chapter3\_figures

BWSchroeter

2023-06-23

library(knitr)  
library(kableExtra)

##   
## Attaching package: 'dplyr'

## The following object is masked from 'package:kableExtra':  
##   
## group\_rows

## The following objects are masked from 'package:stats':  
##   
## filter, lag

## The following objects are masked from 'package:base':  
##   
## intersect, setdiff, setequal, union

##   
## Attaching package: 'tidyr'

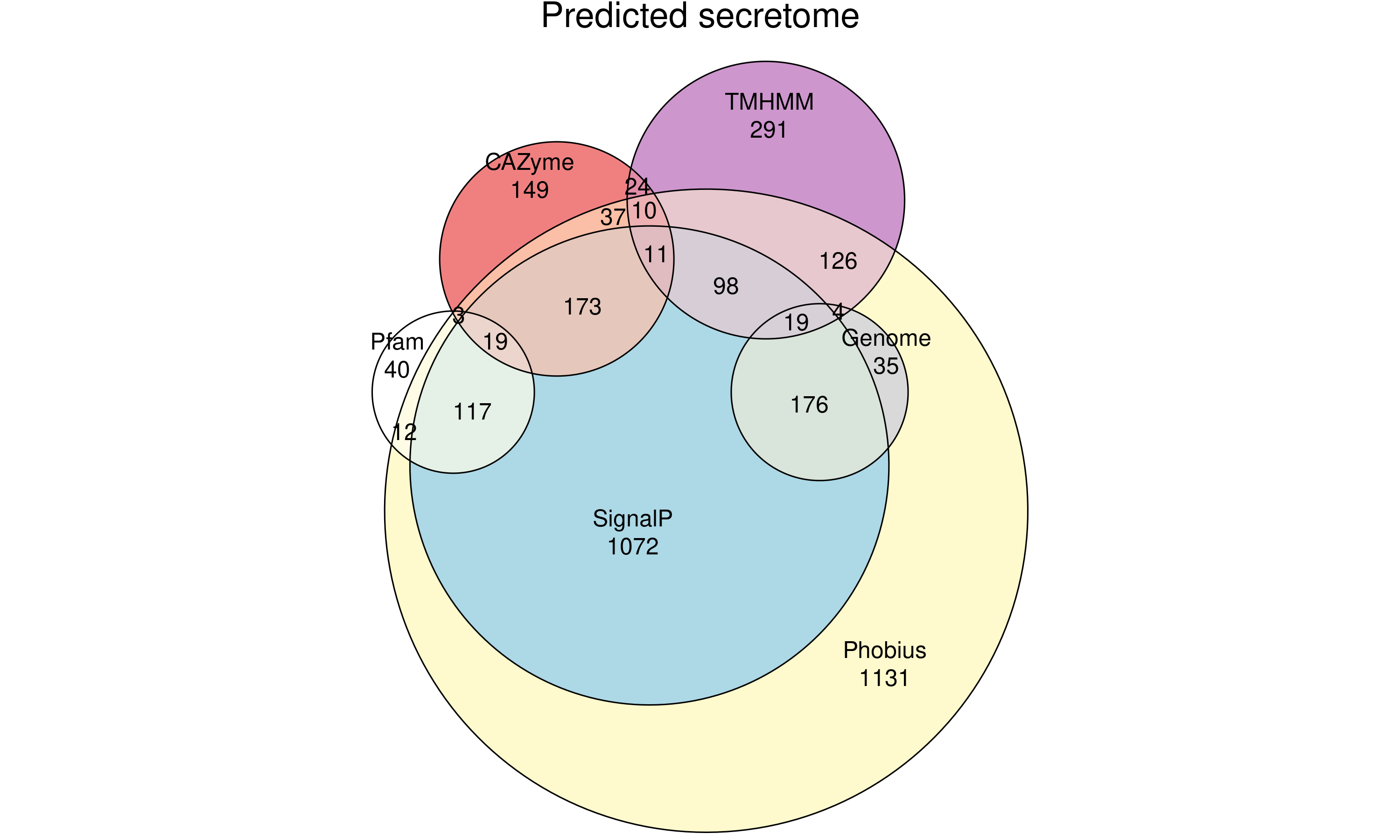
## The following object is masked from 'package:reshape2':  
##   
## smiths

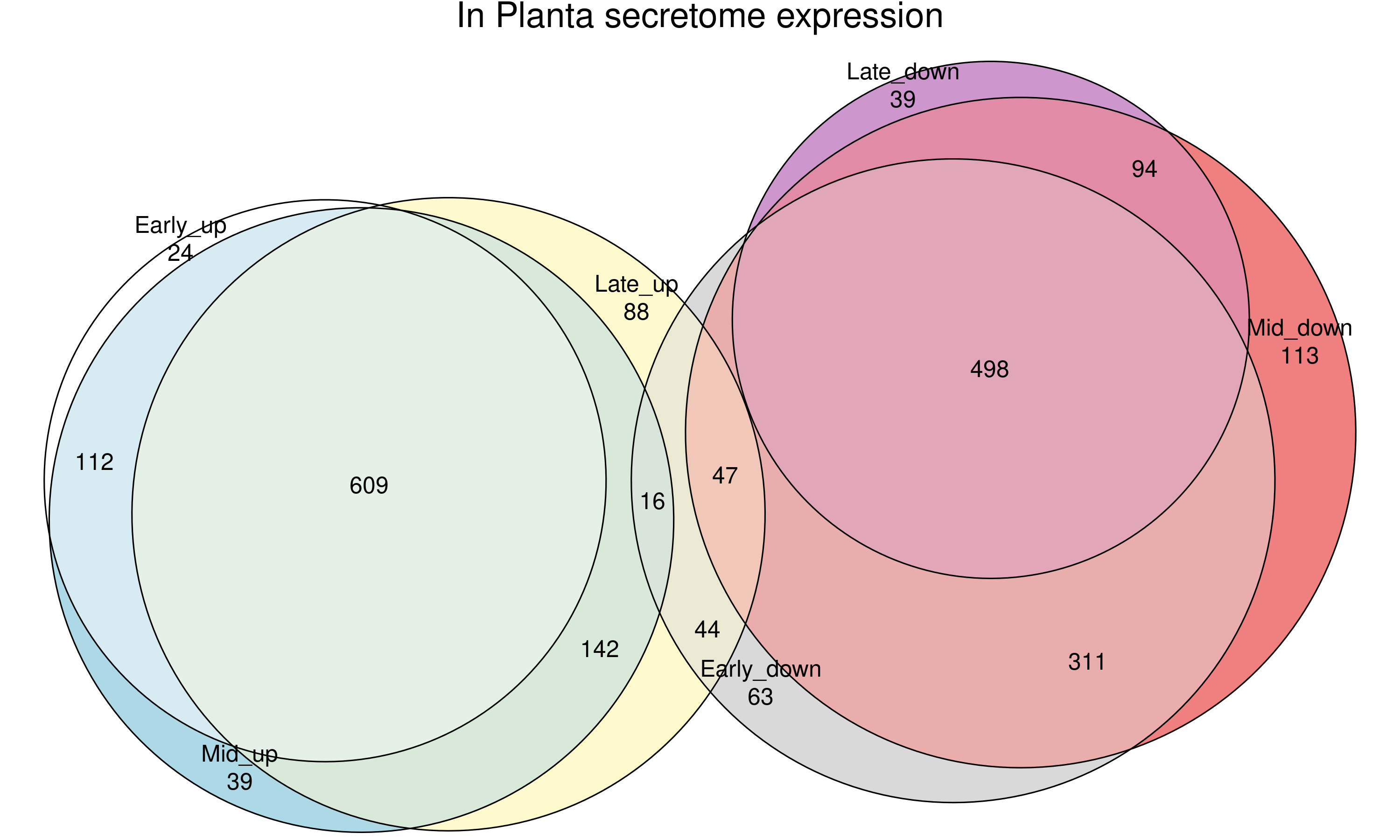
## 'data.frame': 24 obs. of 3 variables:  
## $ V1 : chr "BS01" "BS02" "BS03" "BS04" ...  
## $ Sample : chr "LaH0\_1" "LaH0\_2" "LaH0\_3" "LaH18\_1" ...  
## $ SamplingTime: chr "0 hpi" "0 hpi" "0 hpi" "18 hpi" ...  
## <table class="table" style="margin-left: auto; margin-right: auto;">  
## <thead>  
## <tr>  
## <th style="empty-cells: hide;border-bottom:hidden;" colspan="5"></th>  
## <th style="border-bottom:hidden;padding-bottom:0; padding-left:3px;padding-right:3px;text-align: center; font-weight: bold; font-style: italic; " colspan="2"><div style="border-bottom: 1px solid #ddd; padding-bottom: 5px; ">Phytophthora cinnamomi</div></th>  
## <th style="border-bottom:hidden;padding-bottom:0; padding-left:3px;padding-right:3px;text-align: center; font-weight: bold; font-style: italic; " colspan="2"><div style="border-bottom: 1px solid #ddd; padding-bottom: 5px; ">Lupinus angustifolius</div></th>  
## </tr>  
## <tr>  
## <th style="text-align:center;"> Accession </th>  
## <th style="text-align:center;"> Sample name </th>  
## <th style="text-align:center;"> Sampling time </th>  
## <th style="text-align:center;"> Total reads </th>  
## <th style="text-align:center;"> Total mapped reads </th>  
## <th style="text-align:center;"> Mapped reads </th>  
## <th style="text-align:center;"> Mapped reads (%) </th>  
## <th style="text-align:center;"> Mapped reads </th>  
## <th style="text-align:center;"> Mapped reads (%) </th>  
## </tr>  
## </thead>  
## <tbody>  
## <tr grouplength="12"><td colspan="9" style="border-bottom: 1px solid;"><strong>Water controls</strong></td></tr>  
## <tr>  
## <td style="text-align:center;padding-left: 2em;" indentlevel="1"> BS01\_S2 </td>  
## <td style="text-align:center;"> LaH0\_1 </td>  
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## <td style="text-align:center;"> 35,723,772 </td>  
## <td style="text-align:center;"> 30,381,762 </td>  
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## <td style="text-align:center;padding-left: 2em;" indentlevel="1"> BS02\_S3 </td>  
## <td style="text-align:center;"> LaH0\_2 </td>  
## <td style="text-align:center;"> 0 hpi </td>  
## <td style="text-align:center;"> 40,589,157 </td>  
## <td style="text-align:center;"> 33,832,923 </td>  
## <td style="text-align:center;"> 15 </td>  
## <td style="text-align:center;"> 0.00 </td>  
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## <td style="text-align:center;padding-left: 2em;" indentlevel="1"> BS03\_S4 </td>  
## <td style="text-align:center;"> LaH0\_3 </td>  
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## <td style="text-align:center;padding-left: 2em;" indentlevel="1"> BS04\_S5 </td>  
## <td style="text-align:center;"> LaH18\_1 </td>  
## <td style="text-align:center;"> 18 hpi </td>  
## <td style="text-align:center;"> 40,946,170 </td>  
## <td style="text-align:center;"> 34,126,704 </td>  
## <td style="text-align:center;"> 48 </td>  
## <td style="text-align:center;"> 0.00 </td>  
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## <td style="text-align:center;"> LaH18\_2 </td>  
## <td style="text-align:center;"> 18 hpi </td>  
## <td style="text-align:center;"> 52,569,117 </td>  
## <td style="text-align:center;"> 43,993,443 </td>  
## <td style="text-align:center;"> 18 </td>  
## <td style="text-align:center;"> 0.00 </td>  
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## <td style="text-align:center;"> 35,706,355 </td>  
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## <td style="text-align:center;"> 32,647,597 </td>  
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## <td style="text-align:center;"> LaH48\_1 </td>  
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## <td style="text-align:center;"> 44,416,982 </td>  
## <td style="text-align:center;"> 36,614,529 </td>  
## <td style="text-align:center;"> 8 </td>  
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## <td style="text-align:center;"> LaH48\_2 </td>  
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## <td style="text-align:center;"> 34,172,572 </td>  
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## <td style="text-align:center;"> LaH48\_3 </td>  
## <td style="text-align:center;"> 48 hpi </td>  
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## <td style="text-align:center;"> 28,807,216 </td>  
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## <td style="text-align:center;padding-left: 2em;" indentlevel="1"> BS13\_S14 </td>  
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## <td style="text-align:center;"> 35,095,780 </td>  
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## <td style="text-align:center;padding-left: 2em;" indentlevel="1"> BS14\_S15 </td>  
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## <td style="text-align:center;"> 31,942,184 </td>  
## <td style="text-align:center;"> 31,940,908 </td>  
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## <td style="text-align:center;"> 1,276 </td>  
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## <td style="text-align:center;padding-left: 2em;" indentlevel="1"> BS15\_S16 </td>  
## <td style="text-align:center;"> PcHyp\_3 </td>  
## <td style="text-align:center;"> 0 hpi </td>  
## <td style="text-align:center;"> 42,953,852 </td>  
## <td style="text-align:center;"> 33,309,346 </td>  
## <td style="text-align:center;"> 33,308,551 </td>  
## <td style="text-align:center;"> 100.00 </td>  
## <td style="text-align:center;"> 795 </td>  
## <td style="text-align:center;"> 0.00 </td>  
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## <tr grouplength="9"><td colspan="9" style="border-bottom: 1px solid;"><em><strong>in planta</strong></em></td></tr>  
## <tr>  
## <td style="text-align:center;padding-left: 2em;" indentlevel="1"> BS16\_S17 </td>  
## <td style="text-align:center;"> LaPc18\_1 </td>  
## <td style="text-align:center;"> 18 hpi </td>  
## <td style="text-align:center;"> 42,095,147 </td>  
## <td style="text-align:center;"> 35,019,695 </td>  
## <td style="text-align:center;"> 592,912 </td>  
## <td style="text-align:center;"> 1.69 </td>  
## <td style="text-align:center;"> 34,426,783 </td>  
## <td style="text-align:center;"> 98.31 </td>  
## </tr>  
## <tr>  
## <td style="text-align:center;padding-left: 2em;" indentlevel="1"> BS17\_S18 </td>  
## <td style="text-align:center;"> LaPc18\_2 </td>  
## <td style="text-align:center;"> 18 hpi </td>  
## <td style="text-align:center;"> 39,508,572 </td>  
## <td style="text-align:center;"> 32,954,524 </td>  
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## <td style="text-align:center;"> 2.76 </td>  
## <td style="text-align:center;"> 32,043,657 </td>  
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## <tr>  
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## <td style="text-align:center;"> LaPc18\_3 </td>  
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## <td style="text-align:center;"> 51,975,816 </td>  
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## <td style="text-align:center;"> LaPc30\_1 </td>  
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## <td style="text-align:center;"> 46,398,841 </td>  
## <td style="text-align:center;"> 38,122,434 </td>  
## <td style="text-align:center;"> 5,175,589 </td>  
## <td style="text-align:center;"> 13.58 </td>  
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## <td style="text-align:center;padding-left: 2em;" indentlevel="1"> BS21\_S22 </td>  
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## </tbody>  
## </table><table class="table" style="margin-left: auto; margin-right: auto;">  
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## <tr>  
## <th style="empty-cells: hide;border-bottom:hidden;" colspan="5"></th>  
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## <th style="border-bottom:hidden;padding-bottom:0; padding-left:3px;padding-right:3px;text-align: center; font-weight: bold; font-style: italic; " colspan="2"><div style="border-bottom: 1px solid #ddd; padding-bottom: 5px; ">Lupinus angustifolius</div></th>  
## </tr>  
## <tr>  
## <th style="text-align:center;"> Accession </th>  
## <th style="text-align:center;"> Sample name </th>  
## <th style="text-align:center;"> Sampling time </th>  
## <th style="text-align:center;"> Total reads </th>  
## <th style="text-align:center;"> Total mapped reads </th>  
## <th style="text-align:center;"> Mapped reads </th>  
## <th style="text-align:center;"> Mapped reads (%) </th>  
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## </tr>  
## </thead>  
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## <tr grouplength="3"><td colspan="9" style="border-bottom: 1px solid;"><strong>Hyphae controls</strong></td></tr>  
## <tr>  
## <td style="text-align:center;padding-left: 2em;" indentlevel="1"> BS13\_S14 </td>  
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## <tr grouplength="9"><td colspan="9" style="border-bottom: 1px solid;"><em><strong>in planta</strong></em></td></tr>  
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## <td style="text-align:center;padding-left: 2em;" indentlevel="1"> BS16\_S17 </td>  
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## <td style="text-align:center;"> 1.69 </td>  
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## <td style="text-align:center;"> 32954524 </td>  
## <td style="text-align:center;"> 910867 </td>  
## <td style="text-align:center;"> 2.76 </td>  
## <td style="text-align:center;"> 32043657 </td>  
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## <td style="text-align:center;"> 283922 </td>  
## <td style="text-align:center;"> 0.66 </td>  
## <td style="text-align:center;"> 42666126 </td>  
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## <td style="text-align:center;padding-left: 2em;" indentlevel="1"> BS19\_S20 </td>  
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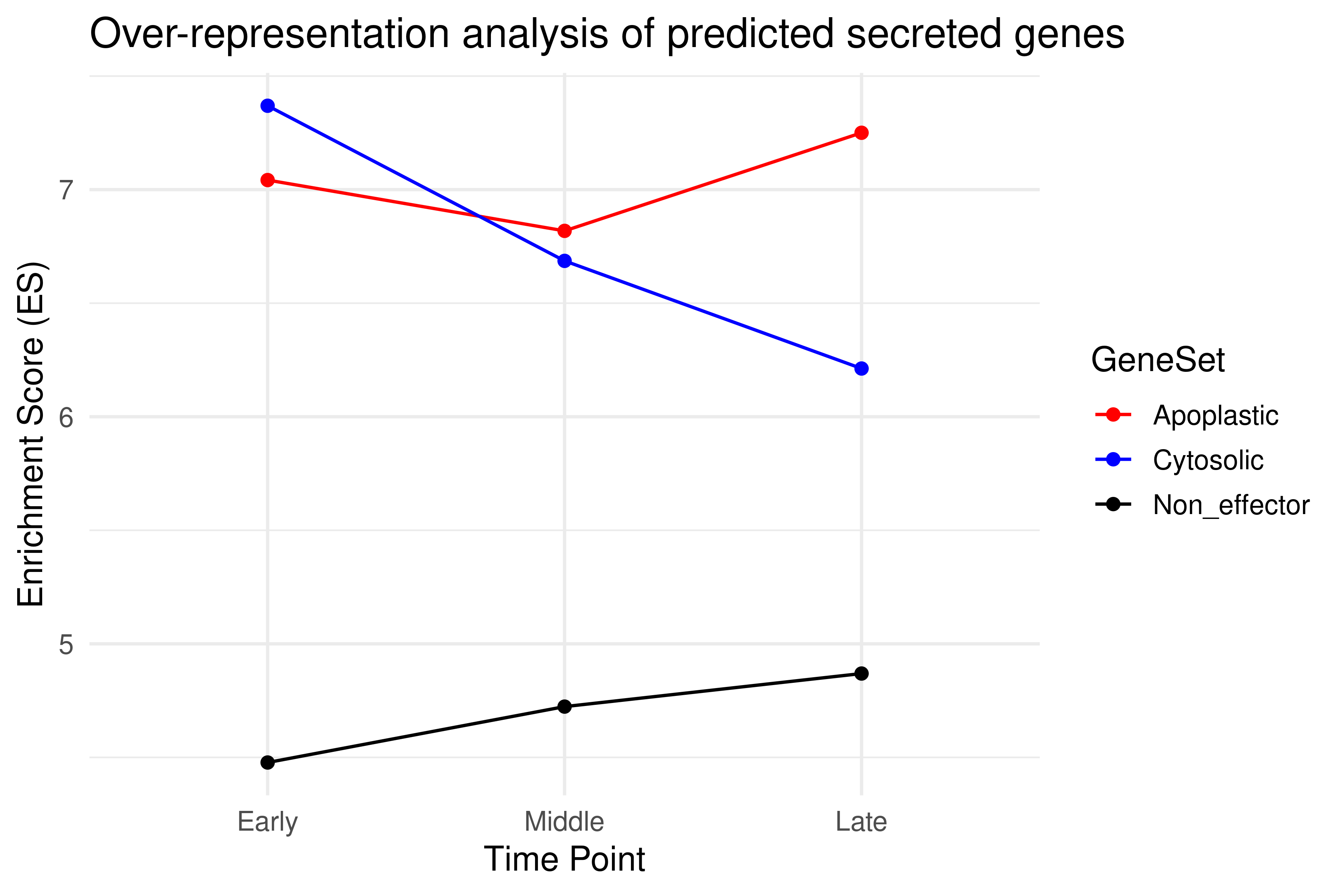
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# Effector analysis

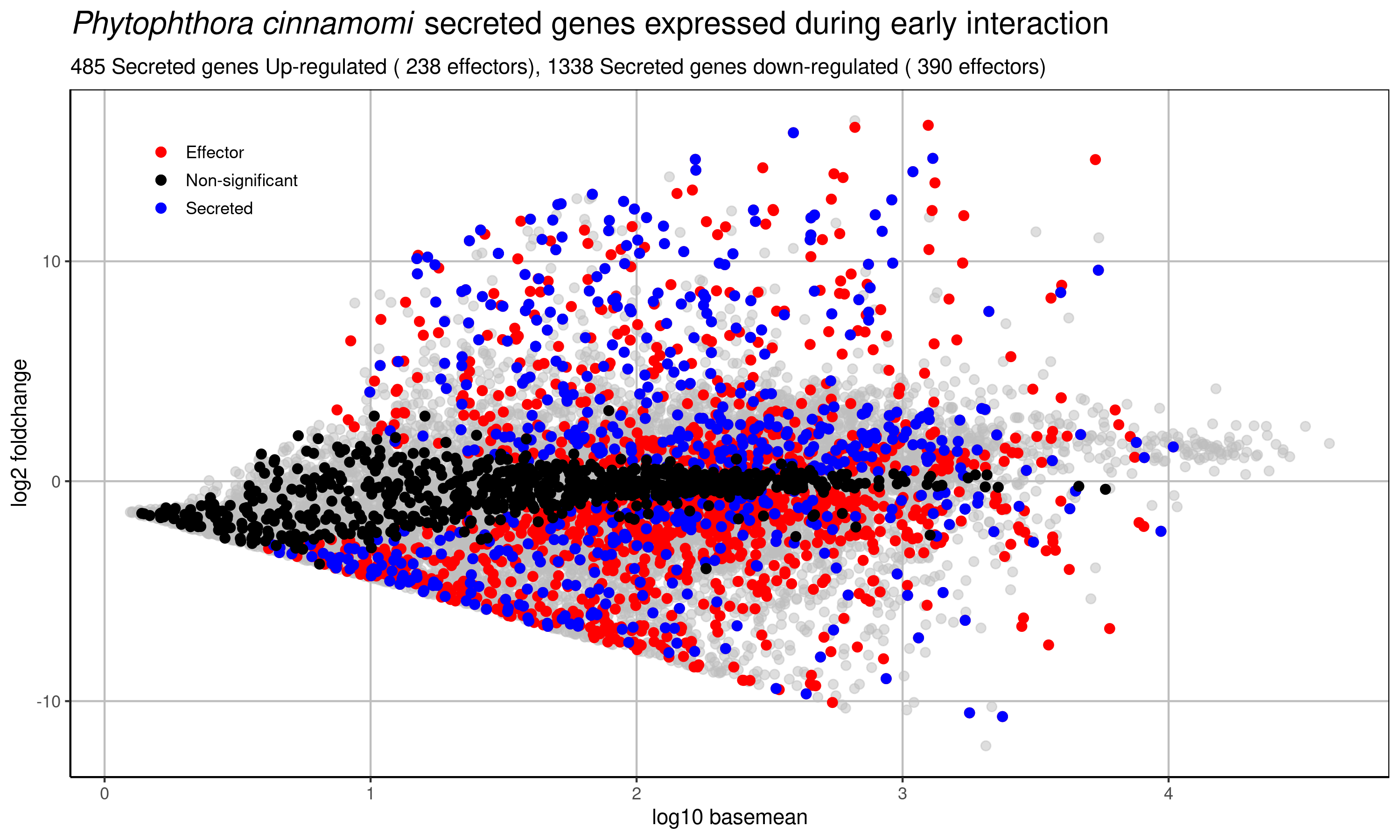
 Figure\_: Predicted secreted Phytophthora cinnamomi proteins. Total proteins obtained from .faa file were ran through multiple predictive models: SignalP, predicted signal peptides containing a Sec/SPI SPs using signalP6.0. Phobius, TMHMM and Pfam contain a predicted; signal peptides (Phobius-1.01); fewer than one transmembrane helix and a signal peptide within the first 60 amino acids (TMHMM-2.0C); or a Pfam domain associated with plant pathogenesis (Pfam-35.0), respectively using InterProScan 5.62-94. CAZyme are predicted carbohydrate-active enzymes using dbCAN3. Genome contains previously predicted known effectors (RxLR, CRN and NLPs) from Engelbrecht, Juanita, et al. 2021.

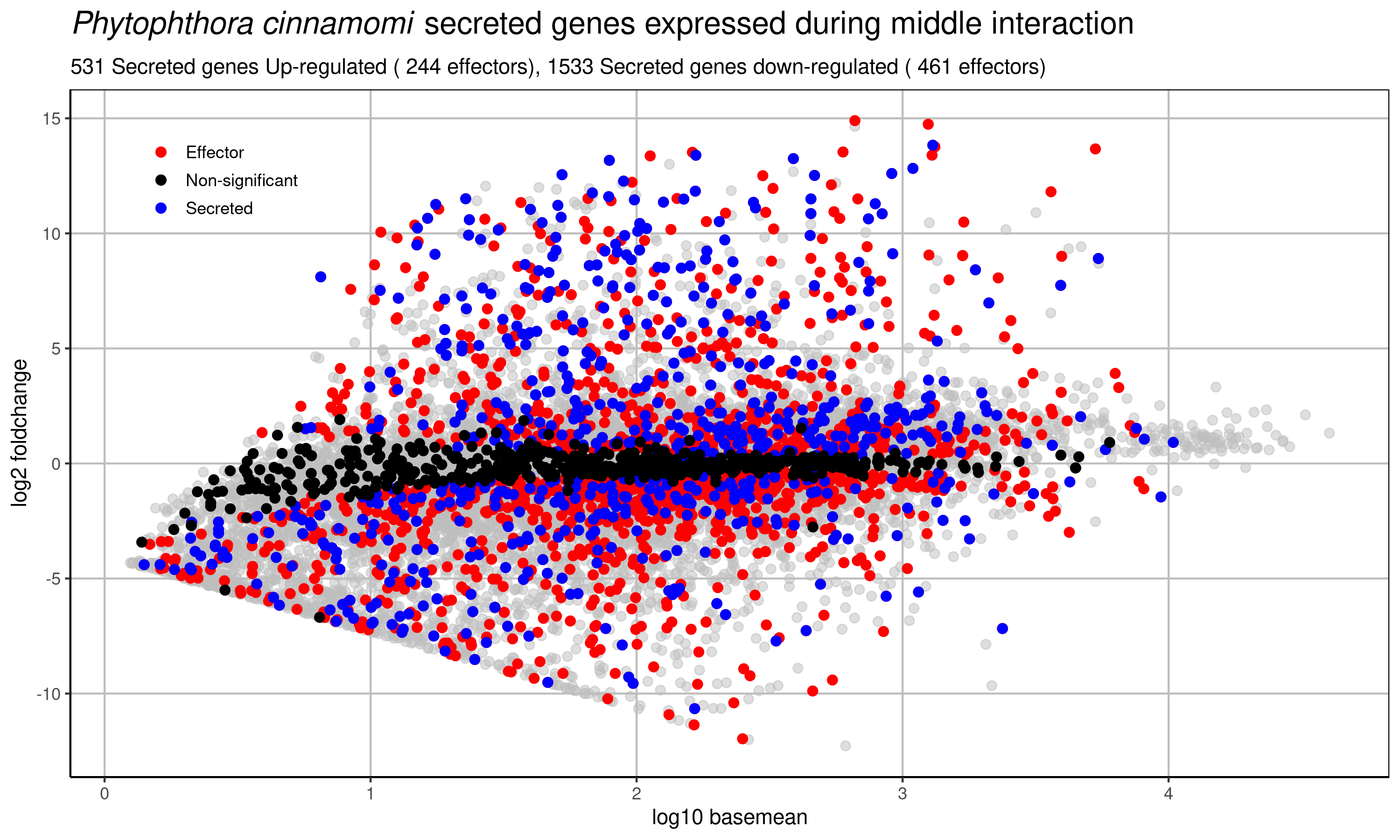


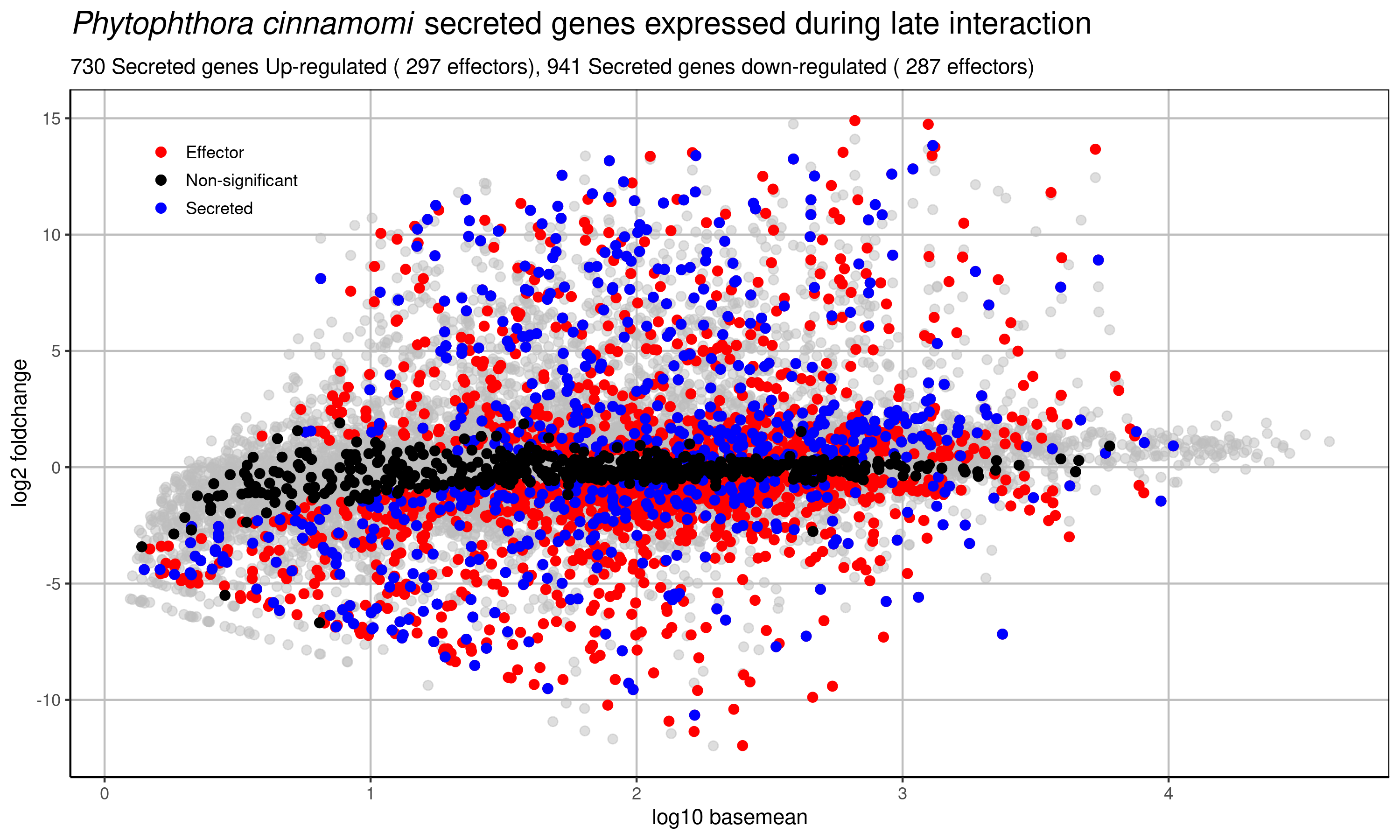
Figure\_: Detected predicted secreted Phytophthora cinnamomi genes expression at 18-, 30-, and 48 hours post inoculation (hpi) in lupin. Genes were considered up regulated if log2fold change was greater than 0 and padj < 0.05, while down regulated if log2fold change was less than 0 and padj < 0.05.



Figure\_: Over representative analysis (ORA) of predicted apoplastic effectors (red), cytosolic effectors (blue) predicted using EffectorP-3.0, together with secreted genes (black) up regulated at 18-, 30-, and 48 hours post inoculation (hpi) in lupin. Background genes are all genes detected throughout the time course.

 Figure\_: Secreted Phytophthora cinnamomi genes expressed in Lupin at 18 hours post inoculation (hpi). Predicted effectors (red), predicted secreted genes (blue) and non significant secreted genes (black). Significance is denoted by +/- 2 log2foldchange in expression compared to vegetative hyphae grown on agar and padj > 0.5.

 Figure\_: Secreted Phytophthora cinnamomi genes expressed in Lupin at 30 hours post inoculation (hpi). Predicted effectors (red), predicted secreted genes (blue) and non significant secreted genes (black). Significance is denoted by +/- log2foldchange in expression compared to vegetative hyphae grown on agar and padj > 0.5.

 Figure\_: Secreted Phytophthora cinnamomi genes expressed in Lupin at 48 hours post inoculation (hpi). Predicted effectors (red), predicted secreted genes (blue) and non significant secreted genes (black). Significance is denoted by +/- log2foldchange in expression compared to vegetative hyphae grown on agar and padj > 0.5.