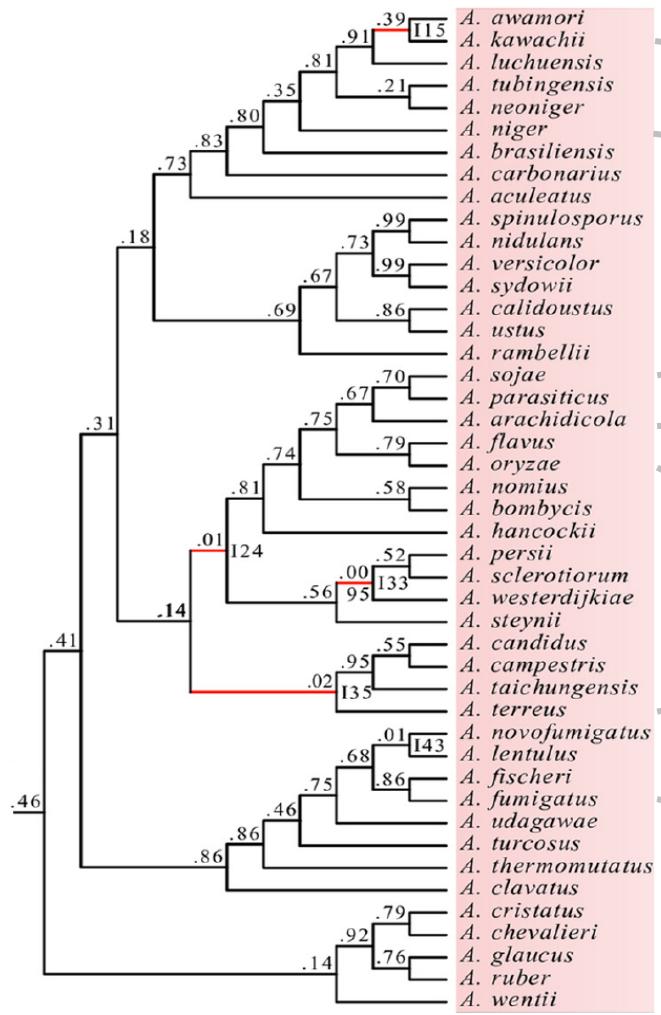


Human Genome Class

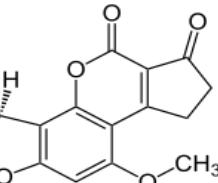
Katherine Chacon-Vargas

RNA-seq workflow: gene-level exploratory analysis and differential expression

Dr. Jekyll and Mr. Hyde of Fungi



A. oryzae



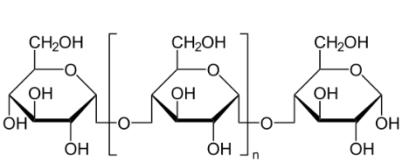
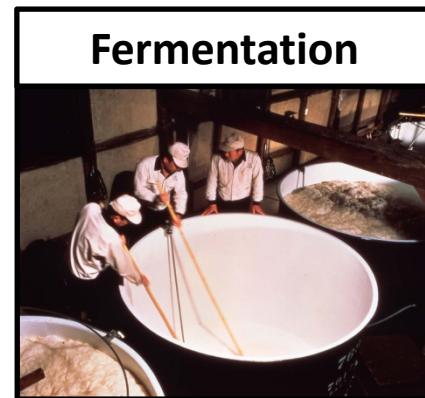
A. flavus



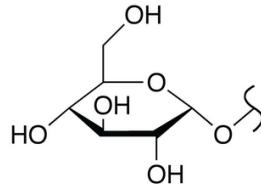
Japanese koji → Sake



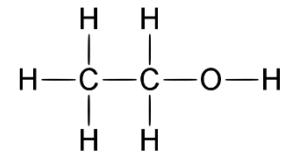
The Role of α -amylase in Sake Production



A. oryzae



Yeast



Starch

Sugar

Alcohol



Experiment

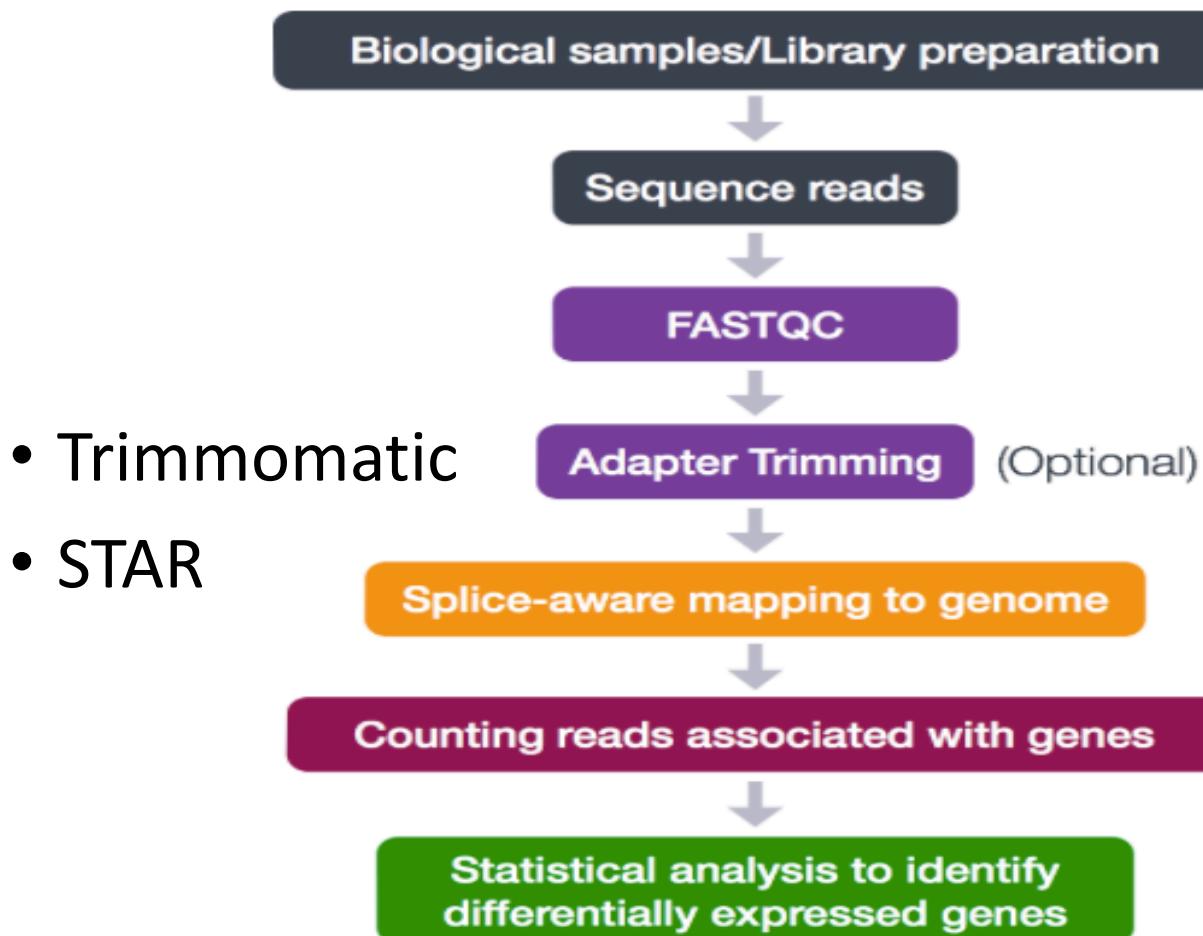


- Rice
- 30° C
- 26 hours
- RNA-seq

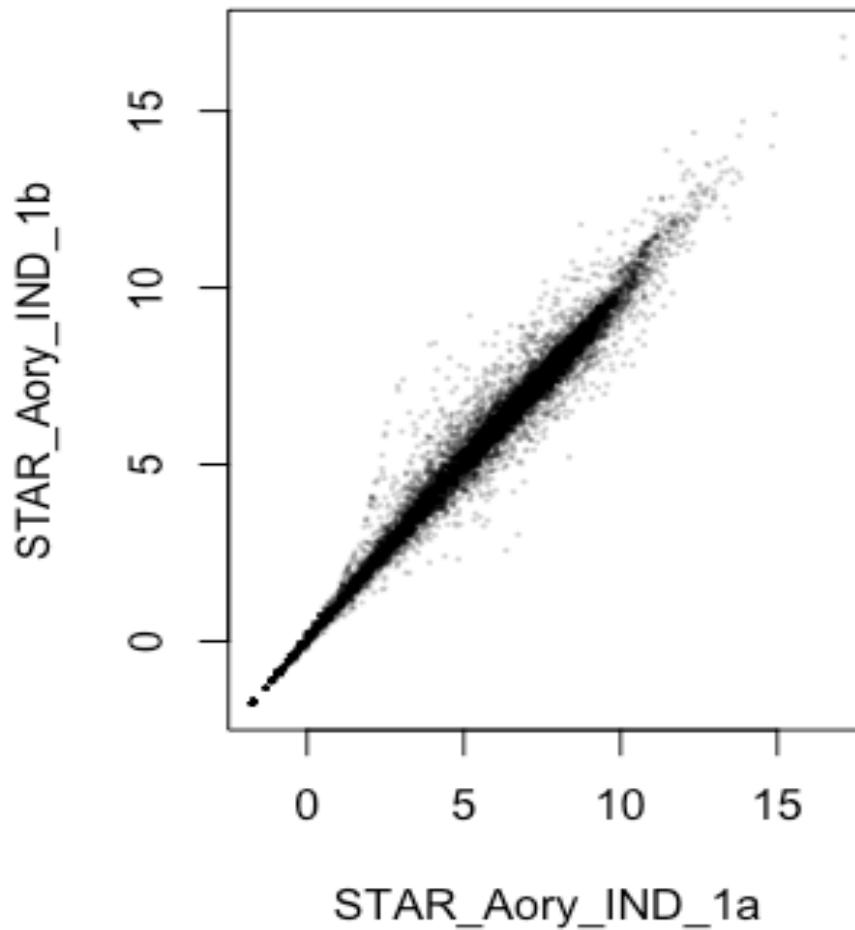
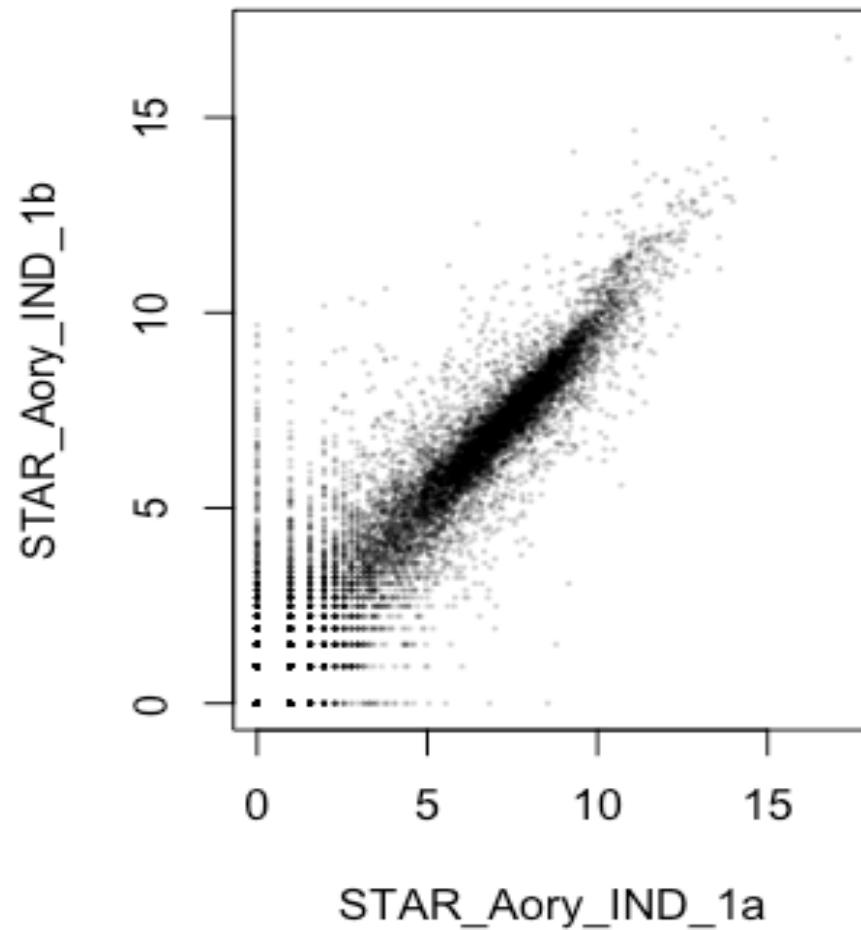
- Koji starters
- Industrial Strain IND
- Wild strain WILD

Cleaning and mapping data

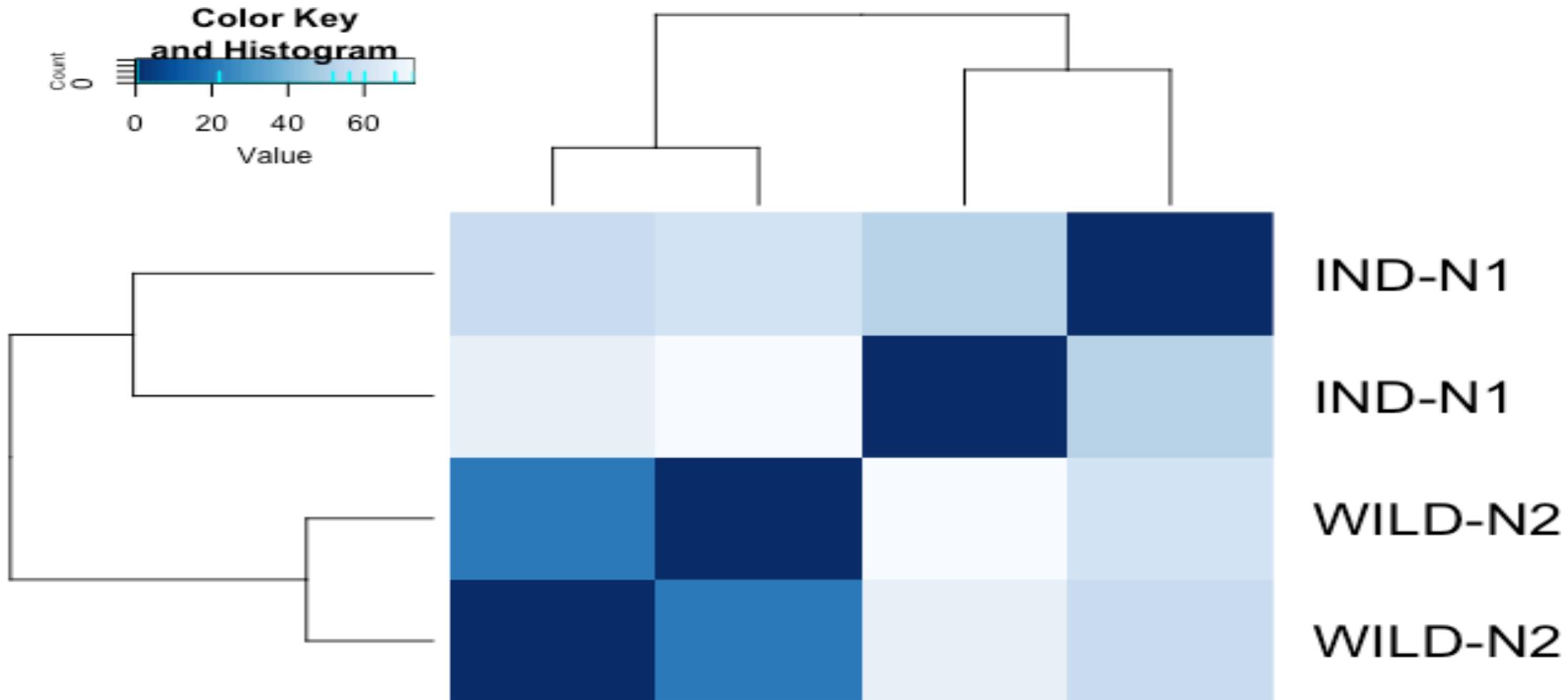
Read Alignment



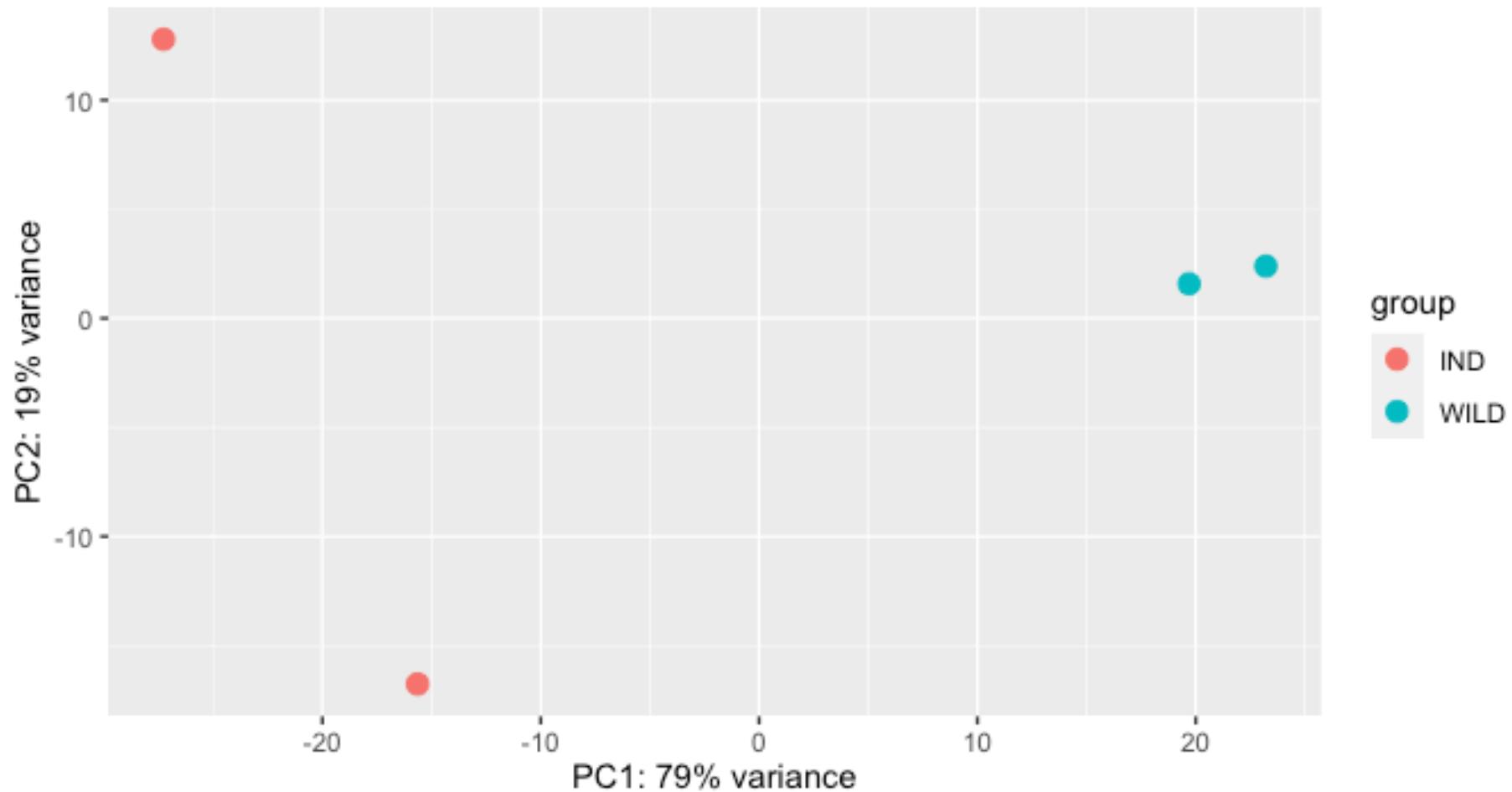
Transforming data using DESeq2 → rlog



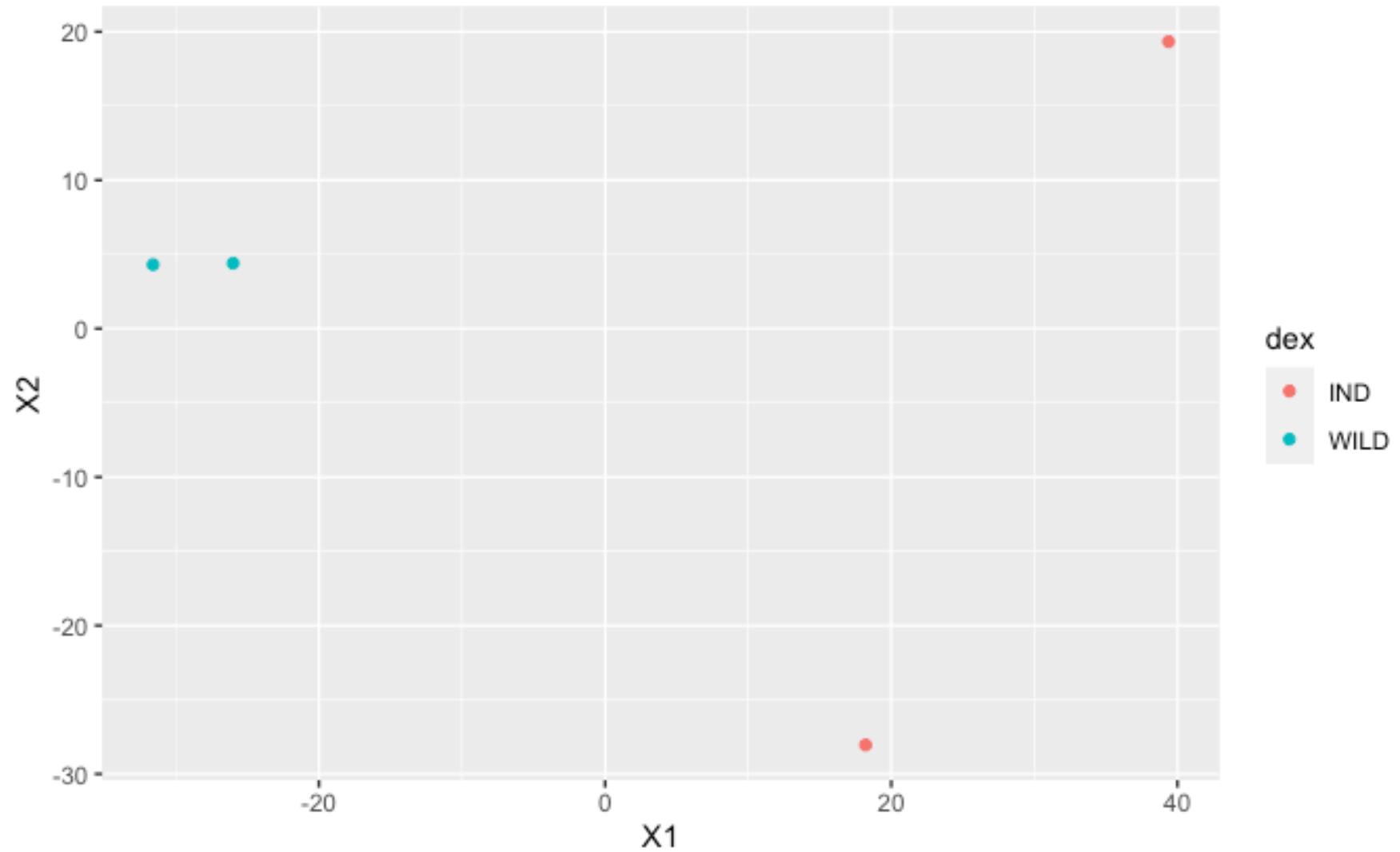
Distance Matrix (Poisson distance)



PCA sample to sample distance



MDS plots

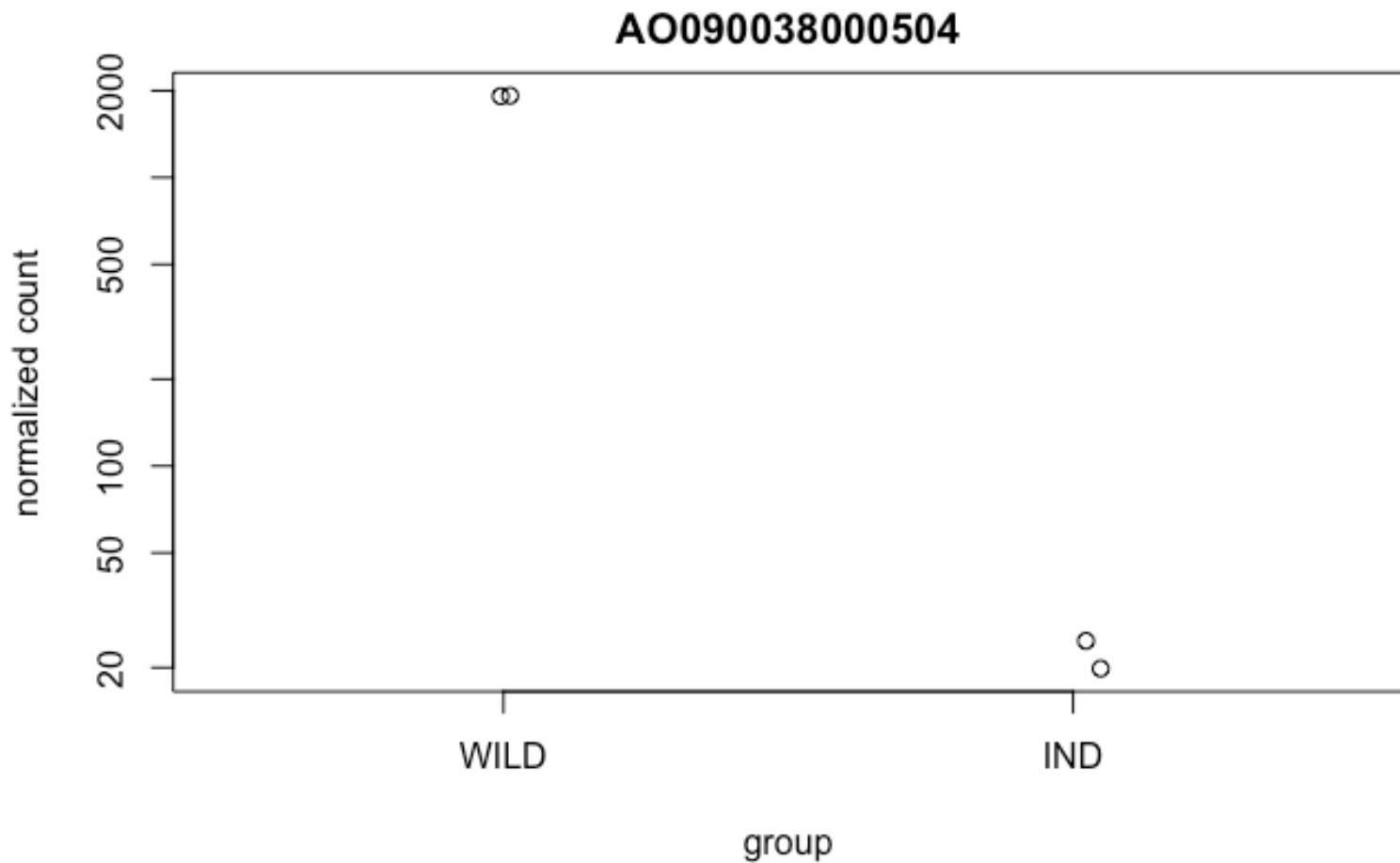


Differential Expression pipeline DESeq2

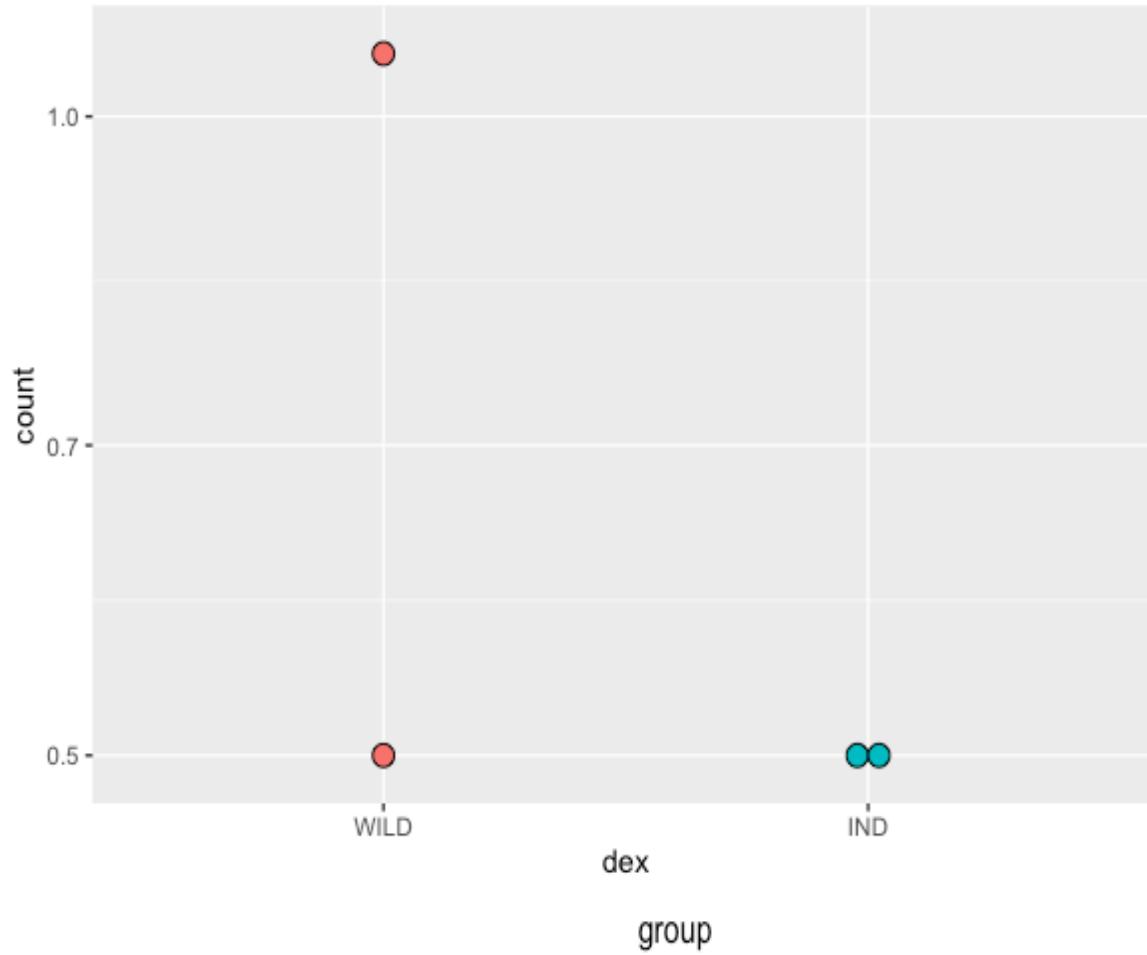
- This estimated log2 fold change and p values
- The column `log2FoldChange` is the effect size estimate. It tells us how much the gene's expression seems to have changed due to condition (IND or WILD)
- `IfcSE`, the standard error estimate for the log2 fold change estimate → `IfcThreshold` for more strict significance
- At FDR level of 10% many genes showed differential expression

Diagnostic plots

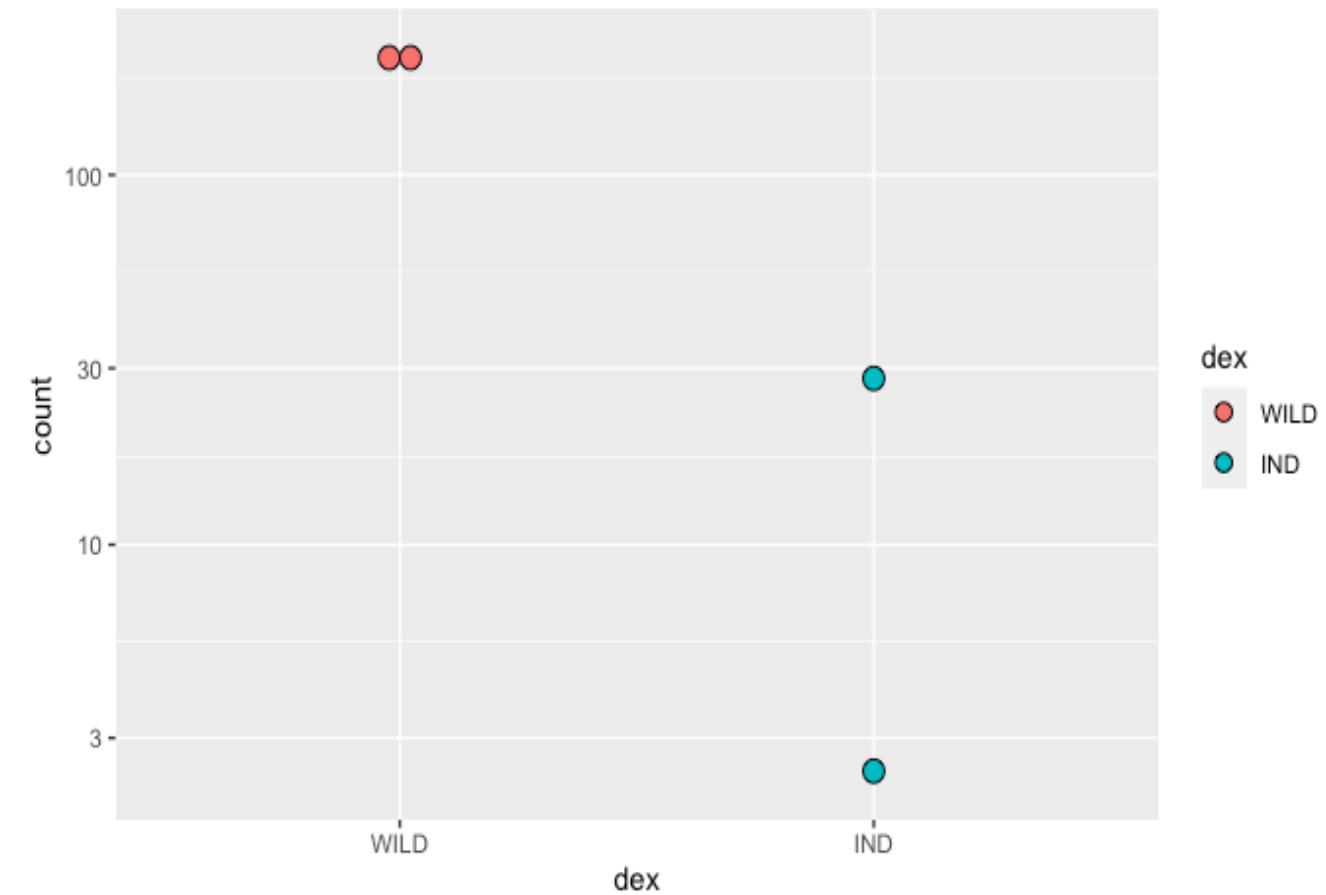
- sort it by the log₂ fold change estimate to get the significant genes with the strongest down-regulation



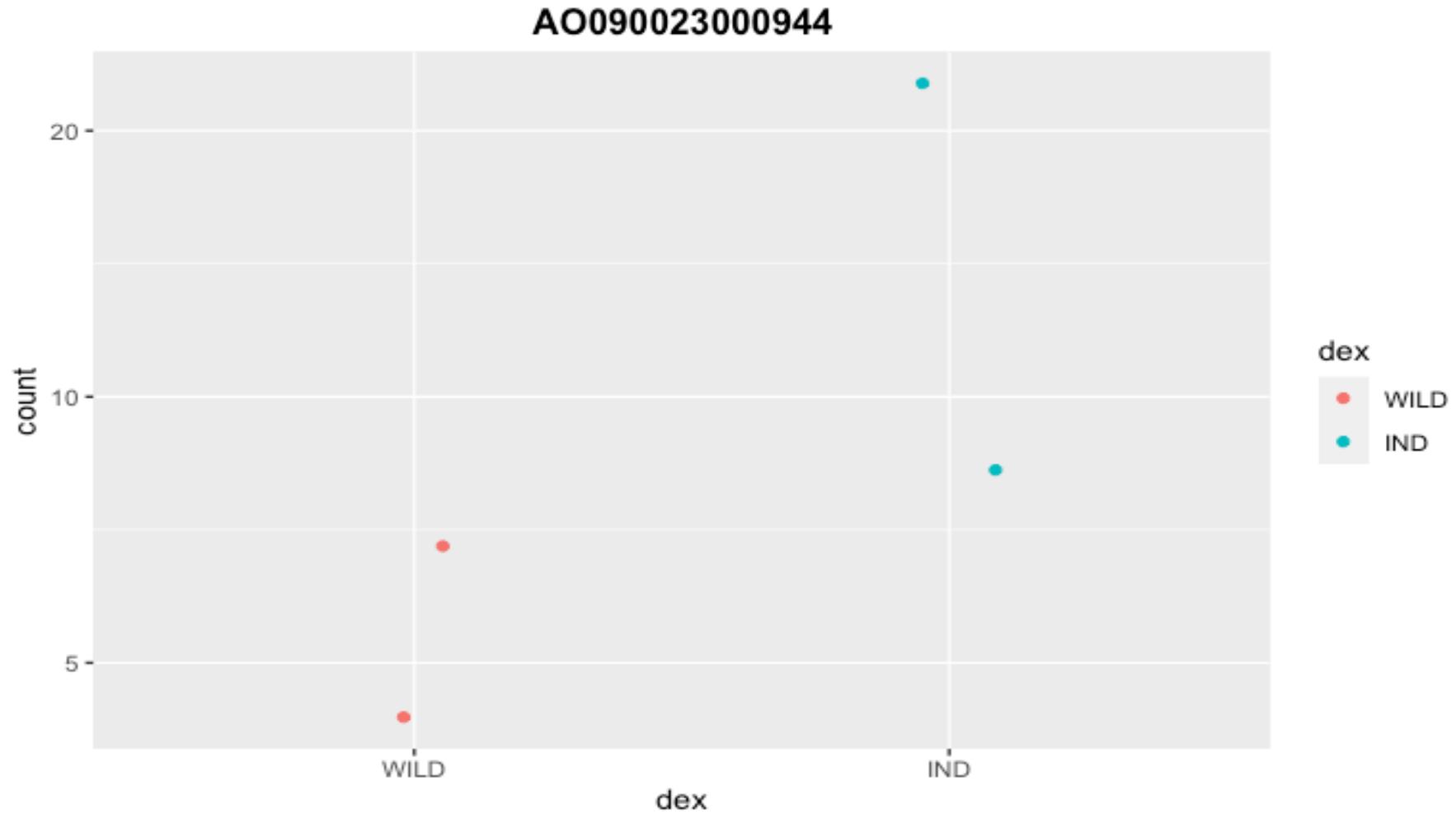
Aflotoxin gene 1



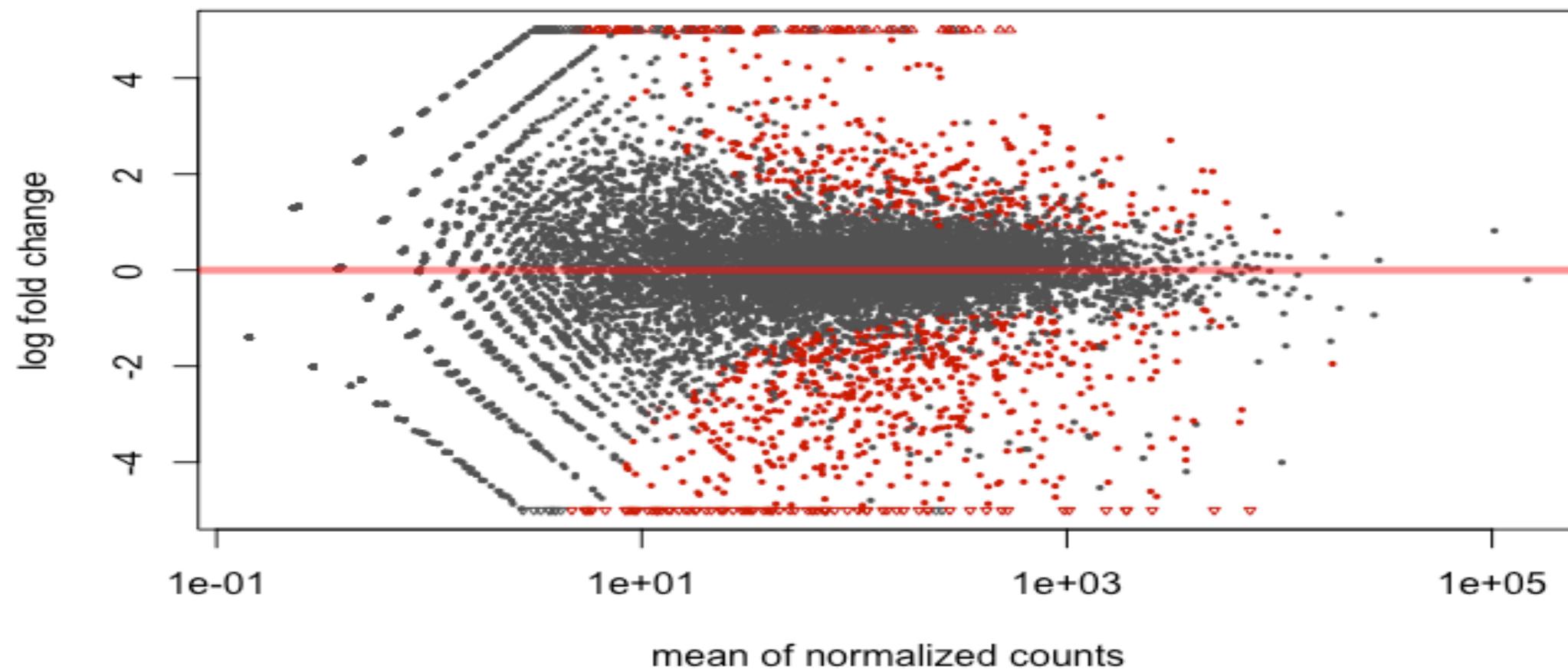
Aflotoxin gene 2



Alpha amylase



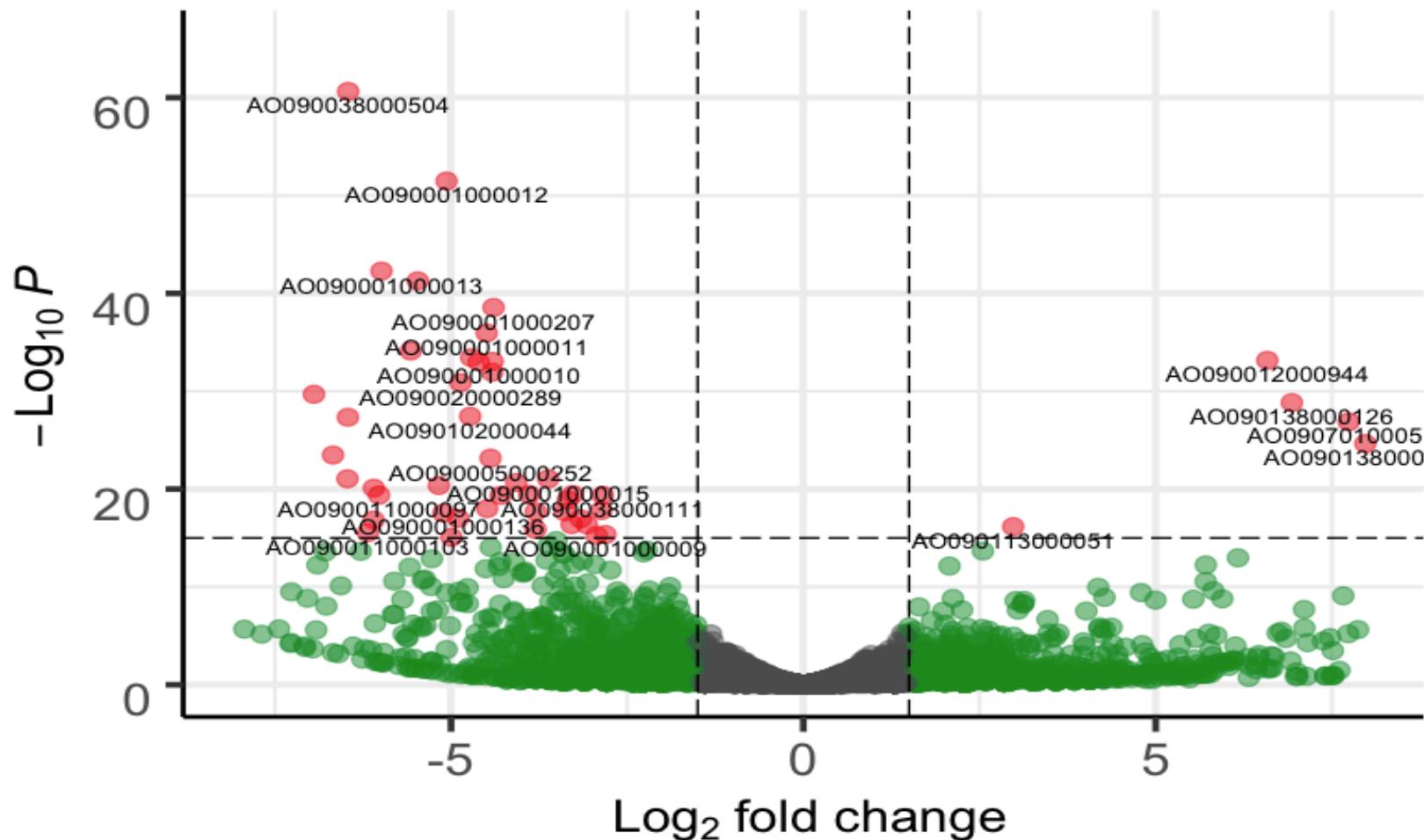
MA-plot



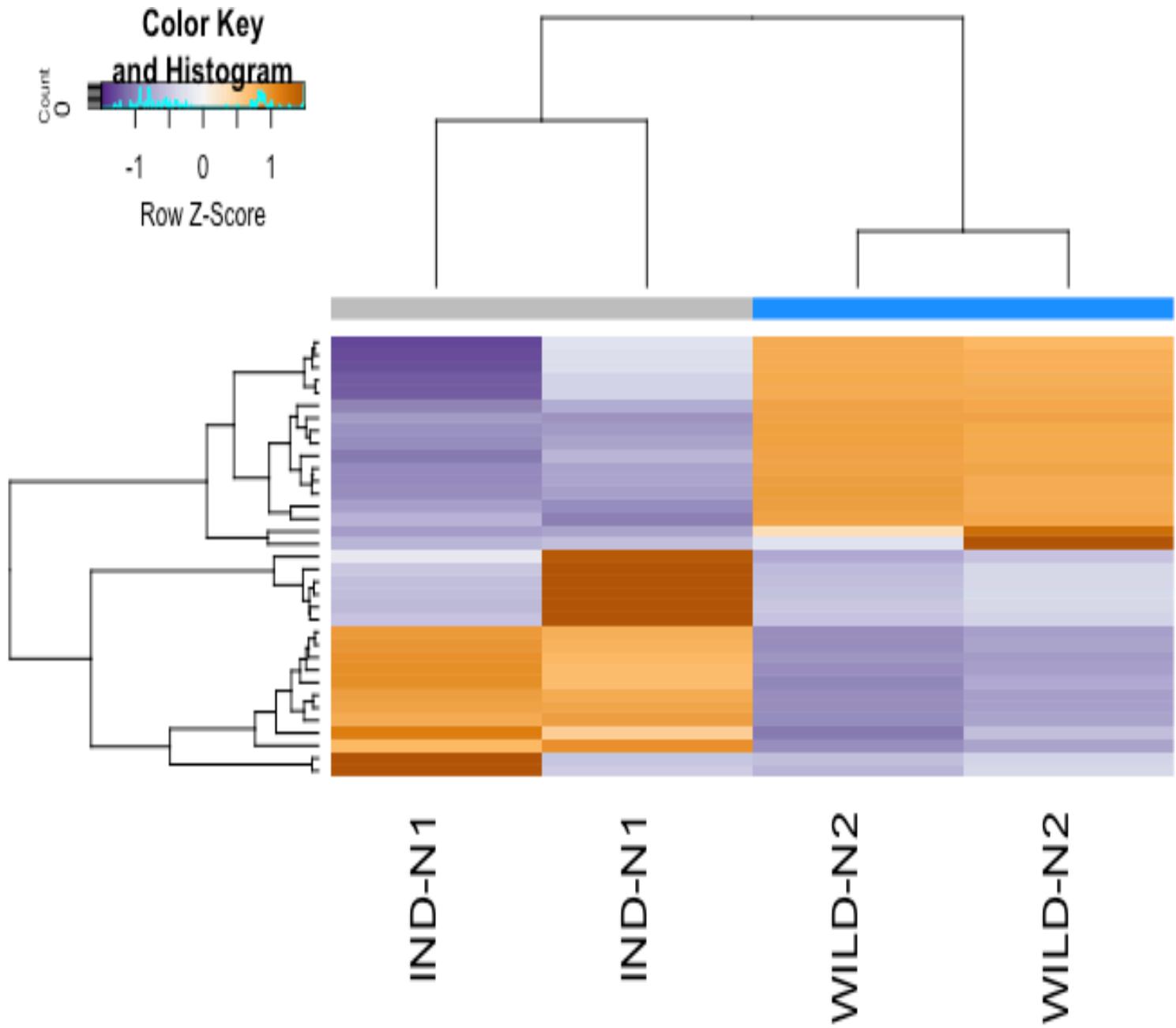
Volcano plot

EnhancedVolcano

● NS ● Log₂ FC ● p – value and log₂ FC



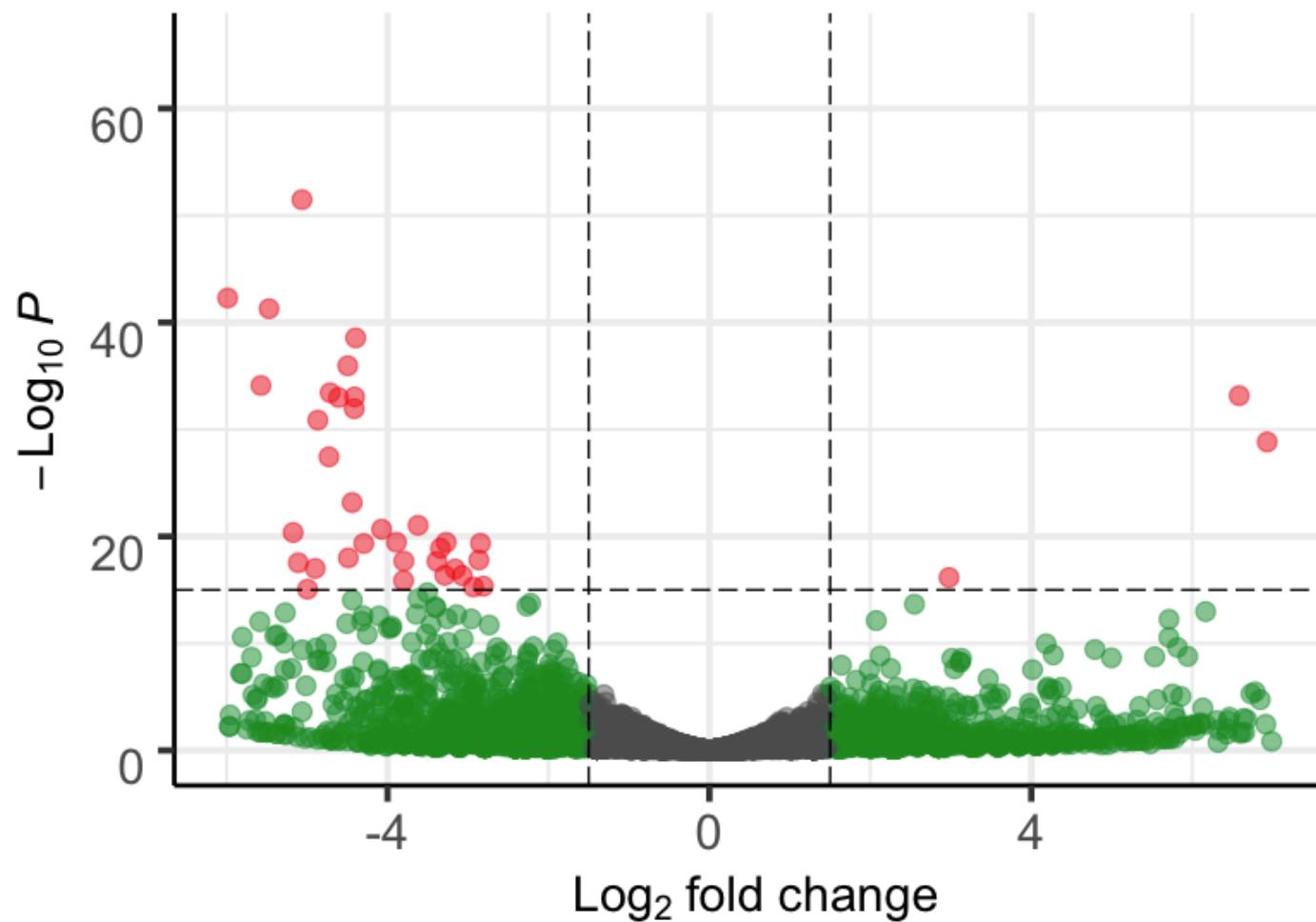
Absolute Expression



Volcano plot

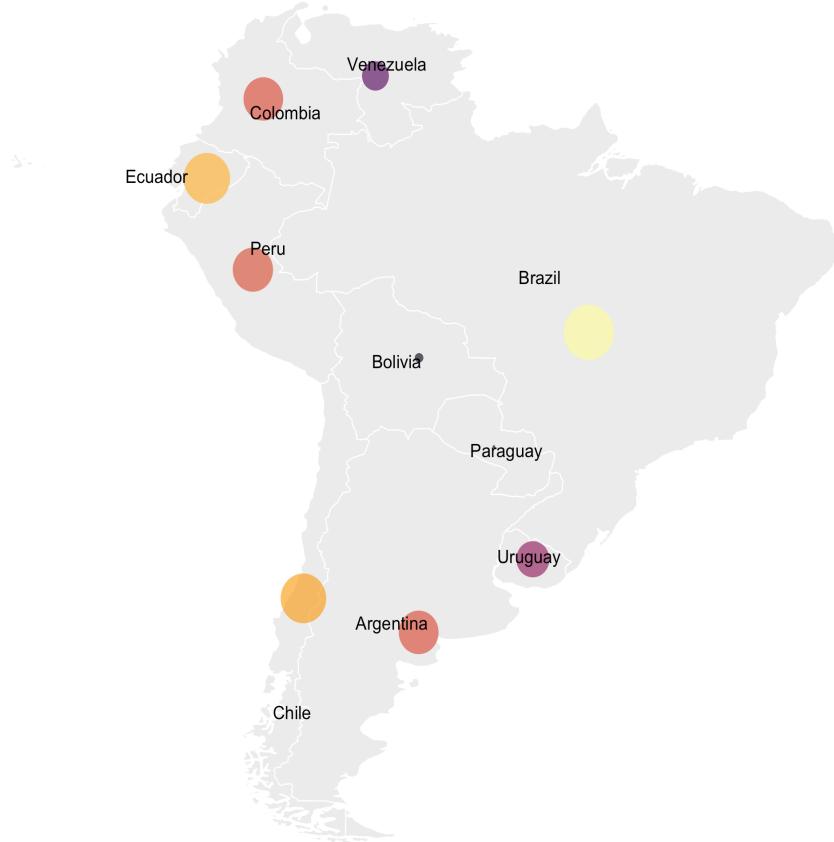
EnhancedVolcano

● NS ● Log₂ FC ● p - value and log₂ FC



MAPS

COVID-19 Confirmed Cases in South America reported on March 24/20



Cases

- 50-99
- 100-199
- 200-299
- 300-399
- 1000-1999
- 2000+

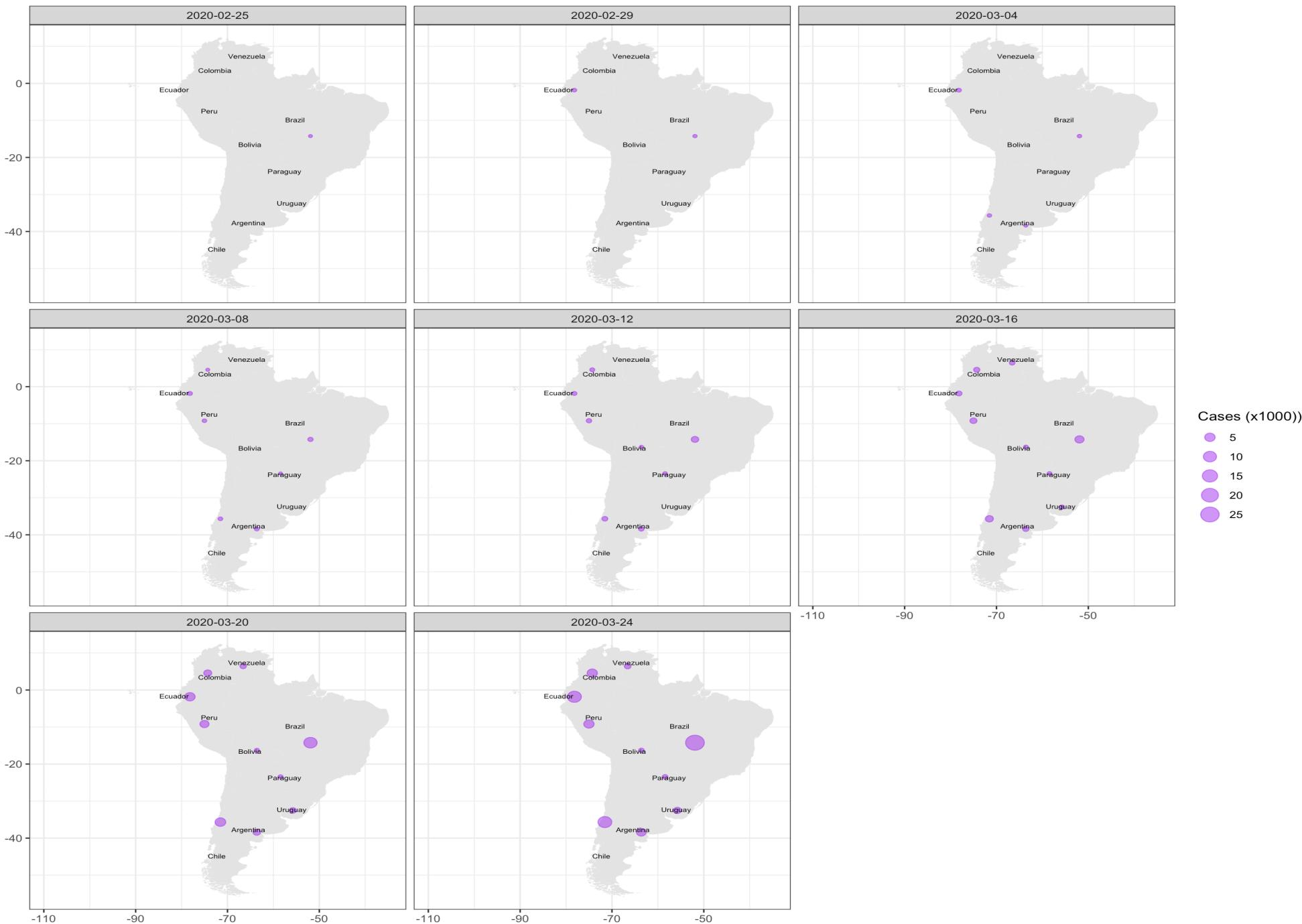
COVID-19 Confirmed Deaths in South America reported on March 24/20



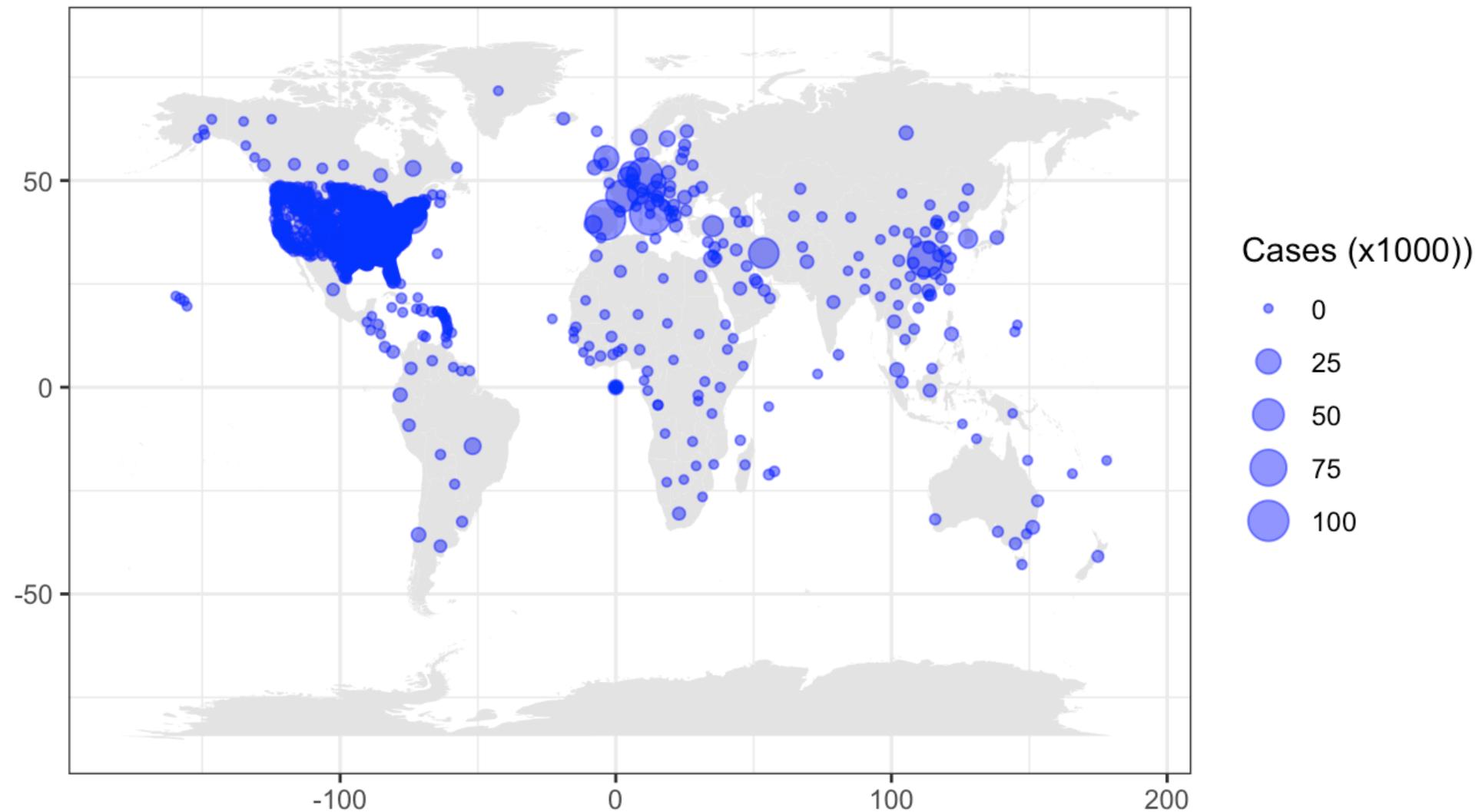
Deaths

- 0-9
- 10-19
- 20-39
- 40-49
- 50+

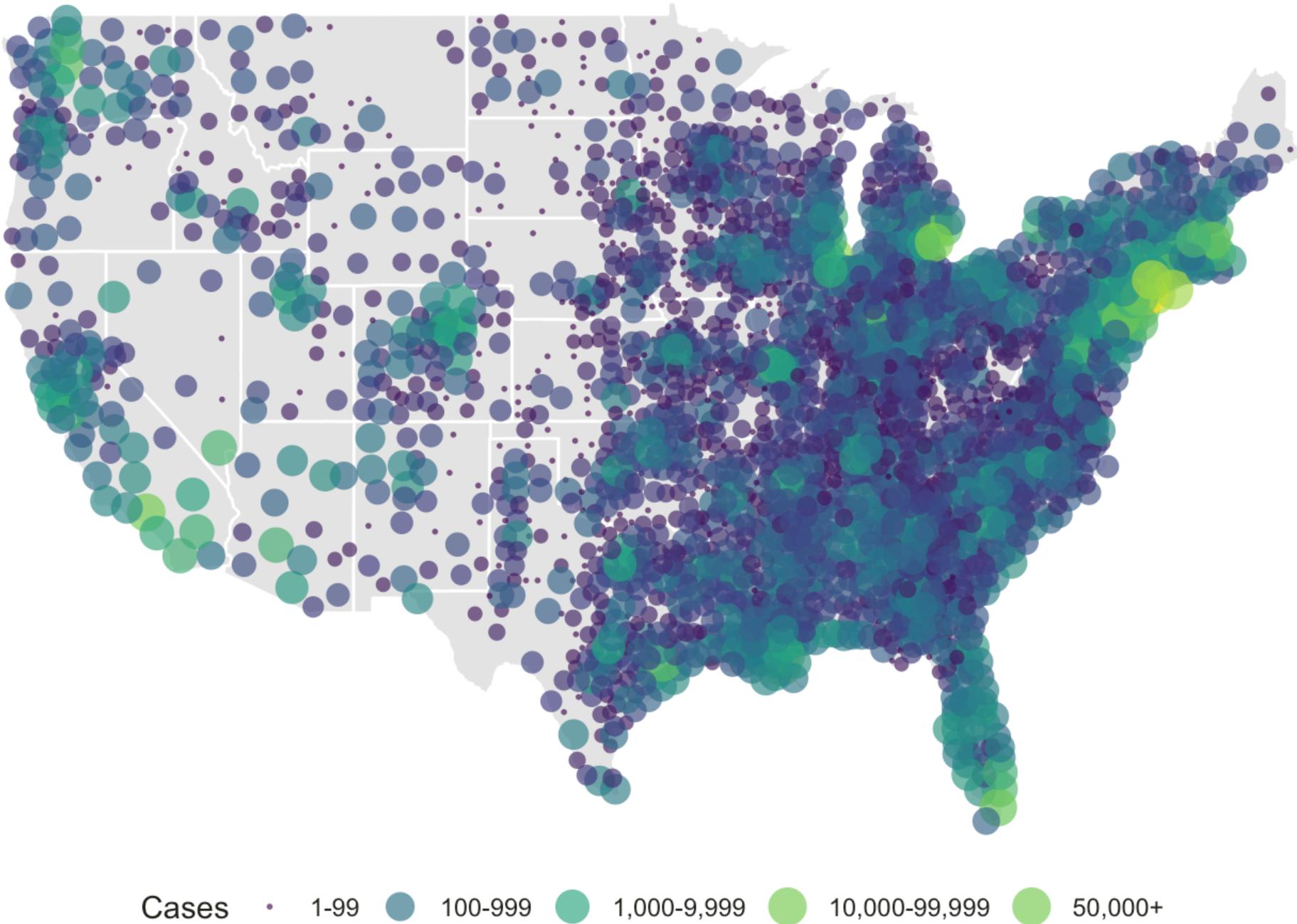
COVID-19 spread



World COVID-19 Confirmed cases March 31, 2020



COVID-19 Confirmed Cases in the US by April 12, 2020



COVID-19 Confirmed Cases in Massachusetts by April 12, 2020

