

**Table S1. Top genes enriched in “Un Gfp-“ population.**

Genes in orange are expected to be enriched in this population; **YDL041W\*** overlaps completely with *SIR2/YDL042C*; N/A = slow growth or lethal phenotype; not tested for p*FUS1*-GFP expression.

Systematic Name	Common Name	Log2 Fold Change	padj	Individually Tested Phenotype	Newly Made Mutant Phenotype
YPR126C	YPR126C	9.427	4.37E-05	Gfp <sup>-</sup> ; no induction	Wild-type
<b>YLR442C</b>	<b>SIR3</b>	9.324	1.40E-08		Gfp <sup>-</sup> ; no induction
<b>YDL159W</b>	<b>STE7</b>	9.283	2.65E-05		Gfp <sup>-</sup> ; no induction
<b>YDR227W</b>	<b>SIR4</b>	9.269	2.71E-14		Gfp <sup>-</sup> ; no induction
<b>YIL011W</b>	TIR3	9.223	1.74E-06	Wild-type	
<b>YDL042C</b>	<b>SIR2</b>	9.177	1.74E-06		Gfp <sup>-</sup> ; no induction
<b>YOR212W</b>	<b>STE4</b>	9.158	5.52E-05		Gfp <sup>-</sup> ; no induction
<b>YDR103W</b>	<b>STE5</b>	9.153	4.46E-06		Gfp <sup>-</sup> ; no induction
<b>YDR443C</b>	SSN2	9.111	4.87E-05	Wild-type	
<b>YDL041W*</b>	<b>YDL041W*</b>	9.102	2.74E-08		
<b>YDR462W</b>	MRPL28	9.063	0.0009	Wild-type	
<b>YDL074C</b>	BRE1	9.041	1.71E-05		Wild-type
<b>YHR177W</b>	YHR177W	9.028	2.59E-05	Lower basal; no induction	Wild-type
<b>YOR359W</b>	VTS1	9.014	2.65E-05	Wild-type	
<b>YIL042C</b>	PKP1	9.000	1.35E-05	Wild-type	
<b>YBR085W</b>	AAC3	8.984	1.87E-08	Lower basal; no induction	Wild-type
<b>YIL066C</b>	RNR3	8.981	0.0002	Wild-type	
<b>YIL133C</b>	RPL16A	8.975	0.0020	Wild-type	
<b>YIL009W</b>	FAA3	8.973	0.0011	Wild-type	
<b>YIL012W</b>	YIL012W	8.966	0.0001	Gfp <sup>-</sup> ; no induction	Wild-type
<b>YOR369C</b>	RPS12	8.962	5.25E-09	Lower basal; no induction	N/A
<b>YIL044C</b>	AGE2	8.961	1.99E-05		
<b>YLL026W</b>	HSP104	8.952	0.0004	Wild-type	
<b>YIL093C</b>	RSM25	8.945	6.29E-05	Gfp <sup>-</sup> ; no induction	
<b>YIL032C</b>	YIL032C	8.942	1.80E-05	Wild-type	
<b>YIR013C</b>	GAT4	8.933	0.0002	Wild-type	
<b>YIL154C</b>	IMP2	8.924	0.0001	Gfp <sup>-</sup> ; no induction	Wild-type
<b>YDL073W</b>	YDL073W	8.917	2.65E-05	Wild-type	
<b>YMR088C</b>	VBA1	8.913	2.50E-05		
<b>YNL264C</b>	PDR17	8.819	4.06E-06	Gfp <sup>-</sup> ; no induction	Wild-type
<b>YIL014W</b>	MNT3	8.816	1.22E-05	Wild-type	
<b>YIL079C</b>	AIR1	8.815	0.0004	Wild-type	
<b>YHR178W</b>	STB5	8.811	2.79E-05	Wild-type	

<b>YIL025C</b>	YIL025C	8.717	0.0029	Wild-type	
<b>YBR032W</b>	YBR032W	8.679	0.0002	Lower basal	Wild-type
<b>YNR075W</b>	COS10	8.668	0.0037	Wild-type	
<b>YIL030C</b>	SSM4/DOA 10	8.632	6.60E-06	Lower basal	Lower basal
<b>YOR320C</b>	GNT1	8.537	8.09E-05		
<b>YNL288W</b>	CAF40	8.354	0.0193		
<b>YNR013C</b>	PHO91	8.328	0.0001		
<b>YKR101W</b>	SIR1	8.231	0.0047		Mixed population, most Gfp <sup>-</sup> (See Figure 3)