Superimposed Experiment using Split Plots

Suppose a randomized complete block experiment with b blocks is set up to investigate the yield differences between r rootstocks for orange trees and that each plot in a block consists of t trees. After several a years of running this initial experiment, it is decided to incorporate t fertilizer treatments into the experiment by randomizing the t treatments to the t trees in a plot.

The sets for this experiment are trees, rootstocks and fertilizers and the tiers are $\mathcal{F}_{\text{trees}} = \{\text{Blocks}, \text{Plots}, \text{Trees}\}$, $\mathcal{F}_{\text{rootstocks}} = \{\text{Rootstocks}\}$ and $\mathcal{F}_{\text{fertilizers}} = \{\text{Fertilizers}\}$. There are two randomizations: rootstocks to plots in the initial experiment and fertilizers to trees in the revised experiment. The performance of these randomizations being separated in time, they cannot be achieved in a single randomization. However, the two randomizations are independent — they involve two distinct subsets of $\mathcal{F}_{\text{trees}}$: see Figure 1. Therefore none of the factors in $\mathcal{F}_{\text{rootstocks}}$ and $\mathcal{F}_{\text{fertilizers}}$ are associated by randomization. However, these two tiers are not combined because, as a result of their separate randomizations, the factors in one tier have a different status in the randomization to those in the second tier.

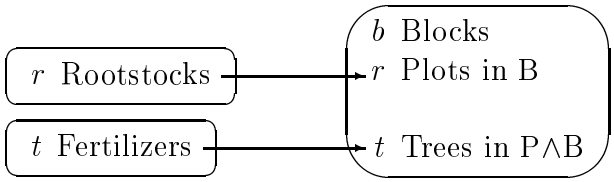

Figure 1: Independent randomizations in superimposed experiment using split plots