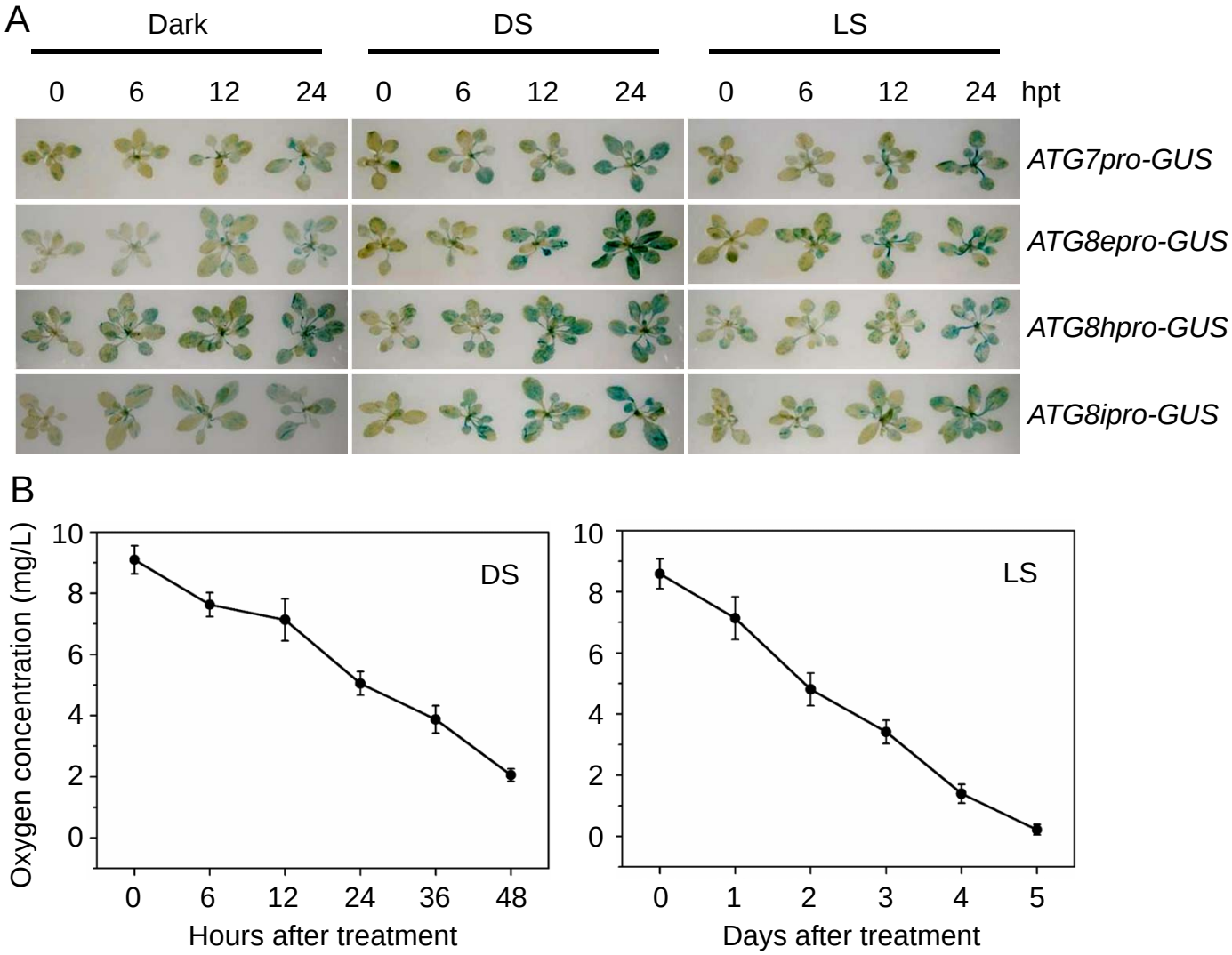

Figure S1. Submergence-inducible expression of *ATG7pro-GUS*, *ATG8epro-GUS*, *ATG8hpro-GUS*, and *ATG8ipro-GUS* reporters and oxygen determination after submergence. (**A**) Histochemical GUS staining of *ATG7pro-GUS*, *ATG8epro-GUS*, *ATG8hpro-GUS*, and *ATG8ipro-GUS* transgenic lines. Four-week-old transformants were subjected to light submergence (LS), dark submergence (DS) or dark (Dark) treatments for 0, 6, 12, and 24 h, and were subsequently stained with X-Gluc. hpt, hours post treatment. (**B**) The oxygen levels around the underwater plants upon submergence. Four-week-old plants were submerged under light (LS; left graph) or dark (DS; right graph) conditions in a plastic box, and the oxygen concentrations in the underwater areas around the submerged plants were measured by the dissolved oxygen analyzer.

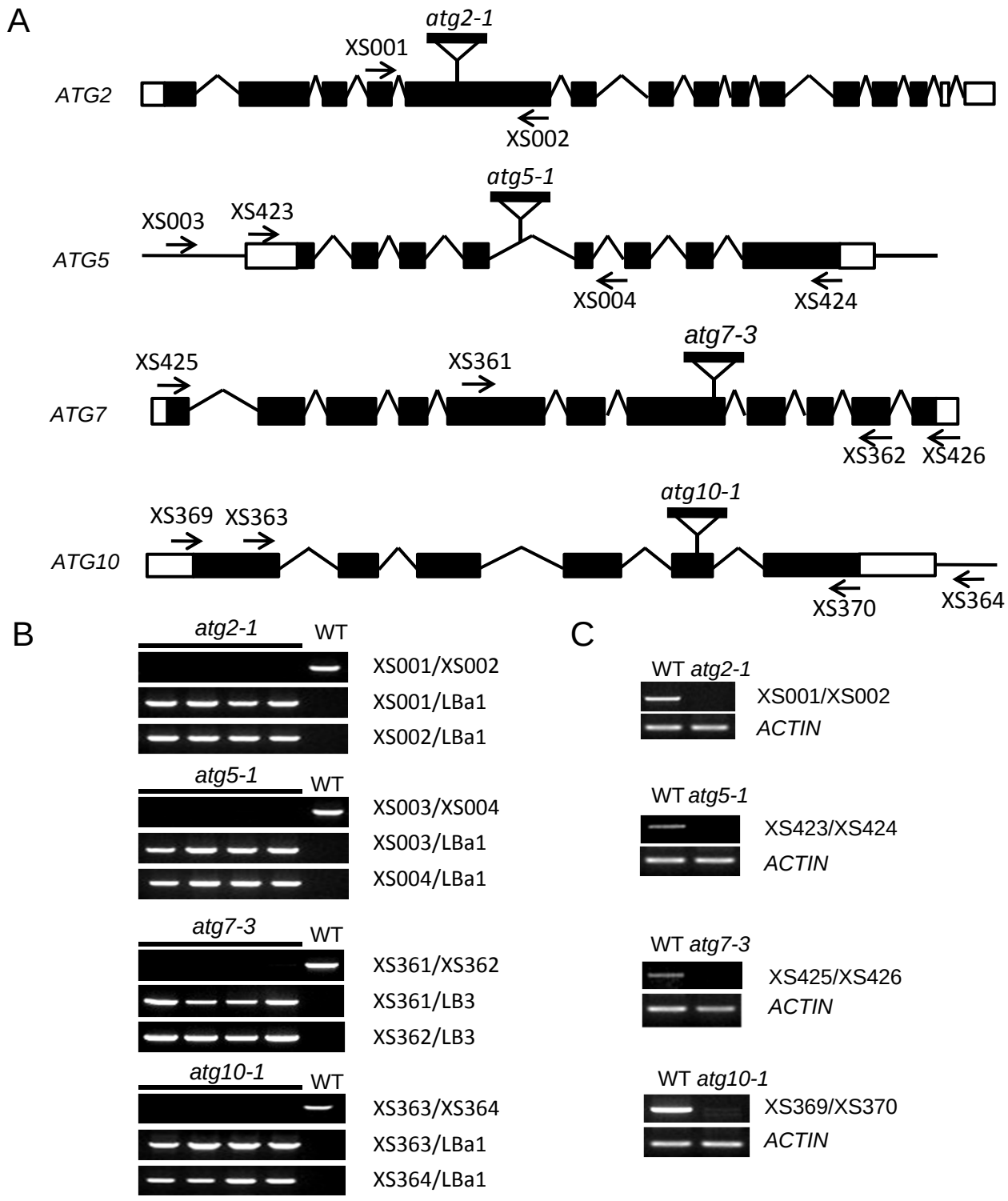

Figure S2. Molecular identification of T-DNA insertion mutants in *ATG2*, *ATG5*, *ATG7*, and *ATG10*. (**A**) T-DNA insertion sites in *atg2-1* (SALK_076727), *atg5-1* (SAIL_129_B07), *atg7-3* (SAIL_11_H07), and *atg10-1* (SALK_084434C). Primers used for genotyping are indicated. White and black boxes indicate UTRs and exons, respectively. Lines between the black boxes indicate introns. (**B**) Genotyping of the *atg2-1*, *atg5-1*, *atg7-3*, and *atg10-1* mutants using PCR. Genomic DNAs isolated from the wild type (WT), *atg2-1*, *atg5-1*, *atg7-3*, and *atg10-1* mutants were amplified using the primer pairs indicated at right. (**C**) RT-PCR analysis showing the decreased or absent expression of *ATG* in the *atg2-1*, *atg5-1*, *atg7-3*, and *atg10-1* mutants. Total RNAs isolated from WT, *atg2-1*, *atg5-1*, *atg7-3*, and *atg10-1* mutants were subjected to RT-PCR using the primer pairs indicated at right. The expression of *ACT2* was used as a control.

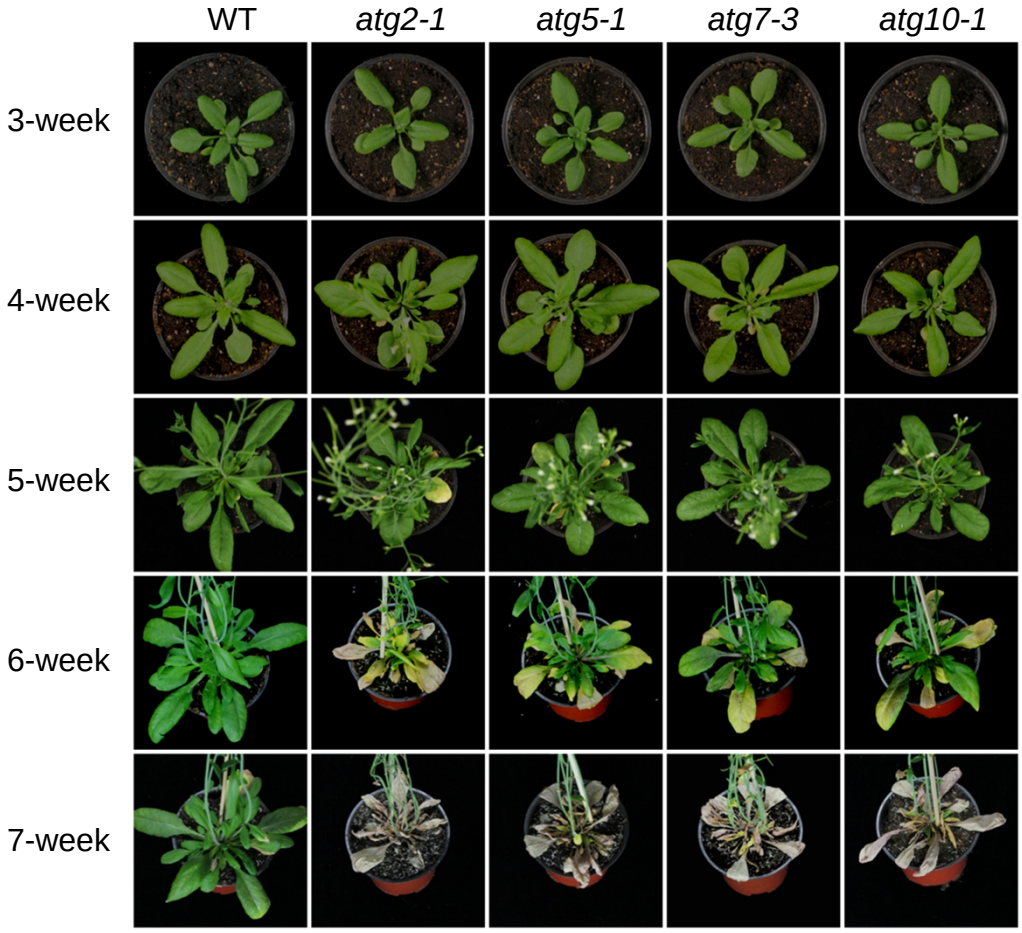

Figure S3. Characterization of the senescence phenotype of *atg* mutants. Images showing the age-dependent leaf senescence in the wild type (WT) and *atg* mutants (*atg2-1*, *atg5-1*, *atg7-3*, and *atg10-1*) under normal growth conditions. Photos were taken at 3, 4, 5, 6, and 7 weeks after germination. As expected, all the *atg* mutants showed accelerated leaf senescence phenotypes.

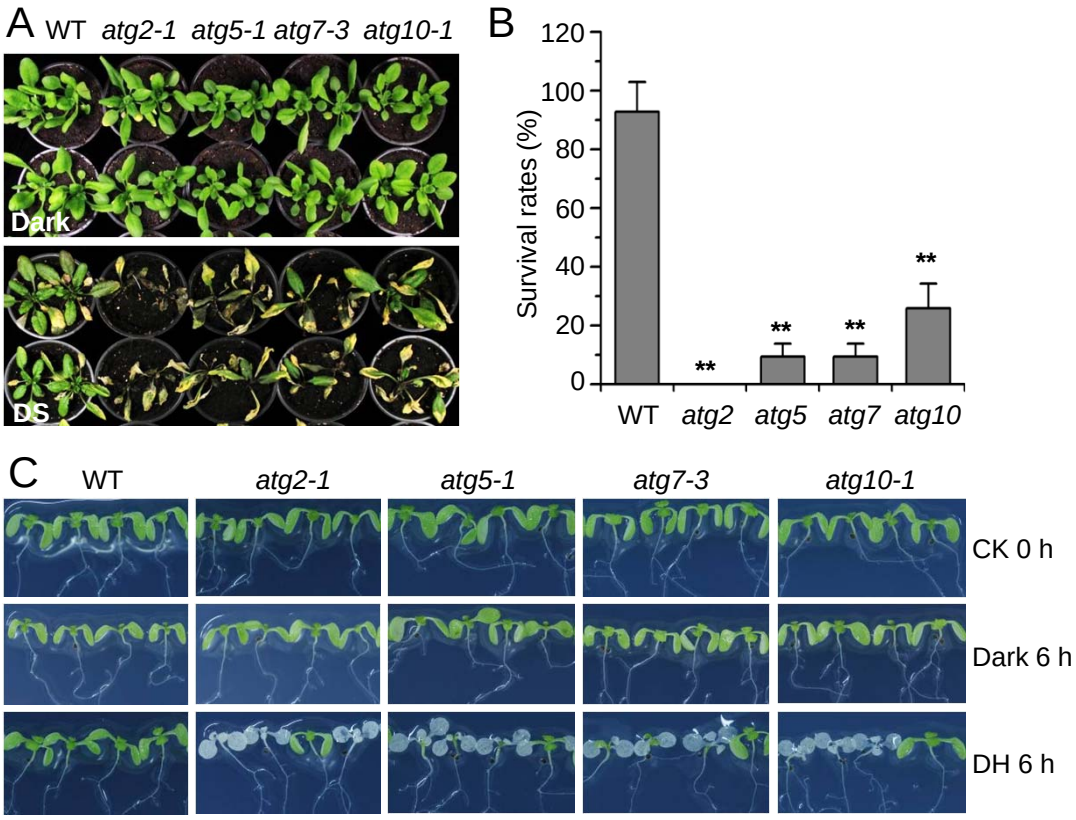

Figure S4. The autophagy defective mutants are more sensitive to dark submergence (DS) and hypoxia treatments. (**A**) Images of the wild type (WT) and *atg* mutants (*atg2-1*, *atg5-1*, *atg7-3*, and *atg10-1*) under constant dark (Dark) and DS treatment (DS). Four-week-old WT and *atg* mutants were treated with dark or DS for 2 days followed by recovery for 6 days. (**B**) Survival of WT and *atg* mutants (*atg2-1*, *atg5-1*, *atg7-3*, and *atg10-1*) upon DS treatment. **, $P < 0.01$ by the Student t test. (**C**) Phenotypes of WT and *atg* mutants (*atg2-1*, *atg5-1*, *atg7-3*, and *atg10-1*) before treatment (CK 0 h), and 6-h treatments of darkness (Dark) and 0.5% O2 under darkness (DH). One-week-old seedlings were treated with or without hypoxia under dark conditions for 6 h followed by recovery for 5 days.

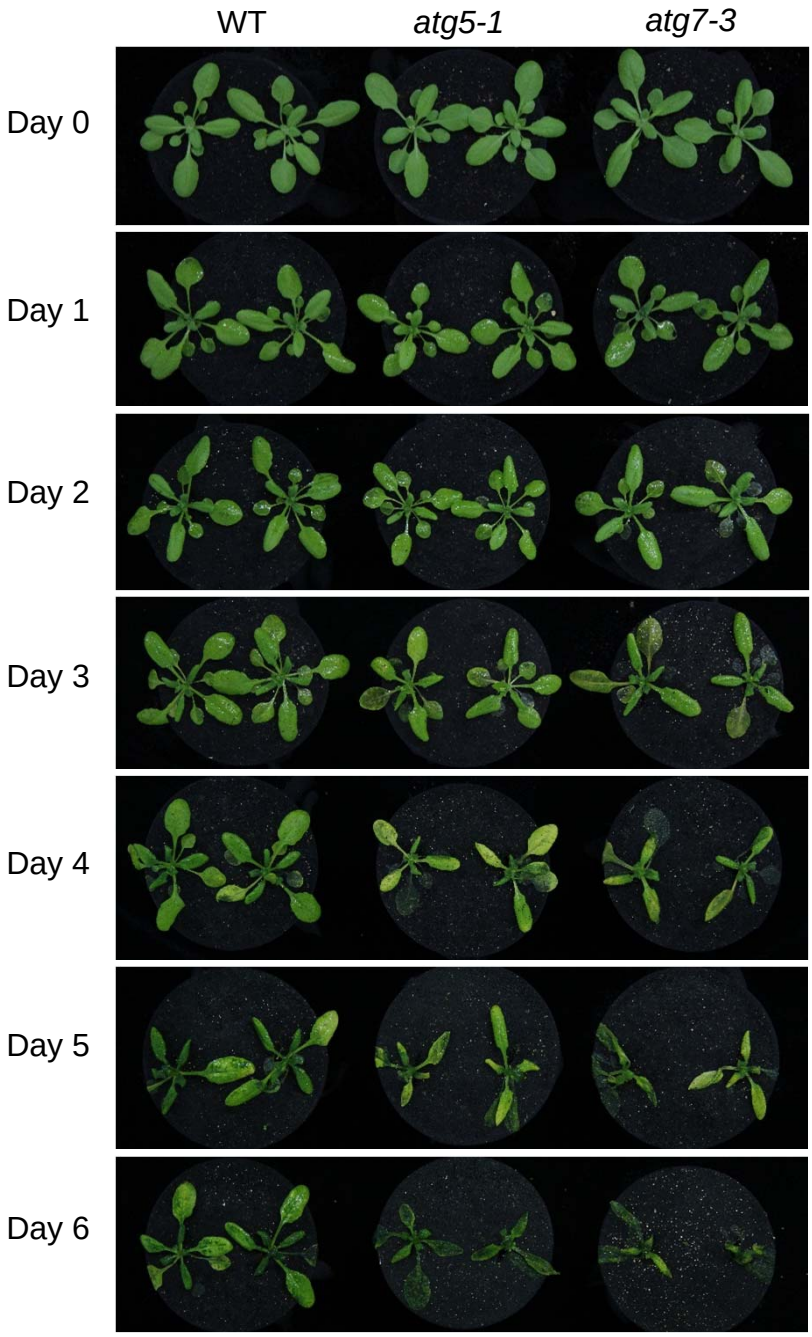

Figure S5. Phenotypes of the wild type (WT) and *atg* mutants before treatment (Day 0) or at various days (Day 1 to Day 6) after LS treatment. Four-week-old WT and *atg* mutants (*atg5* and *atg7*) were used for LS treatment and photos were taken at the indicated days upon submergence.

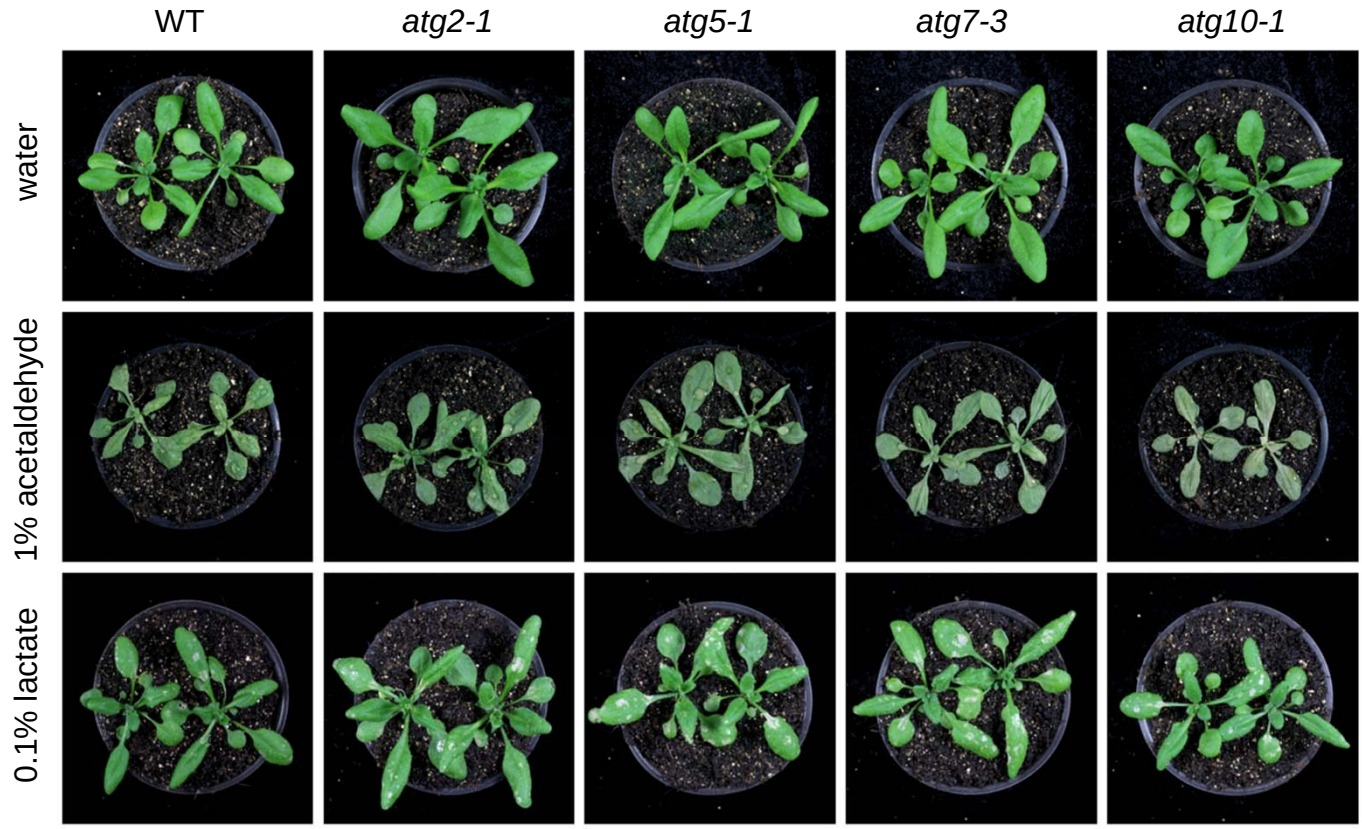

Figure S6. Response of WT and *atg* mutants to treatments with acetaldehyde and lactate. Four-week-old wild type (WT) and *atg* mutants were sprayed with 1% acetaldehyde, 0.1% lactate or water for 24 h and photos were taken at the end of treatment.

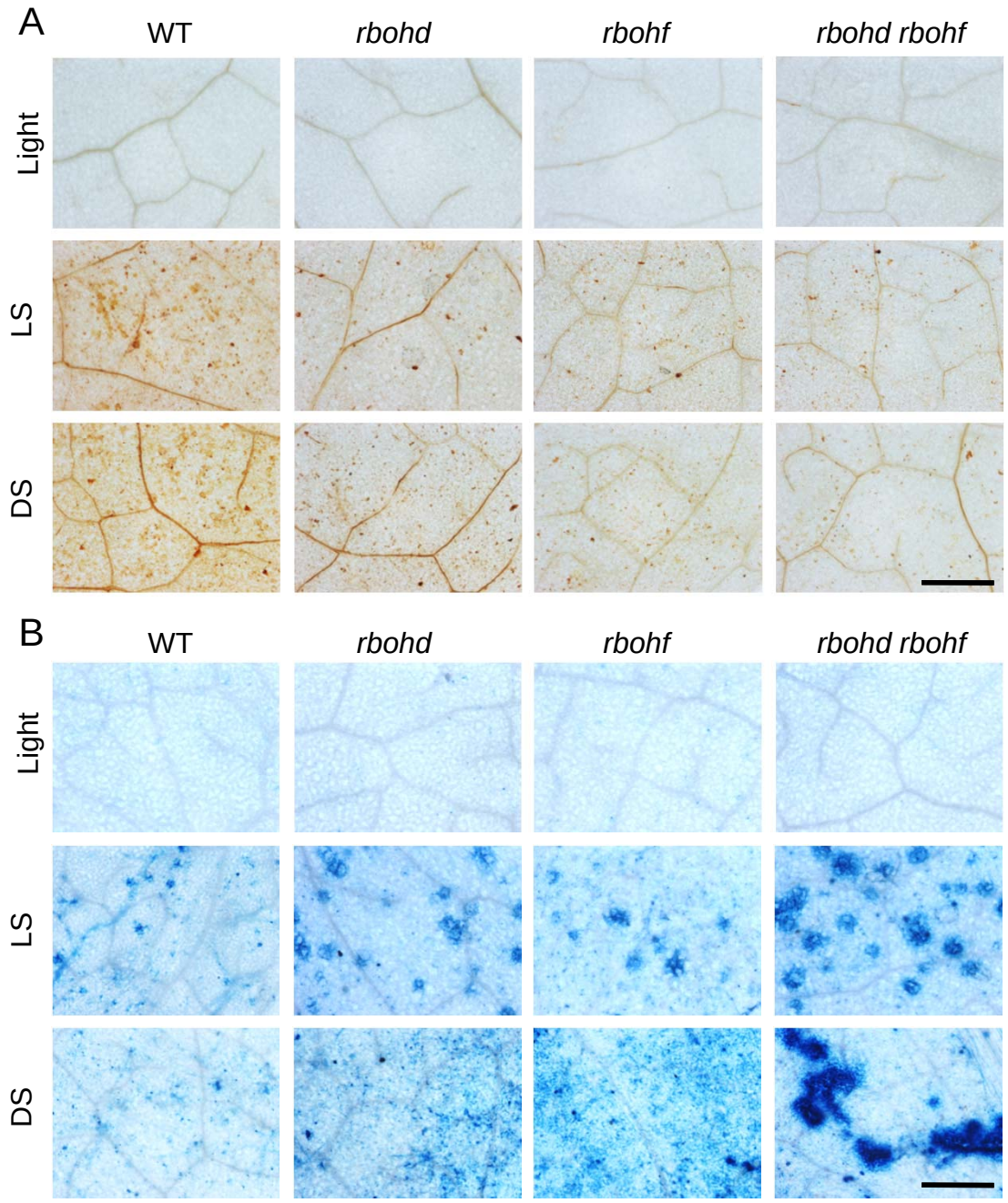

Figure S7. ROS levels and cell death of *rboh* mutants under submergence. (**A**) DAB staining showing ROS levels in the leaves of 4-week-old WT, *rbohd*, *rbohf*, and *rbohd rbohf* mutants before and after 3-day LS or 24-h DS treatment. (**B**) Trypan blue staining showing cell death in the leaves of 4-week-old WT, *rbohd*, *rbohf*, and *rbohd rbohf* mutants before and after 3-day LS or 24-h DS treatment. Scale bars: 500 μm.

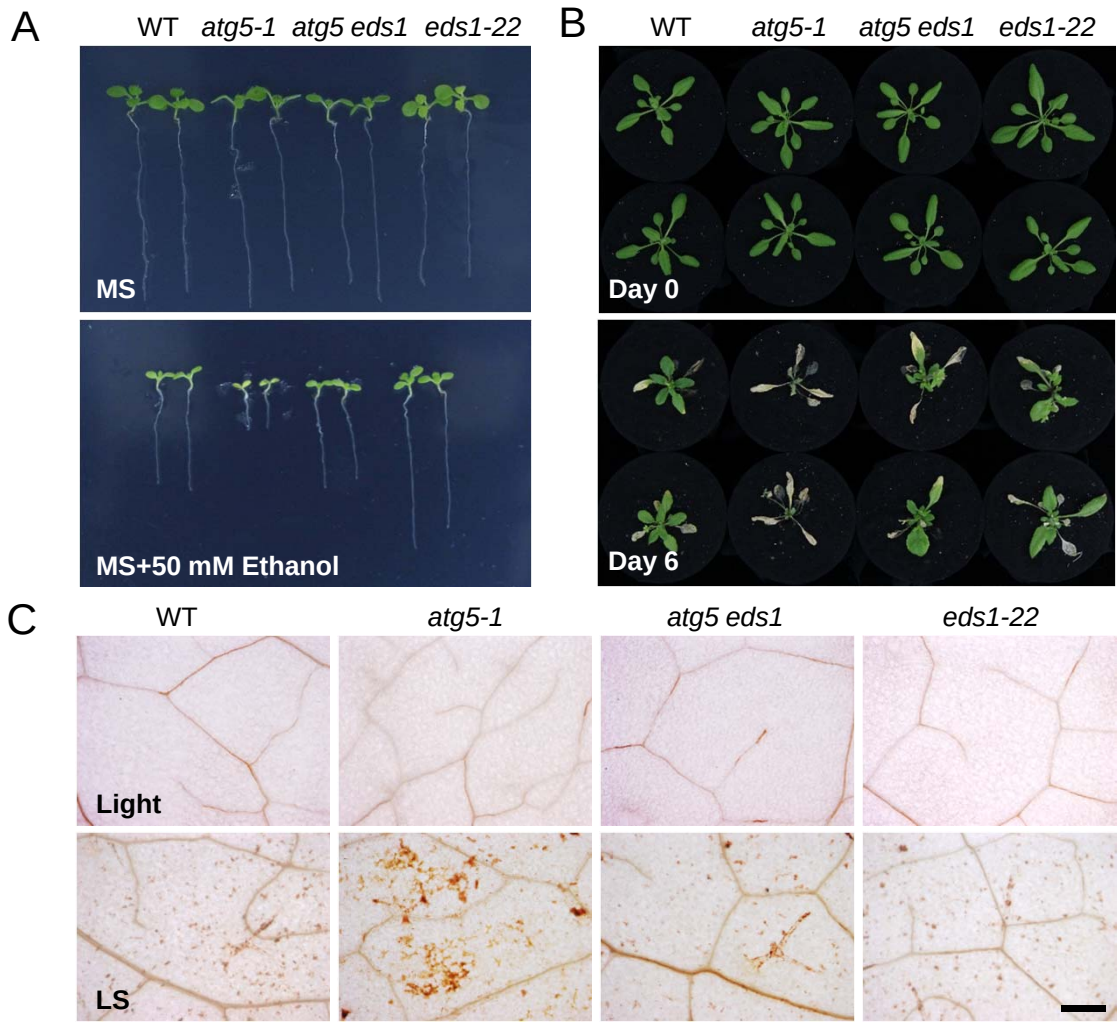

Figure S8. The enhanced LS- and ethanol-sensitivities of *atg* mutants are dependent on EDS1. (**A**) Images of the wild type (WT), *atg5-1*, *atg5 eds1*, and *eds1-22* seeds germinated on MS medium containing no ethanol or 50 mM ethanol, for 2 weeks. (**B**) Images of WT, *atg5-1*, *atg5 eds1*, and *eds1-22* plants before treatment (Day 0) and after a 6-day recovery after a 6-day LS treatment (Day 6). (**C**) DAB staining showing ROS levels in the leaves of 4-week-old WT, *atg5-1*, *atg5 eds1*, and *eds1-22* mutants under normal growth conditions (Light) and after 3-day LS treatment. Scale bar: 500 μm.

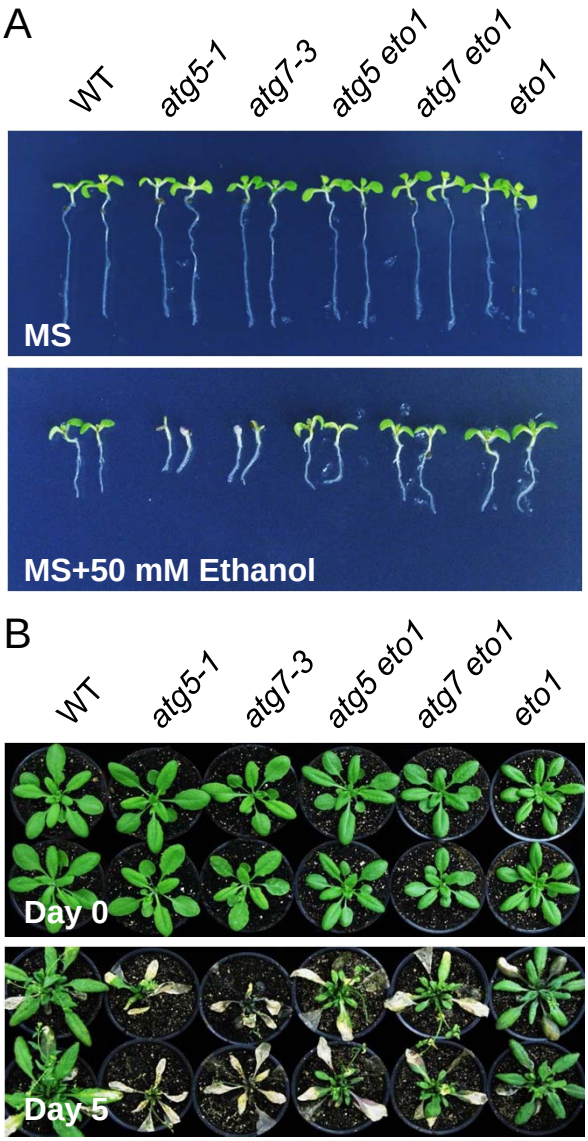

Figure S9. Ethylene overproduction partly rescued the sensitive phenotype of *atg* mutants to ethanol treatment and submergence. (**A**) Images of the wild type (WT), *atg5-1*, *atg7-3*, *atg5 eto1*, *atg7 eto1*, and *eto1* seeds germinated on MS medium containing no ethanol or 50 mM ethanol, for 2 weeks. (**B**) Images of WT, *atg5-1*, *atg7-3*, *atg5 eto1*, *atg7 eto1*, and *eto1* plants before treatment (Day 0) and at 6-day recovery after 5-day LS treatment (Day 5).