

DA_Anova.R

zupap

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```
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# Ingresar datos -----
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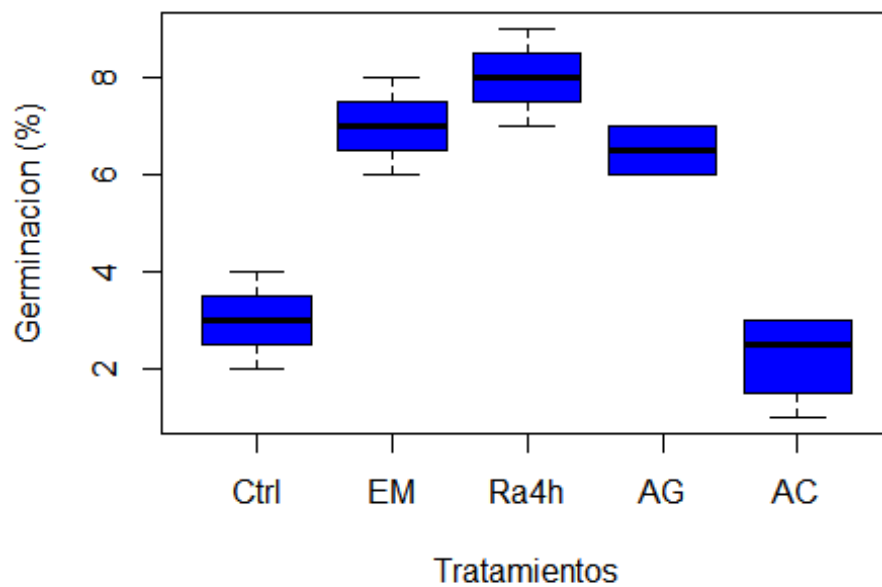
# Ingresar datos del diseño aleatorio
# 5 tratamientos germinativos
# 4 repeticiones cada tratamiento

germ <- c(3, 3, 4, 2, 7, 8, 7, 6, 8, 9, 8, 7,
          6, 7, 7, 6, 3, 2, 1, 3)

trat <- gl(5, 4, 20, labels = c ("Ctrl", "EM", "Ra4h", "AG", "AC"))

Exper <- data.frame(trat, germ)

boxplot(Exper$germ ~ Exper$trat, col = "blue",
        xlab = "Tratamientos", ylab = "Germinacion (%)")
```



```
# Revisar normalidad
shapiro.test(Exper$germ)

##
##  Shapiro-Wilk normality test
##
## data:  Exper$germ
## W = 0.90183, p-value = 0.04462

# Revisa la igualdad de varianzas
bartlett.test(Exper$germ, Exper$trat)

##
##  Bartlett test of homogeneity of variances
##
## data:  Exper$germ and Exper$trat
## Bartlett's K-squared = 0.65675, df = 4, p-value = 0.9566

# Media general
MG <- mean(Exper$germ)

med.trat <- tapply(Exper$germ, Exper$trat, mean)
med.trat

## Ctrl  EM Ra4h  AG  AC
## 3.00  7.00  8.00  6.50  2.25
```

```

var.trat <- tapply(Exper$germ, Exper$trat, var)
var.trat

##      Ctrl      EM      Ra4h      AG      AC
## 0.6666667 0.6666667 0.6666667 0.3333333 0.9166667

Exper$SC <- (Exper$germ - MG)^2

# Suma de cuadrados del experimento Sctot
Sctot <- sum(Exper$SC)
Sctot

## [1] 114.55

# Suma de cuadrados del experimento

SCtrat <- sum((med.trat-MG)^2 * 4)
SCtrat

## [1] 104.8

# Suma de cuadrado del error
Sctot - SCtrat

## [1] 9.75

SCtrat/4

## [1] 26.2

9.7/15

## [1] 0.6466667

26.2/0.6466667

## [1] 40.51546

# Anova usando funcion aov

Exp.aov <- aov(Exper$germ ~ Exper$trat)
summary(Exp.aov)

##              Df Sum Sq Mean Sq F value    Pr(>F)
## Exper$trat    4 104.80   26.20   40.31 7.42e-08 ***
## Residuals   15   9.75    0.65
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

# Prueba de tukey ya que existen diferencias de Los tratamientos de germinacion
TukeyHSD(Exp.aov)

```

```
## Tukey multiple comparisons of means
## 95% family-wise confidence level
##
## Fit: aov(formula = Exper$germ ~ Exper$trat)
##
## $`Exper$trat`
##      diff      lwr      upr    p adj
## EM-Ctrl  4.00  2.2396122  5.7603878 0.0000356
## Ra4h-Ctrl 5.00  3.2396122  6.7603878 0.0000024
## AG-Ctrl  3.50  1.7396122  5.2603878 0.0001587
## AC-Ctrl -0.75 -2.5103878  1.0103878 0.6862491
## Ra4h-EM  1.00 -0.7603878  2.7603878 0.4332120
## AG-EM -0.50 -2.2603878  1.2603878 0.9009428
## AC-EM -4.75 -6.5103878 -2.9896122 0.0000045
## AG-Ra4h -1.50 -3.2603878  0.2603878 0.1140897
## AC-Ra4h -5.75 -7.5103878 -3.9896122 0.0000004
## AC-AG -4.25 -6.0103878 -2.4896122 0.0000175

plot(TukeyHSD(Exp.aov))
```

95% family-wise confidence level

