

Model comparison and experimental design simulation including natural field variability in rice crop (*Oryza sativa* L.)

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Rice (*Oryza sativa*, L.) is not only the most important cereal crop for direct human consumption worldwide but also is the nutritional base for more than half of the global population. Reducing the gap between the best rice producers and the potential yield of varieties is a major challenge for breeding programs. Accurate yield estimations depend both on the model of analysis selected as well as the experimental designs implemented in the fields. The objectives of this work were firstly to compare different models of analysis that consider the soil spatial heterogeneity; and secondly to compare alternative experimental designs, simulated for the experimental field conditions from kriging the natural soil heterogeneity. In order to achieve both objectives a population of about 1000 advanced inbred lines of sp. *O. sativa* L. ssp *indica* and *O. sativa* L. ssp. *tropical japonica*, from the Uruguayan National Breeding Program were used. Phenotypic data was obtained during years 2011, 2012 and 2013. A series of Randomized Complete Block Designs (RCBD) trials were conducted, each one consisted on approximately of 35 lines with two or three replications and repeated checks. For the first objective three models with increasing degree of spatial variability adjustment were compared; the first model consisted on an individual analysis by trial, the second proposed a joint analysis of trials with a spatial adjustment by trial and the third one considered the joint analysis of the trials with a spatial correction due to position of rows and columns in the field. Postblocking, considering location either by taking into consideration the trial of evaluation or the row-column position, helps to improve the estimations of the means. For the second objective four of the most commonly used designs were simulated using the natural field heterogeneity; Completely Randomized Design (CRD), Randomized Complete Block Design (RCBD), Randomized Complete Block Design by Trial (RCBD-T) and Incomplete Block Design (IBD-a). Even though the experimental field was of a considerably large size, high heterogeneity in experimental units within the fields was not detected. The most complex experimental design in terms of restriction in randomization (IBD) was indicated as the best one for the majority of the situations evaluated.

Palabras clave: geostatistics, mixed models, postblocking

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