



AI-driven innovation for crop adaptation

WSAS “Growing with AI” Seminar
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CEO, Heritable Agriculture
2026-02-04



Google Cloud
Partner

The problem

Current breeding timelines cannot keep up with the changes in climate

3 years

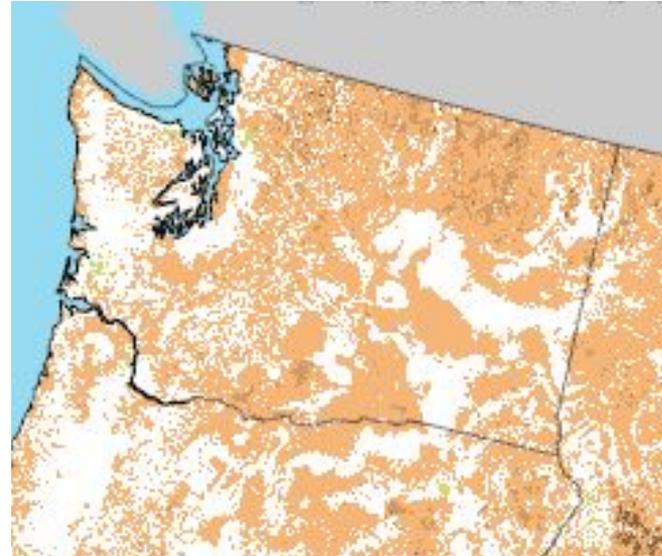
Vegetable pathogen resistance

14 years

Breeding cycle of loblolly pine

10 years

To bring a new product to the market



Half-zone changes since 2012

Source: [USDA ARS](#)



The problem

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To bring a new product to the market

The **traditional** crop development system



Statistical / linear models



Based on DNA



Environment characterized by greenhouse or academic trials



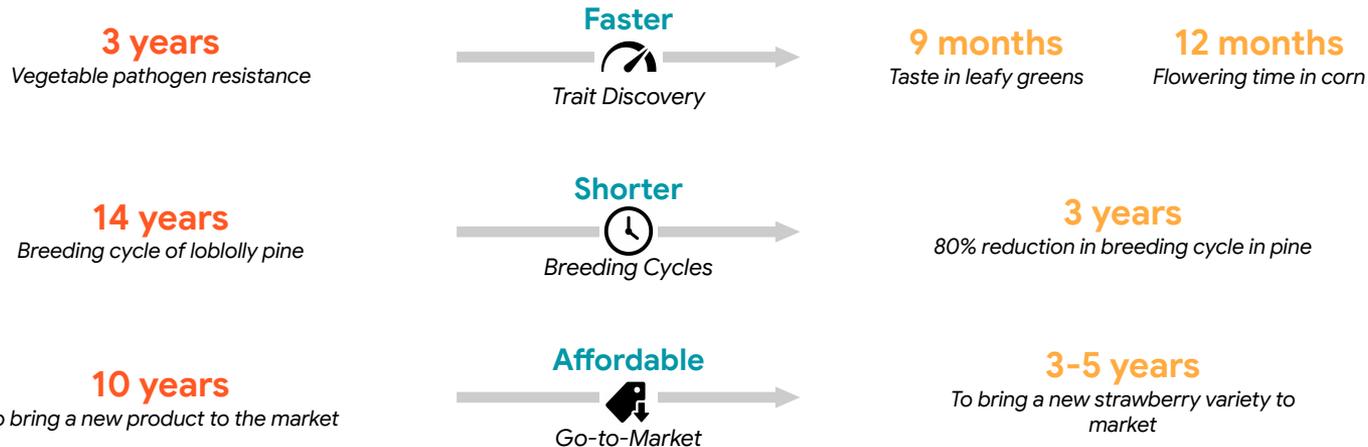
Half-zone changes since 2012

Source: [USDA ARS](#)



Our solution

AI + omics + remote sensing to lower costs and accelerate timelines for crop improvement



The **traditional** crop development system

-  Statistical / linear models
-  Based on DNA
-  Environment characterized by greenhouse or academic trials

The **HERITABLE** crop development system

-  Statistical / linear models
-  Full multimodal: based on DNA, RNA, and more
-  Scalable integration of field data (weather + soil)



Heritable differentiation

AI integrates biological data to inform crop improvement strategies

Information → Simulation → Actuation



DNA



Methylation



Management



Traits



RNA



Metabolites

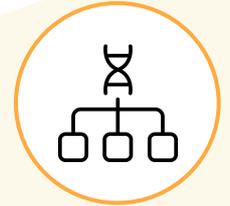
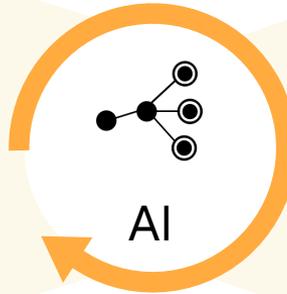


Remote Sensing



Proteins

HERITABLE
AGRICULTURE



Trait Prediction

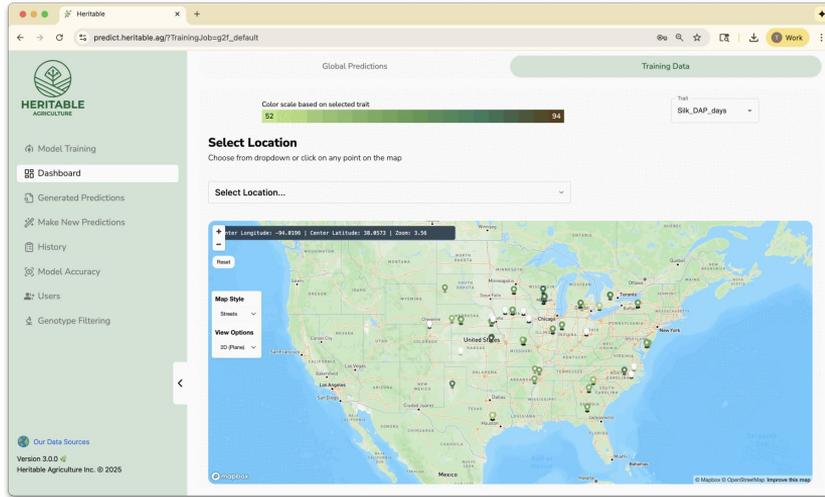


Trait Discovery



Heritable - the Platform

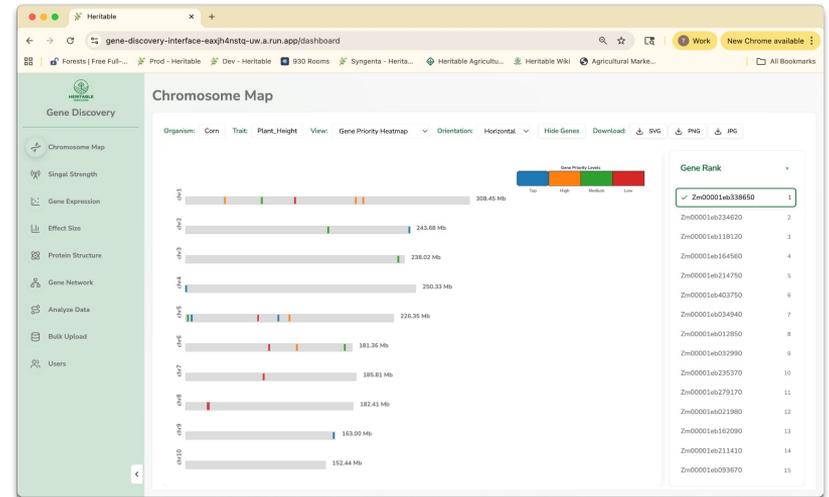
Software for predictive breeding and biotech recommendations



TRAIT PREDICTION

(Marketing) Product placement

(Breeding) Genomic prediction / parental selection



TRAIT DISCOVERY

Gene discovery

AI-marker development

CRISPR

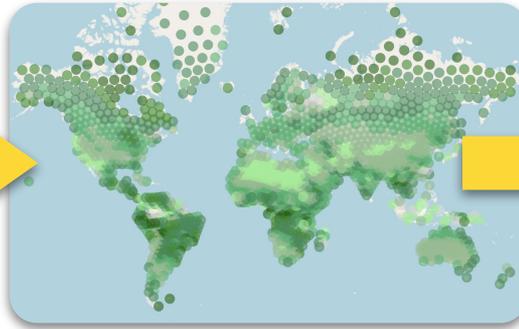


Predictive breeding

Placing and selecting for the best crop for an environment



Training data



Global performance



Specific-field performance



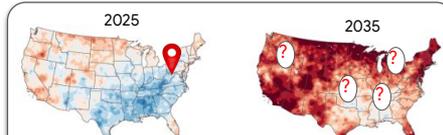
Reduce the number of field trials by **50%**



Open new markets without new field trials



Reduce screening selections by **90%**



Anticipate and adapt to future climate shifts

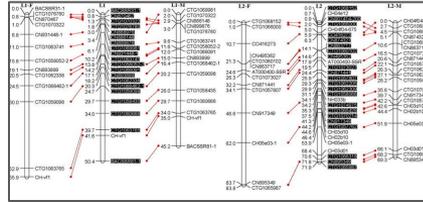


Trait discovery

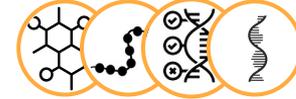
Integration of multiple molecular datasets to pinpoint the genetic basis of traits



[Source](#)



[Source](#)



AI Generated

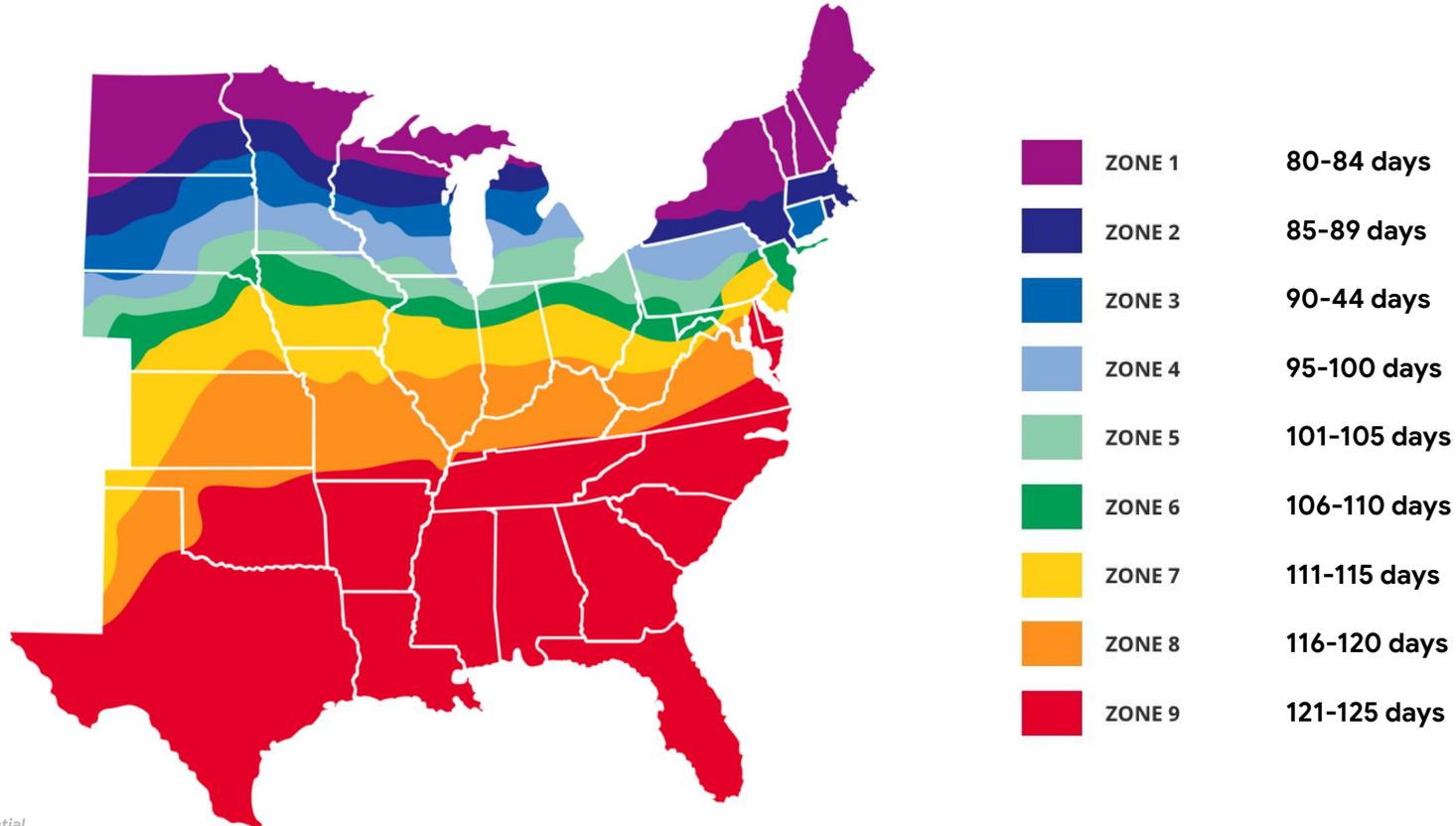


AI Generated



Trait discovery use case

The importance of modulating flowering time in corn



Gene discovery

Modulating flowering time in corn



Inputs: 500 lines, WiDiv panel, field grown (Lincoln, NE), leaf RNAseq, manual and image-based phenotyping

the plant journal



Original Article | [Open Access](#) |

Population-level gene expression can repeatedly link genes to functions in maize

J. Vladimir Torres-Rodríguez, Delin Li, Jonathan Turkus, Linsey Newton, Jensina Davis, Lina Lopez-Corona, Waqar Ali, Guangchao Sun, Ravi V. Mural, Marcin W. Grzybowski, Bradley M. Zamft, Addie M. Thompson, James C. Schnable [✉](#) ... [See fewer authors](#)

First published: 29 May 2024 | <https://doi.org/10.1111/tpj.16801> | Citations: 7



Gene discovery

Modulating flowering time in corn



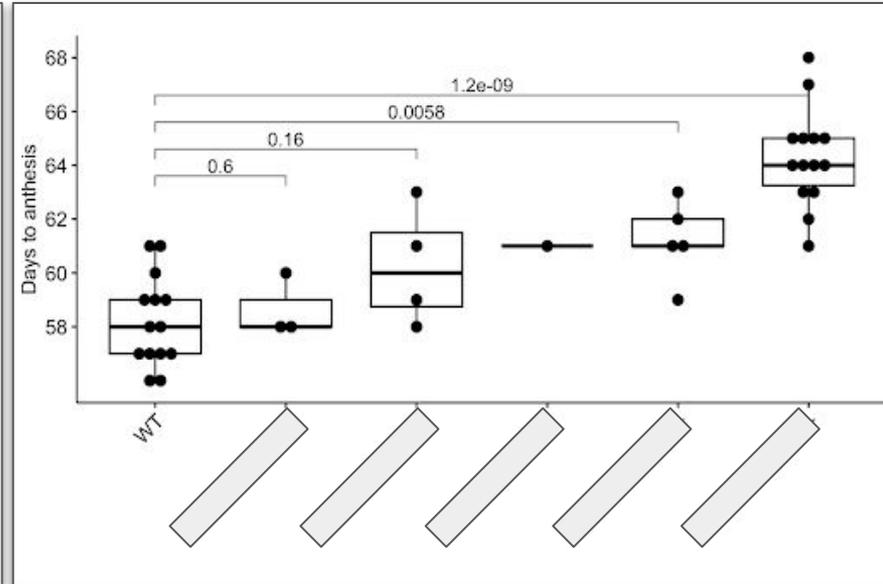
Base plant
56 days to flower
11 leaves



Mutant plant
92 days to flower
14 leaves



Mutant plant
Never flowered
18 leaves

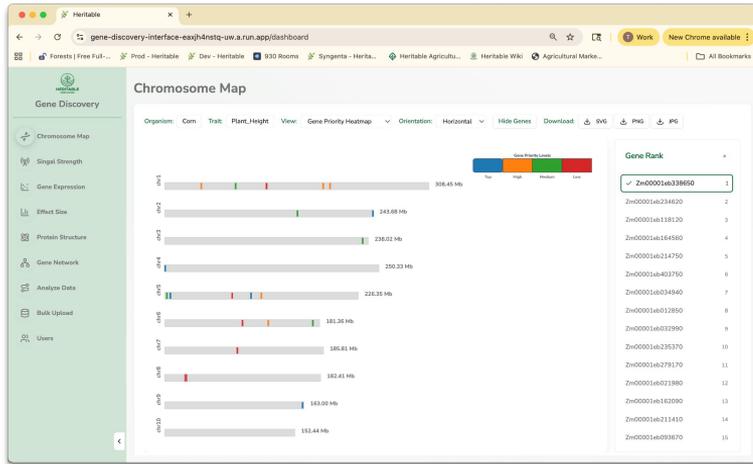


Biotechnology - Gene Discovery

Gene discovery: from bottleneck to breakthrough

The traditional system

The HERITABLE system



Heritable Platform

Candidate genes
in corn

1671

Lab

Flowering time
in corn

8

Taste
in leafy greens

3



22

Greenhouse

3

3



1 (*zmm28*)

Field



Putting it all together

Case study: strawberry strategic alliance



Partnership between



CIV

50 years of world-class strawberry genetics



Heritable

AI to customize for indoor growing in Canada



Red Sun Farms

Growing, packing, shipping and relationships to retail

Purpose: bring local, nutritious, constant strawberry supply to the Northeast

Process: Use Heritable's AI to rapidly **adapt** CIVs excellent genetics to Limington's indoor growers

Requirements: Deep partnership between breeder, grower, and Heritable. Not "services"

WA relevance: apples, wheat, grapes

Climate relevance: disease resistance, stress tolerance, local = reduced scope 3



Trends in AI for Climate + Agriculture

A provocation

- The next record holder for “largest ag exit” will be from climate adaptation
- It will come from a mix of capabilities = partnership model, no “go it alone”
- Everyone is asking for pest resistance
- Order of impact (for genetics): placement, breeding, editing
- Other opportunities for AI + Climate:
 - Intermediate weather prediction
 - Epidemiology
 - DNA language models (Heritable is pursuing these)
 - Plant-microbe interactions
 - Ecosystem modeling
 - Data cleanup
 - Data organization, e.g. LLMs for agronomy notes





Thank you!