

## Supplementary Materials

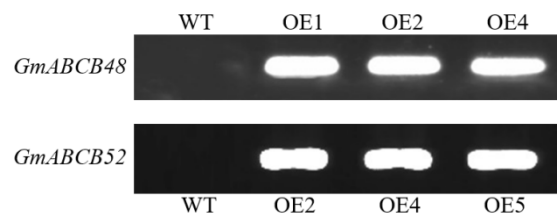


Figure S1. Expression analysis of *GmABCB48* or *GmABCB52* in three representative homozygous T3 lines expressing *GmABCB48* (OE1, OE2 and OE4) or *GmABCB52* (OE2, OE4 and OE5) and WT plants. RT-PCR was performed to detect the mRNA levels.

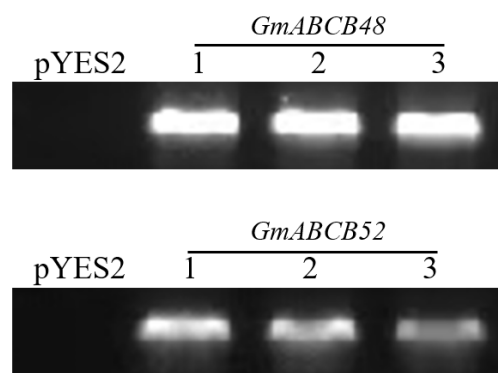
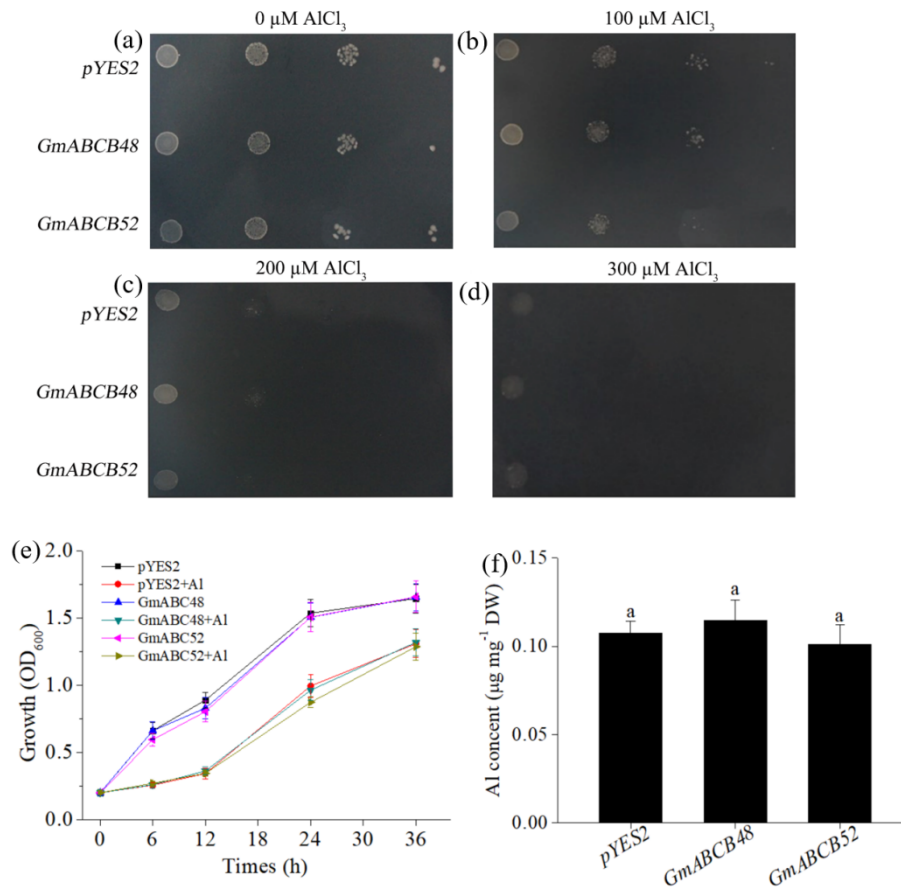
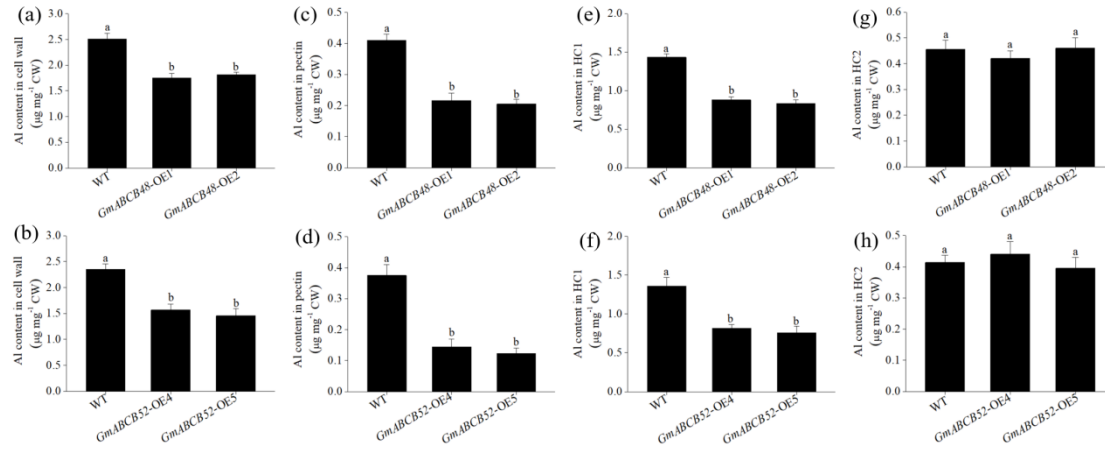


Figure S2. Expression analysis of *GmABCB48* or *GmABCB52* in yeast cells expressing *GmABCB48* or *GmABCB52* and control cells carrying empty vector. RT-PCR was performed to detect the mRNA levels.



**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  $\text{AlCl}_3$  concentrations for 3 d. **(e)** Yeast cells were grown at 30 °C in LPM liquid media and subjected to 100  $\mu\text{M}$  of  $\text{AlCl}_3$  at an  $\text{OD}_{600}$  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  $\mu\text{M}$   $\text{AlCl}_3$  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  $\mu$ M  $\text{AlCl}_3$  solution containing 0.5 mM  $\text{CaCl}_2$  (pH 4.5) for 24 h. Data represent means  $\pm$  SD. Different letters above the bars indicate significant differences ( $P < 0.05$ , LSD test). WT, wild type.