Tarea_18_sep_2025.R

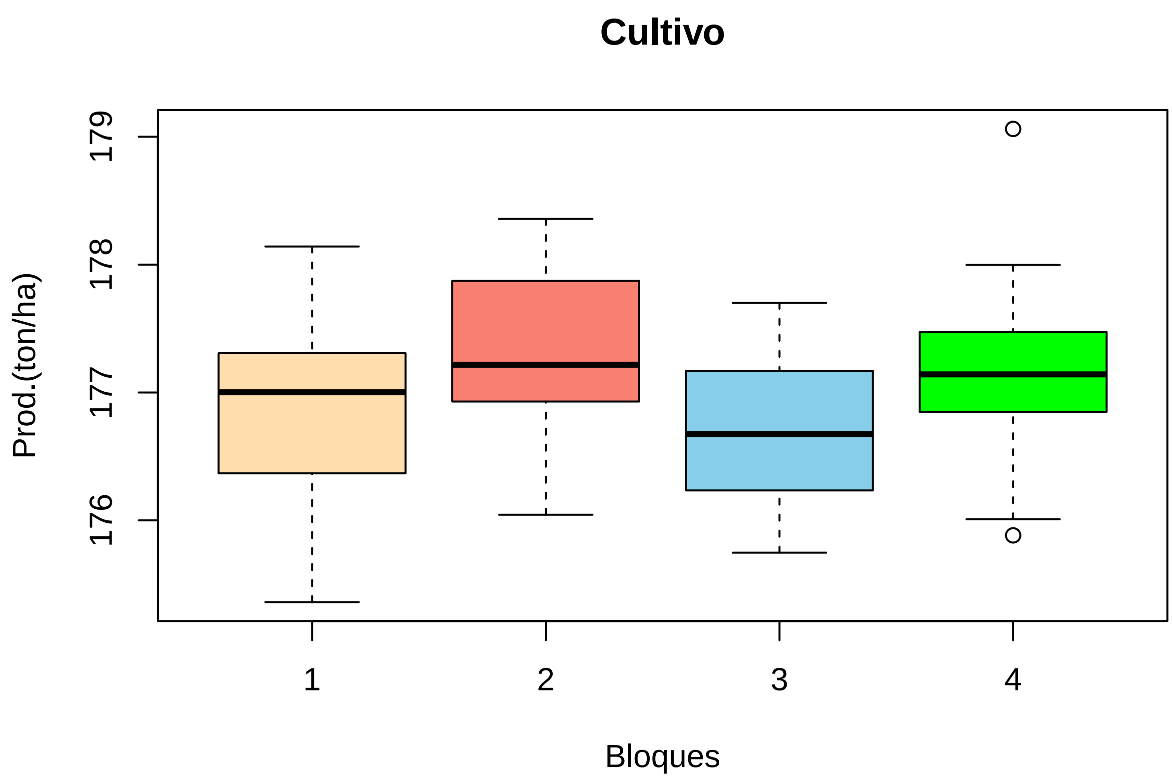
Ramon

2025-09-21

```r
#  RamónCopado García

#Análisis de Variaza
#Productividad de cultivo

#Anova unifactorial o de un solo factor

crop <-read.csv("crop_data.csv",header = T)

#Lo siguiente es para poder usar los numeros como factores
crop$block<-as.factor(crop$block)
crop$fertilizer<-as.factor(crop$fertilizer)
summary(crop)
```

```
##     density     block   fertilizer      yield
##  Min.   :1.0   1:24   1:32        Min.   :175.4
##  1st Qu.:1.0   2:24   2:32        1st Qu.:176.5
##  Median :1.5   3:24   3:32        Median :177.1
##  Mean   :1.5   4:24               Mean   :177.0
##  3rd Qu.:2.0                      3rd Qu.:177.4
##  Max.   :2.0                      Max.   :179.1
```

```r
colores <-c ("navajowhite", "salmon", "skyblue", "green")

# Crear un boxplot Bloque

boxplot (crop$yield ~ crop$block,
         col = colores,
         main = "Cultivo",
         xlab = "Bloques",
         ylab = "Prod.(ton/ha)")
```




```r
tapply(crop$yield, crop$block, mean)
```

```
##        1        2        3        4
## 176.8564 177.3169 176.7126 177.1760
```

```r
tapply(crop$yield, crop$block, sd)
```

```
##         1         2         3         4
## 0.6276010 0.6450171 0.5906473 0.6492183
```

```r
tapply(crop$yield, crop$block, var)
```

```
##         1         2         3         4
## 0.3938831 0.4160471 0.3488642 0.4214844
```

```r
#aplicar prueba de normalidad de datos
shapiro.test(subset(crop$yield, crop$block=="1"))
```

```
##
##  Shapiro-Wilk normality test
##
## data:  subset(crop$yield, crop$block == "1")
## W = 0.97422, p-value = 0.7704
```

```r
shapiro.test(subset(crop$yield, crop$block=="2"))
```

```
##
##  Shapiro-Wilk normality test
##
## data:  subset(crop$yield, crop$block == "2")
## W = 0.95918, p-value = 0.4221
```

```r
shapiro.test(subset(crop$yield, crop$block=="3"))
```

```
##
##  Shapiro-Wilk normality test
##
## data:  subset(crop$yield, crop$block == "3")
## W = 0.94516, p-value = 0.2124
```

```r
shapiro.test(subset(crop$yield, crop$block=="4"))
```

```
##
##  Shapiro-Wilk normality test
##
## data:  subset(crop$yield, crop$block == "4")
## W = 0.94496, p-value = 0.2102
```

```r
#Prueba de Bartlett
bartlett.test(crop$yield~crop$block)#sirve para tres varianzas que comparar
```

```
##
##  Bartlett test of homogeneity of variances
##
## data:  crop$yield by crop$block
## Bartlett's K-squared = 0.24693, df = 3, p-value = 0.9697
```

```r
#Ho = 1=2=3=4
#1Ha = 1=2=3 no igual 4
#2Ha = 1=2=4 no igual 3
#3Ha = 1=3=4 no igual 2
#4Ha = 2=3=1 no igual 4
#5Ha = 3=2=1 no igual 4

#Se acepta Ha

#Prueba ANOVA
crop.aov<-aov(crop$yield~crop$block+crop$block)
summary(crop.aov)
```

```
##             Df Sum Sq Mean Sq F value  Pr(>F)
## crop$block   3   5.61  1.8693   4.732 0.00409 **
## Residuals   92  36.35  0.3951
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

```r
crop.aov<-aov(crop$yield~crop$block*crop$block)
summary(crop.aov)
```

```
##             Df Sum Sq Mean Sq F value  Pr(>F)
## crop$block   3   5.61  1.8693   4.732 0.00409 **
## Residuals   92  36.35  0.3951
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

```r
crop.aov<-aov(crop$yield~crop$block)
summary(crop.aov)
```

```
##             Df Sum Sq Mean Sq F value  Pr(>F)
## crop$block   3   5.61  1.8693   4.732 0.00409 **
## Residuals   92  36.35  0.3951
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

```r
# LSD determinar el valor
qt(.975,93)
```

```
## [1] 1.985802
```

```r
sqrt((3*0.3951)/24)*qt(.975,93) #diferencia mínima de las medias que debe existir
```

```
## [1] 0.4413107
```

```r
tapply(crop$yield, crop$block, mean)
```

```
##        1        2        3        4
## 176.8564 177.3169 176.7126 177.1760
```

```r
#Primer diferencia de medias F1 vs F2
176.8564 - 177.3169 #si hay diferencia
```

```
## [1] -0.4605
```

```r
#Segunda diferencia de medias F1 vs F3
176.8564 - 176.7126 #no hay diferencia
```

```
## [1] 0.1438
```

```r
#Tercer diferencia de medias F1 vs F4
176.8564 - 177.1760 #no hay diferencia
```

```
## [1] -0.3196
```

```r
#Cuarta diferencia de medias F2 vs F3
177.3169 - 176.7126 #si hay deferencia
```

```
## [1] 0.6043
```

```r
#Quinta diferencia de medias F2 vs F4
177.3169 - 177.1760 #no hay diferencia
```

```
## [1] 0.1409
```

```r
#Sexta diferencia de medias F3 vs F4
176.7126 - 177.1760 #si hay diferencia
```

```
## [1] -0.4634
```

```r
# Prueba Tukey
sqrt((3*0.3951)/24)*qtukey(.95, nmeans = 4, df = 93) #diferencia mínima de las
```

```
## [1] 0.8221997
```

```r
#Primer diferencia de medias F1 vs F2
176.8564 - 177.3169 #si hay diferencia
```

```
## [1] -0.4605
```

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```

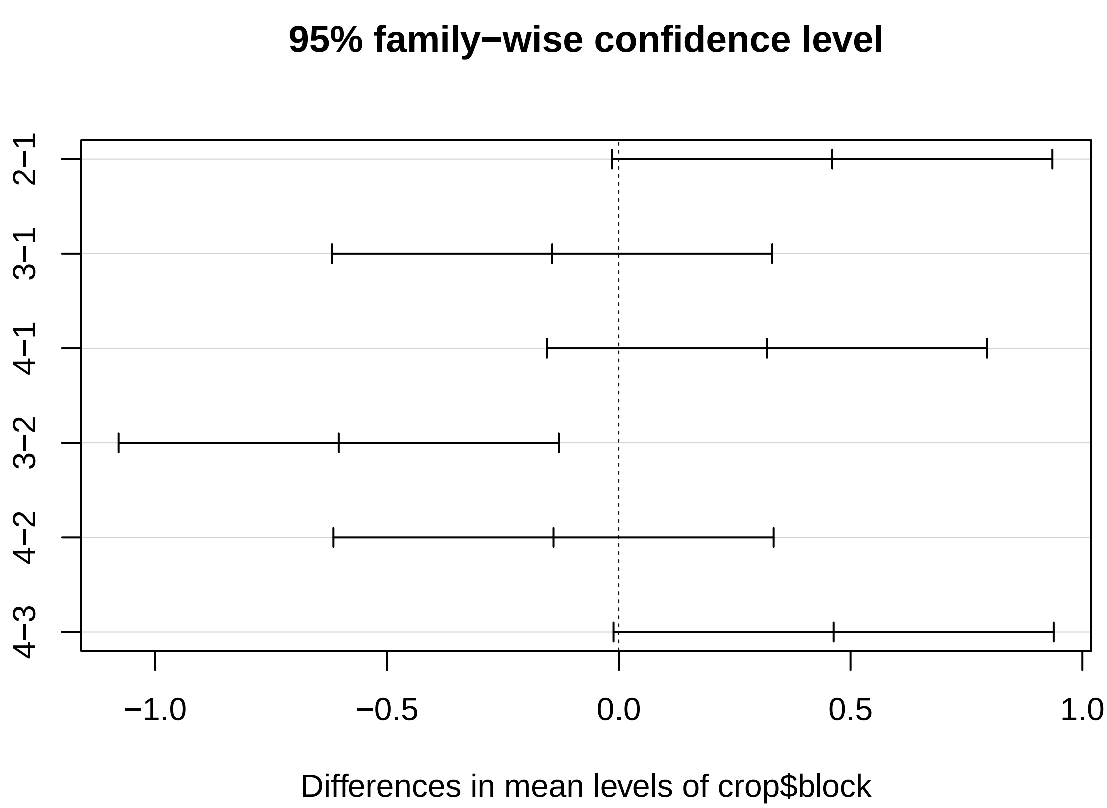
```
## [1] -0.4634
```

```r
#Gráficar con Tukey

TukeyHSD(crop.aov)#aqui si hay diferencias como en el LSD
```

```
##   Tukey multiple comparisons of means
##     95% family-wise confidence level
##
## Fit: aov(formula = crop$yield ~ crop$block)
##
## $`crop$block`
##           diff         lwr        upr     p adj
## 2-1  0.4604949 -0.01427820  0.9352679 0.0607253
## 3-1 -0.1437765 -0.61854958  0.3309966 0.8577312
## 4-1  0.3196407 -0.15513236  0.7944138 0.2984466
## 3-2 -0.6042714 -1.07904445 -0.1294983 0.0067392
## 4-2 -0.1408542 -0.61562723  0.3339189 0.8649907
## 4-3  0.4634172 -0.01135585  0.9381903 0.0583842
```

```r
plot(TukeyHSD(crop.aov))
```



```r
# Se aceptan las hipótesis 1Ha, 4Ha y 6Ha
```