

**Figure S4. Transcriptional regulation of AQP expression under abiotic challenges.** Regulation of expression is indicated as Log<sub>2</sub> ratio of treated samples relative to control samples and is visualized as heatmaps. Differential AQP transcript accumulations between samples were hierarchically clustered using Euclidean distance. Each row corresponds to an AQP gene. Color scale depicts Log<sub>2</sub> ratio value: Green represents down-regulation and red represents up-regulation in treated samples relatively to controls.

**Heatmap A: AQP responses to water deficit and osmotic stress.** Columns correspond to 48 comparisons carried on leaf (L), root (R) or xylem (X). Distinct experimental set-ups of drought and osmotic stress are analysed. Column legends summarized the following information. Poplar hybrids (*Populus deltoides* x *P. nigra* Soligo or Carpaccio) after 36h drought (EAR) and after 10-day water deficit of mild (LMI) or moderate intensity (LMO) (GSE17223 and GSE17230). Soligo or Carpaccio responses to 10-day moderate soil water deficit (LMI2, GSE17226). Soligo after 3-day of 200g/L PEG osmotic stress (PEG, GSE17225). Drought responses of *P. deltoides* x *P. nigra* DN34 and *P. maximowiczii* x *P. nigra* NM6 over a diurnal period - leaf being collected at predawn, midday, lateday and midnight (GSE15242). Drought response of poplar hybrids: DN34 (*P. deltoides* x *P. nigra*), Walker (*P. laurifolia* x *P. nigra*) and Okanese (Walker x (*P. laurifolia* x *P. nigra*)), with two samples per hybrid coming from distinct geographic locations, analysed at predawn and midday (GSE27693). Drought response of *P. balsamifera* (genotypes AP947, AP1005, AP1006, AP2278, AP2298 and AP2300) at predawn and midday (GSE21171). Drought response of young differentiating xylem in *P. canescens* INRA717 1-B4 (GSE20061).

**Heatmap B: AQP responses to salt and hypoxia stresses.** Columns correspond to 9 comparisons between treated and respective control samples, carried on leaf (L), root (R) or xylem (X). Salt responses of *P. euphratica* genotype B2 and of *P. canescens* genotype INRA717 1-B4 analysed in xylem after a 2-week exposure to 100 mM NaCl (E-MEXP-2031). Salt response of *P. euphratica* in cob root tips developed under 150 mM NaCl (E-MEXP-2234). Salt response of *P. canescens* INRA717 1-B4 in control or mycorrhized with *Paxillus involutus* (myc) fine roots, both developed under 150 mM NaCl (E-MEXP-1874). Hypoxia response of *P. canescens* (flooded root system) at three time points in roots (65h, 24h, 168h) and at 168h in leaf (GSE13109).

**Heatmap C: AQP responses to leaf wounding.** Columns correspond to 4 comparisons between treated and respective control samples. Leaf (leaf plastochron index –LPI 8-12) of hydroponically-grown trees of *P. fremontii* x *P. angustifolia* RM5 were wounded and samples were collected 90h or 1 week afterward. Wounding responses were analysed in root tip (Rtip: apical 1 cm) and in mature leaves (L: LPI 5) after 90h, and in young (YL: LPI 0-1) and mature leaves (L: LPI 5) after 1 week (GSE16786).

**Heatmap D: AQP responses to starvation and feeding.** Columns correspond to 9 comparisons between treated and respective control samples, carried on mature leaf (L), young leaf (YL) or bark (B). For clarity, samples were not clustered. Starvation responses in *P. fremontii* x *P. angustifolia* genotypes 1979 and 3200: leaves were collected on trees grown for 4 or 8 weeks on nitrogen deficient medium (Nstarv: 0.125 mM) or on control medium (Ctl: 5 mM nitrogen) (GSE16786). Time-course of bark response to starvation and feeding: defoliated stem of *P. trichocarpa* Nisqually (Nis) were harvested at 0h, 24h, 48h or 72h after the beginning of incubation either in glutamine (Glu: 25 mM), in glucose (Glc: 25 mM), in glutamine and glucose (Glu+Glc 25 mM), or in water (control) (GSE29303).

**Heatmap E: AQP responses to aluminium stress.** Columns correspond to 3 comparisons between treated and respective control samples and were not clustered. Response to 500 µM aluminium treatment in *P. tremula* (Ptre) root tip collected at three time points (6h, 54h and 256h). Root growth was strongly inhibited at 6 h and partially recovered after 2 days (GSE19297).

**Heatmap F: AQP responses to embolism and sucrose infiltration.** Response of xylem parenchyma cells from *P. trichocarpa* plants subjected to artificial embolism or sucrose infiltration relatively to control plants (GSE32322).

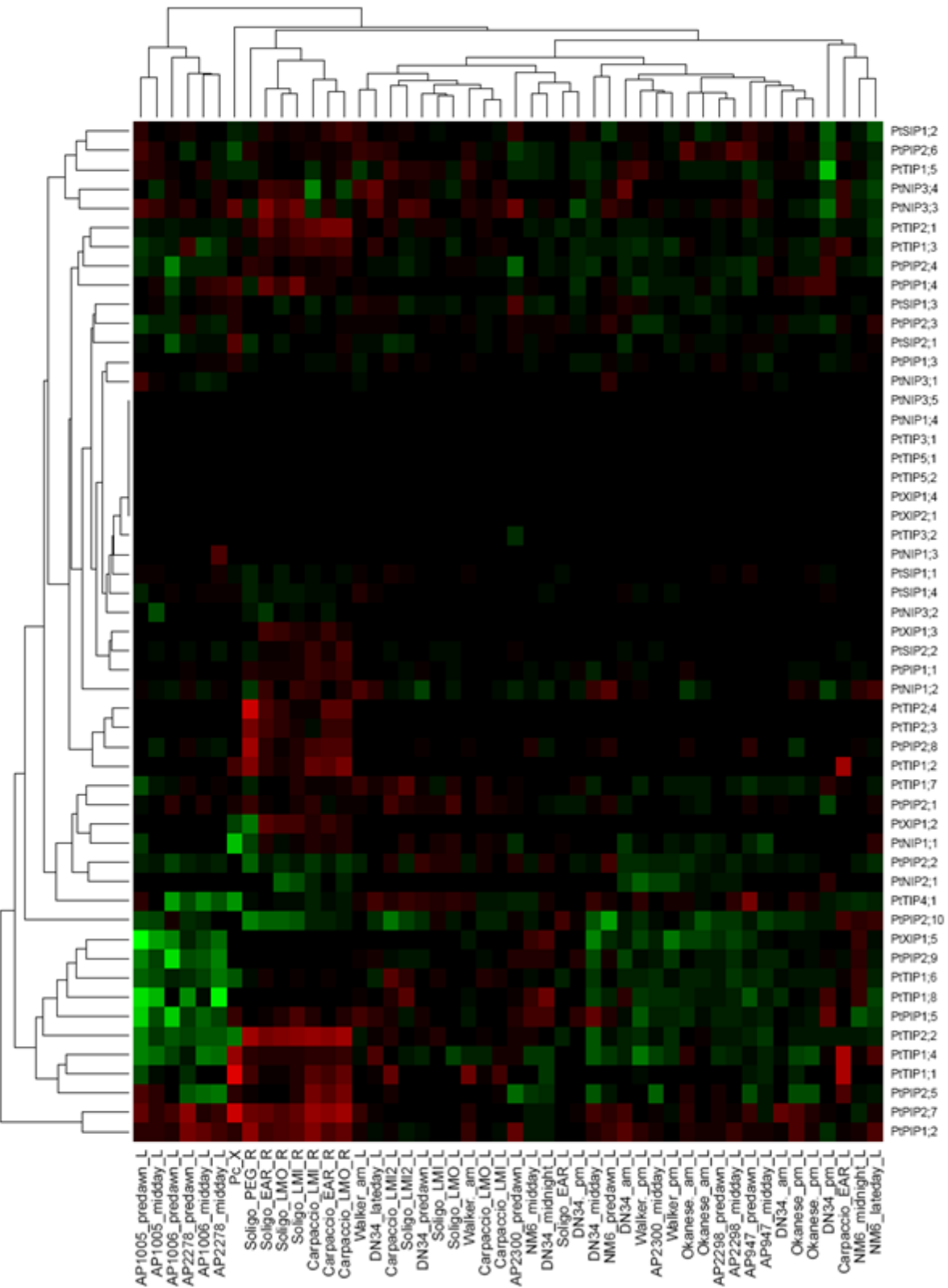
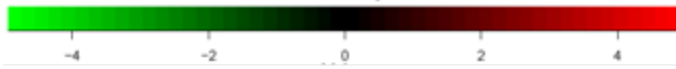


Fig1 fY54A. Water deficit and osmotic stresses

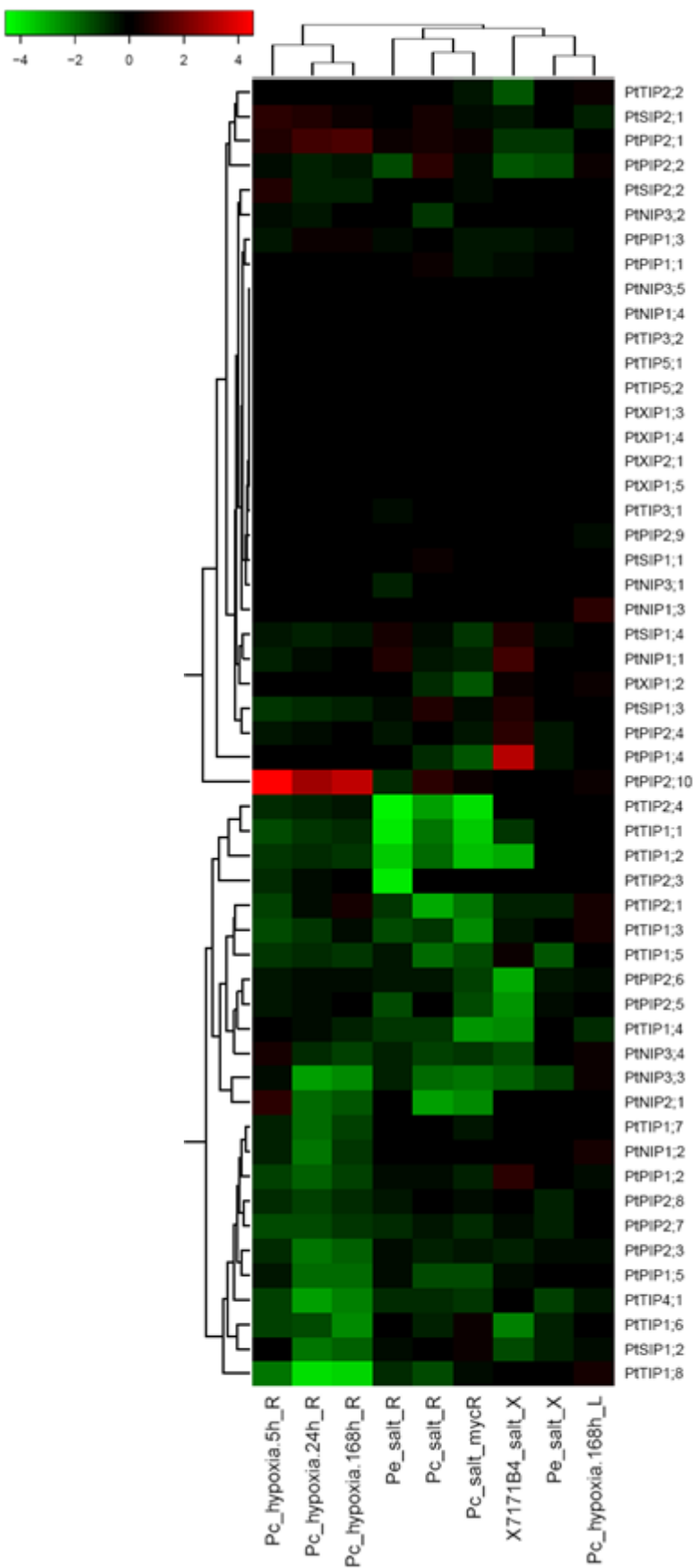


Fig1 fY54B. Salt and hypoxia stresses

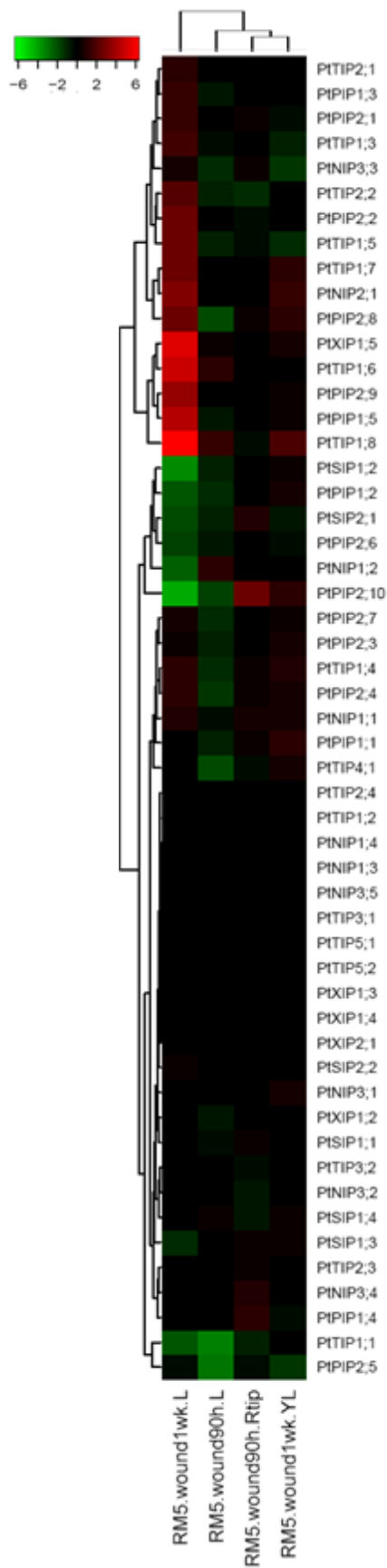


Fig1 fYS(7. Leaf-wounding

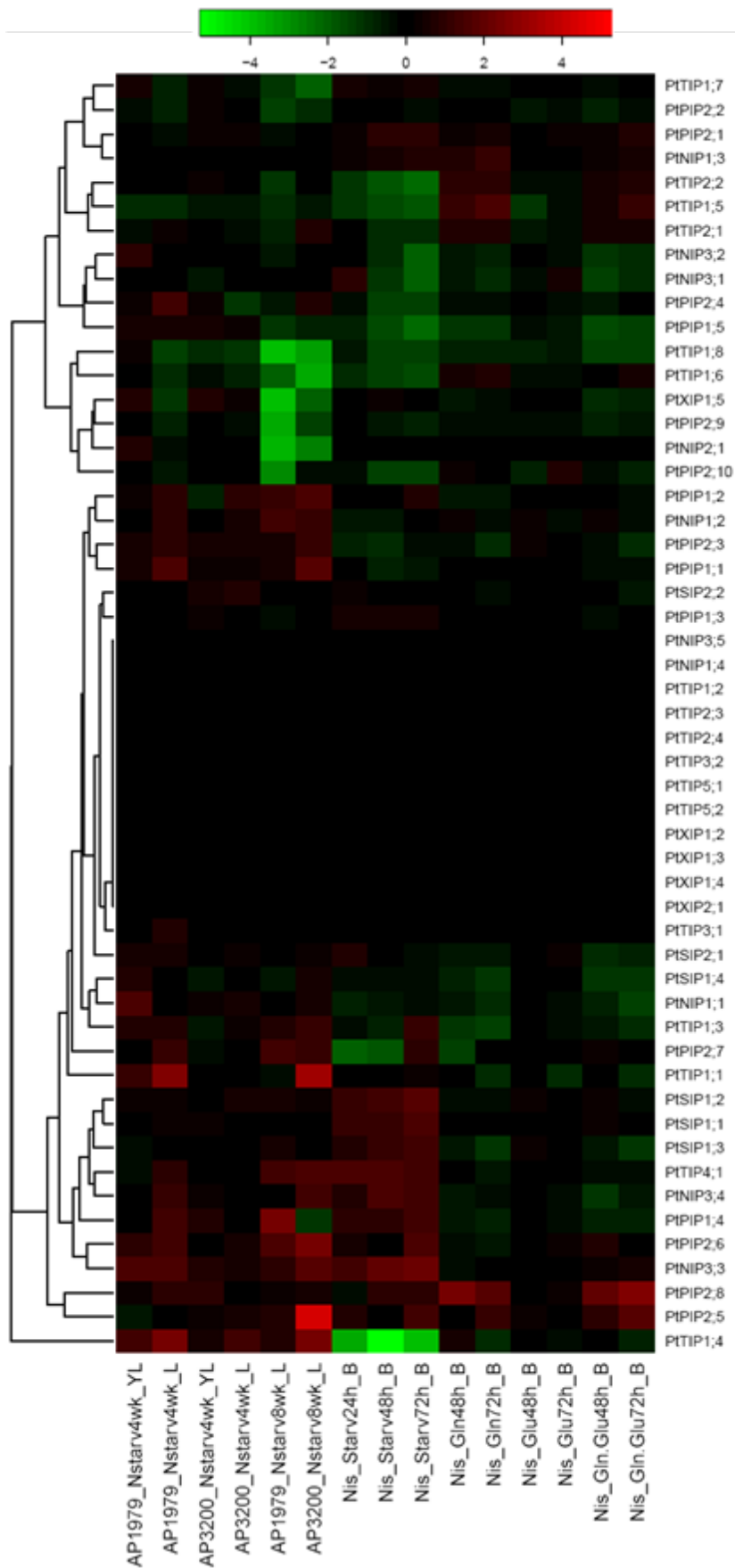


Fig1 fYS4D. Starvation & Feeding

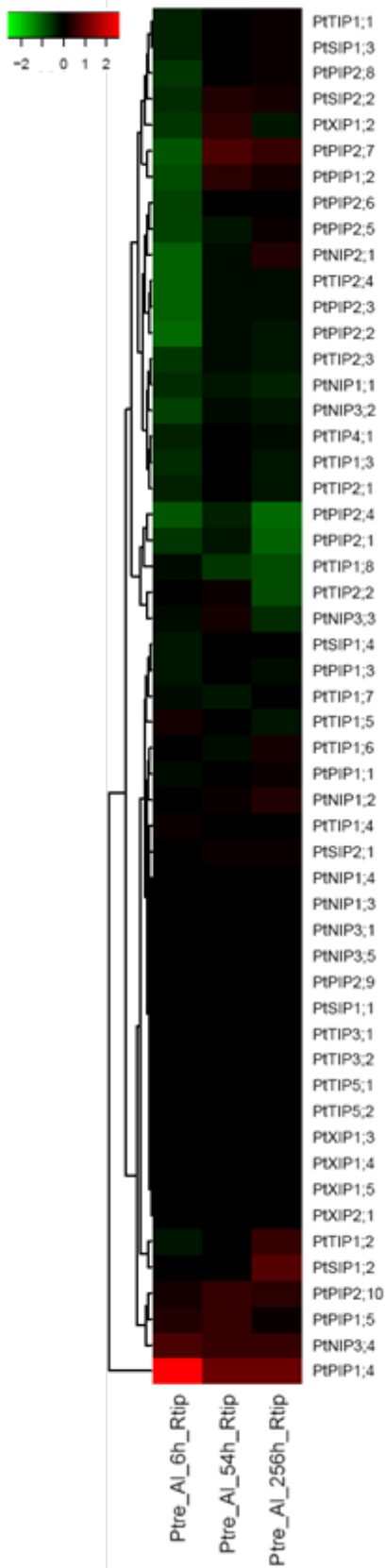


Figure S4E. Aluminium

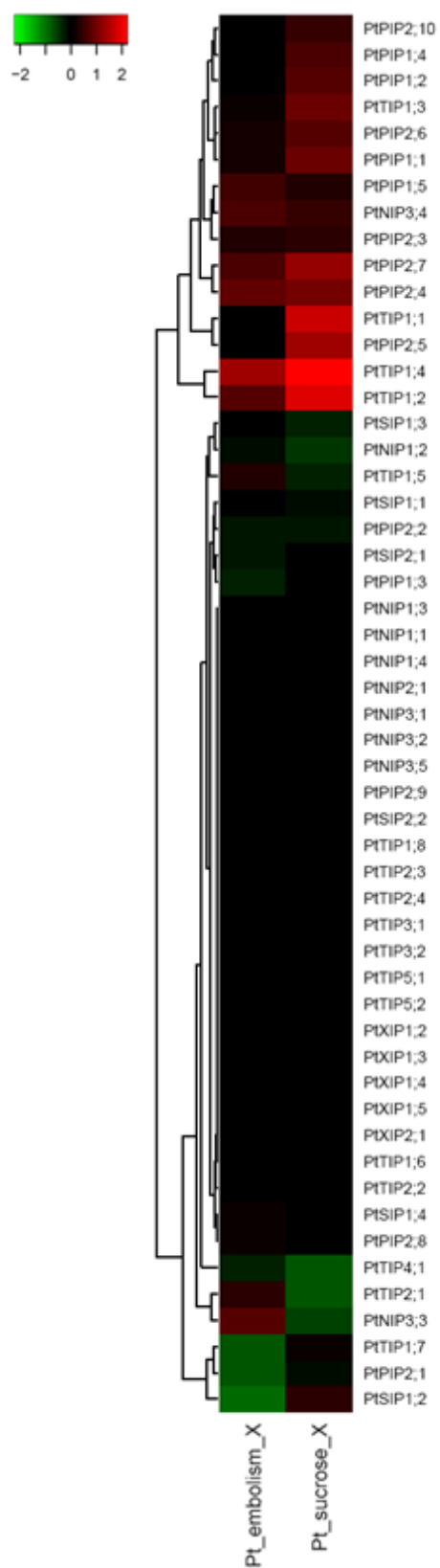


Figure S4F. Embolism and sucrose infiltration