

Genetic improvement of climbing beans using genomics and machine learning

Beat Keller¹, Hector Fabio Buendia², Ana Elisabeth Portilla Benavides², Daniel Ariza², Eliana Macea², Bodo Raatz², Bruno Studer¹
¹Molecular Plant Breeding, ETH Zürich, Switzerland; ²International Center for Tropical Agriculture (CIAT), Cali, Colombia



Background: Climbing beans have high yield on small area and positive effects on soil fertility
Aim: Increase the bean nutrition value and the income of smallholders in the tropics

1. Collect data

Phenotyping:



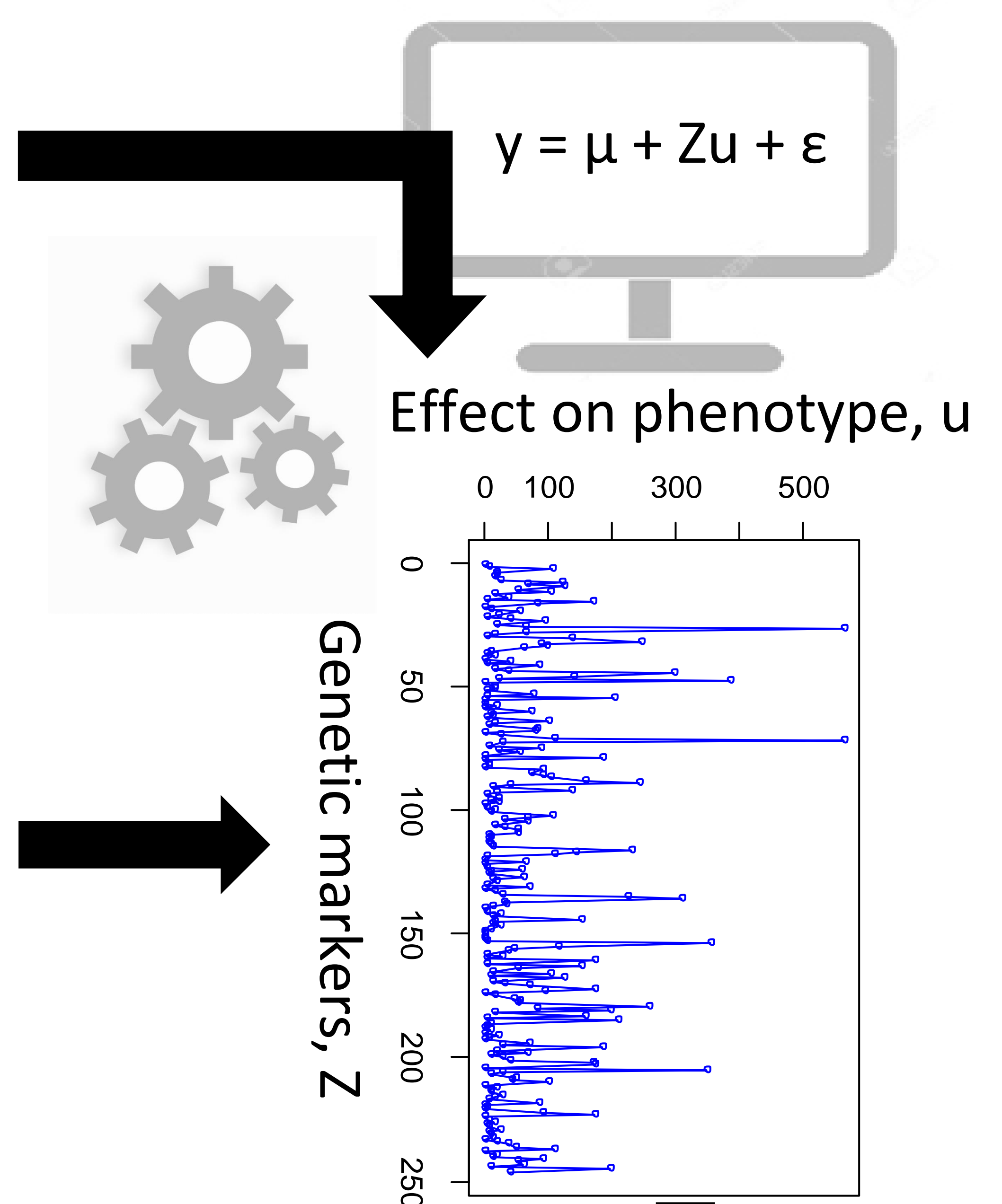
+

Genotyping by sequencing:



GTTGAGTTAATTCCGAGTCT
GTTGATTTAATTCCGCGTCT
GTTGATTTAATTCCGCGTCT
GTTGAGTTAATTCCGAGTCT
GTTGATTTAATTCCGCGTCT
GTTGAGTTAATTCCGCGTCT
GTTGAGTTAATTCCGAGTCT

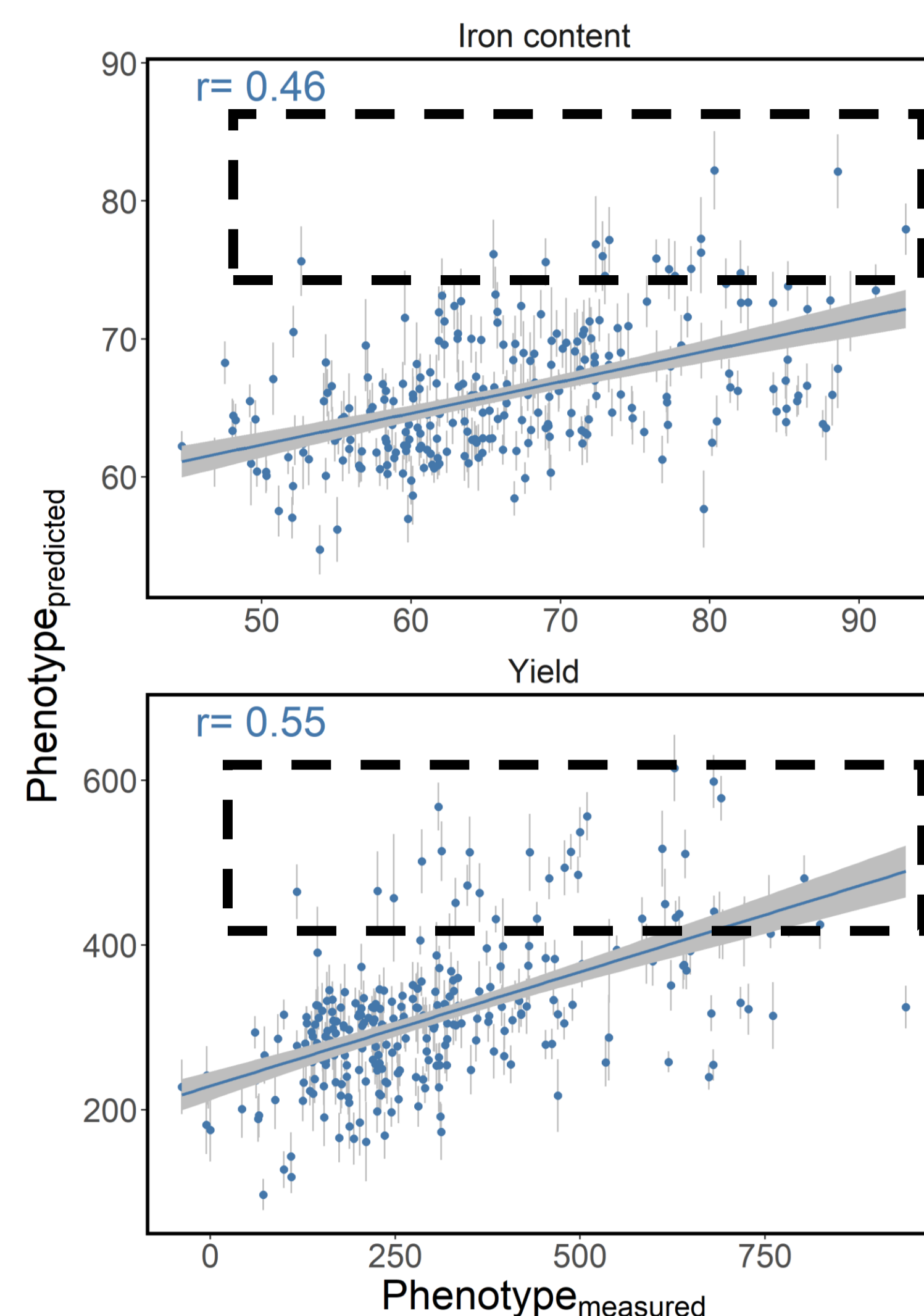
2. Model genetic effects



4. Improve bean varieties

Select superior genotypes based on statistical models. The faster development of new bean varieties improves food security and quality

3. Predict phenotypes of new genotypes



Genotype more lines and predict phenotypes. No more field trials needed.