

## Podcast: Synthetic fertilizer pollution threatens our ecosystems. Are nitrogen-fixing microbes the answer?

Farmers need nitrogen fertilizer to maximize crop yields. Without it, our food supply would be nowhere near as abundant as it is today, and natural sources of usable nitrogen are quite limited. Fortunately, researchers devised a method known as the [Haber-Bosch process](#), in the early 1900s to “fix” nitrogen into forms plants can consume. This was a landmark development, but the process is energy intensive (accelerating climate change) and the resulting fertilizer products take a substantial toll on the environment, as excess fertilizer runs off farmland and enters waterways. According to the [Environmental Protection Agency](#), this nutrient pollution

.... has impacted many streams, rivers, lakes, bays and coastal waters for the past several decades, resulting in serious environmental and human health issues, and impacting the economy.

Too much nitrogen and phosphorus in the water causes algae to grow faster than ecosystems can handle. Significant increases in algae harm water quality, food resources and habitats, and decrease the oxygen that fish and other aquatic life need to survive.

screen shot joyn bio  
Michael Mille. Image:  
Joyn Bio

At the same time, earth’s atmosphere is comprised of more than 70% nitrogen, though it’s not usable by plants in its atmospheric form. Just as the [Haber-Bosch process](#) revolutionized agriculture over 100 years ago, scientists are now developing another milestone technology: genetically engineered microbes that fix nitrogen from the atmosphere for plants, greatly reducing the demand for and negative impacts of synthetic fertilizer.

The research began with the observation that a number of microbes naturally fix nitrogen. By engineering these microbes to associate with plants that cannot fix their own nitrogen, biotech firm Joyn Bio, a collaborative effort backed by several chemistry and synthetic biology companies, hopes to offer farmers a sustainable alternative to synthetic fertilizer. The technology could have its biggest impact in the developing world as populations become wealthier and food demand around the globe booms.

Joyn Bio CEO Michael Mille sits down with plant geneticist and Talking Biotech host Kevin Folta to discuss the company’s engineered microbes, an innovation that could lower the climate impact of farming and slash nitrogen pollution, helping growers feed hungry consumers without damaging vital ecosystems.

<https://geneticliteracyproject.org/wp-content/uploads/2019/10/205-Miille.mp3>

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