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INTRODUCTION

Designing an experiment means deciding how the observations or measurement should be taken to answer a particular question in a valid , efficient and economical way. A well design experiment helps the workers to properly partition the variation of the data into respective component in order to draw valid conclusion.

COMPLETELY RANDOMIZED DESIGN

The Completely Randomized Design(CRD) is the most simplest of all the design based on randomization and replication. In CRD, all treatments are randomly allocated among all experimental subjects.

This allows every experimental unit; i.e.; plot, animal, soil sample etc., to have an equal probability of receiving a treatment .

ADVANTAGES OF CRD

- *CRD has several advantages it is easy to layout the design.*
- *There is complete flexibility in the number of treatments and number of replication which may very from treatment to treatment.*
- *The no. of replication need not to be same for each treatment.*
- *The CRD provides maximum d.f. for the experiment of experimental error.*

DISADVANTAGE OF CRD

The main objection against the CRD is that the principle of local control has not been used in this design.

So that the experimental error is inflated by the presents of the entire variation among experimental units.

USES OF CRD

- *Under conditions where the experimental material is homogenous e.g. in physics, chemistry in chemical and in biological experiment in some green house studies.*
- *In small experiments where there is a small number of d.f.*
- *CRD is may be used in a chemical or baking experiment where the experimental units are the part of the thoroughly mixed chemical or powder.*

STATISTICAL ANALYSIS OF CRD

Linear model of CRD is

$$Y_{ij} = \mu + \varphi_i + \epsilon_{ij} \quad ;i=1,2,3.....t,\ j=1,2,3.....r_i$$

Where Y_{ij} = *an observation*

μ = *the experimental mean or general mean*

φ_i = *the treatment effect*

ϵ_{ij} = *the experimental error*

After analysis it becomes-

Total SS= SS due to treatment + SS due to error

$$S_T^2 = S_t^2 + S_E^2$$

ANOVA TABLE FOR CRD

Source of variance	Degrees of Freedom d.f.	Sum of Square S.S.	Mean Sum of Square M.S.S	Variation Ratio F
Treatment	t-1	$S_t{}^2$	$s_t{}^2 = \frac{S_t{}^2}{t-1}$	$F_t = \frac{s_t{}^2}{s_E{}^2}$
error	n-t	$S_E{}^2$	$s_E{}^2 = \frac{S_E{}^2}{n-t}$	
total	n-1	$S_T{}^2$		

CONCLUSION

A completely randomized design relies on randomization to control for the effect of extraneous variables. CRDs are for the studying the effect on the primary factor without the need to take other nuisance variables into account.

REFERENCE

1. *Fundamental of Applied Statistics: Gupta & Kapoor*
2. *Wikipedia*


Thank
you!