

Supplementary Materials

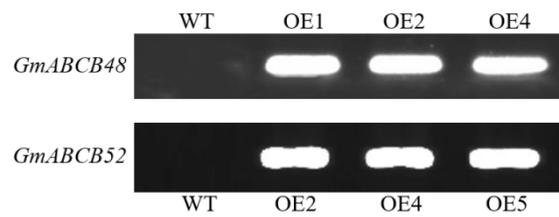


Figure S1. Expression analysis of *GmABCB48* or *GmABCB52* in three representative homozygous T3 lines expressing *GmABCB48* (OE1, OE2 and OE4) or *GmABCB52* (OE2, OE4 and OE5) and WT plants. RT-PCR was performed to detect the mRNA levels.

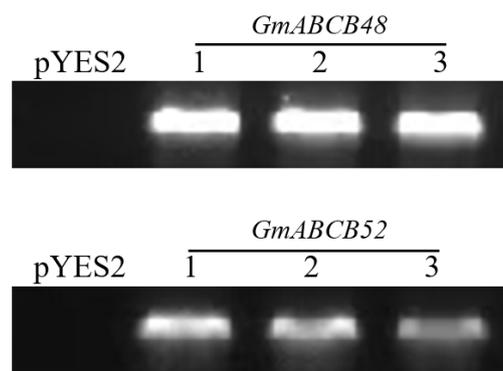


Figure S2. Expression analysis of *GmABCB48* or *GmABCB52* in yeast cells expressing *GmABCB48* or *GmABCB52* and control cells carrying empty vector. RT-PCR was performed to detect the mRNA levels.

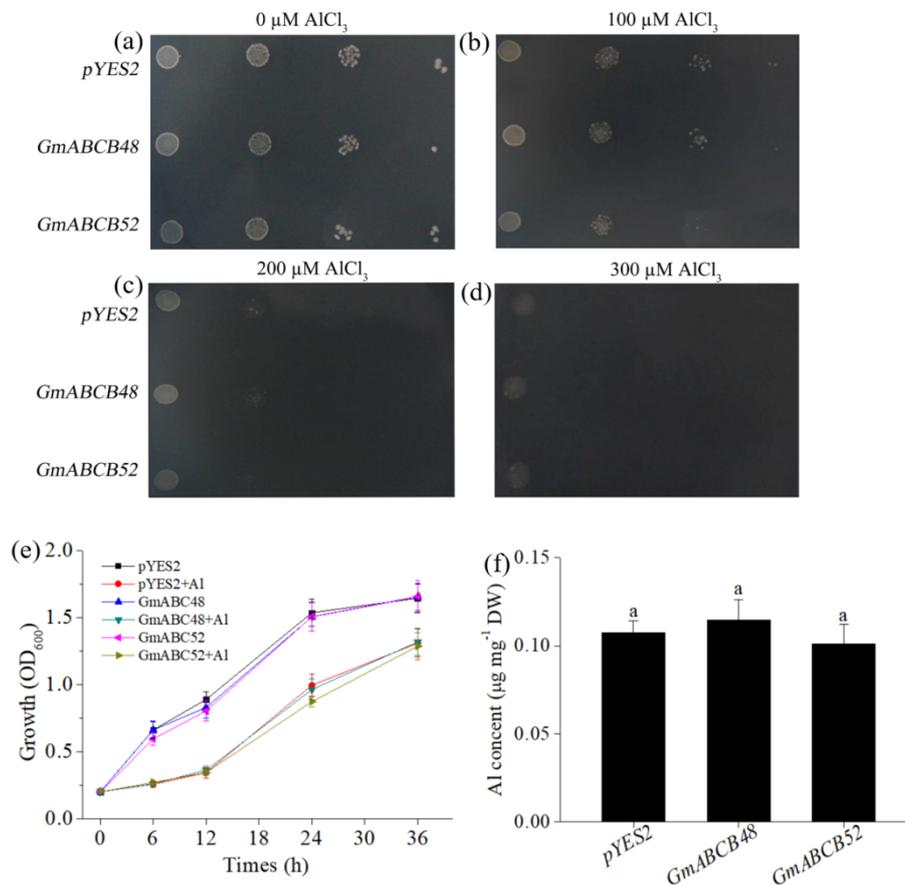


Figure S3. Al transport of GmABCB48 and GmABCB52 in yeast cells. **(a–d)** Al sensitivity of yeast cells carrying the pYES2 control vector, or GmABCB48- or GmABCB52-containing vectors on agar plates. Cell suspension ($\text{OD}_{600} = 2.0$) and three serial 1:10 dilutions were spotted on plates containing different AlCl_3 concentrations for 3 d. **(e)** Yeast cells were grown at 30 °C in LPM liquid media and subjected to 100 μM of AlCl_3 at an OD_{600} of 0.2. Cell density was monitored with the absorbance at 600 nm at 6, 12, 24, and 36 h after the Al treatment. **(f)** Al uptake in yeast cells carrying the pYES2 control vector, or GmABCB48- or GmABCB52-containing vectors. Yeast cells ($\text{OD}_{600} = 2.0$) were exposed to 50 μM AlCl_3 for 6 h. Data represent means \pm SD. Different letters above the bars indicate significant differences ($P < 0.05$, LSD test). WT, wild type.

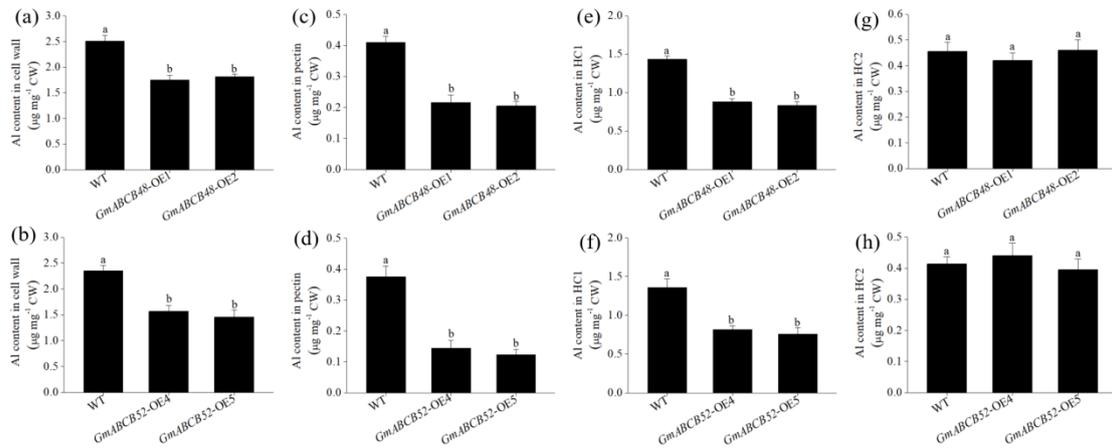


Figure S4. Al content in root cell wall (a, b), pectin (c, d), HC1 (e, f) and HC2 (g, h) of transgenic Arabidopsis and WT plants under Al stress. Four-week-old Arabidopsis seedlings were exposed to 50 μM AlCl₃ solution containing 0.5 mM CaCl₂ (pH 4.5) for 24 h. Data represent means ± SD. Different letters above the bars indicate significant differences ($P < 0.05$, LSD test). WT, wild type.