

Robots find genetic mutations in crops, accelerating breeding solutions

If you want to find what's probably the best example of what robots are doing in crop development, come to the epicenter of American agriculture—Iowa. That's where DuPont Pioneer has a \$40 million production genotyping lab.

On the morning that *IEEE Spectrum* visited, inside the lab, several clusters of whirring, chugging, and occasionally banging machines do their work.

What goes on here is akin to what happens in one of the server farms that run Google's search engine. The lab is an information factory whose primary purpose is to answer a single question more than a 100 million times per year: Does this seed contain variants of genes that are associated with these traits?

Decades ago, it was a tricky procedure. Now, what was once months of work that would earn you an advanced degree is done tens of thousands of times each day. At Pioneer's lab, robotic arms swing to a hypnotic beat, moving cassettes of plant material from one step to another, adding just the right amount of chemicals and markers to each of thousands of DNA samples. All the while technicians and scientists keep track of the results on giant screens.

What's all this automation good for? The most easily measurable metric is that "running a query" now costs mere pennies instead of hundreds of dollars. That means more varieties can be screened and breeders can make a better selection of what plants to cross-pollinate with which.

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