Week 10 Thursday notes

Comparing Designs

CRD

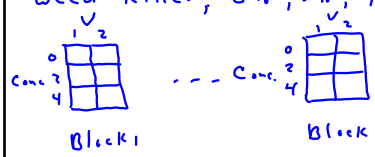
RCBD

Repeated Measures

Oct 27-2:51 PM

1) RCBD vs. CRD.

On a farm, wish to compare 2 seed varieties, 3 concentrations of weed Killer, 0%, 2%, 4%.



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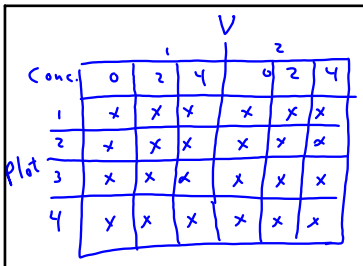

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Source	df	R i	F j	F k	R l	
P_i	3	1	2	3	1	$\sigma_\epsilon^2 + 6\sigma_P^2$
V_j	1	4	0	3	1	$\sigma_\epsilon^2 + 3\sigma_{PV}^2 + 12\phi_V$
C_k	2	4	2	0	1	$\sigma_\epsilon^2 + 2\sigma_{PC}^2 + 8\phi_C$
PV_{ij}	3	1	0	3	1	$\sigma_\epsilon^2 + 3\sigma_{PV}^2$
PC_{ik}	6	1	2	0	1	$\sigma_\epsilon^2 + 2\sigma_{PC}^2$
VC_{jk}	2	4	6	0	1	$\sigma_\epsilon^2 + \sigma_{PVC}^2 + 4\phi_{VC}$
PVC_{ijk}	6	1	0	0	1	$\sigma_\epsilon^2 + \sigma_{PVC}^2$
$\epsilon_{(ijk)l}$	0	1	1	1	1	σ_ϵ^2

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Tests

Variety

$F_{1,3} = \frac{MS_V}{MS_{PV}}$

Concentration

$F_{2,6} = \frac{MS_C}{MS_{CP}}$

V * C

$F_{2,6} = \frac{MS_{VC}}{MS_{PVC}}$

fixed effects tested by their interaction with our Block term.

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Response variables - Yield

% dry matter of weeds.

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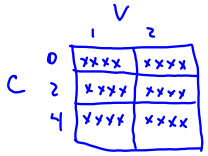
Suppose we ran expt. as CRD with same # observations.

$4 \times 2 \times 3 = 24$ plots randomly assigned to trt. combinations.



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Source	df	EMS
V_i	1	$\sigma_\epsilon^2 + 12\phi_V$
C_j	2	$\sigma_\epsilon^2 + 8\phi_C$
VC_{ij}	2	$\sigma_\epsilon^2 + 4\phi_{VC}$
$\epsilon_{(ij)k}$	18	σ_ϵ^2
	24-1	

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Expt. 1

V $F_{1,3} = \frac{MS_V}{MS_{VP}}$

C $F_{2,6} = \frac{MS_C}{MS_{CP}}$

VC $F_{2,6} = \frac{MS_{VC}}{MS_{PVC}}$

Expt. 2

$F_{1,18} = \frac{MS_V}{MS_E}$

$F_{2,18} = \frac{MS_C}{MS_E}$

$F_{2,18} = \frac{MS_{VC}}{MS_E}$

Which has smaller critical value, $F_{.05}$

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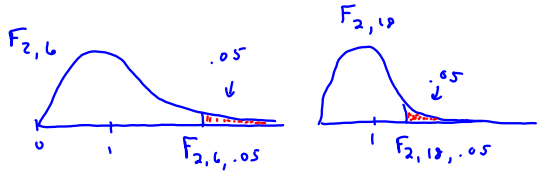
F dist'n



$F_{2,6,.05} > F_{2,18,.05}$

better?

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Look at what our error terms mean.

Expt 1

Plot crossed with our factors, so error term for VC controls for plot to plot variation

Expt 2

our plots are nested within trt. combinations so MS_E includes plot to plot variation!

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Expt 1

VC $F_{2,6} = \frac{MS_{VC}}{MS_{PVC}}$

MS_{PVC} ↑ expt 1

is larger than

Expt 2

VC $F_{2,18} = \frac{MS_{VC}}{MS_{error}}$

MS_{error} ↑ expt 2

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Crossing plots is better than nesting plots with regard to factor combinations.

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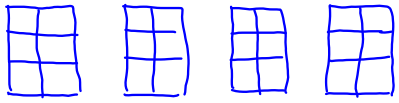
Experiment 3: Joe Blow looked at 1st design and completely randomized the subplots to trt. combinations.



24 randomize to 6 trt. combinations

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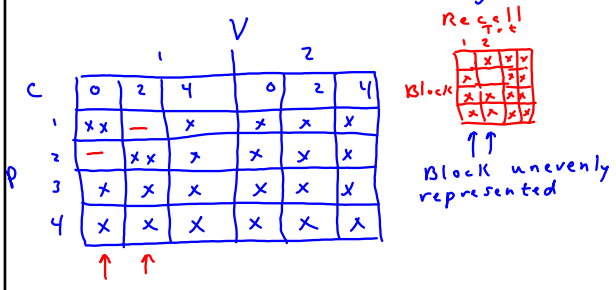
This can lead to following



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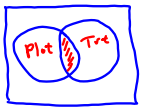
What will this effect?

① If compare Means of trts, we do not "control" for Plots. Have to use LS Means.

② Need to use Type III SS usually numerator MS is adjusted down.



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