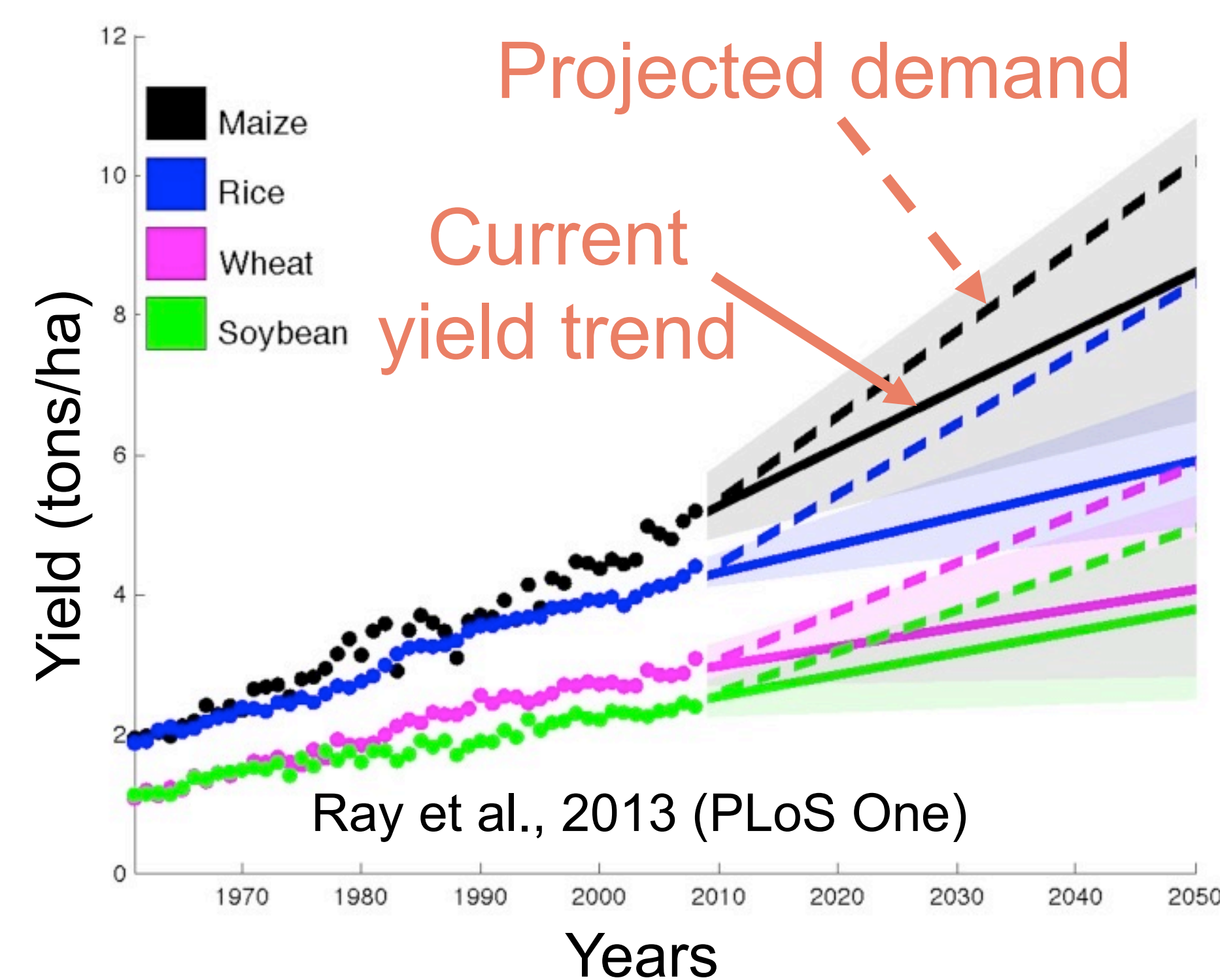


The perils and promise of single-gene solutions to crop yield: extraordinary claims require extraordinary evidence

Merritt Khaipho-Burch¹, Mark Cooper^{2,3}, José Crossa⁴, Natalia de Leon⁵, James Holland⁶, Ramsey Lewis⁶, Susan McCouch¹, Seth Murray⁷, Ismail Rabbi⁸, Pamela Ronald⁹, Jeffrey Ross-Ibarra¹⁰, Detlef Weigel¹¹, Jianbing Yan¹², Edward S. Buckler^{1,13}

Current yield trends are **insufficient** to meet growing demands.

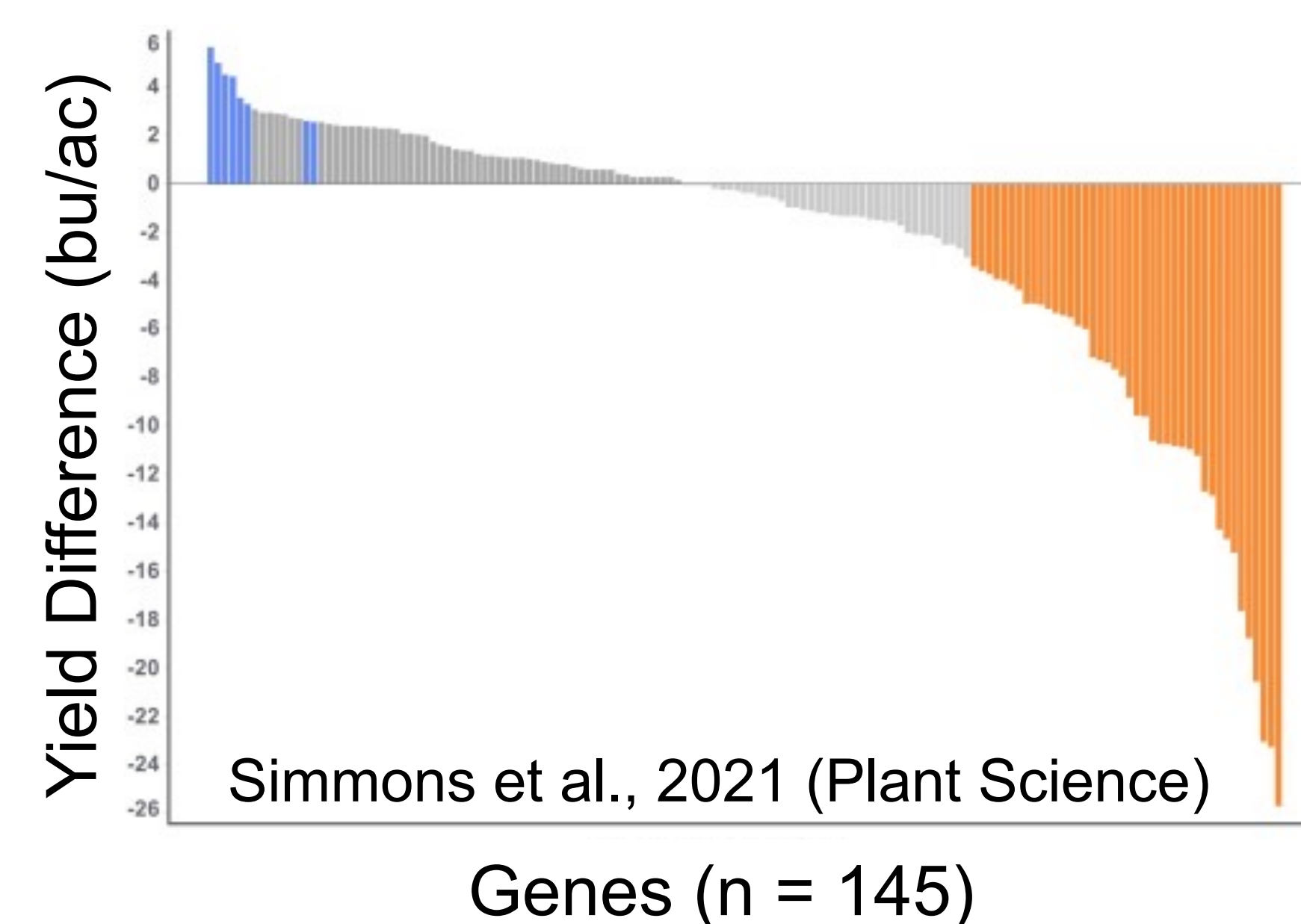


Inaccurate measurement and reporting on yield has **drastic consequences** for feeding the planet.

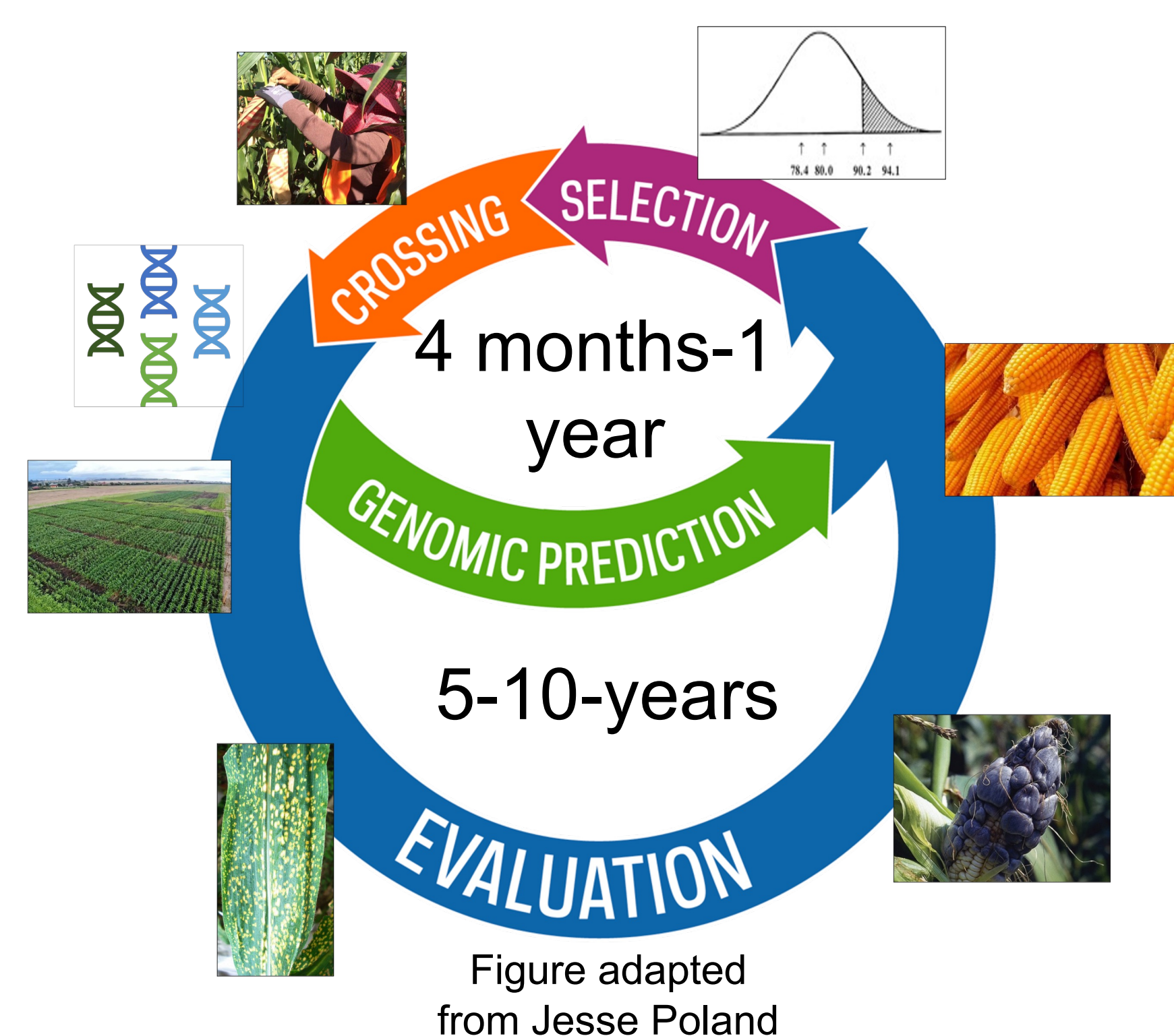
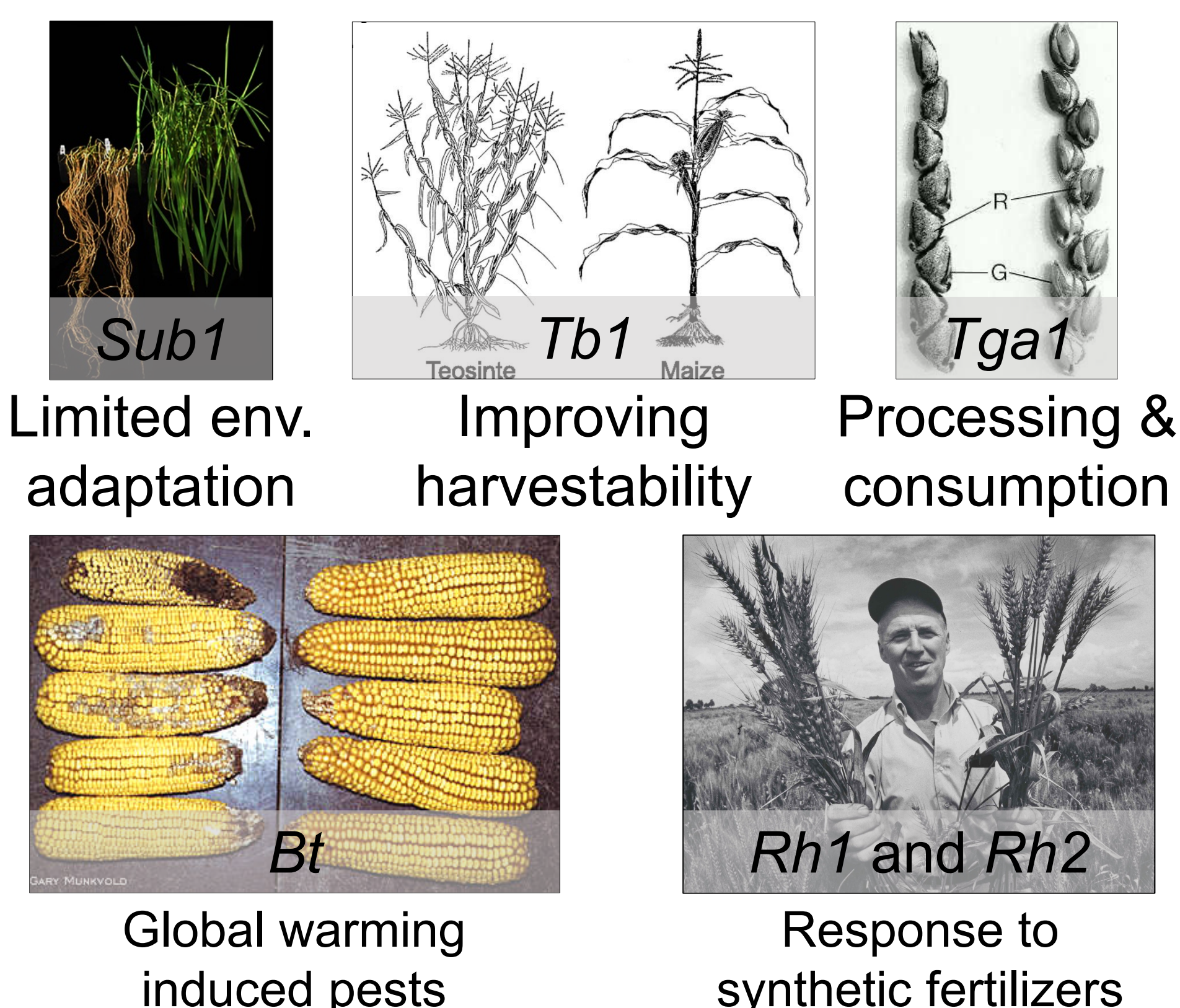
Studies touted as breakthroughs with **8-68% increases in crop yield** are often flawed in how they measure field performance & have **never** translated into significant gains once tested at scale.

1600+ gene constructs were field tested at scale, **only 8 significantly increased** yield and had small effects (1-4%).

Most gene constructs **significantly decrease** or have **no effect** on yield.



Some single genes have worked well in domestication & to stabilize yield; however, **robust yield increases are delivered using genomic selection.**

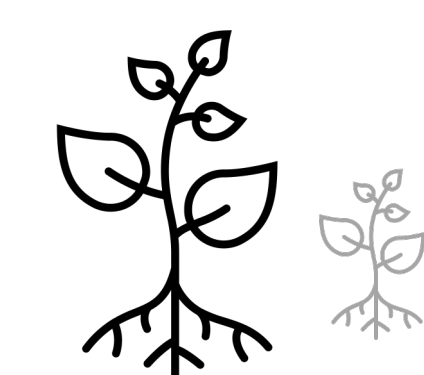


Molecular biologists don't seem to know this one simple trick to increase intrinsic plant yield.

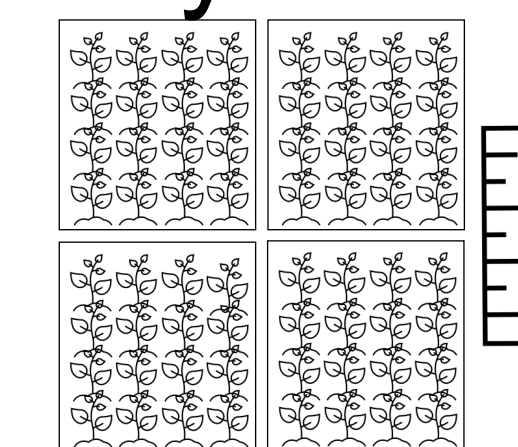
(It's genomic selection)

We **suggest approaches** for researchers and reviewers to use when evaluating the impact of single genes on crop yield:

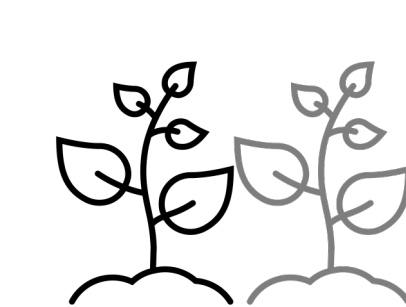
Use elite germplasm



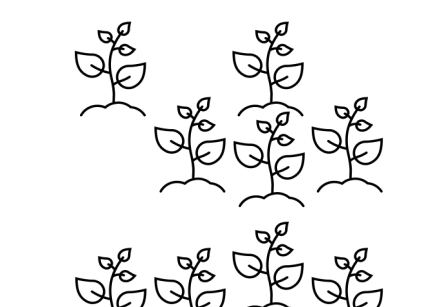
Measure plot yield



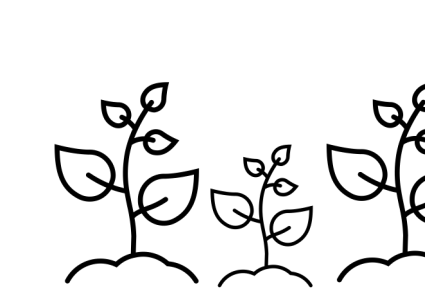
Test G x E x M x T effects



Competition

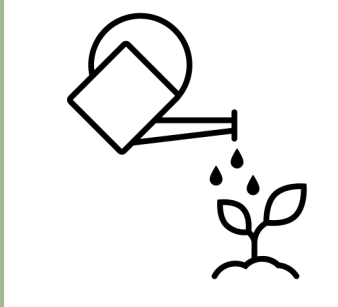


Density



Edge

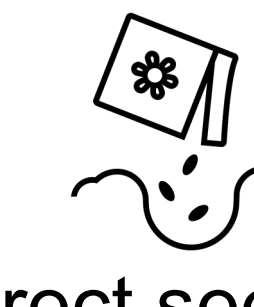
Follow standard management



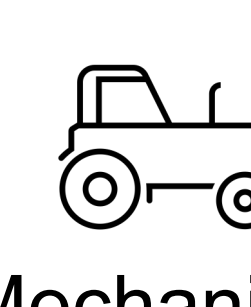
Irrigation



Fertilizer

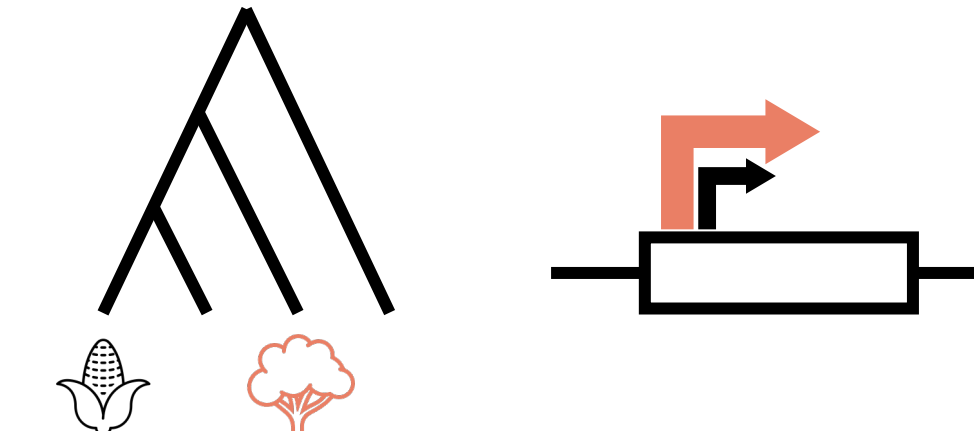


Direct seeding/
transplanting



Mechanical
harvesting

Consider evolution



Develop collaborations



Take a zine!

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