

clase-5.R

Usuario1

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```
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# Clase 5

arena <- c(6, 10, 8, 6, 14, 17, 9, 11, 7, 11)
arcilla <- c(17, 15, 3, 11, 14, 12, 12, 8, 10, 13)
limo <- c(13, 16, 9, 12, 15, 16, 17, 13, 18, 14)

y.ton <- c(arena, arcilla, limo)

suelo <- gl(3, 10, 30, labels=c("arena", "arcilla", "limo"))
prod <- data.frame(suelo, y.ton)
head(prod)

##      suelo y.ton
## 1 arena      6
## 2 arena     10
## 3 arena      8
## 4 arena      6
## 5 arena     14
## 6 arena     17

tapply(prod$y.ton, prod$suelo, mean)

##      arena arcilla      limo
##      9.9      11.5      14.3

tapply(prod$y.ton, prod$suelo, var)

##      arena      arcilla      limo
## 12.544444 15.388889  7.122222

# pruebas de varianza -----

shapiro.test(prod$y.ton)

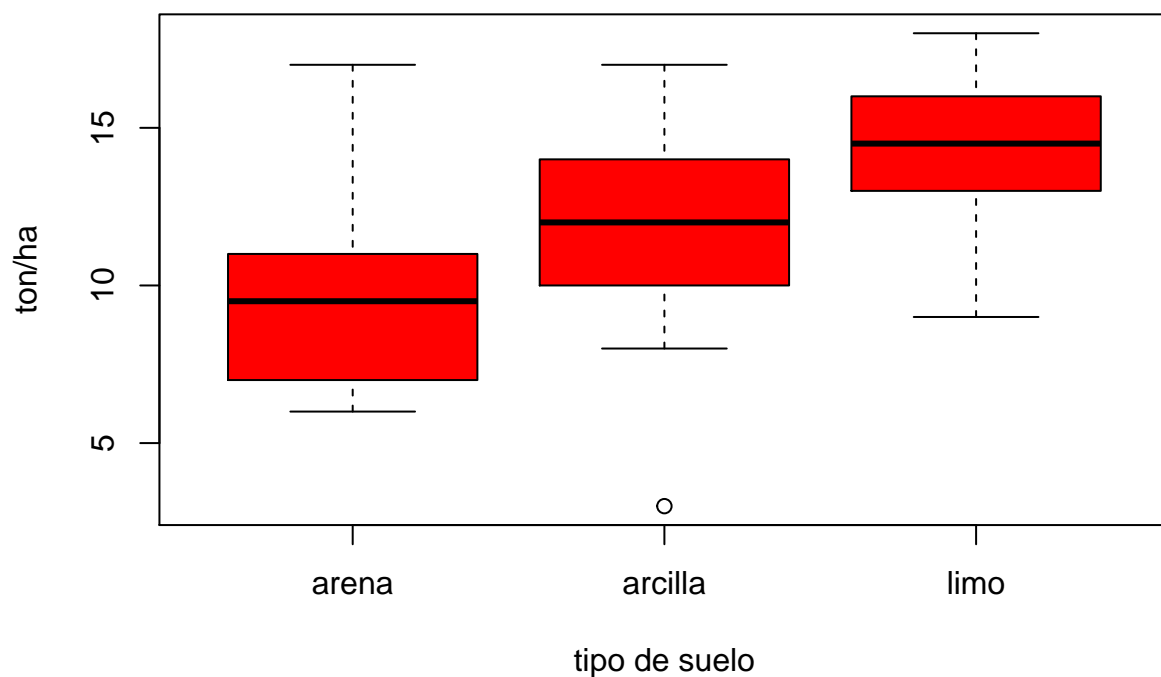
##
##  Shapiro-Wilk normality test
##
## data:  prod$y.ton
## W = 0.97214, p-value = 0.5993
# los ddatos provienen de una distribucion normal

bartlett.test(prod$y.ton, prod$suelo)

##
```

```
## Bartlett test of homogeneity of variances
##
## data: prod$y.ton and prod$suelo
## Bartlett's K-squared = 1.2764, df = 2, p-value = 0.5283
# para determinar la homogeneidad de varianzas

# visualizacion de los datos -----
boxplot(prod$y.ton ~ prod$suelo, xlab = "tipo de suelo", ylab = "ton/ha", col="red")
```



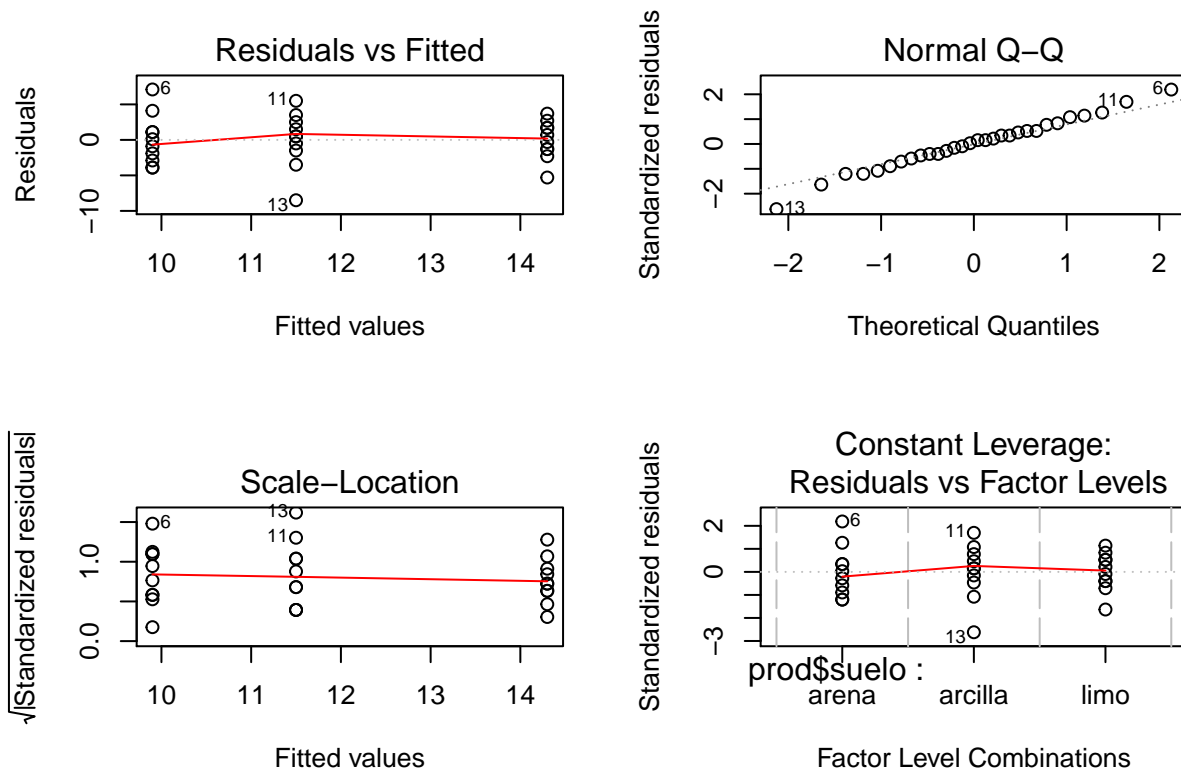
```
aov.suelo <- aov(prod$y.ton ~ prod$suelo)
aov.suelo
```

```
## Call:
## aov(formula = prod$y.ton ~ prod$suelo)
##
## Terms:
##          prod$suelo Residuals
## Sum of Squares      99.2    315.5
## Deg. of Freedom       2       27
##
## Residual standard error: 3.41836
## Estimated effects may be unbalanced
```

```
summary(aov.suelo)
```

```
##           Df Sum Sq Mean Sq F value Pr(>F)
## prod$suelo  2   99.2   49.60   4.245  0.025 *
## Residuals 27  315.5   11.69
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

```
par(mfrow=c(2,2))
plot(aov(prod$y.ton ~ prod$suelo))
```

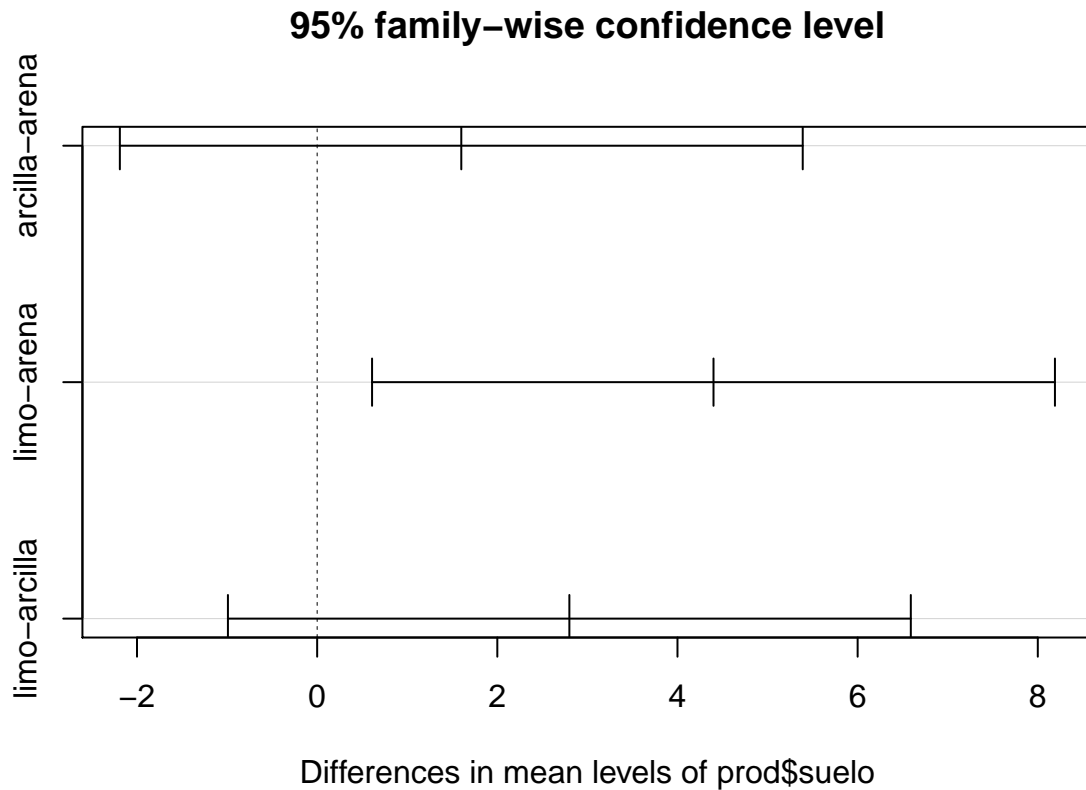


```
par(mfrow=c(1,1))
```

```
TukeyHSD(aov.suelo, conf.level = 0.95)
```

```
## Tukey multiple comparisons of means
## 95% family-wise confidence level
##
## Fit: aov(formula = prod$y.ton ~ prod$suelo)
##
## $`prod$suelo`
##           diff       lwr      upr    p adj
## arcilla-arena  1.6 -2.1903777  5.390378 0.5546301
## limo-arena     4.4  0.6096223  8.190378 0.0204414
## limo-arcilla   2.8 -0.9903777  6.590378 0.1785489
```

```
plot(TukeyHSD(aov.suelo))
```



```
summary.lm(aov.suelo)
```

```
##
## Call:
## aov(formula = prod$y.ton ~ prod$suelo)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
##    -8.5    -1.8     0.3     1.7     7.1
##
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)      9.900      1.081   9.158 9.04e-10 ***
## prod$sueloarcilla  1.600      1.529   1.047  0.30456
## prod$suelolimo    4.400      1.529   2.878  0.00773 **
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 3.418 on 27 degrees of freedom
## Multiple R-squared:  0.2392, Adjusted R-squared:  0.1829
## F-statistic: 4.245 on 2 and 27 DF,  p-value: 0.02495
```

```
# el analisis de varianza es significativo
```

```
# H° que la produccion en toneladas de cereal es el mismo
```

en los tres tipos de suelo.

H1 que al menos uno de los tratamientos es diferente