

Supplementary information

Dynamic control of *ERG20* expression combined with minimized endogenous downstream metabolism contributes to the improvement of geraniol production in *Saccharomyces cerevisiae*

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Table S1. Primers used in this study.

Primer name	Sequences (5'→3')	Amplified genes
<i>P_{ERG20}</i> -UP-F	GACAATCATTACCACAAGATGAACAC	<i>ERG20</i> upstream arm
<i>P_{ERG20}</i> -UP-R	GCGTACGAAGCTTCACCGCTTAGAATACCTC ACACTG	
<i>P_{ERG20}</i> -DN-F	ATGGCTTCAGAAAAAGAAATTAGG	<i>ERG20</i> downstream arm
<i>P_{ERG20}</i> -DN-R	GTCGACTTTGTCTTCAGGTGC	
<i>kanMX</i> -F	AGGTATTCTAAGCGGTGAAGCTTCGTACGCT GCAGG	<i>KanMX</i> expression cassette
<i>kanMX</i> -R	CGCATAGGCCACTAGTGGATCTGAT	
<i>P_{BTS1}</i> -F	GTGATATCAGATCCACTAGTGGCCTATGCGA CGATGTATAGCCGCCATCTC	<i>BTS1</i> promoter
<i>P_{BTS1}</i> -R	CTCTCTCCTAATTTCTTTTTCTGAAGCCATTG ATTTCCAGACTCGTAAAC	
<i>P_{CTR3}</i> -F	GTGATATCAGATCCACTAGTGGCCTATGCGA AGATAATAGACAGTCATAGCATGA	<i>CTR3</i> promoter
<i>P_{CTR3}</i> -R	CTCTCTCCTAATTTCTTTTTCTGAAGCCATAG CAGTGCTGCTACTGCCTC	
<i>P_{HXT1}</i> -F	GTGATATCAGATCCACTAGTGGCCTATGCGT GCAGGTCTCATCTGGAATATAATTCC	<i>HXT1</i> promoter
<i>P_{HXT1}</i> -R	CTCTCTCCTAATTTCTTTTTCTGAAGCCATGA TTTTACGTATATCAACTAGTTGAC	
<i>OYE2</i> -UP-F	AAAACGGAGTAGAATCGGTAAG	<i>OYE2</i> upstream arm
<i>OYE2</i> -UP-R	CGTCTATATTTAGCTTAATATGATG	
<i>OYE2</i> -DN-F	TAGTGTTAACCGTACTTTGTAG	<i>OYE2</i> downstream arm
<i>OYE2</i> -DN-R	ATAGGATGATGAATGACAGCAT	
<i>ATF1</i> -UP-F	ACTTTTTGGACATTGAGCTAAG	<i>ATF1</i> upstream arm
<i>ATF1</i> -UP-R	GAGAGCTGATAAATTGATGGT	
<i>ATF1</i> -DN-F	ATCTCACATGATGCTTGACTG	<i>ATF1</i> downstream arm
<i>ATF1</i> -DN-R	CGACGATTCTGACCCTTTCTA	
<i>OYE2-kanMX</i> -F	TAAATCATCATATTAAGCTAAATATAGACGTG AAGCTTCGTACGCTGCAGG	<i>OYE2</i> deletion fragment
<i>OYE2-kanMX</i> -R	AAATGGTGCTACAAAGTACGGTTAACTACTAC GCATAGGCCACTAGTGGATCT	
<i>ATF1-kanMX</i> -F	ATCACAATACCATCAATTTATCAGCTCTCTG AAGCTTCGTACGCTGCAGG	<i>ATF1</i> deletion fragment
<i>ATF1-kanMX</i> -R	GAATAATATCAGTCAAGCATCATGTGAGATC GCATAGGCCACTAGTGGATCT	
<i>LEU2</i> -F	CAAAGGGGACGTTCTTCACCTCCTTGGAAT GTGTTCCACTATCCTGTACATGAACTGTGGG AATACTCAGGTATCGT	<i>LEU2</i> expression cassette
<i>LEU2</i> -R	CAAATATATTCATGGCCTCTTAGTTTGGCAA CCCAAGACTCGGCATACCTCGACTACGTCGT TAAGGCCG	

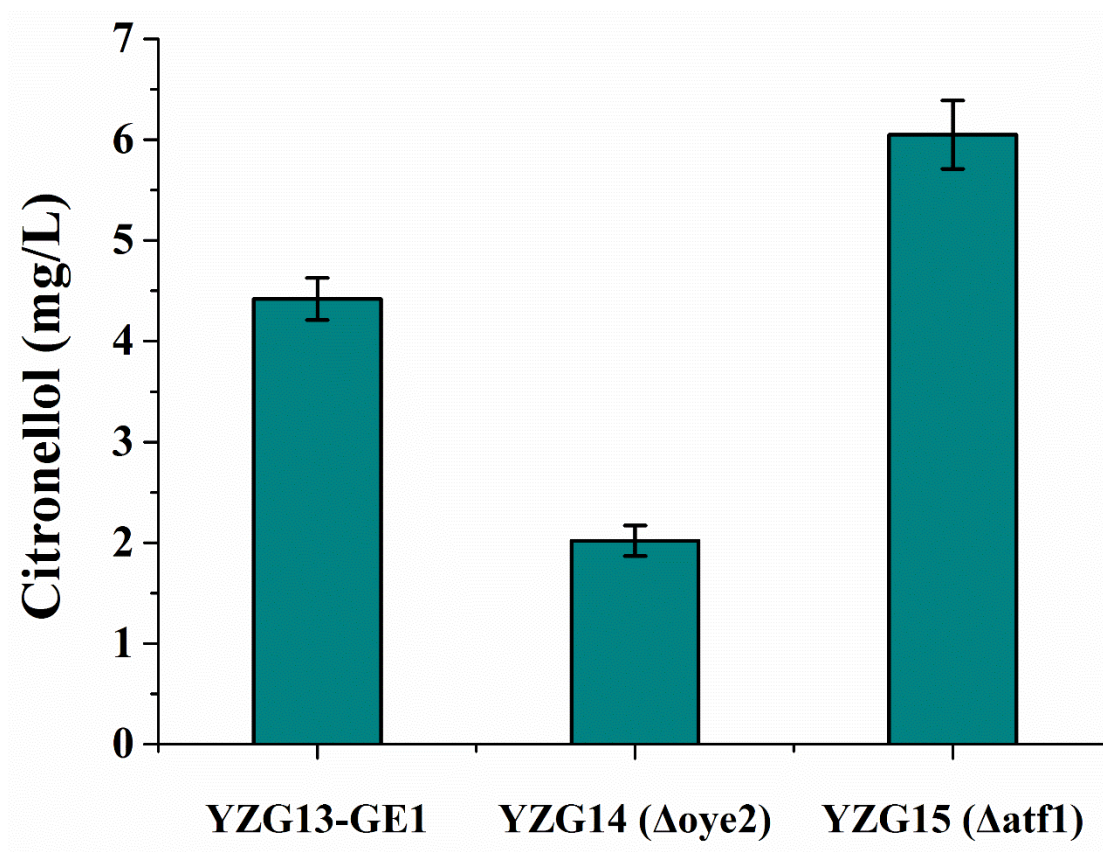


Figure S1. The conversion of geraniol to citronellol in control strain and deletion strains.

The data shown are representative of duplicate experiments, and the error bars represent the standard deviation.

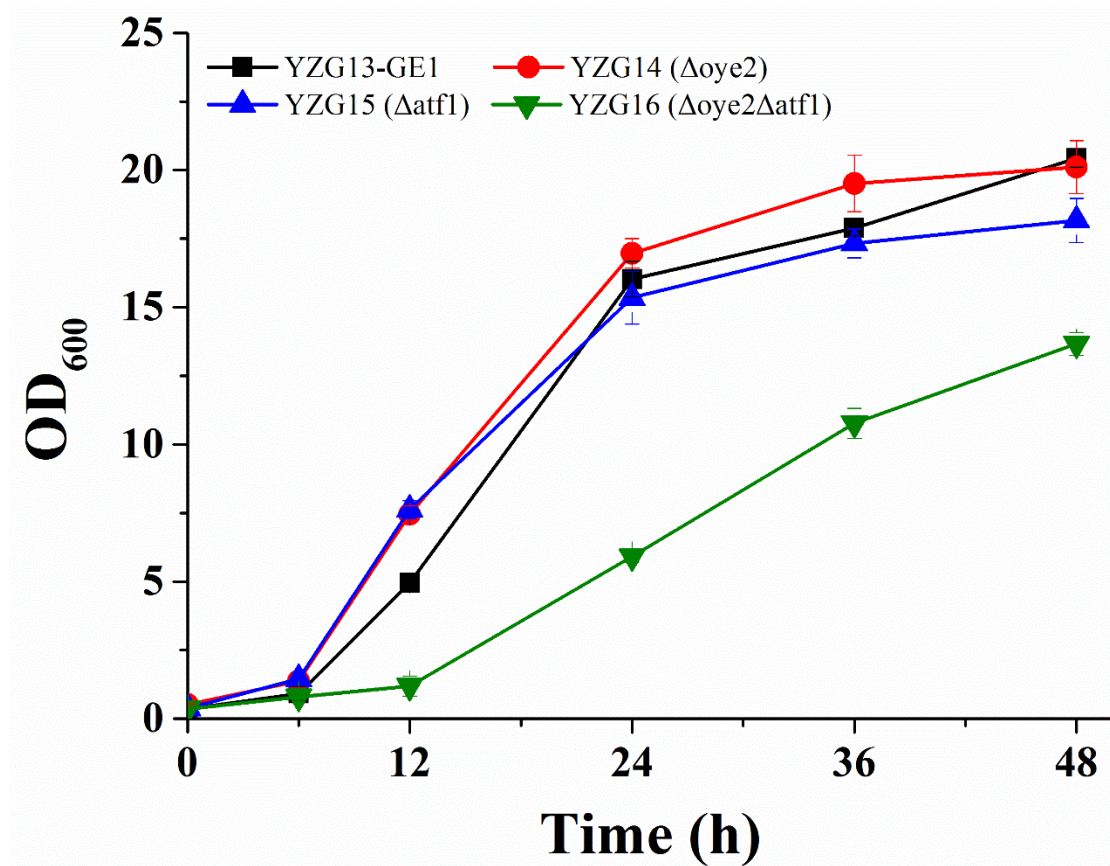


Figure S2. The effect of *OYE2* or/and *ATF1* deletion on cell growth in batch fermentation. All strains harbored pZGV6-GE1 and pZMVA4 plasmids for geraniol production. The data shown are representative of duplicate experiments, and the error bars represent the standard deviation.

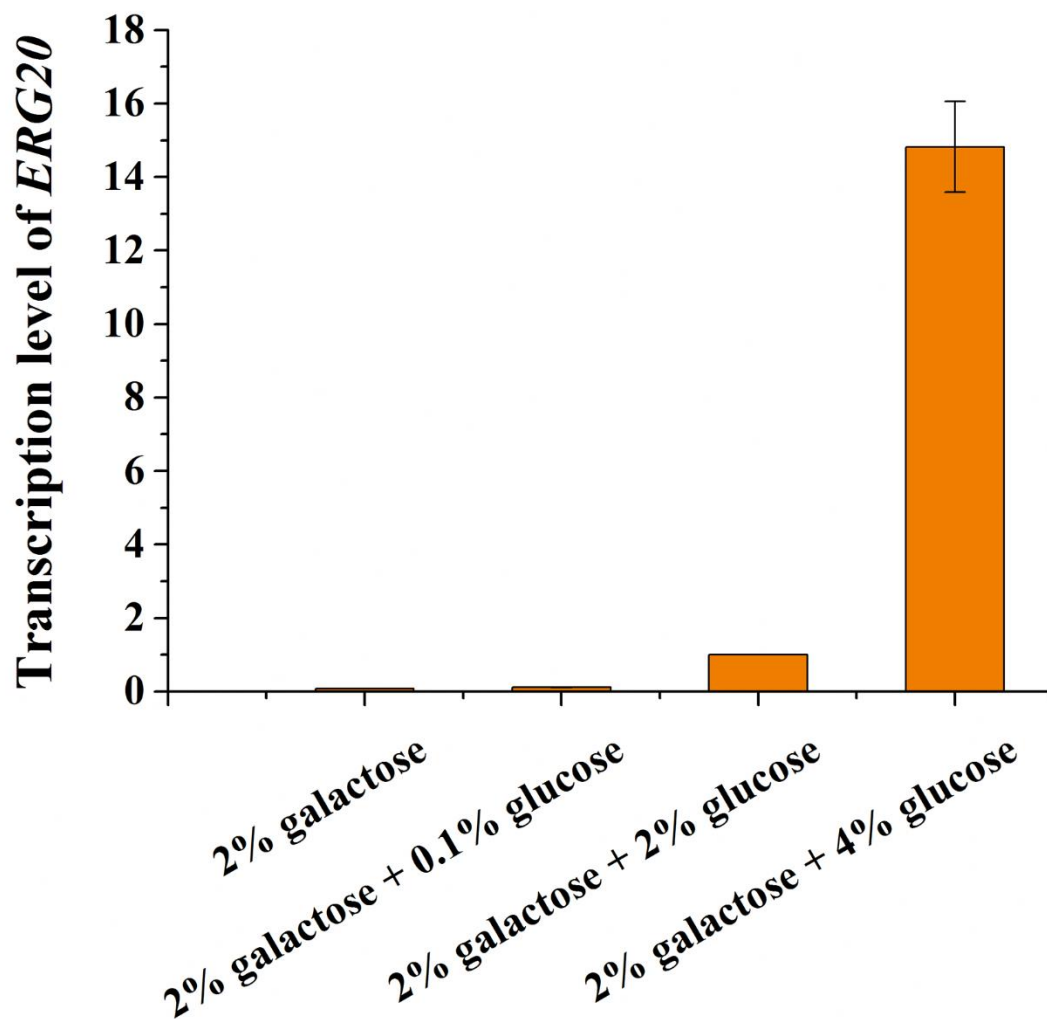


Figure S3. Transcription level of *ERG20* controlled by different promoters in SD-URA-HIS medium with different concentrations glucose. The cells were collected when OD_{600} reached 0.6 to extract mRNA for *ERG20* mRNA and transcription determination. The data shown are representative of triplicate experiments, and the error bars represent the standard deviation.

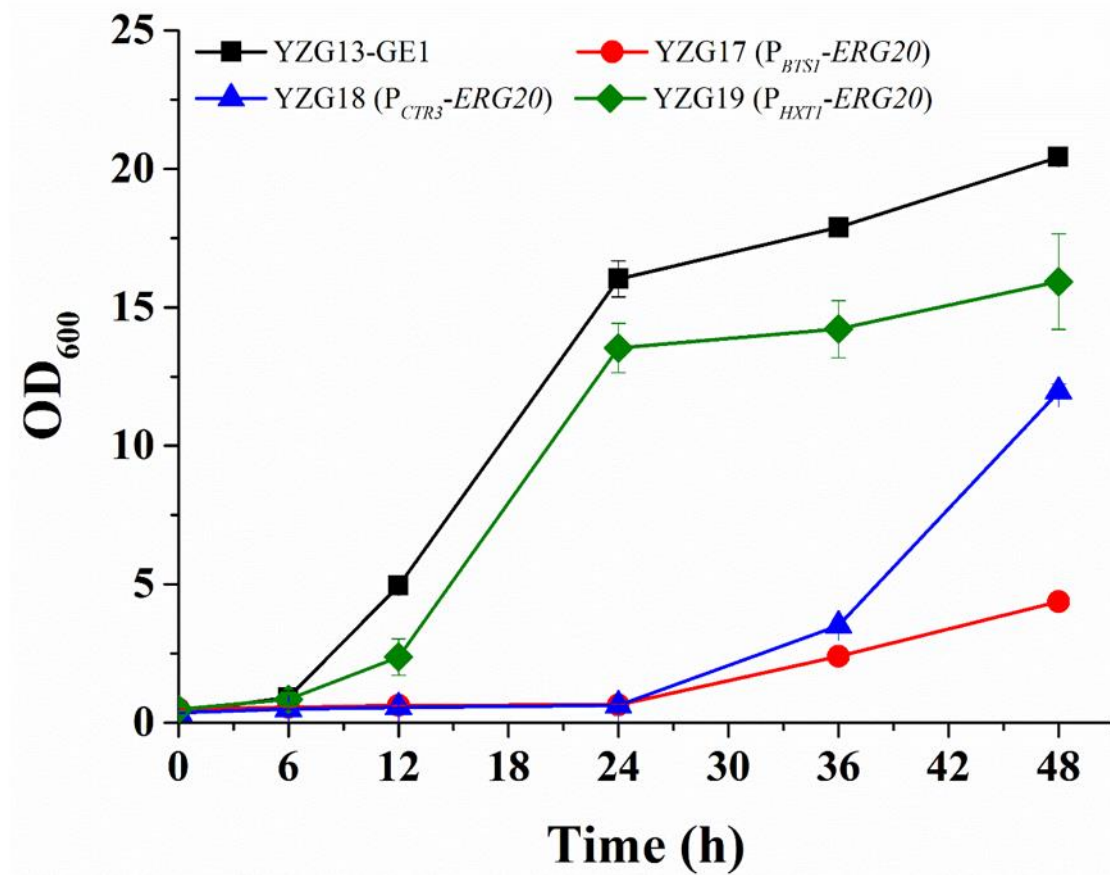


Figure S4. The effect of *ERG20* expression controlled by different promoters on cell growth in batch fermentation. All strains harbored pZGV6-GE1 and pZMVA4 plasmids for geraniol production. The data shown are representative of duplicate experiments, and the error bars represent the standard deviation.