# Explaining genetic modification research

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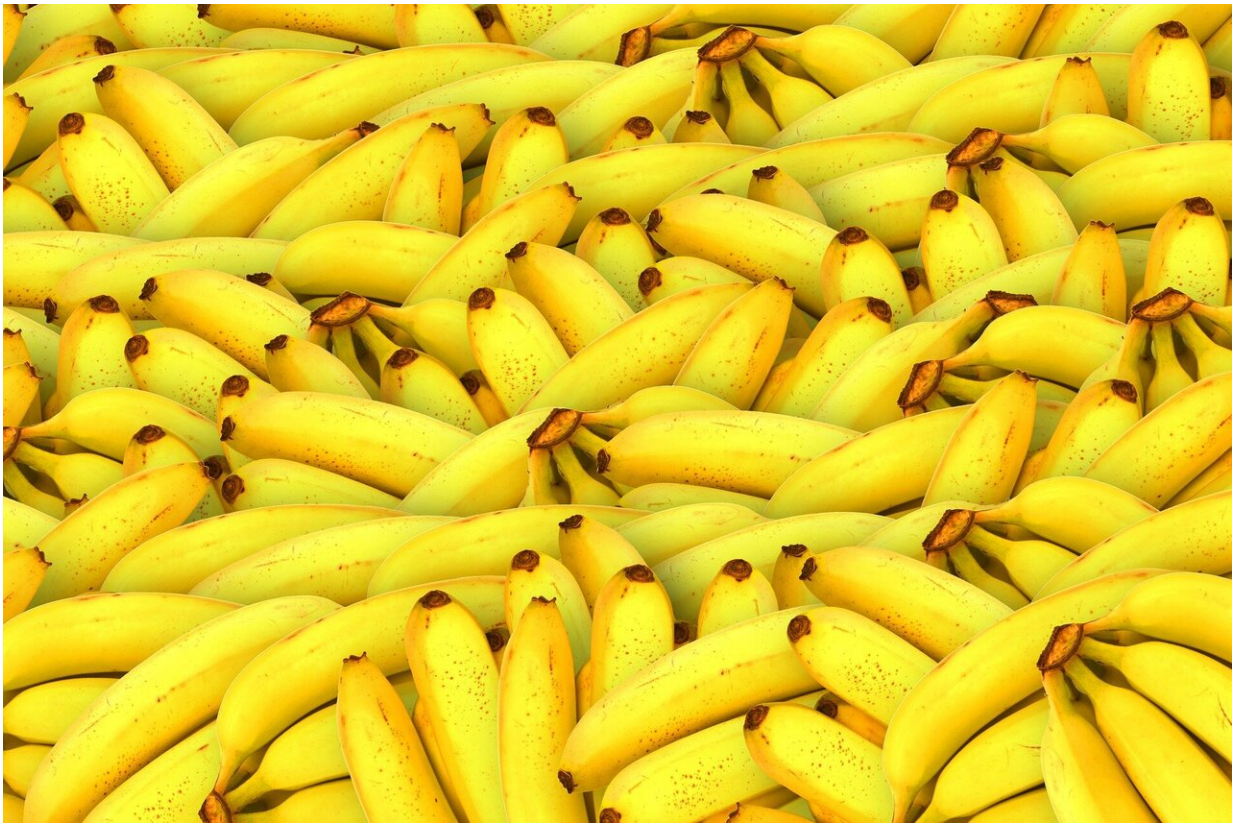

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What do bananas and cavoodles have in common? They're both lovely, yellowy and have been produced by genetic manipulation.

If we went back in time a few hundred years, bananas and cavoodles would look very different—if they even existed at all!

That's because their genetic code has changed from what it is today.

Welcome to Genetic Modification 101.

## What are genes?

Let's start small with DNA.

DNA is made up of molecules that provide a chemical blueprint for each living organism. Specific sequences of DNA are called genes, and these genes are what make us unique.

Genes can give you blue eyes and blonde hair or brown eyes and black hair. They're passed down from your parents. These "units of inheritance" were first suggested in the 1800s by Gregor Mendel. (He laid the mathematical foundation of the science of genetics.)

## What is selective breeding?

Genes aren't only found in people. They're an essential component of all organisms, from bananas to cavoodles. But unlike humans, who have evolved naturally, the genetic codes of bananas and cavoodles have been manipulated.

Take modern dog breeds. They've been created through selective breeding. With selective breeding, you mix together two different breeds with certain genetics. Mix a poodle with a cavalier King Charles spaniel and voilà! You have the cavoodle.

Selective breeding has been practiced by humans for thousands of years. It's essentially old-school genetic modification. And it's far more widespread than dog breeding—the entire practice of agriculture is

based on selective breeding.

That brings us to the banana. Its wild ancestors (*Musa acuminata*) were a "spindly plant with small, okra-like pods". This was bred with the heartier-looking *Musa balbisiana* to create a hybrid—the plantain (*Musa paradisiaca*). It's from plantains that our modern varieties of bananas are derived. (Which, botanically speaking, are actually berries—but don't get us started on that!)

More recently, scientists from the Queensland University of Technology tweaked the DNA of the humble banana to create a super banana, rich in provitamin A and iron.

## To the lab!

Selective breeding may result in offspring carrying over unwanted genes and undesirable traits. For more precise genetic modification, you need a laboratory.

In a lab, scientists can speed up the entire process by targeting specific genes. This can be done through a variety of techniques.

In Australia, the CSIRO's working on several projects involving genetic modification. They include improving the sustainability, productivity, fiber quality and distinctiveness of Australian cotton; creating canola plants that produce long chain omega-3 oils; and plant-based oils that could replace petrochemicals in industrial products.

So it's safe to say there's a lot of research happening in this space.

## Is it worth it?

That depends on who you ask.

Here in WA, GM cotton, GM canola and GM safflower have been commercially planted since 2008, 2010 and 2018 respectively. GMOs are banned in Tasmania until at least 2029, with many local growers and producers supportive. But in South Australia, a ban was lifted in 2020 due to concerns local farmers were missing out on economic opportunities.

Some research suggests GM crops can help mitigate climate change, with one study claiming wider adoption of already-existing GM crops in Europe could reduce greenhouse gas emissions by 7.5%.

Recently, a team of WA researchers discovered the probable cause of Alzheimer's disease using genetically modified mice.

With ever-widening applications across multiple fields and industries, one thing's for certain. Our experimentation with genetic modification has only just begun.

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