

Analyse Factorielle Multiple (AFM) avec FactoMineR sur la description sensorielle de vins

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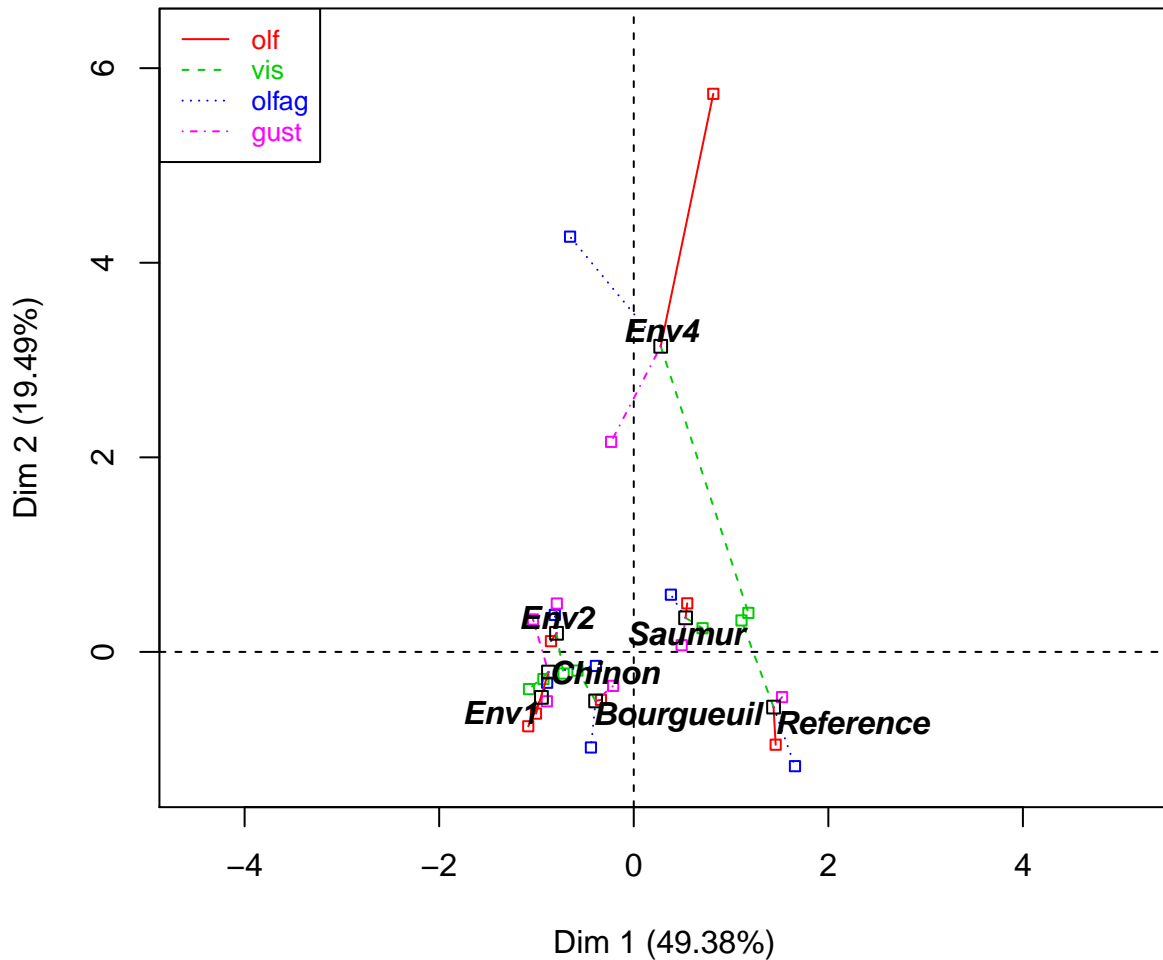
Chargement de FactoMineR

```
library(FactoMineR)  
data(wine)
```

L'AFM

```
res <- MFA(wine, group=c(2,5,3,10,9,2), type=c("n",rep("s",5)),  
          ncp=5, name.group=c("orig","olf","vis","olfag","gust","ens"),  
          num.group.sup=c(1,6))
```

Individual factor map



!!!!

R?sum? des r?sultats On peut obtenir un r?sum? des principaux r?sultats en utilisant la fonction `summary`.

```
summary(res)
```

Nous demandons ici ? avoir les r?sultats sur les 2 premi?res dimensions pour ?viter d'avoir des tableaux trop grands (par d?faut, la fonction retourne les r?sultats des 3 premi?res dimensions).

```
summary(res, ncp=2)
```

```
##
## Call:
## MFA(base = wine, group = c(2, 5, 3, 10, 9, 2), type = c("n",
##     rep("s", 5)), ncp = 5, name.group = c("orig", "olf", "vis",
##     "olfag", "gust", "ens"), num.group.sup = c(1, 6))
##
##
## Eigenvalues
```

```

##          Dim.1  Dim.2  Dim.3  Dim.4  Dim.5  Dim.6
## Variance      3.462  1.367  0.615  0.372  0.270  0.202
## % of var.     49.378 19.494  8.778  5.309  3.857  2.887
## Cumulative % of var. 49.378 68.873 77.651 82.960 86.816 89.703
##          Dim.7  Dim.8  Dim.9  Dim.10  Dim.11  Dim.12
## Variance      0.176  0.126  0.105  0.079  0.074  0.060
## % of var.     2.506  1.796  1.502  1.124  1.054  0.861
## Cumulative % of var. 92.209 94.005 95.506 96.630 97.684 98.545
##          Dim.13  Dim.14  Dim.15  Dim.16  Dim.17  Dim.18
## Variance      0.029  0.022  0.019  0.011  0.009  0.006
## % of var.     0.409  0.313  0.273  0.156  0.131  0.091
## Cumulative % of var. 98.954 99.268 99.541 99.697 99.827 99.918
##          Dim.19  Dim.20
## Variance      0.003  0.002
## % of var.     0.047  0.035
## Cumulative % of var. 99.965 100.000
##
## Groups
##          Dim.1  ctr  cos2  Dim.2  ctr
## olf          | 0.782 22.591 0.380 | 0.620 45.346
## vis          | 0.855 24.688 0.728 | 0.040  2.937
## olfag        | 0.925 26.712 0.625 | 0.469 34.309
## gust         | 0.900 26.009 0.722 | 0.238 17.408
##
##          cos2
## olf          | 0.239 |
## vis          | 0.002 |
## olfag        | 0.161 |
## gust         | 0.050 |
##
## Supplementary groups
##          Dim.1  cos2  Dim.2  cos2
## orig        | 0.296 0.033 | 0.643 0.156 |
## ens         | 0.619 0.380 | 0.254 0.064 |
##
## Individuals (the 10 first)
##          Dim.1  ctr  cos2  Dim.2  ctr
## 2EL         | 0.239 0.078 0.009 | -0.797 2.211
## 1CHA        | -2.045 5.751 0.257 | -1.383 6.667
## 1FON        | -1.220 2.048 0.187 | -0.459 0.734
## 1VAU        | -4.381 26.404 0.426 | 0.995 3.446
## 1DAM        | 2.696 9.996 0.462 | -0.120 0.050
## 2BOU        | 0.869 1.038 0.116 | -0.326 0.371
## 1BOI        | 1.553 3.318 0.294 | -0.280 0.272
## 3EL         | 0.129 0.023 0.001 | 0.789 2.167
## DOM1        | -0.066 0.006 0.001 | -0.253 0.222
## 1TUR        | -1.202 1.987 0.184 | -0.375 0.489
##
##          cos2
## 2EL         | 0.098 |
## 1CHA        | 0.118 |
## 1FON        | 0.026 |
## 1VAU        | 0.022 |
## 1DAM        | 0.001 |
## 2BOU        | 0.016 |
## 1BOI        | 0.010 |

```

```

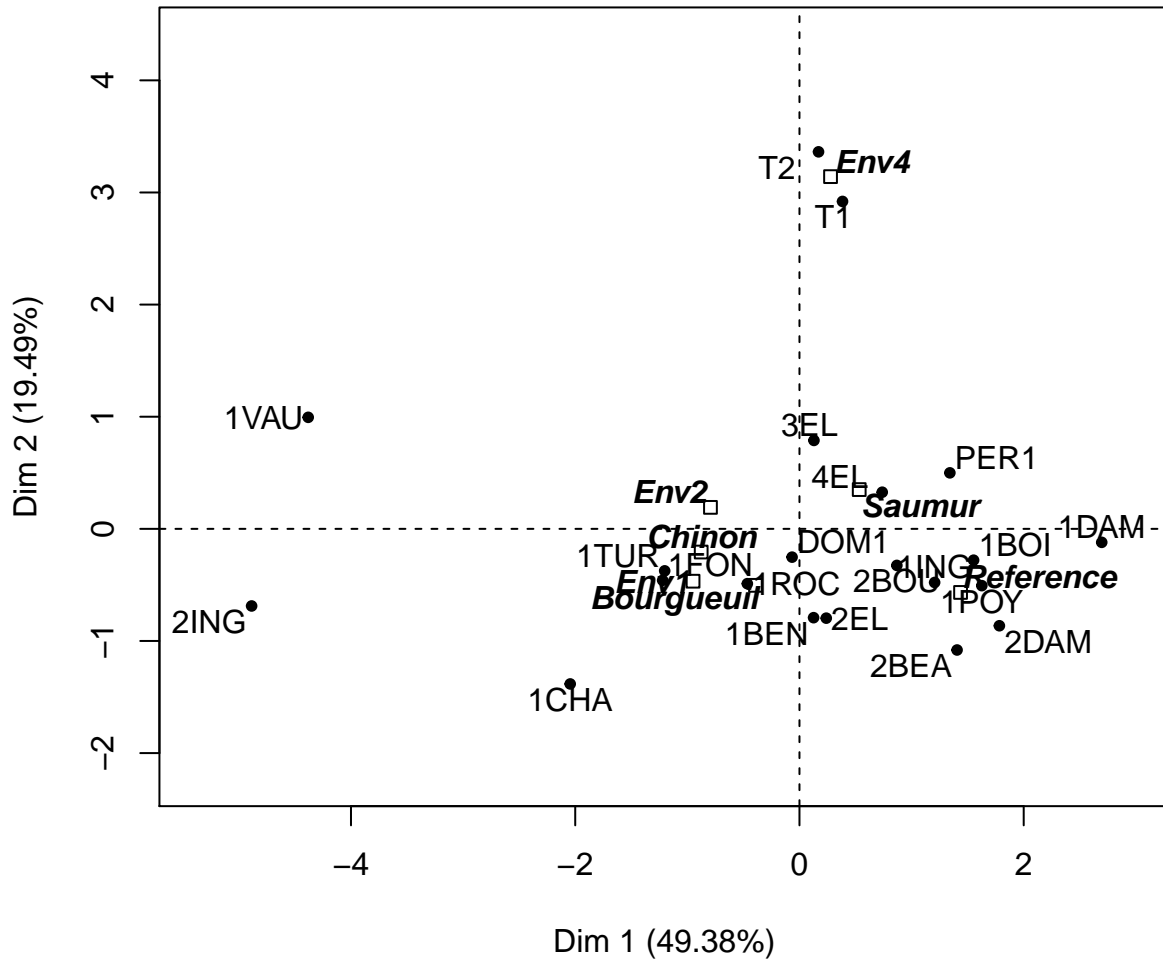
## 3EL          0.052 |
## DOM1         0.017 |
## 1TUR         0.018 |
##
## Continuous variables (the 10 first)
##
##          Dim.1   ctr   cos2   Dim.2   ctr
## Odor.Intensity.before.shaking | 0.591 4.497 0.349 | 0.667 14.530
## Aroma.quality.before.shaking  | 0.835 8.989 0.698 | -0.075 0.186
## Fruity.before.shaking         | 0.716 6.606 0.513 | -0.151 0.741
## Flower.before.shaking        | 0.439 2.480 0.192 | -0.409 5.469
## Spice.before.shaking         | 0.038 0.019 0.001 | 0.865 24.420
## Visual.intensity             | 0.881 7.912 0.776 | 0.238 1.466
## Nuance                      | 0.862 7.577 0.744 | 0.234 1.408
## Surface.feeling             | 0.950 9.198 0.903 | 0.049 0.063
## Odor.Intensity              | 0.627 2.416 0.393 | 0.576 5.155
## Quality.of.odour            | 0.791 3.844 0.626 | -0.410 2.612
##
##          cos2
## Odor.Intensity.before.shaking 0.445 |
## Aroma.quality.before.shaking  0.006 |
## Fruity.before.shaking         0.023 |
## Flower.before.shaking        0.168 |
## Spice.before.shaking         0.748 |
## Visual.intensity             0.057 |
## Nuance                      0.055 |
## Surface.feeling             0.002 |
## Odor.Intensity              0.331 |
## Quality.of.odour            0.168 |
##
## Supplementary continuous variables
##
##          Dim.1   cos2   Dim.2   cos2
## Overall.quality | 0.747 0.558 | -0.504 0.254 |
## Typical        | 0.766 0.586 | -0.466 0.217 |
##
## Supplementary categories
##
##          Dim.1   cos2 v.test   Dim.2   cos2
## Saumur      | 0.533 0.483 1.343 | 0.350 0.209
## Bourgueuil  | -0.392 0.176 -0.596 | -0.504 0.291
## Chinon      | -0.877 0.537 -1.022 | -0.207 0.030
## Reference   | 1.437 0.823 2.442 | -0.567 0.128
## Env1        | -0.949 0.614 -1.613 | -0.467 0.149
## Env2        | -0.794 0.554 -1.067 | 0.191 0.032
## Env4        | 0.277 0.008 0.216 | 3.141 0.971
##
##          v.test
## Saumur      1.405 |
## Bourgueuil -1.219 |
## Chinon      -0.384 |
## Reference   -1.534 |
## Env1        -1.263 |
## Env2         0.409 |
## Env4        3.899 |

```

Grappe des individus et des modalités

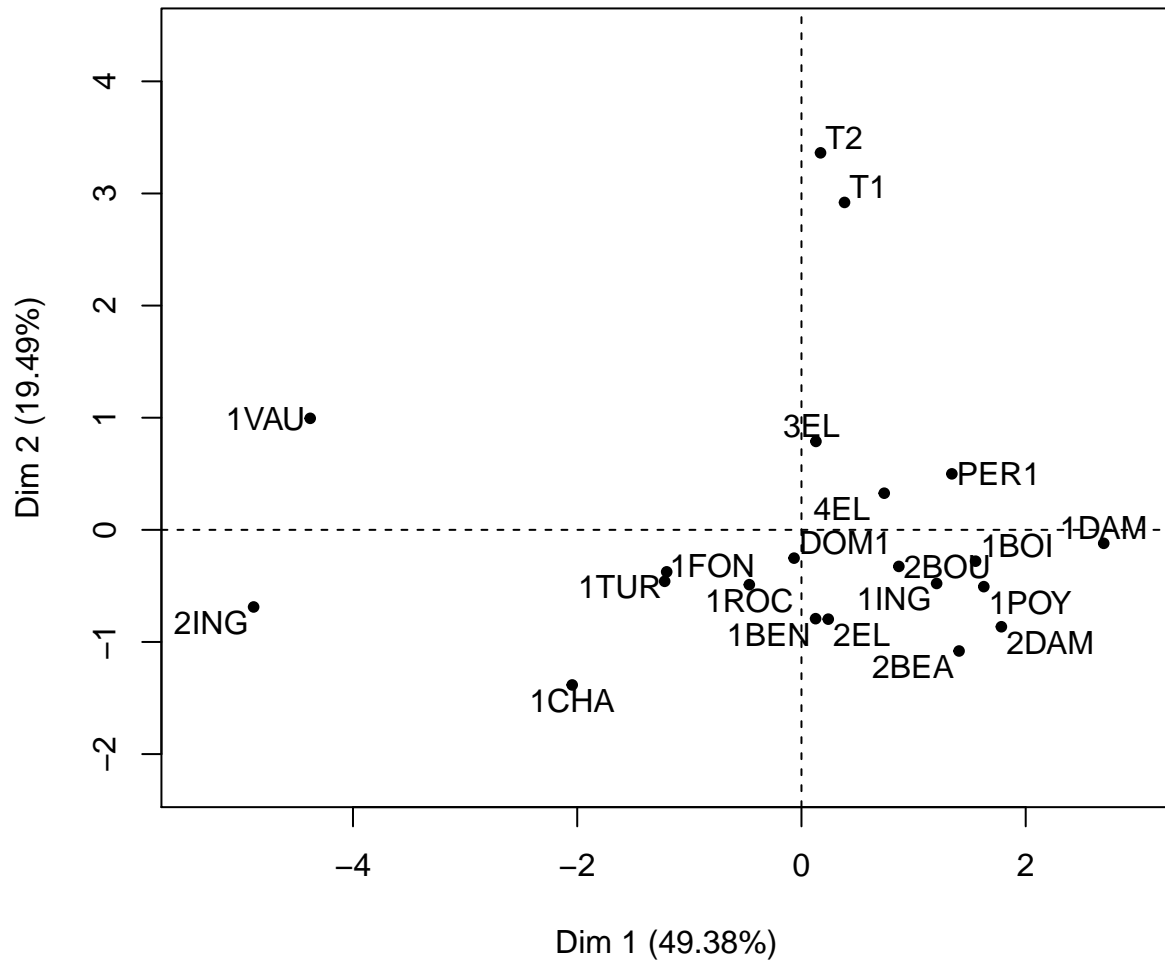
```
plot(res)
```

Individual factor map



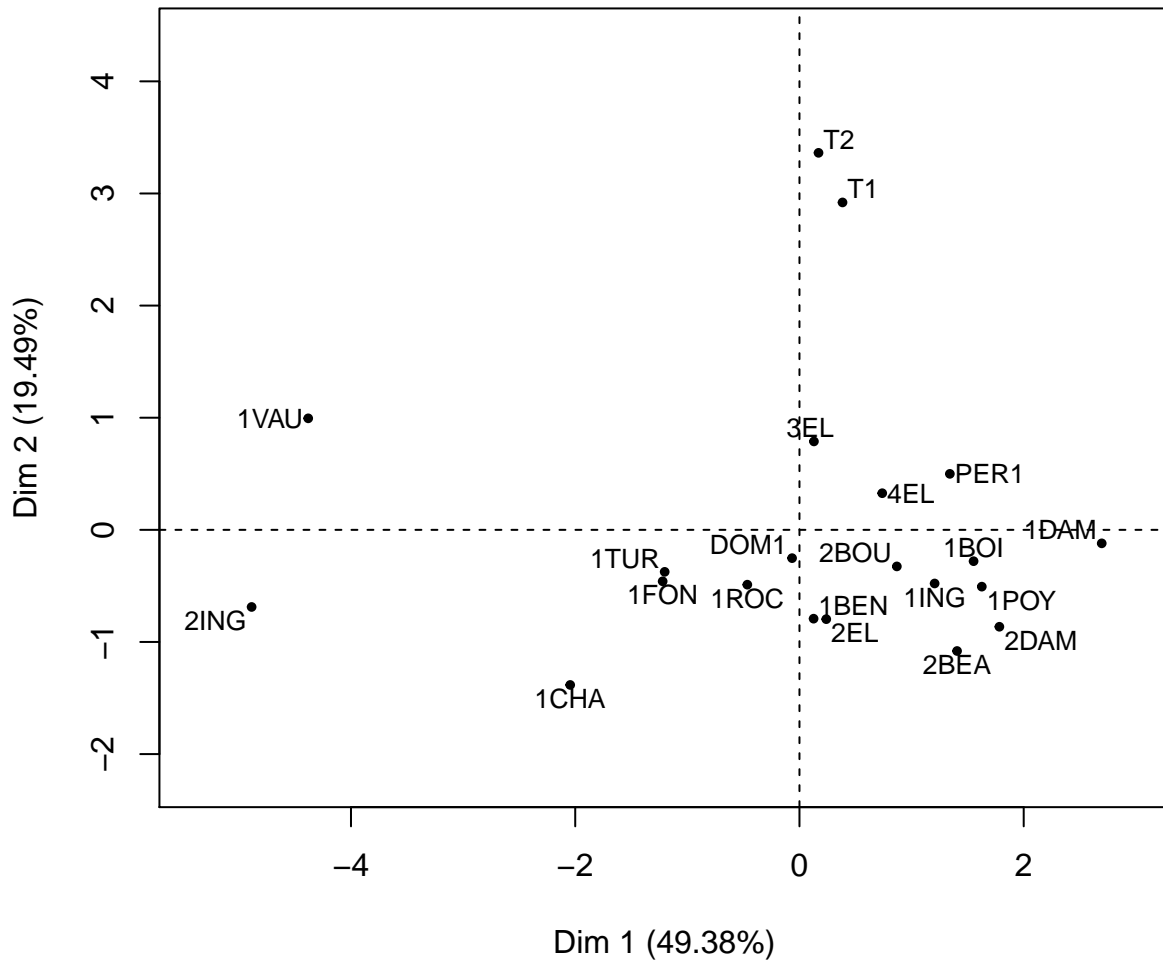
```
plot(res, invisible="quali")
```

Individual factor map



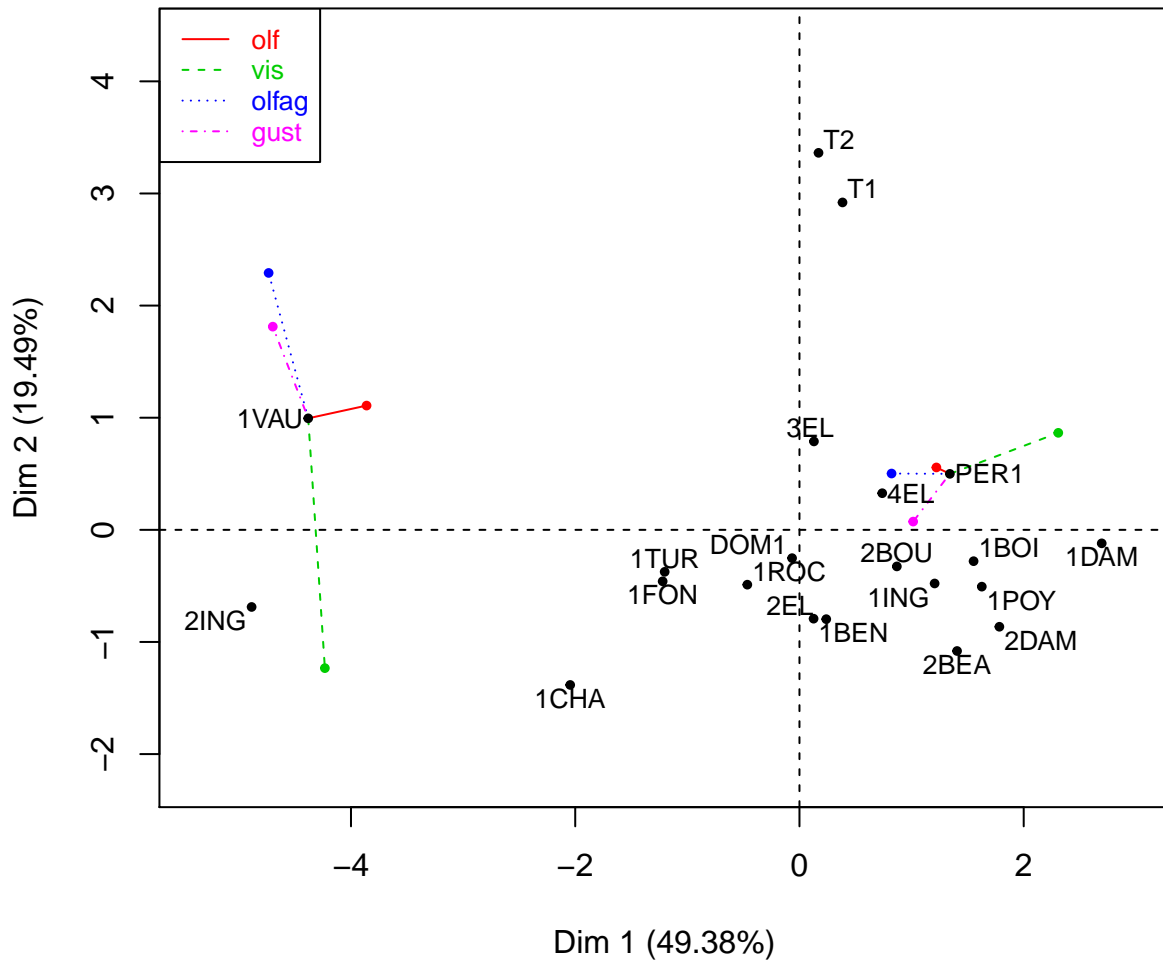
```
plot(res, invisible="quali", cex=0.8)
```

Individual factor map



```
plot(res, invisible="quali", cex=0.8, partial=c("1VAU","PER1"))
```

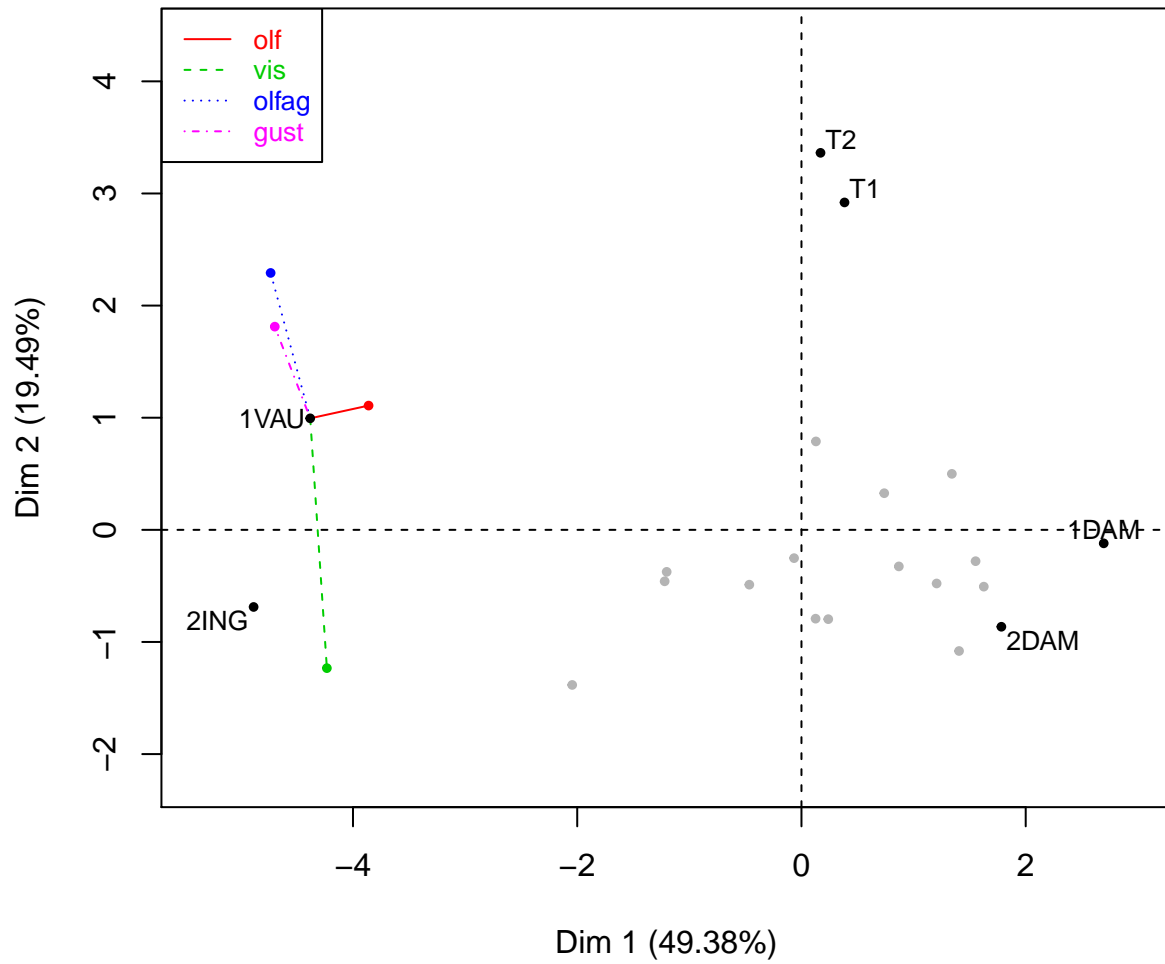
Individual factor map



Graphe des individus avec s?lection

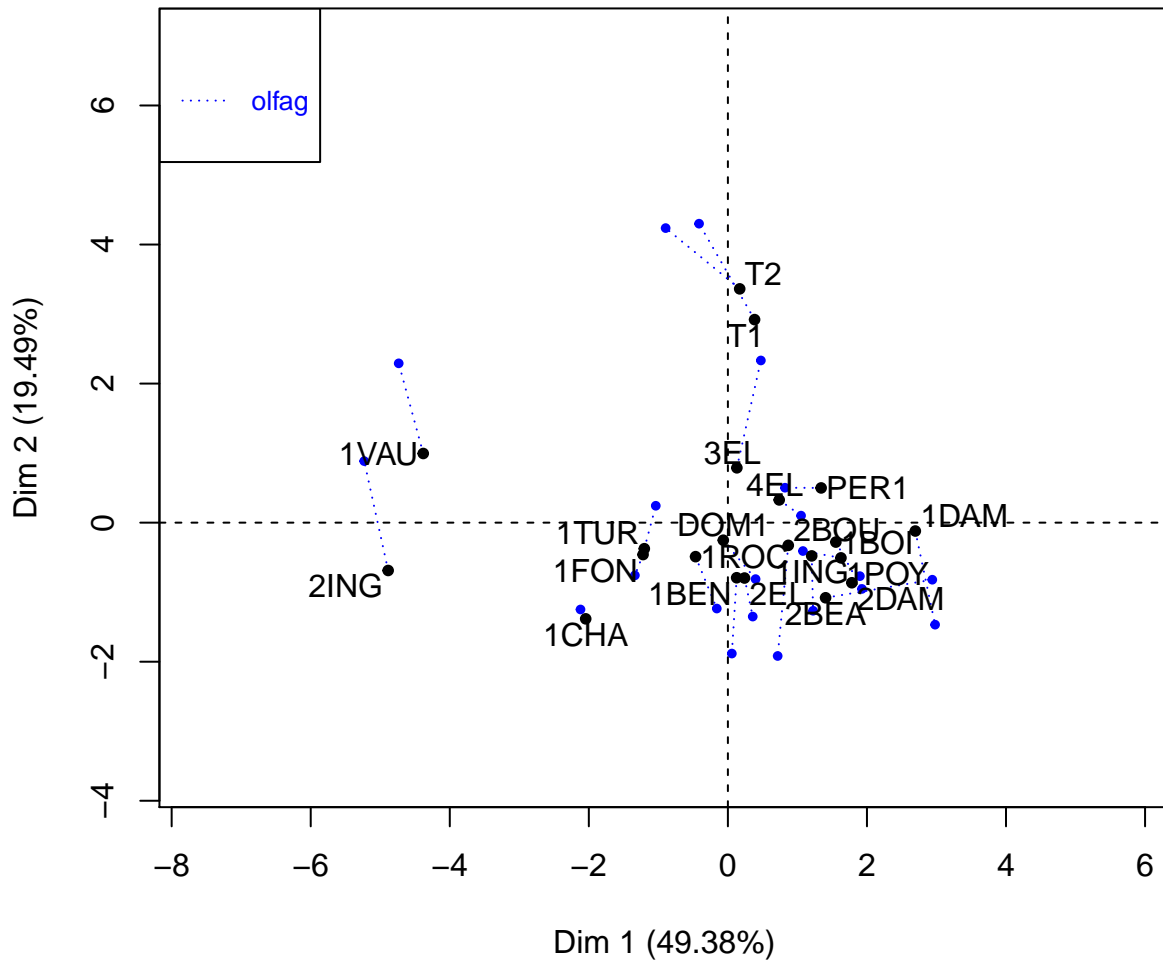
```
plot(res, invisible="quali", cex=0.8, partial=c("1VAU","PER1"), select="cos2 0.4")
```


Individual factor map



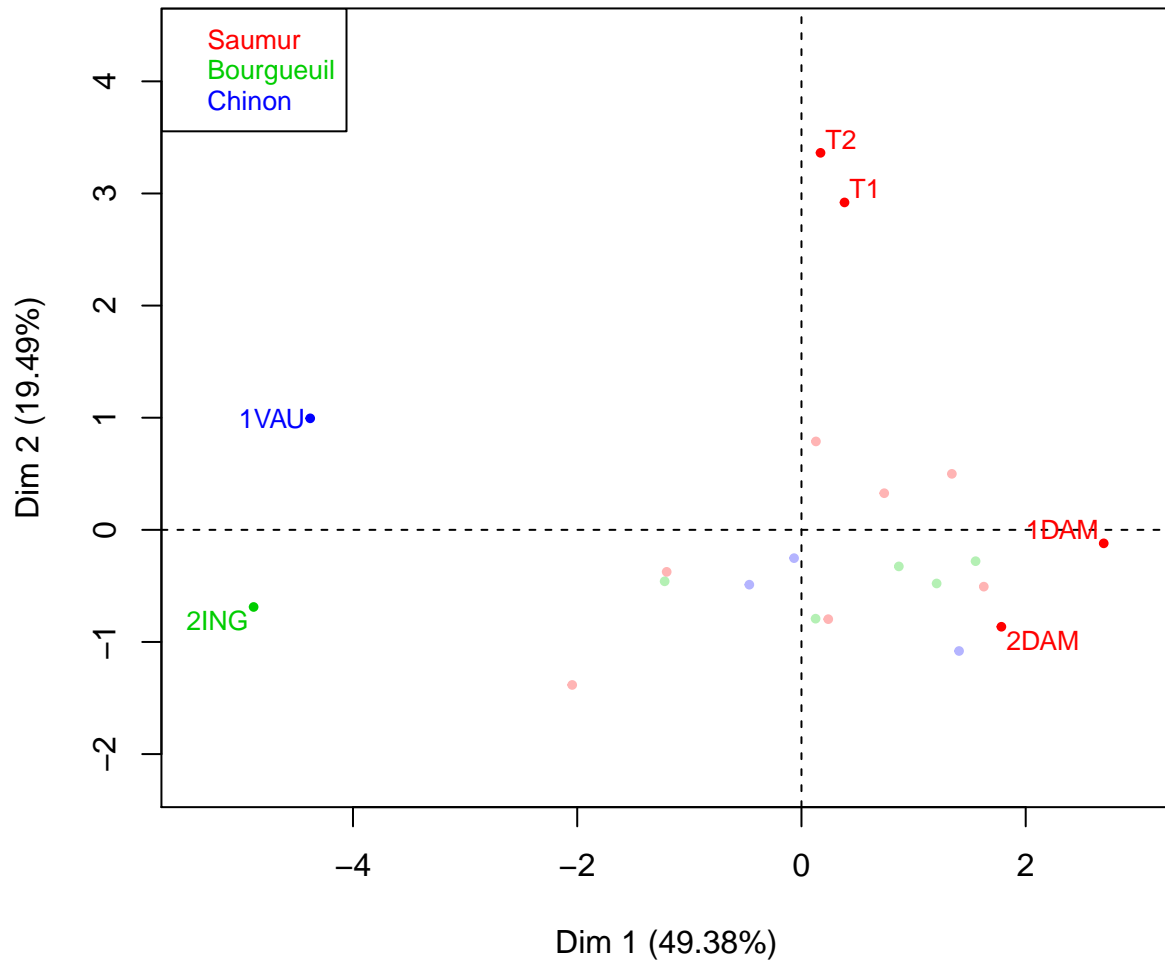
```
plot(res, ,invisible="quali", partial="all",  
      palette=palette(c("black","transparent","transparent","blue","transparent")))
```

Individual factor map



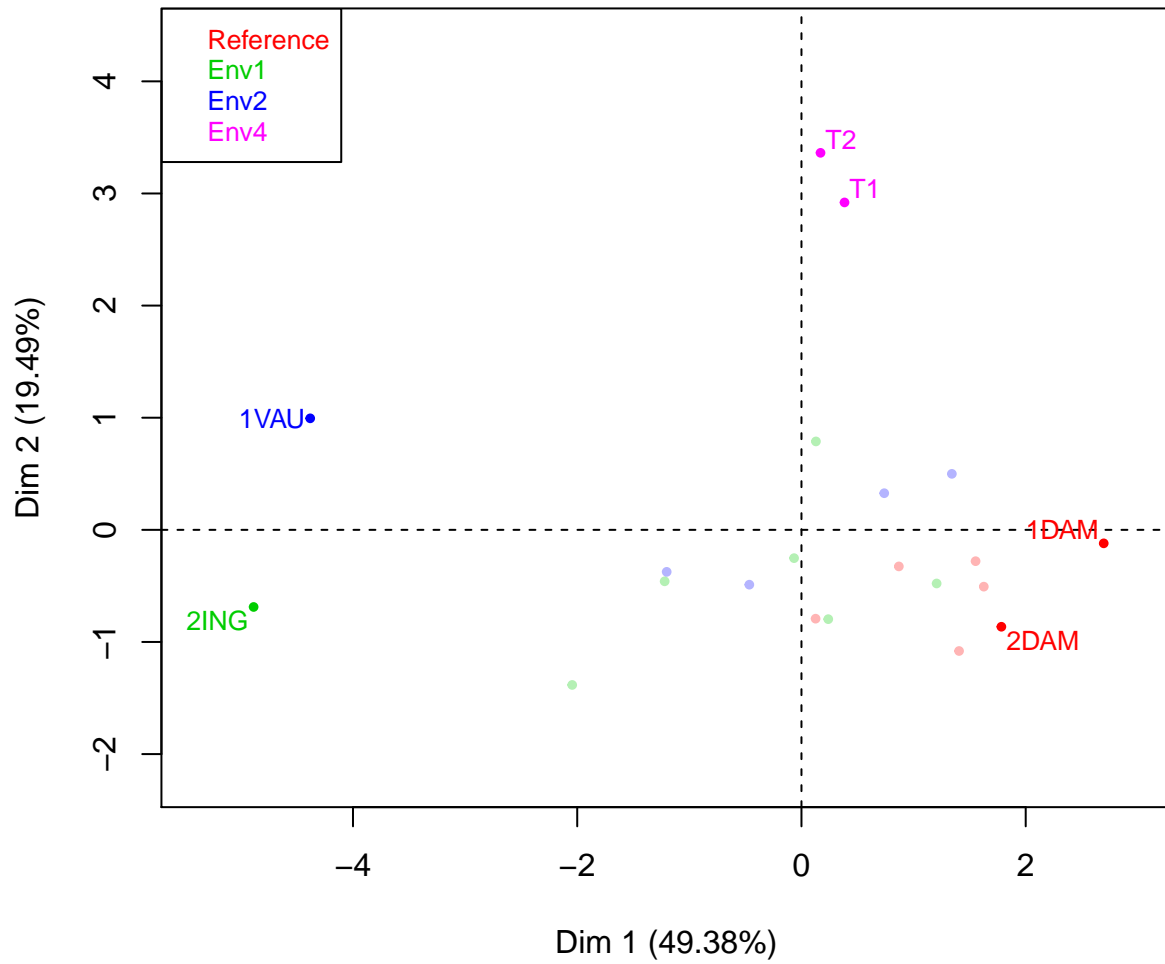
```
plot(res, invisible="quali", habillage=1, cex=0.8, select="cos2 0.4")
```

Individual factor map



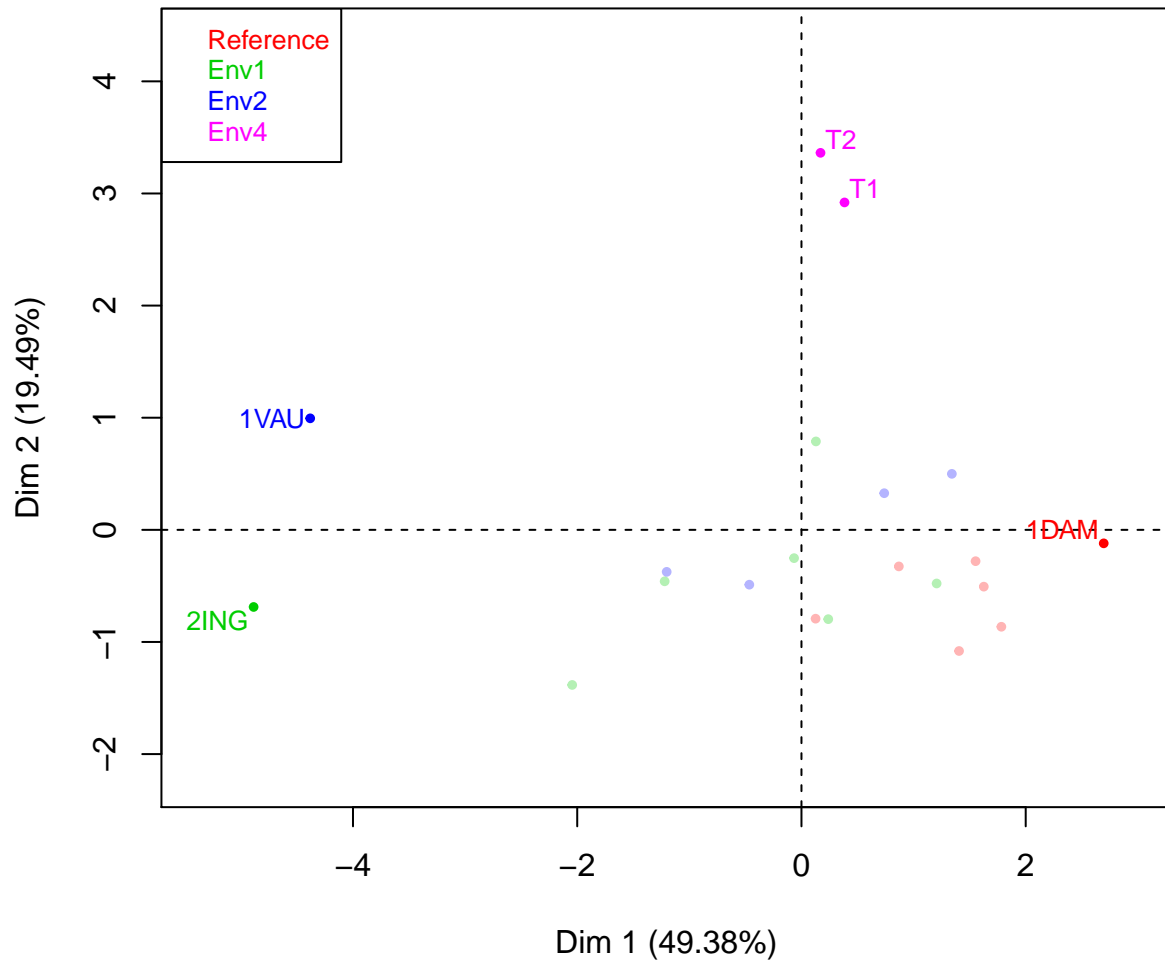
```
plot(res, invisible="quali", habillage="Soil", cex=0.8, select="cos2 0.4")
```

Individual factor map



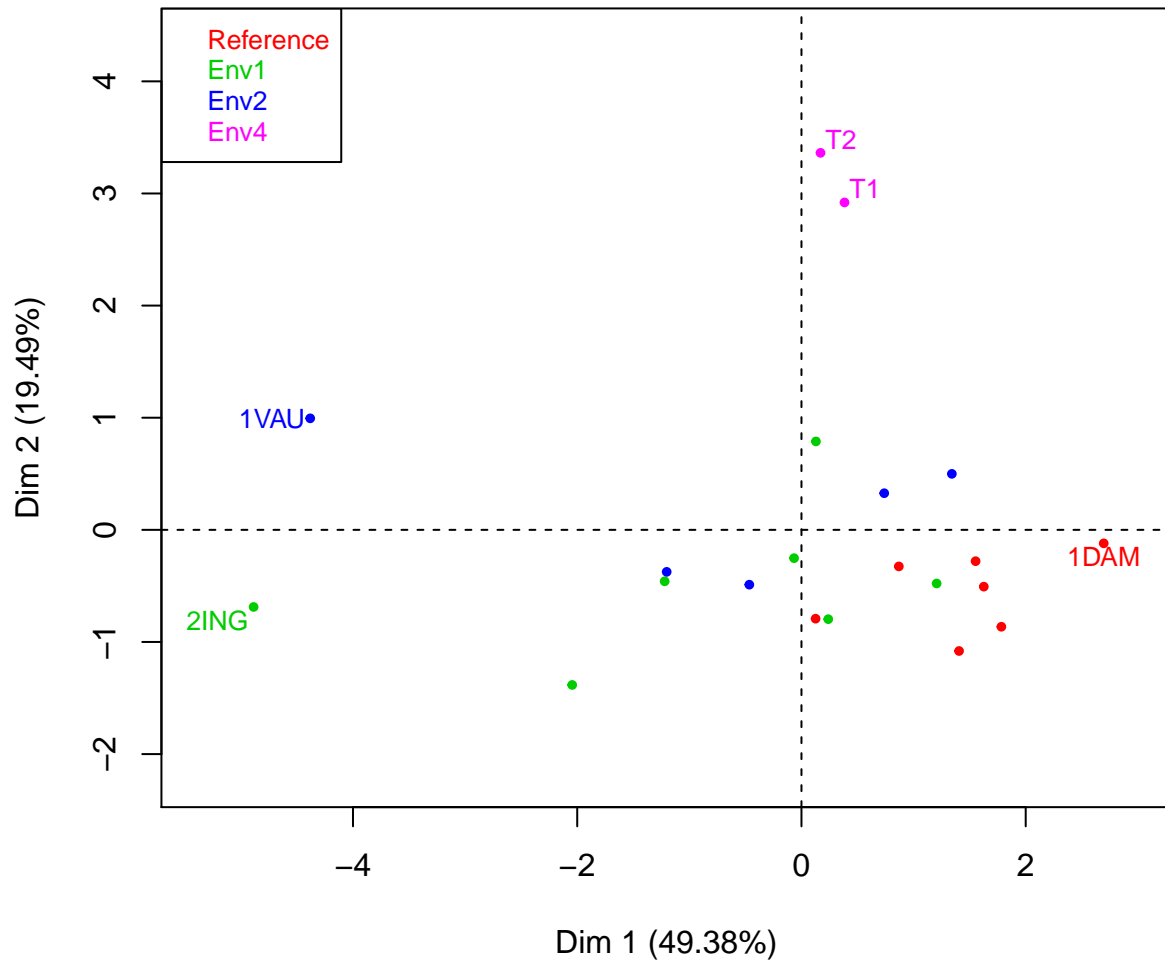
```
plot(res, invisible="quali", habillage="Soil", cex=0.8, select="contrib 5")
```

Individual factor map



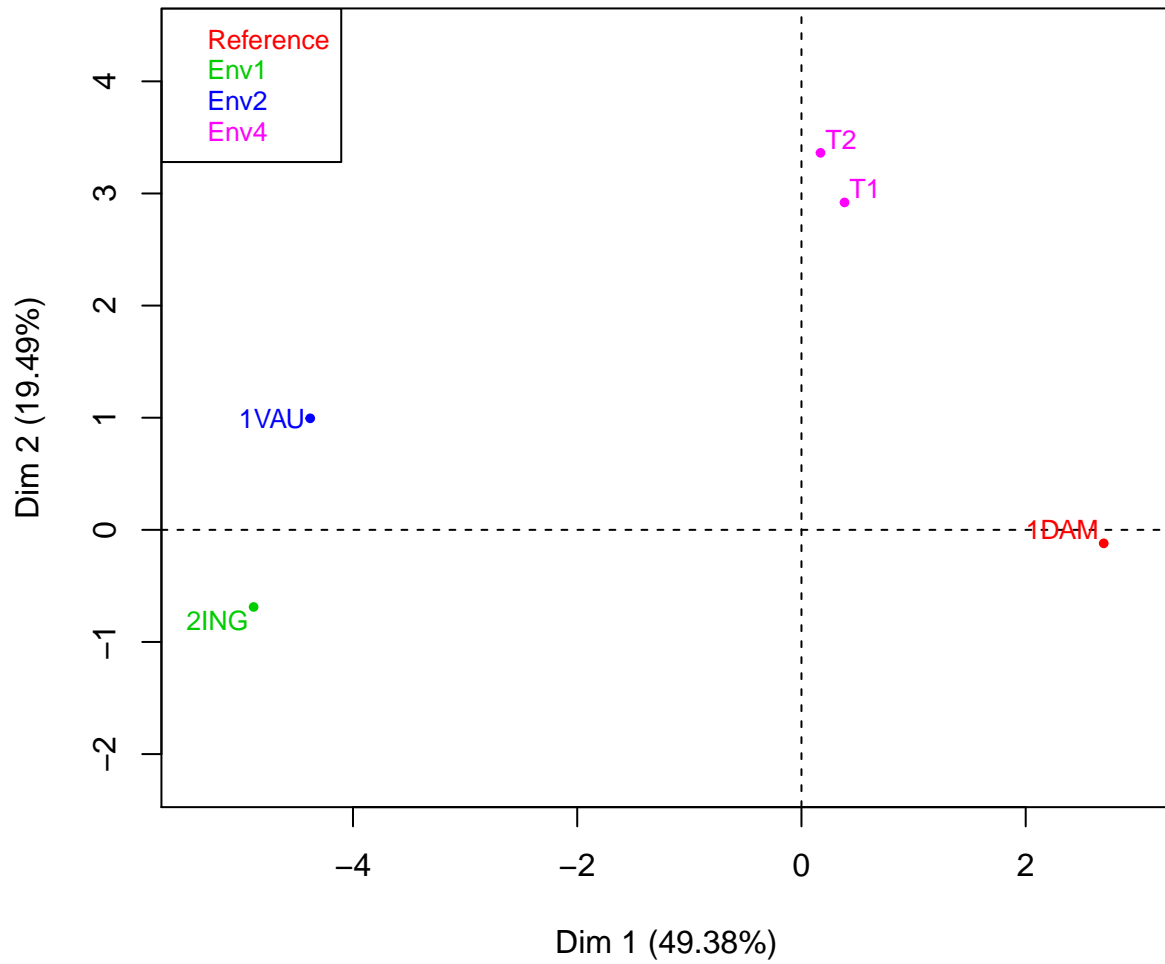
```
plot(res, invisible="quali", habillage="Soil", cex=0.8, select="contrib 5", unselect=0)
```

Individual factor map



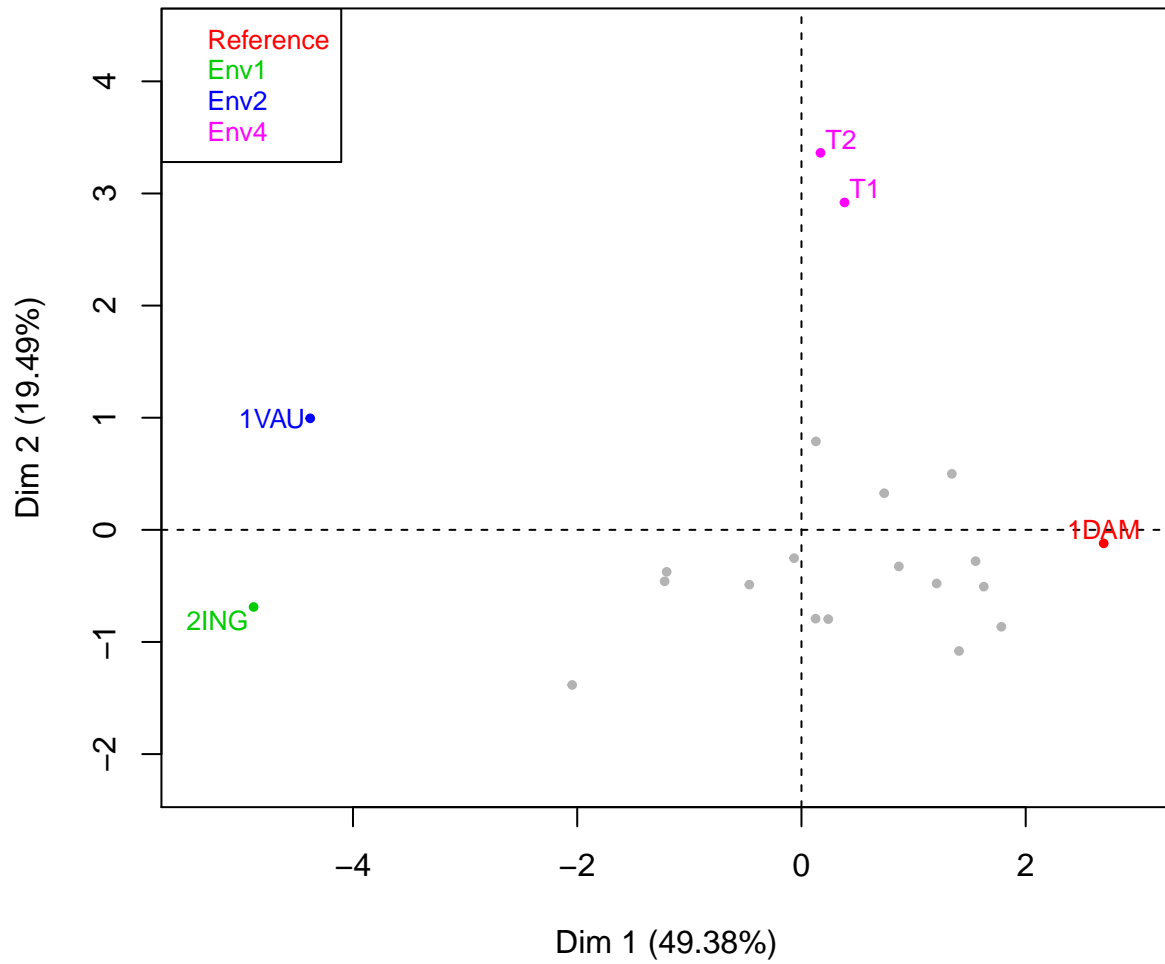
```
plot(res, invisible="quali", habillage="Soil", cex=0.8, select="contrib 5", unselect=1)
```

Individual factor map



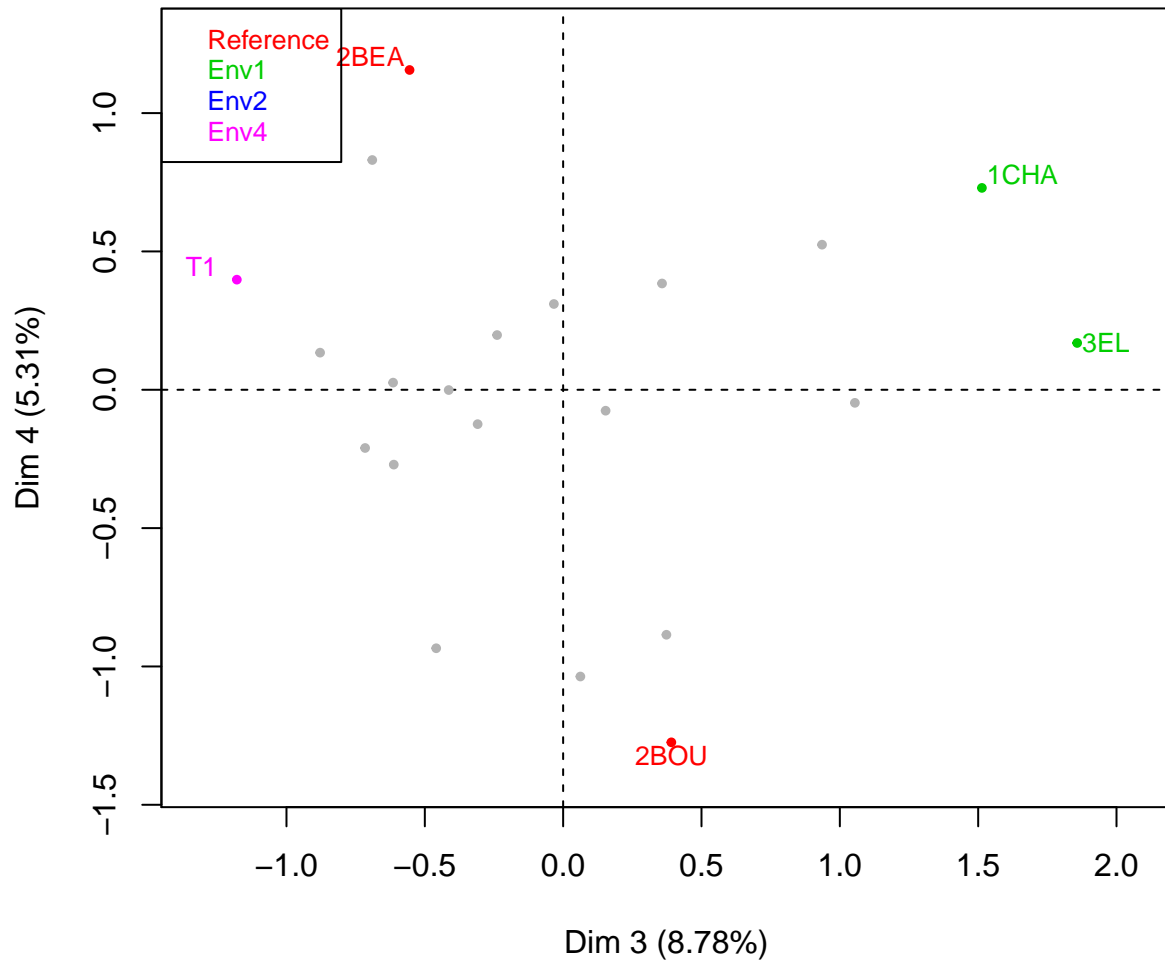
```
plot(res, invisible="quali", habillage="Soil", cex=0.8, select="contrib 5", unselect="grey70")
```

Individual factor map



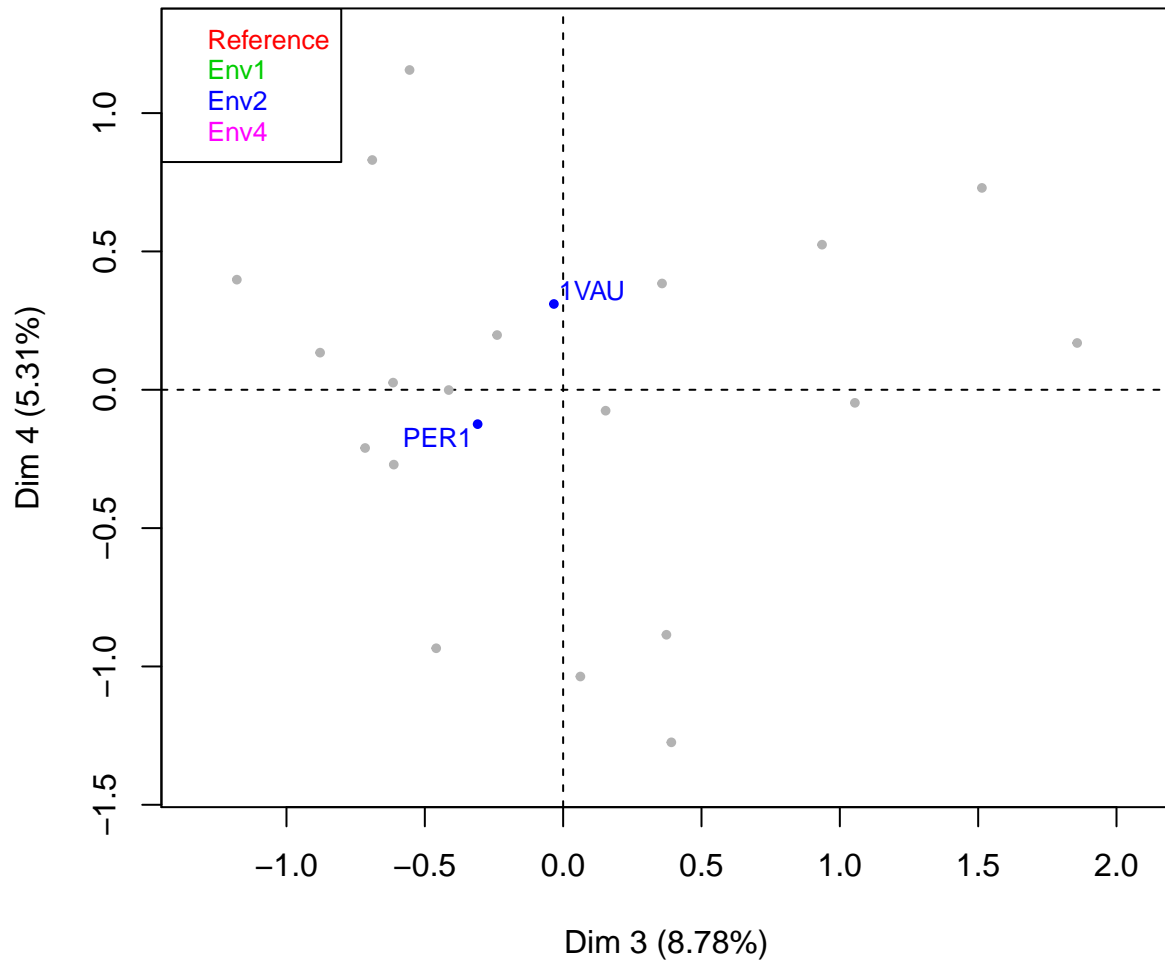
```
plot(res, invisible="quali", habillage="Soil", cex=0.8, select="contrib 5",  
      unselect="grey70", axes=3:4)
```


Individual factor map



```
plot(res, invisible="quali", habillage="Soil", cex=0.8, select=c("1VAU","PER1"),  
      unselect="grey70", axes=3:4)
```

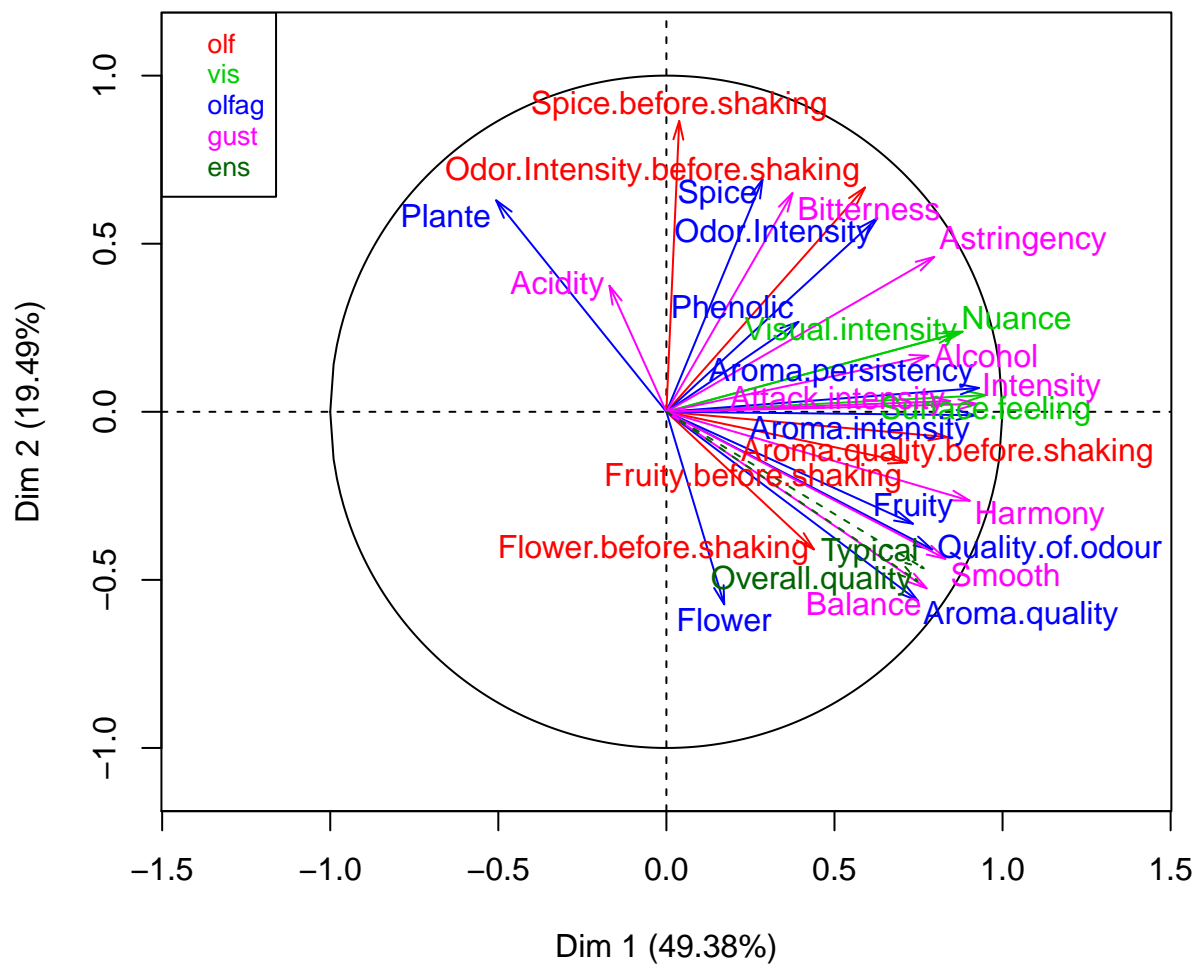
Individual factor map



Graphe des variables

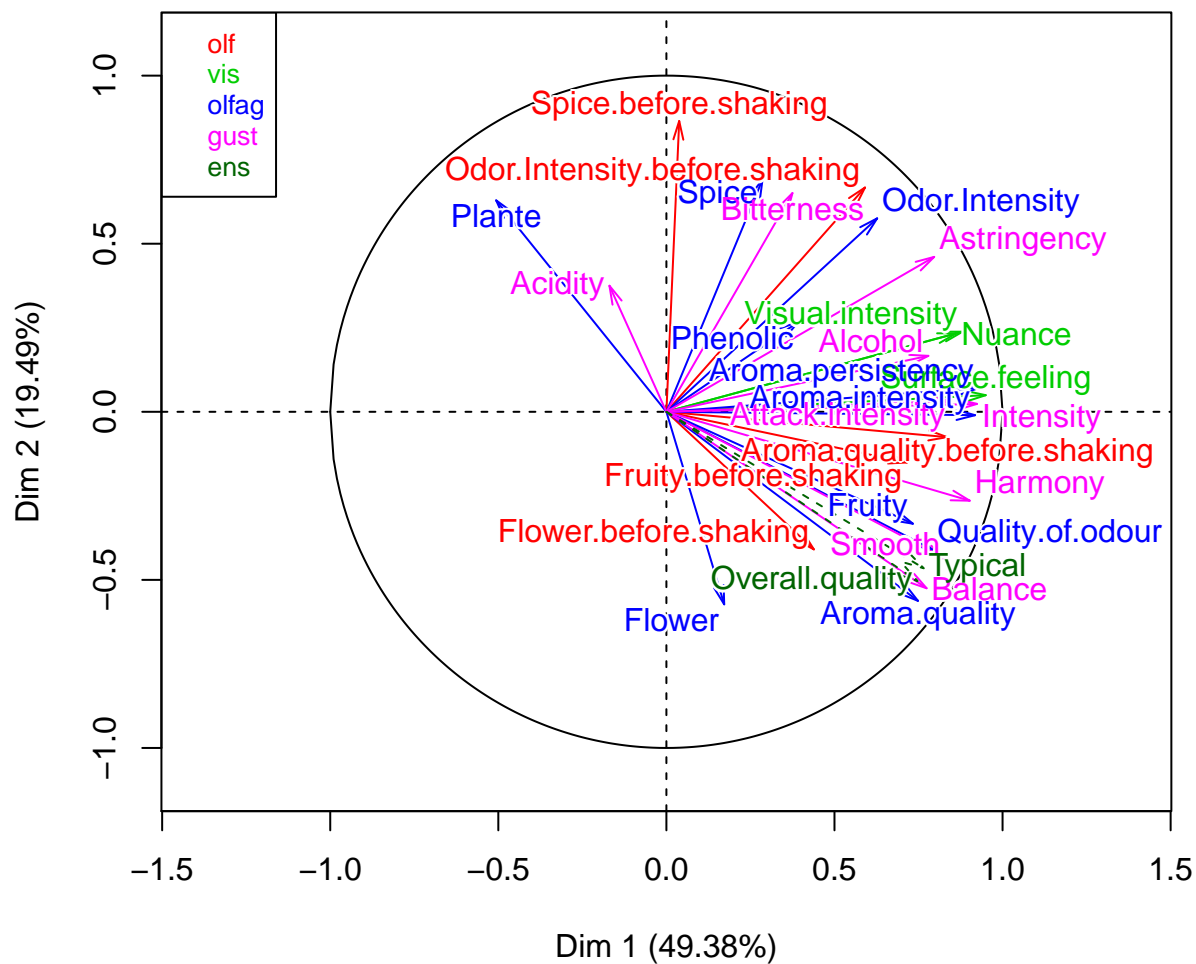
```
plot(res, choix="var")
```

Correlation circle



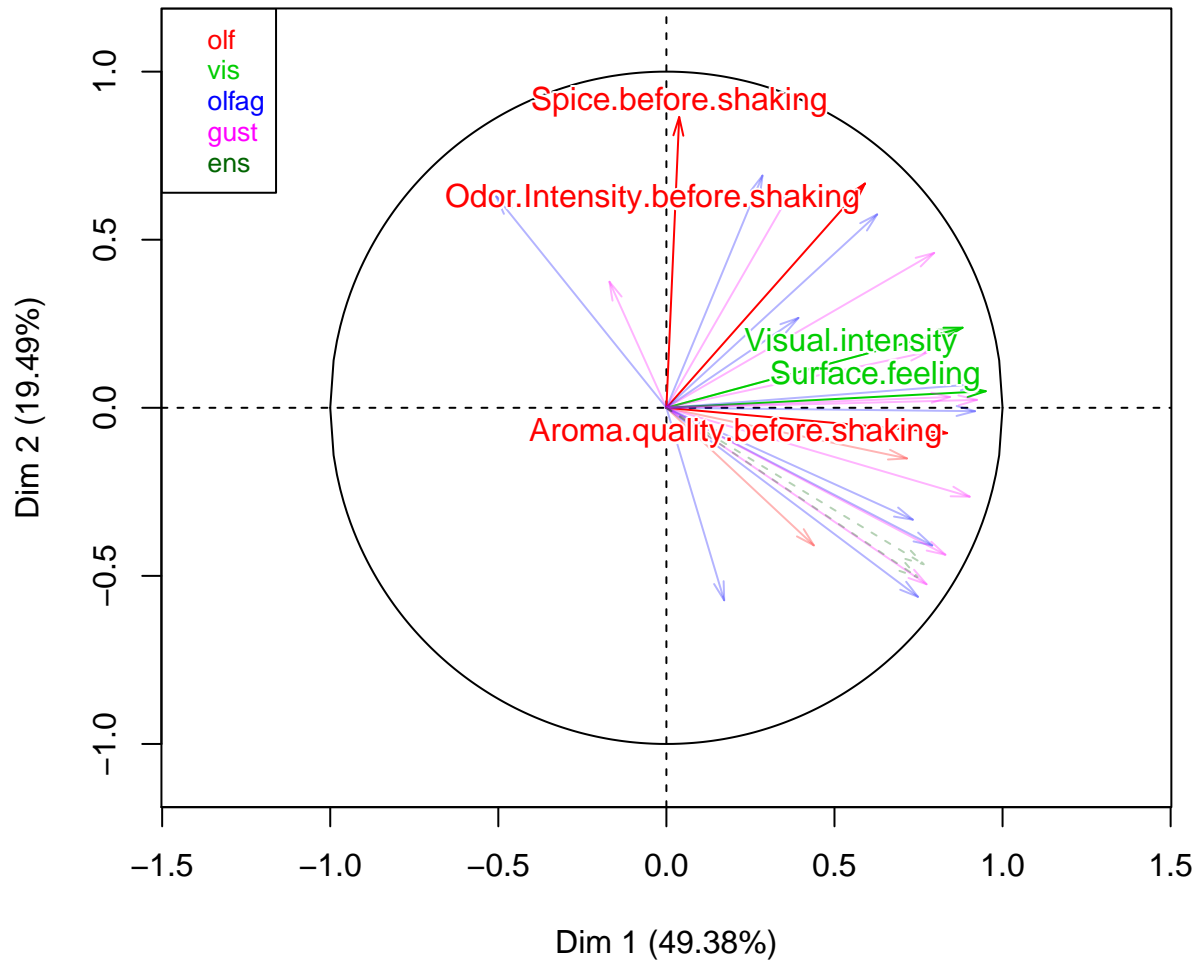
```
plot(res, choix="var", shadow=TRUE)
```

Correlation circle



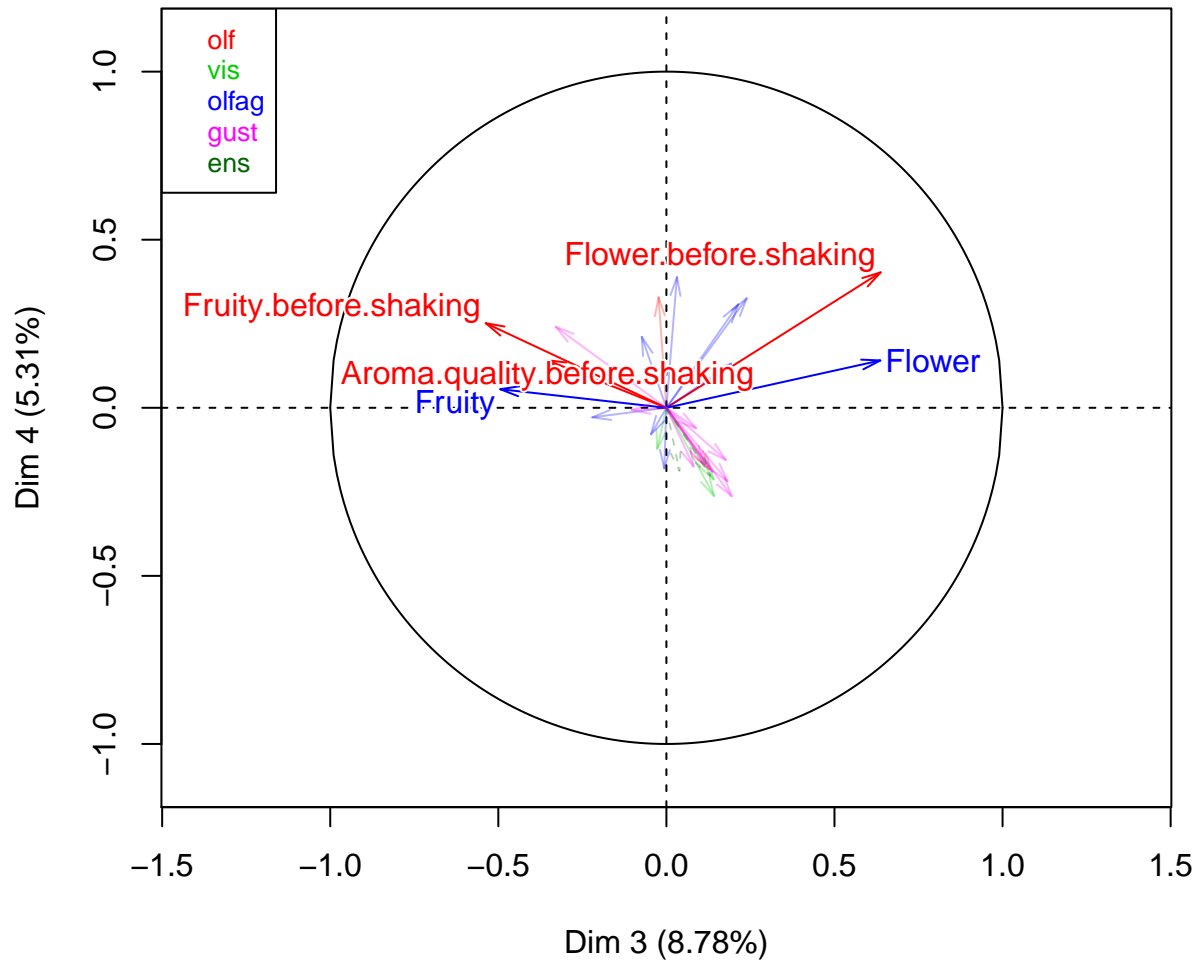
```
plot(res, choix="var", shadow=TRUE, select="contrib 5")
```

Correlation circle



```
plot(res, choix="var", shadow=TRUE, select="contrib 5", axes=3:4)
```

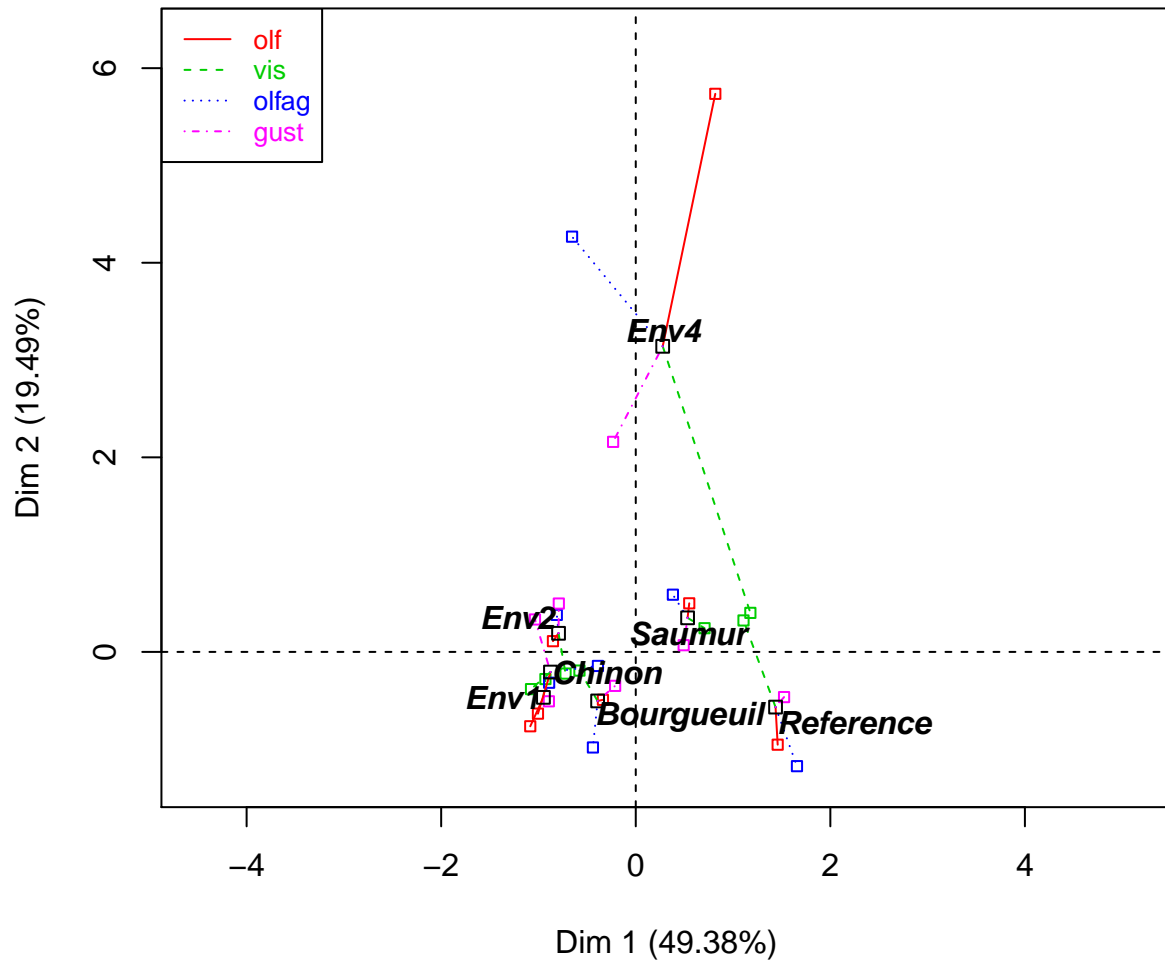
Correlation circle



Graphe des axes partiels

```
res <- MFA(wine, group=c(2,5,3,10,9,2), type=c("n",rep("s",5)),  
  ncp=3, name.group=c("orig","olf","vis","olfag","gust","ens"),  
  num.group.sup=c(1,6))
```

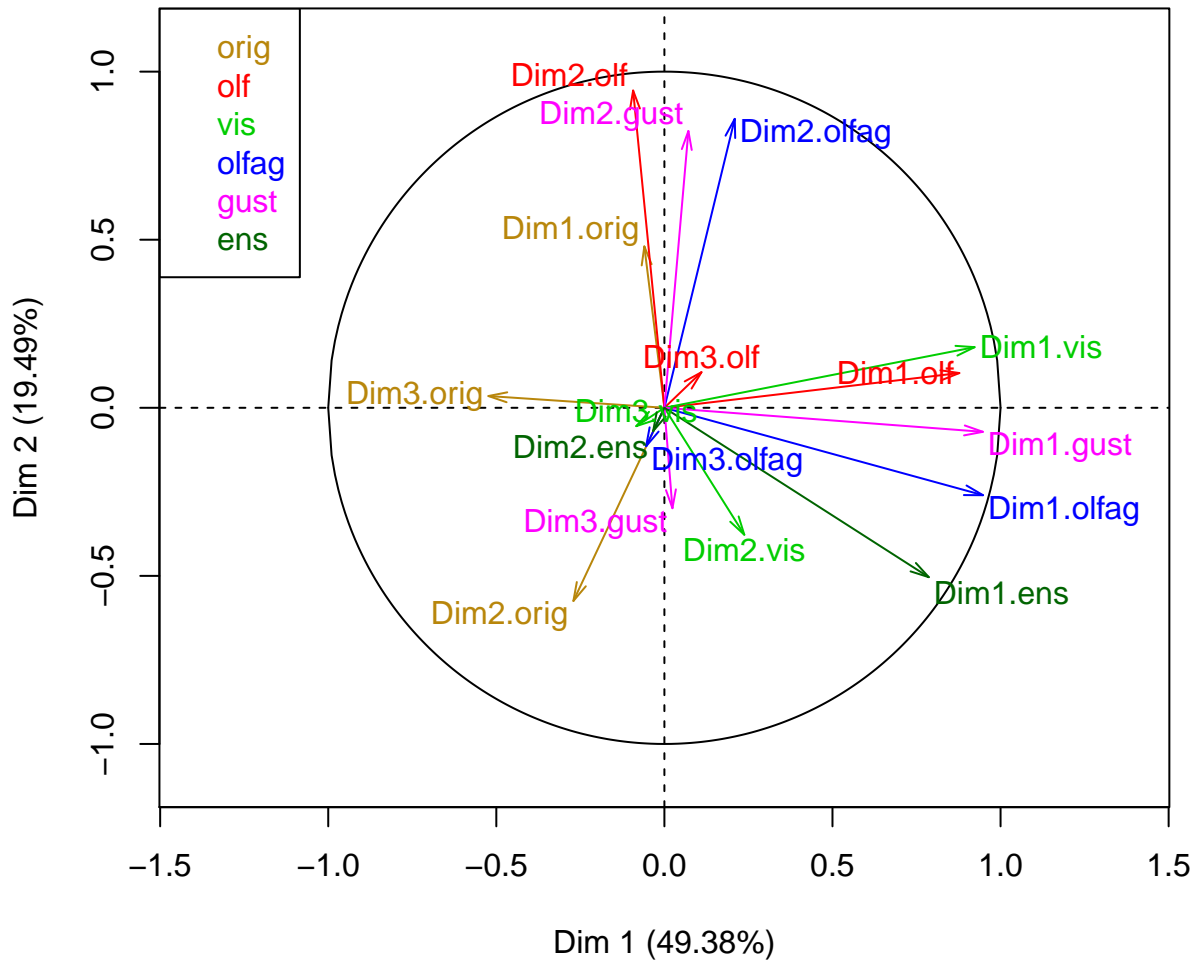
Individual factor map



!!!!

```
plot(res, choix="axes")
```

Partial axes



Description des dimensions

`dimdesc(res)`

```
## $Dim.1
## $Dim.1$quanti
##
## correlation      p.value
## Surface.feeling  0.9501131 4.605897e-11
## Aroma.persistency 0.9298582 1.082737e-09
## Intensity         0.9241930 2.214222e-09
## Aroma.intensity   0.9183490 4.380472e-09
## Harmony           0.9024824 2.221510e-08
## Visual.intensity  0.8811873 1.331392e-07
## Nuance            0.8623373 4.995733e-07
## Attack.intensity  0.8439524 1.524322e-06
## Aroma.quality.before.shaking 0.8352510 2.462507e-06
## Smooth            0.8299677 3.251800e-06
## Astringency       0.7966486 1.549124e-05
```



```

## Quality.of.odour          0.7909364 1.967655e-05
## Alcohol                   0.7792689 3.137694e-05
## Balance                   0.7740492 3.832036e-05
## Typical                   0.7656957 5.221396e-05
## Aroma.quality            0.7484543 9.521647e-05
## Overall.quality          0.7472814 9.901881e-05
## Fruity                    0.7333860 1.550774e-04
## Fruity.before.shaking    0.7160259 2.618708e-04
## Odor.Intensity           0.6270975 2.345881e-03
## Odor.Intensity.before.shaking 0.5908036 4.800834e-03
## Flower.before.shaking    0.4387181 4.664182e-02
## Plante                    -0.5064137 1.915100e-02
##
## $Dim.1$category
##      Estimate      p.value
## Reference 1.444131 0.01043873
##
##
## $Dim.2
## $Dim.2$quanti
##
##      correlation      p.value
## Spice.before.shaking 0.8650199 4.189450e-07
## Spice                 0.6910122 5.233277e-04
## Odor.Intensity.before.shaking 0.6672378 9.524504e-04
## Bitterness            0.6506434 1.404051e-03
## Plante                 0.6290859 2.249914e-03
## Odor.Intensity        0.5755174 6.336628e-03
## Astringency           0.4608480 3.550587e-02
## Smooth                -0.4372509 4.746573e-02
## Typical               -0.4655898 3.341665e-02
## Overall.quality       -0.5036281 1.993378e-02
## Balance               -0.5249698 1.454356e-02
## Aroma.quality         -0.5624494 7.951915e-03
## Flower                -0.5727974 6.648318e-03
##
## $Dim.2$quali
##      R2      p.value
## Soil 0.8255815 1.127917e-06
##
## $Dim.2$category
##      Estimate      p.value
## Env4 2.566606 2.650535e-07
##
##
## $Dim.3
## $Dim.3$quanti
##
##      correlation      p.value
## Flower.before.shaking 0.6373128 0.001887133
## Flower                 0.6364710 0.001921831
## Fruity                 -0.4941180 0.022801235
## Fruity.before.shaking -0.5374876 0.011976303

```