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The Future of Fungal Freshness?

January 17, 2008 | category: Food Mycology, Students, cultivation, edibles, fungi, video
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This post was written by a student, who we'll affectionately call student12. He wisely took two of my classes in Fall 2007, Fungi (PLPA 309), and Mushrooms of Field and Forest (PLPA 319)

Do you like fresh food? That's a silly question, right–who wants to buy limp, old looking food? No one! That is why supermarkets have entire sections devoted to "fresh produce." But what do they mean by "fresh?" How can produce that was harvested a thousand miles away and a week or two ago be "fresh?" That doesn't seem to fresh to me! How would you feel if you knew your food was truly

fresh? Better yet, how would you feel if your food was fresh that day? And even better yet, how would you feel if you knew your mushrooms were fresh that day? Sounds too good to be true! But it's not–thanks to Agata Jaworska. Agata may have changed the face of fresh with her Masters thesis concept, 'Made in Transit.' 'Made in Transit' is a supply chain concept in which the food grows on board a vehicle on the way to the supermarket, shifting the paradigm of packaging from preserving freshness to enabling growth, and shifting 'best before' to 'ready by.'

I love eating mushrooms, and I can't tell you how many times I have gone to the supermarket with mushrooms on my mind, only to be sadly disappointed by a not-so-fresh looking display. Once I heard about Agata's concept, I had to know more. I contacted Agata and asked her for an interview. Here is what she had to say:

Q: Can you give us a brief update on what is going on in the area of "ready by?"

> **Agata**: In a way, the concept of adding value on the way to the market exists. For example, though most of the time bananas are ripened in separate land-based ripening rooms after they arrive, companies are starting to ripen bananas on board the shipping containers, by building the conditioning capacity of ripening rooms into the shipping containers. So, though bananas are not "made" on the way, they are starting to be ripened on the way.
>
> But in chain cost calculations, transport, as far as I know, is always considered a cost factor and never a value-adding factor. I don't know of an instance in which on-the-way production is a dominant part of the production plan.
>
> yellow oysters in their gropakSomething related to the concept are potted plants (take potted basil for example), which the consumer takes home still in the pot. The distinction is that basil is not grown in transit, but rather it is kept alive. In fact, the growth of let's say chives is prevented while in transit, because it wouldn't be the right sort of growth (because conditions are not optimized), so even potted herbs are preserved on the way, and not grown on the way.

Q: What are you currently doing in the area of "ready by"? What is the nature of the project(s) you are currently working on? Who are you currently working with?

> **Agata**: Since graduating from Design Academy Eindhoven in June, the concept has been exhibited at various design events (currently it can be seen at an exhibition focused on sustainability, "Living and Working Together" in Utrecht, The Netherlands, and next it will be part of "Design and the Elastic Mind" at MoMA in New York), I have also been presenting it to industry (fresh food & packaging) in cooperation with the Netherlands Packaging Centre. Through this exposure we are gathering interest to launch the next level of (predominantly scientific) research that needs to happen, and the industry collaboration. I am working with the Systems & Control group, and also the Mushroom Group at Wageningen University to put together a proposal for further funding. We will be looking for PhD students as well (we've decided I may not be the best mushroom researcher after all!).

Q: What species of mushrooms (have you, can be, do you envision being) grown using "Made in Transit" methods? What are the major considerations when choosing mushroom varieties to grow?

> **Agata**: We have done some very preliminary testing with white button mushrooms and grey oysters, but not in a way that cultivation methods are designed around the "Made in Transit" concept, but rather adapted more or less standard ways of growing these species and sent them on their way. It would get a lot more interesting when we start to design the way of cultivating around the reality of transport, much more than is done today.
>
> The kinds of species that would most benefit from the concept are the kind that are extremely fragile (and therefore currently cannot be transported because they begin to liquefy when subjected to refrigeration or vibration), and the kind that have a distributed customership (so therefore it doesn't make economic sense to set up a local farm). Paddy rice straw mushroom is one such example.

Q: What other foods can be (can potentially be) grown using "Made in Transit" methods?

> **Agata**: We could bake bread on the way to the market, in a sort of mobile bakery delivering the freshest goods. Baking can happen on board on the way, which could delay the order and make the chain much more flexible and responsive. Micro vegetables are also a possibility. But I'm sure there are others.

Q: Do you expect to obtain consistent yields and appearance? How does the package design impact produce yield and produce appearance?

> **Agata**: The package I designed (and which was produced by Voges Packaging) is based on the way oyster mushrooms are cultivated now, only adapted to an individual level. Readers of this blog will also notice that what I call the "growth pad" is too small in proportion to the size of fruit bodies. This package is futuristic in the sense that the substrate is smaller than what is currently possible. With the group at Wageningen University we hope to work on this, amongst other things. This concept could only be realized once we are able to control yields and appearance. As long as we're using the same terminology, I've seen the difference in appearance of the sporeless variety of oysters developed by the group in Wageningen, so I'm not too worried about that. The package will have to be designed to create the most ideal condition for growth as possible, and in principle, it should be easier to control the outcome when you are working with an individualized container than on a bulk level (i.e. a package and not a whole room). The conditions surrounding the package will also be controlled.

multigropak.jpg

Q: What are some of the greatest technical difficulties of growing mushrooms in transit?

> **Agata**: The greatest challenge is that realizing this concept involves a lot of change on a system level. It's kind of a revolution and not an evolution, precisely because it is a paradigm shift. But, I don't think it's that far fetched since we already have some of the capacity on board, we just don't put it to this use. Containers already have the capacity to control environmental factors (humidity, temperature, carbon dioxide levels), they just are not typically set to enable growth, but rather to preserve freshness. A lot of the technology exists already, but it just means that we have to build it into the system, which is kind of a big change.

Q: On average, how long does it take for a package to grow? On average, how long will it take to arrive? What mechanisms are available to slow growth in the case when arrival time is expected to be much longer than grow time?

> **Agata**: Remember we are still in the theoretical realm (as this is a futuristic concept) but I'd say 5-7 days. It would be more or less the same as current fruitification times. It is also possible that packages arrive prematurely to the supermarket and the last part of growth could happen there. It would be like bananas that you can buy green or yellow, depending on how soon you want to eat them. Just check the "ready by" date and pick the one you want.
>
> In terms of mechanisms to control growth, it would involve controlling the environmental condition in the vehicle (temperature, etc.), but this and more is yet to be developed.

Q: Given that mushroom harvesting can account for up to 40% of the cost of production using traditional methods, what is the cost breakdown using the "Made in Transit" paradigm?

> **Agata**: Good question, we're not there yet. Harvest cost is zero (and note that harvest labour no longer exists, since for the consumer picking his own mushrooms prior to cooking is more fun than work, I think), on-site production cost would go down (we wouldn't need growing rooms, just packaging facilities), packaging cost would go up because the substrate would be built into the package (and we hope to make the protein-enriched substrate edible) and ideally transport costs would stay the same. Though people may be willing to spend more money on the substantial jump in quality, I am more interested in testing the economic viability of this new mode of production. Of course it may not be such a good idea to start with white button mushrooms since there is such a low margin to begin off with.

Q: What impact do you feel the "Made in Transit" paradigm will have on movements to buy locally grown foods and to support local agriculture?

> **Agata**: Developments in local agriculture can go on as normal, just as developments in my mother's garden will also go on as normal. For this project I was interested in tackling global chains and wondered if they could be done differently, and indeed address their sustainability. For the next project, I may tackle local food production.

oyster mushrooms growing in their packaging
Q: What is the general market acceptance of such a high-tech grow method?

> **Agata**: Indeed, next time a kid asks me where mushrooms come from, I'll have to tell him that they may soon (or not so soon, depending on our research funding and industry partners) come from trucks! And is this a utopia or a dystopia? Well it's not as romantic as going to the forest but I hope it turns out to be more sustainable than the way it is currently done, given our global state of affairs. I think it shows that sustainability is not as clear cut as one would think, and dare I say, that local is not always better than global?

Q: When will "Made in Transit" products be available to the public?

> **Agata**: No idea. It really depends on when we can start the research and find industry partners that want to work with us.

Q: What is your vision of "Made in Transit" for the future?

> **Agata**: I would like to find more applications and develop new business models. I most look forward to working with people from different fields. With this project I already have experienced this, and it was one of the more gratifying things. When you are sitting around the table with professionals and researchers and you don't have to say a thing because the enthusiasm is already there. It's nice how such a concept can do that.

Agata Jaworska graduated from Design Academy Eindhoven with a Master of Design in 2007. She is currently looking for scientific researchers, industry partners and collaborators to make the concept a reality. She can be contacted at jaworska.mail@gmail.com.

If you would like to learn a little more about Agata's design concept "Made in Transit", check out this two-minute animation (Agata says "*The guy is shopping, picks up mushrooms with a 'ready by' instead of 'best before' expiry date, and then we go back in time to see how the mushrooms are made and find out that the chain starts in the packaging factory and the mushrooms are grown in their package on the way to the supermarket*."):

Youtube Two minute animation (or view the Five minute presentation)

Student12 says: I would like to thank Agata for taking time to correspond with me about her fascinating Master's thesis concept. And I look forward to the day when truly fresh mushrooms will be available at every grocery store.

We thank Agata Jaworska for sharing her ideas and images. More on her innovative packaging over at Culiblog. –Ed.

Agata's concept aired at the Museum of Modern Art (MOMA!) as an example of "a successful translation of disruptive innovation." The exhibit was called Design and the Elastic Mind (February 24â€"May 12, 2008).

6 Comments

Comments

6 Responses to " The Future of Fungal Freshness? "

- *geld lenen* on February 23rd, 2008 at 4:53 pm

  Some good stuff from a fellow Dutch student. At it is not my "peace of cake" still very interesting read…

  Thumbs up

- *arefipour* on July 14th, 2008 at 3:43 am

  Hi. It is a good idea for feresh food. I am pleased to reading your subjects on fungal freshness.
  with best regards

M.R.Arefipour

- *Kathie Hodge* on November 3rd, 2008 at 8:56 pm

  Agata wrote to let us all know:

  "Made in Transit was selected number 34 on TIME magazine's 50 best inventions of 2008.

  See the feature on Made in Transit:
  http://www.time.com/time/specials/packages/article/0,28804,1852747_1854195_1854173,00.html

  And the full list:
  http://www.time.com/time/specials/packages/completelist/0,,1852747,00.html

  Made in Transit was my thesis project from the IM Master program at Design Academy Eindhoven."

  Congratulations, Agata!

- *hotel for sale* on November 17th, 2008 at 1:41 am

  Hi.I like your post of the discussion, It is a good way for fresh food. I am pleased to reading your subjects on fungal freshness.

- *hypotheek* on April 7th, 2009 at 3:40 am

  The concept/idea is fresh and worth looking into. I would suggest taking this discussion and idea to ted.com. Agata you may find interested individuals who may share your passion.

  I would say I love the concept but I wanted to know if your concept applies to all kind of veggies and all different area's. In some situations the cost can be significant and the areaâ€™s difficult to reach.

  The main question would be how much will it cost? And will it be cheaper then have it made further from home? I applaud the freshness and I think if we will get better food with good nutrition and vitamin value that in the long-term it will help the quality of life. Thus, decrease the population of stress, cancer, ms and some other illnesses cases.

- *structured settlement* on April 11th, 2009 at 1:20 am

  you have some really good posts here. Im going to spend the next few days reading them. i love your writing style and Iâ€™m really happy to visited your blog. keep those posts coming

About

Most people don't pay much attention to fungi, which include things like mushrooms, molds,

yeasts, and mildews. Here at Cornell we think they're pretty fascinating. In fact, even the most disgusting foot diseases and moldy strawberries are dear to our hearts. We'd like to talk to you about fungi, so that like us, you too can tell gross stories at the dinner table. Afterwards, maybe you'll notice some things you would have overlooked before, and we think this could be good for the planet.

Kathie T. Hodge, Editor

Beneath Notice, our book of borescopic mycology

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