

# Analysis summary of project APEX5\_outlier\_removed

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using RobiNA version 1.2.4\_build656

The analysis was run using count data imported from a precomputedcounts table file:  
APEX5\_cax23\_3\_outliers\_removed.txt

Between the samples defined in the imported counts table, the following contrastshave been computed:

***GCShoot-FLShoot***

***GCRoot-FLRoot***

The normalization and statistical evaluation of differential gene expression has been performed using edgeR (Robinson et al., 2010) with a p-value cut-off of 0.05 and using the Benjamini-Hochberg (1995) method for multiple testing correction.

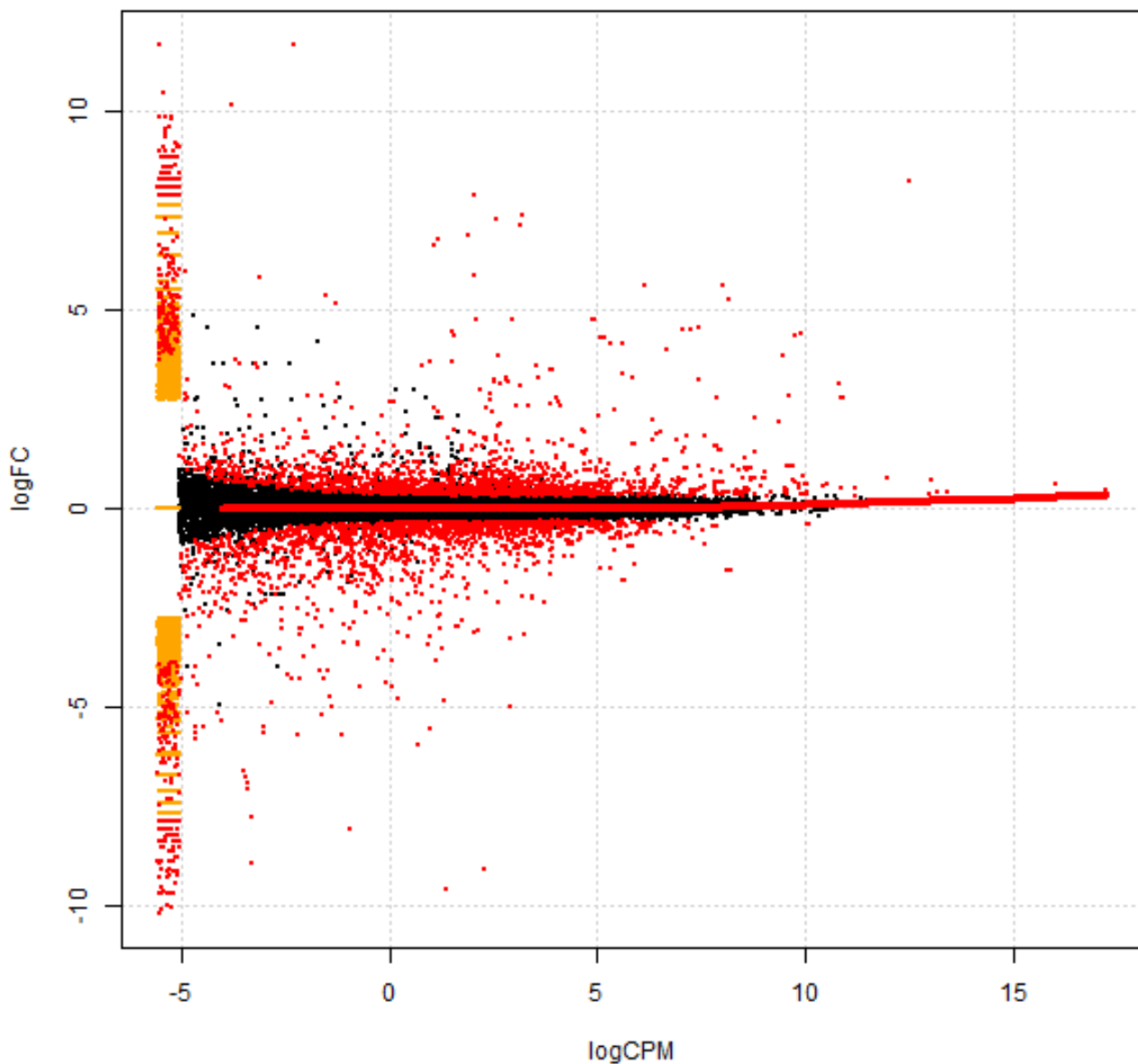
The raw data was normalized according to the default procedure of the differential expression analysis package used. The dispersion was estimated using the auto setting

## MA plots of each comparison

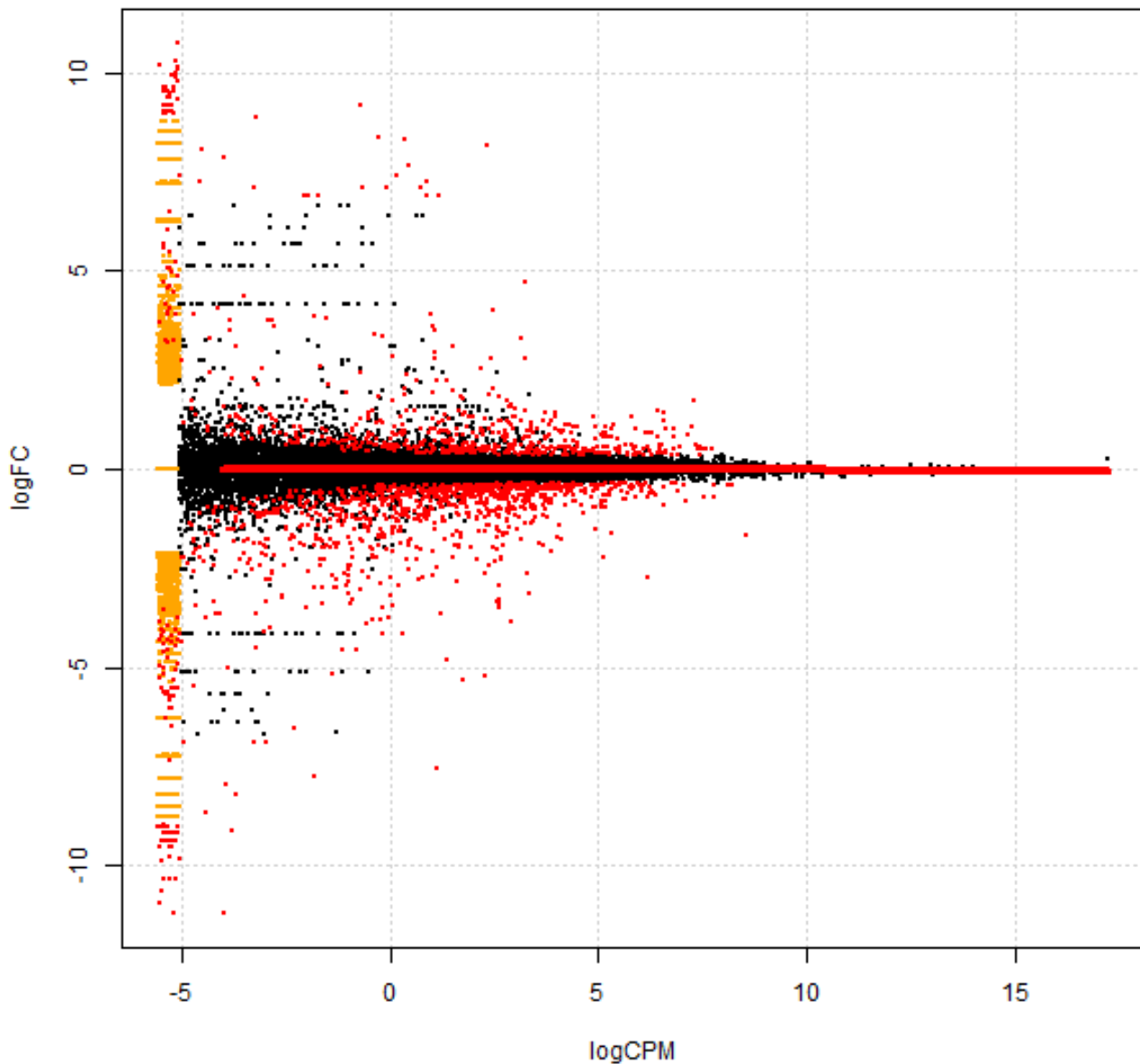
The MA plots show the log2 fold change (M; logFC) plotted versus the average expression strength (A; LogConc) for each of the comparisons that was computed. Usually, these scatter plots show a trumpet-like shape which is attributed to the fact that genes with a lower expression signal strength are more strongly affected by noise than strongly expressed genes.

According to the assumption that under most experimental conditions the bulk of the genes of an organism are not responding differentially, the cloud of points should be centered around a log fold change of 0. Genes that were called significantly differentially expressed are shown in red.

**MA plot of contrast GCRoot-FLRoot**



MA plot of contrast GCShoot-FLShoot



## Venn Diagrams

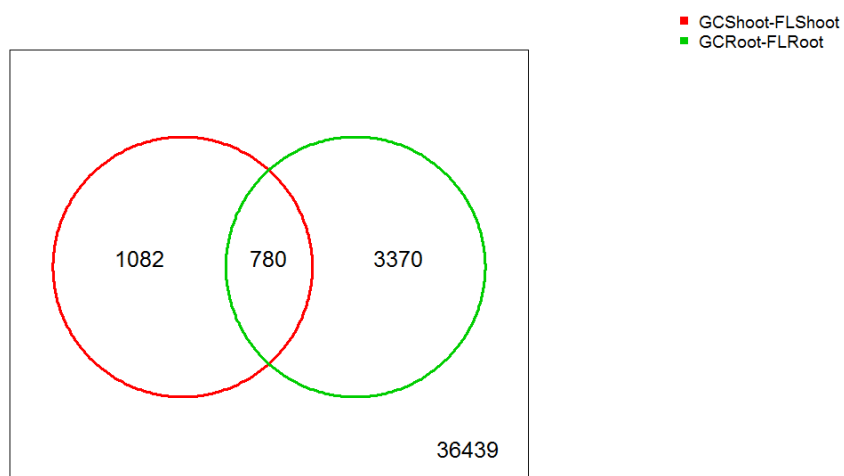
Venn diagrams visualize the amount of genes that were called significantly differentially expressed in each comparison. The conditions are represented by circles. Genes that show a significant response to more than one condition are plotted in the overlapping areas while the amount of not significantly changed genes is given in the lower right corner of the plots.

Venn diagrams allow a simple and quick overview of the impact of the treatments on the gene expression profile and also the specificity of the responses

### Downregulated genes



### Significantly regulated genes



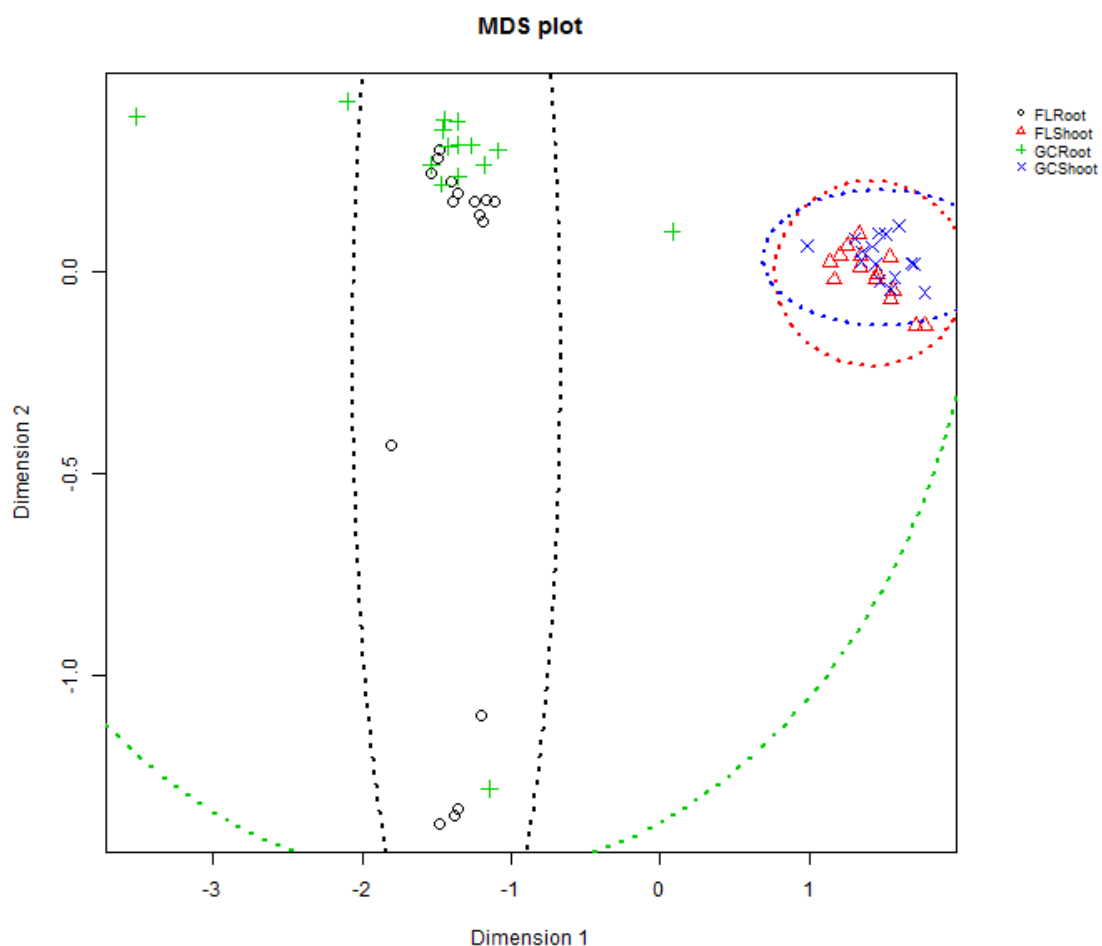
## Upregulated genes



## Multi-dimensional scaling (MDS) plot

The MDS or principal coordinate plot visualizes the distances between the RNA-Seq libraries in the experiment. To compute the points, a set of 500 tags(genes) that have the largest variation between the libraries (i.e. the largest tagwise dispersion when treating all libraries as one experimental group) is selected. The distance between each pair of libraries is equivalent to the square root of the common dispersion between these two libraries (using the top 500 genes).

Hence, the MDS plot gives an insight into the structure of the experiment - libraries that were generated on biological replicates of the same treatment should cluster together



## Top 10 differentially expressed genes tables for each contrast

**Top differentially expressed genes: *full\_table\_GCRoot-FLRoot.txt***

Identifier	logFC	logCPM	LR	PValue	FDR
AT1G26390 .1	-9.09283352 403696	2.28732078 703056	1542.97923 70396	0	0
AT1G26390 .1	-9.09283352 403696	2.28732078 703056	1542.97923 70396	0	0
AT1G26390 .1	-9.09283352 403696	2.28732078 703056	1542.97923 70396	0	0
AT1G26390 .1	-9.09283352 403696	2.28732078 703056	1542.97923 70396	0	0
AT1G26390 .1	-9.09283352 403696	2.28732078 703056	1542.97923 70396	0	0
AT1G26390 .1	-9.09283352 403696	2.28732078 703056	1542.97923 70396	0	0
AT3G41768 .1	8.21773036 013036	12.5356229 339648	2925.09564 358261	0	0
AT3G41768 .1	8.21773036 013036	12.5356229 339648	2925.09564 358261	0	0

Identifier	logFC	logCPM	LR	PValue	FDR
AT3G41768 .1	8.21773036 013036	12.5356229 339648	2925.09564 358261	0	0
AT3G41768 .1	8.21773036 013036	12.5356229 339648	2925.09564 358261	0	0
AT3G41768 .1	8.21773036 013036	12.5356229 339648	2925.09564 358261	0	0
AT3G41768 .1	8.21773036 013036	12.5356229 339648	2925.09564 358261	0	0
AT3G41979 .1	7.14394701 524848	3.14643155 665117	2169.10738 303578	0	0
AT3G41979 .1	7.14394701 524848	3.14643155 665117	2169.10738 303578	0	0
AT3G41979 .1	7.14394701 524848	3.14643155 665117	2169.10738 303578	0	0
AT3G41979 .1	7.14394701 524848	3.14643155 665117	2169.10738 303578	0	0
AT3G41979 .1	7.14394701 524848	3.14643155 665117	2169.10738 303578	0	0
AT3G41979 .1	7.14394701 524848	3.14643155 665117	2169.10738 303578	0	0
AT3G41979 .1	7.14394701 524848	3.14643155 665117	2169.10738 303578	0	0
AT2G01010 .1	6.78577878 196634	1.15060964 02501	1777.00272 538025	0	0
AT2G01010 .1	6.78577878 196634	1.15060964 02501	1777.00272 538025	0	0
AT2G01010 .1	6.78577878 196634	1.15060964 02501	1777.00272 538025	0	0
AT2G01010 .1	6.78577878 196634	1.15060964 02501	1777.00272 538025	0	0
AT2G01010 .1	6.78577878 196634	1.15060964 02501	1777.00272 538025	0	0
AT2G01010 .1	6.78577878 196634	1.15060964 02501	1777.00272 538025	0	0
AT2G01010 .1	6.78577878 196634	1.15060964 02501	1777.00272 538025	0	0
AT2G01020 .1	5.85166266 709917	2.01832098 495825	1602.90933 471005	0	0
AT2G01020 .1	5.85166266 709917	2.01832098 495825	1602.90933 471005	0	0
AT2G01020 .1	5.85166266 709917	2.01832098 495825	1602.90933 471005	0	0
AT2G01020 .1	5.85166266 709917	2.01832098 495825	1602.90933 471005	0	0
AT2G01020 .1	5.85166266 709917	2.01832098 495825	1602.90933 471005	0	0
AT2G01020 .1	5.85166266 709917	2.01832098 495825	1602.90933 471005	0	0
AT2G01020 .1	5.85166266 709917	2.01832098 495825	1602.90933 471005	0	0
AT2G41810 .1	- 5.56603335 393463	0.97919985 9520168	1176.84880 294726	6.55753924 355285e- 258	4.55432029 696818e- 254
AT2G41810 .1	- 5.56603335 393463	0.97919985 9520168	1176.84880 294726	6.55753924 355285e- 258	4.55432029 696818e- 254
AT2G41810 .1	- 5.56603335 393463	0.97919985 9520168	1176.84880 294726	6.55753924 355285e- 258	4.55432029 696818e- 254

Identifier	logFC	logCPM	LR	PValue	FDR
AT2G41810 .1	- 5.56603335 393463	0.97919985 9520168	1176.84880 294726	6.55753924 355285e- 258	4.55432029 696818e- 254
AT2G41810 .1	- 5.56603335 393463	0.97919985 9520168	1176.84880 294726	6.55753924 355285e- 258	4.55432029 696818e- 254
AT2G41810 .1	- 5.56603335 393463	0.97919985 9520168	1176.84880 294726	6.55753924 355285e- 258	4.55432029 696818e- 254
AT2G30750 .1	- 5.01590315 492848	2.92766957 697186	1100.56014 415262	2.49540273 659601e- 241	1.48551324 909561e- 237
AT2G30750 .1	- 5.01590315 492848	2.92766957 697186	1100.56014 415262	2.49540273 659601e- 241	1.48551324 909561e- 237
AT2G30750 .1	- 5.01590315 492848	2.92766957 697186	1100.56014 415262	2.49540273 659601e- 241	1.48551324 909561e- 237
AT2G30750 .1	- 5.01590315 492848	2.92766957 697186	1100.56014 415262	2.49540273 659601e- 241	1.48551324 909561e- 237
AT2G30750 .1	- 5.01590315 492848	2.92766957 697186	1100.56014 415262	2.49540273 659601e- 241	1.48551324 909561e- 237
AT2G30750 .1	- 5.01590315 492848	2.92766957 697186	1100.56014 415262	2.49540273 659601e- 241	1.48551324 909561e- 237
AT2G30750 .1	- 5.01590315 492848	2.92766957 697186	1100.56014 415262	2.49540273 659601e- 241	1.48551324 909561e- 237
AT2G34430 .1	5.61605372 76966	8.02554339 429112	965.118701 680082	6.86021306 355563e- 212	3.57339923 214283e- 208
AT2G34430 .1	5.61605372 76966	8.02554339 429112	965.118701 680082	6.86021306 355563e- 212	3.57339923 214283e- 208
AT2G34430 .1	5.61605372 76966	8.02554339 429112	965.118701 680082	6.86021306 355563e- 212	3.57339923 214283e- 208
AT2G34430 .1	5.61605372 76966	8.02554339 429112	965.118701 680082	6.86021306 355563e- 212	3.57339923 214283e- 208
AT2G34430 .1	5.61605372 76966	8.02554339 429112	965.118701 680082	6.86021306 355563e- 212	3.57339923 214283e- 208
AT2G34430 .1	5.61605372 76966	8.02554339 429112	965.118701 680082	6.86021306 355563e- 212	3.57339923 214283e- 208
AT2G34430 .1	5.61605372 76966	8.02554339 429112	965.118701 680082	6.86021306 355563e- 212	3.57339923 214283e- 208
AT3G01500 .3	4.39321314 688084	9.88357206 361966	942.103302 808181	6.90713803 334243e- 207	3.19808165 541569e- 203
AT3G01500 .3	4.39321314 688084	9.88357206 361966	942.103302 808181	6.90713803 334243e- 207	3.19808165 541569e- 203
AT3G01500 .3	4.39321314 688084	9.88357206 361966	942.103302 808181	6.90713803 334243e- 207	3.19808165 541569e- 203



Identifier	logFC	logCPM	LR	PValue	FDR
AT3G01500.3	4.39321314688084	9.88357206361966	942.103302808181	6.90713803334243e-207	3.19808165541569e-203
AT3G01500.3	4.39321314688084	9.88357206361966	942.103302808181	6.90713803334243e-207	3.19808165541569e-203
AT3G01500.3	4.39321314688084	9.88357206361966	942.103302808181	6.90713803334243e-207	3.19808165541569e-203

**Top differentially expressed genes: full\_table\_GCShoot-FLShoot.txt**

Identifier	logFC	logCPM	LR	PValue	FDR
AT1G26390.1	-5.20744189629937	2.28732078703056	1075.16877668432	8.23882595969031e-236	3.43320116566255e-231
AT1G26390.1	-5.20744189629937	2.28732078703056	1075.16877668432	8.23882595969031e-236	3.43320116566255e-231
AT1G26390.1	-5.20744189629937	2.28732078703056	1075.16877668432	8.23882595969031e-236	3.43320116566255e-231
AT1G26390.1	-5.20744189629937	2.28732078703056	1075.16877668432	8.23882595969031e-236	3.43320116566255e-231
AT1G26390.1	-5.20744189629937	2.28732078703056	1075.16877668432	8.23882595969031e-236	3.43320116566255e-231
AT1G26390.1	-5.20744189629937	2.28732078703056	1075.16877668432	8.23882595969031e-236	3.43320116566255e-231
AT4G31970.1	-4.8229594535976	1.34325913280233	913.993167895773	8.91045868148545e-201	1.8565386185809e-196
AT4G31970.1	-4.8229594535976	1.34325913280233	913.993167895773	8.91045868148545e-201	1.8565386185809e-196
AT4G31970.1	-4.8229594535976	1.34325913280233	913.993167895773	8.91045868148545e-201	1.8565386185809e-196
AT4G31970.1	-4.8229594535976	1.34325913280233	913.993167895773	8.91045868148545e-201	1.8565386185809e-196
AT4G31970.1	-4.8229594535976	1.34325913280233	913.993167895773	8.91045868148545e-201	1.8565386185809e-196
AT4G31970.1	-4.8229594535976	1.34325913280233	913.993167895773	8.91045868148545e-201	1.8565386185809e-196
AT2G30750.1	-3.86218489792156	2.92766957697186	788.229815976674	1.95494534062729e-173	2.71548424297599e-169

Identifier	logFC	logCPM	LR	PValue	FDR
AT2G30750 .1	- 3.86218489 792156	2.92766957 697186	788.229815 976674	1.95494534 062729e- 173	2.71548424 297599e- 169
AT2G30750 .1	- 3.86218489 792156	2.92766957 697186	788.229815 976674	1.95494534 062729e- 173	2.71548424 297599e- 169
AT2G30750 .1	- 3.86218489 792156	2.92766957 697186	788.229815 976674	1.95494534 062729e- 173	2.71548424 297599e- 169
AT2G30750 .1	- 3.86218489 792156	2.92766957 697186	788.229815 976674	1.95494534 062729e- 173	2.71548424 297599e- 169
AT2G30750 .1	- 3.86218489 792156	2.92766957 697186	788.229815 976674	1.95494534 062729e- 173	2.71548424 297599e- 169
AT4G14630 .1	- 5.32163737 413306	1.75328473 866921	603.109843 765055	3.52684324 717829e- 133	3.67417712 382917e- 129
AT4G14630 .1	- 5.32163737 413306	1.75328473 866921	603.109843 765055	3.52684324 717829e- 133	3.67417712 382917e- 129
AT4G14630 .1	- 5.32163737 413306	1.75328473 866921	603.109843 765055	3.52684324 717829e- 133	3.67417712 382917e- 129
AT4G14630 .1	- 5.32163737 413306	1.75328473 866921	603.109843 765055	3.52684324 717829e- 133	3.67417712 382917e- 129
AT4G14630 .1	- 5.32163737 413306	1.75328473 866921	603.109843 765055	3.52684324 717829e- 133	3.67417712 382917e- 129
AT4G14630 .1	- 5.32163737 413306	1.75328473 866921	603.109843 765055	3.52684324 717829e- 133	3.67417712 382917e- 129
AT3G55970 .1	3.57811655 18644	1.01361781 405798	591.250459 067627	1.33942056 541298e- 130	1.11629988 762649e- 126
AT3G55970 .1	3.57811655 18644	1.01361781 405798	591.250459 067627	1.33942056 541298e- 130	1.11629988 762649e- 126
AT3G55970 .1	3.57811655 18644	1.01361781 405798	591.250459 067627	1.33942056 541298e- 130	1.11629988 762649e- 126
AT3G55970 .1	3.57811655 18644	1.01361781 405798	591.250459 067627	1.33942056 541298e- 130	1.11629988 762649e- 126
AT3G55970 .1	3.57811655 18644	1.01361781 405798	591.250459 067627	1.33942056 541298e- 130	1.11629988 762649e- 126
AT3G55970 .1	3.57811655 18644	1.01361781 405798	591.250459 067627	1.33942056 541298e- 130	1.11629988 762649e- 126
AT1G13609 .1	- 3.77395199 142119	- 0.04009562 13321266	529.857502 879021	3.03354091 874049e- 117	2.10684472 708058e- 113

Identifier	logFC	logCPM	LR	PValue	FDR
AT1G13609 .1	- 3.77395199 142119	- 0.04009562 13321266	529.857502 879021	3.03354091 874049e- 117	2.10684472 708058e- 113
AT1G13609 .1	- 3.77395199 142119	- 0.04009562 13321266	529.857502 879021	3.03354091 874049e- 117	2.10684472 708058e- 113
AT1G13609 .1	- 3.77395199 142119	- 0.04009562 13321266	529.857502 879021	3.03354091 874049e- 117	2.10684472 708058e- 113
AT1G13609 .1	- 3.77395199 142119	- 0.04009562 13321266	529.857502 879021	3.03354091 874049e- 117	2.10684472 708058e- 113
AT1G13609 .1	- 3.77395199 142119	- 0.04009562 13321266	529.857502 879021	3.03354091 874049e- 117	2.10684472 708058e- 113
AT1G14540 .1	- 3.67458858 100013	1.22828501 881406	529.164660 515553	4.29221758 697878e- 117	2.55515712 952847e- 113
AT1G14540 .1	- 3.67458858 100013	1.22828501 881406	529.164660 515553	4.29221758 697878e- 117	2.55515712 952847e- 113
AT1G14540 .1	- 3.67458858 100013	1.22828501 881406	529.164660 515553	4.29221758 697878e- 117	2.55515712 952847e- 113
AT1G14540 .1	- 3.67458858 100013	1.22828501 881406	529.164660 515553	4.29221758 697878e- 117	2.55515712 952847e- 113
AT1G14540 .1	- 3.67458858 100013	1.22828501 881406	529.164660 515553	4.29221758 697878e- 117	2.55515712 952847e- 113
AT1G14540 .1	- 3.67458858 100013	1.22828501 881406	529.164660 515553	4.29221758 697878e- 117	2.55515712 952847e- 113
AT1G14540 .1	- 3.67458858 100013	1.22828501 881406	529.164660 515553	4.29221758 697878e- 117	2.55515712 952847e- 113
AT2G41240 .2	- 4.55011365 63798	- 0.79638142 895902	524.453105 517619	4.54692383 737475e- 116	2.36843579 034054e- 112
AT2G41240 .2	- 4.55011365 63798	- 0.79638142 895902	524.453105 517619	4.54692383 737475e- 116	2.36843579 034054e- 112
AT2G41240 .2	- 4.55011365 63798	- 0.79638142 895902	524.453105 517619	4.54692383 737475e- 116	2.36843579 034054e- 112
AT2G41240 .2	- 4.55011365 63798	- 0.79638142 895902	524.453105 517619	4.54692383 737475e- 116	2.36843579 034054e- 112
AT2G41240 .2	- 4.55011365 63798	- 0.79638142 895902	524.453105 517619	4.54692383 737475e- 116	2.36843579 034054e- 112
AT2G41240 .2	- 4.55011365 63798	- 0.79638142 895902	524.453105 517619	4.54692383 737475e- 116	2.36843579 034054e- 112
AT2G45220 .1	- 3.15181050 516285	3.31942104 274585	522.599184 418326	1.15095299 728366e- 115	5.32904026 10897e-112

Identifier	logFC	logCPM	LR	PValue	FDR
AT2G45220 .1	- 3.15181050 516285	3.31942104 274585	522.599184 418326	1.15095299 728366e- 115	5.32904026 10897e-112
AT2G45220 .1	- 3.15181050 516285	3.31942104 274585	522.599184 418326	1.15095299 728366e- 115	5.32904026 10897e-112
AT2G45220 .1	- 3.15181050 516285	3.31942104 274585	522.599184 418326	1.15095299 728366e- 115	5.32904026 10897e-112
AT2G45220 .1	- 3.15181050 516285	3.31942104 274585	522.599184 418326	1.15095299 728366e- 115	5.32904026 10897e-112
AT2G45220 .1	- 3.15181050 516285	3.31942104 274585	522.599184 418326	1.15095299 728366e- 115	5.32904026 10897e-112

## Literature

Robinson MD, McCarthy DJ, Smyth GK (2010) edgeR: a Bioconductor package for differential expression analysis of digital gene expression data. *Bioinformatics* 26: 139-140

Benjamini, Y., and Hochberg, Y. (1995). Controlling the false discovery rate: a practical and powerful approach to multiple testing. *Journal of the Royal Statistical Society Series B*, 57, 289–300.

## R session information

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LC_TIME=English_United States.1252|
Base packages: base, datasets, graphics, grDevices, methods,
stats, utils
Other packages: edgeR 2.6.12, limma 3.12.3
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