Automatic report for a Randomized Complete Block Design (RCBD)

International Potato Center

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# 1. Model specification and data description

There are data from 16 treatments evaluated using a randomize complete block design with 3 blocks. The statistical model is

where

* is the observed response with treatment and block .
* is the mean response over all treatments and blocks.
* is the effect for treatment .
* is the effect for block .
* is the error term.

In this model we assume that the errors are independent and have a normal distribution with common variance, that is, .

# 2. Analysis for trait 1:Maize\_Ear\_Moisture\_content\_%

## 2.1. ANOVA

You have fitted a linear model for a RCBD. The ANOVA table for your model is:

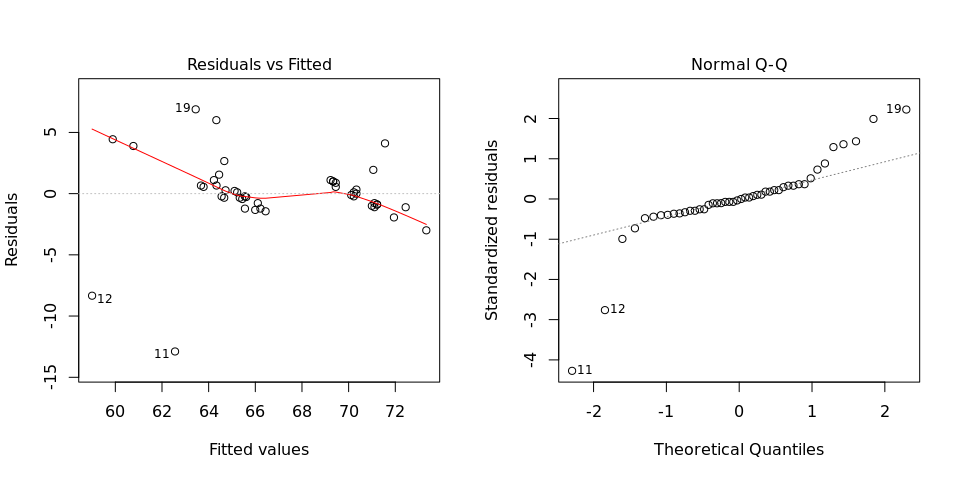
## Analysis of Variance Table  
##   
## Response: "1:Maize\_Ear\_Moisture\_content\_%"  
## Df Sum Sq Mean Sq F value Pr(>F)   
## TREATMENT 15 568.55 37.904 2.6113 0.01369 \*  
## BLOCK 2 38.82 19.412 1.3374 0.27878   
## Residuals 28 406.42 14.515   
## ---  
## Signif. codes: 0 '\*\*\*' 0.001 '\*\*' 0.01 '\*' 0.05 '.' 0.1 ' ' 1

You have some missing values (4.17%) and they have been estimated before running ANOVA.

The coefficient of variation for this experiment is 5.682%. The p-value for treatments is 0.01369 which is significant at the 5% level.

## 2.2. Assumptions

Don’t forget the assumptions of the model. It is supposed that the errors are independent with a normal distribution and with the same variance for all the treatments. The following plots must help you evaluate this:



Any trend in the residuals in the left plot would violate the assumption of independence while a trend in the variability of the residuals –for instance a funnel shape– suggests heterogeneity of variances. Departures from the theoretical normal line on the right plot are symptoms of lack of normality.

## 2.3. Treatment means

Below are the sorted means for each treatment with letters indicating if there are significant differences using the least significance difference method and the multiple comparisons method of Tukey, both at the 5% level.

### 2.3.1. LSD test

## means groups  
## v2\_Irrigation sprinkler system\_300mm\_10 cm\_2019-04-08 72.44444 a  
## v2\_Irrigation sprinkler system\_300mm\_10 cm\_2019-05-08 70.86508 ab  
## v1\_Irrigation sprinkler system\_300mm\_10 cm\_2019-04-08 70.33333 ab  
## v1\_Irrigation sprinkler system\_300mm\_10 cm\_2019-05-08 70.33333 ab  
## v1\_Irrigation sprinkler system\_300mm\_0 cm\_2019-05-08 70.22222 ab  
## v2\_Irrigation sprinkler system\_300mm\_0 cm\_2019-04-08 70.22222 ab  
## v2\_Irrigation sprinkler system\_300mm\_0 cm\_2019-05-08 70.11111 ab  
## v2\_Irrigation sprinkler system\_200mm\_0 cm\_2019-04-08 65.55556 bc  
## v2\_Irrigation sprinkler system\_200mm\_0 cm\_2019-05-08 65.33333 bc  
## v1\_Irrigation sprinkler system\_200mm\_10 cm\_2019-04-08 65.22222 bc  
## v2\_Irrigation sprinkler system\_200mm\_10 cm\_2019-04-08 65.11111 bc  
## v1\_Irrigation sprinkler system\_200mm\_10 cm\_2019-05-08 64.66667 bc  
## v1\_Irrigation sprinkler system\_200mm\_0 cm\_2019-04-08 64.55556 bc  
## v1\_Irrigation sprinkler system\_200mm\_0 cm\_2019-05-08 64.53175 bc  
## v1\_Irrigation sprinkler system\_300mm\_0 cm\_2019-04-08 63.44444 c  
## v2\_Irrigation sprinkler system\_200mm\_10 cm\_2019-05-08 59.88889 c

### 2.3.2. Tukey test

## means groups  
## v2\_Irrigation sprinkler system\_300mm\_10 cm\_2019-04-08 72.44444 a  
## v2\_Irrigation sprinkler system\_300mm\_10 cm\_2019-05-08 70.86508 ab  
## v1\_Irrigation sprinkler system\_300mm\_10 cm\_2019-04-08 70.33333 ab  
## v1\_Irrigation sprinkler system\_300mm\_10 cm\_2019-05-08 70.33333 ab  
## v1\_Irrigation sprinkler system\_300mm\_0 cm\_2019-05-08 70.22222 ab  
## v2\_Irrigation sprinkler system\_300mm\_0 cm\_2019-04-08 70.22222 ab  
## v2\_Irrigation sprinkler system\_300mm\_0 cm\_2019-05-08 70.11111 ab  
## v2\_Irrigation sprinkler system\_200mm\_0 cm\_2019-04-08 65.55556 ab  
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## v1\_Irrigation sprinkler system\_200mm\_0 cm\_2019-05-08 64.53175 ab  
## v1\_Irrigation sprinkler system\_300mm\_0 cm\_2019-04-08 63.44444 ab  
## v2\_Irrigation sprinkler system\_200mm\_10 cm\_2019-05-08 59.88889 b

## 2.4. Variance components

Below are the variance components for this model, under the assumption that treatments and blocks are random. Here the model is fitted using REML and missing values are not estimated.

## Variance Std.Dev.  
## TREATMENT 7.7446733 2.782925  
## BLOCK 0.2002715 0.447517  
## Residual 14.4670486 3.803557