

Transcriptome analysis reveals new insights into bacterial wilt resistance mechanism mediated by silicon in tomato

Nihao Jiang , Xueying Fan, Weipeng Lin , Guoping Wang and Kunzheng Cai

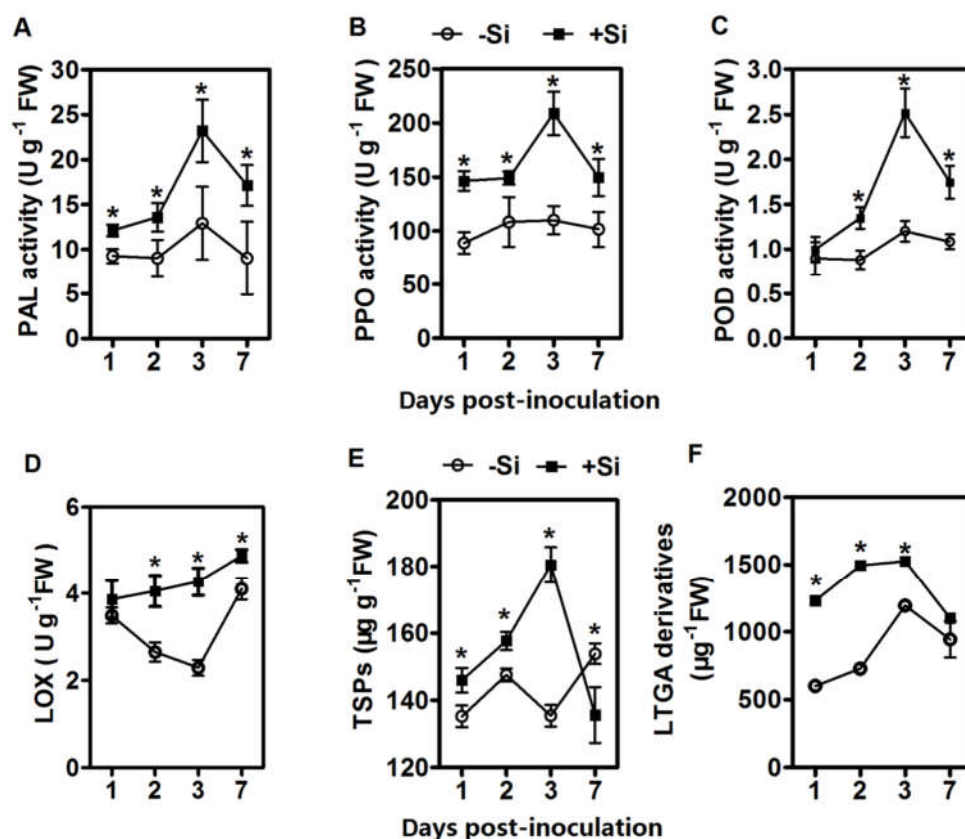


Figure 1. Effect of Si treatment on resistance related enzymes, total soluble phenols (TSPs) and lignin-thioglycolic acid (LTGA) derivatives in tomato root. Activities of PAL (A), POD (B), PPO (C), and LOX (D) in root tissue of Si-treated (+Si) and non-treated (-Si) tomato plants at different times after inoculation with *R. solanacearum*. Concentrations of TSPs (E) and LTGA derivatives (F) in tomato root were detected after pathogen infection. Data are means \pm SE of three replicate samples. Means followed by an asterisk are significantly different from untreated control at the same time-point (Student's *t*-test, $p < 0.05$). FW = fresh weight.

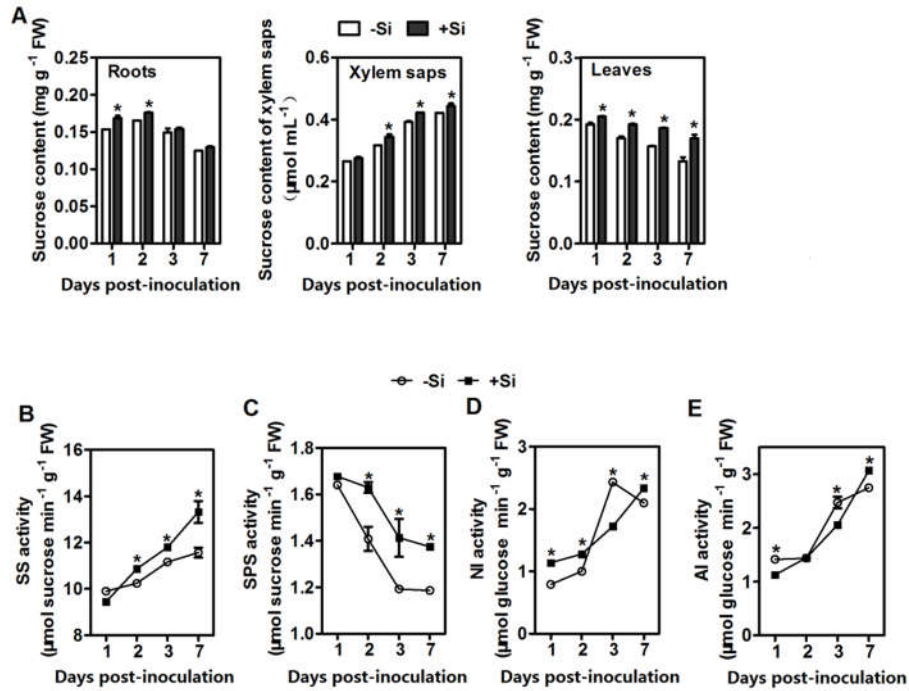


Figure 2. Effect of Si treatment on sucrose concentration and activities of enzymes related to sucrose metabolism in tomato at different time points after infection. **(A)** sucrose contents in roots, xylem saps and leaves of Si-treated (Si+) and untreated (Si-) tomato plants. The SS **(B)**, SPS **(C)**, NI **(D)** and AI **(E)** activities in leaf extracts in the same samples. AI, acid invertase; NI, neutral invertase; SS, sucrose synthase; SPS, sucrose-phosphate synthase. Values are the mean \pm SE of three replicate samples. Means followed by an asterisk are significantly different from untreated control at the same time-point (Student's *t*-test, $p < 0.05$). FW = fresh weight.



Figure 3. The distribution of gene coverage in six library. +Si1, +Si3 and +Si7 represents Si-treated samples obtained at 1, 3 and 7dpi, respectively; -Si1, -Si3 and -Si7 represents untreated samples obtained at 1, 3 and 7dpi, respectively.

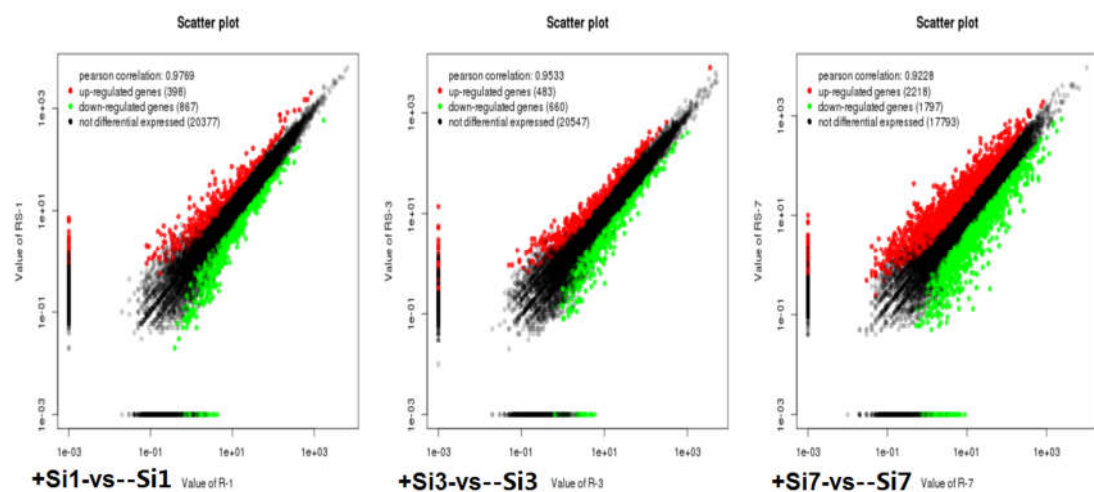


Figure 4. Scatter plot of differentially expressed genes in each comparison. +Si1, +Si3 and +Si7 represents Si-treated samples obtained at 1, 3 and 7dpi, respectively; -Si1, -Si3 and -Si7 represents non-Si-treated samples obtained at 1, 3 and 7dpi, respectively.

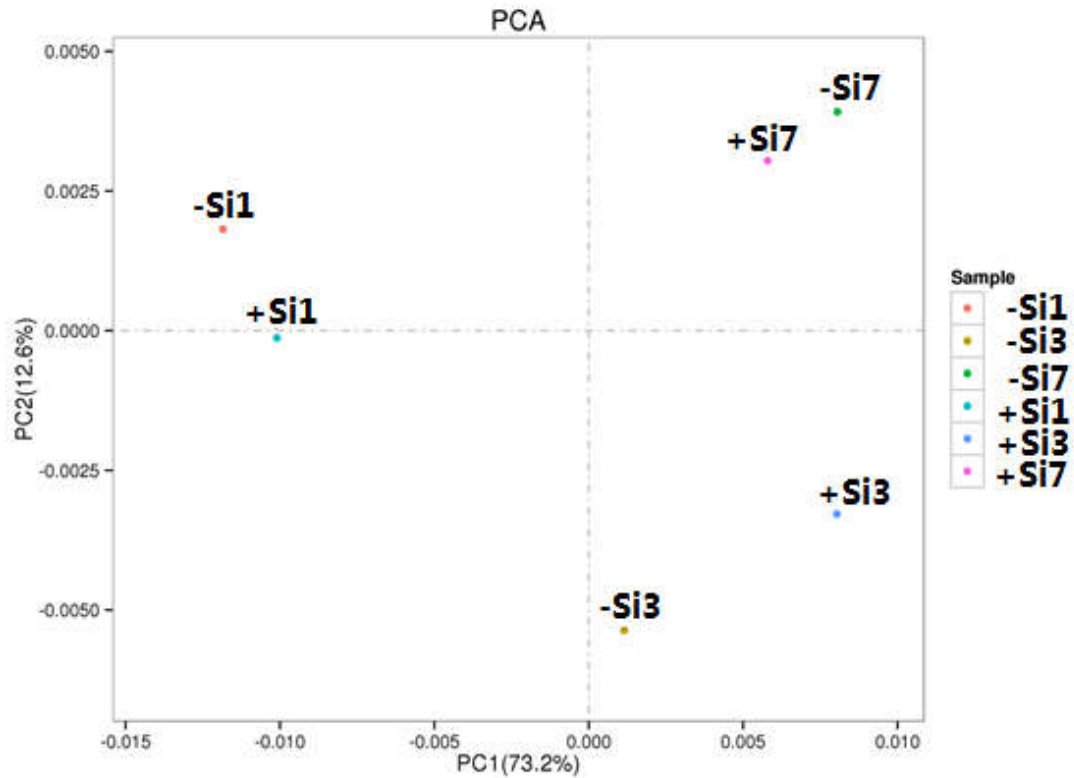


Figure 5. Principal component analysis (PCA) for all RNA-Seq samples. +Si1, +Si3 and +Si7 represents Si-treated samples obtained at 1, 3 and 7dpi, respectively; -Si1, -Si3 and -Si7 represents non-Si-treated samples obtained at 1, 3 and 7dpi, respectively.

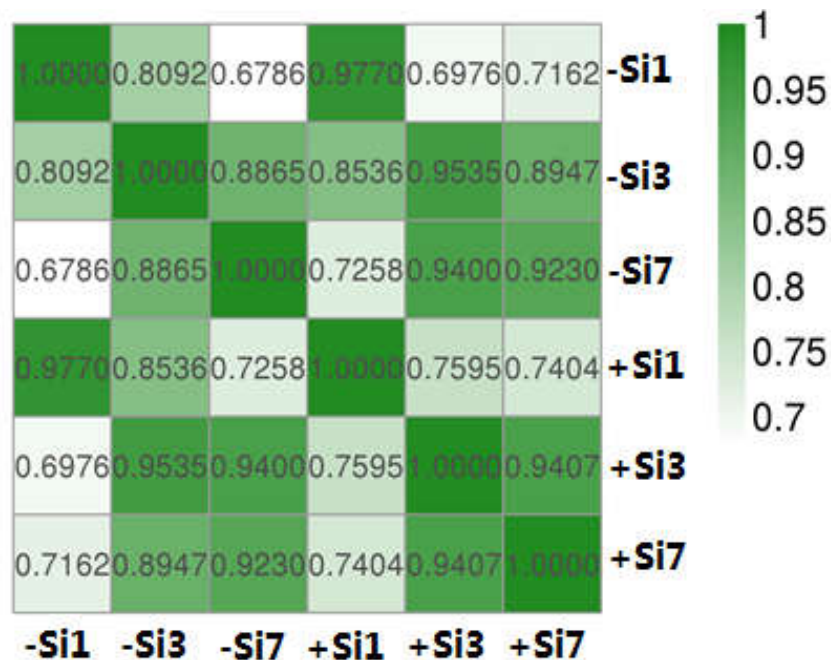


Figure 6. The Pearson correlation coefficients between six samples. +Si1, +Si3 and +Si7 represents Si-treated samples obtained at 1, 3 and 7 dpi, respectively; -Si1, -Si3 and -Si7 represents non-Si-treated samples obtained at 1, 3 and 7 dpi, respectively.

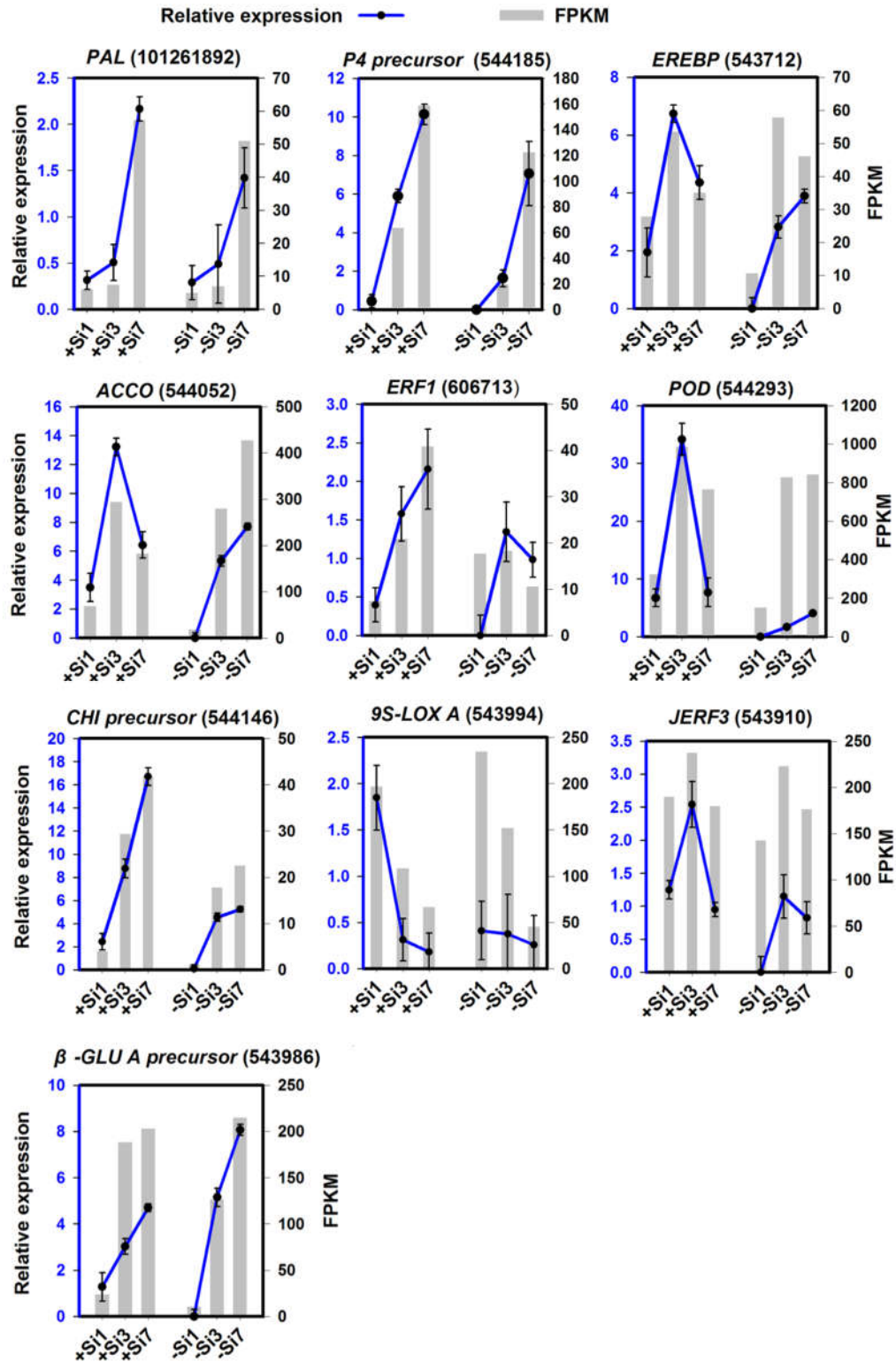


Figure 7. Expression of the selected 10 genes revealed by RNA-Seq and qRT-PCR. The expression levels obtained by qRT-PCR are represented in blue lines, qRT-PCR data showed the mean values from three replicates and the error bars represent the SE of the means, while the corresponding expression data for RNA-seq are represented in gray histogram. +Si1, +Si3 and +Si7 represents Si-treated samples obtained at 1, 3 and 7dpi, respectively; -Si1, -Si3 and -Si7 represents non-Si-treated samples obtained at 1, 3 and 7dpi, respectively; PAL: phenylalanine ammonia-lyase; P4 precursor: pathogenesis-related leaf protein 4 precursor; EREBP: ethylene responsive element binding protein; ACCO: 1-Aminocyclopropane-1-carboxylic acid oxidase; ERF1: ethylene response factor 1; POD: peroxidase; CHI precursor: chitinase precursor; 9S-LOX: linoleate 9S-lipoxygenase A; JERF3: Jasmonate and ethylene responsive factor 1; β -GLU A precursor: glucan endo-1,3-beta-glucosidase A precursor.

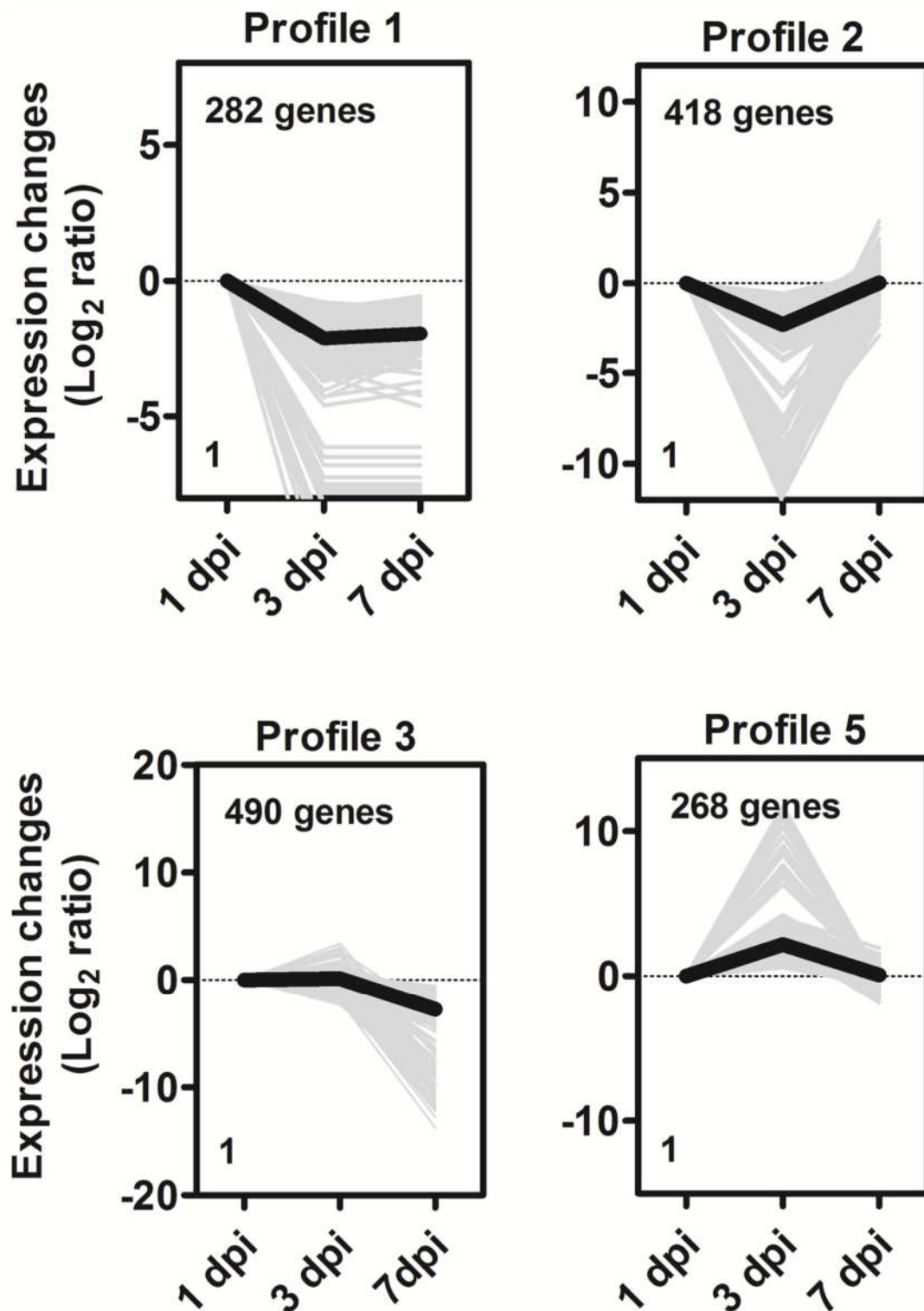


Figure 8. Expression profiles of the four statistically non-significant clusters (profile 1, 2, 3 and 5). X- and Y-axes represent days after *R. solanacearum* inoculation (dpi) and log₂ fold change in gene expression between Si-treated and non-Si-treated samples, respectively. The top left hand corner indicates the number of DEGs belonging to each profile. The lower left hand corner contains the *p*-value of each profile.