5th. September, 1929.

F.K. Jackson, Esq.,
Dept. of Agriculture,
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Dear Mr Jackson,

First with respect to the points in Paterson's memorandum.

The significant difference between A and D, as judged by the t tests represents a theoretical point of very frequent occurrence. The z-test for varieties shows clearly that in the aggregate of the four "varieties" no differences in yields have occurred which can be judged significant. In practice this test may be regarded as settling the question. Experimenters, however, often want to go further and ask "Though there is no significant general effect, are not some of the differences between particular pairs of varieties individually significant?" The factor to be considered if this is done is that the t test is perfectly valid for a pair of varieties chosen in advance, but if we choose the best and worst for comparison after the event, we are already choosing (with 4 varieties) the best of 6 possible comparisons, and roughly speaking oddd of 1/120 on such a chosen pair will be needed to be equally convincing with odds of 1/20 ordinarily lokked for. In other words the best and worst of even a small sample, drawn from a normal distribution of known S.D., will much more frequently differ by 2σ, than will any one value differ from the mean by over 2σ. Variety trials are often reported, even with many varieties, in the form of comparisons between every pair of varieties used, and of course the best v. worst comparison nearly always appears significant. No notice should be taken of this unless z is also significant.

It may be worth while to mention that the use of totals instead of means is usually quicker and gives a more accurate analysis of variance. The rough sheet enclosed only took about ½ an hour, without a machine, and gives slightly better values than Paterson's.

I agree exactly with Paterson's other conclusions in his memorandum.

With respect to your other enquiry, I think I should use colmatage and then include the margins in the plots. I do not think, however, that this will make a great difference one way or the other.

With respect to size of plots one always seems to gain by increasing the number and decreasing the size on the same area. The limiting factor is here labour, and agricultural convenience. Per contra the same design is usually more accurate on a larger scale than on a smaller.

Fivefold replication with a randomised arrangement is usually sufficient to supply a valid estimate of error, so that the experiment is self contained and can stand on its own feet. Whether the precision attained is sufficient is then a question of the precision aimed at; and it can always be increased by enlarging the experiment. I should therefore use 5 as the ordinary minimum, and increase it when necessary, irrespective of the number of treatments.

Yours sincerely,