March 10, 1938

Dear Koshal,

I hope by the time this reaches you you will be completely recovered. For forecasting crops two kinds of data may be used, (1) meteorological records and (2) measurements and other observations on the growing crop itself. To obtain useful formulae using data of either of these kinds, or both of them together, you also must have satisfactory yield data for previous years. This will mean an examination of the existing crop cutting data and of other sources of information as to total yield for different areas. I believe, though I am not sure, that in the Punjab the acreage data can be relied on so that the total outturn from an area may give you satisfactory indications of the variation in yield per acre from year to year. Quite probably, however, you may have to insist on a reconstruction of the crop-cutting methods to ensure an objective measure of precision and a sufficiently high level of precision so measured, or else that these should be supplemented by sample estimates of yield of the kind that Yates has been developing for wheat in England.
I am sending your letter to Yates, so that he may send you any of his publications likely to be useful.

The same simple technique will be needed if you are using observations on the growing crop as a basis for forecast. Thus, Yates has shown that the height of wheat at ear emergence in June is a valuable indication of the yield to be reaped at the end of August.

If, actually, variation in rainfall seems to be unimportant as causes of the year to year variation in yield, then, of course, rainfall data need not be used for prediction, although I suppose for the greater part of the Punjab the amount of the monsoon dominates growing conditions in Summer, even when most of the water intake of the crop comes from irrigation. Certainly I should examine carefully the rainfall records in relation to yield, if you have satisfactory yields to go on. The rainfall data will, I think, be good.

Yours sincerely,