



RotterZwam, Edible Mushrooms from Rotterdam

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In his book *The Blue Economy* (See box), Gunter Pauli offers 100 business cases of things you can do locally with waste. Growing oyster mushrooms on coffee grounds is one of them. While we are both working towards more sustainable livelihoods, Pauli's book inspired us to start RotterZwam, an edible mushroom business in a former tropical swimming pool in the city of Rotterdam.

From waste reduction to food production

Coffee is, after oil, the most-traded commodity in the world. The Netherlands produces about 120 million pounds of coffee waste per year; Rotterdam alone produces 6 million pounds annually. Only 0.2 % of the coffee ends up in your cup, and the remaining 99.8 % is wasted. RotterZwam uses that waste as a main input for their production process growing oyster mushrooms on coffee grounds. It is our ambition to convert as much as possible of that 6 million pounds into food. We strive to do that partly through growing mushrooms in an abandoned swimming pool in the city centre, and we also developed and sell a Growkit that helps people to convert their own coffee grounds into food at home.

Besides coffee grounds, we also use coffee husk, another waste product, for growing our substrate. At first we used straw to mix with the coffee to give the substrate, and therefore the mycelium, more air. By focussing on reusing as much waste as possible, we found that instead of straw we could

also use coffee husk. Husk is released when roasting coffee beans, and roasters normally throw it away as they regard it as waste. The advantage of using husk over straw is that the husk is already pasteurised and is a by-product, whereas straw needs to be bought and requires additional processing and thus energy before it can be used. We have made supply agreements with the majority of the micro roasters in Rotterdam as well as with roasters in the surrounding region to collect enough for our production. We pick up their husk, stored in plastic bags, for free on a monthly basis. Instead of giving the bags to the municipal waste collectors, they gladly give it to us as it makes no difference in their operations and they like being part of our initiative.

RotterZwam's focus is very local because transport of food over long distances yields: a) high CO₂ emissions and energy costs, and b) a system that is very sensitive to disruptions, because it relies heavily on just-in-time delivery. Every supermarket clerk can tell you what happens when even two trucks are late: empty shelves.

The transportation of used coffee waste also brings challenges. We prefer to use fresh coffee grounds for the process, as otherwise we need to pasteurise it before we can use it, adding high energy input and costs to prepare it to be suitable for growing fungi. An advantage of small-scale local production is the short chains, so having fresh grounds is not an issue. We close a circle of raw materials to production and consumption in 3,7 km — On a cargo bike!

Furthermore, we do not see the oyster mushroom as an



Mark & Siemen from Rotterzwam. Photo: Rotterzwam

ultimate goal. We see opportunities for extracting enzymes from our substrate when we are “finished” with it, which could be beneficial for the paper industry. After extracting the enzymes, the residue is suitable to use as animal fodder and as a high-quality compost for farmers in the nearby Hoeksche Waard. These are just two examples of possible uses of the by-products we foresee in the near future.

We also compost a portion of our substrate with compost worms on-site using a system of Hungry Bins (see www.rotterzwam.nl/producten/hungry-bin-wormenbak-voor-thuis/ which is in Dutch, or go to www.hungrybin.co.nz/).

Market demand

We have found that it is not difficult to sell our mushrooms. We had orders coming in through Facebook without doing much (or actually any) marketing. People are very interested in our initiative because they like that we:

- produce food locally instead of transporting it all over the world;
- use coffee grounds for food production instead of burning it in a waste incinerator;
- produce mushrooms that transform nutrients to output 25 times more efficiently than meat does;
- grow gourmet mushrooms on the waste of the city (coffee grounds) in the waste of the city (abandoned real estate).

We earn about 50 % of our income from mushroom production. We sell them for 10 euros per kilo to restaurants and catering businesses and 15 euros per kilo to consumers. We want to



Oyster mushrooms. Photo: Rotterzwam

produce about 7,500 to 10,000 kilos annually in order to make around 100,000 euros per year. In addition, we developed and sell the Growkit for household use and we will soon be selling the Hungry Bin for worm composting. We also give workshops and offer work-placement opportunities, and have translated one of Gunter Pauli's fables into Dutch in order to inspire children to keep dreaming.

One of the challenges we face is upscaling our production. We sell mostly grey oyster mushrooms but we also grow yellow and pink ones, and we harvest twice to three times from a block. Many of the restaurants like to order large quantities of up to 5 kilos per week. Because our total production is currently about 20 kilos per week, we need to step up production. We recently finished our crowdfunding campaign; we received € 20,000 that we can use to grow

The Blue Economy as Inspiration

The Blue Economy is a new business approach that is receiving increased attention in debates on sustainable economic development and circular economy. The Blue Economy concept was introduced by Gunther Pauli, a socially engaged thinker and former CEO of the Ecover company in Belgium. The core of the Blue Economy is to focus on what happens with materials when they are thrown away. The strategy is based on the principles of nature: the waste of one system becomes food for another system. It may take a while and some complex processes, but in the end the materials (nutrients in nature) cycle back to their original form.

Gunther Pauli chose to name his concept and approach the Blue Economy out of disappointment, and as a critique of the Green Economy. The Blue Economy concept especially became known when Pauli, with his Zero Emissions Research & Initiative (ZERI) network of scientists and entrepreneurs, published the report "The Blue Economy: 10 Years, 100 Innovations, 100 Million Jobs". This report was written by ZERI for a project of the United Nations Environment Programme (UNEP) called "Nature's 100 Best" with the aim of finding sustainable, nature-inspired solutions for industry and society and in order to contribute to achieving the UN Millennium Development Goals. The hundred best solutions, which have the potential to change existing business models, were finally collected and published in the book "The Blue Economy".

The Blue Economy is a business and societal response to environmental, resource and social challenges and goes beyond sustainability as it is generally presented. It tries to find "disruptive" new ways for industry and people to work within natural systems, promoting and using cyclic, systemic, biomimicry-based regenerative processes that massively reduce impacts and consumption. More importantly, it claims to restore nature while dramatically reducing costs, maintaining profits and securing happiness and well-being. The most important elements of the Blue Economy approach are: (1) Cyclical economy, (2) No waste, (3) Upcycling, (4) Local & diverse, (5) Renewable energies, and (6) Creation of new companies and inspiring entrepreneurs.

Mushroom production from coffee waste was one of the successful business models presented by the Blue Economy approach, conceived because only 0.2 percent from the biomass harvested for coffee is ingested and the rest is simply left to rot. The Chinese scientist Shuting Chang demonstrated in his lab in Hong Kong that coffee serves as an ideal substrate for farming tropical mushrooms, while at the same time generating jobs, income and food security. Chido Govero, an orphan from Zimbabwe, was one of the first to set up her own business mushroom farming on coffee waste. Since then the model has been followed in many other places.

www.theblueeconomy.org

from start-up to the growth phase. We would like to grow first to 50 kilos a week and then on to 150 kilos a week. We are interested in collaboration and getting in touch with other producers, and we are looking for refrigerated containers to expand our business.

Impacts achieved

We have found that a lot of companies and NGOs want to talk to us. They would like to investigate ways of placing unemployed people with us so they can readjust to a work rhythm. Also, former convicts could seek a training position at our urban farm. People like to work with us and like to offer their knowledge and expertise on administration, marketing and business opportunities.

Interns from Sweden, France, Belgium and the Netherlands have completed our internship, working with us for one week to learn the process of preparing substrate. We taught them how to work with local government, and also other things we have learned over time about setting up the process, the techniques needed to adapt large-scale equipment for small-scale production, and so on.

Several companies are implementing the business case of growing mushrooms on coffee grounds, but few are willing to share the recipe. It takes approximately two years to master the process if you start from scratch. Because of the huge potential for job creation, the reuse of abandoned buildings, local food production and profitable small-scale urban farming, we want more people to know how this works. That is why we started the **Mushroom Learning Network** (www.mushroom-learning-network.org) together with Charles van der Haegen, Ivanka Milenkovic and Camila Amaya Castro, and the help of a few others. On that platform we share the business case and the details of the growing process. That way entrepreneurs all over Europe (and beyond) can learn about the business case, share knowledge and add their expertise.

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