

## Optimizing the allocation of trials to sub-regions in crop variety testing

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New crop varieties are extensively tested in multi-environment trials in order to obtain a solid basis for recommendations to farmers. When the target population of environments is large, a division into sub-regions is often advantageous. If the same set of genotypes is tested in each of the sub-regions, a linear mixed model (LMM) may be fitted with random genotype-within-sub-region effects. The first analytical results to optimizing allocation of trials (designs) to sub-regions have been obtained in Prus and Piepho (2021). In that paper *one-year* experiments, in which the genotype effects for different genotypes were assumed to be uncorrelated with each other, were considered. Prus and Piepho (2024) extended the results from Prus and Piepho (2021) to *multi-year* experiments. In Prus (2025) a solution is proposed for *one-year* experiments with *correlated* genotype effects. The present work generalizes the results obtained so far to *multi-year* experiments models with *correlated* genotype effects.

Prus, M. and Piepho, H.-P. (2021). Optimizing the allocation of trials to sub-regions in multi-environment crop variety testing. *Journal of Agricultural, Biological and Environmental Statistics*, 26, 267–288.

Prus, M. and Piepho, H.-P. (2024). Optimizing the allocation of trials to sub-regions in crop variety testing with multiple years and locations. *Journal of Agricultural, Biological and Environmental Statistics*.

Prus, M. (2025). Computing optimal allocation of trials to sub-regions in crop-variety testing in case of correlated genotype effects. *Statistica Neerlandica*