Response to Reviewers on Manuscript FIELD-D-23-02059

Dear Editors and Reviewers,

Thank you for your feedback on the manuscript entitled “Optimal design for on-farm strip trials --- systematic or randomised?” We have made the following responses to the comments and suggestions provided by the editor.

1. *Field Crops Research has recently altered the format of the Abstract to make it more readable. I request that you revise the Abstract of your manuscript using the following headings and guidelines and resubmit your manuscript.*

Response: the revised abstract is:

CONTEXT OR PROBLEM: Randomised designs are often preferred over systematic designs by agronomists and biometricians. However, for on-farm trials, the choice may depend on the objective of the experiments. If the purpose is to create a prescription map of a continuous input for each plot of a grid covering a large strip trial, a systematic design may be a better choice, but it attracts less discussion and attention.

OBJECTIVE OR RESEARCH QUESTION: This study aims to evaluate the performance of systematic designs with geographically weighted regression (GWR) models in addressing spatial variation and estimating continuous treatment effects in large strip trials through numeric simulations.

METHODS: A Bayesian hierarchical model with spatially correlated random parameters is utilised to generate simulated data for various scenarios of large strip on-farm trials. The study employs GWR models to analyse the simulated data for two assumptions: a linear response and a quadratic response to the treatment effects.

RESULTS: With the assumption of linear response, the difference between a systematic design and a randomised design is not significant regardless of the presence of spatial variation. However, with the assumption of quadratic response, a systematic design is superior to a randomised design concerning the lower mean squared errors (MSE) by GWR.

CONCLUSIONS: The findings highlight the superiority of systematic designs for producing smooth maps of optimal input levels and the impact of spatial variation on the performance of quadratic models in strip trials. Additionally, the study recommends fixed bandwidths based on experimental designs for GWR models. For a large strip trial to create a varying treatment map, a systemic design should be used as it has more flexibility in post-experiment statistical modelling.

IMPLICATIONS OR SIGNIFICANCE: The findings offer practical recommendations for designing large strip trials. By drawing attention to the considerations, especially regarding the experiment's purpose, this research contributes valuable insights for improving the efficacy and planning of future large strip trials.

1. *Please submit, with the manuscript, the names and e-mail addresses of at least 5 potential reviewers, who have published in refereed international journals. Potential reviewers should not have any conflict of interest with any of the co-authors of the manuscript, and at least 3 must be from different countries to the authors. This speeds up the handling of your manuscript.*

Response: the five potential reviewers are:

Matthew J. Pringle, matthew.pringle@qld.gov.au

Department of Environment and Science, GPO Box 2454, Brisbane, QLD 4001,

Australia.

Prof. Dr. Hans-Peter Piepho, piepho@uni-hohenheim.de

Biostatistics (340c) [Director], Institute of Crop Science (340) [Managing director]

University of Hohenheim

Dr. Fiona Evans, fiona@daa.com.au

https://www.daa.com.au/our-people/fiona-evans

Maria Lie Selle, maria.selle@ntnu.no

Department of Mathematical Sciences, Norwegian University of Science and Technology (NTNU), Trondheim, Norway

Osval Antonio Montesinos-López, oamontes2@hotmail.com

Facultad de Telemática, Univ. de Colima, Colima, Colima, 28040 México

Thank you for considering our work for publication in Field Crops Research. We look forward to hearing from you.

Sincerely,

Zhanglong Cao, on behalf of all authors.

Curtin University