$$S.S(\text{due to } A) = \sum_i \frac{[(a_i)]^2}{nr} - C.F$$

$$S.S(\text{due to error}(a)) = (T.S.S)_2 - S.S(\text{blocks}) - S.S(A).$$

Then we prepare table 3.

Table 3:

| Levels of factor B | Levels of factor A | | | | | | Total |
|---|---|---|---|---|---|---|---|
| | $a_1$ | $a_2$ | .... | $a_i$ | ... | $a_m$ | |
| $b_1$ | $(a_1b_1)$ | $(a_2b_1)$ | .... | $(a_ib_1)$ | .... | $(a_mb_1)$ | $(b_1)$ |
| $b_2$ | $(a_1b_2)$ | $(a_2b_2)$ | ... | $(a_ib_2)$ | ... | $(a_mb_2)$ | $(b_2)$ |
| $\vdots$ | $\vdots$ | $\vdots$ | $\vdots$ | $\vdots$ | $\vdots$ | $\vdots$ | $\vdots$ |
| $b_j$ | $(a_1b_j)$ | $(a_2b_j)$ | .... | $(a_ib_j)$ | .... | $(a_mb_j)$ | $(b_j)$ |
| $\vdots$ | $\vdots$ | $\vdots$ | $\vdots$ | $\vdots$ | $\vdots$ | $\vdots$ | $\vdots$ |
| $b_k$ | $a_1b_n$ | $(a_2b_n)$ | .... | $(a_ib_n)$ | ..... | $(a_mb_n)$ | $(b_n)$ |
| Total | $(a_1)$ | $(a_2)$ | ... | $(a_i)$ | ... | $(a_m)$ | $G$ |

Here $(a_ib_j)$ denote the total yield of $r$ sub-plots due to $i^{th}$ level of factor A and $j^{th}$ level of factor B. $(b_j)$ denotes the total yield of $mr$ sub plots due to $i^{th}$ level of factor B.

From table 3,

We calculate the values of $(T.S.S)_3$, S.S (due to factor B), S.S (due to interaction AB) and S.S (due to error (b)) as follows.

$$(T.S.S)_3 = \sum_i \sum_j \frac{[(a_i b_j)]^2}{r} - C.F$$

$$S.S(B) = \sum_j \frac{[(b_j)]^2}{rm} - C.F, \quad j = 1, 2, \ldots, n$$

$$S.S(AB) = (T.S.S)_3 - S.S(A) - S.S(B)$$

$$S.S(\text{error}(b)) = (T.S.S)_1 - (T.S.S)_2 - (T.S.S)_3 + S.S(A).$$

Then we prepare the analysis of variance table as shown below:

| S.V | d.f | S.S | M.S.S | F-R |
|---|---|---|---|---|
| Blocks | $r-1$ | S.S (blocks) | ① $= \frac{S.S(\text{block})}{r-1}$ | ①/③ |
| A | $m-1$ | $S.S(A)$ | ② $= \frac{S.S.(A)}{m-1}$ | ②/③ |
| Error (a) | $(r-1)(m-1)$ | $S.S(E_a)$ | ③ $= \frac{S.S(E_a)}{(r-1)(m-1)}$ | - |
| B | $n-1$ | $S.S(B)$ | ④ $= \frac{S.S(B)}{n-1}$ | ④/⑥ |
| AB | $(m-1)(n-1)$ | $S.S(AB)$ | ⑤ $= \frac{S.S(AB)}{(m-1)(n-1)}$ | ⑤/⑥ |
| Error (b) | $m(n-1)(r-1)$ | $S.S(E_b)$ | ⑥ $= \frac{S.S(E_b)}{m(n-1)(r-1)}$ | - |
| Totals | $mr-1$ | (T.S.S), | | |

Standard Error (S.E).

The ~~S~~ S.E's of the treatment means are given below.

① S.E of the difference between two A means $= \sqrt{\frac{2V_{E_a}}{nr}}$

② S.E of the difference between two means B $= \sqrt{\frac{2V_{E_b}}{mr}}$

③ S.E of the difference between two B means at the same level of A

$$\left[(a_1 b_2) - (a_1 b_1)\right] = \sqrt{\frac{2 V_{E_b}}{r}}$$ and

④ S.E of the difference between two A means at the same or different levels of B

$$[(a_2 b_1) - (a_1 b_1)] \text{ or } [(a_2 b_2) - (a_1 b_1)]$$

$$= \sqrt{2[(n-1) V_{E_b} + V_{E_a}]/rn}$$

In this case, the value of 't' against which the ratio $\left(\frac{\text{difference}}{S.E}\right)$ is to be compared, is given by

$$t_\alpha = \frac{(m-1) V_{E_b} \cdot t_\alpha (\text{for error } b) + V_{E_a} \cdot t_\alpha (\text{for error } a)}{(m-1) V_{E_b} + V_{E_a}}.$$

—x— -