3 May 1933.

Brynmor Thomas, Esq.,
Armstrong College,
Newcastle-upon-Tyne, 2.

Dear Sir:

From each field you have seven sets of five random samples; a simple analysis is

Date	6
Error	28
Total	34

The 28 degrees of freedom for error are of course constituted of 7 sets of 4 each derived from the sets of 5 parallels. The 6 degrees of freedom for Date can be obtained by subtracting from the total, or as an independent check if t is the total of five samples from:-

$$\frac{1}{5}\,S_1^7\,(t-\bar{t})^2$$

where $\bar{t}$ is the mean of the 7 totals.

Putting the two fields together there are 69 degrees of freedom, the two sets of 34 each, and one more for the general difference between the two fields. This probably you want to eliminate, so I should take out the two separate analyses of 34 degrees of freedom each.

Of these 56 are pure error, 28 from each field. The two sixes, however, may be amalgamated and subdivided to show how far the fields agree and how far they differ in their seasonal changes. Thus if T is the total of 10 samples at any date, drawn from the two fields

$$\frac{1}{10} \mathop{S}_{1}^{7} (T-\bar{T})^2$$

is the seasonal effect derived from the sum of the two fields, or in other words the seasonal component they have in common. Again if D is the difference between the sum of the 5 samples from one field and the sum of those from the other

$$\frac{1}{10} \mathop{S}_{1}^{7} (D-\bar{D})^2$$

is the seasonal effect derived from the differences, or in other words the differential seasonal component due presumably to differences in the reaction of the fields to seasonal change.

You will find that these two new quantities, each of 6 degrees of freedom, add up to the same total of the two previous sixes from the individual fields.

On the second problem I should certainly use the method of Ex. 38. A homogeneous result would be reassuring.

Yours sincerely,