## RANDOMISED BLOCK DESIGN (RBD) (OR) TWO WAY CLASSIFICATION

1) Three varieties A, B, C, of a crop are tested in a randomized block design with four replications. The plot yields in pounds are as follows:

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| A | 6 | C | 5 | A | 8 | B | 9 |
| C | 8 | A | 4 | B | 6 | C | 9 |
| B | 7 | B | 6 | C | 10 | A | 6 |

Analysis the experimental yield and state your conclusion.

Soln:

| Varieties | Yields | | | |
|---|---|---|---|---|
| A | 6 | 4 | 8 | 6 |
| B | 7 | 6 | 6 | 9 |
| C | 8 | 5 | 10 | 9 |

| | $x_1$ | $x_2$ | $x_3$ | $x_4$ | total | $x_1^2$ | $x_2^2$ | $x_3^2$ | $x_4^2$ |
|---|---|---|---|---|---|---|---|---|---|
| $y_1$ | 6 | 4 | 8 | 6 | 24 $Sy_1$ | 36 | 16 | 64 | 36 |
| $y_2$ | 7 | 6 | 6 | 9 | 28 $Sy_2$ | 49 | 36 | 36 | 81 |
| $y_3$ | 8 | 5 | 10 | 9 | 32 $Sy_3$ | 64 | 25 | 100 | 81 |
| | $\frac{21}{\Sigma x_1}$ | $\frac{15}{\Sigma x_2}$ | $\frac{24}{\Sigma x_3}$ | $\frac{24}{\Sigma x_4}$ | 84 $Sy_4$ | $\frac{149}{\Sigma x_1^2}$ | $\frac{77}{\Sigma x_2^2}$ | $\frac{200}{\Sigma x_3^2}$ | $\frac{198}{\Sigma x_4^2}$ |

Step 1: Formulating $H_0$ and $H_1$

$H_0$: There is no significant between yields and varieties

$H_1$: There is significant between yields and varieties.

Step 2: To find N & T

$N = n_1 + n_2 + n_3 + n_4$
$= 3+3+3+3 = 12$

$T = \Sigma x_1 + \Sigma x_2 + \Sigma x_3 + \Sigma x_4$
$= 21+15+24+24$
$= 84$

Mean Sum of Squares

MSC: $18/3$
$= 6$

MSR = $8/2$

F-Ratio

$F_c = \frac{6}{1.6} = 3.75$
$F_\alpha(3,6) = 4.76$

$F_R = \frac{4}{1.6} = 2.5$
$F_\alpha(2,6) = 5.14$

Step 3: Correction factor, CF.

$C.F = \frac{T^2}{N} = \frac{84^2}{12} = 588$

Step 4: $TSS = \Sigma x_1^2 + \Sigma x_2^2 + \Sigma x_3^2 + \Sigma x_4^2 - C.F$
$= 149 + 77 + 200 + 198 - 588$
$= 36$

Step 5: $SSC = \frac{(\Sigma x_1)^2}{n_1} + \frac{(\Sigma x_2)^2}{n_2} + \frac{(\Sigma x_3)^2}{n_3} + \frac{(\Sigma x_4)^2}{n_4} - C.F.$ between

$= \frac{21^2}{3} + \frac{15^2}{3} + \frac{24^2}{3} + \frac{24^2}{3} - 588$

$= 18$

$SSR = \frac{(\Sigma y_1)^2}{n_1'} + \frac{(\Sigma y_2)^2}{n_2'} + \frac{(\Sigma y_3)^2}{n_3'} - C.F$

$= \frac{24^2}{4} + \frac{28^2}{4} + \frac{32^2}{4} - 588$

$= 8$

Step 6: $SSE = TSS - SSC - SSR$
$= 36 - 18 - 8$
$= 10$

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