





“Vertical farming is a child of the Silicon Valley high-tech world”

Is cultivating plants indoors an opportunity to protect the world against famine – or just another fashionable, inner-city gimmick? We discussed aspects beyond the technical parameters with cultural and social anthropologist Dr. Mascha Gugganig.

Link

www.mcts.tum.de/people/mascha-gugganig

Dr. Gugganig, what exactly is vertical farming?

Mascha Gugganig: The term is very widely used and different people associate it with entirely different things. I make a distinction between three types. First is a sort of black box, as Dickson Despommier, who is regarded as the founder of the movement, strongly advocated in his 2010 book “The Vertical Farm”. It is, ostensibly, a fully controlled cultivation system, independent of external factors. Secondly, there is the semi-controlled system. This involves growing crops in vertically stacked racks, on vertically inclined surfaces or in other integrated structures in which environmental factors can be controlled. And the third type is the adaptive system. In this case, energy efficiency is at the forefront – so it might involve using previously wasted energy flows, such as waste heat from cold storage, to promote plant growth. These systems are often fully or partially integrated into existing structures, such as buildings.



What are the benefits of vertical farming compared with conventional cultivation methods?

MG: There are several. For one, it allows year-round, high-density production without weather-related crop failures. Pesticides, herbicides and fertilizers are superfluous, though ongoing studies are currently examining just how free from pests these systems can actually be in reality. They require 70 to 95 percent less water than conventional cultivation and reduce transport distances to urban consumers. Vertical farming is also considered an opportunity to return spaces to nature. That is too simplistic, however, as it does not represent a path away from the monocultures we have at present. Ultimately, vertical farming achieves exactly the same thing, but in enclosed spaces.

What are the drawbacks?

MG: The issue of how energy-efficient and cost-efficient such systems are remains contentious to date. Many start-ups in the sector have already been forced to fold. Except for Japan, where the state provides financing, the money in the sector is primarily derived from Silicon Valley. Major investors have discovered the food industry as a potential playground. Which raises the question: How sustainable is this?

What are the origins of vertical farming?

MG: In 2010, microbiologist Dickson Despommier from Columbia University proposed cultivating crops in multi-story buildings. The subtitle of his book – “Feeding the world in the 21st century” – also helped to create a degree of hype around vertical farming in the years since. From a technical perspective, this new form of food production is based on the accomplishments of the greenhouse industry and also of the cannabis industry. It is a child of the Silicon Valley high-tech world. In actual fact, vertical farming has nothing to do with conventional agriculture.



So vertical farming won't be the answer to the global food issue?

MG: No, but your question is also problematic, as it suggests there might be “one” answer to “the” global food issue. To date, the closed systems are only suitable for growing lettuce, tomatoes and herbs. While they can also be used to grow cereals, this would not be sustainable from an economic perspective. The marketing slogan of “feeding the world” was a mistake – as many people in the sector agree. In this context, the flurry of excitement revolving around the new technology wasn't justified. Today, vertical farming is also criticized as a yuppie trend, with affluent urbanites using it to cultivate basil or arugula. ▶



How have consumers accepted the new method?

MG: Approaches aiming to encourage a more in-depth discourse around the issue do exist already. Together with an industry partner from Holland and the European Food Information Council (EUFIC), we developed a citizen participation forum in 2017 and used it to approach visitors at Deutsches Museum in Munich and the Science Museum in London. In many cases, this resulted in what I call an educational moment. People didn't just exchange views about vertical farming but also discussed the agricultural system in general. Is vertical farming really so much more artificial and technical than our current agriculture? Where do our lettuce and tomatoes come from? Vast quantities of fruit and vegetables are grown in distant greenhouses. Most people have no idea of what goes on there. Are these greenhouses better or worse than vertical farming?



What influence do consumers have on vertical farming?

MG: Apart from a few exceptions, there is more of an interest in selling vertical farming products than in democratizing vertical farming, that is to say, encouraging a wider public discourse on the topic. There are certain aspects of democratization, such as the trend of establishing city food councils. These councils address the issue of how food production in cities can be made more attractive and more accessible. I do believe, however, that science, industry and politics need to make a sincere effort to bring this issue that concerns our future more into the public. While vertical farming is still very much in its infancy, it certainly holds a great deal of potential. One niche, for example, could be to use such controlled production methods to create a buffer in times of increasingly volatile weather. This should entail dialoging with the agricultural sector, which, however, is still quite a rare occurrence.

Interview by Karsten Werth

▶
There are four different methods of growing plants.



Dr. Mascha Gugganig

As a cultural and social anthropologist, Gugganig focuses on scientific and technological research in the field of food, agriculture and the environment. Since 2016, Gugganig has worked as a postdoctoral researcher at TUM in the Innovation, Society and Public Policy research group at the Munich Center for Technology in Society (MCTS). As part of the pan-European EIT Food consortium, an innovation initiative launched by the EU, she headed the "Cultivating Engagement" project, which addressed citizen participation in the context of vertical farming, among other issues. Her current research project looks at sustainable agriculture in the EU, and the use of innovation and technology.

Sunlight



1 Outdoor farming

Outdoor gardens or agricultural land with natural light and water

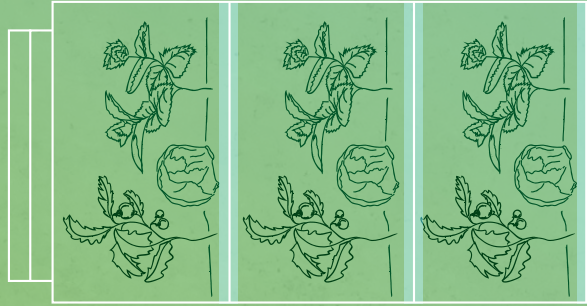
Sunlight



2 Greenhouse

Cultivation in a greenhouse with artificial irrigation. Artificial lighting is also used in many cases.

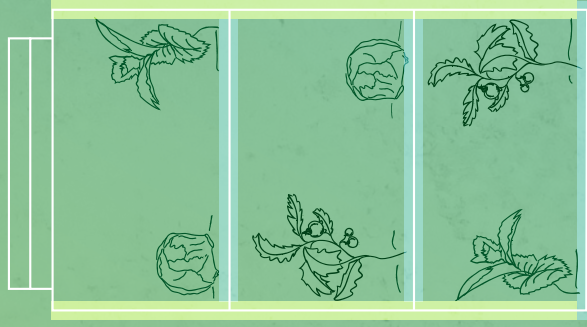
Sunlight



3 Indoor farming

Indoor farming – in recent times, food has also come to be cultivated in enclosed spaces within buildings. This method requires artificial lighting and irrigation.

Sunlight



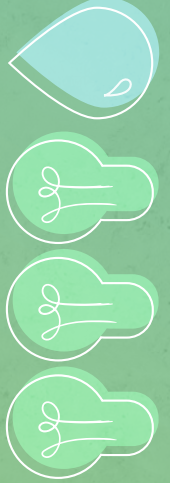
4 Agricultural lighting facade

Vertical farming involves growing plants behind the windows of residential and office buildings. They receive light from outside but require artificial irrigation.

Artificial lighting and irrigation



Artificial lighting and irrigation



Artificial lighting and irrigation

