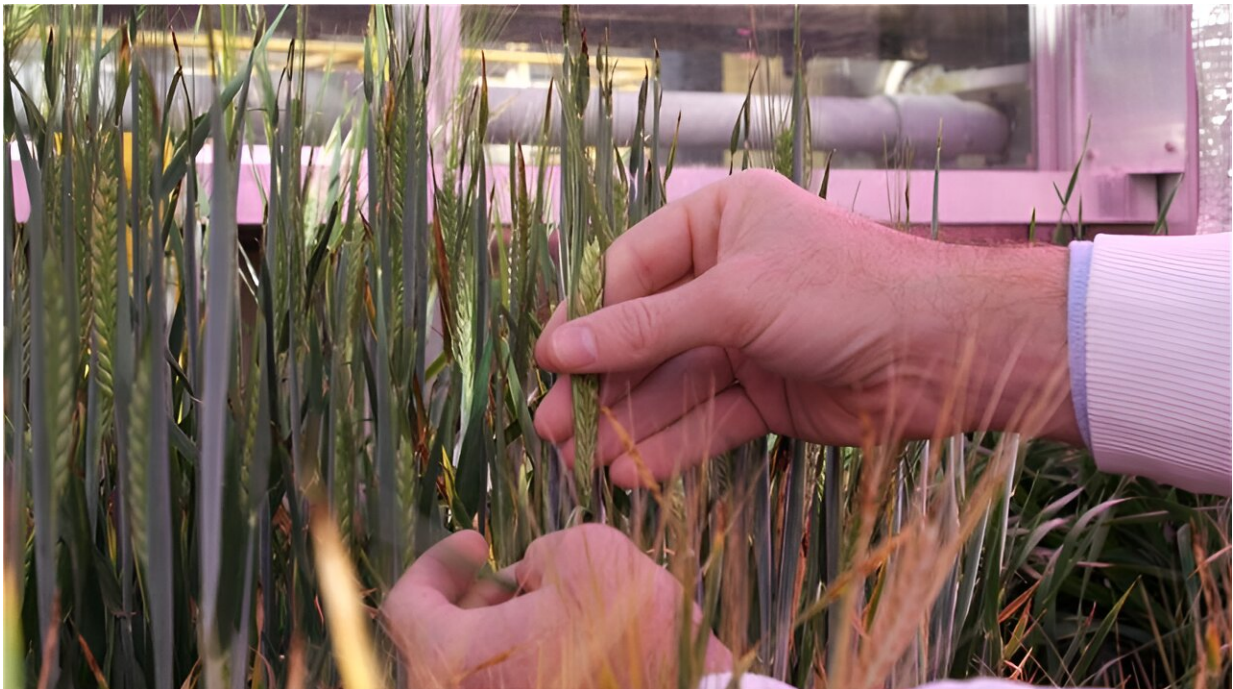


# Turning big data into better breeds and varieties: Can AI help feed the planet?

August 9 2023

---



Barley crop in glass house at UQ. Credit: Queensland Alliance for Agriculture and Food Innovation/University of Queensland

Artificial intelligence could hold the key to feeding 10 billion people by 2050 in the face of climate change and rapidly evolving pests and pathogens according to researchers at The University of Queensland.

Professor Lee Hickey from UQ's Queensland Alliance for Agriculture

and Food Innovation said AI offered opportunities to accelerate the development of high performing plants and animals for better farm sustainability and profitability.

"Breeders are collecting billions of [data points](#), but the big challenge is how we turn this colossal amount of data into knowledge to support smarter decisions in the breeding process," Professor Hickey said. "AI can help to identify which plants and animals we use for crossing or carry forward to the next generation."

Professor Ben Hayes, the co-inventor of genomic prediction, said the QAAFI team had identified four applications for AI in crop and livestock breeding.

"The first one is deciding what to breed—it might sound simple, but this decision is becoming more complex," Professor Hayes said. "In an increasingly challenging environment, consumer acceptance will be more important, so AI is a good way to pull together the preferences of millions of people.

"The second use involves analyzing images taken on a large scale to capture [genetic variation](#) between related lines of plants and certain traits in animals that we want.

"The third area is to take [genetic markers](#) and use that information to predict how good a variety is going to be for breeding."

Professor Hayes said the fourth application of AI was shifting the way researchers approached breeding.

"It's a change from looking at individual genetic lines to thinking about a breeding population as a collection of chunks of DNA that are good for a trait," he said.

"You might have one good chromosome segment in a line that is otherwise not so good, but AI can identify the optimal crossing path to combine it with other segments across the genome and develop a new and superior genotype.

"The crosses needed to bring together the AI selected beneficial segments can be progressed rapidly using 'speed breeding' which allows researchers to turn over multiple generations very quickly.

"Together, AI-informed selection with speed breeding allows researchers and breeders to generate vastly superior genotypes, ready for evaluation, in just a year or two."

UQ researchers are already combining speed breeding and AI in wheat and barley projects that are supported by Grains Research and Development Corporation (GRDC) investment in collaboration with the Queensland Department of Agriculture and Fisheries.

"Integrating speed breeding with genomics and in particular AI is the new frontier in plant and animal breeding, where we tap into these big data sets," Professor Hickey said.

"This will be a game changer, bringing desirable traits together faster than ever before, particularly when it comes to multiple traits governed by multiple genes."

**More information:** Ben J. Hayes et al, Advancing artificial intelligence to help feed the world, *Nature Biotechnology* (2023). [DOI: 10.1038/s41587-023-01898-2](https://doi.org/10.1038/s41587-023-01898-2)

Provided by University of Queensland

Citation: Turning big data into better breeds and varieties: Can AI help feed the planet? (2023, August 9) retrieved 28 April 2024 from <https://phys.org/news/2023-08-big-varieties-ai-planet.html>

This document is subject to copyright. Apart from any fair dealing for the purpose of private study or research, no part may be reproduced without the written permission. The content is provided for information purposes only.