Dissertation code

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## Moisture analysis

ANCOVA carried out to test the effect of time, soil type and irrigation level on the volumetric water content of the soil throughout the experiment.

# ANCOVA  
# Assumptions with chi-squared test and Levene's test  
explanatory\_table = table(moisture$day, moisture$soil\_type)  
print(explanatory\_table)  
print(chisq.test(explanatory\_table))  
# p-value > 0.05 so covariates are independent   
leveneTest(mean\_moisture ~ irrigation\_level, data = moisture)  
# p-value > 0.05 so variance is equal   
# then actually fitting the model  
ancova\_model <- aov(mean\_moisture ~ irrigation\_level + soil\_type + day, data = moisture)  
Anova(ancova\_model, type="III")   
# posthoc test   
postHocs <- glht(ancova\_model, linfct = mcp(soil\_type = "Tukey"))  
summary(postHocs)  
postHocs1 <- glht(ancova\_model, linfct = mcp(irrigation\_level = "Tukey"))  
summary(postHocs1)

## Root and shoot analyses

Linear model carried out to test the effect of species, soil type and irrigation level on the root : shoot ratio values while controlling for total biomass of the individuals.

ratio\_model1 <- lm(root\_shoot ~ irrigation\_level\*species + soil + Dry\_weight\_total, data = ratio)  
summary(ratio\_model1)  
anova(ratio\_model1)  
plot(ratio\_model1)  
summary(gvlma(ratio\_model1))

Linear model carried out to test the effect of dry shoot weight, irrigation level, soil type and species, on the dry root weight of the plants.

ratio3 <- ratio %>% filter(!count %in% c(50,67,87,90)) # taking out outliers  
ratio\_model2 <- lm(log(Dry\_weight\_root) ~ log(Dry\_weight\_shoot) + irrigation\_level\*soil + species, data = ratio3)  
summary(ratio\_model2)  
anova(ratio\_model2)  
plot(ratio\_model2)  
summary(gvlma(ratio\_model2))

## Leaf area analysis

Linear model carried out to test the effect of species, soil type and irrigation level on the leaf area values while controlling for total biomass of the individuals.

leaf\_area\_model <- lm(Leaf\_area ~ species + Dry\_weight\_total + soil\*irrigation\_level, data = ratio)  
summary(leaf\_area\_model)  
anova(leaf\_area\_model)  
plot(leaf\_area\_model)  
summary(gvlma(leaf\_area\_model))

## Total biomass analysis

Linear model carried out to test the effect of species, soil type and irrigation level on the total biomass of the individuals.

total\_biomass\_model <- lm(Dry\_weight\_total ~ species + irrigation\_level\*soil, data = ratio)  
summary(total\_biomass\_model)  
anova(total\_biomass\_model)  
plot(total\_biomass\_model)  
summary(gvlma(total\_biomass\_model))