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IMPROVING PRECISION OF AGRICULTURE FIELD EXPERIMENTS IN PAKISTAN

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ABSTRACT

Agriculture field experiment in Pakistan are usually designed as RCB and analysed through the classical Linear model ANOVA approach. Recent development in several countries have shown that considerable improvement in precision can be attained using methods of analysis which take into account the local spatial variation. Other recent developments have suggested that using incomplete block design also usually improve precision. We have analyzed research trials on wheat crop using spatial methods and found 20-30 percent reduction in the error mean square as well as a consistent decrease in the average pair wise standard error of difference. Here we use uniformity data from wheat trials at several locations to explore the advantages of spatial analysis over the classical analysis. We also explore the possible benefits of improvements in the design structure, again for improving the precision of comparisons. The results show that spatial analysis has a significant advantage over the classical analysis and should be routinely considered for analysis of field trials. While incomplete block designs do not have a particular impact when spatial modeling is used as the analysis tool, they do help in controlling variation from external sources when analyzing through the classical method.

INTRODUCTION

Agriculture field experiments are an important part of a research program in the National Agriculture Research System of Pakistan. These experiments involve the development and verification of new methods for crop improvement. These experiments, usually referred to as comparative experiments, are the mainstay of research programs and involve the comparison of differences among the competing varieties/treatments etc. When laid out in the field these experiments occupy space and are spatial in nature. It has been well established and reported by Batchelor and Reed (1918) and Fisher (1937) that soil fertility behaves in patches and there is