

Stat 402A, Spring 2008 - Important concepts for split plot experiments.

F tests:

Main trt: use Main plot error as denominator of F test, denominator df = Main plot error df.

Split trt: use Split plot error as denominator of F test, denominator df = Split error d.f.

Split*Main interaction: use Split plot error as denominator of F test, denominator df = split error df)

Standard errors for means and differences of means (from easiest to hardest)

Marginal mean for a main plot treatment (e.g. for variety R)

average over a set of main plots and all split plots in those main plots

se depends on Main plot error MS, df = Main plot error df

Difference between marginal means for two main plot treatments (e.g. variety R-L)

each marginal mean are averages of different main plots (so also diff. split plots)

the two means are independent, so $\text{Var}(\text{diff}) = 2 \text{Var}(\text{mean})$

se depends on Main plot error MS, df = Main plot error df

Difference between two split plot marginal means

difference computed **within** each main plot (the miniblock idea).

so variability associated with main plots cancels out

se depends only on Split plot error MS, df = Split plot error df

averaged over fewer main plots than diff. in split plot marginal means.

Marginal mean for a single split plot treatment (e.g. cut date 1)

average over main plots and a single split plot per main plot.

variability between main plots **does not** cancel out

se depends on main plot and split plot variance components, is not any of the MS in the ANOVA table.

Need to construct appropriate combination of variance components

d.f. need to be approximated (Satterthwaite or Kenward-Roger)

Cell mean (e.g. cut date 1 for variety C)

like previous, an average over main plots and a single split plot per main plots.

same issues as previous, just fewer main plots.

Difference between two main treatments in one split plot (e.g. variety C - R in cut date 1)

the two cell means are estimated from different main plots and diff. split plots

so they're independent and $\text{Var}(\text{diff}) = 2 \text{Var}(\text{cell mean})$, same issues as above

Difference between two main trt in different split plot trts (e.g. variety C, cut 1 - variety R, cut 2)

these two cell means are independent, so same issues as above

Notes:

$\text{Var}(\text{diff})$ is not $2 \text{Var}(\text{mean})$ for many comparisons, $\text{se}(\text{mean})$ can be $> \text{se}(\text{diff})!$

different d.f. for main plot, split plot, and cell mean comparisons

comparisons of cell means have two different s.e., two different d.f.