

Exercise 1 – experimental design

Case 1:

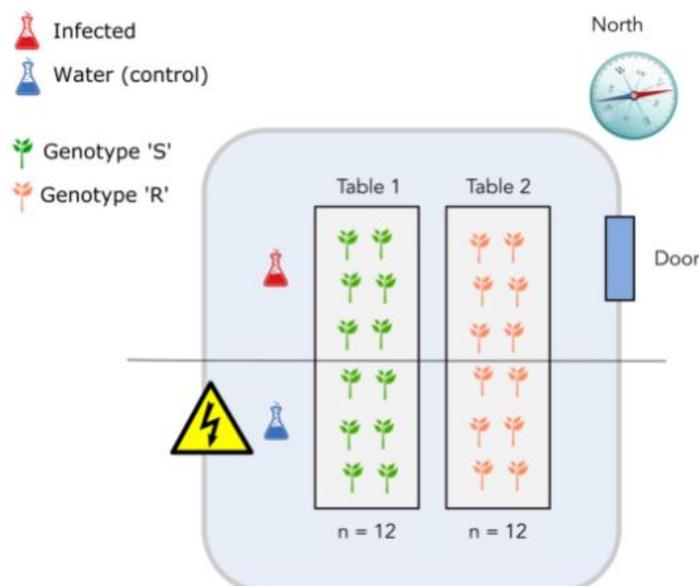
A scientist has to measure the effect of a plant pathogen called "*Designus malatesta*" on two plant genotypes: one resistant to the pathogen (labelled "R" for resistant) and one susceptible (labelled "S").

A total of 24 individual plants are placed on two tables in a greenhouse compartment. Each table can accommodate 12 plants. The greenhouse upper right side is pointing north, close to the location of the entrance door. Finally, there is an electrical board to power lamps and other high voltage installation at the lower left side opposite of the door.

1. Which **experimental factors** are controlled by the scientist?
2. Define the **conditions** in the experiment, and state how many replicates per condition can be used by the scientist (using this greenhouse)?
3. Can you identify another potential source of unwanted variation due to the practical setup of the experiment?
4. The scientist performed the pathogen inoculation using infected water on one part of the greenhouse and plain (control) water on the other part – described by a line in the drawing below.

Can you identify a problem with the suggested experiment setup?

How would you correct it?



Case 2:

A scientist wants to measure the effect of a drug treatment on mice. There are 8 mice, 4 female and 4 male.

5. Suggest how to divide the mice between the conditions.

Case 3:

Due to equipment limitations, you can perform simultaneously up to 8 RNA isolations. You have the following samples:

Sample	Replicate	Condition	Batch
sample1	1	Control	
sample2	2	Control	
sample3	3	Control	
sample4	4	Control	
sample5	1	Treatment A	
sample6	2	Treatment A	
sample7	3	Treatment A	
sample8	4	Treatment A	
sample9	1	Treatment B	
sample10	2	Treatment B	
sample11	3	Treatment B	
sample12	4	Treatment B	

6. Suggest how to perform RNA isolation (divide the samples between the batches). Fill the batch column in the table.