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Phenotyping throughput is more important than accuracy

June 12, 2021

Left: Measuring corn height by hand. Right: Capturing imagery with a drone to extract plant height. Photos by Beth Ann Luedeker, Texas A&M Department of Soil and Crop Sciences.

Phenotyping data is an important component of nearly all plant population studies. Traditionally, the focus has been on increasing measurement precision and accuracy. Recently, there has been an increase in plant phenotyping throughput capacity via the use of drones and other high-throughput technologies, but are these methods worth implementing if measurement accuracy is reduced?

New research in Crop Science reports on a simple simulation to assess the trade-offs between quality and quantity in plant phenotyping. The researchers compared four levels of measurement accuracy across varying levels of throughput to screen more environments and replications. They then assessed the ability to determine true (computer simulated) genetic values and to parse out gene effects.

This study indicated sacrificing measurement accuracy is often tolerable if more data points can be collected. Under the tested scenarios, the true genetic values were best estimated by increasing the number of environments assessed in a given study. In contrast, genetic mapping studies should increase population size as well.

This simulation supports many empirical findings and should be useful to any researcher interested in assessing how high-throughput phenotyping methods affect decision-making in crop research programs.

Dig Deeper

Lane, H.M., & Murray, S.C. (2021). High throughput can produce better decisions than high accuracy when phenotyping plant populations. *Crop Science*.

https://doi.org/10.1002/csc2.20514 (in press)

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