

**Additional file 1: Figure S1.** The structure of the two fragments used for silencing *TaClpS1*.



**Additional file 2: Figure S2.** Phylogenetic analysis of TaHEMA1 homologs and interaction of TaHEMA1 and TaClpS1.

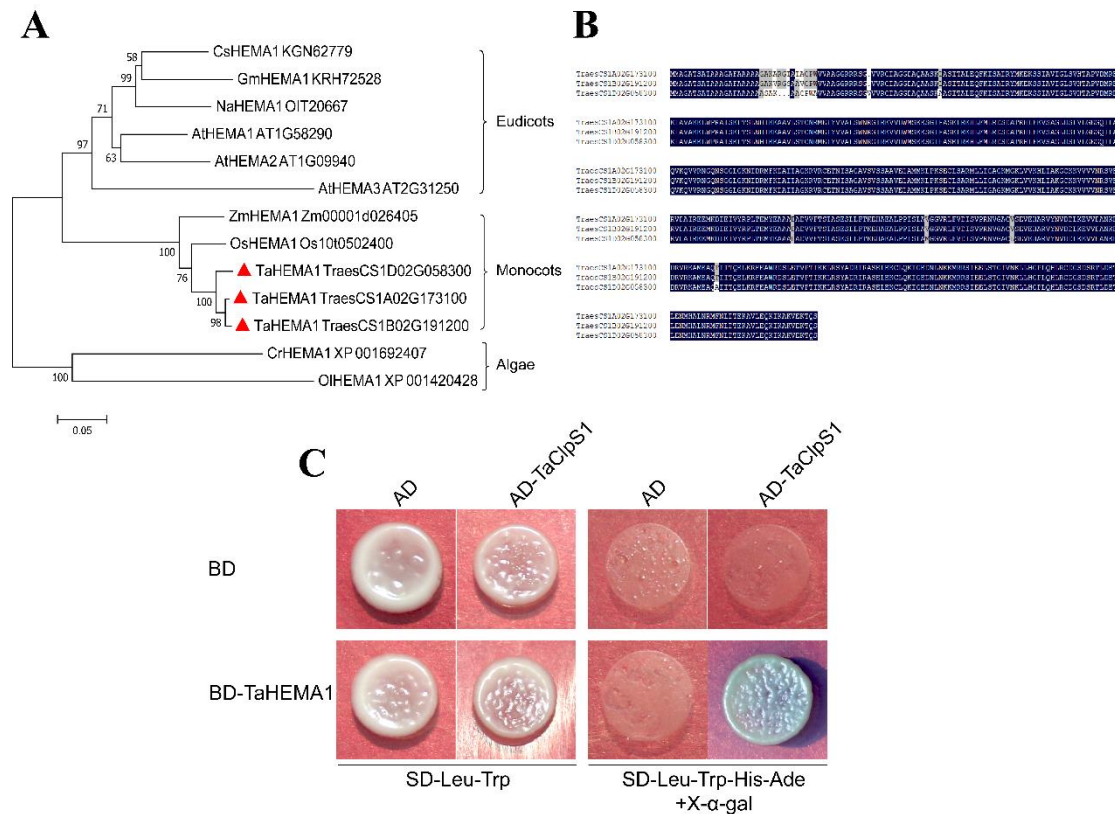


Figure S2. Phylogenetic analysis of TaHEMA1 homologs and interaction of TaHEMA1 and TaClpS1. (A) Phylogenetic analysis of TaHEMA1 and its homologs. MEGA7 software was used to generate the phylogenetic tree by the maximum likelihood method. Branches are labeled with protein names and GenBank accession numbers. Red triangles indicate TaHEMA1 copies in wheat genomes. Ta, *Triticum aestivum*; Os, *Oryza sativa*; Zm, *Zea mays*; Cs, *Cucumis sativus*; Gm, *Glycine max*; Na, *Nicotiana attenuate*; At, *Arabidopsis thaliana*; Cr, *Chlamydomonas reinhardtii*; OI, *Ostreococcus lucimarinus*. Algae was used as the outgroup. (B) Multiple sequence alignment of the protein sequence of the TaHEMA1 copies. The coding sequences of three TaHEMA1 copies were aligned by DNAMAN software. (C) Y2H interaction analysis between TaHEMA1 and TaClpS1 in yeast. The constructed TaHEMA1-BD interacts with TaClpS1-AD in yeast. Strain AH109 yeast cell containing the indicated pairs of plasmids were grown on selective media SD/-Trp/-Leu or SD/-Trp/-Leu/-His/-Ade containing 20  $\mu$ g/mL X- $\alpha$ -gal. Plates were photographed 3 days after inoculation. SD, synthetic dropout growth medium.

**Additional file 3: Table S1.** Primers used in this study.

<b>Primers</b>	<b>Sequence 5' to 3'</b>	<b>use</b>
TaEF-qRT-F	TGGTGTCAATCAAGCCTGGTATGGT	qRT-PCR primer for internal control gene TaEF1- $\alpha$
TaEF-qRT-R	ACTCATGGTGCATCTCAACGGACT	
qPCRTaClpS1-F	CAATGACAATGAAAACAGGCG	qRT-PCR assay for TaClpS1
qPCRTaClpS1-R	TGCGAGCAGACAATAACTACT	
qPCR-TaPR1-F	GAGAATGCAGACGCCCAAGC	qRT-PCR assay for TaPR1
qPCR-TaPR1-R	CTGGAGCTTGCAGTCGTTGATC	
qPCR-TaPR2-F	AGGATGTTGCTTCCATGTTTGCCG	qRT-PCR assay for TaPR2
qPCR-TaPR2-R	AAGTAGATGCGCATGCCGTTGATG	
TaClpS1-1as-F	CTAGCTGATTAATTAATGCTGCTAGGATGCTCCCCT G	Construction of BSMV: TaClpS1-1as for BSMV silencing of TaClpS1
TaClpS1-1as-R	CTAGCTGAGCGGCCGCTTTGTCTGTAGAAAGAACAT GTA	
TaClpS1-2as-F	CTAGCTGATTAATTAACCCATTGTAATCACAGCAGCT GC	Construction of BSMV: TaClpS1-2as for BSMV silencing of TaClpS1
TaClpS1-2as-R	CTAGCTGAGCGGCCGCCCCGGGATTTCTTCTTATCGA AT	
TaClpS1-486-F	CGCGGATCCATGCTGCTAGGATGCTCCCCT	Construction of pTF486-TaClpS1
TaClpS1-486-R	CATGCCATGGGCAGCCACCACTTGCAGGT	
TaClpS1-1302-F	GTAGATCTGACTAGTATGCTGCTAGGATGCTCCCCT	Construction of pCAMBIA1302-TaClpS1
TaClpS1-1302-R	GCTCACCATCCTAGGGCAGCCACCACTTGCAGGT	
TaClpS1 $\Delta$ -1302-F	GTAGATCTGACTAGTATGTTCTTTCTACAGACAAATT T	Construction of pCAMBIA1302-TaClpS1 $\Delta$
TaClpS1 $\Delta$ -1302-R	GCTCACCATCCTAGGGCAGCCACCACTTGCAGGT	
TaClpS1-AD-F	aacatggaggccagtgaattcATGCTGCCAGGATGCTCCC	Construction of AD-TaClpS1
TaClpS1-AD-R	accactgctgggtggaattcGCAGCCACCACTTGCAGG	
TaHEMA1-BD-F	tcagaggaggacctgcatatgATGATGGCGGGAGCGACG	Construction of BD-TaHEMA1
TaHEMA1-BD-R	tcgacggatccccgggaattcGCTTTGGGTCTTCTCTACCTT GG	