---
title: "Tarea_diplomado_Paula"
author: "Dra. Paula Celis-Plá"
date: "2022-10-04"
output:
  pdf_document: default
  html_document: default
editor_options:
  markdown:
    wrap: 72

Evaluación de las respuestas fisiológicas y ambientales del alga *Lessonia spicata* en la Bahía de Valparaíso en prescencia de Cambio Climático

---
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Descripción del Trabajo

La data actual corresponde a valores de variables fisiológicas y ambientales para el alga parda *Lessonia spicata*.

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editor_options:
  markdown:
    wrap: 72

Este estudio tiene por objetivo, evaluar la diferencias estadísticas de las variables fisiológicas y variables ambientales respecto a las variables categóricas estación del Año con 4 niveles; Otoño, Invierno, Primavera y Verano, y tiempo

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“Dra.
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Plá”
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10-04”
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pdf_document:
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html_document:
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72

Las
vari-
ables
fisológi-
cas
anal-
izadas
en este
estudio
fueron
Cloro-
fila a o
Cla
(expre-
sada en
micro-
gramos
*
gramos-
1 de
peso
seco),
Cloro-
fila c =
Clc
(expre-
sada en
micro-
gramos
*
gramos-
1 de
peso
seco),
Carotenos
o Car
(expre-
sada en
micro-

---
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wrap:
72

##
Ha-
bilita
Libre-
rias
##
Vari-
ables
categóri-
cas
Sea-
sons,
time y
repli-
cate
asigna
factor
##
Trans-
forma
vari-
ables a
fac-
tores
`r`
`Datos_Proyecto`
`<-`
`read_excel("Datos_Proyecto.xlsx")`
`summary(Datos_Proyecto)`

---
title:
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pdf_document:
default
html_document:
default
edi-
tor_options:
mark-
down:
wrap:
72

```
##
Seasons
time
Chla
Chlc
##
Length:108
Length:108
Min.
:0.6730
Min.
:0.01000
##
Class
:character
Class
:character
1st
Qu.:0.9888
1st
Qu.:0.06775
##
Mode
:character
Mode
:character
Median
:1.1660
Median
:0.09500
##
Mean
:1.1856
Mean
:0.09365
##
3rd
Qu.:1.3813
3rd
```

---
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Plá”
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pdf_document:
default
html_document:
default
edi-
tor_options:
mark-
down:
wrap:
72

```
r
Datos_Proyecto$Seasons
<-
as.factor(Datos_Proyecto$Seasons)
Datos_Proyecto$time
<-
as.factor(Datos_Proyecto$time)
summary(Datos_Proyecto)
```

---
title:
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Paula
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"2022-
10-04"
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pdf_document:
default
html_document:
default
edi-
tor_options:
mark-
down:
wrap:
72

```
##
Seasons
time
Chla
Chlc
Car ##
Autumn:27
day
1:36
Min.
:0.6730
Min.
:0.01000
Min.
:0.4190
##
Spring:27
day
2:36
1st
Qu.:0.9888
1st
Qu.:0.06775
1st
Qu.:0.6240
##
Summer:27
day
3:36
Median
:1.1660
Median
:0.09500
Median
:0.7520
##
Winter:27
Mean
:1.1856
```

---
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default
html_document:
default
edi-
tor_options:
mark-
down:
wrap:
72

##
His-
togra-
mas
con eti-
quetas
y
títulos
“‘r p1
<- gg-
plot(Datos_Proyecto,
aes(Chla))
+
geom_histogram(bins
= 8,
color
=“blue”,
fill=“blue”)+
labs(title=“Histograma
de Clo-
rofila
a”,
x=“Clorofila
a”,
y=“Frecuencia”)

---
title:
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Paula
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10-04”
output:
pdf_document:
default
html_document:
default
edi-
tor_options:
mark-
down:
wrap:
72
---
p2 <-
gg-
plot(Datos_Proyecto,
aes(Chlc))
+
geom_histogram(bins
= 8,
color
=“red”,
fill=“red”)+
labs(title=“Histograma
de Clo-
rofila
c”,
x=“Clorofila
c”,
y=“Frecuencia”)
p3 <-
gg-
plot(Datos_Proyecto,
aes(Car))
+
geom_histogram(bins
= 8,
color
=“green”,
fill=“green”)+
labs(title=“Histograma
de
Carotenos”,
x=“Carotenos”,
y=“Frecuencia”)
p4 <-
gg-
plot(Datos_Proyecto,
aes(PC))
+
geom_histogram(bins
= 8,

---
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Paula
Celis-
Plá”
date:
“2022-
10-04”
output:
pdf_document:
default
html_document:
default
edi-
tor_options:
mark-
down:
wrap:
72
---
gridExtra::grid.arrange(p1,
p2, p3,
p4, p5,
ncol =
2) “‘

r
gridExtra::grid.arrange(p6,
p7,
p8,
p9,
ncol =
2)

4.
Datos
bal-
ancea-
dos y
tablas
de fre-
cuencia
** Los
datos
estan
bal-
ancea-
dos
r
str(Datos_Proyecto)

---
title:
"Tarea_diplomado_Paula"
author:
"Dra.
Paula
Celis-
Plá"
date:
"2022-
10-04"
output:
pdf_document:
default
html_document:
default
edi-
tor_options:
mark-
down:
wrap:
72

```
##
tibble
[108 x
11]
(S3:
tbl_df/tbl/data.frame)
##  $
Seasons
:
Factor
w/ 4
levels
"Autumn","Spring",..:
1 1 1
1 1 1
1 1 1
1 ...
##  $
time
:
Factor
w/ 3
levels
"day
1","day
2",..:
1 1 1
1 1 1
1 1 1
2 ...
##  $
Chla
: num
[1:108]
1.04
1.6
1.52
1.48
1.14
```

---
title:
“Tarea_diplomado_Paula”
author:
“Dra.
Paula
Celis-
Plá”
date:
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10-04”
output:
pdf_document:
default
html_document:
default
edi-
tor_options:
mark-
down:
wrap:
72

```
r
knitr::kable(table(Datos_Proyecto$Seasons,
Datos_Proyecto$time),
caption
=
"Tabla
de
contingencia")
```
Table:
Tabla
de
contin-
gencia
| | day
1| day
2| day
3| |:——
|——:|—
–:|——:|
|Au-
tumn |
9| 9| 9|
|Spring
| 9| 9|
9|
|Sum-
mer |
9| 9| 9|
|Win-
ter | 9|
9| 9|

---
title:
“Tarea_diplomado_Paula”
author:
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Paula
Celis-
Plá”
date:
“2022-
10-04”
output:
pdf_document:
default
html_document:
default
edi-
tor_options:
mark-
down:
wrap:
72

5.
Relación
entre
vari-
ables
cuanti-
tativas
y fac-
tores
** No
se in-
cluiran
las vari-
ables
Sea-
sons,
time, y
Repli-
cate
porque
son
vari-
ables
categóri-
cas.
`r`
`summary(Datos_Proyecto)`

---
title:
"Tarea_diplomado_Paula"
author:
"Dra.
Paula
Celis-
Plá"
date:
"2022-
10-04"
output:
pdf_document:
default
html_document:
default
edi-
tor_options:
mark-
down:
wrap:
72

```
##
Seasons
time
Chla
Chlc
Car ##
Autumn:27
day
1:36
Min.
:0.6730
Min.
:0.01000
Min.
:0.4190
##
Spring:27
day
2:36
1st
Qu.:0.9888
1st
Qu.:0.06775
1st
Qu.:0.6240
##
Summer:27
day
3:36
Median
:1.1660
Median
:0.09500
Median
:0.7520
##
Winter:27
Mean
:1.1856
```

---
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Plá”
date:
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10-04”
output:
pdf_document:
default
html_document:
default
edi-
tor_options:
mark-
down:
wrap:
72

5.
Grafi-
cas de
cor-
relación
de vari-
ables
contin-
uas
(pear-
son)
```
r
pairs.panels(Datos_Proyecto[,3:11],
method
=
"pearson",
hist.col
=
"blue",
density
=
TRUE,
font=4)
```


---
title:
“Tarea_diplomado_Paula”
author:
“Dra.
Paula
Celis-
Plá”
date:
“2022-
10-04”
output:
pdf_document:
default
html_document:
default
edi-
tor_options:
mark-
down:
wrap:
72

** Se
mues-
tran
cor-
relación
entre
las
primeras
4 vari-
ables
contin-
uas
```
r
pairs.panels(Datos_Proyecto[,3:7],
method
=
"pearson",
hist.col
=
"blue",
density
=
TRUE,
font=2)
```


---
title:
“Tarea_diplomado_Paula”
author:
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Paula
Celis-
Plá”
date:
“2022-
10-04”
output:
pdf_document:
default
html_document:
default
edi-
tor_options:
mark-
down:
wrap:
72

** Se
mues-
tra
cor-
relación
entre
las se-
gundas
4 vari-
ables
contin-
uas
```
r
pairs.panels(Datos_Proyecto[,8:11],
method
=
"pearson",
hist.col
=
"blue",
density
=
TRUE,
font=2)
```


---
title:
“Tarea_diplomado_Paula”
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“Dra.
Paula
Celis-
Plá”
date:
“2022-
10-04”
output:
pdf_document:
default
html_document:
default
edi-
tor_options:
mark-
down:
wrap:
72

5.
Relación
entre
vari-
ables
contin-
uas y
fac-
tores
(box-
plot)
```
r
ggplot(Datos_Proyecto,
aes(x=
Seasons,
y=Chla))+geom_boxplot(fill="olivedrab1")+labs(title
=
"BoxPlot",
x=
"Seasons",
y=
"Clorofila
a")
```


---
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Plá”
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10-04”
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pdf_document:
default
html_document:
default
edi-
tor_options:
mark-
down:
wrap:
72

```
r
ggplot(Datos_Proyecto,
aes(x=
Seasons,
y=Chlc))+geom_boxplot(fill="red")+labs(title
=
"BoxPlot",
x=
"Seasons",
y=
"Clorofila
c")
```

```
r
ggplot(Datos_Proyecto,
aes(x=
Seasons,
y=Car))+geom_boxplot(fill="blue")+labs(title
=
"BoxPlot",
x=
"Seasons",
y=
"Carotenos")
```

---
title:
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Paula
Celis-
Plá”
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10-04”
output:
pdf_document:
default
html_document:
default
edi-
tor_options:
mark-
down:
wrap:
72

```
r
ggplot(Datos_Proyecto,
aes(x=
Seasons,
y=PC))+geom_boxplot(fill="green")+labs(title
=
"BoxPlot",
x=
"Seasons",
y=
"Compuestos
fenólicos")
```

```
r
ggplot(Datos_Proyecto,
aes(x=
Seasons,
y=DPPH))+geom_boxplot(fill="brown")+labs(title
=
"BoxPlot",
x=
"Seasons",
y=
"DPPH")
```

---
title:
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Plá”
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10-04”
output:
pdf_document:
default
html_document:
default
edi-
tor_options:
mark-
down:
wrap:
72

```
r
ggplot(Datos_Proyecto,
aes(x=
Seasons,
y=Temperature))+geom_boxplot(fill="blue")+labs(title
=
"BoxPlot",
x=
"Seasons",
y=
"Temperatura")
```

```
r
ggplot(Datos_Proyecto,
aes(x=
Seasons,
y=pH))+geom_boxplot(fill="green")+labs(title
=
"BoxPlot",
x=
"Seasons",
y=
"pH")
```

---
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10-04”
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pdf_document:
default
html_document:
default
edi-
tor_options:
mark-
down:
wrap:
72

```
r
ggplot(Datos_Proyecto,
aes(x=
Seasons,
y=Salinity))+geom_boxplot(fill="brown")+labs(title
=
"BoxPlot",
x=
"Seasons",
y=
"Salinity")
```

```
r
ggplot(Datos_Proyecto,
aes(x=
Seasons,
y=PAR))+geom_boxplot(fill="yellow")+labs(title
=
"BoxPlot",
x=
"Seasons",
y=
"Radiación
PAR")
```

---
title:
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Paula
Celis-
Plá”
date:
“2022-
10-04”
output:
pdf_document:
default
html_document:
default
edi-
tor_options:
mark-
down:
wrap:
72

6.
Identi-
fi-
cación
si
existen
errores,
datos
fal-
tantes
o error
atípico

---
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10-04”
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pdf_document:
default
html_document:
default
edi-
tor_options:
mark-
down:
wrap:
72

** En
la vari-
able
Salin-
idad,
existe
poca
disper-
sión de
los
datos
en las
esta-
ciones
de pri-
mavera
y
verano,
se reg-
istran
datos
muy
simi-
lares,
por
ellos se
ob-
servó
poca
disper-
sión.

---
title:
“Tarea_diplomado_Paula”
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Paula
Celis-
Plá”
date:
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10-04”
output:
pdf_document:
default
html_document:
default
edi-
tor_options:
mark-
down:
wrap:
72

** No
existen
datos
fal-
tantes
para
cada
vari-
able.
** Los
errores
típicos
en las
vari-
ables se
identifi-
can a
contin-
uación;

---
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output:
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  html_document: default
editor_options:
  markdown:
    wrap: 72

Variable Chlc : para la estación winter se registra un outlier Variable Car : para la estación summer se registra un outlier Variable PC : se registran 2 valores en Spring Variable Temperature: 3 valores en spring Variable pH : 5 valores en

---
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Plá”
date:
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10-04”
output:
pdf_document:
default
html_document:
default
edi-
tor_options:
mark-
down:
wrap:
72

7.
Re-
sumen
de los
datos
con
tablas
y
estadís-
tica
descrip-
tiva
```
r
Datos_Proyecto
<-
read_excel("Datos_Proyecto.xlsx"
,
sheet=
1)
head(Datos_Proyecto)
```

---
title:
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Paula
Celis-
Plá”
date:
“2022-
10-04”
output:
pdf_document:
default
html_document:
default
edi-
tor_options:
mark-
down:
wrap:
72

A
tibble:
6 x 11
##
Seasons
time
Chla
Chlc
Car
PC
DPPH
Temperature
pH
Salinity
PAR ##
<chr>
<chr>
<dbl>
<dbl>
<dbl>
<dbl>
<dbl>
<dbl>
<dbl>
<dbl>
<dbl>
1
Autumn
day 1
1.04
0.095
0.605
9.12
7.58
12.3
7.84
33.7
594.
2

---
title:
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Paula
Celis-
Plá”
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10-04”
output:
pdf_document:
default
html_document:
default
edi-
tor_options:
mark-
down:
wrap:
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```
r
select(Datos_Proyecto,
Chla,
Chlc,
Car,
DPPH)
```

---
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10-04”
output:
pdf_document:
default
html_document:
default
edi-
tor_options:
mark-
down:
wrap:
72

```
## # A
tibble:
108 x
4 ##
Chla
Chlc
Car
DPPH
##
<dbl>
<dbl>
<dbl>
<dbl>
##  1
1.04
0.095
0.605
7.58
##  2
1.60
0.155
0.954
6.08
##  3
1.52
0.143
0.931
7.81
##  4
1.48
0.152
0.905
7.02
##  5
1.14
0.108
0.694
7.20
##  6
```

---
title:
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Plá”
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10-04”
output:
pdf_document:
default
html_document:
default
edi-
tor_options:
mark-
down:
wrap:
72

“‘r
Datos_tab
<-
Datos_Proyecto
%>%
group_by(Seasons)
%>%
sum-
ma-
rize(n
= n(),
Prome-
dio_Chla
=
mean(Chla),
Max-
imo_Chla
=
max(Chla),
Prome-
dio_Chlc
=
mean(Chlc),
Max-
imo_Chlc
=
max(Chlc),
Prome-
dio_Car
=
mean(Car),
Max-
imo_Car
=
max(Car),
Prome-
dio_PC
=
mean(PC),

---
title:
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Paula
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Plá”
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10-04”
output:
pdf_document:
default
html_document:
default
edi-
tor_options:
mark-
down:
wrap:
72

Datos_tab
“‘

---
title:
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author:
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Paula
Celis-
Plá"
date:
"2022-
10-04"
output:
pdf_document:
default
html_document:
default
edi-
tor_options:
mark-
down:
wrap:
72

```
## # A
tibble:
4 x 20
##
Seasons
n
Promed~1
Maxim~2
Prome~3
Maxim~4
Prome~5
Maxim~6
Prome~7
Maxim~8
##
<chr>
<int>
<dbl>
<dbl>
<dbl>
<dbl>
<dbl>
<dbl>
<dbl>
<dbl>
## 1
Autumn
27
1.28
1.70
0.117
0.166
0.790
1.07
16.5
30.4
## 2
Spring
27
```

---
title:
“Tarea_diplomado_Paula”
author:
“Dra.
Paula
Celis-
Plá”
date:
“2022-
10-04”
output:
pdf_document:
default
html_document:
default
edi-
tor_options:
mark-
down:
wrap:
72

```
r
knitr::kable(Datos_tab,
caption
=
"Tabla
de
medidas
resumen")
```

Table:
Tabla
de me-
didas
re-
sumen

---
title:
“Tarea_diplomado_Paula”
author:
“Dra.
Paula
Celis-
Plá”
date:
“2022-
10-04”
output:
pdf_document:
default
html_document:
default
edi-
tor_options:
mark-
down:
wrap:
72

|Seasons
| n|
Prome-
dio_Chla|
Max-
imo_Chla|
Prome-
dio_Chlc|
Max-
imo_Chlc|
Prome-
dio_Car|
Max-
imo_Car|
Prome-
dio_PC|
Max-
imo_PC|
Prome-
dio_DPPH|
Max-
imo_DPPH|
Prome-
dio_Temperature|
Max-
imo_Temperature|
Prome-
dio_pH|
Max-
imo_pH|
Prome-
dio_Salinity|
Max-
imo_Salinity|
Prome-
dio_PAR|
Max-
imo_PAR|
|:—–-

---
title:
“Tarea_diplomado_Paula”
author:
“Dra.
Paula
Celis-
Plá”
date:
“2022-
10-04”
output:
pdf_document:
default
html_document:
default
edi-
tor_options:
mark-
down:
wrap:
72

“‘r
Datos_tab2
<-
Datos_Proyecto
%>%
group_by(time)
%>%
sum-
ma-
rize(n
= n(),
Prome-
dio_Chla
=
mean(Chla),
Max-
imo_Chla
=
max(Chla),
Prome-
dio_Chlc
=
mean(Chlc),
Max-
imo_Chlc
=
max(Chlc),
Prome-
dio_Car
=
mean(Car),
Max-
imo_Car
=
max(Car),
Prome-
dio_PC
=
mean(PC),

---
title:
“Tarea_diplomado_Paula”
author:
“Dra.
Paula
Celis-
Plá”
date:
“2022-
10-04”
output:
pdf_document:
default
html_document:
default
edi-
tor_options:
mark-
down:
wrap:
72

Datos_tab2
“‘

---
title:
“Tarea_diplomado_Paula”
author:
“Dra.
Paula
Celis-
Plá”
date:
“2022-
10-04”
output:
pdf_document:
default
html_document:
default
edi-
tor_options:
mark-
down:
wrap:
72

```
## # A
tibble:
3 x 20
##
time
n
Promedio~1
Maxim~2
Prome~3
Maxim~4
Prome~5
Maxim~6
Prome~7
Maxim~8
##
<chr>
<int>
<dbl>
<dbl>
<dbl>
<dbl>
<dbl>
<dbl>
<dbl>
## 1
day 1
36
1.12
1.62
0.0892
0.155
0.707
1.01
14.4
34.6
## 2
day 2
36
```

---
title:
“Tarea_diplomado_Paula”
author:
“Dra.
Paula
Celis-
Plá”
date:
“2022-
10-04”
output:
pdf_document:
default
html_document:
default
edi-
tor_options:
mark-
down:
wrap:
72

```
r
knitr::kable(Datos_tab2,
caption
=
"Tabla
de
medidas
resumen")
```

Table:
Tabla
de me-
didas
re-
sumen

---
title:
“Tarea_diplomado_Paula”
author:
“Dra.
Paula
Celis-
Plá”
date:
“2022-
10-04”
output:
pdf_document:
default
html_document:
default
edi-
tor_options:
mark-
down:
wrap:
72

|time |
n|
Prome-
dio_Chla|
Max-
imo_Chla|
Prome-
dio_Chlc|
Max-
imo_Chlc|
Prome-
dio_Car|
Max-
imo_Car|
Prome-
dio_PC|
Max-
imo_PC|
Prome-
dio_DPPH|
Max-
imo_DPPH|
Prome-
dio_Temperature|
Max-
imo_Temperature|
Prome-
dio_pH|
Max-
imo_pH|
Prome-
dio_Salinity|
Max-
imo_Salinity|
Prome-
dio_PAR|
Max-
imo_PAR|
|:—–|–

---
title:
“Tarea_diplomado_Paula”
author:
“Dra.
Paula
Celis-
Plá”
date:
“2022-
10-04”
output:
pdf_document:
default
html_document:
default
edi-
tor_options:
mark-
down:
wrap:
72

8.
Utiliza
Paque-
tes
para
impor-
tar
datos a
R como
readxl
o
similar
y pa-
quetes
tidyr,
dplyr,
ggplot2
`r`
`messy`
`<-`
`read_excel("Datos_Proyecto.xlsx")`
`Datos_Proyecto$Seasons`
`<-`
`as.factor(Datos_Proyecto$Seasons)`
`Datos_Proyecto$time`
`<-`
`as.factor(Datos_Proyecto$time)`
`summary(Datos_Proyecto)`

---
title:
“Tarea_diplomado_Paula”
author:
“Dra.
Paula
Celis-
Plá”
date:
“2022-
10-04”
output:
pdf_document:
default
html_document:
default
edi-
tor_options:
mark-
down:
wrap:
72

```
##
Seasons
time
Chla
Chlc
Car ##
Autumn:27
day
1:36
Min.
:0.6730
Min.
:0.01000
Min.
:0.4190
##
Spring:27
day
2:36
1st
Qu.:0.9888
1st
Qu.:0.06775
1st
Qu.:0.6240
##
Summer:27
day
3:36
Median
:1.1660
Median
:0.09500
Median
:0.7520
##
Winter:27
Mean
:1.1856
```

---
title:
“Tarea_diplomado_Paula”
author:
“Dra.
Paula
Celis-
Plá”
date:
“2022-
10-04”
output:
pdf_document:
default
html_document:
default
edi-
tor_options:
mark-
down:
wrap:
72

```
r
summary(messy)
```

---
title:
"Tarea_diplomado_Paula"
author:
"Dra.
Paula
Celis-
Plá"
date:
"2022-
10-04"
output:
pdf_document:
default
html_document:
default
edi-
tor_options:
mark-
down:
wrap:
72

```
##
Seasons
time
Chla
Chlc
##
Length:108
Length:108
Min.
:0.6730
Min.
:0.01000
##
Class
:character
Class
:character
1st
Qu.:0.9888
1st
Qu.:0.06775
##
Mode
:character
Mode
:character
Median
:1.1660
Median
:0.09500
##
Mean
:1.1856
Mean
:0.09365
##
3rd
Qu.:1.3813
3rd
```

---
title:
“Tarea_diplomado_Paula”
author:
“Dra.
Paula
Celis-
Plá”
date:
“2022-
10-04”
output:
pdf_document:
default
html_document:
default
edi-
tor_options:
mark-
down:
wrap:
72

9.
Pro-
poner
hipóte-
sis y
realiza
análisis
estadís-
tico de
los
datos,
incluye
evalu-
ación
de
supuestos
si corre-
sponde

---
title: "Tarea_diplomado_Paula"
author: "Dra. Paula Celis-Plá"
date: "2022-10-04"
output:
  pdf_document: default
  html_document: default
editor_options:
  markdown:
    wrap: 72

Hipótesis Nula: Existe una estructura de grupos separados por las variables categoricas estacionalidad y día.
Hipótesis alternativa: No existe una estructura de grupos separados por las variables categoricas estacionalidad y día.

---
title:
“Tarea_diplomado_Paula”
author:
“Dra.
Paula
Celis-
Plá”
date:
“2022-
10-04”
output:
pdf_document:
default
html_document:
default
edi-
tor_options:
mark-
down:
wrap:
72

```
r
library(readxl)
library(ggplot2)
library(dplyr)
library(knitr)
library(pander)
library(psych)
#
Graficas
de
correlación
library(factoextra)
#
distancia
euclideana
##
Welcome!
Want
to
learn
more?
See
two
factoextra-related
books
at
https://goo.gl/ve3WBa
```

---
title:
“Tarea_diplomado_Paula”
author:
“Dra.
Paula
Celis-
Plá”
date:
“2022-
10-04”
output:
pdf_document:
default
html_document:
default
edi-
tor_options:
mark-
down:
wrap:
72

```
r
library(vegan)
#
Community
Ecology
Package:
Ordination,
Diversity
and
Dissimilarities
##
Loading
required
package:
permute
##
Loading
required
package:
lattice
##
This
is
vegan
2.6-4
r
library(dendextend)
#
extiende
opciones
de
visualización
```

---
title:
“Tarea_diplomado_Paula”
author:
“Dra.
Paula
Celis-
Plá”
date:
“2022-
10-04”
output:
pdf_document:
default
html_document:
default
edi-
tor_options:
mark-
down:
wrap:
72

```
##
Registered
S3
method
overwritten
by
'dendextend':
##
method
from
##
rev.hclust
vegan
```

---
title:
"Tarea_diplomado_Paula"
author:
"Dra.
Paula
Celis-
Plá"
date:
"2022-
10-04"
output:
pdf_document:
default
html_document:
default
edi-
tor_options:
mark-
down:
wrap:
72

```
## ##
----------------------
##
Welcome
to
dendextend
version
1.16.0
##
Type
citation('dendextend')
for
how to
cite
the
package.
## ##
Type
browseVignettes(package
=
'dendextend')
for
the
package
vignette.
## The
github
page
is:
https://github.com/talgalili/dendextend/
## ##
Suggestions
and
bug-reports
can be
submitted
at:
https://github.com/talgalili/dendextend/issues
## You
```

---
title:
“Tarea_diplomado_Paula”
author:
“Dra.
Paula
Celis-
Plá”
date:
“2022-
10-04”
output:
pdf_document:
default
html_document:
default
edi-
tor_options:
mark-
down:
wrap:
72

```
## ##
Attaching
package:
'dendextend'
## The
following
object
is
masked
from
'package:permute':
## ##
shuffle
## The
following
object
is
masked
from
'package:stats':
## ##
cutree
# Im-
portar
datos
proyecto.
r
datos_PCA
<-
read_excel("Datos_Proyecto.xlsx",
sheet
= 1)
summary(datos_PCA)
```

---
title:
“Tarea_diplomado_Paula”
author:
“Dra.
Paula
Celis-
Plá”
date:
“2022-
10-04”
output:
pdf_document:
default
html_document:
default
edi-
tor_options:
mark-
down:
wrap:
72

```
##
Seasons
time
Chla
Chlc
##
Length:108
Length:108
Min.
:0.6730
Min.
:0.01000
##
Class
:character
Class
:character
1st
Qu.:0.9888
1st
Qu.:0.06775
##
Mode
:character
Mode
:character
Median
:1.1660
Median
:0.09500
##
Mean
:1.1856
Mean
:0.09365
##
3rd
Qu.:1.3813
3rd
```

---
title:
“Tarea_diplomado_Paula”
author:
“Dra.
Paula
Celis-
Plá”
date:
“2022-
10-04”
output:
pdf_document:
default
html_document:
default
edi-
tor_options:
mark-
down:
wrap:
72

```
r
datos_PCA$Seasons
<-
as.factor(datos_PCA$Seasons)
datos_PCA$time
<-
as.factor(datos_PCA$time)
head(datos_PCA[,3:11])
%>%
pander(caption
="Variables
ecofisiologicas
y
ambientales
en
Lessonia
spicata")
```

Chla	Chlc	Car	PC	DPPH	Temperature	pH	Salinity	PAR
1.04	0.095	0.605	9.12	7.578	12.29	7.84	33.74	594

1.597 0.155 0.954 13.87 6.085 12.29 7.84 33.74 594

1.521 0.143 0.931 15.83 7.812 12.29 7.84 33.74 594

1.479 0.152 0.905 19.89 7.015 12.29 7.85 17.87 1563

1.139 0.108 0.694 19.81 7.201 12.29 7.85 17.87 1563

1.166 0.115 0.752 21.64 5.119 12.29 7.85 17.87 1563

Table: Variables ecofisiologicas y ambientales en Lessonia spicata

```
str(datos_PCA)
```

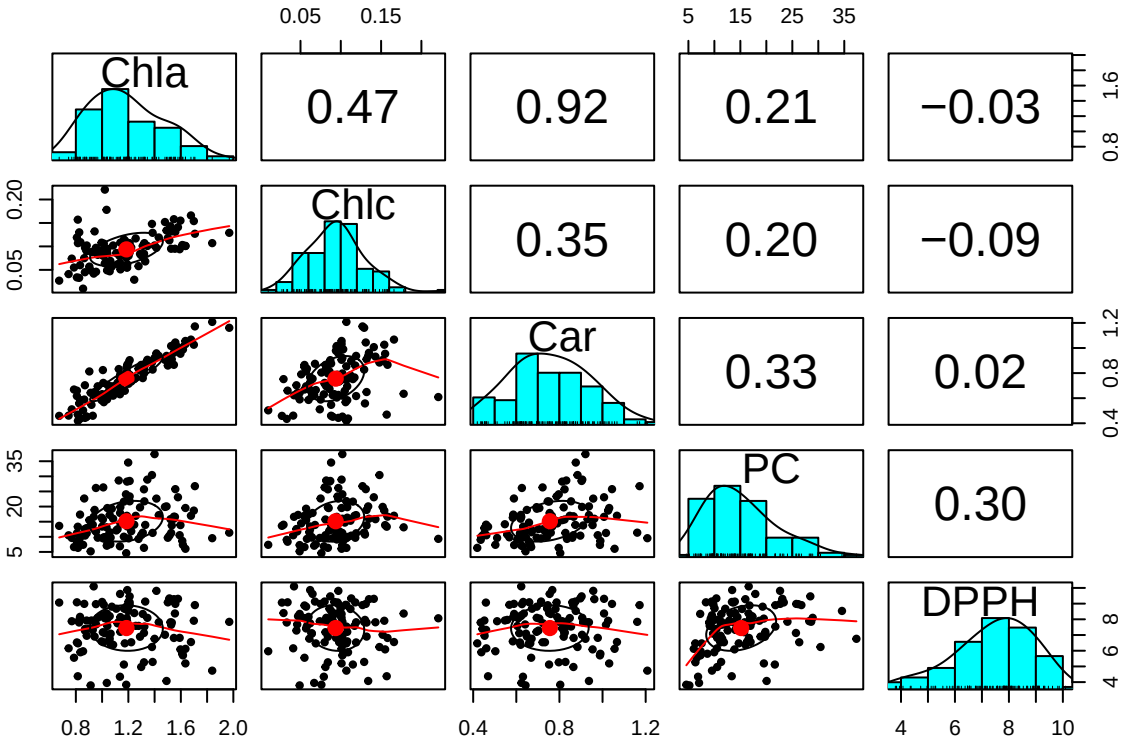
```
## tibble [108 x 11] (S3: tbl_df/tbl/data.frame)
##  $ Seasons    : Factor w/ 4 levels "Autumn","Spring",..: 1 1 1 1 1 1 1 1 1 1 ...
##  $ time       : Factor w/ 3 levels "day 1","day 2",..: 1 1 1 1 1 1 1 1 1 2 ...
##  $ Chla       : num [1:108] 1.04 1.6 1.52 1.48 1.14 ...
##  $ Chlc       : num [1:108] 0.095 0.155 0.143 0.152 0.108 0.115 0.148 0.105 0.102 0.134 ...
##  $ Car        : num [1:108] 0.605 0.954 0.931 0.905 0.694 0.752 0.884 0.659 0.62 0.937 ...
##  $ PC         : num [1:108] 9.12 13.87 15.83 19.89 19.81 ...
##  $ DPPH       : num [1:108] 7.58 6.08 7.81 7.02 7.2 ...
##  $ Temperature: num [1:108] 12.3 12.3 12.3 12.3 12.3 ...
##  $ pH         : num [1:108] 7.84 7.84 7.84 7.85 7.85 7.85 7.88 7.88 7.88 7.84 ...
##  $ Salinity   : num [1:108] 33.7 33.7 33.7 17.9 17.9 ...
##  $ PAR        : num [1:108] 594 594 594 1563 1563 ...
```

```
datos_PCA_mat <- as.matrix(datos_PCA[,-c(1:2)])
str(datos_PCA_mat)
```

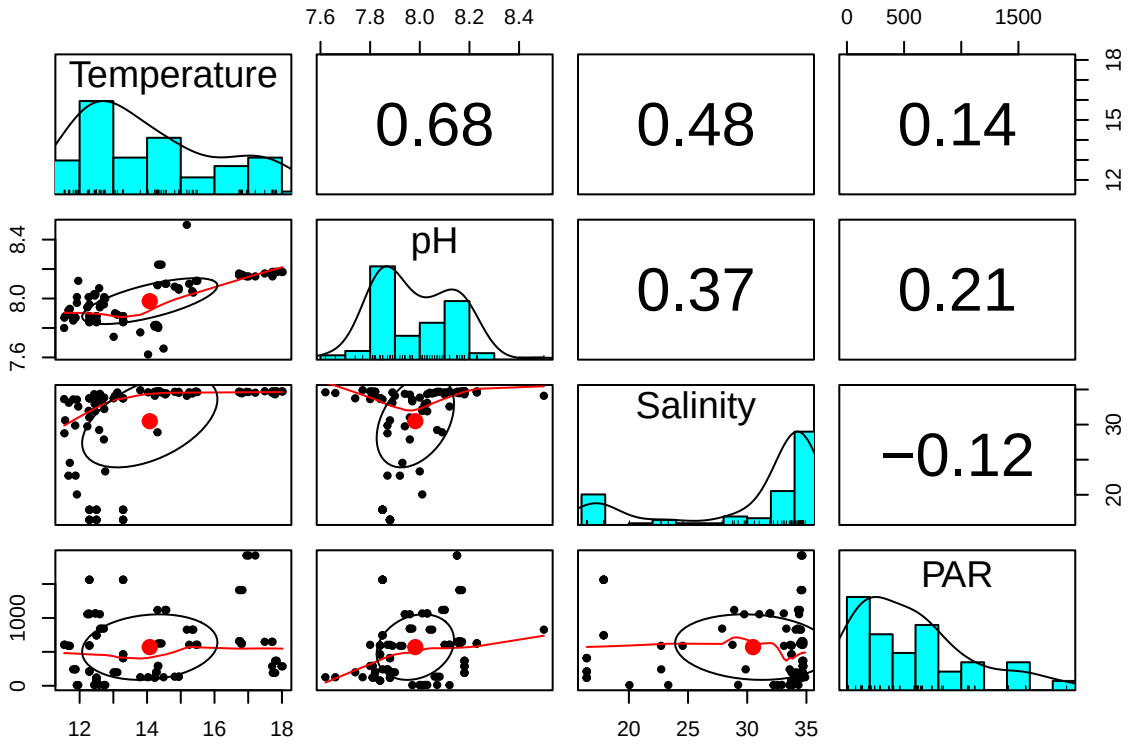
```
##  num [1:108, 1:9] 1.04 1.6 1.52 1.48 1.14 ...
##  - attr(*, "dimnames")=List of 2
##   ..$ : NULL
##   ..$ : chr [1:9] "Chla" "Chlc" "Car" "PC" ...
```

Correlación entre variables

```
pairs.panels(datos_PCA_mat[,1:5], method = "pearson")
```




```
pairs.panels(datos_PCA_mat[,6:9], method = "pearson")
```



Realiza PCA

```
PCA_Lesso <- prcomp(datos_PCA_mat, scale = TRUE)
PCA_Lesso
```

```
## Standard deviations (1, .., p=9):
## [1] 1.6906902 1.4143173 1.0817007 1.0174003 0.8313044 0.7367822 0.6898727
## [8] 0.4164170 0.2298930
##
## Rotation (n x k) = (9 x 9):
##                     PC1         PC2         PC3         PC4         PC5
## Chla        0.4568817 -0.34350662  0.22454424  0.12629866 -0.24706846
## Chlc        0.1751132 -0.51747885 -0.06730790  0.04046899  0.08370557
## Car         0.5000382 -0.24411934  0.17696923  0.15742553 -0.18111272
## PC          0.3194451 -0.03579808 -0.58459611  0.09918040  0.54291925
## DPPH        0.1367811  0.22149655 -0.67868393  0.10946599 -0.60014662
## Temperature 0.4805548  0.32225376  0.01808790  0.01615086  0.17659091
## pH          0.3229442  0.39571168  0.17996698 -0.28930770  0.29540096
## Salinity    0.1609386  0.48974551  0.27345642  0.27704648 -0.25120508
## PAR         0.1693368 -0.06321772 -0.06223532 -0.88039424 -0.25032258
##                     PC6         PC7         PC8          PC9
## Chla         0.169407469 -0.11620759  0.09036154  0.7039032070
## Chlc        -0.815836745  0.05543266 -0.09303314 -0.1051605698
## Car          0.304511115 -0.01829578  0.17626415 -0.6908936552
## PC           0.177673023  0.35675969  0.27987993  0.1146503236
## DPPH        -0.132467634 -0.28410415  0.03181368 -0.0135873412
## Temperature  0.006091989 -0.01917040 -0.79563051 -0.0038316299
## pH          -0.265955836 -0.52941888  0.42981859  0.0031091494
## Salinity    -0.302870960  0.60840260  0.23442065  0.0526626327
```

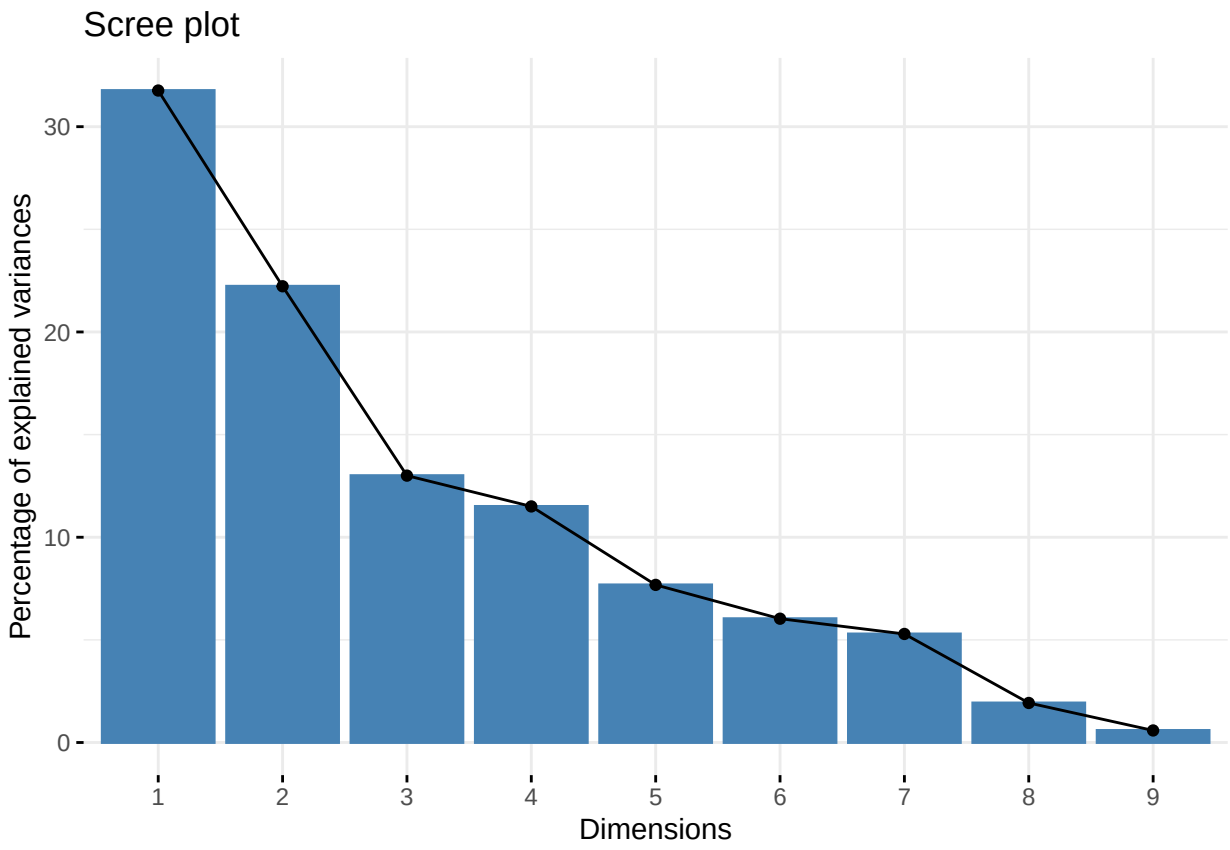
```
## PAR          0.036995683  0.35254795 -0.00638049 -0.0006879714
```

Varianza explicada

```
get_eigenvalue(PCA_Lesso)
```

```
##       eigenvalue variance.percent cumulative.variance.percent
## Dim.1 2.85843341        31.760371                     31.76037
## Dim.2 2.00029353        22.225484                     53.98585
## Dim.3 1.17007637        13.000849                     66.98670
## Dim.4 1.03510343        11.501149                     78.48785
## Dim.5 0.69106702         7.678522                     86.16638
## Dim.6 0.54284803         6.031645                     92.19802
## Dim.7 0.47592430         5.288048                     97.48607
## Dim.8 0.17340312         1.926701                     99.41277
## Dim.9 0.05285079         0.587231                    100.00000
```

```
fviz_eig(PCA_Lesso)
```

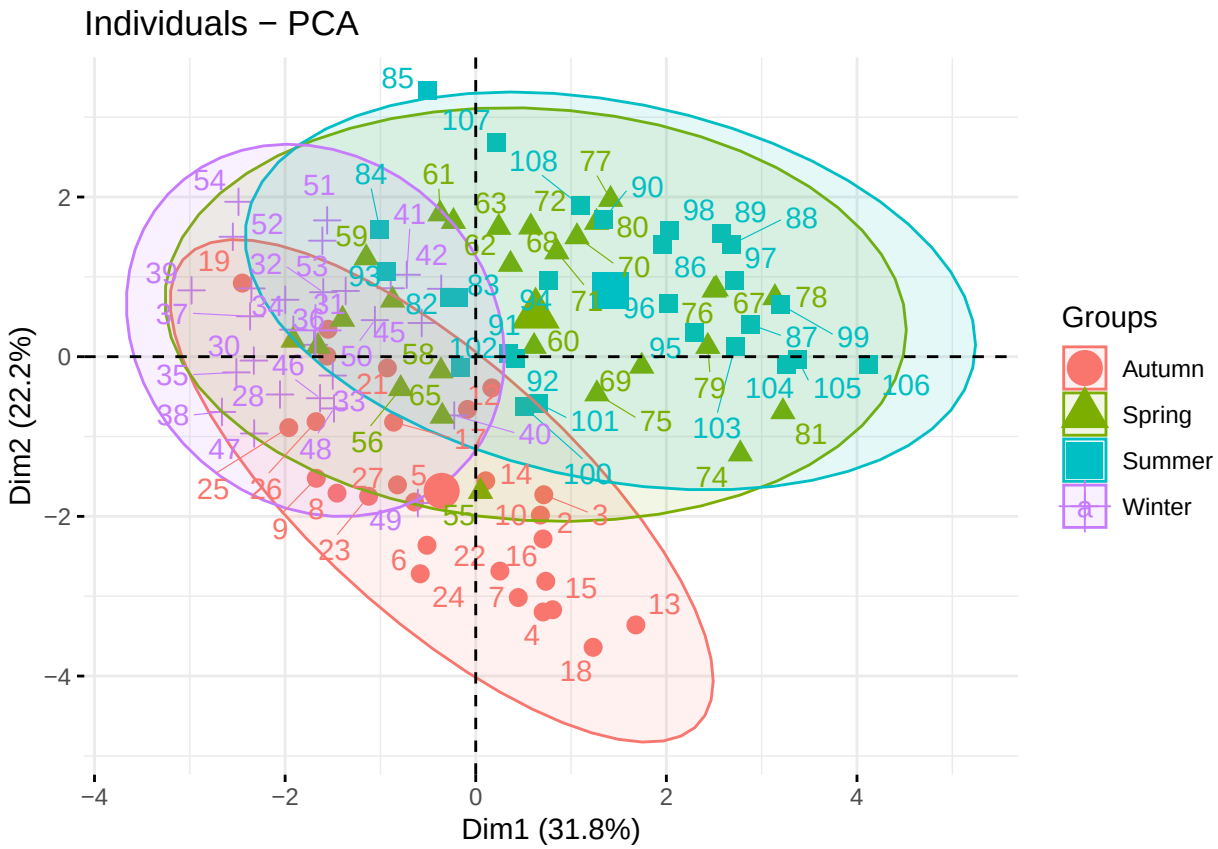


Grafica por sitio

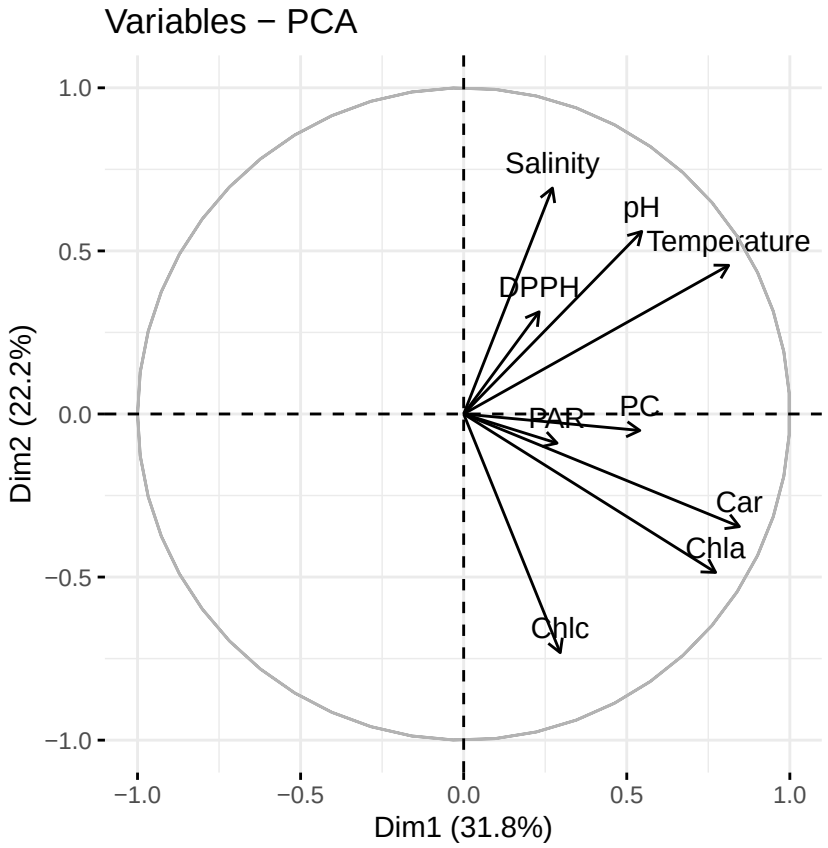
```
fviz_pca_ind(PCA_Lesso,
             repel = TRUE,
             habillage = datos_PCA$Seasons,
             addEllipses = TRUE,
             pointsize = 3)
```

```
## Warning: ggrepel: 10 unlabeled data points (too many overlaps). Consider
```

```
## increasing max.overlaps
```

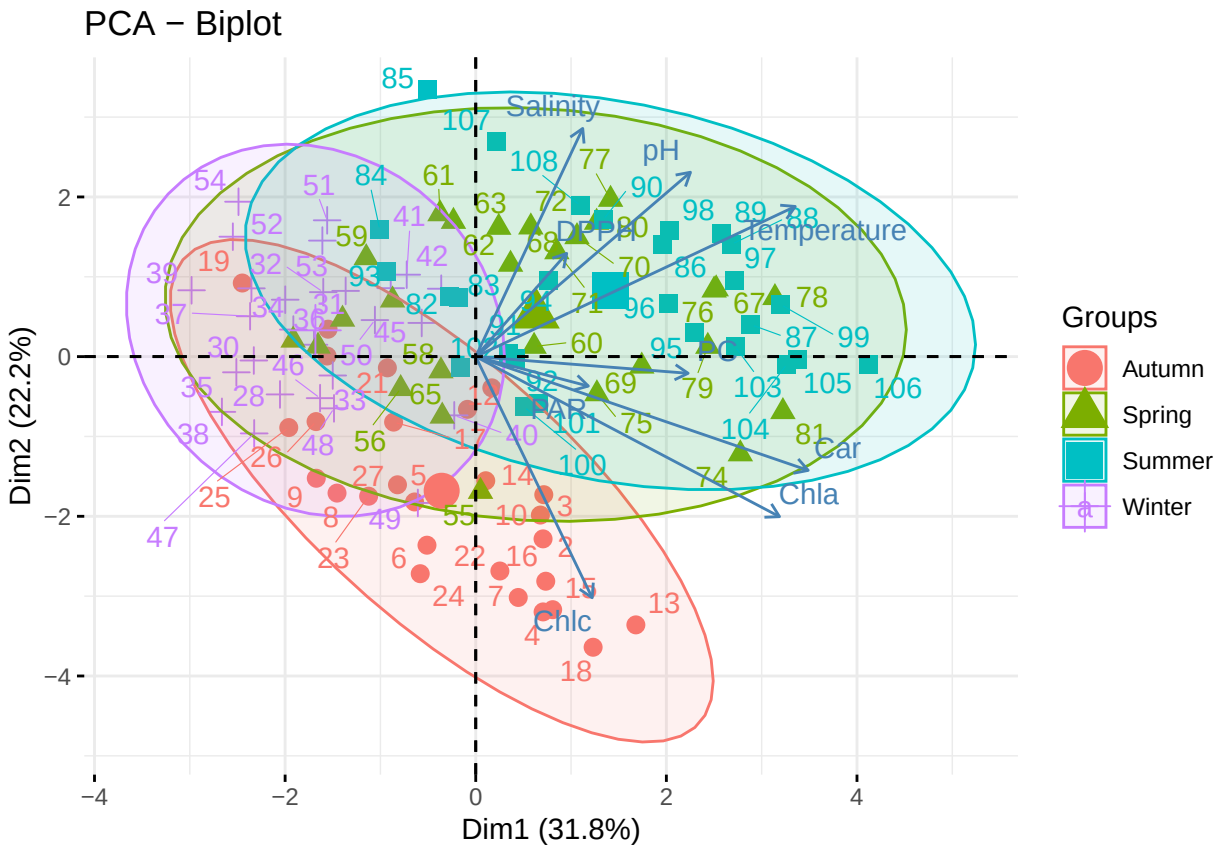



```
fviz_pca_var(PCA_Lesso)
```




```
fviz_pca_biplot(PCA_Lesso,
                repel = TRUE,
                habillage = datos_PCA$Seasons,
                addEllipses = TRUE,
                pointsize = 3)
```

```
## Warning: ggrepel: 10 unlabeled data points (too many overlaps). Consider
## increasing max.overlaps
```



Crea nuevas variables estandarizadas

```
val_estandarizado <- datos_PCA %>%
  select(Chla, Chlc, Car, PC, DPPH, Temperature, pH, Salinity, PAR) %>%
  mutate(Chla1 = (Chla - mean(Chla)) / sd(Chla),Chlc1 = (Chlc - mean(Chlc)) / sd(Chlc), Car1 = (Car - me
    PC1 = (PC - mean(PC)) / sd(PC), DPPH1 = (DPPH - mean(DPPH)) / sd(DPPH), Temperature1 = (Temperature
```

Calcula matriz de distancia

```
dist_euclidea <- dist(val_estandarizado[10:18]) #distancia euclidiana
```

Realiza PERMANOVA

```
permanova <- adonis2(dist_euclidea ~ Seasons*time , method = "bray", data=datos_PCA, permutations=999)

permanova %>% pander()
```

Table 3: Permutation test for adonis under reduced model

	Df	SumOfSqs	R2	F	Pr(>F)
Seasons	3	319.2	0.3315	18.78	0.001
time	2	27.95	0.02903	2.466	0.009
Seasons:time	6	71.83	0.07459	2.113	0.001

	Df	SumOfSqs	R2	F	Pr(>F)
Residual	96	544	0.5649	NA	NA
Total	107	963	1	NA	NA

```
dist_euclidea <- stats::dist(val_estandarizado[10:18], method = "euclidean")
```

10. Presenta, interpreta resultados y realiza conclusión