

Table S1. Primers used in this work

Name	Primes sequence (5'→3')	Description
BGL-up	AGATCTACGTATGGTCATTTC	BGL
BGL-R	TATTCCTTCAATTCAGCAACAA	
Up-arm-F	CATCAGAGCAGATTGTACTGAGAGTGCACC AATTAAATTACGGTGTTAGAAGATGACG	$\delta 1$
Up-arm -R	AGGGAATCTGAAGAAGAAATGACCATACGT AGATCTGATATAGGAATCCTCAAAATGG	
Down-arm-F	TGCAGGCATGCTGTATAC	$\delta 2$
Down-arm-R	GCTATGACCATGATTACGCCAAGCTTGCAT GATTAAATTGAGAAATGGGTGAATGTTG	
KAN-F	CAAATTTTGTGCTGAATTGAAGGAATACA GGTCGACAACCCT	KanMX
KAN-R	CTATAATATTAGGTATACAGCATGCCTGCA GCATAGGCCACTAGTGGATCT	
XYL-F	CCGGGAAGTACCTTCAAAGAAT	IBX
XYL-R	GCAATAGATGCCTTCGAGCG	
upADH-XY-F	AAACAAGATAAGACCCATTCTTTGAAGGT ACTTCCCGGAGTCGCTACTGGCACTCTAT	upADH
upADH-R	ATGATCCGTCTCTCCGGTT	
KA-XY-F	GCTTGAGAAGGTTTTGGGACGCTCGAAGGC ATCTATTGCTACGCTGCAGGTCGACAAC	KanMX
KA-R	GCATAGGCCACTAGTGGATCTG	
adh2-F	TCAACCATTGATACCGGCG	adh
adh2-R	AAGTTATTAGGTGATATCAGATCCACTAGT GGCCTATGCTTATCTTCTACGAATCCAACGG C	
in-adh2-F	CAGCCAAAGAACCTAGACCAC	in-adh
in-adh2-R	AAGTTATTAGGTGATATCAGATCCACTAGT GGCCTATGCTCACGCTGACTTGTCTGGTT	
BamH-IBX-F	GCAAGGATTGATAATGTAATAGGGGGAAGT ACCTTCAAAGAATGGG	IBX
SalI-IBX-R	ATACGAAGTTATATTAAGGGTTGCTTCGAG CGTCCCAAAC	
IN-BGL-F	GGTACATGTTGATGATAGTAC	BGLORF
IN-BGL-R	CTAGACTCGAGTCAAATAGT	
δ -test-R	GGACGAGGCAAGCTAAAC	Sequencing
δ -test-F	TTAAGTTGGGTAACGCCAGG	

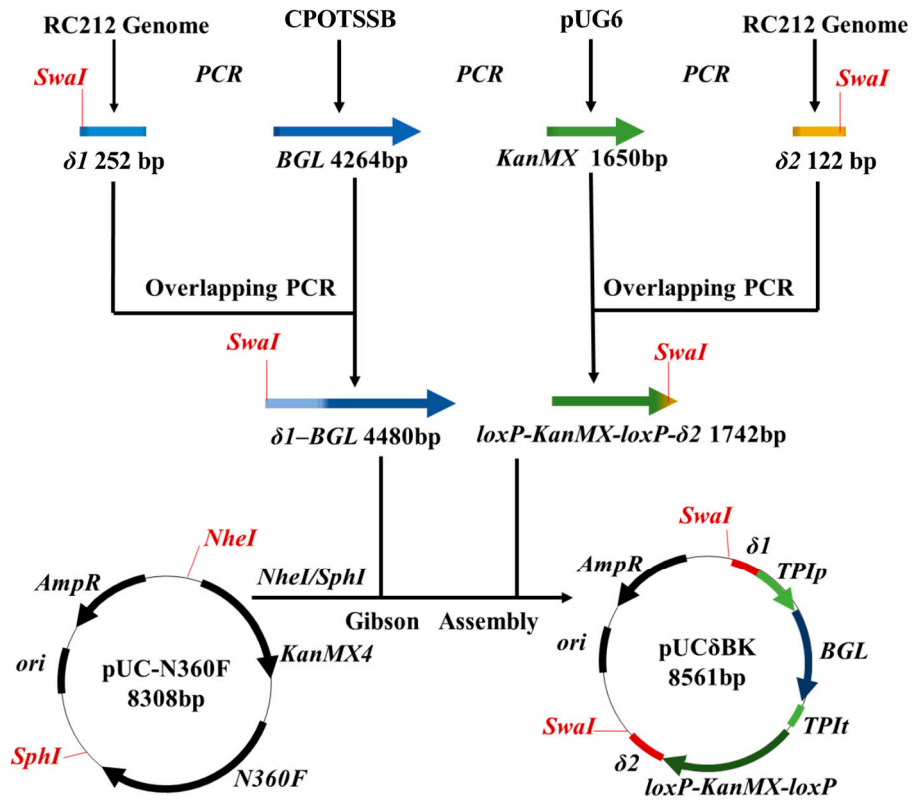


Figure S1. The construction schematic diagram of recombinant plasmid pUCδBK.

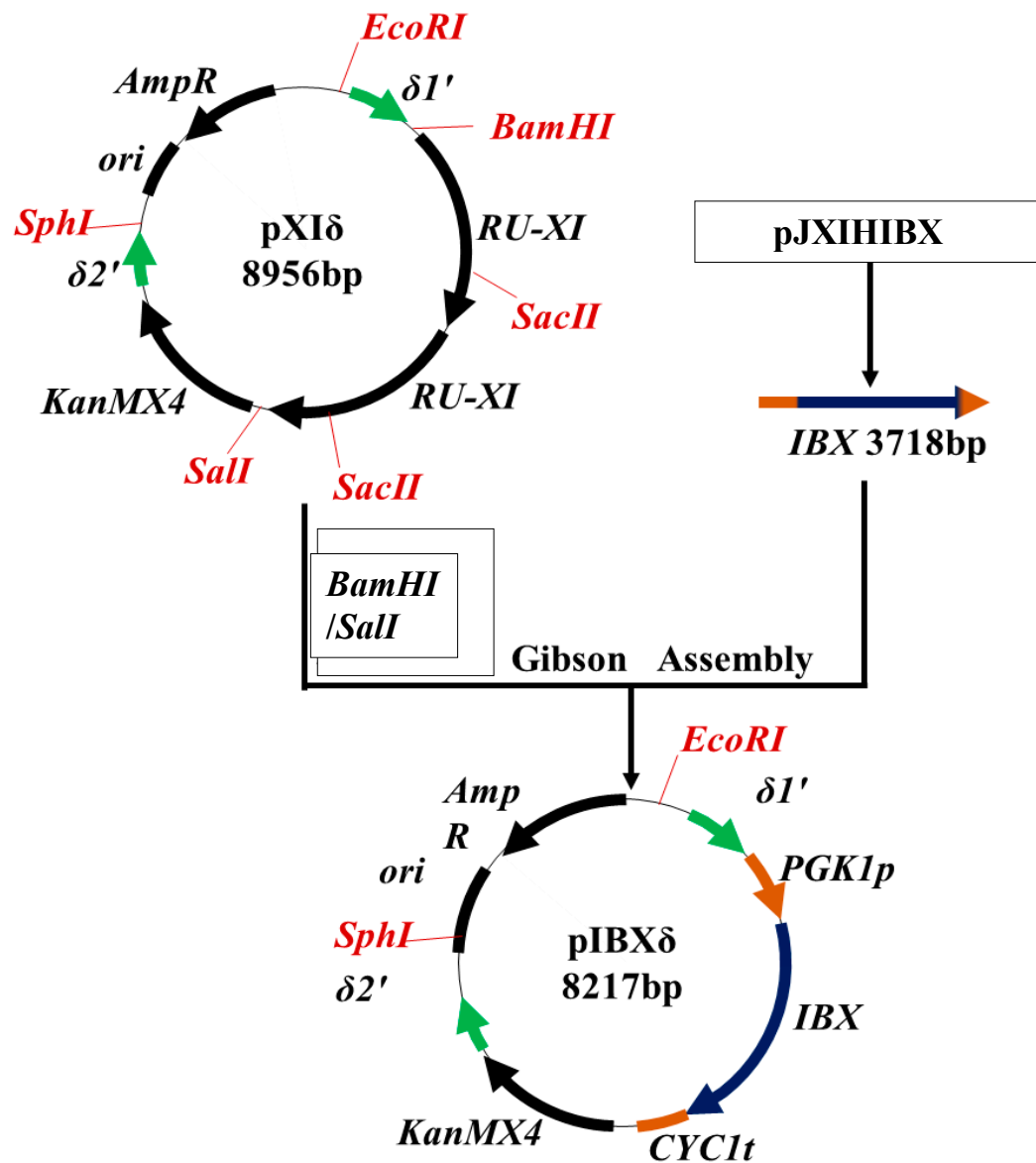
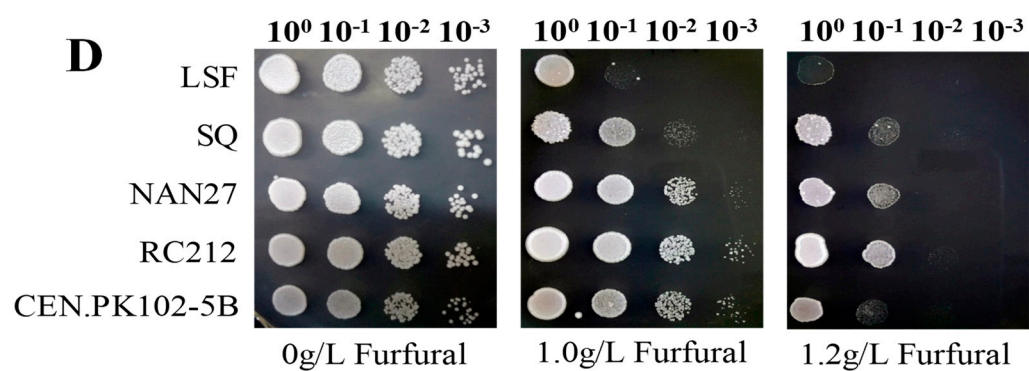
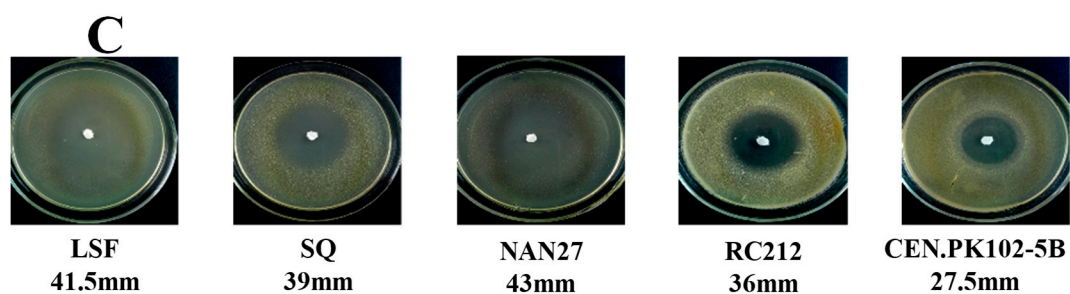
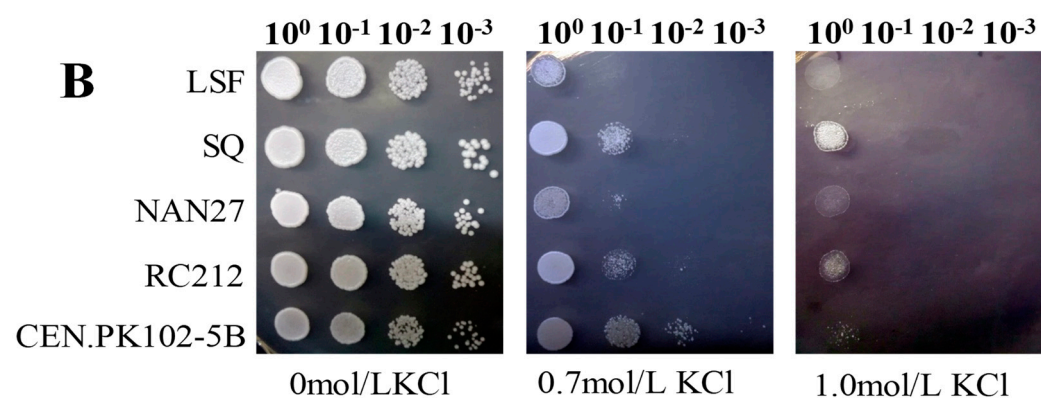
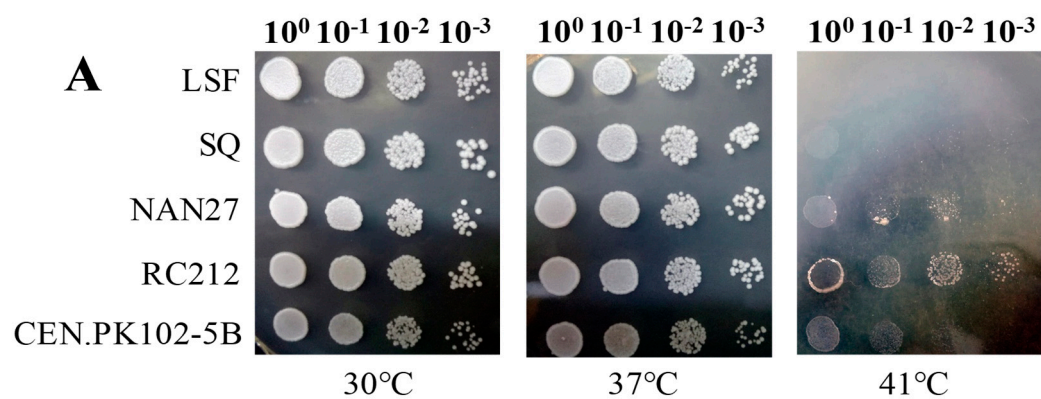


Figure S2. The construction schematic diagram of recombinant plasmid pIBXδ.



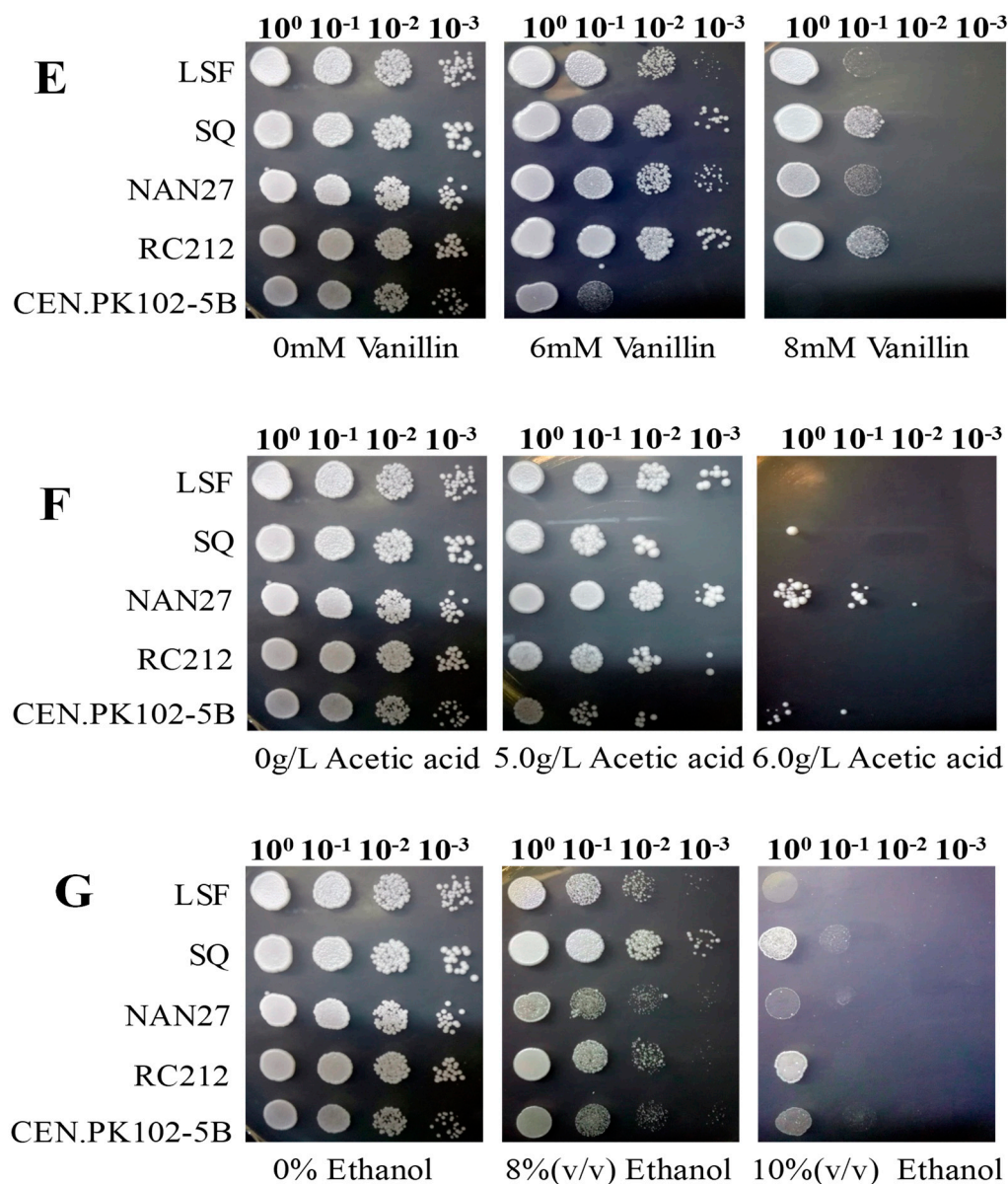


Figure S3. Growth of *S. cerevisiae* strains in solid medium under different stress conditions. (A) Temperatures; (B) Osmotic stress with different concentrations of KCl; (C) Oxidative stress with H₂O₂; (D) Furfural stress; (E) Vanillin stress; (F) Acetic acid stress; (G) Ethanol stress. In addition to detecting the oxidative stress, other *S. cerevisiae* strains were cultured and then diluted to an initial OD₆₀₀ of 1. Then 4 μ L of each suspension from 10-fold serial dilution was spotted onto the corresponding plates. For oxidative stress (C), the cells were diluted to an initial OD₆₀₀ of 2, then 100 μ L cell suspension mixed with 20 mL of YEPD solid medium cooled to about 40 $^{\circ}$ C, and finally placed a 0.5 mm diameter sterile filter paper dropped with 6 μ L of 30% H₂O₂ in the center of the plate. All plates were cultured at 30 $^{\circ}$ C for two days or longer, but two more temperatures, 37 $^{\circ}$ C and 42 $^{\circ}$ C, were considered for thermotolerance evaluation.

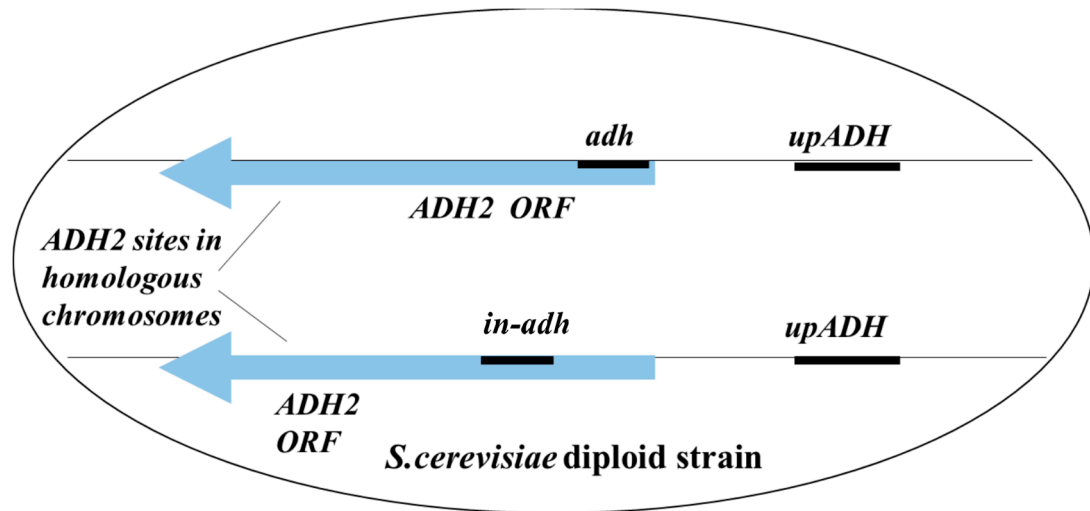


Figure S4. Relative positions of homologous arms *adh*, *upADH* and *in-adh* on the *ADH2* loci on the two chromosomes.