



Mushrooms emerge from the shadows in pesticide-free production push

From stir-frys to stroganoffs, the tasty fungus central to health-conscious cuisine may be cultivated in greener ways.

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Mention La Rioja in northern Spain and most people will picture majestic sun-drenched vineyards nestled in the hillsides. But, hidden from the sunlight, the region is also home to a very different crop that happens to be at the heart of efforts to make European food production more sustainable.

Three small villages in La Rioja house the vast, dark, humid growing sheds that produce its 77 000 tonnes of mushrooms each year. Almost half of Spain's cultivated mushroom crop is grown in the region, making Spain the third-largest producer in Europe, behind Poland and the Netherlands.

New world

‘Mushrooms are a whole different world than we are used to, from growing plants or rearing animals,’ said Pablo Martínez, an agronomist who worked in wineries before being drawn to the specialist mushroom sector after a chance conversation with a former colleague.

Based at the Mushroom Technological Research Centre of La Rioja (CTICH), Martínez manages a Europe-wide project to tackle the environmental challenges faced by the industry.

Many people know very little about how mushrooms are grown. While it’s easy to buy a starter kit online to have a go at home, growing on a commercial scale is very different – managing humidity, temperature and light to produce a regular, quality crop while contending with pest control.

Cultivated mushrooms can double in size in a day and consumer demand for them is mushrooming too.

The global market is projected to grow from around 15 million tonnes in 2021 to more than 24 million tonnes over the next five years. Packed with nutrients, they deliver a protein-rich umami kick that is well suited to the soaring trend for plant-based foods.

To meet demand, growers need to fail-safe their crop from pests and, for now, they rely on pesticides. Tighter regulations are limiting available products and concerns over the impact on the environment and human health mean growers are looking to researchers to come up with answers.

CTICH is coordinating the [BIOSCHAMP](#) project, which works with researchers, commercial partners and mushroom growers in six European countries. In addition to Spain, they are Belgium, the Netherlands, Poland, Serbia and the UK.

Peatland protection

Mushrooms are grown on a substrate, or base layer, made of straw and animal manure, then covered with a thick blanket of peat known as the casing. Made up of partially decayed vegetation, peat perfectly mimics nature’s forest floors that so readily yield mushrooms.

The depletion of precious finite peatlands is a global concern. These wetlands store more carbon than all other vegetation types in the world combined and their conservation is ever more important for countering climate change.

‘Mounting restrictions on peat extraction in European countries threaten the long-term continuity of peat supplies,’ said Martínez. ‘We’re looking to develop a new product for growing mushrooms that could cut pesticide use by 90% while reducing the industry’s reliance on peat.’

Most of Europe’s peat comes from the Baltic countries, traveling first by boat to the Netherlands, where it is treated ready for commercial use, before being distributed to growers across Europe, amassing transport costs and a heavy carbon footprint.

BIOSCHAMP aims to create a low-peat sustainable casing for cultivated mushrooms made from renewable materials sourced close to existing mushroom production.

While the exact details are under wraps, it will combine with a substance known as a biostimulant to enhance the natural growing processes and strengthen the mushroom mycelium in their early phase, protecting them against disease without the need for chemical pesticides.

Fertile waste

In Norway, two mushroom enthusiasts have pioneered a project to explore whether the crop could be cultivated in food waste. The EU-funded initiative is called [VegWaMus CirCrop](#).

Dr Agnieszka Jasinska, who completed her postgraduate research on mushroom substrates, has led the

research in partnership with Dr Ketil Stoknes, senior project leader of research and development at waste-management company Lindum and himself once a specialist mushroom grower.

The project has demonstrated that organic residue from food waste – usually used to feed anaerobic digestors, devised to capture methane and divert it from problematic greenhouse gas to useful fuel – can be a successful starter for mushrooms.

The [European Food Information Council](#) (EUFIC) estimates that a whopping one third of all food produced for human consumption is wasted. Anaerobic digestion, also known as biogas, allows the nutrients from waste to be reused for growing plants in greenhouses.

‘It enables a climate-efficient, resilient, urban food production system based entirely on waste,’ said Stoknes.

Tomatoes, lettuce and herbs had been chosen as the initial candidates. But Stoknes said that mushrooms are degraders, breaking down fibres and so on, and are a necessary part of an integrated biosystem. Inspired by the natural cycle in the forest, the project set out to combine mushrooms and plants in one circular system.

The biogas system is explained as ‘food to waste to food’ and it’s a movement that is growing in popularity.

While mushroom cultivation ceased on a commercial scale in Norway in the early 2000s, unable to compete with other countries, VegWaMus CirCrop has proved there could be a sustainable future for Norwegian mushroom production after all.

Side hustle

The project has hatched a start-up company called SOPPAS with ambitions to scale up the process commercially. In the meantime, it’s embarking on a raft of new ideas, including expanding production at the food waste biogas facility from button mushrooms to oyster mushrooms.

‘The new company will produce starter blocks for growing mushrooms for farmers, plant producers and greenhouse owners who might want to diversify to mushrooms in their low season,’ said Jasinska. ‘They can put their existing pickers, packing line and cold-storage facilities to good use in idle times and sell the produce locally.’

Against the backdrop of growing momentum for producing food from waste and an interest in keeping production local, both EU-funded projects look set to give mushrooms their moment in the sun.

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- [BIOSCHAMP](#)
- [VegWaMus CirCrop](#)
- [EU-funded environment research](#)