



The Hunt for High-Yield Farming

Discover how farmers will be key in feeding the world on less land by combining sustainable farming practices with the smartest intensive agriculture practices of today.

"Buy land. They ain't making more of it."¹

a growing world population with a fixed amount of land. And that leaves farmers right where they always are: with the whole world relying on them.

They will come through, as they always have.

Given advances in soil science, technology, hydrology, pest control, and our improved understanding of the web of life, we don't need to "make" more land. We simply need to use the land we have better. According to a 2018 study from the University of Cambridge,² when farm fields are producing to the max, it means less of a threat to the Amazon Basin and other fragile ecosystems that are being planted or grazed. Farmers are the answer to greater productivity, and with their innovation and hard work, we can have our world-saving food crop and our designated wilderness at the same time. More biodiversity leads to a healthier planet and healthier people.

How will farmers accomplish all that?

That's the mission behind the high-yield movement, which has been boosting farm productivity by astonishing leaps for the last 100 years.

A study from the University of Sheffield shows that the total arable land in the world has fallen by a third over the last 40 years.³ Pair that with the rise in world population, projected to jump from 8 billion in 2023 to 9.7 billion in

That quote, attributed to both Mark Twain and Will Rogers, used to be simply funny. Now the joke is timelier than ever, as it expresses the need to feed

2050, and you see the challenge ahead. As Sheffield's Duncan Cameron told The Guardian: "You think of the Dust Bowl of the 1930s in North America and then you realize we are moving towards that situation if we don't do something."

The Grantham Centre for Sustainable Futures, based at the University of Sheffield, has a pretty good idea of what "something" will be. Their researchers call it the "sustainable intensification" of farming: simultaneously increasing crop yields, on less land, and protecting that land so that it can produce higher yields now and in the future.

Intensive agriculture has been occurring at least since the 1960s, when crop yields began a meteoric rise relative to the amount of land being cultivated. Data from the World Bank and the this is FAO show soaring population and cereal production from 1960 onward, with stable amounts of land being cultivated.⁴ But the mechanical and chemical-intensive farm processes that increased those yields had a tendency to wear out the soil and threaten future harvests. "The soils are silting up river systems," says Cameron. "If you look at the huge brown stain in the ocean where the Amazon deposits soil, you realize how much we are accelerating that process."

Those losses can be arrested, and even reversed, when sustainability comes into the picture. Increasingly, farmers are realizing that the health of soil translates into the health of their business. This is why many are intensifying their use of sustainable farming methods that feed microbial life in the soil, making it more fertile and less vulnerable to pests. By leaving the soil intact, farmers

make their land less vulnerable to erosion. All of those improvements permit more targeted use of chemical fertilizers and pest control, which saves money and labor while decreasing chemical runoff. That means healthier food, healthier land and happier farmers and consumers.

One key to the revolution is another practice farmers have long known about—no-till farming, where fields are spared the plow in favor of drilling individual seeds into settled soil. Many farmers are also employing crop rotations and cover planting that support microbial life, increase water retention in farm fields and enhance nutrient uptake in crops. As farmers have known for generations, those microbes can help plants cope naturally with pest invasions. But bugs are persistent, which is why modern farms use a variety of measures to control them, rotating crop protection products to reduce the likeliness of resistance issues. Farmers are also looking at application methods, targeting specific pests and areas of their crop as data becomes readily available. Targeting applications to where pests are lurking and affecting crops also reduces the amount of pesticides needed and the amount of time farm equipment needs to run. This leads to reduced carbon footprints and increased biodiversity down to the soil level. Additionally, advances in biotechnology provide ways to transition plants back to their symbiotic relationship with healthy soils, allowing them to become more resilient to pests and extreme weather. And by following the principles of sustainable intensification of farming, growers can maximize output on the acres they have, enhancing profits and reducing the need to convert more land to farming. As land opens to varied uses, the planet becomes healthier.

Trey Hill belongs to the latest generation of family members to grow row crops—corn, soybeans, wheat—at Harborview Farms, in Rock Hall, Maryland. He admits that in the current world, “everything drives you nuts,”

including extreme weather patterns that have his farm fields careening from early, wet springs to extreme heat and drought in the summers.

Those challenges have encouraged him to implement no-till, sustainable agriculture on a large scale, supplemented by cover crops in the off-season. “The idea is to maintain the ecosystem in your soil year-round so there are always living roots in the ground,” he says. “That builds resilience in the soil and makes it more adaptive to extremes. Now, when we get a four-inch rainfall, the soil holds the water. And when we have drought, the corn bears better and the yields are higher.”

Hill and Harborview alone aren’t going to head off the food shortages of the future, but there’s hope when you consider wheat yields in Europe over the last century and a half. In 1860, there was very little variance in production between countries. But by 2014, a wide productivity gap appeared, with Belgium at the top—raising more than eight tons per hectare—while other countries such as Russia managed just two tons per hectare. Narrow the gap and you feed the world, now and in the future.

It’s possible to imagine a world where, by using novel technologies and advancements to successfully re-introduce sustainable practices from the past, we can feed the world on less land and with fewer resources. That means additional protection of our productive wildlands and the possible release of acreage back to the habitats that keep our air clean and waters clear.

Farmers will be the frontline workers in that transformation, adding new techniques to time-honored traditions to help crop yields keep pace with a burgeoning world population, while freeing land for other uses. If anyone can accomplish all that, it’s farmers. They already know how to plant for the future, and they harvest what they sow.



¹ 24/7 Wall St., “Memo to Congress: ‘Buy Land, They Ain’t Making Any More of it,’” *Time*, January 28, 2009. <https://content.time.com/time/business/article/0,8599,1874407,00.html#:~:text=Mark%20>.

² “High-Yield’ Farming Costs the Environment Less than Previously Thought – and Could Help Spare Habitats.” *University of Cambridge*, September 14, 2018. <https://www.cam.ac.uk/research/news/high-yield-farming-costs-the-environment-less-than-previously-thought-and-could-help-spare-habitats>.

³ Oliver Milman, “Earth has lost a third of arable land in past 40 years, scientists say,” *The Guardian*, December 2, 2015. <https://www.theguardian.com/environment/2015/dec/02/arable-land-soil-food-security-shortage>.

⁴ Hannah Ritchie, “Yields vs. Land Use: How the Green Revolutions enabled us to feed a growing population,” *Our World in Data*, August 22, 2017. <https://ourworldindata.org/yields-vs-land-use-how-has-the-world-produced-enough-food-for-a-growing-population>.