

Organic agriculture can help feed world, but only if we eat less meat and stop wasting food

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Agriculture could go organic worldwide if we slashed food waste and stopped using so much cropland to feed livestock, a new study finds.

The analysis, published in the journal *Nature Communications*, shows that it will take several strategies operating at once to feed the growing human population in a more sustainable way - and some of those strategies may require people to shift their dietary patterns, too.

The world's population is expected to hit 9.8 billion by 2050, which means an extra 2 billion or so mouths to feed. This will require increasing agricultural output by an additional 50 percent, the study authors wrote - which is made an even greater challenge as [dietary patterns](#) have been changing and the demand for meat has been rising. (Raising livestock leaves a large carbon and water footprint relative to growing plant-based foods.) All of this puts an additional strain on an already taxed environment.

"It is, therefore, crucial to curb the negative environmental impacts of agriculture, while ensuring that the same quantity of [food](#) can be delivered," the study authors wrote.

Experts have thrown out several strategies to deal with the impending food security problem, without coming to a clear agreement on which one would be best. Among the options: improving efficiencies in producing [crops](#) and using resources; reducing food waste; cutting down the animal products we eat; or resorting to more [organic agriculture](#).

"Organic agriculture is one concrete, but controversial, suggestion for improving the sustainability of food systems," the study authors wrote. "It refrains from using synthetic fertilizers and pesticides, promotes crop rotations and focuses on soil fertility and closed nutrient cycles."

Regardless of whether organic fruits, vegetables and other crops are better for you, there's evidence showing they may be better for the environment. Since organically grown crops can't use synthetic nitrogen fertilizer, it means that less excess nitrogen acidifies the soil and ends up

in waterways, or escapes into the air as a greenhouse gas. It also means no man-made pesticides, meaning fewer chemicals in the local environment and less risk to insect biodiversity - which is important because many insects are crucial players in their local ecosystems.

But those benefits are offset somewhat by what's known as the yield gap: the idea that organic crops require more land because their yields are lower than the fertilizer-fed, pesticide-protected conventional crops - potentially resulting in some extra deforestation. Still, could organic crops allow future food needs to be met with less environmental impact?

"Because of the yield gap, there are opposing voices that say it's not possible ... (and) there are proponents that say this yield gap is not really important and one could overcome it," said lead author Adrian Muller, an environmental systems scientist at the Research Institute of Organic Agriculture in Switzerland. "We just wanted to look at it from a food-systems perspective, because we think only looking at the [yield gap](#) is not enough. It is important to really look at production and consumption together and to see what organic agriculture can contribute on such a food-systems level."

To find out, Muller and colleagues developed models based on data from the Food and Agriculture Organization of the United Nations, looking at the effects that going organic would have under different scenarios, modulating the severity of climate change, the amount of food waste and the share of crops used to feed livestock instead of people, for example.

The researchers found that the [human population](#)'s needs could be fully met by all-organic agriculture - but only if food waste was cut in half and the competing feed sources for livestock were eliminated altogether. Since that would seriously scale back the amount of livestock, that might be a hard sell with today's meat-filled diets.

Muller said a more feasible solution might be one where [organic crops](#) make up about 50 percent of crops, [food waste](#) is cut by half, and the competing feed sources are cut by half (allowing for more acreage to grow human food).

"We need to utilize all the potential strategies we have, without supporting one extreme and leaving out other approaches," he said.

Getting to that point may still be a challenge. Organic crops make up a tiny fraction of [agriculture](#) overall, nowhere near that 50 percent target. But there are some things that can be done now, Muller pointed out, such as putting an extra "nitrogen tax" on producers so that the environmental cost of excess fertilizer becomes an economic one.

"I think we are moving in the right direction," Muller said, "and as an optimist I think, yeah, somehow, it will work."

More information: Adrian Muller et al. Strategies for feeding the world more sustainably with organic agriculture, *Nature Communications* (2017). [DOI: 10.1038/s41467-017-01410-w](https://doi.org/10.1038/s41467-017-01410-w)

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