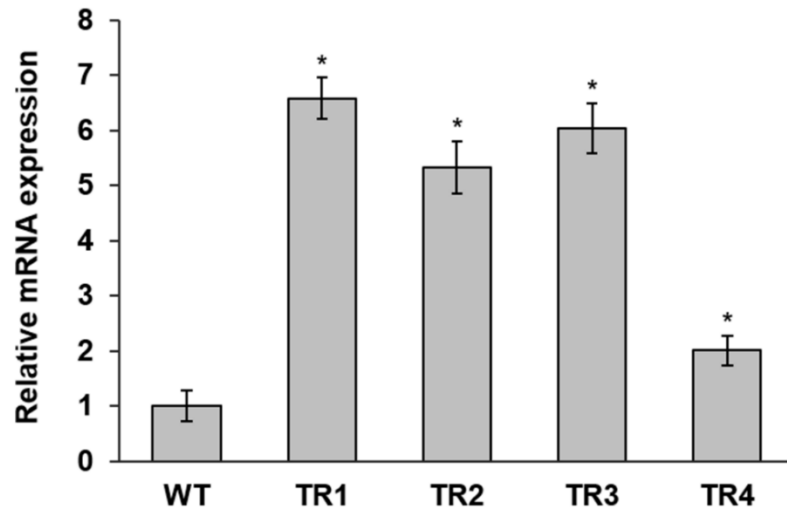
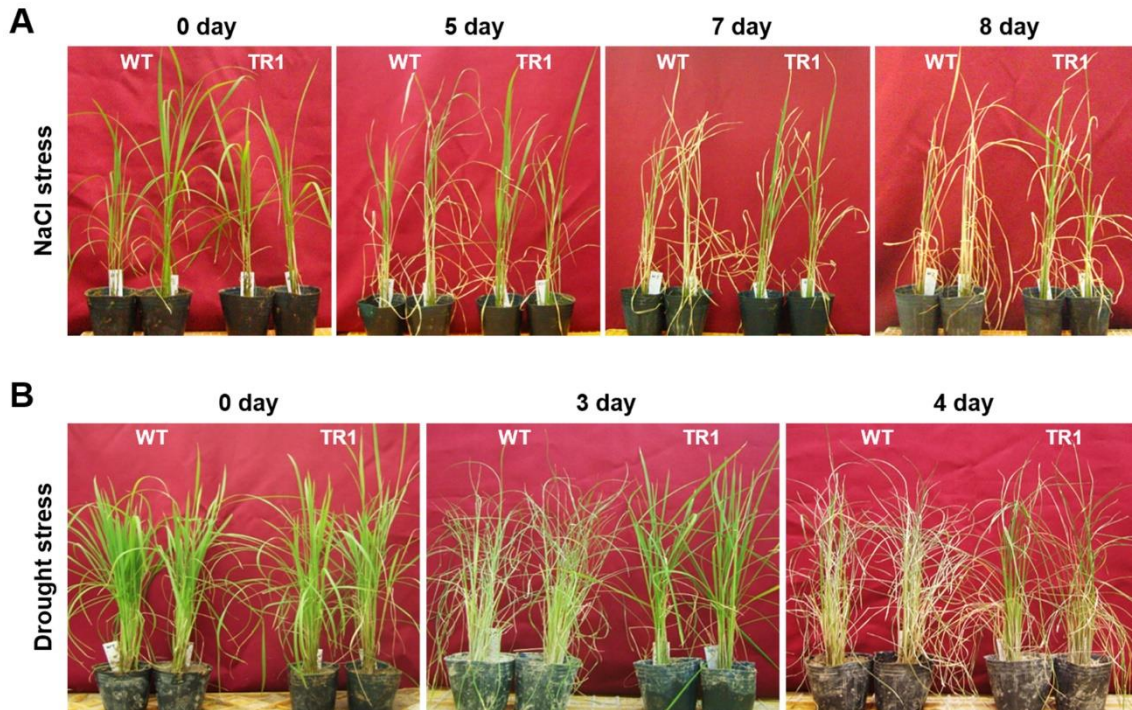


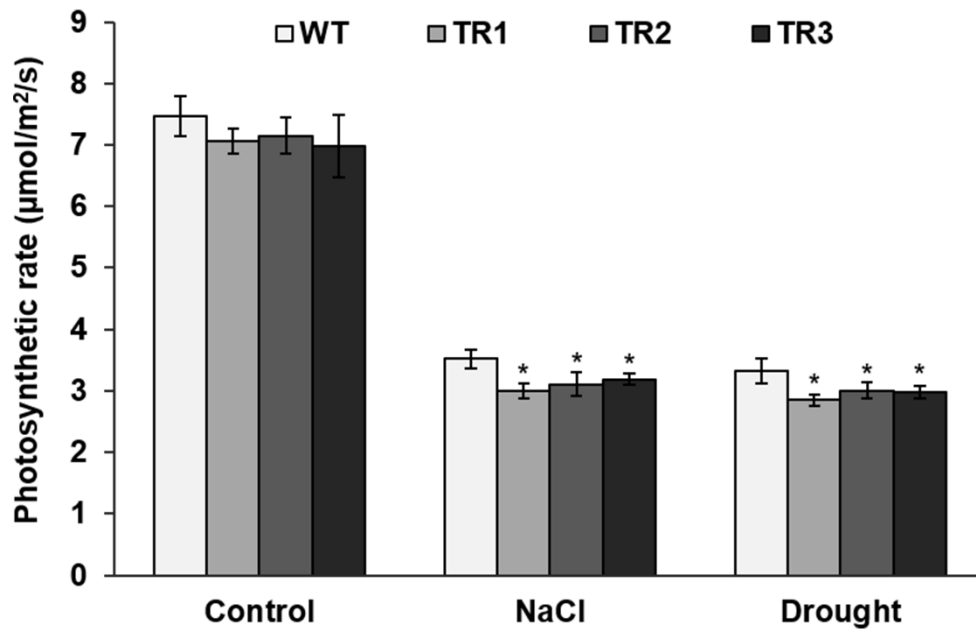
Supplementary Figure S1. Production of *OsASR1*-overexpressing transgenic rice plants. **(A)** Schematic representation of the genomic structure of the *OsASR1* gene including a maize ubiquitin promoter (*Ubi-p*), the *OsASR1* coding regions, and the nos terminator (*Tnos*), which was derived from the nopaline synthase gene. The antibiotic resistance gene, hygromycin (*hgh*), was used as a selection marker. LB, left border; RB, right border; attR1 and attR2, the gateway recombination sites in the *pGA2897* binary vector. **(B)** PCR confirmation of *OsASR1* expression in four independent transgenic plants (TR1, TR2, TR3, and TR4) using primer sets (Ubi-F1, OsASR1-R1, Tub-F, and Tub-R).



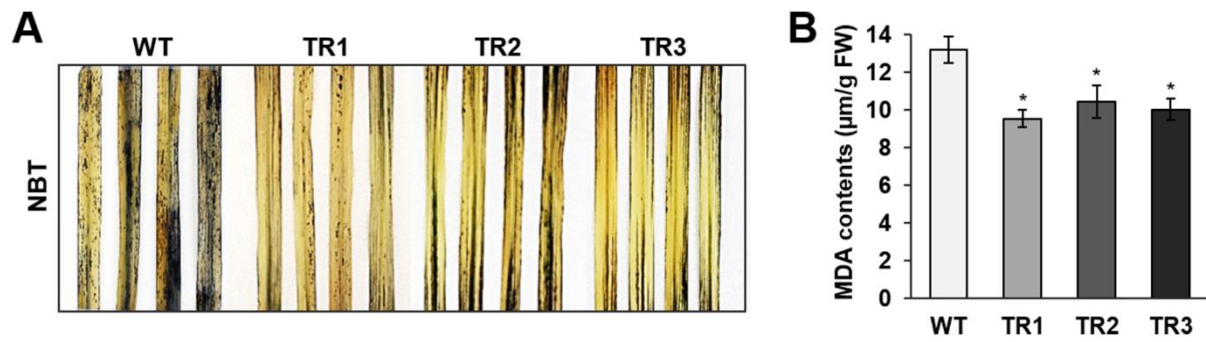
Supplementary Figure S2. Relative expression levels of *OsASR1* in four-week-old *OsASR1*-overexpressing transgenic and WT rice plants.



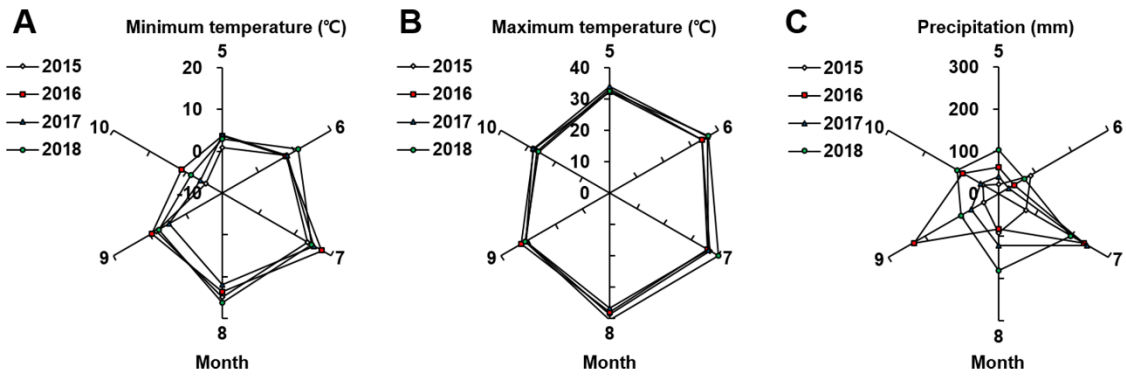
Supplementary Figure S3. Analysis of salt and drought tolerance in *OsASR1*-overexpressing transgenic plants. **(A)** Four-week-old seedlings ($n=15$) after treatment with 200 mM NaCl for 5, 7, and 8 d. **(B)** Four-week-old seedlings ($n=30$) after exposure to non-watered conditions for 3 and 4 d.



Supplementary Figure S4. Net photosynthetic rate in leaves of WT and transgenic rice plants subjected to salt and drought stress for 5 and 2 d, respectively.



Supplementary Figure S5. Analysis of superoxide ion (O_2^-) and malondialdehyde (MDA) contents in *OsASRI*-overexpressing transgenic plants. **(A)** Phenotype of nitro blue tetrazolium (NBT) staining and **(B)** MDA contents in transgenic and WT plants 7 weeks after transplanting in the paddy fields. Asterisks indicate significant differences between treatments determined by Student's *t*-test ($P < 0.05$).



Supplementary Figure S6. Weather conditions during the cultivation periods (May–October) from 2015 to 2018 in the paddy field experiments. **(A)** Average minimum temperature for 6 months. **(B)** Average maximum temperature for 6 months. **(C)** Average monthly precipitation for 6 months.

Supplementary Table S1. Location of gene insertion and copy number through flanking sequence analysis.

| Line | Chromosome | Chr_start | Chr_end | Type | Gene ID | Description |
|------|------------|-----------|----------|---------------------|-------------------------------------|---|
| TR1 | chr12 | 1167426 | 1167554 | Intergenic | Os12t0124100-01 upstream 2.135kb | Conserved hypothetical protein. |
| TR2 | chr02 | 8490179 | 8490353 | 5'Upstream- 1000 | Os02t0250300-01 upstream 0.213kb | Bromodomain containing protein. |
| TR3 | chr12 | 17655452 | 17655685 | Intergenic | Os12t0480300-01 upstream 4.197kb | Hypothetical gene. |
| | chr02 | 6677022 | 6676822 | 5'Upstream- 1000 | Os02t0219800-01 upstream 0.096kb | Tetraspanin domain containing protein. |

Supplementary Table S2. Primer sequences used in this study.

| Oligo name | Oligonucleotide sequences (5'-3') |
|------------|-----------------------------------|
| OsASR1-FC | CACCTAACTCTGTCTGAAGGAAGCTAAGA |
| OsASR1-RC | AATTATGGGGAGAAAGTAATTAAGCA |
| Ubi-F1 | CATCTTCATAGTTACGAGTTTAAGATGGAT |
| OsASR1-F1 | AGCACCACCACCTGTTCCAC |
| OsASR1-R1 | ACTAGATCGATCCCGATCGAATGA |
| Tub-F | GAGTACCCTGCCGCATGAT |
| Tub-R | GTGGTCAGCTTGAGAGTCCT |
| OsZEP1-F | TCTGGGACCATTGTCGTTTTT |
| OsZEP1-R | GCTCAACATCAAAGGCATTCC |
| OsNCED4-F | GATTGCACGGCACCTTCATT |
| OsNCED4-R | CTCTGTAATTTGATTTTTCACTGGCTAAT |
| OsNCED5-F | GGATGGGCTGAACTTCTTCCAG |
| OsNCED5-R | CAGCACATTCGTGATGAACCCT |
| OsRab21-F | CACACCACAGCAAGAGCTAAGTG |
| OsRab21-R | TGGTGCTCCATCCTGCTTAAG |
| OsRab16C-F | TTCCCGGCCAGCACTAAAT |
| OsRab16C-R | AAACTGCACGTACATCACGACAT |
| OsRab16D-F | CGGGTAAACAATAAAGTCGTGATG |
| OsRab16D-R | GCGCACTTACATACAGTGCTACGT |
| OsMOC1-F | CCATTGCTGGCCTTATGTGA |
| OsMOC1-R | CCCCATCATTACCCACCAAA |
| OsDLT-F | ACGCGGTCGAGGAGTATGG |
| OsDLT-R | ATCGTCCCTGCAATGGATTG |
| OsMPH1-F | CATCCTGTCAGCCTCCAGAAG |
| OsMPH1-R | CCCCTGACGCGTAAATGC |
| OsPROG1-F | TGAGTTCGGCAAGCAAACG |
| OsPROG1-R | ATCCTTCCCTCCATTACTTCTTC |