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10 THINGS YOU NEED TO KNOW: WHEN CULTIVATING MUSHROOMS



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We at rotterzwam believe in sharing.

'Share all you have and you will receive more'

Siemen Cox

*Founder rotterzwam, co-founder Blue City, co-founder coffee based
and author of De Blauwe Revolutie*



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Introduction

In January 2013 RotterZwam was born out of an experiment with shiitake on oak logs. Around May 2013 Mark Slegers joined me. We started with mushroom cultivation on coffee waste.

We were both inspired by the story of Gunter Pauli that you can convert coffee waste into mushrooms, and use local 'waste' to produce healthy food, abundance and jobs as well.

How do I?... Is almost always the start of your journey into something you take an interest in. It was the same for us. The interest started because we had a general interest and passion for mushrooms. They are truly fascinating.

We started our journey online and looked for entrepreneurs who were cultivating mushrooms on coffee waste and open to cooperation or sharing knowledge. We looked for entrepreneurs specifically because there is no real school of mushroom cultivation.

But in the beginning no one was willing to share his or her knowledge. Most were protective of the "head start" they had. So we needed to figure it out by ourselves. We decided to take a different path. We believe in sharing.

"Share all you have and you will receive more"

It looks like you are interested in a similar path as well. This Ebook is dedicated to helping you cut your learning curve several weeks while studying about the wonderful world of mushrooms.

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CHAPTER #1 PAUL STAMETS

One of the first people you need to get to know when you want to grow mushrooms is Paul Stamets. Paul Stamets was born July 17, 1955 and he has been active with mushrooms since the 1970's. Stamets is one of the most famous mycologist's* in the world.

*People who study mushrooms are called mycologist because the root system of a mushroom is called mycelium.

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Paul Stamets wrote a number of books. Two of those we highly recommend. They are a must read and must have for anyone serious about mushrooms. Unfortunately I bought them in the wrong order. So in order of importance for the wannabe mushroom grower.

Growing gourmet and medicinal mushroom

This amazing book covers 345 pages of mushroom details. It gives an in depth background on 34 mushrooms species. Next to that he describes all the parameters for the growth of those mushroom species. He gives you all you need to know about: Humidity, CO2 levels, air exchanges in the different growth phases. The book also contains a chapter on troubleshooting diseases and how to organize and layout your farm.

generally enhance the health of our forests and gardens (mycoforestry and mycogardening).”

Paul Stamets also did an interesting TED talk. It's called 'Six ways how mushrooms can help save the world'. It's based on his book "Mycelium Running". So if you're not the reading type, you can skip the book and watch his 18 minute TED talk [here](#).

What also stuck with us was his story on how he 'used' the US army to preserve a piece of nature. Where the conservationists didn't succeed. The army did. Watch the TED talk to get this story.

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Mycelium running

How mushrooms can help save the world

This was the first book I bought written by Paul Stamets. Although it was an interesting read, it didn't help me building the rotterzwam mushroom farm. That why I list it second after Growing gourmet and medicinal mushrooms.

This is the book that helps you tell the story on why you grow mushrooms. Story's like mycelium being nature's internet, in that it can transport knowledge and nutrients over big distances, and also about the ability of mycelium to clean contaminated soils.

Or as the description on Amazon puts it:

“The basic science goes like this: Microscopic cells called “mycelium” the fruit of which are mushrooms recycle carbon, nitrogen, and other essential elements as they break down plant and animal debris in the creation of rich new soil. What Stamets has discovered is that we can capitalize on mycelium's digestive power and target it to decompose toxic wastes and pollutants (mycoremediation), catch and reduce silt from streambeds and pathogens from agricultural watersheds (mycofiltration), control insect populations (mycopesticides), and

CHAPTER #2 SPORES

The second thing you need to know about when you want to grow mushrooms is the spores. They are the DNA packets or the seeds [depending on how you look at it] of the mushroom. The spores are dispersed and sent away to make new mycelium and make sure the species reproduces.

Both gills and pores¹ mushroom species produce spores. They are extremely small [size] and light [weight]. Most of the spores a mushroom produces [80%] land near the mushroom that has ejected them. The ones that don't can travel vast distances. Some say even into outer space

Spore-bearing surface under cap

Pictures: Uploaded by Sridhar1000 to Wikipedia January 2006



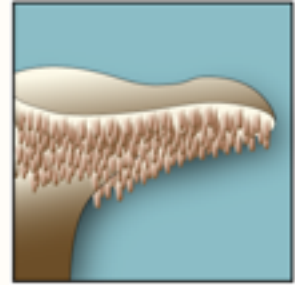
Gills:
wide and thin sheet-like plates radiating from stem



Pores:
Many small tubes ending in a spongy surface



Ridges:
Short, blunt elevated lines on stem and under cap



Teeth:
Many small finger-like projections

Because they are so light, they can stay suspended in the air for decades. Waiting to touch down on fertile soil or in case of a lot of mushroom, decaying organic material. Once they

found a fertile place to set camp, the spore germinates into a mycelium thread not thicker than a human hair.

The mycelium then runs its course by producing enzymes breaking down [mostly] dead or decaying material to feed itself. Mycelium is actually a sort of inside out stomach.

A mycelium thread by itself is not capable of producing mushrooms.

¹ Do a web search on "Mushroom cap morphology" for more details

Therefore an A and a B mycelium thread need to cross each other. For some mushroom species even three or four threads need to cross.

Seeing mycelium doesn't mean that it's capable of producing mushrooms. That's why producing great mushroom spawn is a very special job. But back to the spores. That's how we started this page.

Some mushrooms produce more spores than others. The oyster mushroom is particularly known for producing tremendous amounts of spores. Watch [this video](#) and see a yellow oyster mushroom sporulate.

Oyster mushrooms can produce so much spores that they form 'beards' hanging from the cap of the mushroom. As this pictures shows.



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As we explained earlier, these spores can be suspended in air for a long time. When you grow [oyster] mushrooms yourself you probably keep them packed together in a specially conditioned room. That means that there will be high concentrations of spores in the air. This can be a:

1. Serious threat to your health
2. Serious threat to your equipment

As you can see on the picture, the spores can accumulate. If one mushroom can form a kind of a beard, imagine what a whole room full of them can do!

Health

When inhaled over an extended period of time you will develop an allergy. It can even develop into something with the name [Lycoperdonosis](#)¹. Although that is specifically related to inhaling the spores of puffball species. Do a web search on Mushroom Worker's Lung [MWL] and you will find reports like [these](#)² [pdf will download].

Equipment

If that hasn't made you think twice about 'just starting' a mushroom farm, think about your equipment. Air Filters, humidifiers, fans will all clog and even break down if not cleaned regularly. If you don't care about your health, you may care about your wallet.

1 <http://en.wikipedia.org/wiki/Lycoperdonosis>
2 occmcd.oxfordjournals.org/content/48/7/465.full.pdf

CHAPTER #3 MEAT VS MUSHROOMS

The system we have created for the production of meat is a very polluting one. It takes a HUGE amount of water to produce meat. Up to 15,500 liters of water to produce 1 kg of beef¹. Want to save water? It has nothing to do with showering less. One hamburger equals half a year not showering.

¹ http://www.vlirrigation.org/cms/fileadmin/content/irrig/general/kreith_1991_water_inputs_in_ca_food_productione_xcerpt.pdf
[pdf will download]

What do we feed animals? Soy and wheat. Let's for now avoid the fact that that isn't part of their natural diet and the trouble that causes [E-coli for example]. But humans "can" also eat wheat and soya. But when we feed it to animals they tend to compact it.

It takes a cow 25 kg of food to produce 1 kg of meat. That's food we could have eaten ourselves. So we have a pile of 25 kg of food, then we give to an animal that compacts it into 1 kg of meat. Not a smart trade if you ask me.

A mushroom can convert 1 kg of dry material into 1 kg of mushrooms. Most importantly it can grow on things we consider waste. So there is no competition with the human food chain.

Comparison

So we at RotterZwam believe that mushrooms are the food for the future mostly because of the reasons listed above. But there is more. The

nutrients in a mushroom are a lot like meat. It's almost scary how much the two are similar.

To give you a good comparison between the two we have found¹ this table on the next page.

So if you look at protein there is only a significant difference with steak. So you would need some extra eggs to tackle that one.

Fibers, Vitamine B1 and B2 and potassium content are almost similar. Iron you would miss out on. So bring that spinach on the table. Popeye knew it already ;-)

Because we grow oyster mushrooms here are some facts on their nutrients. They are a low calorie, low cholesterol, and low fat source of protein, dietary fiber, thiamin, vitamin B6, iron, magnesium, zinc, manganese, niacin, copper, potassium, and antioxidants².

¹ Nutritional [\[link\]](#)

² <http://nutritiondata.self.com/facts/vegetablesand-vegetableproducts/3050/2>

	protein	fat	fiber	B1	B2	potassium	iron
<i>per 100 g</i>	<i>g</i>	<i>g</i>	<i>g</i>	<i>mg</i>	<i>mg</i>	<i>mg</i>	<i>mg</i>
Chanterelles	1,49	0,5	3,8	0,06	0,3	506	0
Champignon [baked]	3,5	4	4,2	0,1	0,3	410	0,3

<i>per 100 g</i>	protein	fat	fiber	B1	B2	potassium	iron
Chicken filet	17	8,1	0	0,07	0,07	522	0,82
Broccoli	2,8	0,37	2,6	0,06	0,2	316	0,73
Steak	23	3,5	0	0,04	0,07	316	1,85

Cholesterol

But there is more. Because of the way mushrooms live, in a hostile environment between a multitude of enemies in the soil, they have built in systems to battle intruders. You would be amazed about the benefits they can have for specific human 'conditions'. Cholesterol for example.


Oyster mushrooms [Pleurotus Ostreatus] are one of only a few fungi that naturally synthesize a chemical called lovastatin. Lovastatin is part of the statin family of drugs, meaning that it inhibits the production of cholesterol in the body and can potentially lower LDL cholesterol.

Lovastatin works by inhibiting the activity of the enzyme HMG-CoA reductase, which acts as the rate limiting step to the synthesis of cholesterol in the body. This serves to help prevent hypercholesterolemia, or high cholesterol, which is a major risk factor in cardiovascular disease. [Studies in rats](#)¹ support the cholesterol lowering effects of ingesting Pleurotus ostreatus, which naturally contains about 2.8% Lovastatin by weight.


¹ Bobek, P., L. Ozdin, and I. Kajaba. 1997. "Dosedependent hypocholesterolaemic effect of oyster mushroom (Pleurotus ostreatus) in rats." *Physiological Research*, 46(4):3279. [\[link\]](#)

If you're serious in saving water, you need to eat less meat. Just a few hamburgers less, will get the planet a long distance.¹


10 liters

 of water to make one sheet of paper


40 liters

 of water to make one slice of bread


70 liters

 of water to make one apple


80 liters

 of water per dollar of industrial product


91 liters

 of water to make half a kg of plastic


120 liters

 of water to make one glass of wine


140 liters

 of water to make one cup of coffee


1300 liters

 of water to make one kg of wheat


4800 liters

 of water to make one kg of pork


10855 liters

 of water to make one pair of jeans

15500 liters

 of water to make one kg of beef

16600 liters

 of water to make one kg of leather

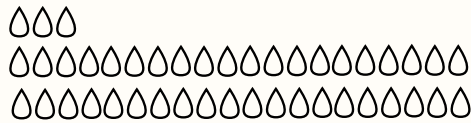
¹ <http://sustainabletable.org.au/its-world-water-day/>



15 liters of water



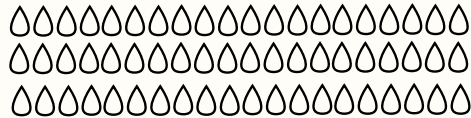
26 kilos of coffee waste



4300 liters of water



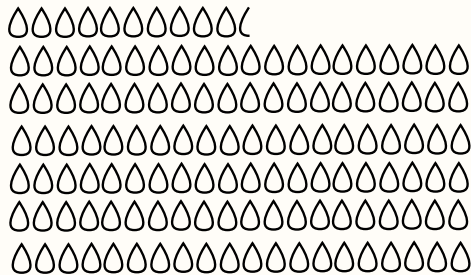
4,5 kilos of animal food



6000 liters of water



9 kilos of animal food



15.500 liters of water



25 kilos of animal food

food we can eat too

CHAPTER #4 PENICILLIUM

Is it the Latin translation of penicillin? Well, sort of.

Did you know that fungi are one of the prime producers of a substance that helps to produce antibiotics? This species of fungus contains more than 300 species¹. It's name is derived from a paintbrush because up close, it really looks like a broom.

¹ Kirk, PM; Cannon, PF; Minter, DW; Stalpers, JA (2008). Dictionary of the Fungi (10th ed.). Wallingford, UK: CABI. p. 505. ISBN 9780851998268.

Species of *Penicillium* are commonly present wherever organic material is available. Within that range [300] the saprophytic [see chapter 8] species of *Penicillium* are one of the more 'famous' species and they thrive on organic biodegradable substances.

Did you know that whenever your orange or lemon got green or blue it was *Penicillium* at work?

And that *Penicillium* drastically reduced the casualties of WWII? Soldiers didn't die of bullets or shrapnel but by the infections they caused. *Penicillium* stopped those infections.

And that Alexander Fleming, a scientist from Britain, discovered *Penicillium* by accident? :-)

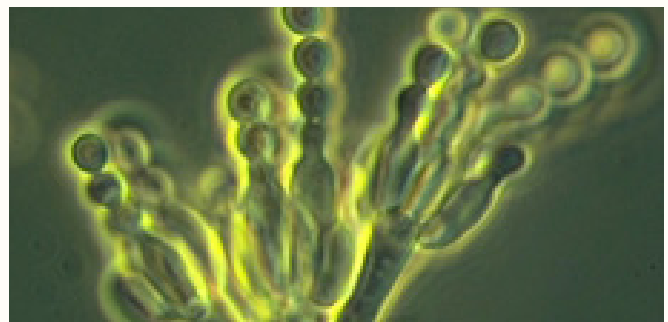
*"When I woke up just after dawn on September 28, 1928, I certainly didn't plan to revolutionize all medicine by discovering the world's first antibiotic, or bacteria killer," Fleming would later say, "But I suppose that was exactly what I did."*¹

¹ Haven, Kendall F. (1994). *Marvels of Science : 50 Fascinating 5Minute Reads*. Littleton, Colo: Libraries Unlimited. p. 182.

To bad now a days we abuse antibiotics to maintain a system of Intensive animal farming also known as factory farming. In this system animals are kept in larger quantities than is usually the case with other forms of animal agriculture.

To put it mildly, there are a lot of issues regarding whether factory farming is sustainable and ethical². It even gave rise to the first animal party in the world. The party for the animals [[Partij voor de dieren](#)] in the Netherlands.

As we discussed in the previous chapter, mushrooms can be a great alternative for meat.



ISBN 1563081598.

² Duram, Leslie A. (2010). *Encyclopedia of Organic, Sustainable, and Local Food*. ABCCLIO. p. 139. ISBN [0313359636](#).

CHAPTER #5 SUBSTRATE

A lot of new words when you start to grow mushrooms. Mycelium, spawn, enzymes and now another one. Substrate. Substrate is the name for the breeding ground in which you place the spawn. As you have read earlier, spawn is the fertile mycelium [able to produce mushrooms] on a medium [wood plugs or grain].

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Traditionally mushrooms are grown on several types of substrate. We will discuss a few of them here.

Horse manure

Champignons have a rather smelly origin. They are grown in dark spaces because the champignon [button mushroom] doesn't require light. Next to the darkness of the absence of light there is also darkness of the poo of horses. x% of the substrate used in farming button mushrooms consists of horse manure.

For one that is a good thing. Horse manure is also considered a waste, so it has a meaningful destination. But there is still a lot of preparation going into preparing the material. Next to that there is a lot of transport involved. Check this big truck that passed me the other day. It says *"raw materials for growing button mushrooms"* on the side.

For the farmer it can be very costly. Up to 30% of the costs of the operation of a button mushroom farmer is buying the prepared substrate. We know we can do better! ;-)

Wooden logs

The Japanese have developed the basics for cultivating shiitake on oak logs. A log like that does look fantastic. In the 1970's it came to Europe.

It comes down to fell a tree or a branch, let it rest for at least three weeks so that the tannin get out of it, and then use wooden plugs with shiitake mycelium grown on them to inoculate the branch.



Then it's a long wait [up to 1,5 years for the shiitake to grow through the log and stick the first mushroom out. It's a nice way of growing mushrooms, but a rather long wait.



Only after 1,5 years you will know if you inoculated correct and can you harvest the fruits of your labor. Next to that the logs are quite heavy and inconvenient to move.

It's good as long as you use oak logs that would have otherwise been discarded. If your farm needs the felling of a small patch of mature oak trees.....

Straw

Now we come to the mushrooms of our trade. Oyster mushrooms or the *Pleurotus Ostreatus*. Modern oyster mushroom farmers grow their crops on straw. Straw is a by product of growing wheat and it has a lot of applications. [You can build with it](#), dress the stable or use it as [a mattress](#).

That is also one of the downsides. Because it has other applications, you need to buy it. But when it's readily available in the town near you, it's a excellent way to start.

The other downside is that straw has a lot of impurities in it. So you need to get rid off those before use. That asks for an certain energy input that we rather don't want to put in or waste.

So, is there a combination of mushroom and substrate that is: 1) locally available in large quantities, 2) fast growing and 3) for free? YES that combination is oyster mushroom and coffee grounds.

CHAPTER #6 CONDITIONING

By now we have got you up to speed on mushroom stuff. You are already more than half way through this Ebook. Rock on! So you also understand that mushrooms need a specific environment. Depending on the species they like it warmer or colder, wetter or dryer and fresher or more stuffy.

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In order of importance.

Temperature

As we mentioned in chapter one a mushroom has several growth phases. In those phases temperature plays a role. Among others that is because of evolution and the way the mushroom disperse its spores.

So, depending on the species of mushrooms you need to:

1. Store spawn in a fridge or not
2. Need to be able to play with temperature in the different growing phases

Pink oyster mushroom for example is a tropical mushroom. You cannot store that spawn in a fridge.

Stuffy

In the first growing phase things need to be very damp and stuffy. You want to mimic the situation in the soils or dead tree where the mycelium grows and spends all it's time. In the soil the mycelium finds warmth and protection

against the elements.

That means that CO2 levels need to be elevated. Mycelium like CO2 levels over 5.000 ppm. So that means that you need a way to use and adjust your ventilation to get at those levels.

Lucky for you the mushroom is a little like a human. It uses oxygen and it produces CO2. You can use that to your advantage to elevate levels in your conditioned room.

Humidity

In what time of the year do you usually spot mushrooms?

I hope you said autumn! ;-)

That's correct, in autumn. Why is that? The natural humidity and temperature drop triggers the sign that winter is near. For mushrooms mycelium that is the time to form mushrooms and sporulate and make sure the next generation finds a good and wet breeding ground to germinate.

That's one important reason why mushrooms are optimized by evolution to function well in

wet conditions.

Space

Did you know that there is a limit to the amount of mushrooms you can get out of a room? That limit is a derivative of the boundaries we mention above. Plus the level of substrate you can place in your conditioned rooms.

This limit puts a cap on what you can produce out of a single room. So it's important to know to calculate your business case and the investments you need to make.



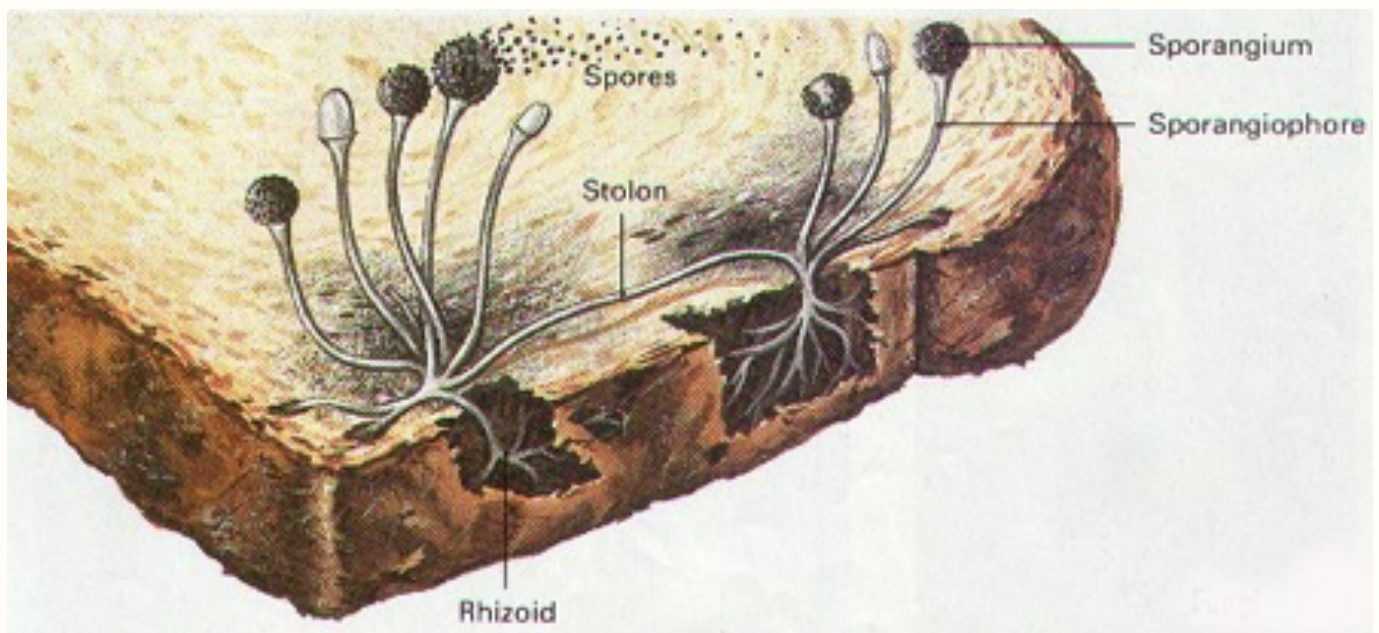
Humidification in the fruiting room @Rotterzwam

CHAPTER 7 THE GREEN MONSTER

What is the link with mushrooms? Well, the green monster is the nickname we got to know Trichoderma with.

Trichoderma is one of the most common fungi out there. You may all recognize it from the time you lived in a dormitory when you were a student. It was everywhere back then, bread, leftovers and ... your coffee.

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Source: [Imagination station](http://www.imaginationstation.com)

Due to their short life cycle the trichoderma is the most prevalent fungi in the soil¹. It can germinate, grow, produce mushroom [not visible to the naked eye] and sporulate in 8 days.

And that's fast. For comparison the shiitake takes up to 3 months for that same cycle. The oyster mushroom is considered a fast growing fungi and it takes up to 5 weeks for the same cycle.

So once you have a contamination with trichoderma it can spread fast. Luckily mushrooms have a way of keeping each other in check with a little biological warfare. So a trichoderma spot on your substrate [chapter 5] doesn't mean the end of the world. But you will need to monitor it.

The interesting thing is that on a cellular level trichoderma and the oyster mycelium can even exchange nutrients and help each other².



If you look closely at the pictures above you can see that there are various stages of Trichoderma contamination. The picture on the left shows a lost cause. You should get rid of that bag. Prevent it spreading to the rest of your substrate. The picture on the right you can see that the mycelium of the oyster has encapsulated the trichoderma.

By encapsulating the trichoderma the mycelium contained the trichoderma. At one stage it can even take over the trichoderma and grow "through" it.

The picture to the left shows an opening of the growing bag where trichoderma has formed. This is mostly caused by not removing and cleaning the remaining parts of mushroom after previous flushes.

Not all molds are to be avoided. The molds used to make certain kinds of cheeses for example. Blue veined cheese such as Roquefort, blue, Gorgonzola, and Stilton are created by the introduction of *P. roqueforti* or *Penicillium* [see chapter 4] *roqueforti* spores. Cheeses such as Brie and Camembert have white surface molds. :)

1 Wikipedia [link]

2 Source: <http://www.alphaenzymes.com/>

CHAPTER 8 MAGIC

There is a lot of magic about mushrooms. But let ' s start that story with magic mushrooms. These are the mushrooms that contain the psychedelic compounds psilocybin and psilocin. There are a lot of species that match that description. The one known as *Psilocybe semilanceata* is a mushroom that is native to The Netherlands.

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Magic mushrooms have a very long history of usage. They have been used in spiritual and religious rites. But with the rise of Rock & Roll they also popped up in the local nightlife. Because the mushrooms are native in Europe [unlike cannabis for example] they are easy to be found. The challenge, as with all mushroom, is how to separate the good from the deadly.

'You can eat all mushrooms. Only, some of them you eat only once'

Magic mushrooms are consumed raw, as a sauce, a soup or a tea. They have mood lifting and psychedelic effects. The mushrooms we grow also lift our mood. That has everything to do with the happiness we feel of contributing to a better world. ;)

As with magic, there is part attraction and part repellent about mushrooms. They can be both exciting and mysterious. They are medicinal and poisonous. They are big and small. But they are definitely versatile.

The real magic is, if you ask me, in the things like the delicate structure of the mycelium. It has a cell wall just several cells thick. It ' s moving, as without a skin, through one of the most hostile environments for microbes, our soil. The soil is teeming with life, all competing for space and food. How can something so delicate and thin [one cell wall thick] survive down there? Consider the 5 or 6 skin layers that we have!

I can tell you that there is some biological warfare [see also chapter 1] in play there. To make a stand, the mushroom has a wide variety of enzymes at its disposal. Those enzymes it uses for 1) eating 2) protection.

Eating

Mushrooms are the cleaners of nature. They break down organic material, eat it partially and make the remains available for other organisms. This is a very important role in nature. If not for mushrooms with their powerful enzymes, it would take forever to break down the structure of wood.

Mushroom mycelium is an inside out stomach.

What we do in our stomach, the mycelium does outside itself. The enzymes produces, break down complex and hard materials like lignin so that the mycelium can consume the nutrients. Lignin is after cellulose the most common organic material on earth. Without mushrooms, there would be a lot more.

Protection

Beside extracellular enzymes and acids, the mycelium also produces alcohols and other simple organic substances as well as complex molecules such as antibiotics that repel or kill other microorganisms. They may also produce mycotoxins that are highly toxic to larger animals, including humans.

Cooperation

Another magical thing about mushrooms inspired us to use it in our core values. Cooperation. There are three main types of mushrooms; mycorrhizal, saprophytic and parasitic.

The parasitic are relatively scarce. They prey on living wood and can devastate whole forests. The saprophytic are the ones you find growing on dead wood helping with cleaning. But the mycorrhizal are the ones we want to focus on.

Mycorrhizal mushrooms [Species like Matsutake, Boletus, Chanterelles and Truffles] form a symbiotic relationship with the root system of other species. Clearly visible in the picture on the next page.¹

They make a very nice trade off. They provide the roots with protection against other fungi and predators. In exchange for that protection the receive certain nutrients from the roots.

A classic win win situation. The mushroom get 's nutrients from places it could not get it by itself. The tree has increased protection.

And what happens if you are well protected? You can grow. As you can clearly see in the image.

So we believe that cooperation is the new competition. Cooperate and together you become bigger.

There is so much research to be done in this field. So much terrain to be gained. There is a whole world out there waiting to be explored. Will you help explore that world?



▲ FIGURE 81

Two Douglas fir trees, one with and one without introduced mycorrhizae. Note the increase in root, shoot, and needle development.

¹ Paul Stamets Mycelium running

CHAPTER 9 ECOVATIVE DESIGN

There are a lot of cool and inspiring companies out there and Ecovative Design is essential for you to know!

This company started with the idea of using mycelium as insulation. As a replacement for all that polluting and unsustainable and oil based insulation that is out there on the market.

They have built a sort of tiny house where they demonstrate the abilities of mycelium as an insulation material.

Then they sort of moved to packaging. A very common way of packaging material is by the use of styrofoam. But this material has a lot of downsides.

The EPA and International Agency for Research on Cancer have determined styrene as a possible human carcinogen. Next to that it is a plastic and therefore petroleum based ^{1 2} product. That means it is not sustainable and not degradable.

So plastic breaks into smaller and smaller and smaller pieces and it just keeps getting smaller to the point where it can even turn into a powder. That 's a reason we can find pictures like these online. ³



Ecovative Design bring us the mycelium based replacement of styrofoam. A radical new way of packaging materials. All by combining agricultural waste and mycelium.

The technique they use is really amazing. They make a mold in the desired shape of the packaging material. In this mold they place straw like material which is considered to be a agricultural waste. Then they add mycelium. They let the mycelium grow for a short period, colonizing the mold.

When the mycelium has grown through the material it is dried in an [solar] oven. It then is water and shock resistant and fully biodegradable. I really love the idea and the possibilities.

Go check them out!

<http://www.ecovatedesign.com/mushroommaterials/>

¹ <http://www.epa.gov/chemfact/styresd.pdf> [pdf will download]

² <http://www.inchem.org/documents/iarc/vol82/8207.html>

³ <http://bluemenpachi.blogspot.nl/2012/11/styrofoamwhatisithowisit-madewhy.html>

CHAPTER 10 THE BLUE ECONOMY

The book that ignited the spark that lit Rotterdam. Both Mark Slegers and Siemen Cox got the mushroom fever out of this excellent read by Gunter Pauli. In this book Gunter describes 100 business cases of things you can do locally with waste. Growing mushrooms on coffee waste was one of them.

But there is more. Using orange peels, mixed with water and a bit of sugar can make a detergent. Or use the leftovers of a demolished building add some plastic and you have stone paper. You don't need trees anymore, hardly any water and you can recycle it indefinitely.

But what is the heart of the blue economy? The simple show explains it in this [short video](#).

The sentence that really strikes me here is:

“ Making people healthy and happy with what they did not know they had ”

It's truly amazing that coffee making is such an inefficient process. Only 0,2% gets in your coffee cup, the rest we consider 'waste'. That leaves 99,8% to be discarded. That means we can improve that process a staggering 5.000 times! Talking about abundance. We talked about the health aspects of mushroom in depth in chapter

3.

Open source? Isn't that something with software?

That's correct. Open source has originated in the software industry and it implies that the source code is public so everybody can modify it. Although you might think that that can be dangerous. Hackers will crack that software in minutes right? Stop for a minute to consider that the preferred software for networks is Linux. Which is open source software.

Some of the most successful software projects are based on open source. Wordpress, Firefox, Linux etc. Now it's time to take open source to the business floor. Let's use the collective intelligence of the human race and create together some of the most flexible, useful, innovative and sustainable businesses the world has ever known.

When we work together we can be smarter, more effective and more adaptive than any other big competitor. The world will be our Research and Development department. All connected thanks to the internet.

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Story

Nice story so far don't you think? Funny, while writing this Ebook I keep catching myself using the words, 'wait, it gets better'. Here we go again, wait it gets better. How do we use this knowledge to empower the next generation? All that Barbie material out there is not gonna help.

That's why Gunter also wrote a number of stories. Because children are dreamers by nature.

See [here](#) for more.



ABOUT ROTTERZWAM

Rotterzwam, a business inspired by Gunter's Blue Economy.

However, nature knows no waste because everything and everybody works together. The only one capable of producing something no one desires are the human species. (Waste is a human invention). We were taught that we should do something ourselves and started growing mushrooms.

We needed a place, and found an old swimming pool. We needed a substrate and collected coffee waste. Now that we have realized our first dream, we should go beyond just farming mushrooms and growing a business.

We feel it is our duty to spread the word and the visionary ideas that Gunter has shared open source. The best way is the old fashioned way: telling a story. With this EBook, we hope to contribute and inspire others to do better and more.

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Mushroom master programma

Do you want to convert local coffee waste in food for your community by cultivating mushrooms? Then follow the Mushroom Master Program with us. This Mushroom Master Program consists out of a program that is developed to teach you all the elements you need to know to cultivate your own mushrooms. You can choose which elements of this program suit your needs.

It's a four day programme. During these days you will work with us. You get access to the technical layout of the growing rooms, we show you the main aspects of the growing process, we share our mistakes [so you don't need to make them] and we will inform you about the legal aspects. For more information please visit:

www.mushroom-cultivation.com and www.youtube.com/user/rotterzwamm

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