# Report: Ten billion mouths to feed by 2050

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When it comes to feeding a growing population at a time of conflict and climate change, Mother Earth has a lot on her plate. To build a sustainable future we'll need to return to a farm-to-table model, and that's opening up vast and exciting avenues of research for scientists in

an array of fields. In this special report, we explore some of the developments taking place in research labs and out on the farm.

Feeding 10 billion people by 2050 will be a formidable challenge. Especially considering that 10% of the world's population is already hungry today and that around 30% is malnourished. And to achieve zero hunger—as set out in United Nations Sustainable Development Goal 2—that same year, we'll have to be able to feed an additional 3 billion people and provide better nutrition for 2 billion more. All that while conflicts and climate change are threatening the viability of vast areas of arable land.

Scientists around the world, undaunted, are working hard to develop new methods and technology that can put us on a more sustainable path. Experience has shown that the problem of hunger can't be solved through increasingly intensive farming: such practices actually make things worse. Large, single-crop farms—still prevalent in many countries—have disastrous effects on biodiversity.

What's more, "We now know that most modern grain varieties—engineered through artificial selection—have a much lower nutritional value than ancient ones," says Ismahane Elouafi, chief scientist at the United Nations Food and Agriculture Organization (FAO). According to Sara Bonetti, the head of EPFL's Laboratory of Catchment Hydrology and Geomorphology and an expert on soils: "The agricultural industry accounts for a third of $CO_2$ emissions from anthropogenic activity. Yet traditional farming methods, many of them centuries old, can capture large amounts of carbon and store it in the soil while boosting crop yields."

## Technology can help

While technology certainly isn't a panacea, researchers from a range of

disciplines are joining forces to address the issue of the global food supply going forward. They're developing novel approaches along the entire production chain, from seed selection, gene editing, germination and crop-growing (in fields, in greenhouses, aboveground or on urban rooftops) to harvesting, shipping, processing and packaging. Scientists are also looking at how we can better care for plants through a combination of chemical compounds, robots and natural methods. Some R&D centers are even studying ways we can grow food either synthetically or by revamping existing biological processes like dry fermentation.

In Israel, an entire food-tech ecosystem is developing around Technion university, where academics are working hand in hand with startups. Similar initiatives are also popping up in Europe, with organizations bringing scientists and farmers together to test new technology and farming methods. Two examples here in Switzerland are the Agropôle technology park in Molondin (in the canton of Vaud), of which EPFL is a member, and EPFL's Integrative Food and Nutrition Center, part of the Swiss Food & Nutrition Valley.

## Sustainable diets are important too

In terms of sustainability, part of the problem lies with our eating habits. While so many people are dying of hunger, billions more are overweight and eat too much meat—which has a large carbon footprint. Making matters worse, they often waste the most food. Adding that waste to crop, harvesting and storage losses, around a third of the food we produce gets thrown away in today's world. The good news is that there are steps we can take to reduce this waste along the entire value chain, all the way to our plates. A pilot test conducted recently at restaurants right here at EPFL shows how.

These figures give the FAO hope we can rise to the 2050 challenge—but

not without a concerted effort. The organization has spelled out concrete recommendations, although some of them could run up against the interests of the business world and policymakers as well as a certain resistance to change among farmers. Such obstacles can be overcome, however, through scientific research, extensive dialog and open collaboration. We have a duty to explore all options in the fight against hunger, as the lives of billions of people are at stake.

**More information:** Report: longread.epfl.ch/en/dossier/te … ths-to-feed-by-2050/

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