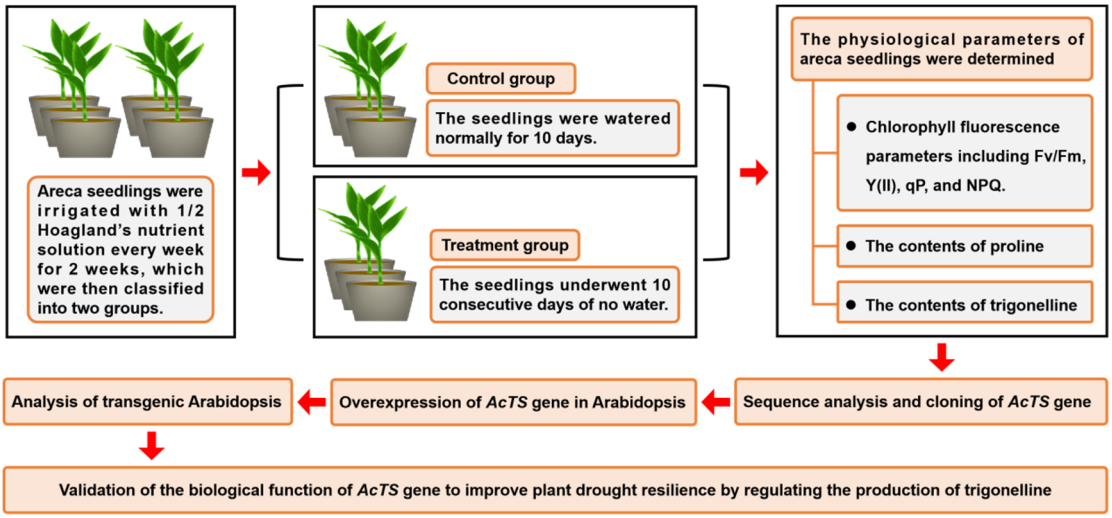
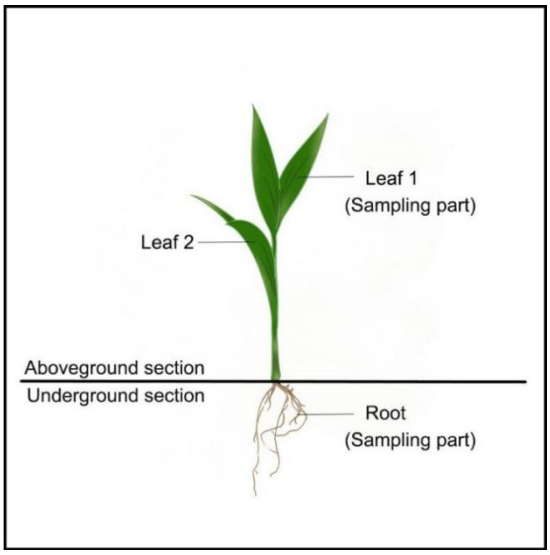
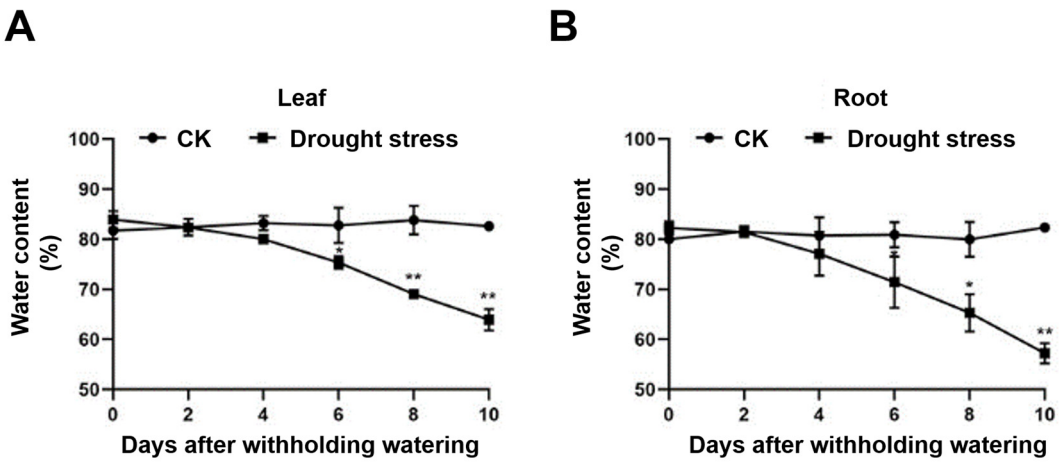


Supplementary Figure S1. The flow chart of this study



Supplementary Figure S2. Schematic diagram of areca seedling. The roots and the first leaf from the top of each seedling were collected at 0, 2, 4, 6, 8 and 10 days after treatment, which were immediately frozen in liquid nitrogen and stored at -80 °C until use.



Supplementary Figure S3. The water content in the leaf and root of areca seedling. *: P value < 0.05; **: P < 0.01.

Supplementary Table S1. The primers used for PCR

Primer name	Primer direction	Primer sequences
AcTS(KpnI)-1300F	Forward primer	GGGGTACCATGGGGTTGAACG TAGAGCAAGTTTTTCA
AcTS(BamHI)-1300R	Reverse primer	CGGGATCCTCACATTTTTGTCT TCAAAGAGATGACAAAAACAG

Note: The underlined sequences represent restriction enzyme sites, namely KpnI and BamHI.

Supplementary Table S2. The primers used for qRT-PCR

Gene name	Primer direction	Primer sequences	Product length (bp)
AcTS	Forward	TGCTCTTCCGGTCCAAACAC	228
	Reverse	GCCAGGCACTCCCACAACAT	
Actin	Forward	GTATCGTGCTTGATTCTGG	167
	Reverse	GCTACTCTTGGCTGTCTCC	

Supplementary seq 1. The full length CDS sequences of *AcTS*

ATGGGGTTGAAGGTAGAGCAAGTTTTTCACATGGTTGGAGGGGCTGGAGAGACCAGCTACGCC
ACCAACTCCAGGCTTCAAGAGAAGGCAATATTTGAAGCAAAGCCCATAGTGGAGGAGGCCGTG
AGAGAGGTCTATAAGACTGTCCTGCCTGAGAGCATGGTGGCGGCTGACTTGGGTTGCTCTTCCG
GTCCAAACACATTTCACGTGGTCTTCGAGGTGATCGATATCGTCGACGATCAGAGCCGAAGGCT
GGGACGGCCCCCGCCGGAGATCCAGTTCTTCTTGAACGATCTCCCGGGGAATGACTTCAACAAT
ATTTTTCAGTCTTTGGAAGGATACGAGAAGAAATTAAAGGAAGAGAAGGGAGAGCGGATTCTG
CCGTTCTATGTTGTGGGAGTGCCTGGCTCTTTCTATGGTAGGCTTTTCCCCTCTGGAAGCGTTCAT
TTCTTCCATTCTTCCTACTGTCTCATGTGGCTCTCCCAGGTTCCTGCGGGAGTTGAGAGTAACAC
CGGTGTTCCATTAAATGAGGGAAACATCTACATATGGGAGACAAGTCCACCTAGTGTGGTGAAA
GCATATCAAGAGCAATACCGGAGGGACTTCACCACTTTTCTCGAGTCCCGTTTCCAAGAACTCA
GTTTCGGAGGACGAATGGTCTTAACATTTTTGGGAAGGACGAGCAAAGATGCACGAAGTGGAG
AACTGAGCAAGCTTTGGGGACAACTGGCTGAGGCATTCAATGCTATGGTCCTAGAGGGTATCAT
ACAAAAGGAAAAGGTGGATGCATTCAATGTGCCTTTTTATGCACCTTCCATGGAGGAAGTGAAG
GCAGTGATACAAAGCGTAGGATTATTTGATCTCGATCGAGTACAAATATTCAAGTCAAACTGGG
ATCCACTTGATGACTCTACTGATGATTACGTACATGATAATTTTCTAAGCGGGAACAATGCGGCA
AAGACTATGAGAGCAGTGATGGAACCCGTGATTGAACGTCACTTTGGGGAGCACATACTTGATG
ATTTGTTTTCAAGATATGCAAAAAATGTCGCAAGGCACCTCTTGAAGGAGAAGACCAAGCATCC
TGTTTTTGTCATCTCTTTGAAGACAAAAATGTGA

Supplementary seq 2. Amino acid sequences of AcTS

MGLKVEQVFHMVGGAGETSYATNSRLQEKAIFEAKPIVEEAVREVYKTVLPESMVAADLGCSSGPNTF
HVVFEVIDIVDDQSRRLGRPPPEIQFFLNDLPGNDFNNIFQSLEGYEKKLKEEKGERILPFYVVGVPGSF
YGRLFPSGSVHFFHSSYCLMWLSQVPAGVESNTGVPLNEGNIYIWETSPPSVVKAYQEQYRRDFTTFL
ESRFQELSFGGRMVLTFLGRTSKDARSGELSKLWGQLAEAFNAMVLEGIIQKEKVDAFNVPFYAPSME
EVKAVIQSVGLFDLDRVQIFKSNWDPLDDSTDDYVHDNFLSGNNAAKTMRAVMEPVIERHFGEHIL
DDLFSRYAKNVARHLLKEKTKHPVFVISLKTKM*

Supplementary seq 3. The full length CDS sequences of *CaTS1*

ATGGAGCTCCAAGAAGTCCTGCATATGAATGGAGGCGAAGGCGATGCAAGCTACGCCAAGAAT
TCATCCTTCAATCAACTGGTTCTCGCCAAGGTGAAACCTGTCCTTGAACAATGCGTAGGGGAATT
GTTGCGGGCCAACTTGCCCAACATCAACAAGTGCATTAAAGTTGCGGATTTGGGATGCGCTTCC

GGACCAAACACACTTTTAACAGTTCGGGACATTGTACAAAGTATTGACAAAGTTAGGCAAGAAA
TGAAGAATGAATTAGAACGTCCCACCATTCAGGTTTTTCTGACTGATCTTTTCCAAAATGATTTCA
ATTCGGTTTTCATGTTGCTGCCAAGTTTCTACCGCAAACTTGAGAAAGAAAATGGACGCAAGAT
AGGATCGTGCCTAATAGCCGCAATGCCTGGCTCTTTCCACGGCAGACTCTTCCCCGAGGAGTCA
ATGCATTTTTTACACTCTTCTTACAGTCTTCAATTTTTATCCCAGGTTCCCAGCGGTTTGGTGACTG
AATTGGGGATCACTGCGAACAAAAGGAGCATTTACTCTTCCAAAGCAAGTCCTCCGCCCGTCCA
GAAGGCAAATTTGGATCAATTTACGAAAGATTTTACCACATTTTTAAGGATTCGTTCGGAAGAGT
TGCTTTCACGCGGCCGAATGCTCCTTACTTGCATTTGCAAAGGAGATGAATTCGACGGCCCGAA
TACCATGGACTTACTTGAGATGGCAATAAACGACTTGGTTGTTGAGGGACATCTGGAGGAAGAA
AAATTGGACAGTTTCAATGTTCCAATCTATGCAGCTTCAGTAGAAGAATTAAAGTGCATAGTTGA
GGAGGAAGGTTCTTTTGAAATTTTGTACTTGGAGACTTTTAAGCTCCGTTATGATGCTGGCTTCTC
TATTGATGATGATTGCCAAGTAAGATCCCATTCCCCAGAATACAGCGATGAACATGCTAGAGCA
GCGCATGTGGCATCATTACTTAGATCAGTTTACGAACCCATCCTCGCAAATCATTTTGGAGAAGC
TATTATACCTGACATATTCCACAGGTTTGCGACGAATGCAGCAAAGGTTATCCGCTTGGGCAAA
GGCTTCTATAATAATCTTATCATTTCTCTTGCCAAAAAACCAGAGAAGTCAGACATATAA

Supplementary seq 4. Amino acid sequences of CaTS1

MELQEVLHMNGGEGDASYAKNSSFNQLVLAKVKPVLEQCVGELLRANLPNINKCIKVADLGCASGP
NTLLTVRDIVQSIDKVRQEMKNELERPTIQVFLTDLFQNDFNSVFMLLPSFYRKLEKENGRKIGSCLIAA
MPGSFHGRLFPEESMHFLHSSYSLQFLSQVPSGLVTELGITANKRSIYSSKASPPPVQKANLDQFTKDF
TTFLRIRSEELLSRGRMLLTCICKGDEFDGPNTMDLLEMAINDLVVEGHLEEEKLDSFNVPIYAASVEELK
CIVEEEGSFEILYLETFKLRYDAGFSIDDDCQVRSHSPEYSDEHARAAHVASLLRSVYEPILANHFGEAIIP
DIFHRFATNAAKVIRLGKGFYNNLIISLAKKPEKSDI

Supplementary seq 5. The full length CDS sequences of *CaTS2*

ATGGAGCTCCAAGAAGTCCTGCATATGAATGGAGGCGAAGGCGAAGCAAGCTACGCCAAGAA
TTCATCCTTCAATCAACTGGTTCTCGCCAAGGTGAAACCTGTCCTTGAACAATGCGTACGGGAAT
TGTTGCGGGCCAACTTGCCCAACATCAACAAGTGCATTAAAGTTGCAGATTTGGGATGCGCTTC
CGGACCAAACACACTTTTAACCGTTTGGGACACTGTACAAAGTATTGACAAAGTTAGGCAAGAA
ATGAAGAATGAATTAGAACGTCCCACCATTCAGGTTTTTCTGACTGATCTTTTCCAAAATGATTTC
AATTCGGTTTTCATGCTGCTGCCAAGCTTCTACCGCAAACTTGAGAAAGAAAATGGACGCAAAA
TAGGATCGTGCCTAATAGCCGCAATGCCTGGCTCTTTCCACGGCAGACTCTTCCCCGAGGAGTC

CATGCATTTTTTACACTCTTCTTACAGTCTTCAGTTTTTATCCCAGGTTCCCAGCGGTTTGGTGACT
GAATTGGGGATCACTGCGAACAAAAGGAGCATTTACTCTTCCAAAGCAAGTCCTCCGCCCGTCC
AGAAGGCATATTTGGATCAATTTACGAAAGATTTTACCACATTTTTAAGGATGCGTTCGGAAGAG
TTGCTTTCACGTGGCCGAATGCTCCTTACTTGCATTTGTAAAGGAGATGAATGCGACGGCCCGA
ATACCATGGACTTACTTGAGATGGCAATAAACGACTTGGTTGCTGAGGGACGTCTGGGGGAAG
AAAAATTGGACAGTTTCAATGTTCCAATCTATACAGCTTCAGTAGAAGAAGTAAAGTGCATGGTT
GAGGAGGAAGGTTCTTTTGAAATTTTATACTTGCAGACTTTTAAGCTCCGTTATGATGCTGGCTTC
TCTATTGATGATGATTGCCAAGTAAGATCCCATTCCCCAGTATACAGCGATGAACATGCTAGAG
CAGCGCATGTGGCATCATTAATTAGATCAGTTTACGAACCCATCCTAGCAAGTCATTTTGGAGAA
GCTATTATACCTGACATATTCCACAGGTTTGCGACGAATGCAGCAAAGGTTATCCGCTTGGGCA
AAGGCTTCTATAATAATCTTATCATTTCTCTTGCCAAAAAACCAGAGAAGTCAGACATATAA

Supplementary seq 6. Amino acid sequences of CaTS2

MELQEVLHMNGGEGEASYAKNSSFNQLVLAKVKPVLEQCVRELLRANLPNINKCIKVADLGCASGP
NTLLTVWDTVQSIDKVRQEMKNELERPTIQVFLTDLFQNDFNSVFMLLPSFYRKLEKENGRKIGSCLIA
AMPGSFHGRLFPEESMHFLHSSYSLQFLSQVPSGLVTELGITANKRSIYSSKASPPPVQKAYLDQFTKD
FTTFLRMRSEELLSRGRMLLTCICKGDECDGPNTMDLLEMAINDLVAEGRLGEEKLDSFNVPIYTASVE
EVKCMVEEEGSFEILYLQTFKLRYDAGFSIDDDCQVRSHSPVYSDEHARAAHVASLIRSVYEPILASHFG
EAIIPDIFHRFATNAAKVIRLGKGFYNNLIISLAKKPEKSDI*

Supplementary seq 7. The full length CDS sequences of *AtTS*

ATGGAGAACGAAAGCTCAGAGAGTAGAAACAGAGCTCGTCTTGCCATTATGGAGCTTGCTAAC
ATGATTAGCGTTCCCATGTCTCTCAATGCCGCCGTGCGACTAGGCATTGCCGACGCCATTTGGA
ACGGCGGAGCCAATTCTCCTCTCTCTGCCGCCGAGATCCTCCCTCGCCTCCACCTACCATCTCA
CACTACCATTGGTGGCGACCCCGAGAATCTTCAGCGTATACTTCGGATGCTCACCAGCTACGGT
GTCTTCTCCGAACACCTTGTTGGATCCATTGAGAGGAAATACTCTCTTACGGACGTCGGAAAAA
CTCTTGTAACCGACTCCGGCGGCCTCTCTTACGCTGCCTACGTCCTCCAACATCACCAGGAGGC
GTTGATGCGAGCATGGCCACTAGTTCACACGGCAGTGGTGGAGCCGGAGACAGAGCCGTACGT
GAAAGCAAACGGCGAGGCGGCATACGCTCAGTATGGGAAAAGTGAGGAGATGAATGGTCTAA
TGCAAAAGGCAATGTCTGGCGTATCTGTACCGTTCATGAAAGCTATATTAGACGGCTACGATGG
GTTTAAATCAGTGGATATTTTGGTTGACGTAGGAGGTAGTGCAGGGGATTGTCTGCGTATGATCC

TTCAACAATTTCCTAACGTCCGTGAAGGGATTAATTTCGATTTACCTGAAGTTGTTGCCAAAGCC
CCCAATATTCCTGGAGTGACTCACGTGGGTGGGGATATGTTCCAATCAGTTCCTAGCGCTGACG
CTATCTTCATGAAGTGGGTGTTAACGACATGGACGGATGAAGAATGCAAGCAGATAATGAAGA
ATTGCTACAACGCGTTACCAGTTGGAGGAAAGCTGATTGCGTGTGAGCCGGTCTTGCCTAAGGA
AACCGATGAAAGTCACCGGACTCGTGCCTTGTTAGAAGGTGACATCTTTGTCATGACCATCTATA
GAACCAAAGGTAAGCATAGAACCGAAGAAGAGTTTATAGAGCTTGGTCTCTCCGCGGGATTCC
CTACTTTTCGACCTTTCTACATTGATTACTTCTACACCATCTTAGAGTTTCAGAAGTAA

Supplementary seq 8. Amino acid sequences of AtTS

MENESSESRNRARLAIMELANMISVPMSLNAAVRLGIADAIWNGGANSPLSAAEILPRLHLPSHTTIG
GDPENLQRILRMLTSYGVFSEHLVGSIERKYSLTDVGKTLVTDSGGLSYAAYVLQHHQEALMRAWPLV
HTAVVEPETEPYVKANGEAAYAQYGKSEEMNGLMQKAMSGVSVPFMKAILDGYDGFKSVDILVDVG
GSAGDCLRMILQQFPNVREGINFDLPEVVAKAPNIPGVTHVGGDMFQSVPSADAIFMKWVLTTWTD
EECKQIMKNCYNALPVGGKLIACEPVLPKETDESHRTRALLEGDIFVMTIYRTKGKHRTEEEFIELGLSAG
FPTFRPFYIDYFYTILEFQK*

Supplementary seq 9. The full length CDS sequences of *GmTS*

ATGGAGAAAGAGGAGAGCACGGAACAGCGAAAGCAAGCGAGGCTTGCCATTATGGAGCTCGC
CAACATGATAAGCGTTCCCATGGCGCTAAACGCCGTCGTTCGCCTCAACGTCGCCGACGCCATC
TGGCAAGGCGGCGCCAACAACCCCCTCTCCGCCGCTGAGATCCTCCCCCGCCTCCTTCCCGCC
GGCGGCGGCGACGCCGAGAACCTCCAGCGGCTCCTCCGGATGCTGGCCAGTTACGGCGTCTTC
TACGAGCACCTCTCCGCCGGCGAGCGGAAGTACTCCCTCACCGACGTCGGCAAAACGCTTGTC
ACCGATGAACAAGGCCTGTCGTACGCGCATTACGTGCTCCAACACCACCAGGATGCGTTGATG
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AAATGGGGAGCCAGCATATGGATACTATCTGAAGCACCCAGAGATGAATGACCTAATGGTGAG
GGCCATGTCAGGGGTGTCAGTGCCCTTCATTAGGGCCATGTTGGAGGGCTATGATGGCTTTCAA
GGTGTGGAGAAGCTTGTGGATGTGGGTGGTAGTGGCGGTGATTGCCTTCGTATGATCTTGGAAA
AACACCCCACCATCAAAGAAGGGATCAACTTTGACCTACCTGAAGTTGTGGCCAAAGCCCCAC
AAATCCCATTTGTAACCCATGTGGGTGGTGACATGTTCAAGTTTATTCCCCAAGGAGATGCTATC
TTCATGAAGTGGGTGCTAACAACATGGACTGATGAAGAATGCAAGCACATAATGCAGAACTGTC
ACAAGGCACTCCCTGAGGGAGGAAAACTAATAGCATGTGAGCCAGTGCTCCCGGAGGACTCAG
ACGAGAGTCACAGAACGAGGGCATTGCTTGAAGGTGACATTTTTGTGATGACAATCTACAGAGC

CAAAGGGAAGCACAGGACTGAAGAACAGTTCAGGCAATTAGCCATTGATGCAGGCTTCCCTCG

TTTCAGAGCCTTCCATGTTGACCATTTCTACACTGTCCTTGAGTTTCAGAAATGA

Supplementary seq 10. Amino acid sequences of GmTS

MEKEESTEQRKQARLAIMELANMISVPMALNAVVRLNVADAIWQGGANNPLSAAEILPRLLPAGGG

DAENLQRLLRMLASYGVFYEHLSAGERKYSLTDVGKTLVTDEQGLSYAHYVLQHHQDALMRAWPM

VHEAVVDPTKEPFERANGEPAYGYYLKHPEMNDLMVRAMSGVSVPFIRAMLEGYDGFQGVEKLVDV

GGSGGDCLRMILEKHPTIKEGINFDLPEVVAKAPQIPFVTHVGGDMFKFIPQGDAIFMKWVLTTWTDE

ECKHIMQNCHKALPEGGKLIACEPVLPEDSDESHRTRALLEGDIFVMTIYRAKGKHRTEEQFRQLAIDA

GFPRFRAFHVDHFYTVLEFQK*

Supplementary seq 11. The full length CDS sequences of *OsTS*

ATGGGCGGCGGAGGAGACGGCGAACTGTCCCCGGCGGAGGCCAGGCTGGCGATGATGGAGCT

CGCCAACATGATCTCCGTCCCCATGGCGCTCACCGCCGTCATCCGCCTCGGCGTCCCCGCCAA

GCTCTGGGCGGGAGGCGCCAACGCCCCGCTCGCCGCCGCCGACCTCCTCCCCGCGGGCCACC

CGGACCCCTCCGTCCTCGAGCGCCTCCTCCGCCTCCTCGCCTCCCGCGGCGTCTTCTCCGAGCA

CACCGGATCATCCTCCCCCTCCCCGCGCCGCTTCTCGCTCACCGCCGTCGGCCGCACCCTCGTC

CCCGGCGGCGGCGGTAGCCCCTCCGGCTCCGGCGCGTCCTACGCCGACTACGTTCTGCAGCAC

CACCAGGATGCGCTCGTCCGCGCCTGGCCCCTCCTCCACGAGGCCGTCCTCGACCCCTCCGGC

CCCGAGCCCTTCGCCCGCGCCAACGCCGGCGTCCCCGCCTACGCCTACTACGGCAAGGACAG

GGAGGCGAACGAGGTGATGCTCCGGGCGATGACGGGGGTGTCGGAGCCGTTCATGGAGGCGC

TGCTGGAGGGCTACGGCGACGGCGGGTTCGAGGGGGTGAGCACGCTGGTGGACGTGGGAGGC

AGCTCCGGCGCGTGCCTGGAGATGATCATGCGGCGGGTCCGCACCATCCGGGACGGCGTCAA

CTTCGACCTGCCCGACGTCGTCGCGGCGGCGCCGCCCATTCCCGGAGTGAGGCATGTTGGCGG

GGACATGTTCAAGTCCATCCCCTCCGGTGATGCCATCTTCATGAAGTGGGTTCTGACGACATGG

ACGAACGAGGAGTGCACGGCGATCCTGAGCAACTGCCACAAGGCGCTGCCGGGCGGCGGGAA

GGTGATCGCCTGCGAGCCGGTGGTGCCGGACACGACGGACGGCAGCACGAGGACGAGGGCG

CTGCTGGAGAACGACATCTTCGTCATGGCCACCTACCGGACTCAGGGCAGGGAGCGATCCGAG

GAGGAGTTCCGCCACCTCGGCCTCGCCGCCGGCTTCGCCTCCTTCCGGGCCATCTACCTCGACC

CTTTCTACGCTGTCCTCGAGTACACCAAGTAG

Supplementary seq 12. Amino acid sequences of OsTS

MGGGGDGELSPAEARLAMMELANMISVPMALTAVIRLGVPAKLWAGGANAPLAAADLLPAGHPD

PSVLERLLRLLASRGVFSEHTGSSSPSPRRFSLTAVGRTLVPGGGGSPSGSGASYADYVLQHHQDALV

RAWPLLHEAVLDPSGPEPFARANAGVPAYAYYGKDREANEVMLRAMTGVSEPFMEALLEGYGDGG

FEGVSTLVDVGGSSGACLEMIMRRVRTIRDGVNFDLPDVVAAAPPIPGVRHVGGDMFKSIPSGDAIF

MKWVLTTWTNEECTAILSNCHKALPGGGKVIACEPVVPDTTDGSTRTRALLENDIFVMATYRTQGRE

RSEEEFRHLGLAAGFASFRAIYLDPFYAVLEYTK*