especies

2024-06-21

R Markdown

This is an R Markdown document. Markdown is a simple formatting syntax for authoring HTML, PDF, and MS Word documents. For more details on using R Markdown see http://rmarkdown.rstudio.com.

When you click the **Knit** button a document will be generated that includes both content as well as the output of any embedded R code chunks within the document. You can embed an R code chunk like this:

```
## Cargando paquete requerido: permute
## Cargando paquete requerido: lattice
## This is vegan 2.6-6.1
##
## Adjuntando el paquete: 'dplyr'
  The following objects are masked from 'package:stats':
##
##
       filter, lag
## The following objects are masked from 'package:base':
##
##
       intersect, setdiff, setequal, union
## Welcome! Want to learn more? See two factoextra-related books at https://goo.gl/ve3WBa
## Cargando paquete requerido: tcltk
## BiodiversityR 2.16-1: Use command BiodiversityRGUI() to launch the Graphical User Interface;
## to see changes use BiodiversityRGUI(changeLog=TRUE, backward.compatibility.messages=TRUE)
## Registered S3 method overwritten by 'GGally':
##
     method from
##
     +.gg
            ggplot2
## Cargando paquete requerido: fda
## Cargando paquete requerido: splines
## Cargando paquete requerido: fds
## Cargando paquete requerido: rainbow
## Cargando paquete requerido: MASS
##
## Adjuntando el paquete: 'MASS'
## The following object is masked from 'package:patchwork':
##
##
       area
```

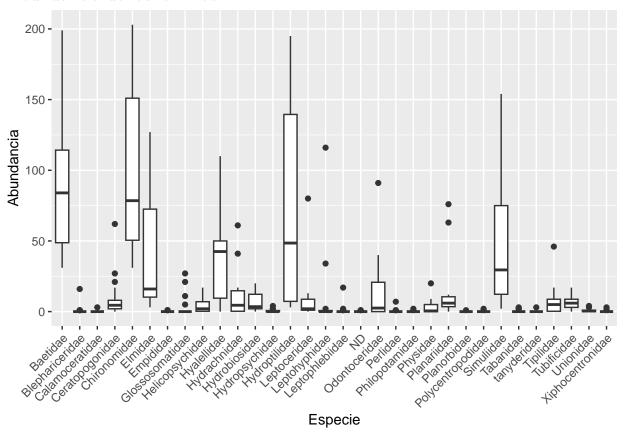
```
## The following object is masked from 'package:dplyr':
##
##
       select
## Cargando paquete requerido: pcaPP
## Cargando paquete requerido: RCurl
##
## Adjuntando el paquete: 'RCurl'
## The following object is masked from 'package:tidyr':
##
##
       complete
## Cargando paquete requerido: deSolve
##
## Adjuntando el paquete: 'fda'
## The following object is masked from 'package:lattice':
##
       melanoma
## The following object is masked from 'package:graphics':
##
       matplot
## Cargando paquete requerido: fields
## Cargando paquete requerido: spam
## Spam version 2.10-0 (2023-10-23) is loaded.
## Type 'help( Spam)' or 'demo( spam)' for a short introduction
## and overview of this package.
## Help for individual functions is also obtained by adding the
## suffix '.spam' to the function name, e.g. 'help( chol.spam)'.
##
## Adjuntando el paquete: 'spam'
## The following objects are masked from 'package:base':
##
##
       backsolve, forwardsolve
## Cargando paquete requerido: viridisLite
##
## Try help(fields) to get started.
## Cargando paquete requerido: sp
## Cargando paquete requerido: maps
## Cargando paquete requerido: shapefiles
## Cargando paquete requerido: foreign
##
## Adjuntando el paquete: 'shapefiles'
## The following objects are masked from 'package:foreign':
##
##
       read.dbf, write.dbf
```

Número de especies (familia) por observación

Calculo de la riqueza

[1] 19 16 15 20 16 18 17 16 17 18 14 16 16 16 14 15 19 17

Abundancia de las familias



Calcula los estimadores Chao, Chao corregido, primer y segundo orden de jacknife y bootstrap

```
##
                 [,1]
                            [,2]
                                      [,3]
                                                 [,4]
                                                            [,5]
                                                                       [,6]
## S.obs
            19.000000 16.000000 15.000000 20.0000000 16.0000000 18.000000
## S.chao1
            22.000000 16.500000 15.750000 20.1666667 16.0000000 21.000000
## se.chao1
                      1.285850
                                 1.416776
                                           0.5418947
                                                       0.2420615
## S.ACE
            21.220027 16.758139 18.588889 21.1188918 16.3814383 21.446995
##
  se.ACE
             2.159960
                       1.819877
                                 2.178757
                                            2.2279120
                                                       1.9895658
                                                                  2.264138
##
                  [,7]
                             [,8]
                                       [,9]
                                                [,10]
                                                           [,11] [,12]
                                                                            [,13]
            17.0000000 16.000000 17.000000 18.000000 14.000000
                                                                   16 16.0000000
## S.obs
## S.chao1 17.2500000 17.500000 23.000000 21.000000 14.750000
                                                                   16 16.3333333
## se.chao1 0.7330126 2.222752 7.226160 4.147575
                                                       1.416295
                                                                       0.9197451
            19.0653595 20.666667 19.759838 21.302326 17.834949
## S.ACE
                                                                   16 17.2405303
  se.ACE
             2.1044997
                        1.610298
                                  2.118435
                                             2.346490
                                                       2.275706
                                                                       2.0385547
##
                 [,14]
                           [,15]
                                     [,16]
                                                [,17]
                                                           [,18]
            16.0000000 14.00000 15.000000 19.0000000 17.000000
## S.obs
## S.chao1 16.0000000 14.00000 16.000000 19.0000000 20.000000
## se.chao1 0.2420615 0.00000 2.291288 0.1622214 4.553845
```

```
## S.ACE 16.3171852 14.00000 16.314129 19.4000000 19.338180
## se.ACE 1.9605366 1.85164 1.978430 2.0826916 2.229890
```

Calculamos chao2, con el paquete fossil

Obtenemos las incidencias, para calclular chao2

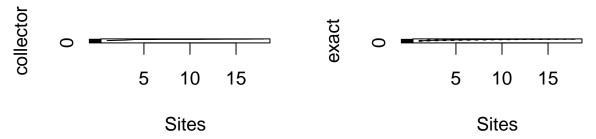
Calculo de chao2

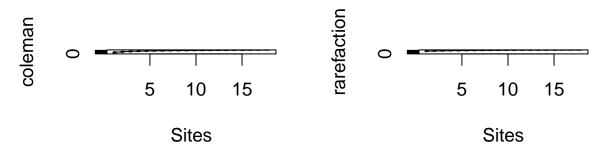
##		[,1]	[,2]	[,3]	[,4]	[,5]	[,6]	[,7]	[,8]	[,9]	[,10]	[,11]	[,12]	[,13]
##	S.obs	1	0	0	1	1	1	1	1	1	1	1	1	1
##	S.chao1	1	0	0	1	1	1	1	1	1	1	1	1	1
##	se.chao1	0	NaN	NaN	0	0	0	0	0	0	0	0	0	0
##	S.ACE	${\tt NaN}$	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN
##	se.ACE	${\tt NaN}$	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN
##		[,14]	[,15	[,1	.6] [17]	[,18]							
##	S.obs	1		1	1	1	1							
##	S.chao1	1		1	1	1	1							
##	se.chao1	0		0	0	0	0							
##	S.ACE	NaN	Na	N N	1aN	NaN	NaN							
##	se.ACE	NaN	Na	N N	JaN	NaN	NaN							

Curvas de acumulación

Existen diferentes metodos para estimar la riqueza.

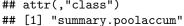
Warning in cor(x > 0): La desviación estándar es cero

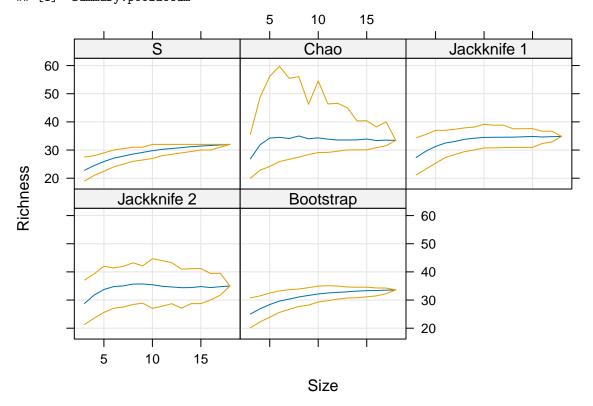




Utilizando cantidad de especies observadas, podemos calcular la riqueza con métodos no paramétricos

```
[1,] 3 26.82002 19.95923 35.56458 4.301921
##
   [2,] 4 31.85719 22.82937 48.68750 7.042256
   [3,] 5 34.25991 24.16500 56.16500 8.763097
   [4,] 6 34.51412 25.90868 59.75000 8.457804
##
        7 34.09662 26.70393 55.47857 7.296992
   [6,] 8 34.98218 27.47719 56.05000 7.524974
##
   [7,] 9 34.00076 28.39500 46.25556 4.848523
   [8,] 10 34.32318 29.10156 54.54375 6.354899
   [9,] 11 33.85202 29.15587 46.36364 5.227295
## [10,] 12 33.57538 29.58875 46.58750 4.204932
## [11,] 13 33.56905 30.03846 45.04423 3.566423
## [12,] 14 33.60676 30.08473 40.35714 3.227874
## [13,] 15 33.91326 30.08517 40.40000 3.206885
## [14,] 16 33.36852 30.85000 38.19570 2.004362
## [15,] 17 33.51745 31.54510 40.03922 2.018094
## [16,] 18 33.41667 33.41667 33.41667 0.000000
##
## attr(,"class")
```





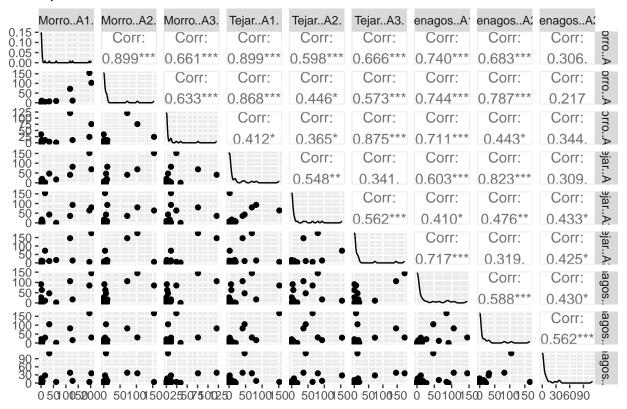
Análisis de correspondencia

##	Orden	Familia	MorroA1.	MorroA2.		
##	Length:32	Length:32	Min. : 0.00	Min. : 0.00		
##	Class :character	Class :character	1st Qu.: 0.00	1st Qu.: 0.00		
##	Mode :character	Mode :character	Median: 1.00	Median: 0.50		
##			Mean : 24.47	Mean : 12.62		
##			3rd Qu.: 4.50	3rd Qu.: 7.00		
##			Max. :203.00	Max. :154.00		
##	MorroA3.	TejarA1.	TejarA2.	TejarA3.		

```
Min. : 0.000
                    Min. : 0.00
                                    Min. : 0.00
                                                    Min. : 0.00
   1st Qu.: 0.000
                    1st Qu.: 0.00
                                    1st Qu.: 0.00
                                                    1st Qu.: 0.00
                                    Median: 0.50
                                                    Median: 1.00
   Median : 0.000
                    Median: 2.00
   Mean : 9.656
                    Mean : 15.25
                                    Mean : 16.56
                                                    Mean : 15.53
   3rd Qu.: 5.000
                                    3rd Qu.: 7.75
                                                    3rd Qu.: 9.50
                    3rd Qu.: 10.25
##
   Max. :121.000
                    Max. :152.00
                                    Max. :154.00
                                                    Max. :176.00
    Penagos..A1.
                    Penagos..A2.
                                    Penagos..A3.
                                                     Morro..D1.
   Min. : 0.00
                   Min. : 0.00
                                   Min. : 0.000
                                                    Min. : 0.00
##
##
   1st Qu.: 0.00
                   1st Qu.: 0.00
                                   1st Qu.: 0.000
                                                    1st Qu.: 0.00
   Median: 1.00
                   Median: 0.50
                                   Median : 1.000
                                                    Median: 1.00
   Mean : 19.53
                   Mean : 15.25
                                   Mean : 8.844
                                                    Mean : 21.72
                                   3rd Qu.: 7.250
   3rd Qu.: 14.75
                   3rd Qu.: 12.50
##
                                                    3rd Qu.: 10.50
   Max. :145.00
                   Max. :167.00
                                   Max. :110.000
                                                    Max. :197.00
##
##
     Morro..D2.
                     Morro..D3.
                                     Tejar..D1.
                                                     Tejar..D2.
   Min. : 0.00
##
                   Min. : 0.00
                                   Min. : 0.00
                                                   Min. : 0.00
   1st Qu.: 0.00
                   1st Qu.: 0.00
                                                   1st Qu.: 0.00
##
                                   1st Qu.: 0.00
##
   Median: 0.00
                   Median: 1.00
                                   Median: 0.50
                                                   Median: 0.50
   Mean : 14.00
                   Mean : 15.72
                                   Mean : 16.78
                                                   Mean :14.00
##
   3rd Qu.: 2.25
                   3rd Qu.: 10.50
                                   3rd Qu.: 8.75
                                                   3rd Qu.: 8.25
   Max. :174.00
                   Max. :116.00
                                   Max. :153.00
                                                   Max. :84.00
##
##
     Tejar..D3.
                    Penagos..D1.
                                   Penagos..D2.
                                                   Penagos..D3.
##
   Min. : 0.00
                   Min. : 0.00
                                   Min. : 0.00
                                                  Min. : 0.00
   1st Qu.: 0.00
                   1st Qu.: 0.00
                                   1st Qu.: 0.00
                                                  1st Qu.: 0.00
##
   Median: 0.00
                   Median: 0.00
                                                  Median: 1.00
##
                                   Median: 2.50
                                                  Mean : 15.19
##
   Mean : 10.72
                   Mean : 20.16
                                   Mean :11.06
   3rd Qu.: 6.00
                   3rd Qu.: 11.75
                                   3rd Qu.:13.00
                                                  3rd Qu.: 12.00
## Max. :136.00
                   Max. :199.00
                                   Max. :77.00
                                                  Max. :141.00
```

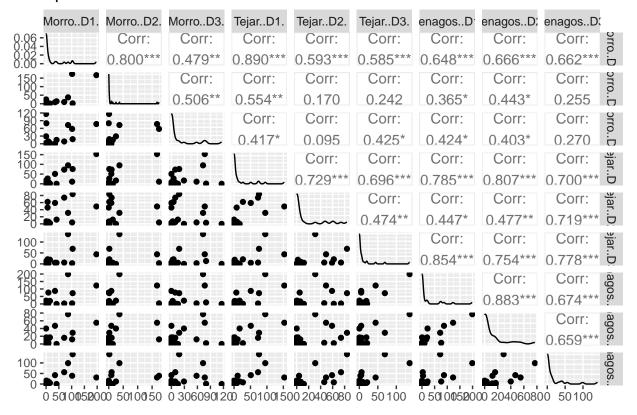
Correlación entre especies en la epoca lluviosa

Época Iluviosa



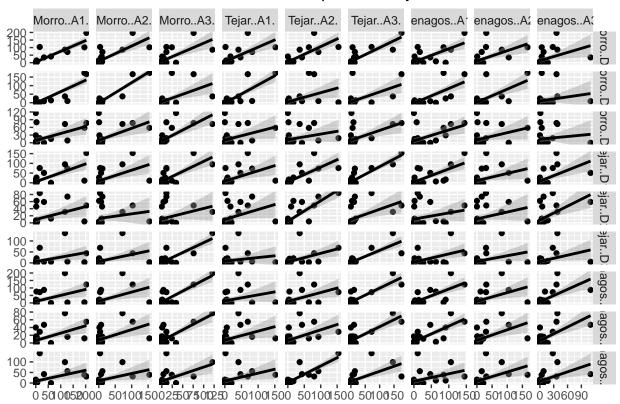
Correlación entre muestras de la época seca

Época Seca



Correlación entre las diferentes épocas

Correlación entre observaciones en época seca y lluviosa



Matriz de correlaciones

```
## $Xcor
##
                Morro..A1. Morro..A2. Morro..A3. Tejar..A1. Tejar..A2. Tejar..A3.
## Morro..A1.
                 1.0000000 0.8988782 0.6609518
                                                   0.8985678
                                                              0.5976017
                                                                         0.6659407
## Morro..A2.
                 0.8988782
                            1.0000000
                                       0.6333094
                                                   0.8678127
                                                              0.4460874
                                                                         0.5729924
## Morro..A3.
                 0.6609518
                           0.6333094
                                       1.0000000
                                                   0.4121275
                                                              0.3648136
                                                                         0.8749026
## Tejar..A1.
                 0.8985678
                            0.8678127
                                       0.4121275
                                                   1.0000000
                                                              0.5482511
                                                                         0.3405506
## Tejar..A2.
                 0.5976017
                            0.4460874
                                       0.3648136
                                                   0.5482511
                                                              1.0000000
                                                                         0.5618352
## Tejar..A3.
                 0.6659407
                            0.5729924
                                       0.8749026
                                                   0.3405506
                                                              0.5618352
                                                                         1.0000000
                                                   0.6030545
## Penagos..A1.
                 0.7401534
                            0.7435638
                                       0.7105941
                                                              0.4095967
                                                                         0.7174569
## Penagos..A2.
                 0.6827241
                            0.7865510
                                       0.4427316
                                                   0.8225855
                                                              0.4762654
                                                                         0.3189575
## Penagos..A3.
                 0.3058010 0.2169251 0.3438712 0.3092316
                                                              0.4325060
                                                                         0.4253486
##
                Penagos..A1. Penagos..A2. Penagos..A3.
                                0.6827241
                                              0.3058010
## Morro..A1.
                   0.7401534
                                              0.2169251
## Morro..A2.
                   0.7435638
                                0.7865510
## Morro..A3.
                   0.7105941
                                0.4427316
                                              0.3438712
## Tejar..A1.
                   0.6030545
                                0.8225855
                                              0.3092316
## Tejar..A2.
                   0.4095967
                                0.4762654
                                              0.4325060
## Tejar..A3.
                   0.7174569
                                0.3189575
                                              0.4253486
## Penagos..A1.
                   1.0000000
                                0.5884442
                                              0.4301542
## Penagos..A2.
                   0.5884442
                                1.0000000
                                              0.5615317
## Penagos..A3.
                   0.4301542
                                0.5615317
                                              1.0000000
##
## $Ycor
```

```
Morro..D1. Morro..D2. Morro..D3. Tejar..D1. Tejar..D2. Tejar..D3.
## Morro..D1.
                  1.0000000
                             0.7999017
                                         0.4790742
                                                     0.8901385
                                                                 0.5928431
                                                                            0.5846311
                              1.0000000
                                         0.5063014
## Morro..D2.
                  0.7999017
                                                     0.5535246
                                                                 0.1697926
                                                                            0.2417536
                             0.5063014
                                                                 0.0952119
## Morro..D3.
                  0.4790742
                                         1.0000000
                                                     0.4173452
                                                                            0.4246843
## Tejar..D1.
                  0.8901385
                             0.5535246
                                         0.4173452
                                                     1.0000000
                                                                 0.7291733
                                                                            0.6960008
## Tejar..D2.
                  0.5928431
                                         0.0952119
                                                     0.7291733
                                                                 1.0000000
                                                                            0.4735260
                             0.1697926
## Tejar..D3.
                  0.5846311
                             0.2417536
                                         0.4246843
                                                     0.6960008
                                                                 0.4735260
                                                                            1.0000000
## Penagos..D1.
                  0.6481837
                             0.3648301
                                         0.4235931
                                                     0.7852252
                                                                 0.4467974
                                                                            0.8543656
  Penagos..D2.
                  0.6663941
                             0.4432619
                                         0.4033863
                                                     0.8074694
                                                                 0.4768874
                                                                            0.7537384
  Penagos..D3.
                  0.6615128
                             0.2551524
                                         0.2696842
                                                     0.6998567
                                                                 0.7191939
                                                                            0.7783689
                 Penagos..D1. Penagos..D2. Penagos..D3.
## Morro..D1.
                    0.6481837
                                  0.6663941
                                                0.6615128
## Morro..D2.
                    0.3648301
                                  0.4432619
                                                0.2551524
## Morro..D3.
                    0.4235931
                                  0.4033863
                                                0.2696842
## Tejar..D1.
                    0.7852252
                                  0.8074694
                                                0.6998567
## Tejar..D2.
                    0.4467974
                                  0.4768874
                                                0.7191939
## Tejar..D3.
                    0.8543656
                                  0.7537384
                                                0.7783689
## Penagos..D1.
                    1.0000000
                                  0.8827883
                                                0.6744209
## Penagos..D2.
                                                0.6587625
                    0.8827883
                                  1.0000000
  Penagos..D3.
                    0.6744209
                                  0.6587625
                                                1.0000000
##
##
  $XYcor
##
                 Morro..A1. Morro..A2. Morro..A3. Tejar..A1. Tejar..A2. Tejar..A3.
                                                     0.8985678
## Morro..A1.
                  1.0000000
                             0.8988782
                                         0.6609518
                                                                 0.5976017
                                                                            0.6659407
## Morro..A2.
                  0.8988782
                             1.0000000
                                         0.6333094
                                                     0.8678127
                                                                 0.4460874
                                                                            0.5729924
## Morro..A3.
                  0.6609518
                             0.6333094
                                         1.0000000
                                                     0.4121275
                                                                 0.3648136
                                                                            0.8749026
  Tejar..A1.
                  0.8985678
                             0.8678127
                                         0.4121275
                                                     1.0000000
                                                                 0.5482511
                                                                             0.3405506
## Tejar..A2.
                  0.5976017
                             0.4460874
                                         0.3648136
                                                     0.5482511
                                                                 1.0000000
                                                                            0.5618352
## Tejar..A3.
                  0.6659407
                              0.5729924
                                         0.8749026
                                                     0.3405506
                                                                 0.5618352
                                                                             1.0000000
## Penagos..A1.
                  0.7401534
                              0.7435638
                                                     0.6030545
                                                                 0.4095967
                                         0.7105941
                                                                             0.7174569
## Penagos..A2.
                  0.6827241
                              0.7865510
                                         0.4427316
                                                     0.8225855
                                                                 0.4762654
                                                                            0.3189575
  Penagos..A3.
                  0.3058010
                              0.2169251
                                         0.3438712
                                                     0.3092316
                                                                 0.4325060
                                                                            0.4253486
## Morro..D1.
                  0.8874450
                              0.7689652
                                         0.6750579
                                                     0.6975204
                                                                 0.8004709
                                                                             0.8432879
## Morro..D2.
                  0.8863439
                              0.9501813
                                         0.5294277
                                                     0.8216159
                                                                 0.4455906
                                                                            0.5624911
                  0.4991360
                                         0.6996399
                                                     0.3578417
                                                                 0.2512495
## Morro..D3.
                              0.5190639
                                                                             0.5146411
                             0.5245324
## Tejar..D1.
                  0.7199604
                                         0.7394248
                                                     0.4863823
                                                                 0.7566574
                                                                            0.9001297
## Tejar..D2.
                  0.4002247
                              0.1747907
                                         0.2973962
                                                     0.3610093
                                                                 0.8081401
                                                                             0.4654165
## Tejar..D3.
                              0.3926028
                  0.4212135
                                         0.8406191
                                                     0.1913734
                                                                 0.5104039
                                                                            0.8221752
## Penagos..D1.
                                                     0.2880617
                  0.4976747
                              0.4518195
                                         0.8281201
                                                                 0.4636327
                                                                             0.8451662
## Penagos..D2.
                  0.5588814
                             0.4798968
                                                     0.3951531
                                                                 0.5092583
                                                                            0.7868105
                                         0.7597193
## Penagos..D3.
                  0.4543212
                             0.3654238
                                         0.5340065
                                                     0.3818852
                                                                0.8731736
##
                 Penagos..A1. Penagos..A2. Penagos..A3. Morro..D1. Morro..D2.
## Morro..A1.
                    0.7401534
                                  0.6827241
                                                0.3058010
                                                           0.8874450
                                                                       0.8863439
## Morro..A2.
                    0.7435638
                                  0.7865510
                                                0.2169251
                                                           0.7689652
                                                                       0.9501813
## Morro..A3.
                    0.7105941
                                  0.4427316
                                                0.3438712
                                                           0.6750579
                                                                       0.5294277
## Tejar..A1.
                    0.6030545
                                  0.8225855
                                                0.3092316
                                                           0.6975204
                                                                       0.8216159
## Tejar..A2.
                    0.4095967
                                  0.4762654
                                                0.4325060
                                                           0.8004709
                                                                       0.4455906
## Tejar..A3.
                    0.7174569
                                  0.3189575
                                                0.4253486
                                                           0.8432879
                                                                       0.5624911
## Penagos..A1.
                    1.0000000
                                  0.5884442
                                                0.4301542
                                                           0.7356419
                                                                       0.7667970
## Penagos..A2.
                    0.5884442
                                  1.0000000
                                               0.5615317
                                                           0.5564032
                                                                       0.6692602
## Penagos..A3.
                                                1.000000
                                                           0.4276887
                    0.4301542
                                  0.5615317
                                                                       0.1964208
## Morro..D1.
                    0.7356419
                                  0.5564032
                                                0.4276887
                                                            1.0000000
                                                                       0.7999017
## Morro..D2.
                    0.7667970
                                  0.6692602
                                                0.1964208
                                                           0.7999017
                                                                       1.0000000
## Morro..D3.
                    0.5247359
                                  0.3348921
                                                0.1189694
                                                           0.4790742
                                                                       0.5063014
```

```
## Tejar..D1.
                    0.7186225
                                 0.3817603
                                               0.5612841
                                                          0.8901385
                                                                      0.5535246
## Tejar..D2.
                                               0.5473745
                                                          0.5928431
                    0.2604887
                                 0.2821834
                                                                      0.1697926
## Tejar..D3.
                    0.5177087
                                 0.3472733
                                               0.3732196
                                                          0.5846311
                                                                      0.2417536
## Penagos..D1.
                    0.7552779
                                 0.4689567
                                               0.6514414
                                                          0.6481837
                                                                      0.3648301
## Penagos..D2.
                    0.8020749
                                 0.5260998
                                               0.6612239
                                                          0.6663941
                                                                      0.4432619
## Penagos..D3.
                    0.4207766
                                 0.5057043
                                               0.4945676
                                                          0.6615128
                                                                      0.2551524
##
                Morro..D3. Tejar..D1. Tejar..D2. Tejar..D3. Penagos..D1.
## Morro..A1.
                 0.4991360
                             0.7199604
                                        0.4002247
                                                    0.4212135
                                                                  0.4976747
## Morro..A2.
                 0.5190639
                             0.5245324
                                        0.1747907
                                                    0.3926028
                                                                  0.4518195
## Morro..A3.
                 0.6996399
                             0.7394248
                                        0.2973962
                                                    0.8406191
                                                                  0.8281201
## Tejar..A1.
                 0.3578417
                             0.4863823
                                        0.3610093
                                                    0.1913734
                                                                  0.2880617
## Tejar..A2.
                 0.2512495
                             0.7566574
                                         0.8081401
                                                    0.5104039
                                                                  0.4636327
## Tejar..A3.
                             0.9001297
                                         0.4654165
                                                    0.8221752
                 0.5146411
                                                                  0.8451662
## Penagos..A1.
                 0.5247359
                             0.7186225
                                         0.2604887
                                                    0.5177087
                                                                  0.7552779
## Penagos..A2.
                 0.3348921
                             0.3817603
                                        0.2821834
                                                    0.3472733
                                                                  0.4689567
## Penagos..A3.
                 0.1189694
                             0.5612841
                                         0.5473745
                                                    0.3732196
                                                                  0.6514414
## Morro..D1.
                 0.4790742
                             0.8901385
                                        0.5928431
                                                    0.5846311
                                                                  0.6481837
                 0.5063014
                             0.5535246
                                         0.1697926
                                                    0.2417536
## Morro..D2.
                                                                  0.3648301
## Morro..D3.
                 1.0000000
                             0.4173452
                                        0.0952119
                                                    0.4246843
                                                                  0.4235931
## Tejar..D1.
                 0.4173452
                             1.0000000
                                         0.7291733
                                                    0.6960008
                                                                  0.7852252
## Tejar..D2.
                 0.0952119
                             0.7291733
                                        1.0000000
                                                    0.4735260
                                                                  0.4467974
## Tejar..D3.
                 0.4246843
                             0.6960008
                                        0.4735260
                                                    1.0000000
                                                                  0.8543656
## Penagos..D1.
                 0.4235931
                             0.7852252
                                        0.4467974
                                                    0.8543656
                                                                  1.0000000
## Penagos..D2.
                 0.4033863
                             0.8074694
                                        0.4768874
                                                    0.7537384
                                                                  0.8827883
## Penagos..D3.
                 0.2696842
                             0.6998567
                                        0.7191939
                                                    0.7783689
                                                                  0.6744209
##
                Penagos..D2. Penagos..D3.
## Morro..A1.
                    0.5588814
                                 0.4543212
## Morro..A2.
                    0.4798968
                                 0.3654238
## Morro..A3.
                    0.7597193
                                 0.5340065
## Tejar..A1.
                   0.3951531
                                 0.3818852
## Tejar..A2.
                    0.5092583
                                 0.8731736
## Tejar..A3.
                    0.7868105
                                 0.6155638
## Penagos..A1.
                    0.8020749
                                 0.4207766
                                 0.5057043
## Penagos..A2.
                    0.5260998
## Penagos..A3.
                    0.6612239
                                 0.4945676
## Morro..D1.
                    0.6663941
                                 0.6615128
## Morro..D2.
                    0.4432619
                                 0.2551524
## Morro..D3.
                    0.4033863
                                 0.2696842
## Tejar..D1.
                    0.8074694
                                 0.6998567
## Tejar..D2.
                    0.4768874
                                 0.7191939
## Tejar..D3.
                    0.7537384
                                 0.7783689
## Penagos..D1.
                    0.8827883
                                 0.6744209
## Penagos..D2.
                    1.0000000
                                 0.6587625
                                 1.0000000
## Penagos..D3.
                    0.6587625
## [1] 0.9996478 0.9981457 0.9895672 0.9698888 0.9365403 0.7868200 0.4813210
   [8] 0.3745553 0.2645913
## $xcoef
##
                         [,1]
                                        [,2]
                                                     [,3]
                                                                   [,4]
                                                                                 [,5]
## Morro..A1.
                -0.002169916 -0.0009541553
                                              0.019885229 -0.010021196 -0.006510075
## Morro..A2.
                 0.028628581 -0.0416452557
                                              0.026548147
                                                           0.002837016
                                                                         0.035740228
## Morro..A3.
                -0.007895181
                              0.0031204728 -0.031764066
                                                           0.025892985
                                                                         0.071184414
## Tejar..A1.
                               0.0177833578 -0.022441983 -0.001239397 -0.036495783
                -0.011506440
## Tejar..A2.
                -0.013583075  0.0002411774  0.017930394
                                                           0.027487508 0.030560770
```

```
-0.020045583 0.0110303649 -0.007669074 -0.042391971 -0.045463335
## Tejar..A3.
## Penagos..A1. 0.002652025 -0.0099483229 -0.016541973 0.016602460 -0.010645968
## Penagos..A2. -0.001126045 0.0002573931 -0.008158150 -0.003086788 0.001337998
## Penagos..A3. 0.005020415 -0.0078589843 -0.001732661 0.026757287 -0.015901654
                      [,6]
                                 [,7]
                                              [,8]
                                                          [,9]
## Morro..A1.
              -0.019720840
                           ## Morro..A2.
              -0.098897221 0.03151464 0.0692145009 0.094625161
## Morro..A3.
              -0.098876900 0.03170590 0.0209346574 -0.006911921
             0.045802011 -0.22144867 -0.0358891497 -0.043684793
## Tejar..A1.
## Tejar..A2.
             -0.036960644 0.03080686 0.0004300122 0.027705039
## Tejar..A3.
               0.120660478 -0.11049224 -0.0234989085 -0.024382218
## Penagos..A1. -0.007282767 0.01061974 -0.0386667915 0.011864224
## Penagos..A2. 0.103849281 0.01752443 -0.0247157300 -0.044346882
## Penagos..A3. -0.094231113 0.03422997 0.0733695245 0.041425314
##
## $ycoef
##
                      [,1]
                                   [,2]
                                               [,3]
                                                           [,4]
                                                                       [,5]
## Morro..D1.
             -0.016479394 0.0120572527 0.029499969 -0.028097366 -0.034786817
              0.019098466 -0.0331143359 -0.002863383 0.012647341
## Morro..D2.
                                                                0.018077073
              -0.002781904 0.0014588024 -0.007433772 0.006858995
## Morro..D3.
                                                                0.015216018
## Tejar..D1.
              ## Tejar..D2.
               0.006700402 -0.0036951509 0.002094997 0.025792252 -0.009365423
              -0.006612592 \quad 0.0008069433 \ -0.003212706 \ -0.054838175 \quad 0.035991831
## Tejar..D3.
## Penagos..D1. 0.007459187 -0.0118011019 -0.018493804 0.018154282 -0.013672092
## Penagos..D2. 0.001748233 -0.0002101210 -0.018916870 0.017321900 -0.040502578
## Penagos..D3. -0.004266518 -0.0050853256 0.011055225 0.041921265 0.031817397
##
                      [,6]
                                  [,7]
                                              [,8]
                                                          [,9]
## Morro..D1.
               0.039900219 0.072489305 0.042308387 -0.04566891
## Morro..D2.
              -0.013365759 -0.047787248 -0.010086614 0.01992041
## Morro..D3.
              -0.052576510 -0.049231221 -0.079010118 0.06968280
## Tejar..D1.
## Tejar..D2.
              -0.012037166 -0.028674483 0.062932579 -0.04319350
## Tejar..D3.
               0.021473150 -0.045659170 0.014086687 -0.03298099
## Penagos..D1. -0.003022487 0.013317445 0.038075222 0.03709048
## Penagos..D2. 0.045027138 0.026091791 -0.035952239 -0.11767411
## Penagos..D3. 0.002298048 0.004779194 -0.041902731 0.04354975
```

Con ayuda de la función plot.cc(), podemos hacer la gráfica donde se puede explorar la correlación canónica

