Incomplete split-block designs: perspectives and challenges

Stanisław Mejza and Iwona Mejza

Poznań University of Life Sciences, Poland

Abstract

Split-block designs are very often used in life science experiments and in engineering. They are specifically suited to two-factor experiments that utilize two kinds of experimental units (row plots and – crossed within them – column plots) within blocks. Levels of one of the factors (called row treatments) are assigned to the rows, and levels of the second factor (called column treatments) are assigned to the columns.

A split-block design in which all levels of a particular factor occur on the relevant kind of units (e.g. rows, columns within blocks) is called a complete (orthogonal) design. Any design that it is not complete is called incomplete (non-orthogonal) design. The paper deals with planned incomplete split-block designs. From the statistical point of view, complete split-block designs are the best. However, the incomplete designs better fit the particular (available) structures of experimental units. But in the case of incomplete designs there are many new open problems. The most important problems, which are discussed in this paper, are:

- 1. statistical modeling observations;
- 2. ANOVA;
- 3. general constructing methods for optimal incomplete split-block designs;
- 4. constructing methods for optimal incomplete designs with special reference to two kinds of treatments (test treatments and control treatments) in the experiments.

1