

Photosynthetic and antioxidant behavior of *Phaseolus vulgaris* in response to potassium nutrition

set working directory and load data

Normality tests for biochemical data, growth parameters, NDVI and IRGA data

```
## $Catalase
##
##  Shapiro-Wilk normality test
##
## data:  X[[i]]
## W = 0.84759, p-value = 0.0005523
## $Ascorbate
##
##  Shapiro-Wilk normality test
##
## data:  X[[i]]
## W = 0.77077, p-value = 2.009e-05
## $carotenos
##
##  Shapiro-Wilk normality test
##
## data:  X[[i]]
## W = 0.93855, p-value = 0.08315
## $Flavonoids
##
##  Shapiro-Wilk normality test
##
## data:  X[[i]]
## W = 0.89887, p-value = 0.007881
## $Phenolics
##
##  Shapiro-Wilk normality test
##
## data:  X[[i]]
## W = 0.96128, p-value = 0.3339
## Levene's Test for Homogeneity of Variance (center = median)
##      Df F value Pr(>F)
## group  9  1.1612 0.3694
##      20
## Levene's Test for Homogeneity of Variance (center = median)
##      Df F value Pr(>F)
## group  9  1.0646 0.4281
##      20
## Levene's Test for Homogeneity of Variance (center = median)
##      Df F value Pr(>F)
## group  9  0.4999 0.8573
##      20
## Levene's Test for Homogeneity of Variance (center = median)
##      Df F value Pr(>F)
## group  9   0.29 0.9695
```

```

##      20
## Levene's Test for Homogeneity of Variance (center = median)
##      Df F value Pr(>F)
## group  9   0.774 0.6417
##      20
##      Cultivar Potassium Totalleavemass drymatter Rootlength movedvolume
## 13      DAMA          1          10.36  28.61111  22.00000          6
## 14      DAMA          1          10.37  26.28205  24.55556         10
## 15      DAMA          1           9.04  30.00000  21.11111          8
## 19      DAMA         10          22.04  18.61004  26.88889          5
## 20      DAMA         10          25.58  25.80000  27.88889         12
## 21      DAMA         10          28.71  23.96396  23.00000         15
## $Totalleavemass
##
## Shapiro-Wilk normality test
##
## data:  X[[i]]
## W = 0.90862, p-value = 0.01374
## $drymatter
##
## Shapiro-Wilk normality test
##
## data:  X[[i]]
## W = 0.96422, p-value = 0.3952
## $<NA>
## NULL
## $<NA>
## NULL
## Levene's Test for Homogeneity of Variance (center = median)
##      Df F value Pr(>F)
## group  9   1.0453 0.4406
##      20
## Levene's Test for Homogeneity of Variance (center = median)
##      Df F value Pr(>F)
## group  9    0.37 0.9362
##      20
## Levene's Test for Homogeneity of Variance (center = median)
##      Df F value Pr(>F)
## group  9   0.6684 0.7275
##      20
## Levene's Test for Homogeneity of Variance (center = median)
##      Df F value Pr(>F)
## group  9   0.6625 0.7323
##      20
##      Cultivar Potassium          A          B          T
## 1      DAMA          0 16.70000 2.800000 19.50000
## 2      DAMA          0 17.40000 2.900000 20.30000
## 25     DAMA          0 16.93889 2.863889 19.80278
## 110    DAMA          1 17.46111 3.288889 20.75000
## 9      DAMA          1 23.52222 4.805556 28.32778
## 17     DAMA          1 21.73333 4.044444 25.77778
## $A
##
## Shapiro-Wilk normality test
##
## data:  X[[i]]
## W = 0.9617, p-value = 0.3422

```

```

## $B
##
## Shapiro-Wilk normality test
##
## data: X[[i]]
## W = 0.96728, p-value = 0.4676
## $T
##
## Shapiro-Wilk normality test
##
## data: X[[i]]
## W = 0.96621, p-value = 0.4414
## Levene's Test for Homogeneity of Variance (center = median)
##      Df F value Pr(>F)
## group 9  0.965 0.4956
##      20
## Levene's Test for Homogeneity of Variance (center = median)
##      Df F value Pr(>F)
## group 9  0.904 0.5402
##      20
## Levene's Test for Homogeneity of Variance (center = median)
##      Df F value Pr(>F)
## group 9  0.9846 0.4818
##      20
## Cultivar Potassium Photo Cond Ci Trmmol Tl.Ta
## 1 UIRAPURU 2 1.914150 0.02603159 303.3628 0.4086196 1.467224
## 2 UIRAPURU 2 1.911054 0.02622771 304.3686 0.4120533 1.466382
## 3 UIRAPURU 2 1.921549 0.02639688 304.3986 0.4151354 1.465816
## 4 UIRAPURU 2 1.913860 0.02694064 307.0089 0.4244464 1.463811
## 5 UIRAPURU 2 1.903966 0.02735267 309.0894 0.4315903 1.463229
## 6 UIRAPURU 2 1.868497 0.02773255 312.4396 0.4381612 1.463304
## SVTleaf CndTotal Ci.Ca WUE Ls CarbE
## 1 2.812601 0.02579515 0.7034756 73.53182 0.2965244 0.006309772
## 2 2.813579 0.02598772 0.7058793 72.86392 0.2941207 0.006278749
## 3 2.814464 0.02615379 0.7060575 72.79455 0.2939425 0.006312609
## 4 2.815688 0.02668748 0.7123624 71.03988 0.2876376 0.006233890
## 5 2.815908 0.02709175 0.7174821 69.60805 0.2825179 0.006159921
## 6 2.815520 0.02746436 0.7255705 67.37558 0.2744295 0.005980346
## $Photo
##
## Shapiro-Wilk normality test
##
## data: X[[i]]
## W = 0.91821, p-value < 2.2e-16
## $Cond
##
## Shapiro-Wilk normality test
##
## data: X[[i]]
## W = 0.30722, p-value < 2.2e-16
## $Ci
##
## Shapiro-Wilk normality test
##
## data: X[[i]]
## W = 0.75193, p-value < 2.2e-16
## $Trmmol

```

```

##
## Shapiro-Wilk normality test
##
## data: X[[i]]
## W = 0.87025, p-value < 2.2e-16
## $Tl.Ta
##
## Shapiro-Wilk normality test
##
## data: X[[i]]
## W = 0.29161, p-value < 2.2e-16
## $SVTleaf
##
## Shapiro-Wilk normality test
##
## data: X[[i]]
## W = 0.22783, p-value < 2.2e-16
## $CndTotal
##
## Shapiro-Wilk normality test
##
## data: X[[i]]
## W = 0.8784, p-value < 2.2e-16
## $Ci.Ca
##
## Shapiro-Wilk normality test
##
## data: X[[i]]
## W = 0.71295, p-value < 2.2e-16
## $WUE
##
## Shapiro-Wilk normality test
##
## data: X[[i]]
## W = 0.96306, p-value = 3.589e-12
## $Ls
##
## Shapiro-Wilk normality test
##
## data: X[[i]]
## W = 0.70784, p-value < 2.2e-16
## $CarbE
##
## Shapiro-Wilk normality test
##
## data: X[[i]]
## W = 0.72788, p-value < 2.2e-16
## Levene's Test for Homogeneity of Variance (center = median)
##      Df F value    Pr(>F)
## group  9  7.5557 1.353e-10 ***
##      680
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
## Levene's Test for Homogeneity of Variance (center = median)
##      Df F value    Pr(>F)
## group  9 34.092 < 2.2e-16 ***
##      680

```

```

## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
## Levene's Test for Homogeneity of Variance (center = median)
##      Df F value    Pr(>F)
## group  9  30.67 < 2.2e-16 ***
##      680
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
## Levene's Test for Homogeneity of Variance (center = median)
##      Df F value    Pr(>F)
## group  9  14.073 < 2.2e-16 ***
##      680
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
## Levene's Test for Homogeneity of Variance (center = median)
##      Df F value    Pr(>F)
## group  9  31.055 < 2.2e-16 ***
##      680
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
## Levene's Test for Homogeneity of Variance (center = median)
##      Df F value    Pr(>F)
## group  9  32.475 < 2.2e-16 ***
##      680
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
## Levene's Test for Homogeneity of Variance (center = median)
##      Df F value    Pr(>F)
## group  9  11.876 < 2.2e-16 ***
##      680
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
## Levene's Test for Homogeneity of Variance (center = median)
##      Df F value    Pr(>F)
## group  9  30.481 < 2.2e-16 ***
##      680
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
## Levene's Test for Homogeneity of Variance (center = median)
##      Df F value    Pr(>F)
## group  9  32.408 < 2.2e-16 ***
##      680
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
## Levene's Test for Homogeneity of Variance (center = median)
##      Df F value    Pr(>F)
## group  9  33.509 < 2.2e-16 ***
##      680
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
## Levene's Test for Homogeneity of Variance (center = median)
##      Df F value    Pr(>F)
## group  9  15.212 < 2.2e-16 ***
##      680
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
## Cultivar Potassium NDVI

```

```
## 1      DAMA      1 5.02
## 2      DAMA      1 4.32
## 3      DAMA      1 5.21
## 4      DAMA      1 6.13
## 5      DAMA      1 4.10
## 6      DAMA      1 4.86
## $NDVI
##
## Shapiro-Wilk normality test
##
## data: X[[i]]
## W = 0.80061, p-value < 2.2e-16
## Levene's Test for Homogeneity of Variance (center = median)
##      Df F value    Pr(>F)
## group  9  2.5392 0.008417 **
##      242
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

ANALYSIS OF VARIANCE (TWO-WAY ANOVA) FOR BIOCHEMICAL, GROWTH PAARAMETERS, NDVI AND IRGA DATA

```
##              df type III SS mean square F value    p>F
## factor_1      1    379.0697    379.0697 30.3898 <0.001
## factor_2      4    571.2778    142.8194 11.4498 <0.001
## factor_1:factor_2 4    117.5171     29.3793  2.3553 0.0885
## Residuals     20    249.4714     12.4736      -      -
## factor_1 adjusted.mean standard.error tukey snk duncan t scott_knott
## 1      DAMA      10.8573      0.9119      a  a      a a      a
## 2 UIRAPURU      3.7480      0.9119      b  b      b b      b
## factor_2 adjusted.mean standard.error tukey snk duncan t scott_knott
## 1      2      15.3600      1.4418      a  a      a a      a
## 2      10      7.1133      1.4418      b  b      b b      b
## 3      20      6.2967      1.4418      b  b      bc bc      b
## 4      1      5.5600      1.4418      b  b      bc bc      b
## 5      0      2.1833      1.4418      b  b      c  c      b
## $`factor_1 in 0`
## treatment adjusted.mean standard.error tukey snk duncan t scott_knott
## 2 UIRAPURU.0      2.3667      2.0391      a  a      a a      a
## 1      DAMA.0      2.0000      2.0391      a  a      a a      a
##
## $`factor_1 in 1`
## treatment adjusted.mean standard.error tukey snk duncan t scott_knott
## 3      DAMA.1      11.1133      2.0391      a  a      a a      a
## 4 UIRAPURU.1      0.0067      2.0391      b  b      b b      b
##
## $`factor_1 in 2`
## treatment adjusted.mean standard.error tukey snk duncan t scott_knott
## 5      DAMA.2      19.62      2.0391      a  a      a a      a
## 6 UIRAPURU.2      11.10      2.0391      b  b      b b      b
```

```

##
## $`factor_1 in 10`
##      treatment adjusted.mean standard.error tukey snk duncan t scott_knott
## 7      DAMA.10      11.7267      2.0391      a  a      a a      a
## 8 UIRAPURU.10      2.5000      2.0391      b  b      b b      b
##
## $`factor_1 in 20`
##      treatment adjusted.mean standard.error tukey snk duncan t scott_knott
## 9      DAMA.20      9.8267      2.0391      a  a      a a      a
## 10 UIRAPURU.20      2.7667      2.0391      b  b      b b      b
## $`factor_2 in DAMA`
##      treatment adjusted.mean standard.error tukey snk duncan t scott_knott
## 5      DAMA.2      19.6200      2.0391      a  a      a a      a
## 7      DAMA.10      11.7267      2.0391      ab b      b b      b
## 3      DAMA.1      11.1133      2.0391      ab b      b b      b
## 9      DAMA.20      9.8267      2.0391      bc b      b b      b
## 1      DAMA.0      2.0000      2.0391      c  c      c c      c
##
## $`factor_2 in UIRAPURU`
##      treatment adjusted.mean standard.error tukey snk duncan t scott_knott
## 6      UIRAPURU.2      11.1000      2.0391      a  a      a a      a
## 10 UIRAPURU.20      2.7667      2.0391      ab b      b b      b
## 8      UIRAPURU.10      2.5000      2.0391      ab b      b b      b
## 2      UIRAPURU.0      2.3667      2.0391      b  b      b b      b
## 4      UIRAPURU.1      0.0067      2.0391      b  b      b b      b
##
##      df type III SS mean square F value      p>F
## factor_1      1 1504.9250 1504.9250 32.3039 <0.001
## factor_2      4 2993.0528 748.2632 16.0618 <0.001
## factor_1:factor_2 4 9669.7529 2417.4382 51.8914 <0.001
## Residuals      20 931.7302 46.5865      -      -
##      factor_1 adjusted.mean standard.error tukey snk duncan t scott_knott
## 1 UIRAPURU      25.2540      1.7623      a  a      a a      a
## 2      DAMA      11.0887      1.7623      b  b      b b      b
##      factor_2 adjusted.mean standard.error tukey snk duncan t scott_knott
## 1      1      34.9250      2.7865      a  a      a a      a
## 2      20      21.6183      2.7865      b  b      b b      b
## 3      2      17.9667      2.7865      bc bc      bc bc      b
## 4      0      9.9500      2.7865      bc cd      cd cd      c
## 5      10      6.3967      2.7865      c  d      d d      c
## $`factor_1 in 0`
##      treatment adjusted.mean standard.error tukey snk duncan t scott_knott
## 1      DAMA.0      14.7367      3.9407      a  a      a a      a
## 2 UIRAPURU.0      5.1633      3.9407      a  a      a a      a
##
## $`factor_1 in 1`
##      treatment adjusted.mean standard.error tukey snk duncan t scott_knott
## 4 UIRAPURU.1      69.33      3.9407      a  a      a a      a
## 3      DAMA.1      0.52      3.9407      b  b      b b      b
##
## $`factor_1 in 2`
##      treatment adjusted.mean standard.error tukey snk duncan t scott_knott
## 6 UIRAPURU.2      35.7100      3.9407      a  a      a a      a
## 5      DAMA.2      0.2233      3.9407      b  b      b b      b
##
## $`factor_1 in 10`
##      treatment adjusted.mean standard.error tukey snk duncan t scott_knott
## 8 UIRAPURU.10      12.0333      3.9407      a  a      a a      a

```

```

## 7      DAMA.10      0.7600      3.9407      a      a      a a      a
##
## $`factor_1 in 20`
##      treatment adjusted.mean standard.error tukey snk duncan t scott_knott
## 9      DAMA.20      39.2033      3.9407      a      a      a a      a
## 10 UIRAPURU.20      4.0333      3.9407      b      b      b b      b
## $`factor_2 in DAMA`
##      treatment adjusted.mean standard.error tukey snk duncan t scott_knott
## 9      DAMA.20      39.2033      3.9407      a      a      a a      a
## 1      DAMA.0      14.7367      3.9407      b      b      b b      b
## 7      DAMA.10      0.7600      3.9407      b      c      c c      c
## 3      DAMA.1      0.5200      3.9407      b      c      c c      c
## 5      DAMA.2      0.2233      3.9407      b      bc     c c      c
##
## $`factor_2 in UIRAPURU`
##      treatment adjusted.mean standard.error tukey snk duncan t scott_knott
## 4      UIRAPURU.1      69.3300      3.9407      a      a      a a      a
## 6      UIRAPURU.2      35.7100      3.9407      b      b      b b      b
## 8      UIRAPURU.10     12.0333      3.9407      c      c      c c      c
## 2      UIRAPURU.0      5.1633      3.9407      c      c      c c      c
## 10 UIRAPURU.20      4.0333      3.9407      c      c      c c      c
##
##      df type III SS mean square F value      p>F
## factor_1      1      1.9866      1.9866 3.8083 0.0651
## factor_2      4      8.2210      2.0552 3.9398 0.0162
## factor_1:factor_2 4      4.5432      1.1358 2.1773 0.1086
## Residuals     20     10.4332      0.5217      -      -
## factor_1 adjusted.mean standard.error tukey snk duncan t scott_knott
## 1      DAMA      2.8967      0.1865      a      a      a a      a
## 2 UIRAPURU      2.3820      0.1865      a      a      a a      a
## factor_2 adjusted.mean standard.error tukey snk duncan t scott_knott
## 1      0      3.5817      0.2949      a      a      a a      a
## 2      20     2.6767      0.2949      ab     b      b b      b
## 3      10     2.6267      0.2949      ab     ab     b b      b
## 4      2      2.2367      0.2949      b      b      b b      b
## 5      1      2.0750      0.2949      b      b      b b      b
## $`factor_1 in 0`
##      treatment adjusted.mean standard.error tukey snk duncan t scott_knott
## 1      DAMA.0      4.2667      0.417      a      a      a a      a
## 2 UIRAPURU.0      2.8967      0.417      b      b      b b      b
##
## $`factor_1 in 1`
##      treatment adjusted.mean standard.error tukey snk duncan t scott_knott
## 4 UIRAPURU.1      2.3167      0.417      a      a      a a      a
## 3      DAMA.1      1.8333      0.417      a      a      a a      a
##
## $`factor_1 in 2`
##      treatment adjusted.mean standard.error tukey snk duncan t scott_knott
## 6 UIRAPURU.2      2.3067      0.417      a      a      a a      a
## 5      DAMA.2      2.1667      0.417      a      a      a a      a
##
## $`factor_1 in 10`
##      treatment adjusted.mean standard.error tukey snk duncan t scott_knott
## 7      DAMA.10      2.8200      0.417      a      a      a a      a
## 8 UIRAPURU.10      2.4333      0.417      a      a      a a      a
##
## $`factor_1 in 20`
##      treatment adjusted.mean standard.error tukey snk duncan t scott_knott

```

```

## 9      DAMA.20      3.3967      0.417      a      a      a a      a
## 10 UIRAPURU.20      1.9567      0.417      b      b      b b      b
## $`factor_2 in DAMA`
##      treatment adjusted.mean standard.error tukey snk duncan t scott_knott
## 1      DAMA.0      4.2667      0.417      a      a      a a      a
## 9      DAMA.20      3.3967      0.417      ab     ab      ab ab      a
## 7      DAMA.10      2.8200      0.417      ab     ab      bc bc      b
## 5      DAMA.2      2.1667      0.417      b      b      bc c      b
## 3      DAMA.1      1.8333      0.417      b      b      c c      b
##
## $`factor_2 in UIRAPURU`
##      treatment adjusted.mean standard.error tukey snk duncan t scott_knott
## 2      UIRAPURU.0      2.8967      0.417      a      a      a a      a
## 8      UIRAPURU.10      2.4333      0.417      a      a      a a      a
## 4      UIRAPURU.1      2.3167      0.417      a      a      a a      a
## 6      UIRAPURU.2      2.3067      0.417      a      a      a a      a
## 10 UIRAPURU.20      1.9567      0.417      a      a      a a      a
##
##      df type III SS mean square F value      p>F
## factor_1      1      90659.82      90659.82      1.775 0.1977
## factor_2      4      106805.70      26701.43      0.5228 0.7201
## factor_1:factor_2 4      306235.54      76558.89      1.4989 0.2402
## Residuals      20      1021529.02      51076.45      -      -
##      factor_1 adjusted.mean standard.error tukey snk duncan t scott_knott
## 1      DAMA      764.9447      58.3532      a      a      a a      a
## 2 UIRAPURU      654.9993      58.3532      a      a      a a      a
##      factor_2 adjusted.mean standard.error tukey snk duncan t scott_knott
## 1      1      784.6383      92.2645      a      a      a a      a
## 2      0      769.8900      92.2645      a      a      a a      a
## 3      10      704.4983      92.2645      a      a      a a      a
## 4      2      657.0567      92.2645      a      a      a a      a
## 5      20      633.7767      92.2645      a      a      a a      a
## $`factor_1 in 0`
##      treatment adjusted.mean standard.error tukey snk duncan t scott_knott
## 1      DAMA.0      793.0567      130.4817      a      a      a a      a
## 2 UIRAPURU.0      746.7233      130.4817      a      a      a a      a
##
## $`factor_1 in 1`
##      treatment adjusted.mean standard.error tukey snk duncan t scott_knott
## 3      DAMA.1      1039.9433      130.4817      a      a      a a      a
## 4 UIRAPURU.1      529.3333      130.4817      b      b      b b      b
##
## $`factor_1 in 2`
##      treatment adjusted.mean standard.error tukey snk duncan t scott_knott
## 6 UIRAPURU.2      666.1100      130.4817      a      a      a a      a
## 5      DAMA.2      648.0033      130.4817      a      a      a a      a
##
## $`factor_1 in 10`
##      treatment adjusted.mean standard.error tukey snk duncan t scott_knott
## 8 UIRAPURU.10      714.7200      130.4817      a      a      a a      a
## 7      DAMA.10      694.2767      130.4817      a      a      a a      a
##
## $`factor_1 in 20`
##      treatment adjusted.mean standard.error tukey snk duncan t scott_knott
## 9      DAMA.20      649.4433      130.4817      a      a      a a      a
## 10 UIRAPURU.20      618.1100      130.4817      a      a      a a      a
## $`factor_2 in DAMA`
##      treatment adjusted.mean standard.error tukey snk duncan t scott_knott

```

```

## 3      DAMA.1      1039.9433      130.4817      a      a      a      a      a
## 1      DAMA.0      793.0567      130.4817      a      a      a      ab     a
## 7      DAMA.10     694.2767      130.4817      a      a      a      ab     a
## 9      DAMA.20     649.4433      130.4817      a      a      a      b      a
## 5      DAMA.2      648.0033      130.4817      a      a      a      b      a
##
## $`factor_2 in UIRAPURU`
##      treatment adjusted.mean standard.error tukey snk duncan t scott_knott
## 2      UIRAPURU.0      746.7233      130.4817      a      a      a      a      a
## 8      UIRAPURU.10     714.7200      130.4817      a      a      a      a      a
## 6      UIRAPURU.2      666.1100      130.4817      a      a      a      a      a
## 10     UIRAPURU.20     618.1100      130.4817      a      a      a      a      a
## 4      UIRAPURU.1      529.3333      130.4817      a      a      a      a      a
##
##      df type III SS mean square F value      p>F
## factor_1      1      529.8722      529.8722  0.5539 0.4654
## factor_2      4      1748.1212      437.0303  0.4569 0.7664
## factor_1:factor_2  4      9562.3191      2390.5798  2.4991 0.0752
## Residuals      20      19131.7117      956.5856      -      -
##      factor_1 adjusted.mean standard.error tukey snk duncan t scott_knott
## 1      UIRAPURU      217.5433      7.9858      a      a      a      a      a
## 2      DAMA      209.1380      7.9858      a      a      a      a      a
##      factor_2 adjusted.mean standard.error tukey snk duncan t scott_knott
## 1      0      221.5083      12.6266      a      a      a      a      a
## 2      1      218.9550      12.6266      a      a      a      a      a
## 3      2      215.0883      12.6266      a      a      a      a      a
## 4      20     211.4700      12.6266      a      a      a      a      a
## 5      10     199.6817      12.6266      a      a      a      a      a
##
## $`factor_1 in 0`
##      treatment adjusted.mean standard.error tukey snk duncan t scott_knott
## 1      DAMA.0      238.5867      17.8567      a      a      a      a      a
## 2      UIRAPURU.0      204.4300      17.8567      a      a      a      a      a
##
## $`factor_1 in 1`
##      treatment adjusted.mean standard.error tukey snk duncan t scott_knott
## 4      UIRAPURU.1      219.5567      17.8567      a      a      a      a      a
## 3      DAMA.1      218.3533      17.8567      a      a      a      a      a
##
## $`factor_1 in 2`
##      treatment adjusted.mean standard.error tukey snk duncan t scott_knott
## 5      DAMA.2      227.2133      17.8567      a      a      a      a      a
## 6      UIRAPURU.2      202.9633      17.8567      a      a      a      a      a
##
## $`factor_1 in 10`
##      treatment adjusted.mean standard.error tukey snk duncan t scott_knott
## 8      UIRAPURU.10     222.0233      17.8567      a      a      a      a      a
## 7      DAMA.10     177.3400      17.8567      a      a      a      a      a
##
## $`factor_1 in 20`
##      treatment adjusted.mean standard.error tukey snk duncan t scott_knott
## 10     UIRAPURU.20     238.7433      17.8567      a      a      a      a      a
## 9      DAMA.20      184.1967      17.8567      b      b      b      b      b
##
## $`factor_2 in DAMA`
##      treatment adjusted.mean standard.error tukey snk duncan t scott_knott
## 1      DAMA.0      238.5867      17.8567      a      a      a      a      a
## 5      DAMA.2      227.2133      17.8567      a      a      ab      ab     a
## 3      DAMA.1      218.3533      17.8567      a      a      ab      ab     a
## 9      DAMA.20     184.1967      17.8567      a      a      ab      b      a

```

```
## 7 DAMA.10 177.3400 17.8567 a a b b a
##
## $`factor_2 in UIRAPURU`
## treatment adjusted.mean standard.error tukey snk duncan t scott_knott
## 10 UIRAPURU.20 238.7433 17.8567 a a a a a
## 8 UIRAPURU.10 222.0233 17.8567 a a a a a
## 4 UIRAPURU.1 219.5567 17.8567 a a a a a
## 2 UIRAPURU.0 204.4300 17.8567 a a a a a
## 6 UIRAPURU.2 202.9633 17.8567 a a a a a
```

```
## df type III SS mean square F value p>F
## factor_1 1 121.2030 121.2030 3.9141 0.0618
## factor_2 4 527.0346 131.7587 4.255 0.0119
## factor_1:factor_2 4 83.6967 20.9242 0.6757 0.6167
## Residuals 20 619.3107 30.9655 - -
## factor_2 adjusted.mean standard.error tukey snk duncan t scott_knott
## 1 10 21.2350 2.2718 a a a a a
## 2 20 19.8900 2.2718 ab a ab ab a
## 3 0 13.9700 2.2718 ab ab bc bc b
## 4 2 12.9817 2.2718 ab ab bc c b
## 5 1 10.2900 2.2718 b b c c b
```

```
## df type III SS mean square F value p>F
## factor_1 1 172.3723 172.3723 15.1441 <0.001
## factor_2 4 736.8730 184.2183 16.1848 <0.001
## factor_1:factor_2 4 177.4205 44.3551 3.8969 0.0169
## Residuals 20 227.6433 11.3822 - -
## factor_1 adjusted.mean standard.error tukey snk duncan t scott_knott
## 1 UIRAPURU 28.6452 0.8711 a a a a a
## 2 DAMA 23.8512 0.8711 b b b b b
## factor_2 adjusted.mean standard.error tukey snk duncan t scott_knott
## 1 1 32.2733 1.3773 a a a a a
## 2 2 30.3795 1.3773 a ab ab ab a
## 3 10 27.2308 1.3773 ab b b b a
## 4 20 22.4730 1.3773 bc c c c b
## 5 0 18.8844 1.3773 c c c c b
```

```
## $`factor_1 in 0`
## treatment adjusted.mean standard.error tukey snk duncan t scott_knott
## 1 DAMA.0 21.0373 1.9478 a a a a a
## 2 UIRAPURU.0 16.7315 1.9478 a a a a a
##
```

```
## $`factor_1 in 1`
## treatment adjusted.mean standard.error tukey snk duncan t scott_knott
## 4 UIRAPURU.1 36.2488 1.9478 a a a a a
## 3 DAMA.1 28.2977 1.9478 b b b b b
##
```

```
## $`factor_1 in 2`
## treatment adjusted.mean standard.error tukey snk duncan t scott_knott
## 6 UIRAPURU.2 32.2993 1.9478 a a a a a
## 5 DAMA.2 28.4596 1.9478 a a a a a
##
```

```
## $`factor_1 in 10`
## treatment adjusted.mean standard.error tukey snk duncan t scott_knott
## 8 UIRAPURU.10 31.6702 1.9478 a a a a a
## 7 DAMA.10 22.7913 1.9478 b b b b b
```

```

##
## $`factor_1 in 20`
##      treatment adjusted.mean standard.error tukey snk duncan t scott_knott
## 10 UIRAPURU.20      26.2762      1.9478      a   a      a a      a
## 9   DAMA.20      18.6698      1.9478      b   b      b b      b
## $`factor_2 in DAMA`
##      treatment adjusted.mean standard.error tukey snk duncan t scott_knott
## 5   DAMA.2      28.4596      1.9478      a  ab      a a      a
## 3   DAMA.1      28.2977      1.9478      a  b      a a      a
## 7   DAMA.10     22.7913      1.9478     ab bc      ab ab      b
## 1   DAMA.0      21.0373      1.9478     ab ac      b b      b
## 9   DAMA.20     18.6698      1.9478      b  c      b b      b
##
## $`factor_2 in UIRAPURU`
##      treatment adjusted.mean standard.error tukey snk duncan t
## 4   UIRAPURU.1      36.2488      1.9478      a   a      a a
## 6   UIRAPURU.2      32.2993      1.9478     ab  ab      ab a
## 8   UIRAPURU.10     31.6702      1.9478     ab  ab      ab ab
## 10  UIRAPURU.20     26.2762      1.9478      b   b      b b
## 2   UIRAPURU.0     16.7315      1.9478      c   c      c c
##      scott_knott
## 4           a
## 6           a
## 8           a
## 10          b
## 2           c
##
##              df type III SS mean square F value      p>F
## factor_1      1      11.5113      11.5113      2.487 0.1305
## factor_2      4      951.7979      237.9495 51.4082 <0.001
## factor_1:factor_2 4      41.2856      10.3214 2.2299 0.1022
## Residuals     20      92.5725      4.6286      -      -
## factor_2 adjusted.mean standard.error tukey snk duncan t scott_knott
## 1      2      24.4259      0.8783      a   a      a a      a
## 2     10      24.2685      0.8783      a   a      a ab      a
## 3      1      22.2269      0.8783      a   a      a ab      b
## 4     20      21.6852      0.8783      a   a      a b      b
## 5      0       9.3333      0.8783      b   b      b c      c
## $`factor_1 in 0`
##      treatment adjusted.mean standard.error tukey snk duncan t scott_knott
## 2 UIRAPURU.0      10.1111      1.2421      a   a      a a      a
## 1   DAMA.0       8.5556      1.2421      a   a      a a      a
##
## $`factor_1 in 1`
##      treatment adjusted.mean standard.error tukey snk duncan t scott_knott
## 3   DAMA.1      22.5556      1.2421      a   a      a a      a
## 4 UIRAPURU.1      21.8981      1.2421      a   a      a a      a
##
## $`factor_1 in 2`
##      treatment adjusted.mean standard.error tukey snk duncan t scott_knott
## 6 UIRAPURU.2      24.8148      1.2421      a   a      a a      a
## 5   DAMA.2      24.0370      1.2421      a   a      a a      a
##
## $`factor_1 in 10`
##      treatment adjusted.mean standard.error tukey snk duncan t scott_knott
## 7   DAMA.10      25.9259      1.2421      a   a      a a      a
## 8 UIRAPURU.10     22.6111      1.2421      a   a      a a      a
##

```

```

## $`factor_1` in 20`
##      treatment adjusted.mean standard.error tukey snk duncan t scott_knott
## 9      DAMA.20      23.9630      1.2421      a      a      a a      a
## 10 UIRAPURU.20      19.4074      1.2421      b      b      b b      b
## $`factor_2` in DAMA`
##      treatment adjusted.mean standard.error tukey snk duncan t scott_knott
## 7      DAMA.10      25.9259      1.2421      a      a      a a      a
## 5      DAMA.2      24.0370      1.2421      a      a      a a      a
## 9      DAMA.20      23.9630      1.2421      a      a      a a      a
## 3      DAMA.1      22.5556      1.2421      a      a      a a      a
## 1      DAMA.0      8.5556      1.2421      b      b      b b      b
##
## $`factor_2` in UIRAPURU`
##      treatment adjusted.mean standard.error tukey snk duncan t
## 6      UIRAPURU.2      24.8148      1.2421      a      a      a a
## 8      UIRAPURU.10      22.6111      1.2421      ab     ab      ab ab
## 4      UIRAPURU.1      21.8981      1.2421      ab     ab      ab ab
## 10     UIRAPURU.20      19.4074      1.2421      b      b      b b
## 2      UIRAPURU.0      10.1111      1.2421      c      c      c c
##      scott_knott
## 6      a
## 8      a
## 4      a
## 10     a
## 2      b
##
##      df type III SS mean square F value      p>F
## factor_1      1      0.3000      0.3000 0.0254 0.8749
## factor_2      4     167.1333     41.7833 3.541 0.0243
## factor_1:factor_2 4     21.5333     5.3833 0.4562 0.7668
## Residuals     20     236.0000     11.8000      -      -
##      factor_2 adjusted.mean standard.error tukey snk duncan t scott_knott
## 1      2      11.1667      1.4024      a      a      a a      a
## 2      10     9.6667      1.4024      ab     ab      a a      a
## 3      1      7.6667      1.4024      ab     ab      ab ab      a
## 4      20     7.5000      1.4024      ab     ab      ab ab      a
## 5      0      4.1667      1.4024      b      b      b b      a
## $`factor_2` in DAMA`
##      treatment adjusted.mean standard.error tukey snk duncan t scott_knott
## 7      DAMA.10      10.6667      1.9833      a      a      a a      a
## 5      DAMA.2      9.6667      1.9833      a      a      a ab      a
## 3      DAMA.1      8.0000      1.9833      a      a      a ab      a
## 9      DAMA.20      7.6667      1.9833      a      a      a ab      a
## 1      DAMA.0      4.6667      1.9833      a      a      a b      a
##
## $`factor_2` in UIRAPURU`
##      treatment adjusted.mean standard.error tukey snk duncan t
## 6      UIRAPURU.2      12.6667      1.9833      a      a      a a
## 8      UIRAPURU.10      8.6667      1.9833      ab     ab      ab ab
## 4      UIRAPURU.1      7.3333      1.9833      ab     ab      ab ab
## 10     UIRAPURU.20      7.3333      1.9833      ab     ab      ab ab
## 2      UIRAPURU.0      3.6667      1.9833      b      b      b b
##      scott_knott
## 6      a
## 8      a
## 4      a
## 10     a
## 2      a

```

```

##              df type III SS mean square F value      p>F
## factor_1      1      0.0756      0.0756  0.0113 0.9162
## factor_2      4     91.7315     22.9329  3.4449 0.0269
## factor_1:factor_2  4     37.2997      9.3249  1.4008 0.2698
## Residuals     20    133.1416      6.6571      -      -
##   factor_2 adjusted.mean standard.error tukey snk duncan  t scott_knott
## 1      20      23.8676      1.0533      a  a      a a      a
## 2      10      23.4907      1.0533     ab  a      a a      a
## 3       2      21.9667      1.0533     ab ab     ab ab     a
## 4       1      21.0120      1.0533     ab ab     ab ab     b
## 5       0      19.0546      1.0533      b  b      b b     b
## $`factor_2 in  DAMA`
##   treatment adjusted.mean standard.error tukey snk duncan  t scott_knott
## 9  DAMA.20      24.9611      1.4896      a  a      a a      a
## 5  DAMA.10      24.1704      1.4896      a  a      a a      a
## 7  DAMA.2      22.5926      1.4896     ab  a      a a      a
## 3  DAMA.1      20.9056      1.4896     ab ab     ab ab     a
## 1  DAMA.0      17.0130      1.4896      b  b      b b     b
##
## $`factor_2 in  UIRAPURU`
##   treatment adjusted.mean standard.error tukey snk duncan  t scott_knott
## 6  UIRAPURU.10      22.8111      1.4896      a  a      a a      a
## 10 UIRAPURU.20      22.7741      1.4896      a  a      a a      a
## 8  UIRAPURU.2      21.3407      1.4896      a  a      a a      a
## 4  UIRAPURU.1      21.1185      1.4896      a  a      a a      a
## 2  UIRAPURU.0      21.0963      1.4896      a  a      a a      a
##
##              df type III SS mean square F value      p>F
## factor_1      1      0.0192      0.0192  0.035 0.8536
## factor_2      4     10.7412      2.6853  4.8977 0.0064
## factor_1:factor_2  4      2.6864      0.6716  1.2249 0.3317
## Residuals     20     10.9655      0.5483      -      -
##   factor_2 adjusted.mean standard.error tukey snk duncan  t scott_knott
## 1      10      4.9435      0.3023      a  a      a a      a
## 2      20      4.9324      0.3023      a  a      a a      a
## 3       2      4.1491      0.3023     ab ab     ab ab     b
## 4       1      4.0713      0.3023     ab ab     ab ab     b
## 5       0      3.3505      0.3023      b  b      b b     b
## $`factor_2 in  DAMA`
##   treatment adjusted.mean standard.error tukey snk duncan  t scott_knott
## 9  DAMA.20      5.3537      0.4275      a  a      a a      a
## 5  DAMA.10      5.0296      0.4275      a  a      a ab     a
## 7  DAMA.2      4.2889      0.4275     ab ab     a ab     a
## 3  DAMA.1      4.0463      0.4275     ab ab     ab bc     a
## 1  DAMA.0      2.8546      0.4275      b  b      b c     b
##
## $`factor_2 in  UIRAPURU`
##   treatment adjusted.mean standard.error tukey snk duncan  t scott_knott
## 6  UIRAPURU.10      4.8574      0.4275      a  a      a a      a
## 10 UIRAPURU.20      4.5111      0.4275      a  a      a a      a
## 4  UIRAPURU.1      4.0963      0.4275      a  a      a a      a
## 8  UIRAPURU.2      4.0093      0.4275      a  a      a a      a
## 2  UIRAPURU.0      3.8463      0.4275      a  a      a a      a
##
##              df type III SS mean square F value      p>F
## factor_1      1      0.1708      0.1708  0.0156 0.9018

```

```
## factor_2          4      164.4124      41.1031  3.7574 0.0195
## factor_1:factor_2  4       59.3706      14.8427  1.3568 0.2841
## Residuals        20      218.7823      10.9391      -      -
##   factor_2 adjusted.mean standard.error tukey snk duncan  t scott_knott
## 1         20      28.8000       1.3503      a  a      a a      a
## 2         10      28.4343       1.3503      a  a      a a      a
## 3          2      26.1157       1.3503     ab ab      ab ab      b
## 4          1      25.0833       1.3503     ab ab      ab ab      b
## 5          0      22.4051       1.3503      b  b      b b      b
## $`factor_2 in  DAMA`
##   treatment adjusted.mean standard.error tukey snk duncan  t scott_knott
## 9  DAMA.20      30.3148       1.9095      a  a      a a      a
## 5  DAMA.10      29.2000       1.9095      a  a      a a      a
## 7  DAMA.2       26.8815       1.9095     ab  a      a a      a
## 3  DAMA.1       24.9519       1.9095     ab ab      ab ab      a
## 1  DAMA.0       19.8676       1.9095      b  b      b b      b
##
## $`factor_2 in  UIRAPURU`
##   treatment adjusted.mean standard.error tukey snk duncan  t scott_knott
## 6  UIRAPURU.10      27.6685       1.9095      a  a      a a      a
## 10 UIRAPURU.20      27.2852       1.9095      a  a      a a      a
## 8  UIRAPURU.2       25.3500       1.9095      a  a      a a      a
## 4  UIRAPURU.1       25.2148       1.9095      a  a      a a      a
## 2  UIRAPURU.0       24.9426       1.9095      a  a      a a      a
```

```
##              df type III SS mean square F value    p>F
## factor_1          1      4.1069      4.1069  0.5723 0.4501
## factor_2          4     84.6108     21.1527  2.9474 0.021
## factor_1:factor_2  4      8.0579      2.0145  0.2807 0.8903
## Residuals       242    1736.7389      7.1766      -      -
##   factor_2 adjusted.mean standard.error tukey snk duncan  t scott_knott
## 1          0       5.7653       0.4465      a  a      a a      a
## 2         10       5.2756       0.3646      a ab      ab a      a
## 3          2       5.1302       0.3646      a ab      ab ab      a
## 4          1       4.2380       0.3646      a  b      b b      b
## 5         20       4.2369       0.3646      a ab      b b      b
## $`factor_1 in  0`
##   treatment adjusted.mean standard.error tukey snk duncan  t scott_knott
## 1  DAMA.0       5.9700       0.6314      a  a      a a      a
## 2  UIRAPURU.0     5.5606       0.6314      a  a      a a      a
##
## $`factor_1 in  1`
##   treatment adjusted.mean standard.error tukey snk duncan  t scott_knott
## 3  DAMA.1       4.6152       0.5156      a  a      a a      a
## 4  UIRAPURU.1     3.8607       0.5156      a  a      a a      a
##
## $`factor_1 in  2`
##   treatment adjusted.mean standard.error tukey snk duncan  t scott_knott
## 5  DAMA.2       5.3196       0.5156      a  a      a a      a
## 6  UIRAPURU.2     4.9407       0.5156      a  a      a a      a
##
## $`factor_1 in  10`
##   treatment adjusted.mean standard.error tukey snk duncan  t scott_knott
## 8  UIRAPURU.10     5.2785       0.5156      a  a      a a      a
```

```
## 7      DAMA.10      5.2726      0.5156      a      a      a a      a
##
## $`factor_1` in 20`
##      treatment adjusted.mean standard.error tukey snk duncan t scott_knott
## 10 UIRAPURU.20      4.3585      0.5156      a      a      a a      a
## 9      DAMA.20      4.1152      0.5156      a      a      a a      a
## $`factor_2` in DAMA`
##      treatment adjusted.mean standard.error tukey snk duncan t scott_knott
## 1      DAMA.0      5.9700      0.6314      a      a      a a      a
## 5      DAMA.2      5.3196      0.5156      a      a      ab ab      a
## 7      DAMA.10      5.2726      0.5156      a      a      ab ab      a
## 3      DAMA.1      4.6152      0.5156      a      a      ab ab      a
## 9      DAMA.20      4.1152      0.5156      a      a      b b      a
##
## $`factor_2` in UIRAPURU`
##      treatment adjusted.mean standard.error tukey snk duncan t
## 2      UIRAPURU.0      5.5606      0.6314      a      a      a a
## 8      UIRAPURU.10      5.2785      0.5156      a      a      a ab
## 6      UIRAPURU.2      4.9407      0.5156      a      a      a ab
## 10     UIRAPURU.20      4.3585      0.5156      a      a      a ab
## 4      UIRAPURU.1      3.8607      0.5156      a      a      a b
##      scott_knott
## 2      a
## 8      a
## 6      a
## 10     a
## 4      a
```

uv-visible data analysis

```
## [1] "DAMA1" "DAMA10" "DAMA2" "DAMA20" "DAMANEG" "UIRA1" "UIRA10"
## [8] "UIRA2" "UIRA20" "UIRANEG"
## [1] 3.466275
```

```
## 'data.frame': 601 obs. of 3 variables:
## $ WL : num 200 201 202 203 204 205 206 207 208 209 ...
## $ Treatment : chr "UIRA1" "UIRA1" "UIRA1" "UIRA1" ...
## $ Absorbance: num 2.06 2.13 1.97 1.87 1.93 ...
## [1] 4.623936
```

Correlations between variables

```
##
## Pearson correlations of all variables
##
```

```
=====
=====
=====
=====
```

##		A	B	Total	Catalase	Ascorbate	
carotenos	Flavonoids	Phenolics	Totalleavemass	drymatter	Rootlength		
movedvolume	Photo	Cond	Ci	Trmmol	Tl.Ta		
SVTleaf	CndTotal	Ci.Ca	WUE	Ls	CarbE		
##	-----	-----	-----	-----	-----	-----	-----
##	-----	-----	-----	-----	-----	-----	-----
##	A						
##	B	0.98* * * *					
##	Total	1.00* * * *	0.99* * * *				
##	Catalase	0.43	0.32	0.41			
##	Ascorbate	0.04	0.06	0.04	-0.34		
##	carotenos	-0.38	-0.31	-0.36	-0.26	0.10	
##	Flavonoids	-0.35	-0.30	-0.34	0.15	-0.54	-0.01
##	Phenolics	-0.52	-0.52	-0.52	-0.32	-0.13	-0.13
##	0.08						
##	Totalleavemass	0.61	0.63	0.61	0.19	-0.32	0.29
##	-0.26 -0.41						
##	drymatter	0.12	0.11	0.12	0.00	0.42	-0.62
##	-0.23 0.32 -0.46						
##	Rootlength	0.85* *	0.81* *	0.84* *	0.58	0.16	-0.58
##	-0.21 -0.43 0.23		0.52				
##	movedvolume	0.59	0.53	0.58	0.62	0.07	-0.46
##	-0.18 -0.35 0.11		0.53	0.86* *			
##	Photo	-0.09	0.02	-0.06	-0.46	-0.17	0.37
##	-0.13 0.31 0.41		0.02	-0.22	-0.08		
##	Cond	0.10	0.22	0.13	-0.33	-0.10	-0.04
##	0.00 0.17 0.08		0.27	0.05	0.04	0.64*	
##	Ci	-0.51	-0.59	-0.53	-0.10	0.21	-0.14
##	0.14 0.01 -0.62		-0.01	-0.30	-0.19	-0.62	-
##	0.72*						
##	Trmmol	-0.17	-0.05	-0.14	-0.48	-0.18	0.20
##	0.03 0.22 0.08		0.07	-0.26	-0.15	0.76*	
##	0.93* * * * -0.59						
##	Tl.Ta	0.27	0.38	0.30	-0.19	-0.07	-0.19
##	0.01 0.12 0.09		0.36	0.24	0.15	0.51	
##	0.97* * * * -0.76* 0.81* *						
##	SVTleaf	0.14	0.26	0.17	-0.28	-0.12	-0.05
##	0.03 0.15 0.11		0.24	0.08	0.03	0.60	
##	0.99* * * * -0.76* 0.90* * * * 0.98* * * *						
##	CndTotal	-0.27	-0.16	-0.24	-0.58	-0.13	0.23
##	-0.04 0.24 0.04		0.08	-0.34	-0.18	0.80* *	
##	0.85* * -0.46 0.98* * * * 0.70* 0.80* *						
##	Ci.Ca	-0.54	-0.62	-0.56	-0.11	0.17	-0.09
##	0.16 0.02 -0.58		-0.07	-0.35	-0.24	-0.59	-
##	0.74* 1.00* * * * -0.59		-0.79* *	-0.78* *	-0.46		
##	WUE	0.43	0.35	0.41	0.57	-0.04	0.19
##	-0.22 -0.26 0.55		-0.33	0.29	0.22	-0.23	
##	-0.66* -0.04 -0.69*		-0.58	-0.62	-0.71*	-0.01	
##	Ls	0.54	0.62	0.56	0.10	-0.18	0.06
##	-0.14 -0.01 0.58		0.08	0.35	0.24	0.59	
##	0.74* -1.00* * * * 0.59		0.79* *	0.78* *	0.45	-1.00* * *	
##	* 0.01						
##	CarbE	0.14	0.27	0.17	-0.34	-0.16	0.09
##	-0.04 0.22 0.30		0.19	0.03	0.04	0.83* *	

0.95*	*	*	*	-0.82*	*	0.91*	*	*	*	0.90*	*	*	*	0.94*	*	*	*	0.84*	*	-
0.83*	*			-0.46	0.83*	*														
##		NDVI		-0.52		-0.51		-0.52		0.08		-0.61		0.45						
0.33		0.14		0.09		-0.39		-0.52		-0.19		0.40								
0.24		-0.15		0.49		0.08		0.22		0.50		-0.11								
-0.22	0.09	0.26																		
##	-----																			

Principal component analysis and hierarchical analysis

##	Potassium	Cultivar	A	B	Total	Catalase	Ascorbate
## 1	0	DAMA	16.93889	2.863889	19.80278	2.000000000	14.7366667
## 2	0	UIRAPURU	18.88889	3.338889	22.22778	2.366666667	5.1633333
## 3	1	DAMA	20.90556	4.046296	24.95185	11.113333333	0.5200000
## 4	1	UIRAPURU	21.11852	4.096296	25.21481	0.006666667	69.3300000
## 5	2	DAMA	22.59259	4.288889	26.88148	19.620000000	0.2233333
## 6	2	UIRAPURU	21.34074	4.009259	25.35000	11.100000000	35.7100000
## 7	10	DAMA	24.17037	5.029630	29.20000	11.726666667	0.7600000
## 8	10	UIRAPURU	22.81111	4.857407	27.66852	2.500000000	12.0333333
## 9	20	DAMA	24.96111	5.353704	30.31481	9.826666667	39.2033333
## 10	20	UIRAPURU	22.77407	4.511111	27.28519	2.766666667	4.0333333
##	carotenos	Flavonoids	Phenolics	Totalleavemass	drymatter	Rootlength	
## 1	4.266667	793.0567	238.5867	15.203333	21.03729	8.555556	
## 2	2.896667	746.7233	204.4300	12.736667	16.73148	10.111111	
## 3	1.833333	1039.9433	218.3533	9.923333	28.29772	22.555556	
## 4	2.316667	529.3333	219.5567	10.656667	36.24880	21.898148	
## 5	2.166667	648.0033	227.2133	16.566667	28.45963	24.037037	
## 6	2.306667	666.1100	202.9633	9.396667	32.29934	24.814815	
## 7	2.820000	694.2767	177.3400	25.443333	22.79133	25.925926	
## 8	2.433333	714.7200	222.0233	17.026667	31.67023	22.611111	
## 9	3.396667	649.4433	184.1967	21.280000	18.66981	23.962963	
## 10	1.956667	618.1100	238.7433	18.500000	26.27622	19.407407	
##	movedvolume	Photo	Cond	Ci	Trmmol	Tl.Ta	SVTleaf
## 1	4.666667	6.312472	0.10366328	274.0481	2.603041	0.5667116	4.019008
## 2	3.666667	3.252782	0.09282107	311.1969	2.310134	0.7268570	4.011903
## 3	8.000000	2.821720	0.04179593	299.6879	1.042041	1.2877211	3.698433
## 4	7.333333	3.774856	0.06557001	302.7293	1.326512	1.1521639	3.604686
## 5	9.666667	3.323678	0.04403774	258.3200	1.147543	1.2776915	3.849061
## 6	12.666667	3.756182	0.07551224	301.6902	1.664784	0.9712431	3.480453
## 7	10.666667	5.186249	0.07594198	261.4438	1.771898	0.9690461	3.748445
## 8	8.666667	6.669436	0.70054303	205.8075	4.786959	6.1782862	10.973010
## 9	7.666667	3.501513	0.03992171	249.1579	1.071472	1.2426745	3.878351
## 10	7.333333	5.289685	0.07480859	275.0843	1.660662	1.0073675	3.689997
##	CndTotal	Ci.Ca	WUE	Ls	CarbE	NDVI	
## 1	0.09972118	0.7037189	61.51740	0.2962811	0.02301830	5.970000	
## 2	0.08917997	0.7881593	41.96468	0.2118407	0.01063136	5.560556	
## 3	0.04107283	0.7526530	53.42977	0.2538744	0.01143672	4.615185	
## 4	0.06364550	0.7582593	51.11705	0.2420129	0.01307772	3.860741	
## 5	0.043333680	0.6540217	75.69949	0.3459783	0.01318473	5.319630	
## 6	0.07243991	0.7479381	55.01257	0.2520619	0.01255039	4.940741	
## 7	0.07329634	0.6670040	71.96819	0.3329960	0.01970415	5.272593	
## 8	0.14890510	0.5138550	30.97411	0.4861450	0.04981023	5.278519	

```

## 9 0.03925214 0.6282674 82.42623 0.3721462 0.01499142 4.115185
## 10 0.07240186 0.6966216 67.57454 0.3133260 0.02039600 4.358519
##
##          A          B          Total          Catalase          Ascorbate          carotenos
## DAMA_0          16.93889 2.863889 19.80278 2.000000000 14.7366667 4.266667
## UIRAPURU_0      18.88889 3.338889 22.22778 2.366666667 5.1633333 2.896667
## DAMA_1          20.90556 4.046296 24.95185 11.113333333 0.5200000 1.833333
## UIRAPURU_1      21.11852 4.096296 25.21481 0.006666667 69.3300000 2.316667
## DAMA_2          22.59259 4.288889 26.88148 19.620000000 0.2233333 2.166667
## UIRAPURU_2      21.34074 4.009259 25.35000 11.100000000 35.7100000 2.306667
## DAMA_10         24.17037 5.029630 29.20000 11.726666667 0.7600000 2.820000
## UIRAPURU_10     22.81111 4.857407 27.66852 2.500000000 12.0333333 2.433333
## DAMA_20         24.96111 5.353704 30.31481 9.826666667 39.2033333 3.396667
## UIRAPURU_20     22.77407 4.511111 27.28519 2.766666667 4.0333333 1.956667
##
##          Flavonoids Phenolics Totalleavemass drymatter Rootlength
## DAMA_0          793.0567 238.5867 15.203333 21.03729 8.555556
## UIRAPURU_0      746.7233 204.4300 12.736667 16.73148 10.111111
## DAMA_1          1039.9433 218.3533 9.923333 28.29772 22.555556
## UIRAPURU_1      529.3333 219.5567 10.656667 36.24880 21.898148
## DAMA_2          648.0033 227.2133 16.566667 28.45963 24.037037
## UIRAPURU_2      666.1100 202.9633 9.396667 32.29934 24.814815
## DAMA_10         694.2767 177.3400 25.443333 22.79133 25.925926
## UIRAPURU_10     714.7200 222.0233 17.026667 31.67023 22.611111
## DAMA_20         649.4433 184.1967 21.280000 18.66981 23.962963
## UIRAPURU_20     618.1100 238.7433 18.500000 26.27622 19.407407
##
##          movedvolume          Photo          Cond          Ci          Trmmol          Tl.Ta
## DAMA_0          4.666667 6.312472 0.10366328 274.0481 2.603041 0.5667116
## UIRAPURU_0      3.666667 3.252782 0.09282107 311.1969 2.310134 0.7268570
## DAMA_1          8.000000 2.821720 0.04179593 299.6879 1.042041 1.2877211
## UIRAPURU_1      7.333333 3.774856 0.06557001 302.7293 1.326512 1.1521639
## DAMA_2          9.666667 3.323678 0.04403774 258.3200 1.147543 1.2776915
## UIRAPURU_2      12.666667 3.756182 0.07551224 301.6902 1.664784 0.9712431
## DAMA_10         10.666667 5.186249 0.07594198 261.4438 1.771898 0.9690461
## UIRAPURU_10     8.666667 6.669436 0.70054303 205.8075 4.786959 6.1782862
## DAMA_20         7.666667 3.501513 0.03992171 249.1579 1.071472 1.2426745
## UIRAPURU_20     7.333333 5.289685 0.07480859 275.0843 1.660662 1.0073675
##
##          SVTleaf          CndTotal          Ci.Ca          WUE          Ls          CarbE
## DAMA_0          4.019008 0.09972118 0.7037189 61.51740 0.2962811 0.02301830
## UIRAPURU_0      4.011903 0.08917997 0.7881593 41.96468 0.2118407 0.01063136
## DAMA_1          3.698433 0.04107283 0.7526530 53.42977 0.2538744 0.01143672
## UIRAPURU_1      3.604686 0.06364550 0.7582593 51.11705 0.2420129 0.01307772
## DAMA_2          3.849061 0.04333680 0.6540217 75.69949 0.3459783 0.01318473
## UIRAPURU_2      3.480453 0.07243991 0.7479381 55.01257 0.2520619 0.01255039
## DAMA_10         3.748445 0.07329634 0.6670040 71.96819 0.3329960 0.01970415
## UIRAPURU_10     10.973010 0.14890510 0.5138550 30.97411 0.4861450 0.04981023
## DAMA_20         3.878351 0.03925214 0.6282674 82.42623 0.3721462 0.01499142
## UIRAPURU_20     3.689997 0.07240186 0.6966216 67.57454 0.3133260 0.02039600
##
##          NDVI
## DAMA_0          5.970000
## UIRAPURU_0      5.560556
## DAMA_1          4.615185
## UIRAPURU_1      3.860741
## DAMA_2          5.319630
## UIRAPURU_2      4.940741
## DAMA_10         5.272593
## UIRAPURU_10     5.278519
## DAMA_20         4.115185
## UIRAPURU_20     4.358519

```

```
## Importance of components:
##               PC1      PC2      PC3      PC4      PC5      PC6
## Standard deviation    2.9651 2.5778 1.7930 1.43007 1.06936 0.98779
## Proportion of Variance 0.3663 0.2769 0.1340 0.08521 0.04765 0.04065
## Cumulative Proportion 0.3663 0.6432 0.7772 0.86237 0.91002 0.95067
##               PC7      PC8      PC9      PC10
## Standard deviation    0.81273 0.66438 0.28628 1.308e-15
## Proportion of Variance 0.02752 0.01839 0.00341 0.000e+00
## Cumulative Proportion 0.97819 0.99659 1.00000 1.000e+00
## [1] "sdev"      "rotation" "center"  "scale"     "x"
##               PC1      PC2
## A              0.113887889 -0.35671367
## B              0.150810303 -0.33208000
## Total          0.123117765 -0.35186476
## Catalase       -0.061097078 -0.24700729
## Ascorbate      -0.054301915 -0.04873282
## carotenos      0.006958326  0.15365803
## Flavonoids     -0.038551572  0.11942511
## Phenolics      0.022301549  0.21022486
## Totalleavemass 0.134356921 -0.17599809
## drymatter      0.061598854 -0.06442210
## Rootlength     0.067882130 -0.34589519
## movedvolume    0.054137193 -0.26553955
## Photo         0.245798286  0.13520426
## Cond          0.315421360  0.09172351
## Ci            -0.303397486  0.09370676
## Trmmol        0.284254119  0.19516882
## Tl.Ta         0.312791040  0.01680445
## SVTleaf       0.317307866  0.07398068
## CndTotal      0.253159781  0.22701284
## Ci.Ca        -0.307432662  0.10430265
## WUE          -0.122581081 -0.24252486
## Ls           0.307133225 -0.10640117
## CarbE        0.327584045  0.07702153
## NDVI         0.066902139  0.22389188
```

```
##               A      B      Total  Catalase  Ascorbate
## DAMA_0        -1.9682383 -1.82066641 -1.9386797 -0.8431758 -0.1499396
## UIRAPURU_0    -1.1535868 -1.19200526 -1.1663220 -0.7848722 -0.5678613
## DAMA_1        -0.3110839 -0.25575357 -0.2987099  0.6059332 -0.7705650
## UIRAPURU_1    -0.2221144 -0.18957871 -0.2149567 -1.1601352  2.2333200
## DAMA_2        0.3937096  0.06531704  0.3158734  1.9585763 -0.7835159
## UIRAPURU_2    -0.1292766 -0.30477198 -0.1719005  0.6038131  0.7656465
## DAMA_10       1.0528578  1.04568530  1.0543169  0.7034592 -0.7600878
## UIRAPURU_10   0.4850000  0.81774968  0.5665431 -0.7636709 -0.2679530
## DAMA_20       1.3832056  1.47459642  1.4093832  0.4013406  0.9181472
## UIRAPURU_20   0.4695271  0.35942751  0.4444522 -0.7212683 -0.6171912
##               carotenos Flavonoids Phenolics Totalleavemass drymatter
## DAMA_0        2.2016628  0.60829792  1.2055712 -0.09027005 -0.821384188
## UIRAPURU_0    0.3481532  0.26907202 -0.4255107 -0.56402776 -1.500101075
## DAMA_1        -1.0904590  2.41585942  0.2393697 -1.10436763  0.323064678
## UIRAPURU_1    -0.4365444 -1.32253193  0.2968324 -0.96352074  1.576378421
## DAMA_2        -0.6394834 -0.45369877  0.6624609  0.17157712  0.348586651
## UIRAPURU_2    -0.4500736 -0.32113222 -0.4955484 -1.20552130  0.953832632
```

##	DAMA_10	0.2444288	-0.11491216	-1.7191384	1.87646464	-0.544897043
##	UIRAPURU_10	-0.2787029	0.03476211	0.4146230	0.25992653	0.854666852
##	DAMA_20	1.0246165	-0.44315592	-1.3917123	1.07683846	-1.194566023
##	UIRAPURU_20	-0.9235980	-0.67256048	1.2130525	0.54290072	0.004419096
##		Rootlength	movedvolume	Photo	Cond	Ci
##	DAMA_0	-1.9398114	-1.27259262	1.4081722	-0.1382358	0.004089467
##	UIRAPURU_0	-1.6847928	-1.65059043	-0.8316579	-0.1921522	1.159265381
##	DAMA_1	0.3553563	-0.01259993	-1.1472150	-0.4458911	0.801381129
##	UIRAPURU_1	0.2475806	-0.26459847	-0.4494761	-0.3276669	0.895957967
##	DAMA_2	0.5982312	0.61739642	-0.7797592	-0.4347430	-0.484988870
##	UIRAPURU_2	0.7257406	1.75138984	-0.4631466	-0.2782259	0.863644212
##	DAMA_10	0.9078967	0.99539423	0.5837265	-0.2760889	-0.387852303
##	UIRAPURU_10	0.3644642	0.23939861	1.6694856	2.8299402	-2.117912266
##	DAMA_20	0.5860875	-0.13859920	-0.6495755	-0.4552113	-0.769895378
##	UIRAPURU_20	-0.1607528	-0.26459847	0.6594459	-0.2817251	0.036310662
##		Trmmol	Tl.Ta	SVTleaf	CndTotal	Ci.Ca
##	DAMA_0	0.5897107	-0.5895592	-0.2086961	0.76780495	0.15719575
##	UIRAPURU_0	0.3297849	-0.4923507	-0.2118090	0.44910962	1.20491619
##	DAMA_1	-0.7955231	-0.1519053	-0.3491517	-1.00532738	0.76436075
##	UIRAPURU_1	-0.5430838	-0.2341887	-0.3902255	-0.32288125	0.83392244
##	DAMA_2	-0.7019008	-0.1579933	-0.2831562	-0.93688000	-0.45943822
##	UIRAPURU_2	-0.2429005	-0.3440079	-0.4446565	-0.05699752	0.70585918
##	DAMA_10	-0.1478471	-0.3453415	-0.3272397	-0.03110457	-0.29835632
##	UIRAPURU_10	2.5277234	2.8166756	2.8381053	2.25479678	-2.19860103
##	DAMA_20	-0.7694060	-0.1792486	-0.2703230	-1.06037287	-0.77899252
##	UIRAPURU_20	-0.2465578	-0.3220803	-0.3528476	-0.05814777	0.06913381
##		WUE	Ls	CarbE	NDVI	
##	DAMA_0	0.1482303	-0.17970273	0.35520871	1.54154910	
##	UIRAPURU_0	-1.0856174	-1.23455085	-0.70804357	0.93513240	
##	DAMA_1	-0.3621283	-0.70945710	-0.63891425	-0.46502918	
##	UIRAPURU_1	-0.5080696	-0.85763361	-0.49805672	-1.58241571	
##	DAMA_2	1.0431716	0.44112623	-0.48887115	0.57830376	
##	UIRAPURU_2	-0.2622479	-0.73209873	-0.54332063	0.01714204	
##	DAMA_10	0.8077128	0.27894848	0.07073369	0.50863852	
##	UIRAPURU_10	-1.7791624	2.19212063	2.65493618	0.51741524	
##	DAMA_20	1.4676533	0.76802105	-0.33379119	-1.20556517	
##	UIRAPURU_20	0.5304575	0.03322662	0.13011893	-0.84517099	
##		DAMA_0	UIRAPURU_0	DAMA_1	UIRAPURU_1	DAMA_2
##	UIRAPURU_2	UIRAPURU_2				
##	DAMA_10	4.549868				
##	DAMA_1	7.284298	5.353787			
##	UIRAPURU_1	7.552308	6.196825	5.531548		
##	DAMA_2	7.516852	6.847887	4.606935	6.087851	
##	UIRAPURU_2	7.267949	5.854917	4.063985	3.806819	4.193867
##	DAMA_10	7.954855	7.300928	6.256930	7.053247	4.184786
##	UIRAPURU_10	9.918258	10.711171	10.586858	10.320708	9.574991
##	DAMA_20	8.730795	7.907158	6.737628	6.530287	4.894629
##	UIRAPURU_20	6.425127	5.837442	4.965436	4.633790	3.981951
##		DAMA_10	UIRAPURU_10	DAMA_20		
##	UIRAPURU_0					
##	DAMA_1					
##	UIRAPURU_1					
##	DAMA_2					
##	UIRAPURU_2					
##	DAMA_10					
##	UIRAPURU_10	8.953060				
##	DAMA_20	3.712819	9.996715			
##	UIRAPURU_20	4.541161	8.661887	5.073224		

```

## [1] 0.9570636
##      WL Treatment Absorbance
## 1  200      DAMA1    1.058605
## 9  201      DAMA1    1.111343
## 17 202      DAMA1    1.080882
##      Treatment      200      201      202      203
## 1      DAMA1 1.0586047 1.1113430 1.0808817 0.9015223
## 2      DAMA10 0.3668403 0.4497503 0.9521477 0.8060340
## 3      DAMA2 0.3589153 0.4334457 0.5506933 0.3728293
## 4      DAMA20 0.9744917 1.0654123 0.9483413 0.7084677
## 5      DAMANEG 2.6857030 2.6566600 2.3861380 2.3953040
## 6      UIRA1 2.0576930 2.1315817 1.9744193 1.8695880
## 7      UIRA10 1.9421907 1.9764353 1.8370267 1.7291053
## 8      UIRA2 1.9385300 1.9904583 1.8178727 1.7438547
## 9      UIRA20 1.9519403 2.0007250 1.8663107 1.7667287
## 10     UIRANEG 2.6275870 2.6463080 2.3092140 2.3282150
##      W_300      W_301      W_302      W_303      W_304
## DAMA1 2.552942 2.669388 2.520800 2.401311 2.473744
## DAMA10 2.488976 2.623435 2.828826 2.962465 3.090931
## DAMA2 2.478791 2.630072 2.805860 2.952647 3.080332
## DAMA20 2.541604 2.653212 2.843692 2.960158 3.096070
## DAMANEG 2.760000 2.839549 2.980465 3.094418 3.192629
## UIRA1 2.720212 2.822344 2.958635 3.066517 3.176737
## UIRA10 2.667972 2.774233 2.922186 3.038804 3.156099
## UIRA2 2.664771 2.772097 2.919263 3.047822 3.147841
## UIRA20 2.656151 2.766035 2.919334 3.037535 3.148367
## UIRANEG 2.700593 2.808022 2.951335 3.063572 3.176892
##      DAMA1      DAMA10      DAMA2      DAMA20      DAMANEG      UIRA1
## DAMA10 23.653068
## DAMA2 27.928327 16.628530
## DAMA20 24.716250 11.553083 18.506013
## DAMANEG 30.784032 21.177443 9.712799 23.262290
## UIRA1 31.262183 19.906818 25.054230 11.422044 29.913793
## UIRA10 29.163138 19.106387 26.672822 10.093977 30.962258 8.664264
## UIRA2 25.482375 13.446579 17.795228 5.452246 22.228901 11.327032
## UIRA20 25.912291 14.675114 9.769203 14.316003 12.295470 21.667904
## UIRANEG 29.873516 17.197351 15.152194 13.447841 20.318841 15.033974
##      UIRA10      UIRA2      UIRA20
## DAMA10
## DAMA2
## DAMA20
## DAMANEG
## UIRA1
## UIRA10
## UIRA2 9.999993
## UIRA20 22.866498 14.613702
## UIRANEG 17.324567 11.387903 15.676788

## [1] 0.8780649
## Standard deviations:
## [1] 9.910493e+00 8.245526e+00 3.813217e+00 3.061930e+00 2.264971e+00
## [6] 1.687831e+00 1.528981e+00 9.457601e-01 8.162575e-01 6.277340e-15

```

```

##
## Rotation:
##          PC1          PC2          PC3          PC4          PC5
## W_300  0.015010383 -0.0504651720 -0.136116984 -0.118712643  0.090996530
## W_301  0.015503856 -0.0556563174 -0.141960383 -0.104319786  0.074057885
## W_302  0.016663295 -0.1126190553  0.004231589 -0.057753342  0.050074016
## W_303  0.013564417 -0.1165710044  0.037776345 -0.037837604  0.039190238
## W_304  0.014468260 -0.1166903047  0.047797252 -0.030456726  0.031413039
## W_305  0.014590436 -0.1166051509  0.053571923 -0.023819133  0.024578343
## W_306  0.012029647 -0.1165789466  0.059250562 -0.020257983  0.026453680
## W_307  0.013701209 -0.1159877424  0.062525104 -0.021645245  0.025746164
## W_308  0.013614065 -0.1159435215  0.063040603 -0.023370630  0.023617625
## W_309  0.013219776 -0.1159894777  0.064466272 -0.017375378  0.022907840
## W_310  0.012559046 -0.1158612510  0.066645322 -0.016226944  0.021482150
## W_311  0.012775854 -0.1155570959  0.068371489 -0.018461753  0.023226185
## W_312  0.012724312 -0.1156189033  0.068256715 -0.017436107  0.020479812
## W_313  0.013005010 -0.1154260793  0.069444629 -0.016389559  0.021030058
## W_314  0.012565606 -0.1154244076  0.069883760 -0.016814729  0.021815990
## W_315  0.012711262 -0.1153243797  0.070578797 -0.016932239  0.020049975
## W_316  0.012675338 -0.1152362339  0.071136173 -0.017246423  0.020020710
## W_317  0.012686355 -0.1151884495  0.071551103 -0.016366383  0.020665951
## W_318  0.012710648 -0.1151385902  0.072053415 -0.016287895  0.019321257
## W_319  0.012839552 -0.1151040860  0.072146046 -0.016098130  0.019256049
## W_320  0.012911070 -0.1149551121  0.073089422 -0.016604209  0.017856288
## W_321  0.012855325 -0.1148762081  0.073625112 -0.016063115  0.019307272
## W_322  0.012932295 -0.1148850814  0.073562851 -0.016334706  0.018670439
## W_323  0.012864982 -0.1148567238  0.073821903 -0.016119454  0.017729049
## W_324  0.012948332 -0.1148575793  0.073697381 -0.015832927  0.018423870
## W_325  0.012852372 -0.1148454617  0.073920055 -0.015901034  0.018339382
## W_326  0.012775830 -0.1148198247  0.074212636 -0.015714499  0.017619073
## W_327  0.012879997 -0.1147687215  0.074397007 -0.016112092  0.017325415
## W_328  0.012850330 -0.1147431486  0.074578586 -0.016131318  0.017498463
## W_329  0.012809605 -0.1147100511  0.074861542 -0.016114071  0.017797750
## W_330  0.012801486 -0.1147106680  0.074813915 -0.016043176  0.017586701
## W_331  0.012833848 -0.1147049669  0.074891544 -0.015846969  0.017157740
## W_332  0.012876845 -0.1147248264  0.074736804 -0.015634069  0.017043551
## W_333  0.012827454 -0.1146967903  0.074970119 -0.015872876  0.017247482
## W_334  0.012838516 -0.1146496301  0.075235807 -0.016317019  0.017024161
## W_335  0.012867805 -0.1146390173  0.075281029 -0.016073648  0.017152395
## W_336  0.012837960 -0.1146335659  0.075313524 -0.016173709  0.017181772
## W_337  0.012809215 -0.1146005068  0.075618298 -0.015963802  0.016895622
## W_338  0.012836544 -0.1145715752  0.075781987 -0.015853340  0.016842590
## W_339  0.012825163 -0.1145779287  0.075769153 -0.015839029  0.016777654
## W_340  0.012863420 -0.1146292517  0.074931820 -0.013451812  0.015908995
## W_341  0.012697704 -0.1146355122  0.075130092 -0.013887391  0.015724093
## W_342  0.012995891 -0.1145801168  0.075053034 -0.013564096  0.015359166
## W_343  0.012987106 -0.1146536906  0.074562167 -0.012912013  0.015286149
## W_344  0.012980307 -0.1146268994  0.074815034 -0.012682366  0.015672275
## W_345  0.013597940 -0.1162971504  0.002608331 -0.060637957  0.014029932
## W_346  0.013352679 -0.1116680614 -0.039183864 -0.084718077  0.012526217
## W_347  0.013483561 -0.1119241570 -0.037617059 -0.083623275  0.013013317
## W_348  0.010972337 -0.1122940902 -0.051828852 -0.081000821  0.013984029
## W_349 -0.003392521 -0.1102898371 -0.051891198 -0.065858253 -0.072924349
## W_350 -0.013492230 -0.1116754604 -0.073084569 -0.043794336 -0.083358241
## W_351 -0.010329479 -0.1074253684 -0.081668586 -0.044537152 -0.078911335
## W_352 -0.008604927 -0.1064045095 -0.084869535 -0.048628726 -0.031001113
## W_353 -0.024325979 -0.1044495945 -0.085813157 -0.024392911 -0.120048604

```

##	W_354	-0.022569158	-0.0968588048	-0.120649145	-0.046502558	-0.119563221
##	W_355	-0.025479132	-0.1039236230	-0.082792333	-0.018386413	-0.126178280
##	W_356	-0.020997681	-0.0978952229	-0.128739958	-0.013773589	-0.089223684
##	W_357	-0.025399965	-0.0917317149	-0.131474180	-0.045989190	-0.129526615
##	W_358	-0.024192932	-0.0887769780	-0.141317232	-0.054781374	-0.126850095
##	W_359	-0.018411232	-0.0913653502	-0.147695944	0.005188586	-0.064304431
##	W_360	-0.027438859	-0.0890403857	-0.153896406	0.008086353	-0.027926308
##	W_361	-0.026637247	-0.0886788075	-0.138187109	-0.042995210	-0.135176303
##	W_362	-0.020770467	-0.0907201368	-0.146619615	0.002988985	-0.078318891
##	W_363	-0.023466843	-0.0962204043	-0.122781240	0.020919674	-0.087406520
##	W_364	-0.021308797	-0.0903528427	-0.148036790	-0.004005379	-0.084877853
##	W_365	-0.033016151	-0.0917917941	-0.139765718	0.015174812	-0.032338144
##	W_366	-0.024105849	-0.0921411604	-0.136471236	0.005478368	-0.097972845
##	W_367	-0.044397974	-0.0920084987	-0.106861774	-0.023624373	-0.093332825
##	W_368	-0.039750714	-0.0916666771	-0.114313348	-0.031783813	-0.111236974
##	W_369	-0.032570391	-0.1005992396	-0.046800484	0.043494289	-0.143734199
##	W_370	-0.035099432	-0.0991585022	-0.033225671	0.027260823	-0.170592684
##	W_371	-0.016587857	-0.1014104241	0.069179022	0.026569187	-0.091611408
##	W_372	-0.023533339	-0.0981623089	0.070703260	0.041829063	-0.144057655
##	W_373	-0.043579512	-0.0943241718	0.079025252	0.064631962	-0.083907975
##	W_374	-0.030984340	-0.0956068295	0.057909415	0.061661150	-0.167494181
##	W_375	-0.035478422	-0.0921303063	0.043755160	0.073943568	-0.166790217
##	W_376	-0.049915994	-0.0979297182	-0.006601840	0.077820227	-0.079819533
##	W_377	-0.046118787	-0.0953803736	-0.070993488	0.080607443	-0.025316594
##	W_378	-0.052562041	-0.0826055028	0.054451475	0.142315275	-0.030242037
##	W_379	-0.052242788	-0.0850345275	-0.107409619	0.071053450	0.027626215
##	W_380	-0.062460805	-0.0697084190	-0.089054197	0.084982656	0.114491460
##	W_381	-0.061340802	-0.0647663754	-0.119835219	0.066824164	0.107603136
##	W_382	-0.067761701	-0.0585532449	-0.121090438	0.078595678	0.075764989
##	W_383	-0.069175981	-0.0556821848	-0.118870257	0.085433655	0.074767406
##	W_384	-0.067236707	-0.0557405677	-0.127954690	0.081584701	0.072569988
##	W_385	-0.067711488	-0.0482547040	-0.149667207	0.055258546	0.047375770
##	W_386	-0.066701758	-0.0471706920	-0.155223998	0.053603689	0.044976557
##	W_387	-0.067490063	-0.0463149844	-0.153877158	0.054287980	0.042715420
##	W_388	-0.068022392	-0.0409470583	-0.154145777	0.041863089	0.067713482
##	W_389	-0.070422095	-0.0369860082	-0.142146434	0.045189096	0.089175653
##	W_390	-0.068823555	-0.0352955336	-0.144972505	0.035216193	0.106784685
##	W_391	-0.081319704	-0.0219692552	-0.096339957	-0.060782769	0.097490177
##	W_392	-0.084571719	-0.0175199053	-0.094508953	-0.086811033	0.090141918
##	W_393	-0.084200143	-0.0118126090	-0.092916771	-0.100252937	0.106136632
##	W_394	-0.084592610	-0.0078767196	-0.081003747	-0.122921465	0.096648621
##	W_395	-0.084198899	-0.0050115935	-0.071592858	-0.135647165	0.095405885
##	W_396	-0.083255332	-0.0049947068	-0.074211952	-0.136800066	0.098792450
##	W_397	-0.085378832	-0.0046870651	-0.048718885	-0.144340806	0.087878437
##	W_398	-0.087365839	-0.0049767972	-0.046808395	-0.131122507	0.076377838
##	W_399	-0.088107835	-0.0021157318	-0.026196618	-0.134466533	0.075011054
##	W_400	-0.089292797	-0.0076124763	-0.054116761	-0.109475673	0.077102977
##	W_401	-0.086882884	0.0002438203	-0.029295377	-0.147749286	0.086278047
##	W_402	-0.088295863	0.0025686186	-0.018209615	-0.139904686	0.074993198
##	W_403	-0.091753856	-0.0015812665	-0.034995051	-0.107710365	0.056186381
##	W_404	-0.093933710	-0.0055168353	-0.019006643	-0.091512180	0.083940002
##	W_405	-0.097356418	0.0002204815	0.028392690	-0.062519316	0.032790361
##	W_406	-0.096728075	-0.0046098488	0.018168176	-0.056500113	0.087260132
##	W_407	-0.095030357	-0.0125512482	-0.041980927	-0.052591362	0.082779179
##	W_408	-0.099016948	-0.0090283061	0.019468976	0.002435907	0.064935023
##	W_409	-0.091733440	-0.0197715358	0.014197828	0.085505085	0.085930368
##	W_410	-0.096187809	-0.0111956349	0.051914343	0.024224755	0.081409584

##	W_411	-0.095652257	-0.0173228405	0.031061327	0.056240476	0.067409047
##	W_412	-0.080076655	-0.0312106144	-0.015431319	0.135928677	0.075828526
##	W_413	-0.079815173	-0.0300659444	-0.012780070	0.136693192	0.074931569
##	W_414	-0.080400308	-0.0300679972	-0.014241327	0.134060853	0.081963687
##	W_415	-0.081011666	-0.0297841321	-0.016723143	0.132492601	0.086218471
##	W_416	-0.080572494	-0.0334683359	-0.019993907	0.138056794	0.061771714
##	W_417	-0.081026650	-0.0307165573	-0.020613118	0.135570337	0.071600554
##	W_418	-0.081339952	-0.0309368061	-0.017141610	0.139046895	0.071982025
##	W_419	-0.081577575	-0.0276873340	-0.016824915	0.135053377	0.082349961
##	W_420	-0.096091851	-0.0153824742	0.040231881	0.042806991	0.072982210
##	W_421	-0.095806172	-0.0112040073	0.055928795	0.008984424	0.046706943
##	W_422	-0.096421179	-0.0117996521	0.043823757	0.038887091	0.061991908
##	W_423	-0.095536349	-0.0059355030	0.061884092	0.016208088	0.078378516
##	W_424	-0.093494527	-0.0014840579	0.076630334	-0.011565188	0.068017452
##	W_425	-0.094764712	-0.0025184746	0.066545732	-0.002247304	0.072316228
##	W_426	-0.093511262	0.0003263003	0.073996225	-0.013870274	0.074171356
##	W_427	-0.094706284	-0.0036648906	0.064189799	0.018681224	0.086211645
##	W_428	-0.093343521	-0.0007424857	0.072302894	-0.004830199	0.067935713
##	W_429	-0.094597882	-0.0102214210	0.043746293	0.057790162	0.087470443
##	W_430	-0.092665675	-0.0181507368	0.033278101	0.071000918	0.034577506
##	W_431	-0.091513798	-0.0215930530	0.032926358	0.083412369	0.072610913
##	W_432	-0.089512450	-0.0190166929	0.044290086	0.071929144	0.029207619
##	W_433	-0.078809673	-0.0349880600	-0.018462475	0.147460381	0.087496980
##	W_434	-0.071914607	-0.0443128591	-0.043633343	0.173911143	0.025439049
##	W_435	-0.073211902	-0.0424810665	-0.036719407	0.176564554	-0.005798956
##	W_436	-0.084759572	-0.0267937731	0.029381347	0.071016348	-0.015302646
##	W_437	-0.085686737	-0.0339553972	0.003825821	0.128844047	0.034731295
##	W_438	-0.084937735	-0.0209337929	0.048644641	0.046577316	-0.007178342
##	W_439	-0.090813003	-0.0181040237	0.037641569	0.059373185	0.020724544
##	W_440	-0.092311209	-0.0027929222	0.068134335	0.014260763	0.067453861
##	W_441	-0.091532314	0.0011692599	0.074793849	-0.006701579	0.069573752
##	W_442	-0.090299782	-0.0059890108	0.086009409	-0.013874528	0.084612997
##	W_443	-0.090487997	-0.0086576608	0.092477973	-0.027509664	0.050826992
##	W_444	-0.095136936	0.0101891154	0.051648945	-0.044679406	0.040045662
##	W_445	-0.093851923	-0.0094335278	0.057536706	-0.062830566	0.040312613
##	W_446	-0.094877792	0.0002217121	0.047931789	-0.065417944	0.033773662
##	W_447	-0.092540577	0.0100198458	0.048967509	-0.066023170	0.061013438
##	W_448	-0.090526855	0.0058485173	0.051047839	-0.101142907	0.049482378
##	W_449	-0.089357342	0.0022562110	0.010619440	-0.097392097	0.099417430
##	W_450	-0.088542530	0.0020407518	-0.001020835	-0.104181618	0.101706479
##	W_451	-0.088634594	0.0425314488	0.005298405	-0.084491337	-0.082091334
##	W_452	-0.086409138	0.0446451857	0.005168467	-0.100445323	-0.060415552
##	W_453	-0.090304211	0.0224141376	0.022280705	-0.113287629	-0.059888501
##	W_454	-0.091478732	0.0117096850	0.030248886	-0.115611016	-0.049706623
##	W_455	-0.091231177	0.0170355406	0.030372567	-0.104871183	-0.085139237
##	W_456	-0.090073647	0.0179528666	0.028199717	-0.113311480	-0.065725688
##	W_457	-0.089746323	0.0338504291	0.012839714	-0.100234329	-0.062743112
##	W_458	-0.091270232	0.0157073345	0.023271544	-0.111531695	-0.041999982
##	W_459	-0.090864183	0.0205597388	0.028136381	-0.105149491	-0.069121424
##	W_460	-0.090347466	0.0240932401	0.025936391	-0.102512562	-0.069098345
##	W_461	-0.092190602	0.0116435904	0.033094483	-0.105863599	-0.059062292
##	W_462	-0.092624817	0.0099317062	0.030913242	-0.102256983	-0.067349490
##	W_463	-0.092198655	0.0218968431	0.032267006	-0.091196081	-0.067088953
##	W_464	-0.092187099	0.0186450864	0.030031898	-0.095662012	-0.074861793
##	W_465	-0.090833675	0.0196571503	0.029469240	-0.101029178	-0.079164183
##	W_466	-0.092532587	0.0181444150	0.029233997	-0.094807892	-0.071003874
##	W_467	-0.093548183	0.0120788127	0.029311640	-0.094234656	-0.063801093

##	W_468	-0.091805822	0.0229729439	0.021304457	-0.093630059	-0.066771905
##	W_469	-0.091692306	0.0141295570	0.034489160	-0.086742818	-0.099667600
##	W_470	-0.090939597	0.0166843915	0.035893589	-0.091873067	-0.097948377
##	W_650	-0.095232019	0.0377548154	0.014112734	0.005557208	-0.025321661
##	W_651	-0.095712591	0.0353556012	0.017723686	0.006925807	-0.031512784
##	W_652	-0.096023517	0.0330690676	0.020443199	0.011221466	-0.037758315
##	W_653	-0.095765469	0.0318525146	0.024043806	0.018674212	-0.045423033
##	W_654	-0.095746719	0.0290702604	0.028939396	0.020971900	-0.056587538
##	W_655	-0.095726840	0.0268274679	0.030582775	0.027625671	-0.060807995
##	W_656	-0.095653608	0.0242709108	0.031419098	0.031000489	-0.068199748
##	W_657	-0.095179132	0.0225537246	0.036312552	0.034910818	-0.073529862
##	W_658	-0.095279442	0.0192472844	0.038959598	0.040508744	-0.073462161
##	W_659	-0.094542176	0.0180050038	0.043921330	0.043574539	-0.082120905
##	W_660	-0.094447867	0.0157599909	0.046013131	0.046612756	-0.082739852
##	W_661	-0.094355663	0.0119864665	0.047949712	0.048989962	-0.087056591
##	W_662	-0.094100456	0.0110585688	0.049702630	0.056605978	-0.082130517
##	W_663	-0.093872337	0.0090782928	0.051219360	0.058372115	-0.082666595
##	W_664	-0.093854386	0.0087691317	0.050430642	0.059903121	-0.083472438
##	W_665	-0.093734113	0.0076352711	0.049970331	0.057956453	-0.087302060
##	W_666	-0.093882961	0.0094188595	0.049858850	0.057110744	-0.084656274
##	W_667	-0.094053120	0.0096240648	0.046562883	0.056747863	-0.084394068
##	W_668	-0.094049211	0.0105863916	0.044759837	0.054837591	-0.089599176
##	W_669	-0.094135561	0.0134832531	0.043984211	0.053963794	-0.087879492
##	W_670	-0.094309153	0.0162873750	0.039525754	0.048174708	-0.085527521
##	W_671	-0.094207932	0.0194319061	0.036720948	0.046505037	-0.084102170
##	W_672	-0.093895526	0.0230475472	0.031999678	0.044052394	-0.082994023
##	W_673	-0.093427368	0.0265420946	0.026392126	0.041128631	-0.084151844
##	W_674	-0.092835625	0.0321291866	0.019784351	0.041209044	-0.075832795
##	W_675	-0.092321555	0.0375655081	0.013368418	0.035619272	-0.063893538
##	W_676	-0.091206214	0.0428714851	0.004843875	0.027549416	-0.054660065
##	W_677	-0.089833425	0.0465286049	-0.004278513	0.030541486	-0.044456844
##	W_678	-0.087079930	0.0518669870	-0.016395500	0.024952833	-0.039897555
##	W_679	-0.085699456	0.0551956205	-0.024577222	0.019164728	-0.019768591
##	W_680	-0.083640667	0.0580127815	-0.031126066	0.003360322	-0.008552263
##		PC6	PC7	PC8	PC9	PC10
##	W_300	0.250225264	2.510728e-01	0.1897986264	0.0642658554	-0.235662945
##	W_301	0.238701525	2.335755e-01	0.2096735201	0.1418332384	-0.071460023
##	W_302	0.091055662	1.192618e-01	0.0938005067	0.0439762131	0.114112981
##	W_303	0.031160062	5.357935e-02	0.0733931950	0.0504586454	0.060255336
##	W_304	0.014982447	4.207736e-02	0.0362486066	0.0331261598	0.157395070
##	W_305	-0.006500836	3.675882e-02	0.0277826654	0.0286364047	-0.133146773
##	W_306	-0.008116850	2.627997e-02	0.0258592230	0.0365737272	-0.164000455
##	W_307	-0.013204029	1.696237e-02	0.0268987085	0.0258442881	0.013321752
##	W_308	-0.013044493	2.054344e-02	0.0214795726	0.0163544774	-0.101558192
##	W_309	-0.020149098	1.746454e-02	0.0144337032	0.0143513568	0.082783861
##	W_310	-0.022078113	1.457906e-02	0.0176761813	0.0195489011	-0.001736127
##	W_311	-0.022866505	8.830557e-03	0.0187306701	0.0157030040	-0.104293771
##	W_312	-0.026389655	7.885458e-03	0.0132076131	0.0178068975	-0.054186072
##	W_313	-0.027747720	6.891000e-03	0.0127631204	0.0174257124	0.047761449
##	W_314	-0.027468922	6.131381e-03	0.0131266273	0.0171480566	-0.098182906
##	W_315	-0.028882370	3.434847e-03	0.0133980711	0.0151591067	-0.074622973
##	W_316	-0.030131118	2.683276e-03	0.0126125150	0.0173387027	0.093521419
##	W_317	-0.030303841	1.415509e-03	0.0135027494	0.0157295126	-0.071891169
##	W_318	-0.030550361	7.895046e-04	0.0127967490	0.0130303113	-0.076339315
##	W_319	-0.031150139	1.489646e-03	0.0106742845	0.0145717208	-0.099945914
##	W_320	-0.032580857	2.613082e-05	0.0104762330	0.0154499317	0.038878598
##	W_321	-0.033192674	-1.413058e-03	0.0112610547	0.0147413586	0.034599674

##	W_322	-0.032634777	-1.569299e-03	0.0100916544	0.0129606827	0.039111025
##	W_323	-0.034201026	-2.246928e-03	0.0096174560	0.0131740398	0.037179003
##	W_324	-0.034312862	-2.117487e-03	0.0086764595	0.0128440251	-0.005198296
##	W_325	-0.034038090	-2.183003e-03	0.0091428832	0.0125806501	0.034599435
##	W_326	-0.034753700	-2.614153e-03	0.0091484512	0.0129206181	0.125610300
##	W_327	-0.035080699	-3.810608e-03	0.0089675667	0.0123695405	-0.165691047
##	W_328	-0.035313269	-4.214077e-03	0.0087449513	0.0119545860	-0.140251190
##	W_329	-0.035127678	-4.208285e-03	0.0084644320	0.0117526869	-0.035065498
##	W_330	-0.035964565	-4.025113e-03	0.0085412913	0.0121918888	0.125920495
##	W_331	-0.035849851	-4.336520e-03	0.0085938733	0.0115700196	-0.008815849
##	W_332	-0.035903626	-4.474601e-03	0.0082587683	0.0110658179	0.077929460
##	W_333	-0.035614755	-4.462391e-03	0.0085417272	0.0112378055	0.013827200
##	W_334	-0.035689808	-5.256608e-03	0.0083564536	0.0113658965	0.057311342
##	W_335	-0.035959126	-4.801829e-03	0.0081391839	0.0115539412	-0.165779075
##	W_336	-0.036154615	-4.880264e-03	0.0085837567	0.0118844980	-0.134582151
##	W_337	-0.036345862	-5.822858e-03	0.0078361355	0.0105418955	0.032045145
##	W_338	-0.036641199	-5.856847e-03	0.0075362999	0.0109272164	0.012906242
##	W_339	-0.036518809	-5.837216e-03	0.0076936219	0.0107426752	0.031250693
##	W_340	-0.044123702	-4.856494e-03	0.0094600680	0.0100248945	0.137622017
##	W_341	-0.043247343	-5.192497e-03	0.0105926862	0.0095734373	0.101167304
##	W_342	-0.044917701	-5.895316e-03	0.0100585173	0.0089731462	0.178086264
##	W_343	-0.045500763	-4.527764e-03	0.0094883921	0.0097795336	-0.101702435
##	W_344	-0.045066779	-4.466993e-03	0.0096235915	0.0090175926	-0.128555175
##	W_345	-0.089922651	-3.030823e-02	-0.0227892475	-0.0399025362	-0.142456672
##	W_346	-0.111329211	-4.334170e-02	-0.0418654589	-0.0670929704	0.093401767
##	W_347	-0.110594994	-4.283975e-02	-0.0411172624	-0.0647773269	0.182194336
##	W_348	-0.090044621	-4.264079e-02	0.0051360340	0.0532899464	0.154428563
##	W_349	-0.069637393	-1.777532e-02	-0.1350614906	-0.2255531142	-0.188612661
##	W_350	-0.010530379	-1.217672e-02	0.0462563166	0.0223901607	0.131087808
##	W_351	0.030598540	2.688185e-03	-0.1520677180	0.2259777029	0.001131052
##	W_352	-0.019127281	-3.337468e-02	0.2498287136	0.2179742344	-0.053107578
##	W_353	0.038466759	2.028211e-03	0.0673059979	0.0889980436	0.196684649
##	W_354	0.024490694	-4.645744e-03	-0.0272136966	0.0816096372	-0.010320853
##	W_355	0.050976047	7.779542e-03	0.0437232703	0.1108215221	0.115543443
##	W_356	0.065850860	-6.021325e-02	-0.0059650134	0.0312779434	-0.032363444
##	W_357	0.030975843	-3.033046e-03	-0.0285829303	0.0755641717	0.002152519
##	W_358	0.020279199	-7.043276e-03	-0.0526564749	0.0524746851	0.034932087
##	W_359	0.088735176	-1.146219e-01	-0.0512194432	-0.0867520547	0.051306874
##	W_360	0.036751634	-9.636669e-02	-0.1028558610	-0.0672041707	-0.062226668
##	W_361	0.035533931	-1.034627e-02	-0.0564959629	0.0179551426	0.021739853
##	W_362	0.086652648	-1.024794e-01	-0.0507951236	-0.0923768768	-0.019832093
##	W_363	0.110804711	-8.736544e-02	-0.0177883904	-0.0356137428	0.040951343
##	W_364	0.080267550	-9.172080e-02	-0.0567157334	-0.0745600143	-0.026903978
##	W_365	0.026247670	-7.110843e-02	-0.1197572324	-0.0534396656	-0.014324091
##	W_366	0.095851611	-7.891193e-02	-0.0567504055	-0.0513567430	0.052525274
##	W_367	-0.045191226	4.682731e-02	-0.0489487396	0.0516615628	-0.080051303
##	W_368	-0.028841031	3.466741e-02	-0.0772061779	0.0077053986	0.034150256
##	W_369	0.131933165	5.640514e-04	0.0189235441	0.0583759431	-0.035835953
##	W_370	0.106765911	3.894094e-02	0.0215058368	0.0513855947	0.134222441
##	W_371	-0.014103166	5.215809e-03	0.2765454133	-0.3581756714	0.085926926
##	W_372	0.038950278	3.682358e-02	0.0342318138	-0.3600685346	0.034035439
##	W_373	-0.021209448	9.786933e-02	-0.0263899535	-0.1651987290	0.078774107
##	W_374	0.110579143	5.882061e-02	-0.0251602890	-0.1365742489	-0.191903465
##	W_375	0.149199126	6.244932e-02	0.0604740898	0.0500174281	-0.057533595
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##	W_378	0.089854277	3.851542e-02	-0.0156681571	0.0224531155	-0.008405395

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W_434 0.088326869 -2.655425e-02 0.1499195371 0.0003632675 -0.021603423
W_435 0.106630926 -7.486076e-03 -0.0618785532 -0.0654611261 -0.018240057

##	W_436	0.167713538	-2.105722e-01	-0.0148008141	0.0288246395	-0.024960088
##	W_437	0.067475317	-9.751936e-02	0.0032897249	-0.0695360458	-0.017671403
##	W_438	0.236185619	-1.391578e-01	0.0172330622	-0.0569117255	0.022586357
##	W_439	0.100819525	-1.836579e-01	-0.0331078436	0.0678425269	0.019570643
##	W_440	0.108900238	-1.105152e-01	-0.0233275626	0.1021002833	-0.034501388
##	W_441	0.133535524	-8.360403e-02	-0.0230075870	0.0649880409	0.064282926
##	W_442	0.098277807	-7.902684e-02	-0.0338688060	0.1057281313	-0.006850929
##	W_443	0.094684536	-8.803041e-02	0.0510096647	-0.0020737436	0.016350630
##	W_444	0.072221227	-9.023967e-02	0.0478122726	-0.0587028238	-0.023733809
##	W_445	0.049735539	-9.713045e-02	0.0409505204	-0.0843635516	-0.030055063
##	W_446	0.053357905	-9.488993e-02	0.0501116658	-0.0872563018	-0.059798177
##	W_447	0.087735372	-8.011492e-02	0.0587688222	-0.1607002229	0.013214122
##	W_448	0.086832292	-1.511961e-02	0.0882840028	-0.1617006620	0.056461213
##	W_449	0.121559211	-7.010741e-02	0.1045620258	-0.1271556605	0.005325053
##	W_450	0.125580768	-6.211568e-02	0.1158777647	-0.1156561850	-0.016690453
##	W_451	-0.008914231	1.829528e-02	-0.0024041692	0.0610358578	0.029041776
##	W_452	0.032520818	7.625529e-02	0.0135181513	0.0315488108	0.018000196
##	W_453	0.030034767	8.195238e-02	0.0104028040	0.0295096785	-0.017139790
##	W_454	0.027391526	8.072051e-02	0.0091006307	0.0055598456	0.012270303
##	W_455	-0.019707401	4.521608e-02	-0.0010927316	0.0692108998	-0.045151366
##	W_456	0.023155687	1.032679e-01	-0.0044516193	0.0310836796	0.048062796
##	W_457	0.024648784	7.103253e-02	-0.0067163370	0.0313605294	0.051878707
##	W_458	0.044191740	1.050755e-01	0.0064704328	0.0113602725	-0.006925858
##	W_459	0.002174668	9.253740e-02	-0.0152043167	0.0252765786	-0.034190747
##	W_460	0.023819482	9.989993e-02	-0.0218101917	0.0310223348	-0.002281052
##	W_461	0.012473382	8.253574e-02	-0.0286537511	-0.0058891908	-0.032135927
##	W_462	0.006718170	7.724728e-02	-0.0269121112	0.0329197426	-0.031568533
##	W_463	0.009250801	7.866589e-02	-0.0357855824	0.0254960144	0.032760253
##	W_464	-0.004673298	7.044060e-02	-0.0511027749	0.0025802211	-0.010275113
##	W_465	0.012911796	9.591817e-02	-0.0276561647	0.0180990170	-0.032661199
##	W_466	0.008325496	7.422848e-02	-0.0286105413	0.0203437760	0.016599681
##	W_467	0.029124055	6.441831e-02	-0.0448008246	-0.0032083575	0.004705149
##	W_468	0.039847746	9.053772e-02	-0.0318988994	0.0085691387	0.038712517
##	W_469	-0.017527592	8.969058e-02	-0.0288603424	0.0464148504	-0.018056356
##	W_470	-0.008120192	9.354382e-02	-0.0204320589	0.0325925126	-0.004861988
##	W_650	-0.018457469	2.285509e-02	-0.0624048065	-0.0167018213	0.016571904
##	W_651	-0.022414596	2.289656e-02	-0.0511313664	-0.0145817088	-0.074048462
##	W_652	-0.029229632	2.063680e-02	-0.0460103808	-0.0143001477	0.010273810
##	W_653	-0.042478787	1.857468e-02	-0.0477514301	-0.0046852566	0.033411636
##	W_654	-0.053265803	5.126887e-03	-0.0371584480	0.0067885616	-0.002051455
##	W_655	-0.060812975	2.454623e-03	-0.0291133418	0.0024285687	-0.084995868
##	W_656	-0.067726648	5.716112e-03	-0.0317014798	0.0063128238	0.078772532
##	W_657	-0.074651992	-4.445517e-03	-0.0325997954	0.0258392263	-0.017341722
##	W_658	-0.077210490	-8.889715e-03	-0.0262464910	0.0193671551	-0.032755120
##	W_659	-0.080620864	-1.464811e-02	-0.0173403454	0.0222994299	-0.120431444
##	W_660	-0.081794611	-2.359507e-02	-0.0134525512	0.0160613677	-0.093303712
##	W_661	-0.083310754	-1.817811e-02	-0.0141889880	0.0197955561	0.078752200
##	W_662	-0.081040460	-3.153446e-02	0.0004037853	0.0237567431	-0.018363813
##	W_663	-0.083790034	-3.906486e-02	-0.0047533934	0.0155911975	-0.119934629
##	W_664	-0.083716100	-3.623749e-02	0.0045287727	0.0166274880	0.030809713
##	W_665	-0.086903711	-4.370314e-02	0.0071051140	0.0155616105	-0.025586437
##	W_666	-0.084524741	-4.222959e-02	0.0042044308	0.0192067805	-0.119675354
##	W_667	-0.089103818	-3.937073e-02	0.0176177927	0.0118533277	-0.047497781
##	W_668	-0.086827628	-3.638436e-02	0.0196084154	0.0170430946	0.048998156
##	W_669	-0.080681267	-3.661956e-02	0.0226357215	0.0118338452	0.020134084
##	W_670	-0.088159892	-3.045797e-02	0.0450609026	0.0199634661	-0.079756699
##	W_671	-0.086312987	-3.049139e-02	0.0557349086	0.0207235452	0.079679338

```
## W_672 -0.087035328 -3.291301e-02 0.0763943249 0.0176738956 0.084084499
## W_673 -0.088911710 -3.586133e-02 0.0854518745 0.0250178854 -0.004797308
## W_674 -0.084327216 -3.037345e-02 0.1035918136 0.0174580619 0.055065376
## W_675 -0.074853259 -2.835786e-02 0.1226912566 0.0162781677 0.015536149
## W_676 -0.068099469 -2.149346e-02 0.1527582002 0.0094042937 -0.007994587
## W_677 -0.062693008 -1.034358e-02 0.1816947608 0.0096136681 -0.050706727
## W_678 -0.063350978 -2.072063e-02 0.2137075625 0.0410011008 -0.098134717
## W_679 -0.046773891 -1.267041e-02 0.2366947353 0.0291631354 0.040977121
## W_680 -0.041013028 -1.248409e-02 0.2681899396 0.0050267160 0.019915795
## Importance of components:
##
## PC1 PC2 PC3 PC4 PC5 PC6 PC7
## Standard deviation 9.9105 8.2455 3.81322 3.06193 2.2650 1.6878 1.52898
## Proportion of Variance 0.4862 0.3366 0.07198 0.04641 0.0254 0.0141 0.01157
## Cumulative Proportion 0.4862 0.8228 0.89479 0.94120 0.9666 0.9807 0.99227
##
## PC8 PC9 PC10
## Standard deviation 0.94576 0.8163 6.277e-15
## Proportion of Variance 0.00443 0.0033 0.000e+00
## Cumulative Proportion 0.99670 1.0000 1.000e+00
```

Graphics produced in the manuscript and table of means and standard deviations

```
## Blocos Potassium Cultivar chlA chlB chlTotal
## 1 BL1 2 UIRAPURU 26.7 5.2 31.9
## 2 BL1 2 UIRAPURU 14.0 2.3 16.3
## 3 BL1 2 UIRAPURU 23.4 4.3 27.7
## 4 BL1 2 UIRAPURU 18.6 3.2 21.8
## 5 BL1 2 UIRAPURU 18.7 3.4 22.1
## 6 BL1 2 UIRAPURU 17.0 2.7 19.7
## 'data.frame': 504 obs. of 6 variables:
## $ Blocos : chr "BL1" "BL1" "BL1" "BL1" ...
## $ Potassium: num 2 2 2 2 2 2 2 2 2 1 ...
## $ Cultivar : chr "UIRAPURU" "UIRAPURU" "UIRAPURU" "UIRAPURU" ...
## $ chlA : num 26.7 14 23.4 18.6 18.7 17 17.5 23.8 19.5 20.1 ...
## $ chlB : num 5.2 2.3 4.3 3.2 3.4 2.7 3 4.4 3.5 3.5 ...
## $ chlTotal : num 31.9 16.3 27.7 21.8 22.1 19.7 20.5 28.2 23 23.6 ...
```

```
## Cultivar Potassium Proteins Catalase Ascorbate carotenos Chla Chlb
## 1 UIRAPURU 1 0.36 0.00 60.32 1.50 27.08 48.01
## 2 UIRAPURU 1 0.29 0.01 73.13 2.54 25.00 42.32
## 3 UIRAPURU 1 0.29 0.01 74.54 2.91 24.92 42.43
## 4 UIRAPURU 2 0.17 12.30 39.56 2.72 25.28 41.43
## 5 UIRAPURU 2 0.20 10.00 32.17 2.44 24.97 43.02
## 6 UIRAPURU 2 0.19 11.00 35.40 1.76 25.38 44.37
## 7 UIRAPURU 10 0.26 2.16 10.39 3.27 25.22 38.66
## 8 UIRAPURU 10 0.23 2.45 11.80 2.25 24.89 42.38
## 9 UIRAPURU 10 0.20 2.89 13.91 1.78 25.28 42.80
## 10 UIRAPURU 20 0.18 2.67 3.89 1.83 26.13 44.34
## 11 UIRAPURU 20 0.17 2.95 4.30 2.99 25.47 38.86
```

## 12	UIRAPURU	20	0.18	2.68	3.91	1.05	26.39	46.29
## 13	DAMA	1	0.17	13.62	0.64	0.91	23.28	38.54
## 14	DAMA	1	0.28	8.10	0.38	2.12	26.33	45.88
## 15	DAMA	1	0.20	11.62	0.54	2.47	24.99	42.99
## 16	DAMA	2	0.14	16.07	0.18	1.34	28.30	49.81
## 17	DAMA	2	0.17	12.99	0.15	2.51	24.98	43.96
## 18	DAMA	2	0.07	29.80	0.34	2.65	25.18	42.61
## 19	DAMA	10	0.16	13.98	0.91	2.94	25.03	42.15
## 20	DAMA	10	0.17	13.28	0.86	2.59	25.04	43.79
## 21	DAMA	10	0.28	7.92	0.51	2.93	25.00	43.13
## 22	DAMA	20	0.18	7.30	29.11	2.70	24.97	43.54
## 23	DAMA	20	0.08	15.51	61.88	4.41	25.27	39.48
## 24	DAMA	20	0.20	6.67	26.62	3.08	25.07	41.69
## 25	UIRAPURU	0	0.22	2.25	4.91	2.88	25.22	40.95
## 26	UIRAPURU	0	0.19	2.53	5.52	2.88	25.47	42.32
## 27	UIRAPURU	0	0.21	2.32	5.06	2.93	25.38	41.69
## 28	DAMA	0	0.29	1.95	14.36	5.12	25.69	36.21
## 29	DAMA	0	0.29	1.99	14.68	3.27	25.22	42.99
## 30	DAMA	0	0.28	2.06	15.17	4.41	26.39	42.15

##	Chltotal	Flavonoids	Phenolics
----	----------	------------	-----------

## 1	75.09	386.67	247.91
## 2	67.33	540.33	214.68
## 3	67.35	661.00	196.08
## 4	66.71	641.83	163.09
## 5	68.00	548.83	206.72
## 6	69.75	807.67	239.08
## 7	63.89	574.33	182.43
## 8	67.27	581.33	210.58
## 9	68.09	988.50	273.06
## 10	70.47	909.83	251.79
## 11	64.33	345.67	272.08
## 12	72.67	598.83	192.36
## 13	61.82	1306.83	184.66
## 14	72.21	1254.33	191.21
## 15	67.98	558.67	279.19
## 16	78.11	561.67	234.21
## 17	68.94	493.17	228.15
## 18	67.78	889.17	219.28
## 19	67.17	848.00	192.87
## 20	68.83	576.33	165.75
## 21	68.13	658.50	173.40
## 22	68.51	728.83	208.51
## 23	64.75	588.67	164.00
## 24	66.75	630.83	180.08
## 25	66.17	638.00	207.26
## 26	68.00	598.00	203.75
## 27	67.17	1004.17	202.28
## 28	61.89	793.67	239.79
## 29	68.13	1004.17	237.91
## 30	68.09	581.33	238.06

## [1]	"alldata"	"anova1"	"anova2"
## [4]	"anova3"	"clorophylldata"	"corr"
## [7]	"d1"	"d2"	"DAMA1"

```
## [10] "DAMA10"          "DAMA2"           "DAMA20"
## [13] "DAMANEG"         "data"            "data_og"
## [16] "data_wide"       "dataFrame"       "dist2"
## [19] "dist3"           "factor"          "gesi.PCA"
## [22] "Groups"          "growthparameters2" "hc"
## [25] "hcl"             "ir.pca"           "irga_data2"
## [28] "mycolors"        "ndvi_data2"       "newBio2"
## [31] "NEWchloroanalyser" "norm"            "pr.out"
## [34] "tab"             "Treatment"        "ttran.s"
## [37] "ttran.ss"        "UDESC"            "UIRA1"
## [40] "UIRA10"          "UIRA2"            "UIRA20"
## [43] "UIRANEG"         "uv_vis"
## [1] "Cultivar"  "Potassium" "NDVI"
```

```
##      Potassium Cultivar      Photo      Cond      Ci      Trmmol      Tl.Ta
## 1          0      DAMA 6.312472 0.10366328 274.0481 2.603041 0.5667116
## 2          0 UIRAPURU 3.252782 0.09282107 311.1969 2.310134 0.7268570
## 3          1      DAMA 2.821720 0.04179593 299.6879 1.042041 1.2877211
## 4          1 UIRAPURU 3.774856 0.06557001 302.7293 1.326512 1.1521639
## 5          2      DAMA 3.323678 0.04403774 258.3200 1.147543 1.2776915
## 6          2 UIRAPURU 3.756182 0.07551224 301.6902 1.664784 0.9712431
## 7         10      DAMA 5.186249 0.07594198 261.4438 1.771898 0.9690461
## 8         10 UIRAPURU 6.669436 0.70054303 205.8075 4.786959 6.1782862
## 9         20      DAMA 3.501513 0.03992171 249.1579 1.071472 1.2426745
## 10        20 UIRAPURU 5.289685 0.07480859 275.0843 1.660662 1.0073675
```

```
##      SVTleaf      CndTotal      Ci.Ca      WUE      Ls      CarbE
## 1 4.019008 0.09972118 0.7037189 61.51740 0.2962811 0.02301830
## 2 4.011903 0.08917997 0.7881593 41.96468 0.2118407 0.01063136
## 3 3.698433 0.04107283 0.7526530 53.42977 0.2538744 0.01143672
## 4 3.604686 0.06364550 0.7582593 51.11705 0.2420129 0.01307772
## 5 3.849061 0.04333680 0.6540217 75.69949 0.3459783 0.01318473
## 6 3.480453 0.07243991 0.7479381 55.01257 0.2520619 0.01255039
## 7 3.748445 0.07329634 0.6670040 71.96819 0.3329960 0.01970415
## 8 10.973010 0.14890510 0.5138550 30.97411 0.4861450 0.04981023
## 9 3.878351 0.03925214 0.6282674 82.42623 0.3721462 0.01499142
## 10 3.689997 0.07240186 0.6966216 67.57454 0.3133260 0.02039600
##      Potassium Cultivar      Photo      Cond      Ci      Trmmol      Tl.Ta
## 1          0      DAMA 1.6209559 0.030699553 2.002990 0.6383594 0.3169625
## 2          0 UIRAPURU 0.8173016 0.047572337 26.121612 0.9818338 0.4461039
## 3          1      DAMA 2.3964193 0.018733396 64.398587 0.4594182 0.2148379
## 4          1 UIRAPURU 3.1217561 0.037199578 21.235964 0.3752591 0.1935303
## 5          2      DAMA 0.8931878 0.009302998 25.275702 0.2159183 0.1379268
## 6          2 UIRAPURU 2.5707826 0.059393707 6.079524 1.3163970 0.5935120
## 7         10      DAMA 2.6481072 0.045788501 16.842650 0.9836619 0.4440371
## 8         10 UIRAPURU 3.2158884 0.714834580 129.173877 0.9211327 8.7958281
## 9         20      DAMA 2.1005435 0.018723059 29.550962 0.5174941 0.2296121
## 10        20 UIRAPURU 3.0155570 0.038954159 55.646165 0.6800384 0.3625331
##      SVTleaf      CndTotal      Ci.Ca      WUE      Ls      CarbE
## 1 0.09206467 0.028364720 0.007615308 2.277704 0.007615308 0.005836075
## 2 0.06072717 0.044005167 0.066074472 15.997412 0.066074472 0.003316284
## 3 0.21631138 0.018182710 0.154668278 32.578477 0.136144684 0.010572378
## 4 0.44975030 0.035252435 0.055375976 14.531090 0.054108500 0.011438183
## 5 0.11528903 0.009032619 0.062909785 15.950059 0.062909785 0.004297146
## 6 0.48461927 0.055615985 0.020155688 9.694225 0.020155688 0.008719225
```

```
## 7    0.12836239 0.043155940 0.043987813 11.319637 0.043987813 0.009501352
## 8   10.18664166 0.056464004 0.362729137 22.556734 0.362729137 0.029883978
## 9    0.16358642 0.018131985 0.069263321 14.836872 0.066882367 0.010217560
## 10   0.29712366 0.036960364 0.129329011 16.266180 0.073034451 0.011748730
```

Produced by Uarrota (PhD)