples were adopted for each panel(t test, *P \leq 0.05, **P \leq 0.01, *P \leq 0.001).**

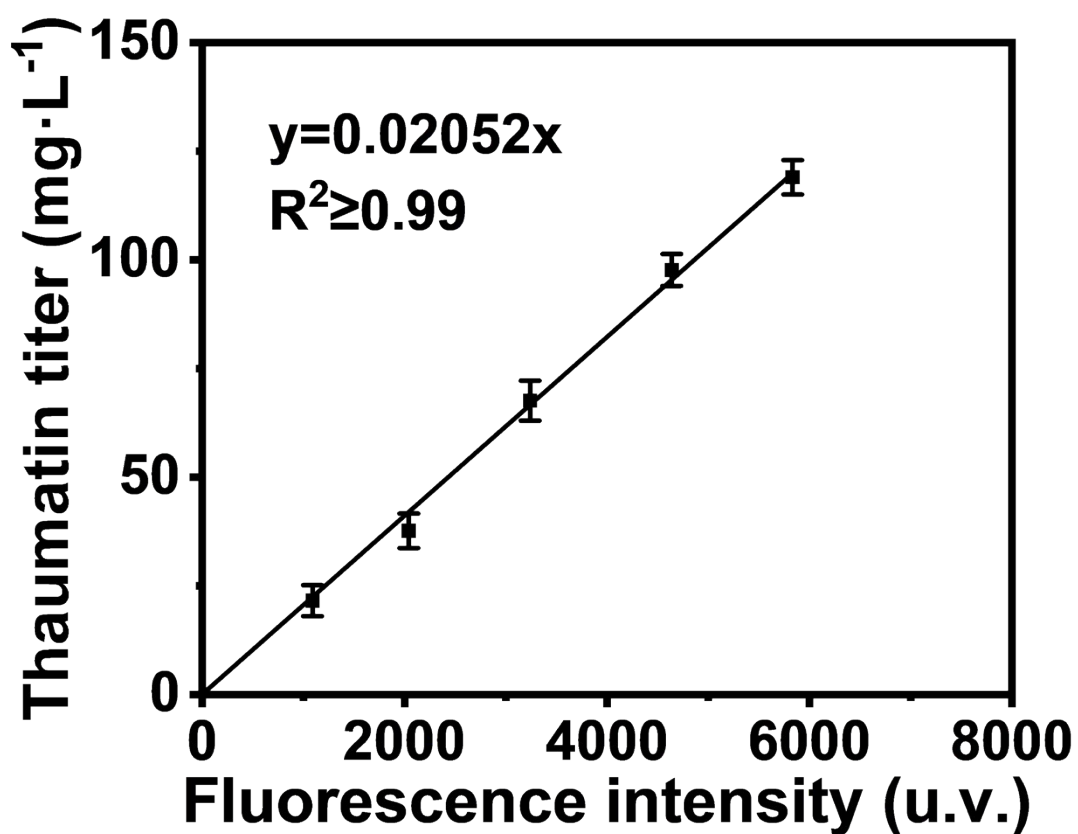


Figure. S7. Correlation Between Thaumatin Production and Fluorescence Intensity in the Initial SCRaMbLE Strain. All data represent the mean \pm SD. Triplicate independent samples were adopted for each panel.

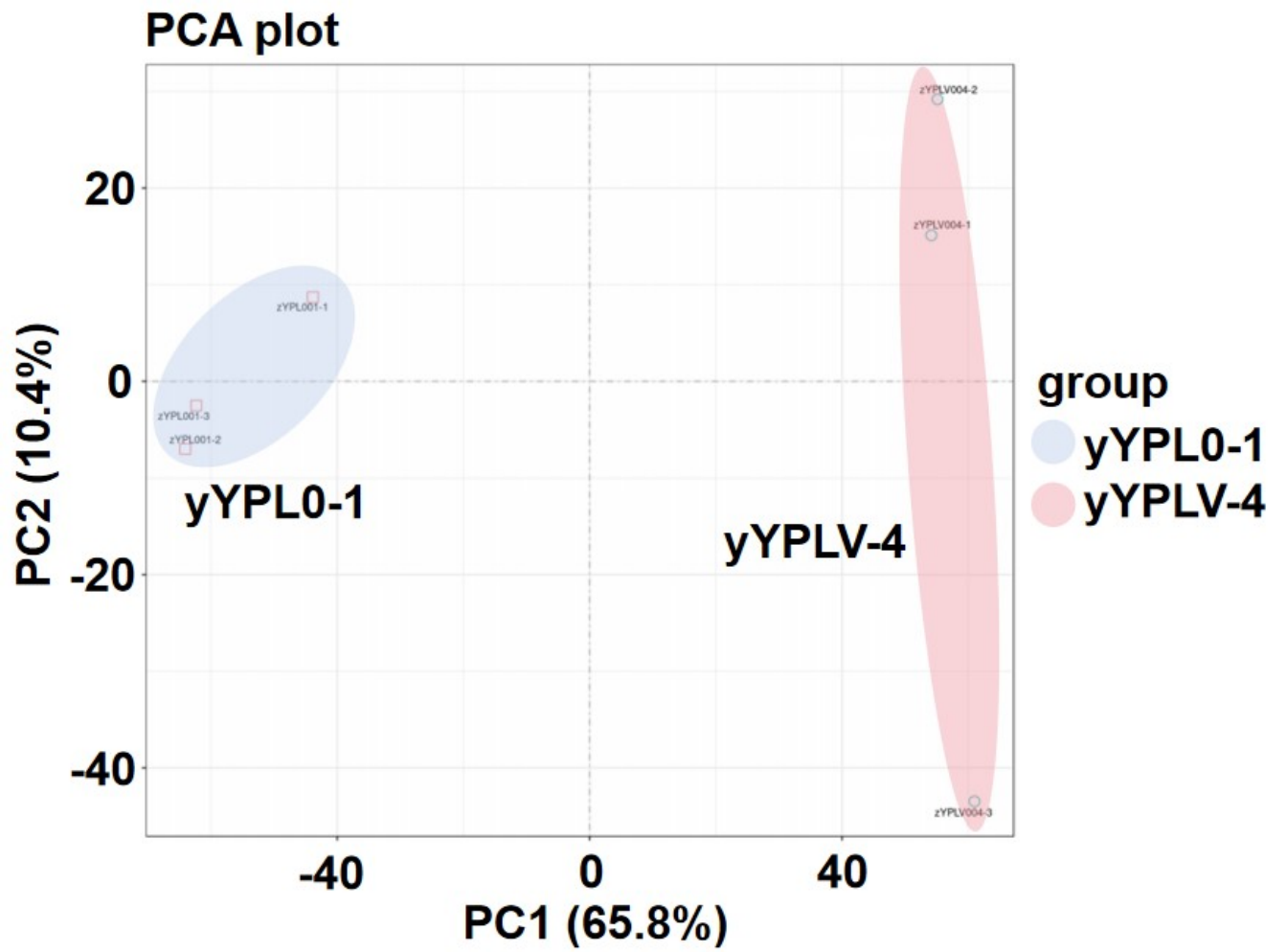


Figure. S8. Plot of principal component analysis results.

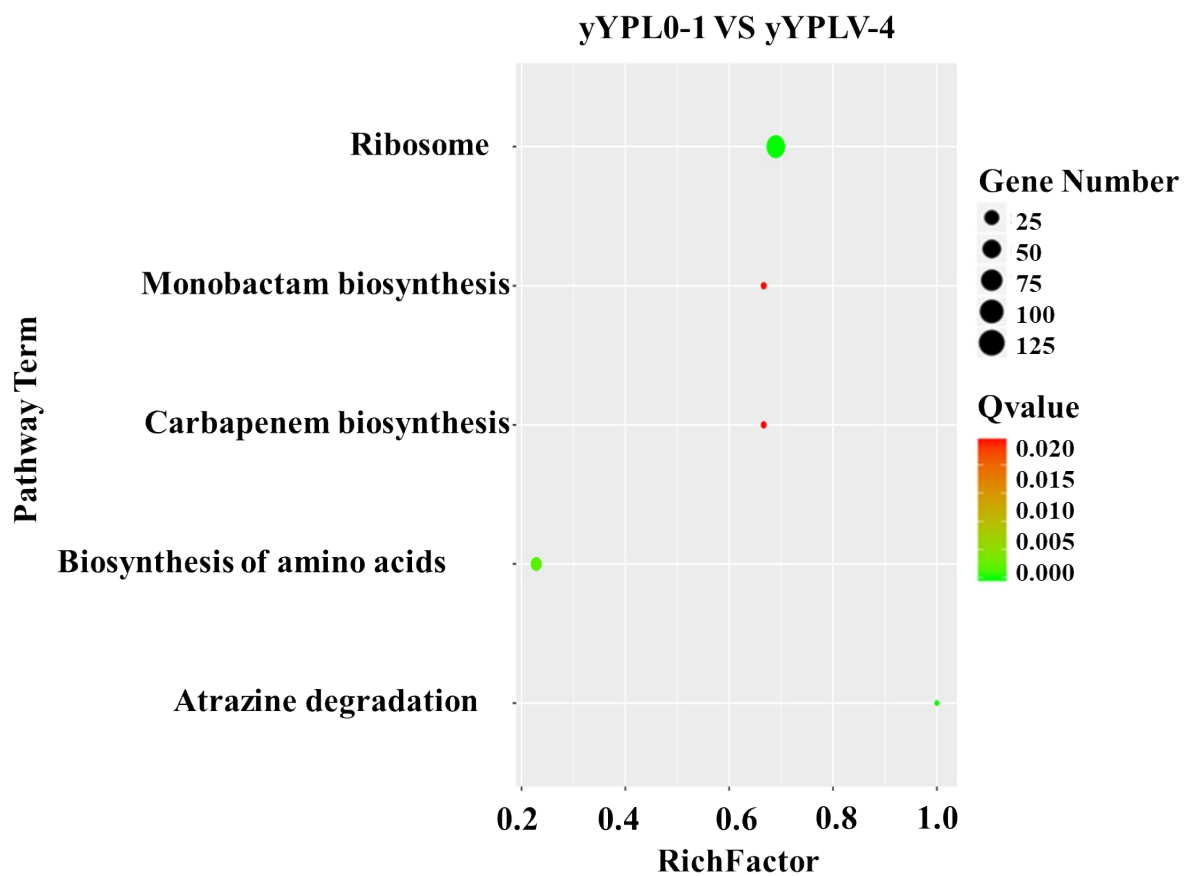


Figure. S9. KEGG Enrichment Plot of Differential Genes.

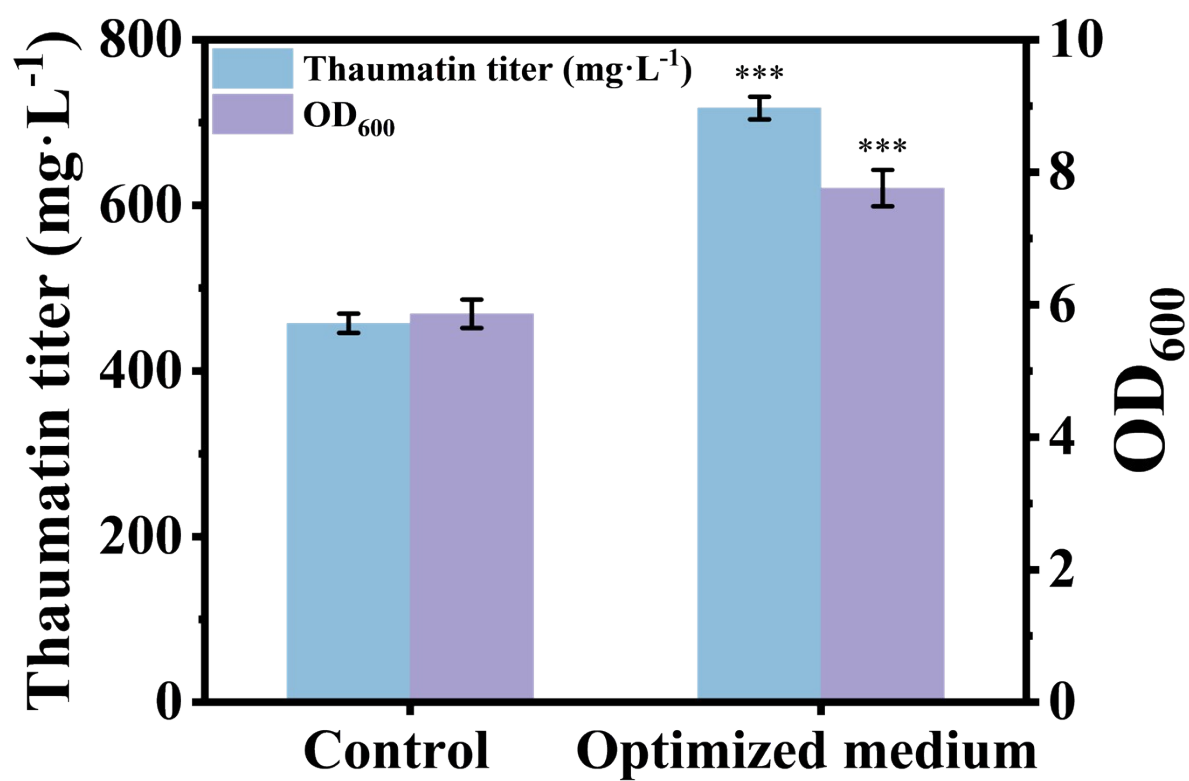


Figure. S10. Overall optimization of fermentation conditions and culture medium. All data represent the mean \pm SD. Triplicate independent samples were adopted for each panel (t test, * $P \leq 0.05$, ** $P \leq 0.01$, *** $P \leq 0.001$).

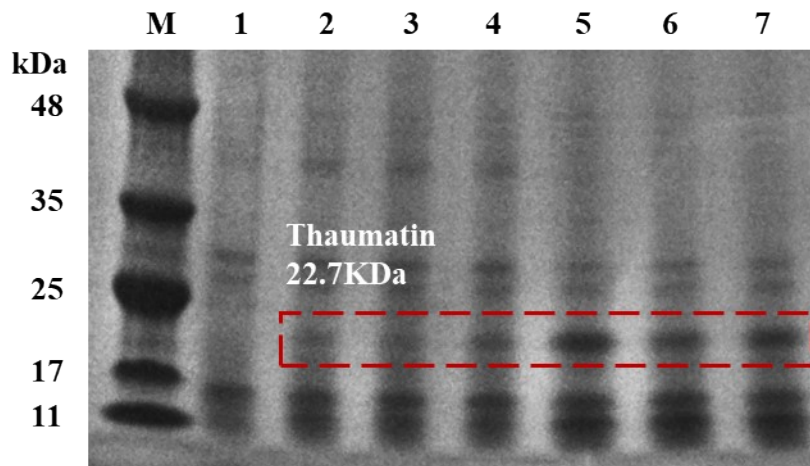


Figure. S11. SDS-PAGE analysis of thaumatin production from the original strain yYPL032 and the engineered strain yYPL101. Samples were collected after 72 h of shake-flask fermentation. Lane M: protein molecular weight marker; Lane 1: negative control strain (empty vector-transformed strain); Lanes 2, 3, and 4: total cellular proteins of strain yYPL032 (three biological replicates); Lanes 5, 6, and 7: total cellular proteins of strain yYPL101 (three biological replicates); The thaumatin band is highlighted by the red dashed box.

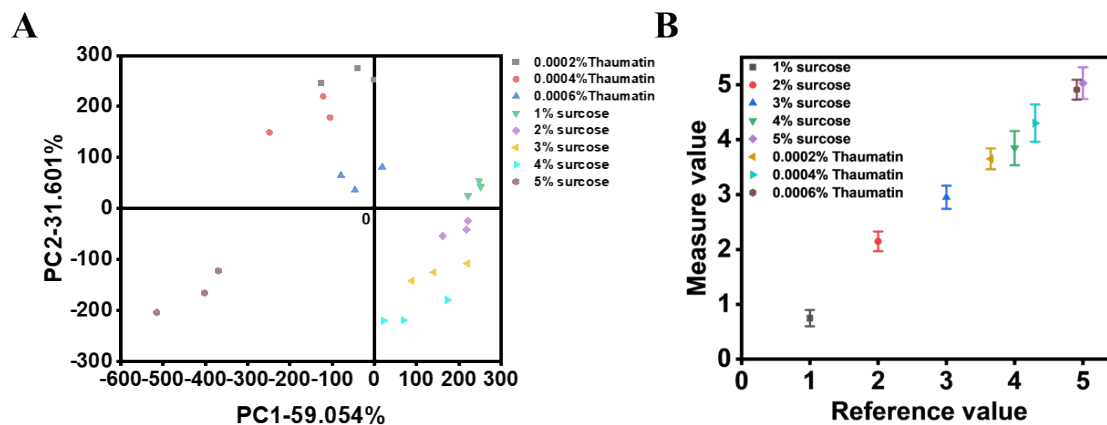


Figure. S12. Concentration and Sucrose Effects: PCA and PLS Score Plots. (A) PCA (Principal Component Analysis) plot of thaumatin protein samples at different concentrations versus sucrose; (B) PLS (Partial Least Squares) analysis plot of thaumatin protein samples at different concentrations versus sucrose.

Table S1. Plasmids used in this study.

Plasmid	Description	Source
pRS426	CEN/ARS with <i>URA3</i> marker	This study
pYPL001	pRS426-pTEF1- <i>Thaumatococcus</i> -CYC1t	This study
pYPL002	pRS426-pTDH1- <i>Thaumatococcus</i> -CYC1t	This study
pYPL003	pRS426-pTDH2- <i>Thaumatococcus</i> -CYC1t	This study
pYPL004	pRS426-pTEF2- <i>Thaumatococcus</i> -CYC1t	This study
pYPL005	pRS426-pTDH3- <i>Thaumatococcus</i> -CYC1t	This study
pYPL006	pRS426-pPGK1- <i>Thaumatococcus</i> -CYC1t	This study
pYPL007	pRS426-pTDH3- <i>Thaumatococcus</i> -GIC1t	This study
pYPL008	pRS426-pTDH3- <i>Thaumatococcus</i> -ICY2t	This study
pYPL009	pRS426-pTDH3- <i>Thaumatococcus</i> -ADH1t	This study
pYPL010	pRS426-pTDH3- <i>Thaumatococcus</i> -IDP1t	This study
pYPL011	pRS426-pTDH3- <i>Thaumatococcus</i> -DIT1t	This study
pYPL012	pRS426-pTDH3- <i>Thaumatococcus</i> -syn14t	This study
pYPL013	pRS426-pTDH3- <i>Thaumatococcus</i> -syn17t	This study
pYPL014	pRS426-pTDH3- <i>Thaumatococcus</i> -syn25t	This study
pYPL015	pRS426-pTDH3- <i>Thaumatococcus</i> -syn8t	This study
pYPL016	pRS426-pTDH3- <i>Thaumatococcus</i> -syn3t	This study
pYPL017	pRS426-pTDH3- <i>Thaumatococcus</i> -syn19t	This study
pYPL018	pRS426-pTDH3- <i>FLO10-Thaumatococcus</i> -DIT1t	This study
pYPL019	pRS426-pTDH3- <i>afactor-Thaumatococcus</i> -DIT1t	This study
pYPL020	pRS426-pTDH3- <i>PHO5-Thaumatococcus</i> -DIT1t	This study
pYPL021	pRS426-pTDH3- <i>PSG1-Thaumatococcus</i> -DIT1t	This study
pYPL022	pRS426-pTDH3- <i>MID2-Thaumatococcus</i> -DIT1t	This study
pYPL023	pRS426-pTDH3- <i>SWP1-Thaumatococcus</i> -DIT1t	This study
pYPL024	pRS426-pTDH3- <i>PIR1-Thaumatococcus</i> -DIT1t	This study
pYPL025	pRS426-pTDH3- <i>PIR3-Thaumatococcus</i> -DIT1t	This study
pYPL026	pRS426-pTDH3- <i>GAS5-Thaumatococcus</i> -DIT1t	This study
pYPL027	pRS426-pTDH3- <i>CSI2-Thaumatococcus</i> -DIT1t	This study
pYPL028	pRS426-pTDH3- <i>NCW2-Thaumatococcus</i> -DIT1t	This study
pYPL029	pRS426-pTDH3- <i>aa9D-Thaumatococcus</i> -DIT1t	This study
pYPL030	pRS426-pTDH3- <i>app10-Thaumatococcus</i> -DIT1t	This study

pYPL031	pRS426-pTDH3- <i>appS4-Thaumatin</i> -DIT1t	This study
pYPL032	pRS426-pTDH3- <i>HAC1</i> -DIT1t	This study
pYPL033	pRS426-pTDH3- <i>VPS34</i> -DIT1t	This study
pYPL034	pRS426-pTDH3- <i>MSN2</i> -DIT1t	This study
pYPL035	pRS426-pTDH3- <i>MSN4</i> -DIT1t	This study
pYPL036	pRS426-pTDH3- <i>RIL1</i> -DIT1t	This study
pYPL037	pRS426-pTDH3- <i>PAB1</i> -DIT1t	This study
pYPL038	pRS426-pTDH3- <i>CDC33</i> -DIT1t	This study
pYPL039	pRS426-pTDH3- <i>TIF4632</i> -DIT1t	This study
pYPL040	pRS426-pTDH3- <i>KAR2</i> -DIT1t	This study
pYPL041	pRS426-pTDH3- <i>PDII</i> -DIT1t	This study
pYPL042	pRS426-pTDH3- <i>ERO1</i> -DIT1t	This study
pYPL043	pRS426-pTDH3- <i>BMH2</i> -DIT1t	This study
pYPL044	pRS426-pTDH3- <i>SSO2</i> -DIT1t	This study
pYPL045	pRS426-pTDH3- <i>HAC1-CDC33</i> -DIT1t	This study
pYPL046	pRS426-pTDH3- <i>HAC1-PDII</i> -DIT1t	This study
pYPL047	pRS426-pTDH3- <i>CDC33-PDII</i> -DIT1t	This study
pYPL048	pRS426-pTDH3- <i>HAC1-CDC33-PDII</i> -DIT1t	This study
pRS413	pRS413	This study
pRS426	CEN/ARS with Ura3 marker	This study
pCRE4	pRS413, pGal1-Cre-EBD-tCYC1	This study
pYPL0-1	PRS426, pTDH3-Thaumatin- <i>polycistron-RFP-DIT1t</i>	This study
pYPL049	pRS426-pTDH3- <i>HAC1-CDC33-PDII-YMR323W</i> -DIT1t	This study
pYPL050	pRS426-pTDH3- <i>HAC1-CDC33-PDII-YER074W-A</i> -DIT1t	This study
pYPL051	pRS426-pTDH3- <i>HAC1-CDC33-PDII-YHR033W</i> -DIT1t	This study
pYPL052	pRS426-pTDH3- <i>HAC1-CDC33-PDII-YJR009C</i> -DIT1t	This study
pYPL053	pRS426-pTDH3- <i>HAC1-CDC33-PDII-YER157W</i> -DIT1t	This study

pYPL054	pRS426-pTDH3- <i>HAC1-CDC33-PDII-YER091C-DIT1t</i>	This study
pYPL055	pRS426-pTDH3- <i>HAC1-CDC33-PDII-YER138C-DIT1t</i>	This study
pYPL056	pRS426-pTDH3- <i>HAC1-CDC33-PDII-YGL009C-DIT1t</i>	This study
pYPL057	pRS426-pTDH3- <i>HAC1-CDC33-PDII-YEL046C-DIT1t</i>	This study
pYPL058	pRS426-pTDH3- <i>HAC1-CDC33-PDII-MED2-DIT1t</i>	This study
pYPL059	pRS426-pTDH3- <i>HAC1-CDC33-PDII-GPDI-DIT1t</i>	This study
pYPL060	pRS426-pTDH3- <i>HAC1-CDC33-PDII-FHL1-DIT1t</i>	This study
pYPL061	pRS426-pTDH3- <i>HAC1-CDC33-PDII-AFT1-DIT1t</i>	This study
pYPL062	pRS426-pTDH3- <i>HAC1-CDC33-PDII-YER074W-A-YER157W-DIT1t</i>	This study
pYPL063	pRS426-pTDH3- <i>HAC1-CDC33-PDII-YER074W-A-YGL009C-DIT1t</i>	This study
pYPL064	pRS426-pTDH3- <i>HAC1-CDC33-PDII-YER157W-YGL009C-DIT1t</i>	This study
pYPL065	pRS426-pTDH3- <i>HAC1-CDC33-PDII-YER074W-A-YER157W-YGL009C-DIT1t</i>	This study
pYPL066	PRS415-pTDH3- <i>MED2-DIT1t</i>	This study
pYPL067	PRS415-pTDH3- <i>GPDI-DIT1t</i>	This study
pYPL068	PRS415-pTDH3- <i>FHL1-DIT1t</i>	This study
pYPL069	PRS415-pTDH3- <i>AFT1-DIT1t</i>	This study
pYPL070	PRS415-pTDH3- <i>AIM22-DIT1t</i>	This study
pYPL071	PRS415-pTDH3- <i>YER074W-A-YGL009C-DIT1t</i>	This study
pYPL072	PRS415-pTDH3- <i>YER074W-A-YGL009C-AIM22-FHL1-DIT1t</i>	This study
pYPL073	pYPL072 with 2×Thaumatococcus	This study
pYPL074	pYPL072 with 3×Thaumatococcus	This study
pYPL075	pYPL072 with 4×Thaumatococcus	This study

Table S2. Engineered *S. cerevisiae* strains used in this study.

Strains	Description	Sources
<i>E. coli</i> DH5 α	Host of constructed plasmid	Lab storage
yFJ440	<i>MATa his3Δ1 leu2Δ0 met15Δ0 ura3Δ0 SynV&X</i>	Lab storage
yYPL001	yFJ440 with pYPL001	This study
yYPL002	yFJ440 with pYPL002	This study
yYPL003	yFJ440 with pYPL003	This study
yYPL004	yFJ440 with pYPL004	This study
yYPL005	yFJ440 with pYPL005	This study
yYPL006	yFJ440 with pYPL006	This study
yYPL007	yFJ440 with pYPL007	This study
yYPL008	yFJ440 with pYPL008	This study
yYPL009	yFJ440 with pYPL009	This study
yYPL010	yFJ440 with pYPL010	This study
yYPL011	yFJ440 with pYPL011	This study
yYPL012	yFJ440 with pYPL012	This study
yYPL013	yFJ440 with pYPL013	This study
yYPL014	yFJ440 with pYPL014	This study
yYPL015	yFJ440 with pYPL015	This study
yYPL016	yFJ440 with pYPL016	This study
yYPL017	yFJ440 with pYPL017	This study
yYPL018	yFJ440 with pYPL018	This study
yYPL019	yFJ440 with pYPL019	This study
yYPL020	yFJ440 with pYPL020	This study
yYPL021	yFJ440 with pYPL021	This study
yYPL022	yFJ440 with pYPL022	This study
yYPL023	yFJ440 with pYPL023	This study
yYPL024	yFJ440 with pYPL024	This study
yYPL025	yFJ440 with pYPL025	This study
yYPL026	yFJ440 with pYPL027	This study
yYPL027	yFJ440 with pYPL027	This study
yYPL028	yFJ440 with pYPL028	This study
yYPL029	yFJ440 with pYPL029	This study

yYPL030	yFJ440 with pYPL030	This study
yYPL031	yFJ440 with pYPL031	This study
yYPL032	<i>MATa his3Δ1 leu2Δ0 met15Δ0 ura3Δ0 SynV ::pTDH3-NCW2-Thumatin-DIT1t &X</i>	This study
yYPL033	yYPL032 with pYPL032	This study
yYPL034	yYPL032 with pYPL033	This study
yYPL035	yYPL032 with pYPL034	This study
yYPL036	yYPL032 with pYPL035	This study
yYPL037	yYPL032 with pYPL036	This study
yYPL038	yYPL032 with pYPL037	This study
yYPL039	yYPL032 with pYPL038	This study
yYPL040	yYPL032 with pYPL039	This study
yYPL041	yYPL032 with pYPL040	This study
yYPL042	yYPL032 with pYPL041	This study
yYPL043	yYPL032 with pYPL042	This study
yYPL044	yYPL032 with pYPL043	This study
yYPL045	yYPL032 with pYPL044	This study
yYPL046	yYPL032 with pYPL045	This study
yYPL047	yYPL032 with pYPL046	This study
yYPL048	yYPL032 with pYPL047	This study
yYPL049	yYPL032 with pYPL048	This study
yYPL050	yYPL032 with pYPL049	This study
yYPL051	yYPL032, <i>ΔYPT1</i>	This study
yYPL052	yYPL032, <i>ΔUBC1</i>	This study
yYPL053	yYPL032, <i>ΔHRD1</i>	This study
yYPL054	yYPL032, <i>ΔYAP3</i>	This study
yYPL055	yYPL032 with pYPL032, <i>ΔYPT1</i>	This study
yYPL056	yYPL032 with pYPL032, <i>ΔYAP3</i>	This study
yYPL057	yYPL032 with pYPL038, <i>ΔYAP3</i>	This study
yYPL058	yYPL032 with pYPL041, <i>ΔYAP3</i>	This study
yYPL059	yYPL032 with pYPL045, <i>ΔYPT1</i>	This study
yYPL060	yYPL032 with pYPL046, <i>ΔYPT1</i>	This study
yYPL061	yYPL032 with pYPL032, <i>ΔYPT1, ΔYAP3</i>	This study

yYPL062	yYPL032 with pYPL046, <i>ΔYAP3</i>	This study
yYPL063	yYPL032 with pYPL041, <i>ΔYPT1</i> , <i>ΔYAP3</i>	This study
yYPL064	yYPL032 with pYPL048, <i>ΔYPT1</i>	This study
yYPL065	yYPL032 with pYPL046, <i>ΔYPT1</i> , <i>ΔYAP3</i>	This study
yYPL066	yYPL032 with pYPL048, <i>ΔYAP3</i>	This study
yFJ440	<i>MATa his3Δ1 leu2Δ0 met15Δ0 ura3Δ0</i> <i>SynV&X</i>	This study
zYFW005	<i>MATa his3Δ1 leu2Δ0 met15Δ0</i> <i>SynV ::URA3 &X</i>	This study
yYPL0-1	<i>MATa his3Δ1 leu2Δ0 met15Δ0 ura3Δ0</i> <i>SynV ::Thaumatococcus-policistron-RFP &X</i>	This study
yYPLI-2	SCRaMbLEd strain from the yYPL0-1	This study
yYPLII-7	SCRaMbLEd strain from the yYPLI-2	This study
yYPLIII-5	SCRaMbLEd strain from the yYPLII-7	This study
yYPLIV-4	SCRaMbLEd strain from the yYPLIII-5	This study
yYPLV-4	SCRaMbLEd strain from the yYPLIV-4	This study
yYPL067	yYPL032 with pYPL049, <i>ΔYPT1</i>	This study
yYPL068	yYPL032 with pYPL050, <i>ΔYPT1</i>	This study
yYPL069	yYPL032 with pYPL051, <i>ΔYPT1</i>	This study
yYPL070	yYPL032 with pYPL052, <i>ΔYPT1</i>	This study
yYPL071	yYPL032 with pYPL053, <i>ΔYPT1</i>	This study
yYPL072	yYPL032 with pYPL054, <i>ΔYPT1</i>	This study
yYPL073	yYPL032 with pYPL055, <i>ΔYPT1</i>	This study
yYPL074	yYPL032 with pYPL056, <i>ΔYPT1</i>	This study
yYPL075	yYPL032 with pYPL057, <i>ΔYPT1</i>	This study
yYPL076	yYPL032 with pYPL058, <i>ΔYPT1</i>	This study
yYPL077	yYPL032 with pYPL059, <i>ΔYPT1</i>	This study
yYPL078	yYPL032 with pYPL060, <i>ΔYPT1</i>	This study
yYPL079	yYPL032 with pYPL061, <i>ΔYPT1</i>	This study
yYPL080	yYPL032 with pYPL048, <i>ΔYPT1</i> , <i>ΔYCL030C</i>	This study
yYPL081	yYPL032 with pYPL048, <i>ΔYPT1</i> , <i>ΔYER073W</i>	This study
yYPL082	yYPL032 with pYPL048, <i>ΔYPT1</i> , <i>ΔYER151C</i>	This study
yYPL083	yYPL032 with pYPL048, <i>ΔYPT1</i> , <i>ΔYJL047C</i>	This study

yYPL084	yYPL032 with pYPL048, <i>ΔYPT1</i> , <i>ΔYLR134W</i>	This study
yYPL085	yYPL032 with pYPL062, <i>ΔYPT1</i>	This study
yYPL086	yYPL032 with pYPL063, <i>ΔYPT1</i>	This study
yYPL087	yYPL032 with pYPL064, <i>ΔYPT1</i>	This study
yYPL088	yYPL032 with pYPL065, <i>ΔYPT1</i>	This study
yYPL089	yYPL032 with pYPL048, <i>ΔYPT1</i> , <i>ΔYER073W</i> , <i>ΔYER151C</i>	This study
yYPL090	yYPL032 with pYPL048, <i>ΔYPT1</i> , <i>ΔYER073W</i> , <i>ΔYJL047C</i>	This study
yYPL091	yYPL032 with pYPL048, <i>ΔYPT1</i> , <i>ΔYER151C</i> , <i>ΔYJL047C</i>	This study
yYPL092	yYPL032 with pYPL048, <i>ΔYPT1</i> , <i>ΔYER073W</i> , <i>ΔYER151C</i> , <i>ΔYJL047C</i>	This study
yYPL093	yYPL032 with pYPL048, pYPL066, <i>ΔYPT1</i>	This study
yYPL094	yYPL032 with pYPL048, pYPL067, <i>ΔYPT1</i>	This study
yYPL095	yYPL032 with pYPL048, pYPL068, <i>ΔYPT1</i>	This study
yYPL096	yYPL032 with pYPL048, pYPL069, <i>ΔYPT1</i>	This study
yYPL097	yYPL032 with pYPL048, pYPL070, <i>ΔYPT1</i>	This study
yYPL098	yYPL032 with pYPL048, pYPL071, <i>ΔYPT1</i>	This study
yYPL099	yYPL032 with pYPL048, pYPL071, <i>ΔYPT1</i> , <i>ΔYER073W</i> , <i>ΔYJL047C</i>	This study
yYPL100	yYPL032 with pYPL048, pYPL072, <i>ΔYPT1</i> , <i>ΔYER073W</i> , <i>ΔYJL047C</i>	This study
yYPL101	yYPL100 with pYPL073	This study
yYPL102	yYPL100 with pYPL074	This study
yYPL103	yYPL100 with pYPL075	This study

Table S3. Primers used in this study.

Primer name	Sequence (5' to 3')	Sources
HAC1-F	AACACACATAAAACAAACAAAATGGAAATGACTGA TTTTGA	This study
HAC1-R	AACACACATAAAACAAACAAAATGGAAATGACTGA TTTTGA	This study
Vps34-F	AACACACATAAAACAAACAAAATGTCACTGAACAA CATAAC	This study
Vps34-R	AATGTAGCGCTCTTACTTTATCAGGTCCGCCAGTA TTGTG	This study
KAR2-F	AACACACATAAAACAAACAAAATGTTTTTCAACAG ACTAAG	This study
KAR2-R	AATGTAGCGCTCTTACTTTACTACAATTCGTCGTG TTCGA	This study
PDI1-F	AACACACATAAAACAAACAAAATGAAGTTTTCTGC TGGTGC	This study
PDI1-R	AATGTAGCGCTCTTACTTTATTACAATTCATCGTG AATGG	This study
ERO1-F	AACACACATAAAACAAACAAAATGAGATTAAGAAC CGCCAT	This study
ERO1-R	AATGTAGCGCTCTTACTTTATTATTGTATATCTAGC TTAT	This study
BMH2-F	AACACACATAAAACAAACAAAATGTCCCAAACCTCG TGAAGA	This study
BMH2-R	AATGTAGCGCTCTTACTTTATTATTTGGTTGGTTCA CCTT	This study
SSO2-F	AACACACATAAAACAAACAAAATGAGCAACGCTAA TCCTTA	This study
SSO2-R	AATGTAGCGCTCTTACTTTATTACTTTCTTGTTTCC ACAA	This study
loxp-F	ATAACTTCGTATAATGTACATTATACGAAGTTATT CATTATCAATACTGCCATT	This study
loxp-R	ATAACTTCGTATAATGTACATTATACGAAGTTATT TACTCCGCAACGCTTTTCT	This study
loxpl-F	TCGACGGTATCGATAAAGCTATAACTTCGTATAAT GTACA	This study
loxpl-R	CGGGCTGCAGGAATTGAATTATAACTTCGTATAAT GTACA	This study
TDH3+Loxp-F	TCGACGGTATCGATAAAGCTATAACTTCGTATAAT GTACATTATACGAAGTTATTCATTATCAATACTGC CATT	This study
DIT1+Loxp-R	CGGGCTGCAGGAATTGAATTATAACTTCGTATAAT GTACATTATACGAAGTTATTTACTCCGCAACGCTT TTCT	This study
PDI1+HAC1-F	CCATTCACGATGAATTGTAACAATCAAACATGGA AATGACTGATTTTGA	This study
HAC1+PDI1-R	GCACCAGCAGAAAACCTTCATGTTTGATTGTCATGA AGTGATGAAGAAAT	This study
PDI1+ERO1-F	CCATTCACGATGAATTGTAACAATCAAACATGAG	This study

	ATTAAGAACCGCCAT	
PDI1+EH-R	TTACAATTCATCGTGAATGG	This study
HAC1+ERO1-F	ATTTCTTCATCACTTCATGACAATCAAACATGAGA TTAAGAACCGCCAT	This study
HAC1+ERO1-R	TCATGAAGTGATGAAGAAAT	This study
GENE-F	TCGCGCGTTTCGGTGATGAC	This study
YOS1-R	GCAACAGGACTAGGATGAGTA	This study
TDH2-R	TTCATCTCTTCCACCCATGTC	This study
YEL046C-R	TTAGCATCCCTTCCCTTTGC	This study
YHR033W-R	TAGTTTTGCTGGCCGCATC	This study
YMR323W-R	TGCGGTATTTACACCCGCA	This study
UBP9-R	AACGAGGCGGTCTCTTTTTT	This study
YER091C-R	TGCCTTTTTTCGACGAAGAA	This study
YGL009C-R	TGGGAGGTCATCGAAAGAGA	This study
YER138C-R	CACCAGTCACAGAAAAGCAT	This study
MSN2-F	AACACACATAAAACAAACAAAATGACGGTCGACCA TGATTT	This study
MSN2-R	AATGTAGCGCTCTTACTTTTATTAATGTCTCCATG TTTTT	This study
MSN4-F	AACACACATAAAACAAACAAAATGCTAGTCTTCGG ACCTAA	This study
MSN4-R	AATGTAGCGCTCTTACTTTATCAAAAATCACCGTG CTTTT	This study
RLI1-F	AACACACATAAAACAAACAAAATGAGTGATAAAAA CAGTCG	This study
RIL1-R	AATGTAGCGCTCTTACTTTATTAATACCGGTGTT ATCCA	This study
PAB1-F	AACACACATAAAACAAACAAAATGGCTGATATTAC TGATAAGACAG	This study
PAB1-R	AATGTAGCGCTCTTACTTTATTAAGCTTGCTCAGT TTGTTGT	This study
TIF4632-F	AACACACATAAAACAAACAAAATGACTGACCAAAG AGGTCCAC	This study
TIF4632-R	AATGTAGCGCTCTTACTTTATTAATCACTGTCCCC ATCGTTA	This study
TIF2-F	AACACACATAAAACAAACAAAATGTCTGAAGGTAT TACTGATATTGAAG	This study
TIF2-R	AATGTAGCGCTCTTACTTTATTAGTTCAACAAGGT AGCAATGTC	This study
CDC33-F	AACACACATAAAACAAACAAAATGTCCGTTGAAGA AGTTAGCA	This study
CDC33-R	AATGTAGCGCTCTTACTTTATTACAAGGTGATTGA TGGTTGAGG	This study
YAP3U-F	TCGACGGTATCGATAAAGCTATCAATTACTCTCGT TCCAACAG	This study

YAP3U-R	ACCTGAGTATTCCCACAGTTAACAATTGCTTCAGC CTTATTCT	This study
YAP3D -F	TTAAGAAAATCCTTGCTTAAATAGACTTTGACAAA AATAACTTAC	This study
YAP3D-R	CGGGCTGCAGGAATTGAATTAATCCTGCCAGTCTT GATTATTAC	This study
YPT1U-F	TCGACGGTATCGATAAAGCTAGTACACGTTTCAGTC TCTCC	This study
YPT1U-R	ACCTGAGTATTCCCACAGTTATTAGTGCTTTTCTTG TTTT	This study
YPT1D-F	TTAAGAAAATCCTTGCTTAAACAAGCGCGCCTCTA CCTTG	This study
YPT1D-R	CGGGCTGCAGGAATTGAATTAAGATAAAAAGAGA GCGTGATATAA	This study
UBC1U-F	TCGACGGTATCGATAAAGCTTTAAAATCCCTTCTG GATAAAAAGGC	This study
UBC1U-R	ACCTGAGTATTCCCACAGTTCGCTTACTTCTTACT ACTACTACTT	This study
UBC1D-F	TTAAGAAAATCCTTGCTTAAATAGATAAAAAAAA AACGCACCAAG	This study
UBC1D-R	CGGGCTGCAGGAATTGAATTACTGGAAGGCCCTT ACTGTG	This study
HRD1U-F	TCGACGGTATCGATAAAGCTCCTGTATCCTCATTC TATCCATATT	This study
HRD1U-R	ACCTGAGTATTCCCACAGTATTATTATTTTGTCTT TCTC	This study
HRD1D-F	TTAAGAAAATCCTTGCTTAAATTGCATGTTTTATA TTATACATAG	This study
HRD1D-R	CGGGCTGCAGGAATTGAATTTTATCAACCTTAGGA TTTCTGCTTC	This study
LEU-F	AACTGTGGGAATACTCAGGTATC	This study
LEU-R	TTAAGCAAGGATTTTCTTAACTTCT	This study
YPT1-F	TCGCGCGTTTCGGTGATGA	This study
YPT1-R	GGCCTTTTGCTCACATGTTCT	This study
GPD1-R	GCTTTTCTGTAACGTTACCC	This study
MED2-R	ACCGCATAGGGTAATAACTGAT	This study
AFT1-R	GATACCGTCGACCTCGAGGG	This study
FHL1-R	CAGCACATCTAACACCTCTACA	This study
YOS1-R	GCAACAGGACTAGGATGAGTA	This study
YGL009C-R	TGGGAGGTCATCGAAAGAGA	This study
2X-R	GTCTACCACCAGCATCCAAA	This study
3X-R	TGTGATGCTCGTCAGGGG	This study
4X-R	CAACTCGGTGCCGCATA	This study