# Randomizing Plots

## Introduction

In the lesson, we discussed the importance of randomizing plots. R has an incredibly easy

## Example 1

Create an experimental design with 4 replications of treatments "A" and "B".

### The Agricolae Package

To randomize two-treatment trials with paired treatments, we will use the "agricolae" package of R. We first install agricolae and load it into our session.

```
# install.packages("agricolae")
library(agricolae)
```

### Randomizing the Plot

We will use the "design.rcbd" function from the agricolae package. We need to supply the following arguments to this function: - trt: a vector with treatment names - r: the number of replications

We will create a vector called "treatment_names", containing treatments "A" and "B". We will use the argument r=4 to tell R to generate 4 blocks.

```
treatment_name=c("A", "B")

plot_plan = design.rcbd(trt = treatment_name, r=4)
```

### Working with Lists

The code above created an object called "plot_plan". So far in R we have dealt with two kinds of objects: a data frame, which is basically a table of values, and a vector, which can be thought of as a single column of numbers. "treatment_names" above is an example of a vector.

"plot_plan" is a third type of R object, called a "list". A list is a collection of other R objects. It can contain multiple data frames, vectors, single values, etc. A list is a very useful way to bundle up information, but they can be a little tricky to unpack.

If we just run plot_plan below, we will get two windows. One will list all of the objects in the list. The second window will show the plot plan.

```
plot_plan
```

```
## $parameters
## $parameters$design
## [1] "rcbd"
##
## $parameters$trt
## [1] "A" "B"
```

```
##
## $parameters$r
## [1] 4
##
## $parameters$serie
## [1] 2
##
## $parameters$seed
## [1] 980731668
##
## $parameters$kinds
## [1] "Super-Duper"
##
## $parameters[[7]]
## [1] TRUE
##
##
## $sketch
##      [,1] [,2]
## [1,] "A"  "B"
## [2,] "A"  "B"
## [3,] "B"  "A"
## [4,] "B"  "A"
##
## $book
##   plots block treatment_name
## 1   101     1              A
## 2   102     1              B
## 3   201     2              A
## 4   202     2              B
## 5   301     3              B
## 6   302     3              A
## 7   401     4              B
## 8   402     4              A
```

We can access this information more directly. If we type "plot_plan$sketch", we get a plot map of sorts.

```
plot_plan$sketch
```

```
##      [,1] [,2]
## [1,] "A"  "B"
## [2,] "A"  "B"
## [3,] "B"  "A"
## [4,] "B"  "A"
```

If we type "plot_plan$book", we get a data frame with the plots, block, and treatment_names.

```
plot_plan$book
```

```
##   plots block treatment_name
## 1   101     1              A
## 2   102     1              B
## 3   201     2              A
## 4   202     2              B
## 5   301     3              B
## 6   302     3              A
```

```
## 7   401     4              B
## 8   402     4              A
```

## Example 2

In a field trial, we wish to compare the biomass of two fiber hemp varieties, “Jerry” and “Bob”. We wish to design a paired experimental design with 10 replications.

```
hemp_variety = c("Jerry", "Bob")

hemp_plot_plan = design.rcbd(trt = hemp_variety, r=10)
```

Here is the plot layout:

```
hemp_plot_plan$sketch
```

```
##       [,1]    [,2]
##  [1,] "Jerry" "Bob"
##  [2,] "Bob"   "Jerry"
##  [3,] "Jerry" "Bob"
##  [4,] "Bob"   "Jerry"
##  [5,] "Jerry" "Bob"
##  [6,] "Jerry" "Bob"
##  [7,] "Jerry" "Bob"
##  [8,] "Bob"   "Jerry"
##  [9,] "Bob"   "Jerry"
## [10,] "Jerry" "Bob"
```

And here is the table we can cut and paste into our spreadsheet:

```
hemp_plot_plan$book
```

```
##    plots block hemp_variety
## 1    101     1        Jerry
## 2    102     1          Bob
## 3    201     2          Bob
## 4    202     2        Jerry
## 5    301     3        Jerry
## 6    302     3          Bob
## 7    401     4          Bob
## 8    402     4        Jerry
## 9    501     5        Jerry
## 10   502     5          Bob
## 11   601     6        Jerry
## 12   602     6          Bob
## 13   701     7        Jerry
## 14   702     7          Bob
## 15   801     8          Bob
## 16   802     8        Jerry
## 17   901     9          Bob
## 18   902     9        Jerry
## 19  1001    10        Jerry
## 20  1002    10          Bob
```