Some Standard Designs

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Completely Randomized Designs

It is a design in which the experimental units are assigned to the treatments completely at random, subject only to the number of observations to be taken on each treatment. It is used when an experiment involves no blocks.

Block Designs

In a block design, the experimenters partition the experimental units into blocks, determine the allocation of treatments to blocks, and assign the experimental units within each block to the treatments completely at random. Note the random assignments take place within each block, that is a key difference with completely randomized designs.

- Complete block designs: each treatment is observed the same number of times. If each treatment is observed only once in each block, the design is a randomized complete block design or, simply, randomized block design.

Block Designs

- Incomplete block design: when the block size (i.e., the number of experimental units in the block) is smaller than the number of treatments, not all treatments can be observed in a block. The design is an incomplete design.

Designs with Two or More Blocking Factors

- Row-Column Design: a design involving two crossed blocking factors. Factors are crossed if all combinations of levels of the factors are used.
- Nested (or hierarchical) blocking factors: Factors are nested if a particular level of one of the factors occurs at only one level of the other factor.

For example, the experiment units may be samples of some experimental material(e.g., cotton) taken from several different batches that are from different suppliers. The samples, which are to be assigned to the treatments, are nested within batches, and the batches are nested within suppliers.

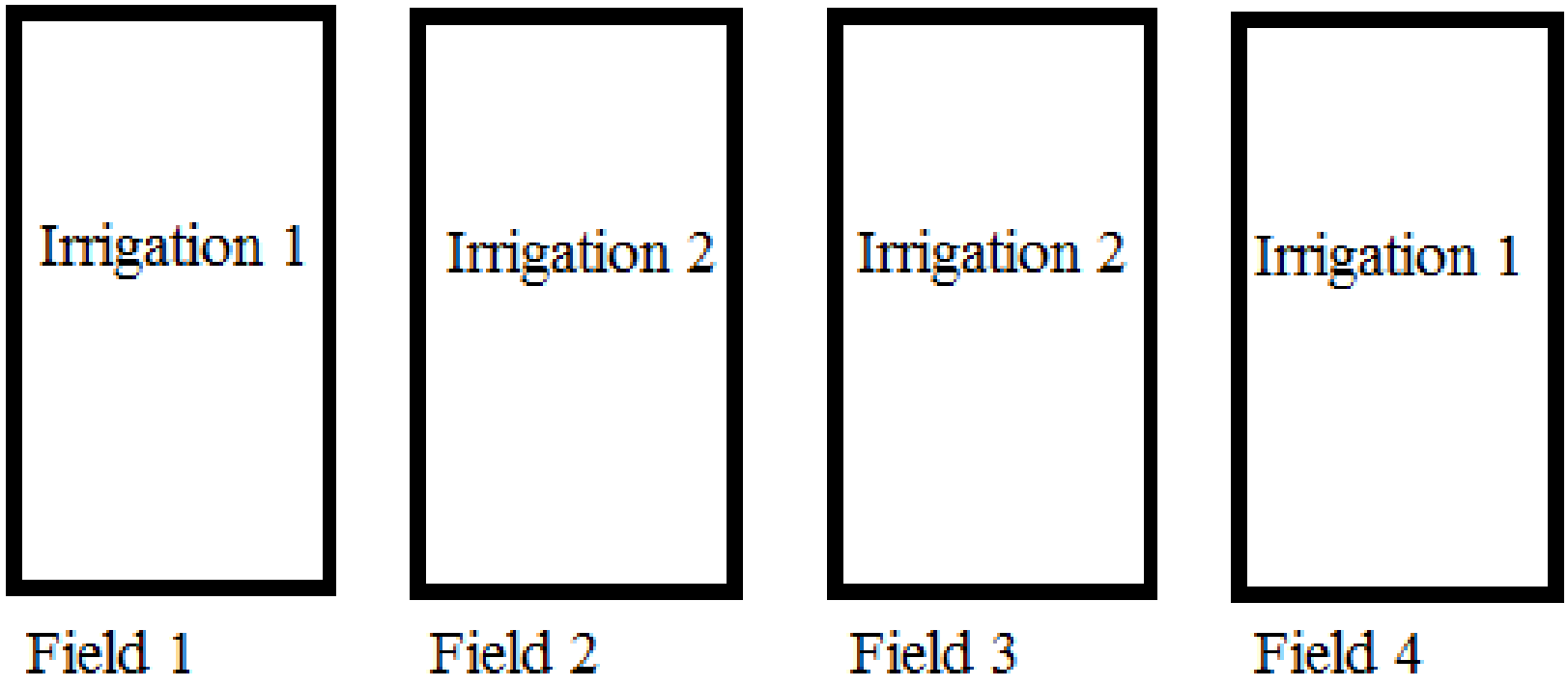
Split-Plot Designs

Commonly used in agricultural experiments. This design facilitates easier implementation. It involves a two-stage randomization: The levels of one factor is assigned to large experimental units (whole plots) that are split into smaller units (sub-plots). Levels of another factor are assigned to sub-plots. Usually the treatments assigned to the whole plots are harder to change.

Example of Split-Plot Design

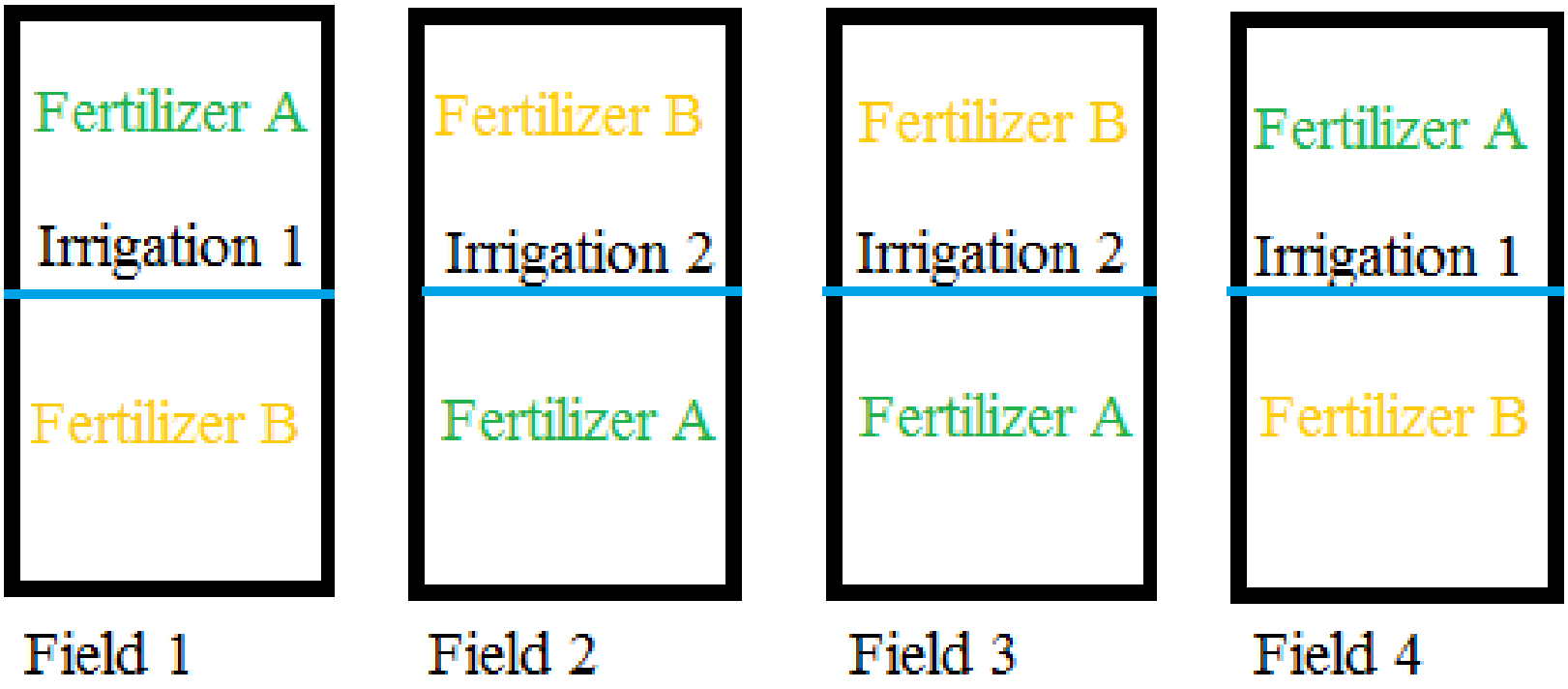
Consider two factors: Irrigation method (with two levels) and fertilizer (with two levels).

The two irrigation methods are randomly assigned to 4 large fields (whole plots):



Example of Split-Plot Design

Each whole plot is then divided into two sub-plots and the two fertilizers are randomly assigned to the sub-plots.



Additional Reading

Sections 2.4 and 2.5. Read the examples of the real experiment and study how the checklist is followed through.