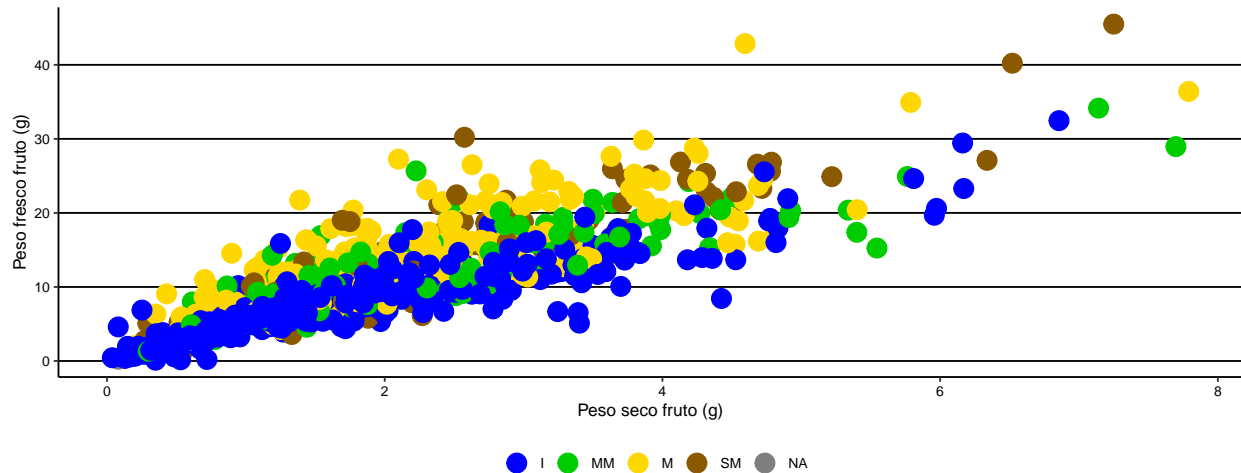


Peso seco

Carga de datos y conversión de variables

```
## New names:  
## * `` -> `...15`
```

Gráfico de dispersión



Se ajusta el modelo

```
##  
## Call:  
## lm(formula = psf ~ pff, data = datospeso)  
##  
## Coefficients:  
## (Intercept)      pff  
##    0.1749      0.1657
```

Modelo

```
##  
## Call:  
## lm(formula = psf ~ pff, data = datospeso)  
##  
## Residuals:  
##      Min       1Q   Median       3Q      Max   
## -2.68401 -0.26222 -0.07354  0.22012  2.85114   
##  
## Coefficients:  
##              Estimate Std. Error t value Pr(>|t|)      
## (Intercept)  0.17491    0.03283   5.328 1.19e-07 ***  
## pff          0.16571    0.00281  58.983 < 2e-16 ***
```

```
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.6162 on 1164 degrees of freedom
## Multiple R-squared:  0.7493, Adjusted R-squared:  0.7491
## F-statistic: 3479 on 1 and 1164 DF,  p-value: < 2.2e-16
```

Análisis univariado

Fenoles

Tabla descriptiva por población

```
## # A tibble: 2 x 6
##   site          n Mean  min  max   sd
##   <fct>        <int> <dbl> <dbl> <dbl> <dbl>
## 1 Concordia      64  522.  66.1 1666.  439.
## 2 Gualeguaychu   38  198.  79.7  485.  106.
```

Gráfico por población

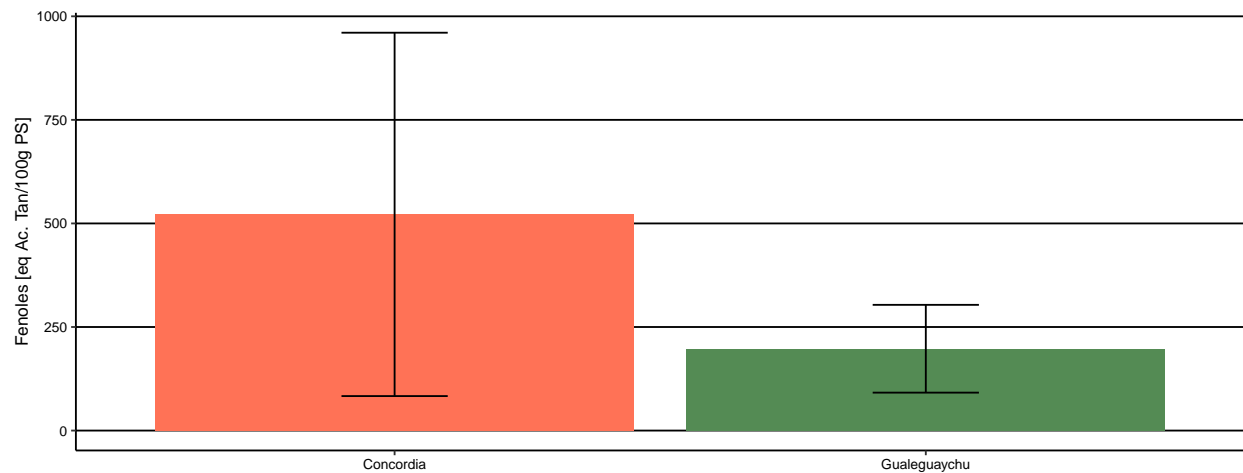
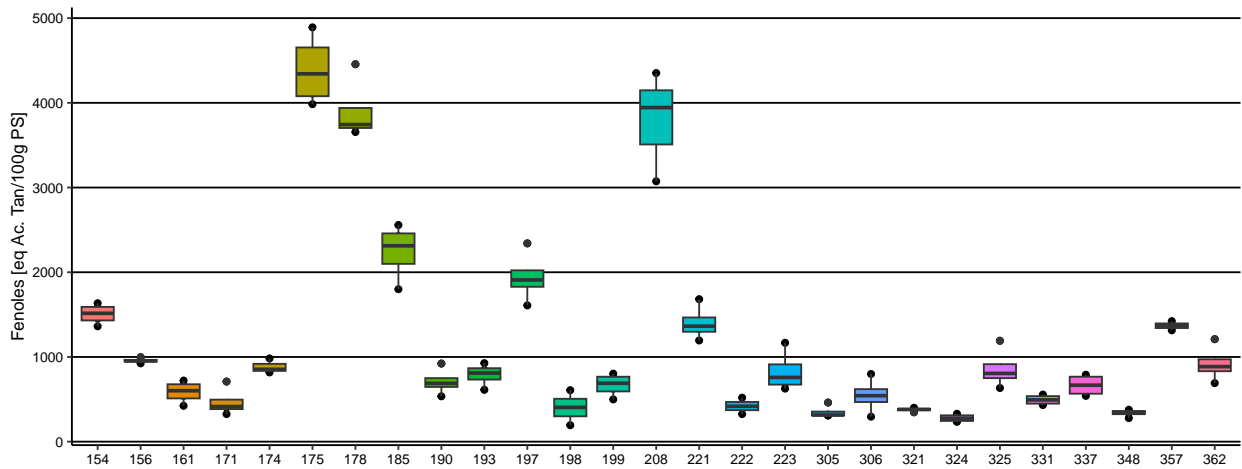
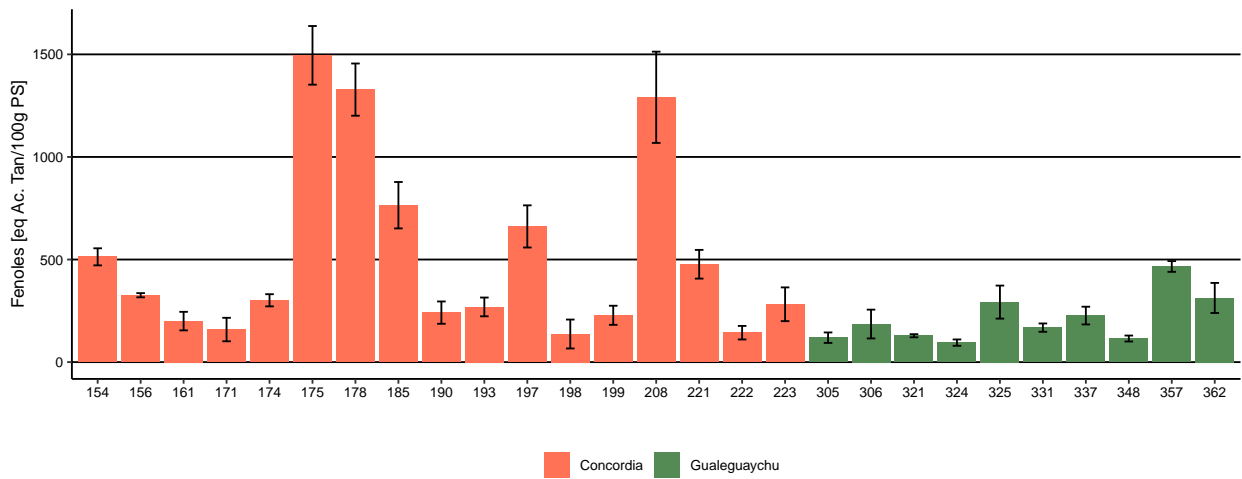


Tabla descriptiva por fenotipo

```
## # A tibble: 27 x 7
## # Groups:   site [2]
##   site    phenotype     n Mean  min  max   sd
##   <fct>    <fct>    <int> <dbl> <dbl> <dbl> <dbl>
## 1 Concordia 154         4  513.  464.  557.  41.6
## 2 Concordia 156         4  326.  315.  339.  10.1
## 3 Concordia 161         4  200.  144.  246.  45.2
## 4 Concordia 171         4  159.  111.  242.  57.2
## 5 Concordia 174         3  301.  278.  335.  29.6
## 6 Concordia 175         4 1495. 1357. 1666. 143.
```

```
## 7 Concordia 178      4 1328. 1245. 1518. 127.
## 8 Concordia 185      4  765.   613.   871. 113.
## 9 Concordia 190      4  241.   182.   314.  54.3
## 10 Concordia 193      4  269.   208.   316.  45.7
## # i 17 more rows
```

Gráficos por fenotipo



AAO

0.025

####Tabla descriptiva por población

```
## # A tibble: 2 x 6
##   site          n Mean  min  max  sd
```

```
##   <fct>          <int> <dbl> <dbl> <dbl> <dbl>
## 1 Concordia      65  78.7  17.5 100.   22.8
## 2 Gualeguaychu   38  72.6  19.5  97.1  24.7
```

Gráfico por población

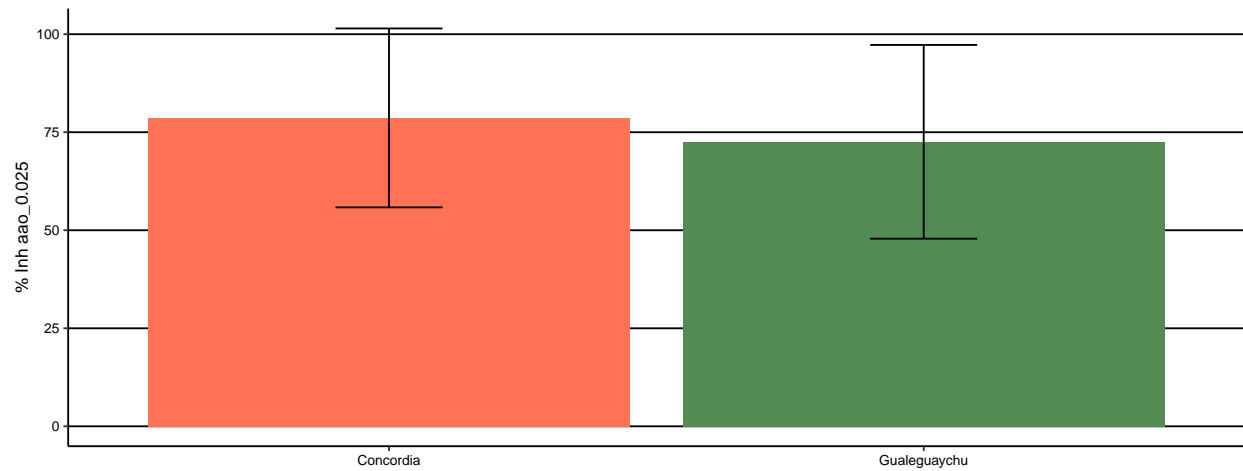
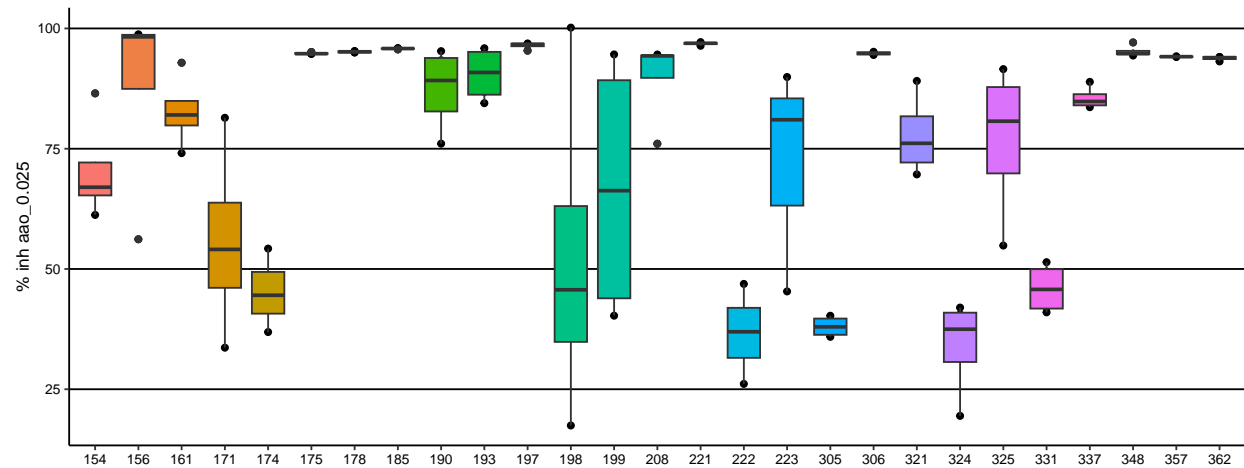
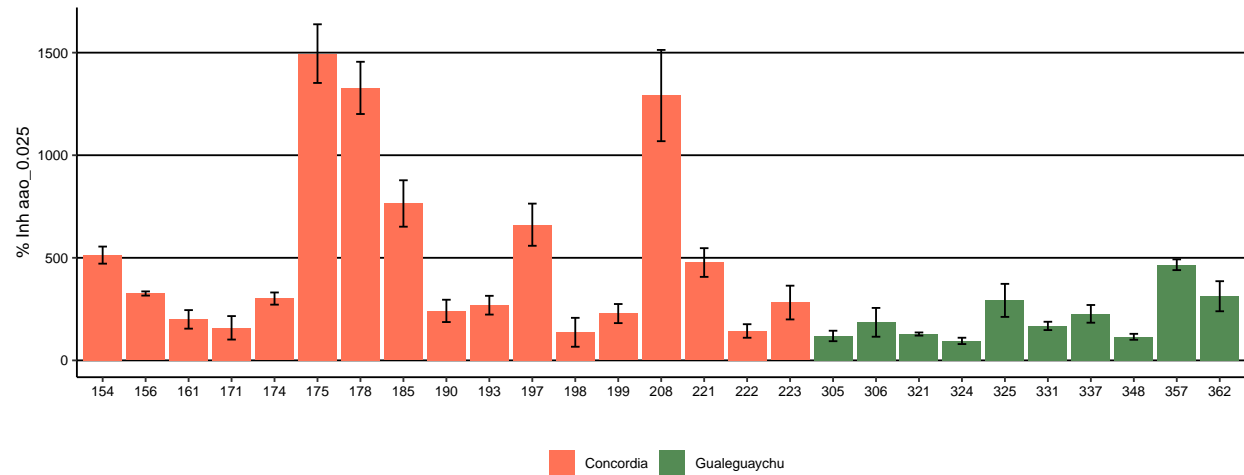


Tabla descriptiva por fenotipo

```
## # A tibble: 27 x 7
## # Groups:   site [2]
##   site phenotype    n Mean   min   max   sd
##   <fct>   <fct>  <int> <dbl> <dbl> <dbl> <dbl>
## 1 Concordia 154      4  70.4  61.2  86.5 11.1
## 2 Concordia 156      4  87.9  56.2  98.8 21.1
## 3 Concordia 161      4  82.7  74.1  92.9  7.72
## 4 Concordia 171      4  55.8  33.6  81.4 19.9
## 5 Concordia 174      3  45.2  36.9  54.2  8.70
## 6 Concordia 175      4  94.8  94.7  95.1  0.187
## 7 Concordia 178      4  95.1  95.0  95.3  0.160
## 8 Concordia 185      4  95.8  95.6  95.9  0.114
## 9 Concordia 190      4  87.4  76.1  95.3  8.81
## 10 Concordia 193      4  90.5  84.5  95.9  5.72
## # i 17 more rows
```

Gráficos por fenotipo



0.050

Tabla descriptiva por población

```
## # A tibble: 2 x 6
##   site      n Mean  min  max  sd
##   <fct>    <int> <dbl> <dbl> <dbl> <dbl>
## 1 Concordia    64  90.5  34.2 100.  12.7
## 2 Guleguaychu  38  84.6  39.7  97.1  15.7
```

Gráfico por población

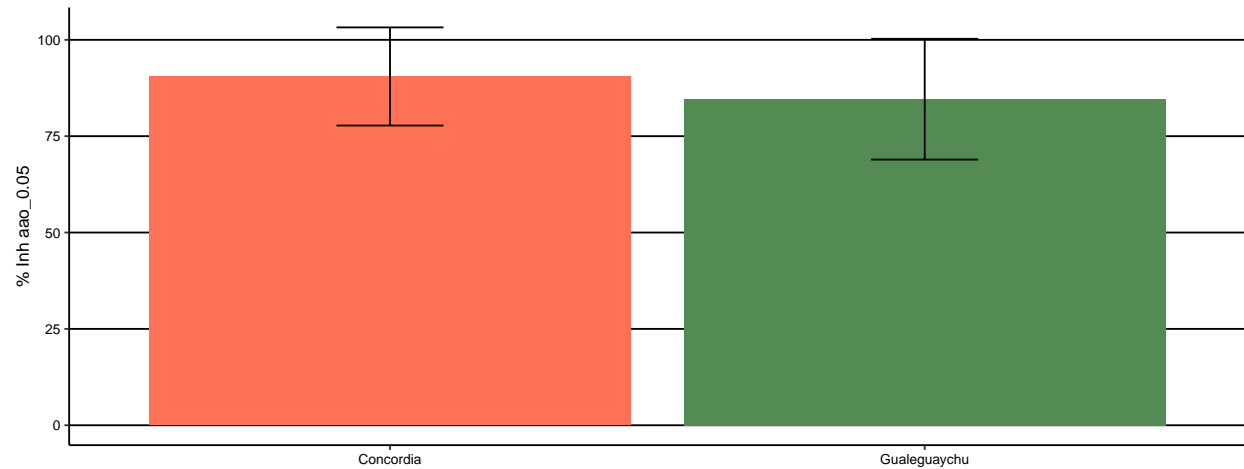
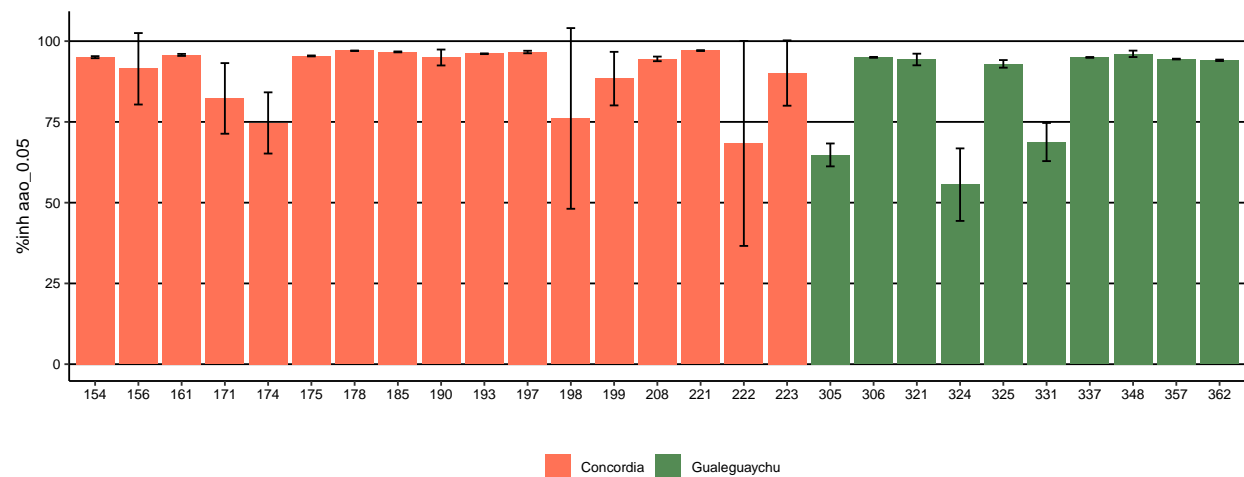
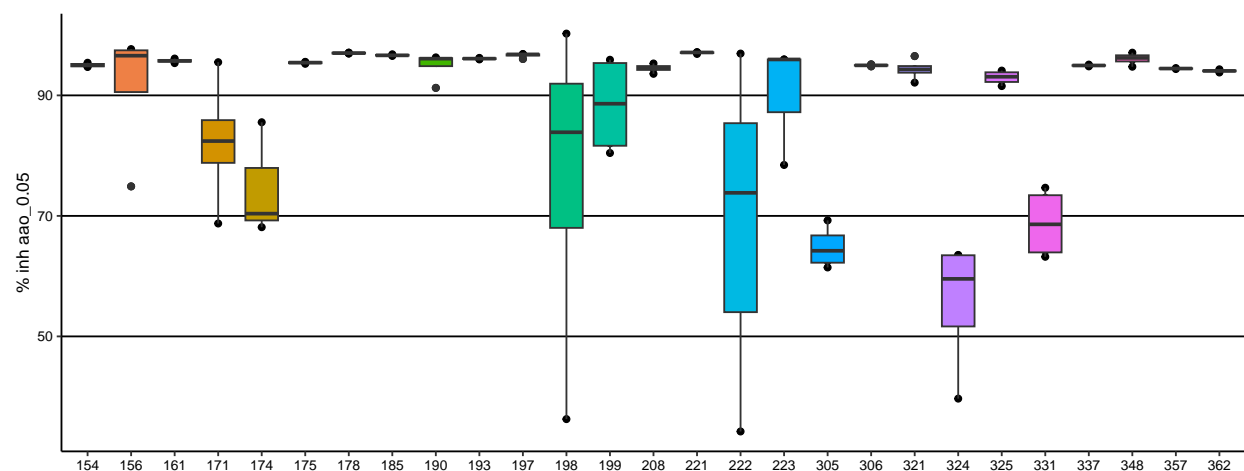


Tabla descriptiva por fenotipo

```
## # A tibble: 27 x 7
## # Groups:   site [2]
##   site   phenotype     n Mean   min   max    sd
##   <fct>   <fct>   <int> <dbl> <dbl> <dbl> <dbl>
## 1 Concordia 154         4  95.0  94.7  95.4  0.315
## 2 Concordia 156         4  91.4  74.9  97.7  11.1
## 3 Concordia 161         4  95.7  95.4  96.1  0.312
## 4 Concordia 171         4  82.3  68.7  95.5  10.9
## 5 Concordia 174         3  74.7  68.1  85.5   9.47
## 6 Concordia 175         4  95.4  95.2  95.6  0.145
## 7 Concordia 178         4  97.0  96.9  97.1  0.0801
## 8 Concordia 185         3  96.7  96.5  96.8  0.139
## 9 Concordia 190         4  94.9  91.2  96.3   2.46
## 10 Concordia 193         4  96.1  96.0  96.2  0.108
## # i 17 more rows
```

Gráficos por fenotipo





0.100

Tabla descriptiva por población

```
## # A tibble: 2 x 6
##   site          n Mean   min   max   sd
##   <fct>      <int> <dbl> <dbl> <dbl> <dbl>
## 1 Concordia      64  94.5  60.3  100.   6.24
## 2 Gualeguaychu   38  92.3  56.1  96.6   7.10
```

Gráfico por población

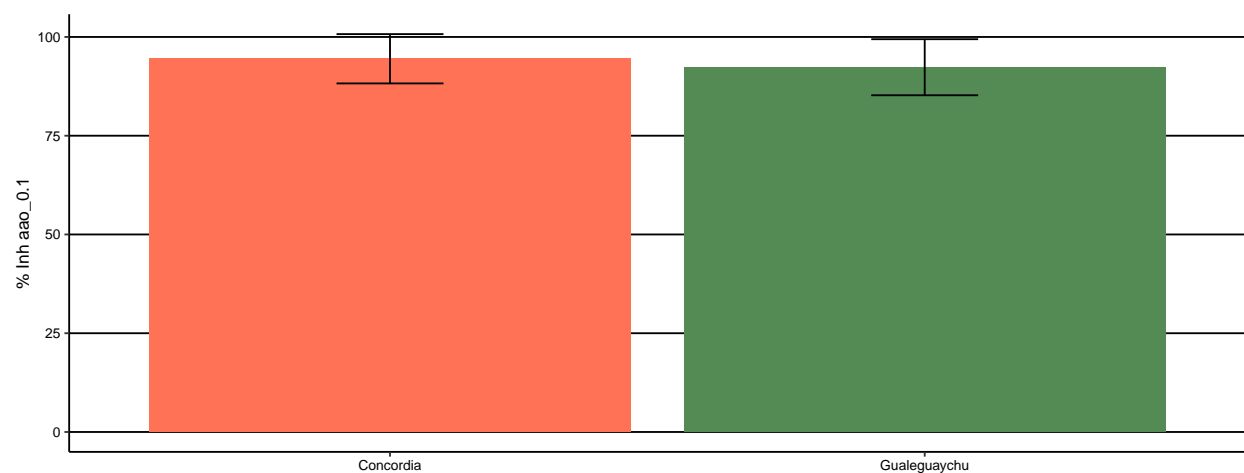
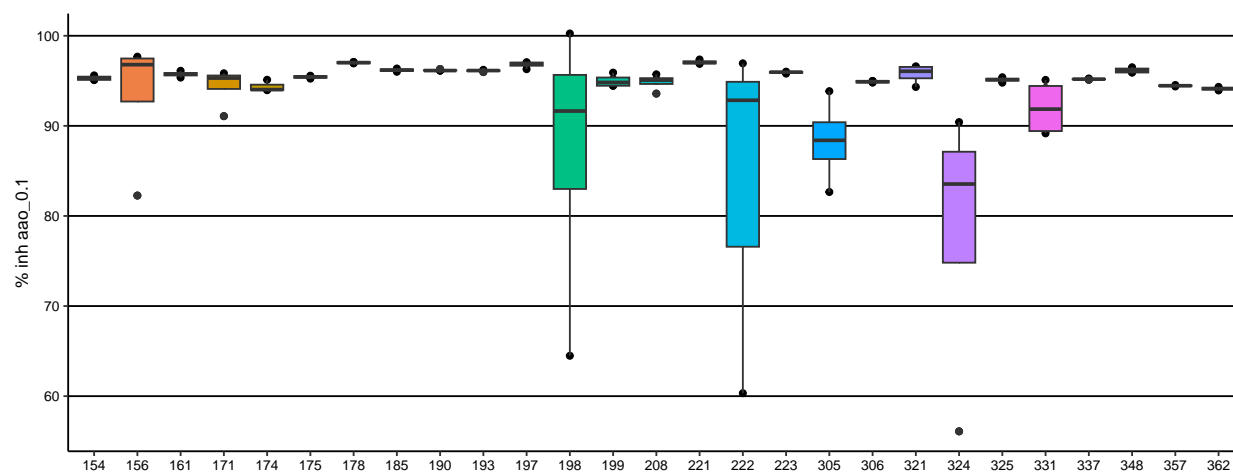
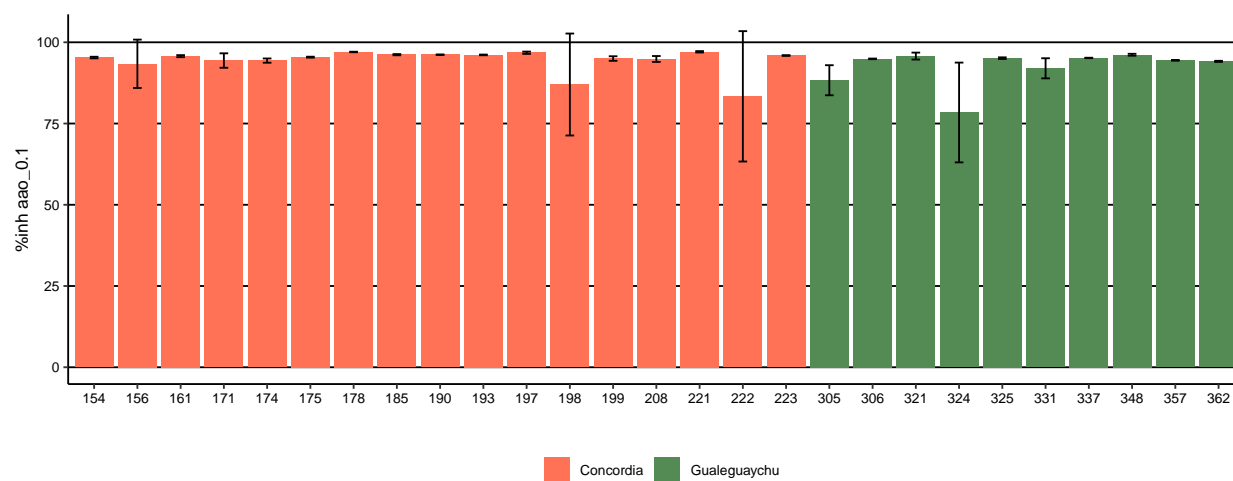


Tabla descriptiva por fenotipo

```
## # A tibble: 27 x 7
## # Groups:   site [2]
```

```
##      site      phenotype      n Mean   min   max    sd
##      <fct>      <fct>      <int> <dbl> <dbl> <dbl> <dbl>
##  1 Concordia 154          4  95.3  95.1  95.6 0.249
##  2 Concordia 156          4  93.4  82.3  97.7 7.44
##  3 Concordia 161          4  95.7  95.4  96.1 0.312
##  4 Concordia 171          4  94.4  91.1  95.8 2.22
##  5 Concordia 174          3  94.4  94.0  95.1 0.650
##  6 Concordia 175          4  95.4  95.2  95.6 0.145
##  7 Concordia 178          4  97.0  96.9  97.1 0.0801
##  8 Concordia 185          3  96.2  96.0  96.4 0.182
##  9 Concordia 190          4  96.2  96.1  96.3 0.0858
## 10 Concordia 193          4  96.1  96.0  96.2 0.106
## # i 17 more rows
```

Gráficos por fenotipo



0.250

Tabla descriptiva por población

```
## # A tibble: 2 x 6
##   site      n Mean  min  max  sd
##   <fct>    <int> <dbl> <dbl> <dbl> <dbl>
## 1 Concordia      64  95.5  82.7 101.  1.93
## 2 Gualeguaychu   38  95.6  94.0  97.3  0.901
```

Gráfico por población

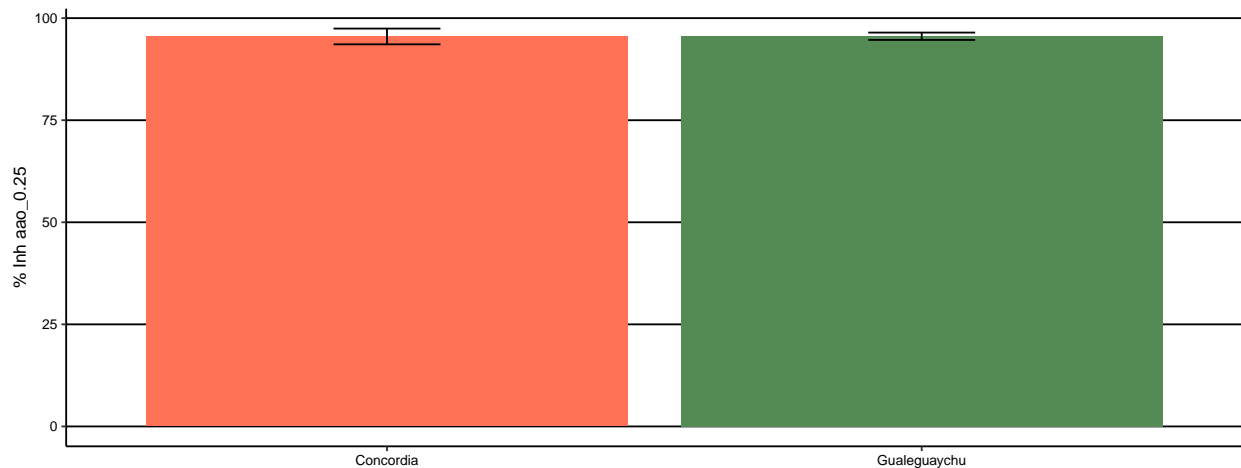
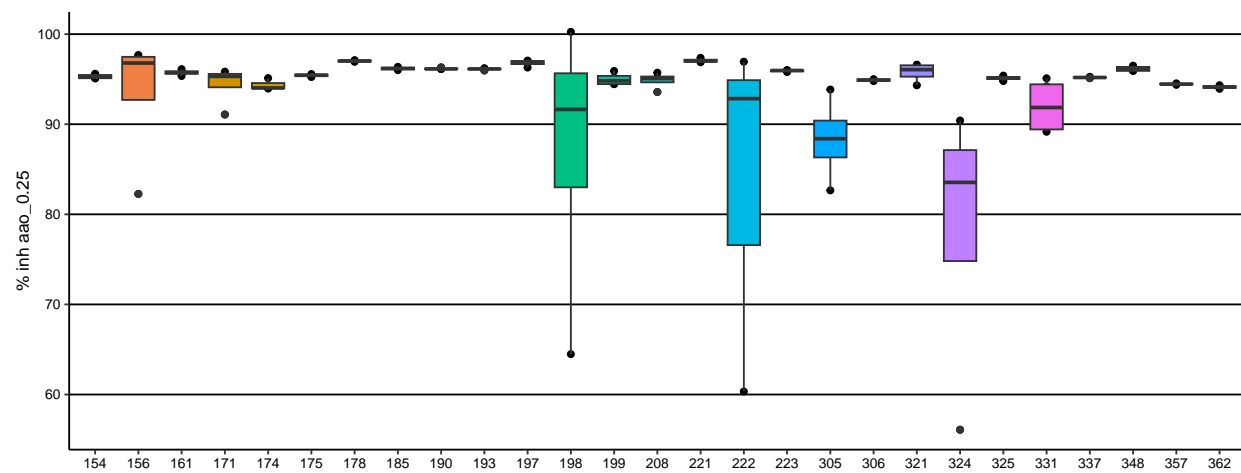
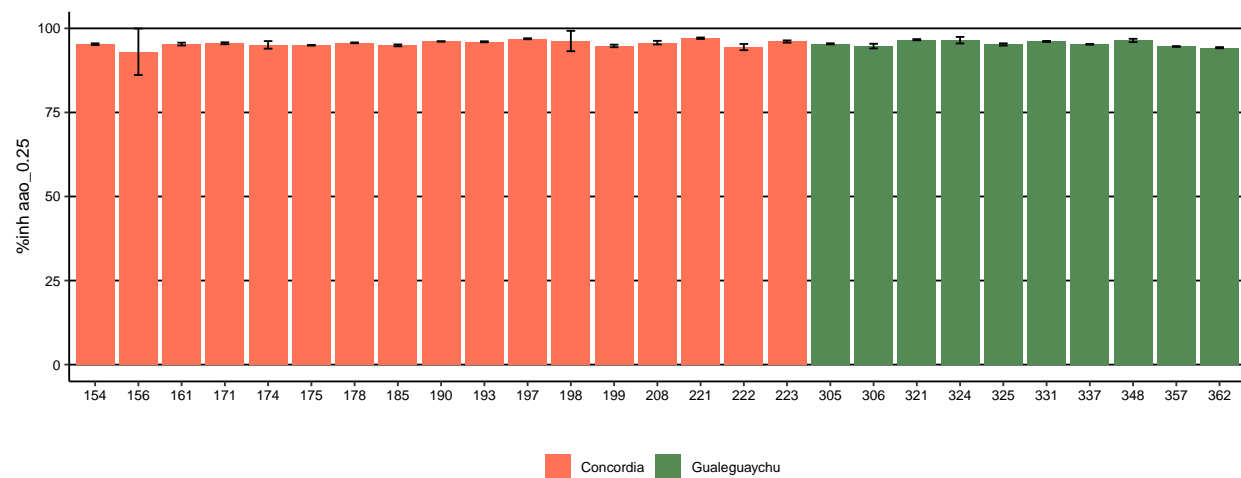


Tabla descriptiva por fenotipo

```
## # A tibble: 27 x 7
## # Groups:   site [2]
##   site      phenotype      n Mean  min  max  sd
##   <fct>    <fct>    <int> <dbl> <dbl> <dbl> <dbl>
## 1 Concordia 154      4  95.3  95.1  95.6  0.249
## 2 Concordia 156      4  93.0  82.7  96.7  6.92
## 3 Concordia 161      4  95.3  94.9  95.9  0.417
## 4 Concordia 171      4  95.6  95.2  95.8  0.280
## 5 Concordia 174      3  95.1  94.0  96.2  1.12
## 6 Concordia 175      4  95.0  94.9  95.1  0.0922
## 7 Concordia 178      4  95.7  95.6  95.8  0.113
## 8 Concordia 185      3  94.9  94.6  95.2  0.277
## 9 Concordia 190      4  96.1  96.1  96.1  0.0429
## 10 Concordia 193      4  96.0  95.8  96.1  0.145
## # i 17 more rows
```

Gráficos por fenotipo



Clorofila a

Tabla descriptiva por población

```
## # A tibble: 2 x 6
##   site          n Mean    min  max    sd
##   <fct>      <int> <dbl> <dbl> <dbl> <dbl>
## 1 Concordia     63  6.42  0.386 16.3  4.50
## 2 Gualeguaychu  37 25.8  10.2  62.8 12.5
```

Gráfico por población

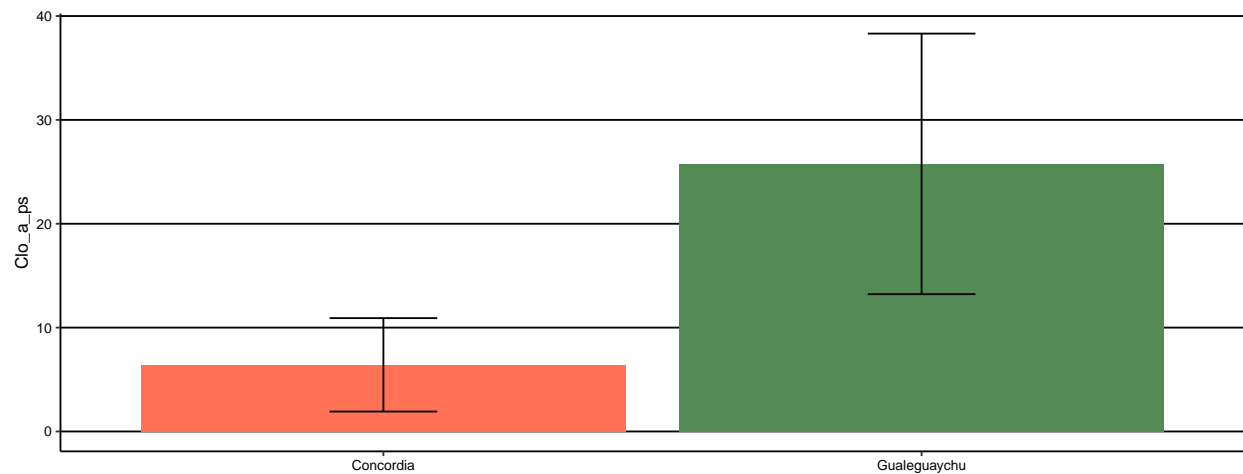
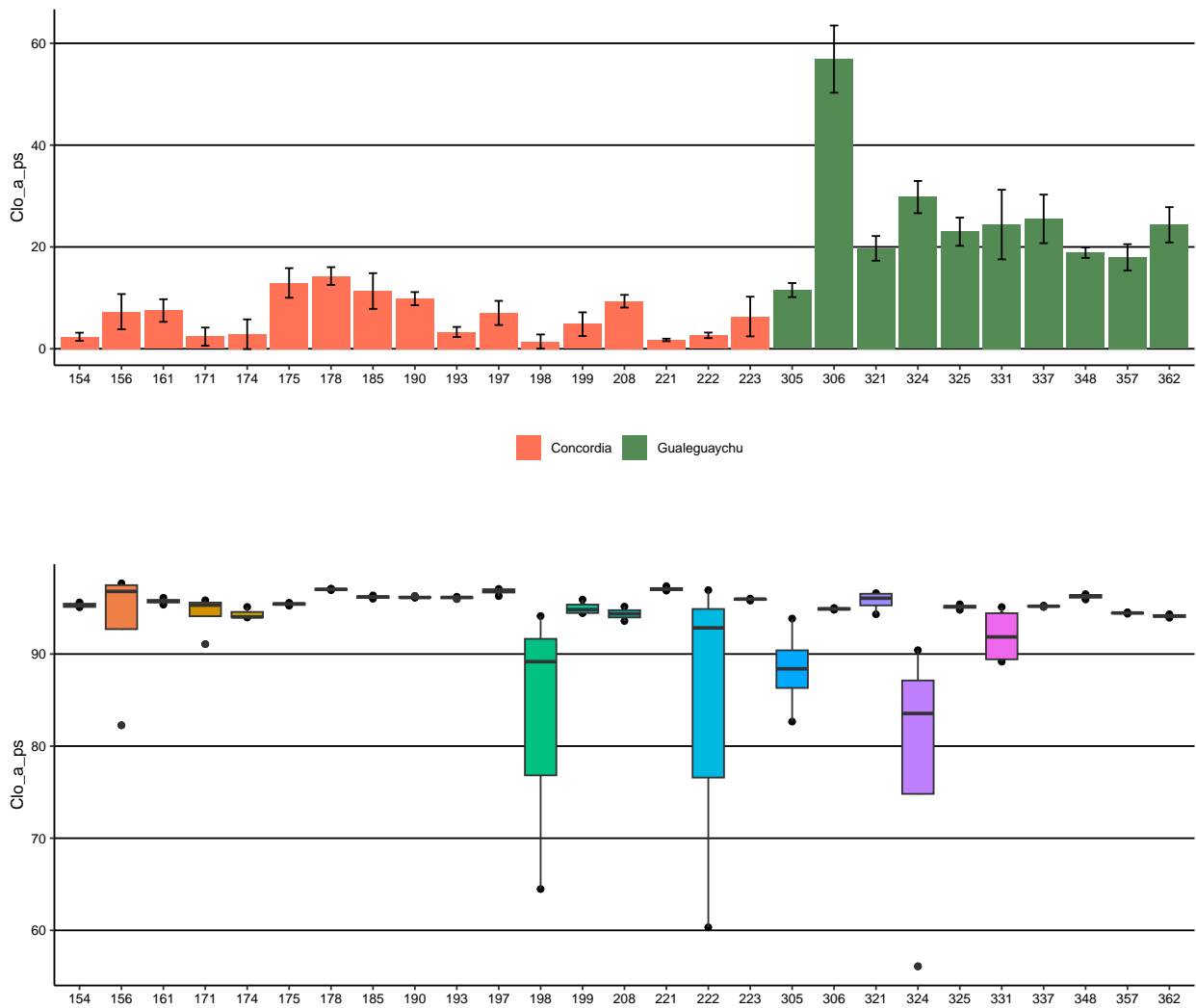


Tabla resumen por fenotipo

```
## # A tibble: 27 x 7
## # Groups:   site [2]
##   site    phenotype     n Mean   min   max   sd
##   <fct>    <fct>   <int> <dbl> <dbl> <dbl> <dbl>
## 1 Concordia 154         4  2.36  1.38  3.22 0.798
## 2 Concordia 156         4  7.29  2.54 10.8  3.46
## 3 Concordia 161         4  7.51  5.35 10.3  2.22
## 4 Concordia 171         4  2.38  0.851 4.76 1.79
## 5 Concordia 174         3  2.86  0.688 6.18 2.92
## 6 Concordia 175         4 12.9   9.31 16.2  2.91
## 7 Concordia 178         4 14.3  12.3 16.3  1.74
## 8 Concordia 185         4 11.3   8.25 14.8  3.50
## 9 Concordia 190         4  9.85  8.08 10.8  1.29
## 10 Concordia 193         4  3.30  2.42  4.71 0.992
## # i 17 more rows
```

Gráfico resumen por fenotipo



Clorofila b

Tabla descriptiva por población

```
## # A tibble: 2 x 6
##   site      n Mean   min  max   sd
##   <fct>    <int> <dbl> <dbl> <dbl> <dbl>
## 1 Concordia    63  10.9  0.659  27.8  7.66
## 2 Guauguaychu  37  44.0 17.4  107.  21.4
```

Gráfico por población

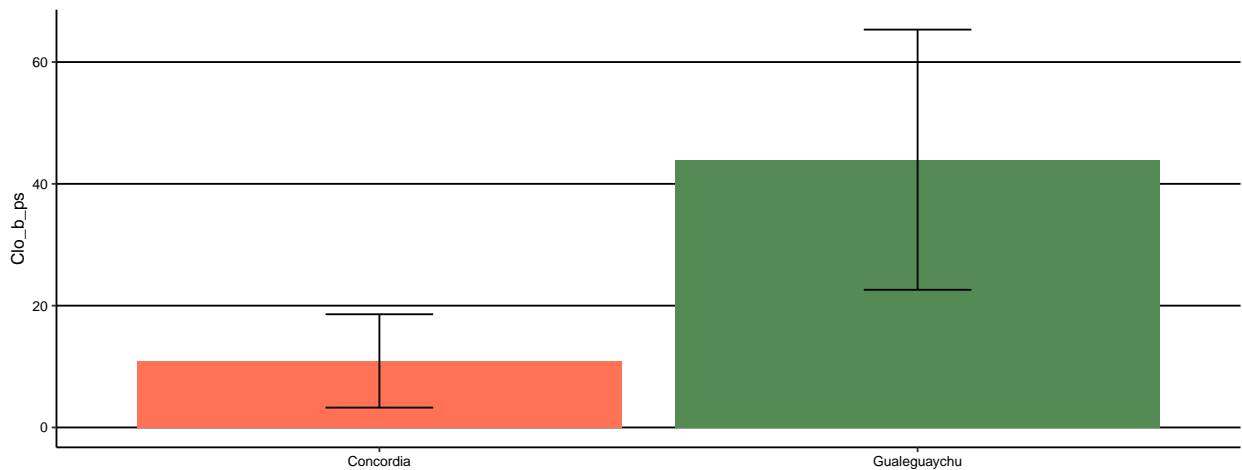
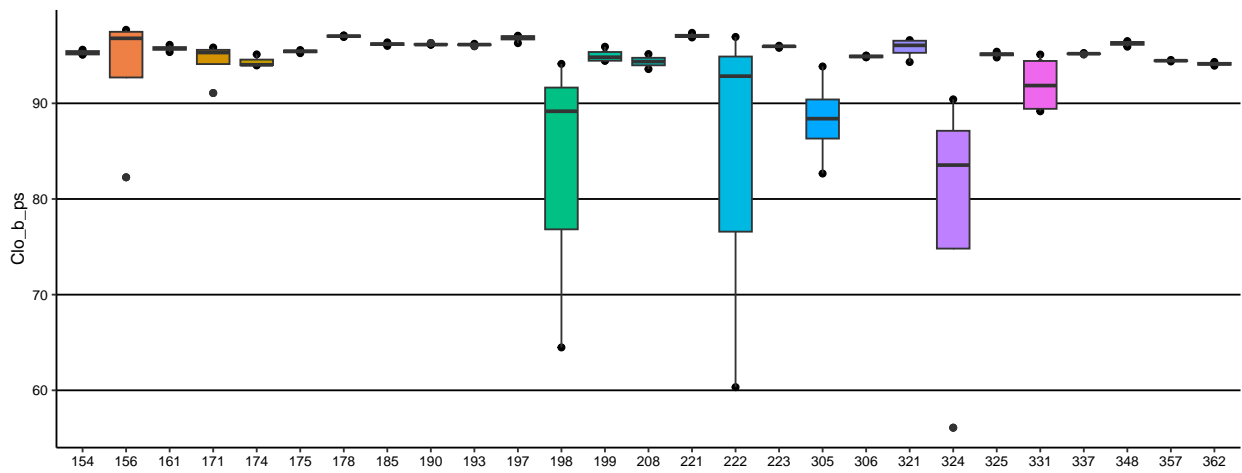
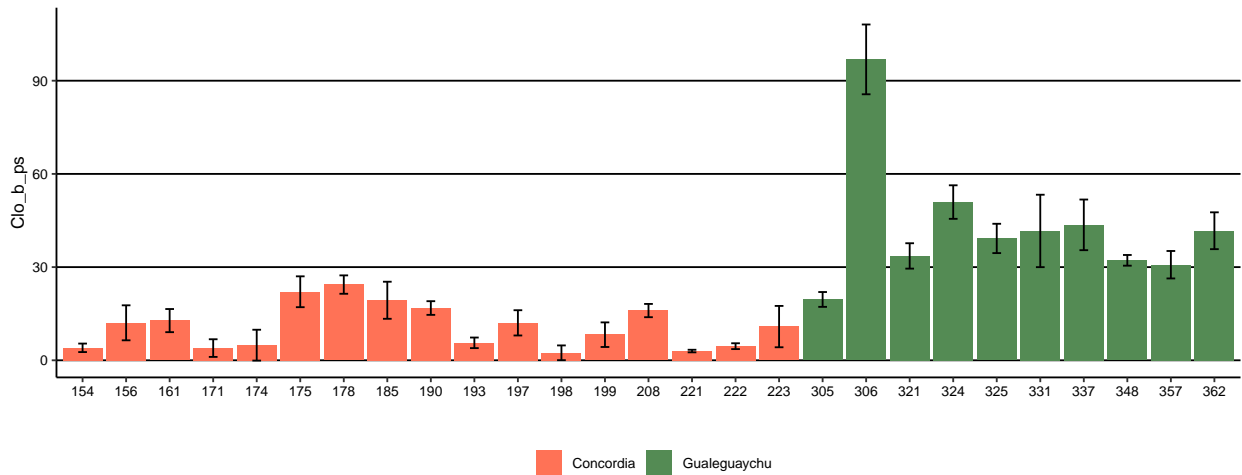


Tabla resumen por fenotipo

```
## # A tibble: 27 x 7
## # Groups:   site [2]
##   site    phenotype      n Mean   min   max   sd
##   <fct>    <fct>    <int> <dbl> <dbl> <dbl> <dbl>
## 1 Concordia 154         4  4.02  2.35  5.50  1.37
## 2 Concordia 156         4 12.1   4.24 17.6   5.63
## 3 Concordia 161         4 12.8   9.14 17.4   3.73
## 4 Concordia 171         4  3.93  1.46  7.66  2.84
## 5 Concordia 174         3  4.87  1.18 10.5   4.97
## 6 Concordia 175         4 22.1  15.9 27.7   4.97
## 7 Concordia 178         4 24.4  21.1 27.8   2.96
## 8 Concordia 185         4 19.3  14.1 25.1   5.97
## 9 Concordia 190         4 16.8  13.8 18.5   2.20
## 10 Concordia 193         4  5.62  4.12  8.04  1.70
## # i 17 more rows
```

Gráfico resumen por fenotipo



Carotenoides

Tabla descriptiva por población

```
## # A tibble: 2 x 6
##   site      n Mean  min  max  sd
##   <fct>    <int> <dbl> <dbl> <dbl> <dbl>
## 1 Concordia    63  15.5  6.59  29.3  6.32
## 2 Gualeduaychu  37  15.4  9.08  27.7  4.64
```

Gráfico por población

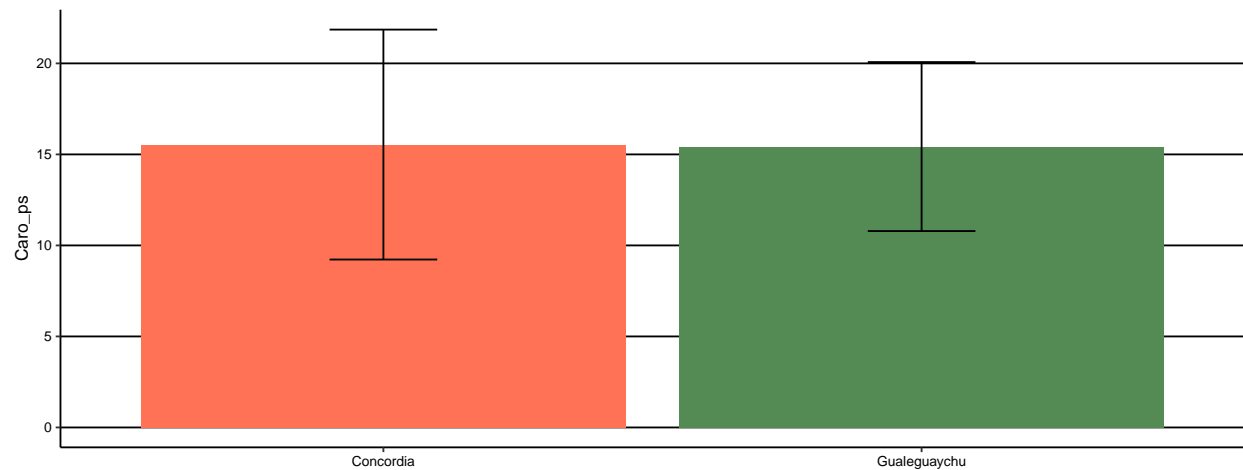
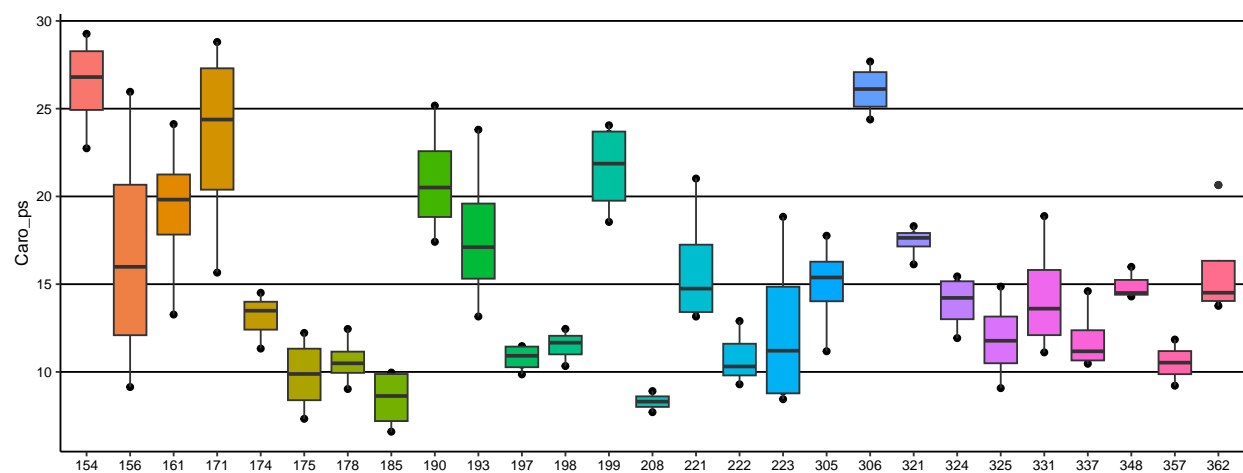
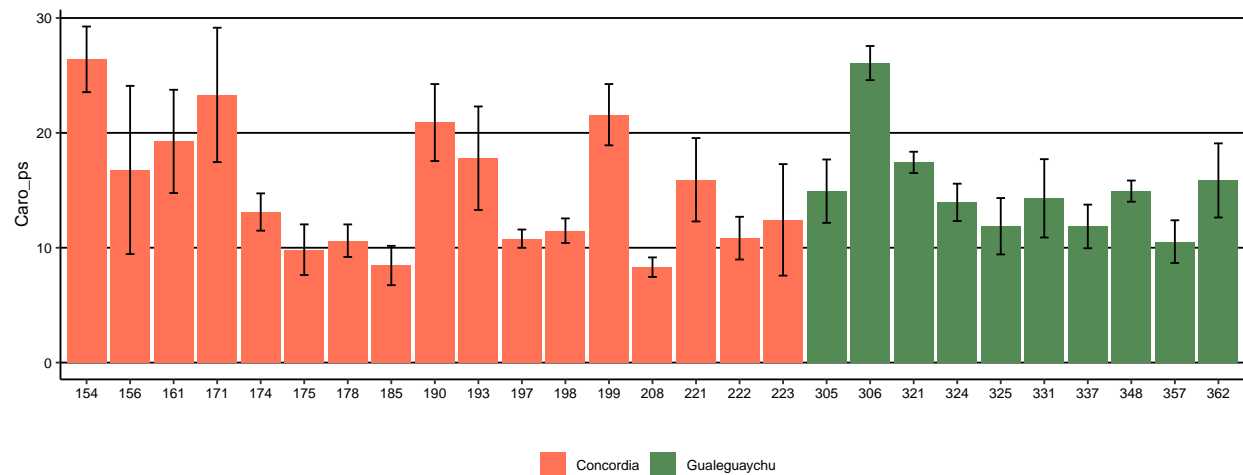


Tabla de carotenoides

```
## # A tibble: 27 x 7
## # Groups:   site [2]
##   site    phenotype      n Mean   min   max   sd
##   <fct>    <fct>    <int> <dbl> <dbl> <dbl> <dbl>
## 1 Concordia 154         4 26.4  22.7  29.3  2.86
## 2 Concordia 156         4 16.8   9.14 26.0  7.32
## 3 Concordia 161         4 19.3  13.3  24.1  4.49
## 4 Concordia 171         4 23.3  15.7  28.8  5.85
## 5 Concordia 174         3 13.1  11.3  14.5  1.62
## 6 Concordia 175         4  9.83  7.33  12.2  2.20
## 7 Concordia 178         4 10.6   9.03  12.4  1.42
## 8 Concordia 185         4  8.45  6.59  9.96  1.71
## 9 Concordia 190         4 20.9  17.4  25.2  3.35
## 10 Concordia 193         4 17.8  13.2  23.8  4.50
## # i 17 more rows
```

Gráfico de carotenoides



Acidez Total Titulable (ATT)

```
## # A tibble: 2 x 6
##   site          n Mean   min   max   sd
##   <fct>      <int> <dbl> <dbl> <dbl> <dbl>
## 1 Concordia    29  1.41  0.29  2.59  0.678
## 2 Guaileguaychu 15  0.353 0.15  0.88  0.235
```


Gráfico por población

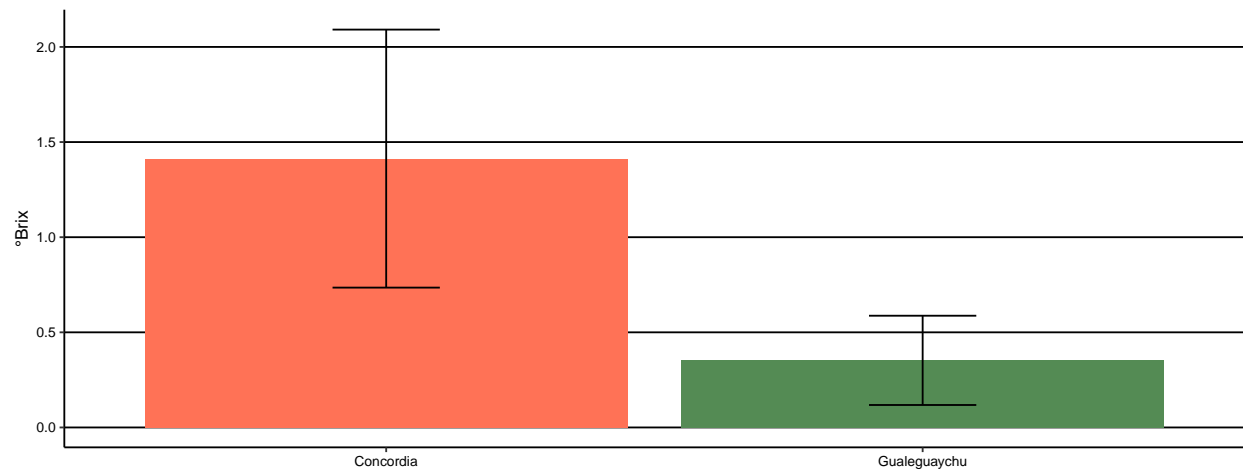
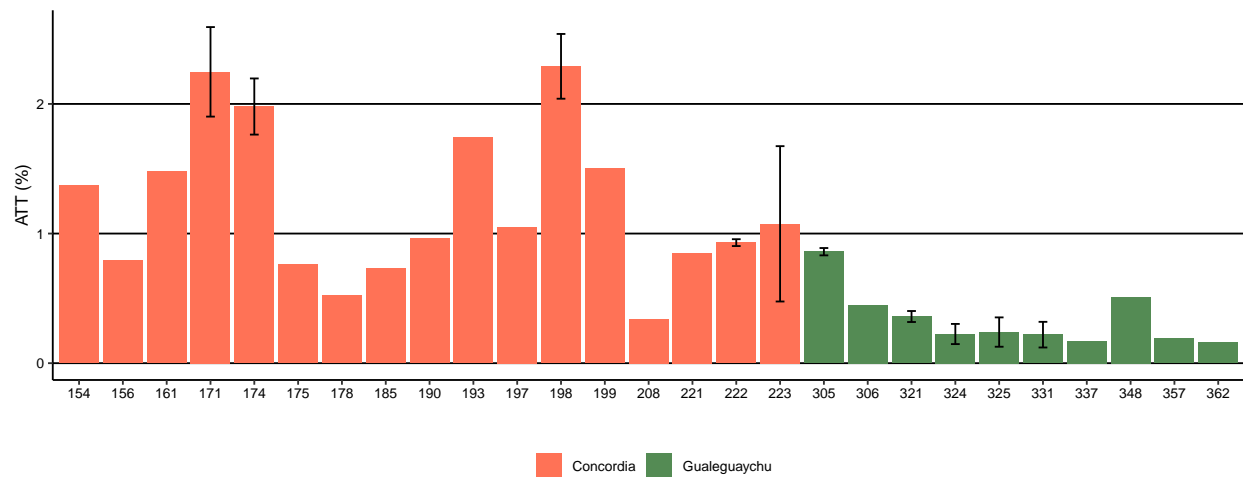


Tabla descriptiva

```
## # A tibble: 27 x 7
## # Groups:   site [2]
##   site    phenotype      n Mean   min   max   sd
##   <fct>    <fct>    <int> <dbl> <dbl> <dbl> <dbl>
## 1 Concordia 154         1  1.37  1.37  1.37  NA
## 2 Concordia 156         1  0.79  0.79  0.79  NA
## 3 Concordia 161         1  1.48  1.48  1.48  NA
## 4 Concordia 171         4  2.25  1.84  2.59  0.345
## 5 Concordia 174         3  1.98  1.85  2.23  0.217
## 6 Concordia 175         1  0.76  0.76  0.76  NA
## 7 Concordia 178         1  0.52  0.52  0.52  NA
## 8 Concordia 185         1  0.73  0.73  0.73  NA
## 9 Concordia 190         1  0.96  0.96  0.96  NA
## 10 Concordia 193         1  1.74  1.74  1.74  NA
## # i 17 more rows
```

Gráfico por fenotipo



Sólidos solubles

Tabla descriptiva

```
## # A tibble: 2 x 6
##   site      n Mean  min  max  sd
##   <fct>    <int> <dbl> <dbl> <dbl> <dbl>
## 1 Concordia    29  9.58  5.9  13.1  2.15
## 2 Gualaquaychu  15  6.69  5.3   9.3  1.21
```

Gráfico por población

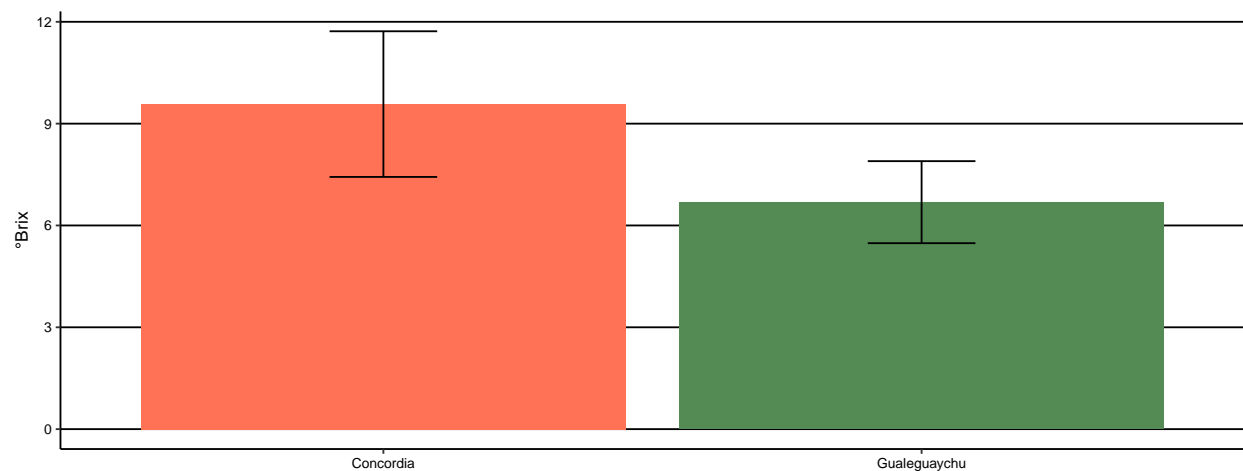
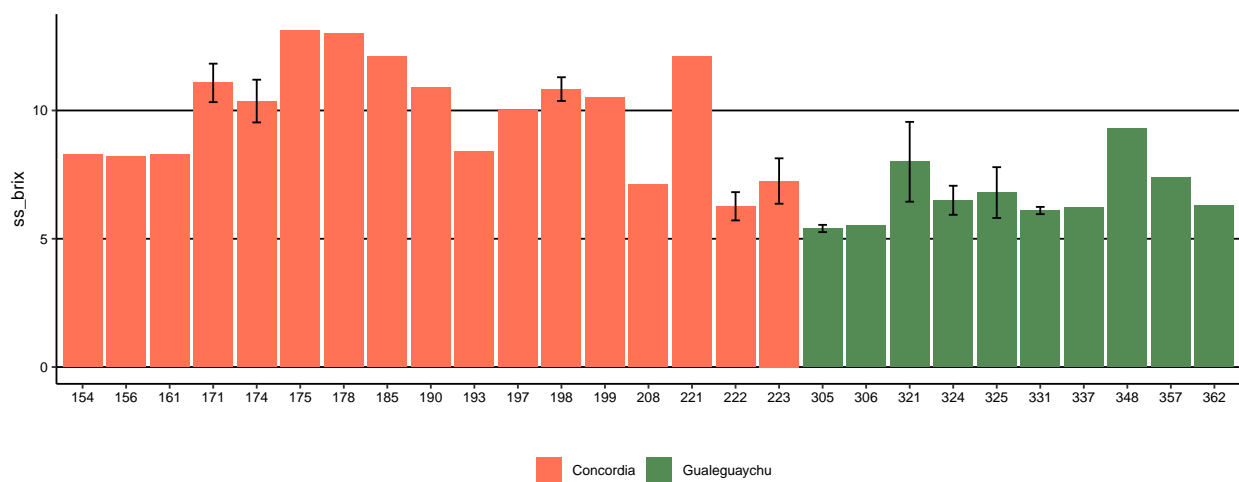


Tabla descriptiva

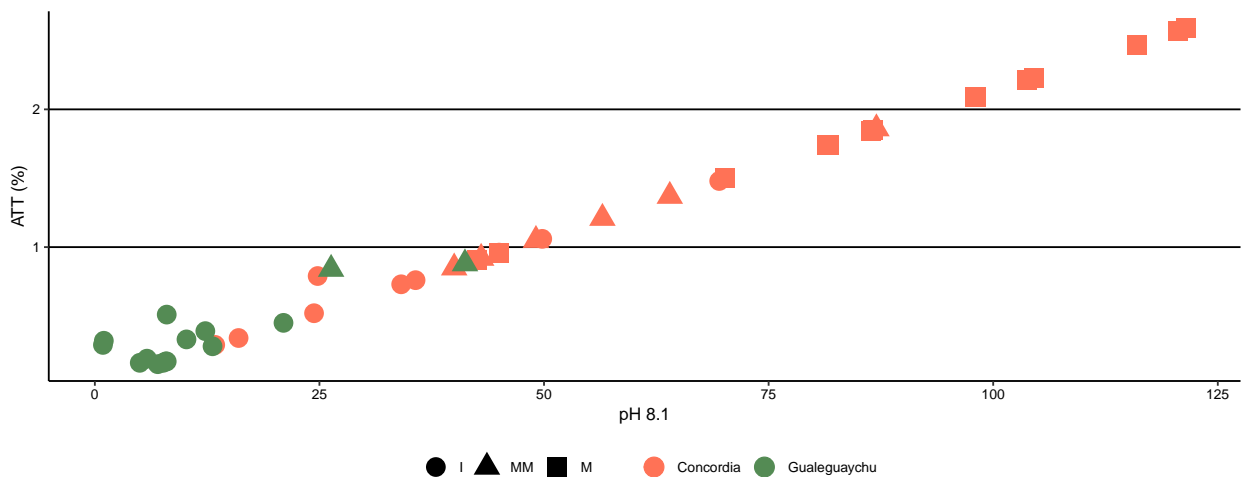
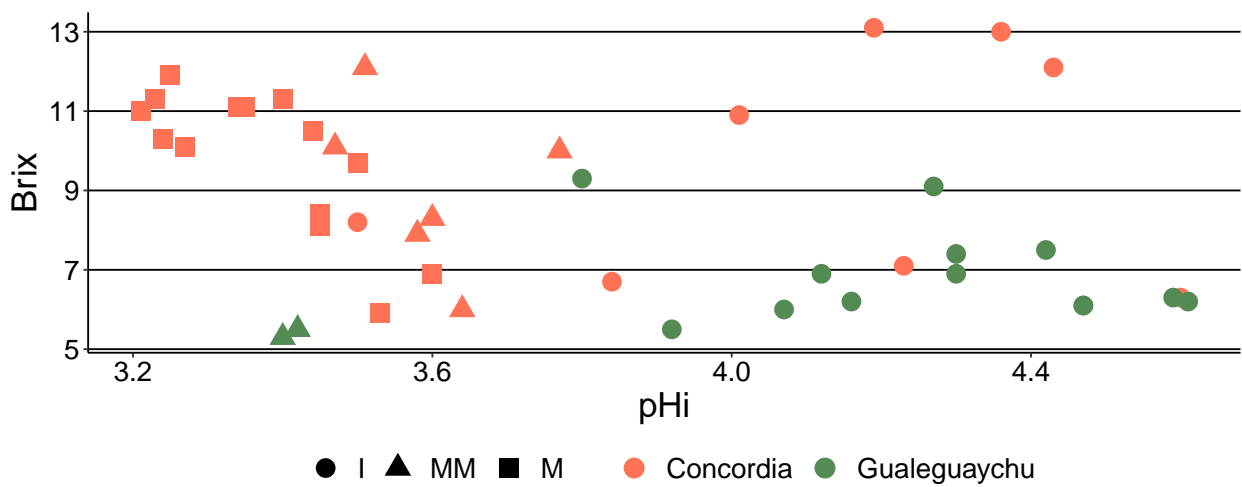
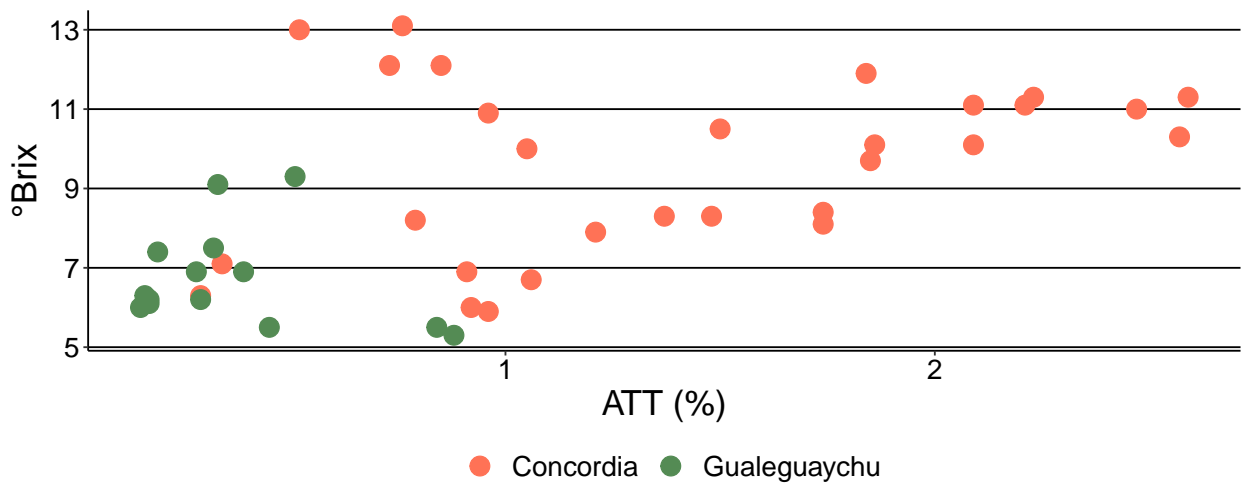
```
## # A tibble: 27 x 7
```

```
## # Groups:   site [2]
##   site      phenotype      n Mean   min   max   sd
##   <fct>     <fct>    <int> <dbl> <dbl> <dbl> <dbl>
## 1 Concordia 154        1   8.3   8.3   8.3  NA
## 2 Concordia 156        1   8.2   8.2   8.2  NA
## 3 Concordia 161        1   8.3   8.3   8.3  NA
## 4 Concordia 171        4  11.1  10.1  11.9  0.75
## 5 Concordia 174        3  10.4   9.7  11.3  0.833
## 6 Concordia 175        1  13.1  13.1  13.1  NA
## 7 Concordia 178        1  13     13    13    NA
## 8 Concordia 185        1  12.1  12.1  12.1  NA
## 9 Concordia 190        1  10.9  10.9  10.9  NA
## 10 Concordia 193       1   8.4   8.4   8.4  NA
## # i 17 more rows
```

Gráfico por fenotipo



Relación ATT y SS



Análisis de CCI

Resumen del modelo

Supuestos del modelo

Test de normalidad para muestras biológicas (frutos)

Test de normalidad para genotipos

Conclusiones

ICC del modelo

- \longrightarrow %
- \longrightarrow %
- \longrightarrow %

ICC del modelo =

Análisis multivariado