



EDUCATIONAL MODULE

Beeswax food wrap



In a nutshell

In this hands-on workshop, children will make their own piece of beeswax food wrap, which sticks like plastic food wrap does but is reusable. They will also learn and discuss about different food and general packaging methods and materials, why do we package it and how to prevent unnecessary packaging.

Food 2030 focus



What for?

To explore and understand the food system
To train or educate people on food system transformation.

For whom?

Educators

How long?

45-60 minutes

Created by

Science Centre AHHA Foundation (Tartu, Estonia)

Something to share?

Leave us a comment about this tool on the [FIT4FOOD2030 Knowledge Hub](#).
You can also contact Helin Haga, helin.haga@ahhaa.ee

This tool was developed as part of the FIT4FOOD2030 project; find this tool and many more on the [FIT4FOOD2030 Knowledge Hub](#).

Date of creation: March 2019

How to cite?

Science Centre AHHA Foundation (2019). Beeswax Food Wrap. FIT4FOOD2030 project tool.

What will you gain from this?

After successfully completing this module participants will:

- Understand the extent of producing waste and how much of it is one-time packaging.
- Identify moments when packaging can be avoided.
- Know more about where different materials come from and their properties (plastic and beeswax for example).
- Repeat some simple kitchen cooking techniques that they might not have tried before.
- Make a reusable alternative to plastic wrap: beeswax food wrap.
- Understand why we use food packaging and why plastic wrap is so successful in achieving this goal.

BEESWAX FOOD WRAP

This workshop allows children to see the environmental and resource consumption footprint of packaging and gives them a tactile example of how they themselves can make a difference.

This workshop is created as a science centre / science museum one-hour workshop that requires participants to be present for the whole duration, from start to finish. Trained facilitators can carry out the workshop multiple times in one day, with different participants.

Scientists or specialists from the field of waste management, food preservation and material sciences could be brought to the workshop to share their insights on packaging materials and methods and what happens with the waste.

The workshop is considered non-formal education. Connections with the school curriculum can be found and the workshop could be used to exemplify an environmental topic.



Participants of the workshop getting ready to make their own food wraps.



Thematic area

Food packaging, food waste

Target audience

Primary to high school students

Age of participants

12-18 years old

Number of participants

10-20

Number of facilitators

1 (optional: 1 food system expert)

Prior knowledge required for participation

No prerequisites

GETTING PREPARED

Set the scene

The activity should take place in a room sufficiently large to accommodate the necessary tables for seating groups of four participants and the necessary equipment – it is best if the room has a fixed oven, or a portable oven can be set up beforehand. A drying rack or a clothesline between chairs should be set up, with a cover to protect the floor underneath from any dripping beeswax. Keep the materials participants have to use at a large table at the front of the room, but where handling larger groups dividing some of the materials beforehand (e.g. pieces of cloth, beeswax in smaller containers) can be helpful.

With the necessary kitchen equipment at hand, namely an oven, the Beeswax Food Wrap workshop could also be facilitated, for example, in a classroom, as part of a science festival or some other science seminar, as a fun hands-on workshop to further engage and energise participants. Shops and markets selling unpackaged food or regular shops transitioning towards less-waste practices might also find such a workshop attractive.

Materials

- 1.5 m² of thin cotton cloth (recycled is the best)
- 0.5 kg of beeswax pellets
- 3 baking mats (reusable silicone mats are the best, cooking paper works also)
- 5 kitchen scales
- 10 small bowls
- 5 pairs of sharp scissors
- 5 rulers (at least 25 cm long)
- 5 pencils
- 5 silicone spatulas
- 1 oven (can be fixed in the room or portable)
- 3 oven trays
- 1 drying rack
- 1 clothes line (a substitute for a drying rack, to be tied between two chairs)
- 1 floor cover underneath the drying rack or clothes line (for example a large plastic waste bag, meant to be reused)
- 10 large printed pictures of topics and items mentioned in the workshop (such as wax plates being produced by bees, oceanic plastic pollution, growing cotton etc.)
- 3 store-bought examples of over-packaged products
- 10 non-toxic fabric markers
- 1 to 2 oven mitts

FLOW

STEP 1: Introduction (2 minutes)

STEP 2: Discussion on packaging (10 minutes)

STEP 3: Introducing beeswax (5 minutes)

STEP 4: Preparing and personalizing the textile (10 minutes)

STEP 5: Putting the textile and wax into the oven (10 minutes)

STEP 6: Spreading the wax on the textile (2 minutes)

STEP 7: Hanging the food wraps to dry (15 minutes)

STEP 8: Collecting the food wraps from the drying rack (2 minutes)

STEP 9: Conclusion and goodbyes (2 minutes)

ALTERNATIVE: Holding the activity online



FACILITATOR TIPS

This tool needs to be carried out together with the participants.

As a facilitator you need several skills and competences, such as verbal and non-verbal skills, negotiating skills, flexibility, and leadership. You will need to create an environment in which all participants feel secure, are able to speak up and give their perspective on issues being discussed. This means that you may have to stimulate some participants to speak more often, while you may have to prevent other participants to speak too often or too long. It also means that you will need to avoid discussions on issues that are not directly relevant.

Moreover, handling a large number of participants and hot tools (oven and oven trays) in the room requires particular attention.

A brief guide with facilitation tips is provided in this address:

<https://knowledgehub.fit4food2030.eu/facilitatorstips>

*Steps in the making of a beeswax food wrap;
Pictures courtesy of Fondazione Edmund Mach
(Food Lab Trentino), Italy.*

STEP 1: INTRODUCTION

2 MINUTES

Tell participants that in this workshop participants will take a look at packaging, will get to know more about the concept of overpackaging, about different packaging materials and make their own piece of sustainable packaging – beeswax food wrap, that can be reused many times, unlike the single use plastic food wrap.



TIPS & TRICKS:

Be careful not to make the introduction too long. You could introduce the hands-on task as early as possible to capture the students' interest. Furthermore, the flow of the activity could be arranged so that the waiting moments during the preparation of the food wrap are used more efficiently for discussion.

STEP 2: DISCUSSION ON PACKAGING

10 MINUTES

To have participants share their own ideas about food packaging, start with the following questions:

What is the point of food packaging? For example, for store-bought products.

What kind of food is not packaged?

Use the extra information to further explain key ideas behind packaging, as participants touch upon them:

Packaging protects food products (and other products) from going to waste and lets us store or use them for a longer time. Packaging depends on the product, but generally its principles are:

- **Lock nutrients** and ingredients in one place (for example, moisture and aroma compounds could easily leave an unsealed product);
- Control contact with **air** (e.g. meat would rot faster in contact with oxygen, because it enhances microbial growth);
- Regulate **moisture** (keep it in or keep it out);
- Block **organisms** from reaching the product and spoiling the product;
- Block **light** from affecting the food – photodeterioration, which causes chemical reactions in vitamins, pigments, amino acids and fats (for example, storing milk in transparent bottles under bright supermarket lighting results in a distinct flavour change and loss of vitamins);
- Preserve the **shape** of brittle food items (e.g. chips and cookies);

Furthermore, packaging gives us **information** about the product, its nutrients, usage and safe storage methods and duration. Packaging can also be used to boost the attractiveness of a product (**marketing**).

Show participants store-bought or otherwise acquired real examples of overpackaging one by one and ask:

What is wrong with this example?

What is the reason behind this packaging?

What could be done differently in this example?

What are the downsides of food packaging?

What happens with packages after they are used?



TIPS & TRICKS

It can be useful, while showing some packaging examples, to have the same food product packed in different ways to trigger comparison and discussion.

Prepare and use some extra information to explain this further. The information below is related to Estonia, but a number of European and national sources can help you adapt this to your context. Some of the links in Appendix A might also come in handy.

In Estonia, there is an average of **311 kg of unrecycled waste generated each year by each person**. 30% of its mass and 60% of its volume is packaging waste. All of the packaging waste created by the small Estonian nation in one year takes up the space of a three-story building, two football fields in size. In the European Union, Estonia is among the top three plastic packaging waste producers, behind Ireland and Luxembourg (2016).

Waste thrown in the **general bin will not get recycled**. Instead it is put in a landfill or incinerated. These methods can be used for **generating energy** (by utilizing the landfill gas methane, created by microorganisms, or heat generated by incineration), but it is better to have the packaging materials recycled and thus reused (for example, bottles) or downcycled (made into flower pots, fleece cloth, packaging paper etc.).

29 European countries have established a system of **recyclable packaging bins**, where companies pay a fee to finance the collection, sorting and recovery of packaging waste. But, of course, consumers are the ones paying for this service, as a part of the product price. Recycling has its controversies, such as consumers fail to recycle correctly, packages with mixed materials might still not get recycled, humans still have to sort through the recycled waste and for this waste is sometimes shipped overseas etc.

Packaging is the dominant use of plastics in the world, **accounting to 42% of the plastic use** (second is construction with 19%). In 2016, the global population of 7 billion created more than 300 million tons of plastic in one year, while in 1950s the number was about 1.5 million tons. Much of it **ends up in the oceans**, also as microplastics. Reports show that if this trend would continue, by 2050 our oceans will contain more plastic than fish by weight.

Sustainable packaging, **minimizing single-use plastics** and avoiding unnecessary packaging in the first place is key here. An example is to use beeswax food wrap instead of plastic wrap or a single-use plastic bag.

STEP 3: INTRODUCING BEESWAX

5 MINUTES

Give each of the groups (or have them come to you and receive) the following items:

- one scale
- groups share of beeswax in a bowl (~100 g)
- measuring bowl
- groups share of cloth
- scissors
- pencils
- fabric markers

With a sample of beeswax on their tables, have the participants touch and smell pellets of beeswax, while you explain what it is.

Beeswax is an **antibacterial, waterproof, malleable** substance that young bees secrete on the bottom of their bodies. Bees eat honey in order to create beeswax, then scrape the beeswax platelets from the bottoms of their bodies, chew them up and build their hives using it. Beeswax has a melting point of 60-65°C and its autoignition temperature is 204°C.

Beeswax is **non-toxic** and safe if ingested, although it wouldn't provide you any nutrients, because our bodies cannot break it down. Beeswax is in fact so stable, that thousands of years old beeswax discovered in pyramids is still the same as beeswax produced today.

"I never knew that beeswax could be used for wrapping food. Wow."

A participant in the piloting of the module

STEP 4: PREPARING AND PERSONALIZING THE TEXTILE

10 MINUTES

Instruct participants to measure and cut themselves 25 cm x 25 cm pieces of cloth, that they can design using fabric markers. They must add at least a minimal element of design, such as their name, in order to identify their wrap later.

Meanwhile, turn the oven on at 100 degrees Celsius, it will heat for about 8 minutes. Put the baking mats on the oven trays outside of the oven.

STEP 5: PUTTING THE TEXTILE AND WAX INTO THE OVEN

10 MINUTES

Give the oven trays to groups and instruct the group to measure 20 grams of beeswax per each person. Then they will need to fold their cloth in two, lay it on the tray and sandwich the beeswax between the two layers of their cloth. One group's 4 pieces of cloth should fit all on one tray. Then put the tray in the oven (or let the children do it) for 3-4 minutes. Task the children with measuring time.

As ovens don't have space for many trays, and usually there aren't many trays either, groups will use the trays and get oven-time taking turns.



TIPS & TRICKS

To get a better idea on how the wax and textile should be "merged", you can take a look at the instructional video created by the Fondazione Edmund Mach (Food Lab Trentino), Italy available at: <https://www.youtube.com/watch?v=-7Rna-CduTQ&feature=youtu.be>.

"The participants really appreciated the how-to video."

Fondazione Edmund Mach (Food Lab Trentino), Italy on the facilitation of the module

STEP 6: SPREADING THE WAX ON THE TEXTILE

2 MINUTES

Explain the next part, so it goes more smoothly and quickly: once the tray comes out of the oven, it will be placed on a table near the drying rack. Participants must take care with the hot tray and spread their beeswax on their cloth using the spatulas very quickly. The beeswax hardens very rapidly at room temperature within a couple of minutes.

STEP 7: HANGING THE FOOD WRAPS TO DRY

15 MINUTES

After 4 minutes have passed (verify visually that the wax is totally molten) invite the corresponding table-group to the table that is set up near the drying rack. Take the tray out using oven mitts. (The tray is actually not very hot, but it is a precaution.) Place the tray on that table and have them quickly spread the beeswax into the dry parts of their cloth.

Then quickly separate the two layers of the folded cloth and hang the pieces on the drying rack. Older participants can hang the cloth by themselves.

Repeat this with each group.

STEP 8: COLLECTING THE FOOD WRAPS FROM THE DRYING RACK

2 MINUTES

After a couple of minutes of drying, participants can take their cloth. Allow people to test their food wrap on the bowls that were used in the workshop. Ask them:

What can you use this wrap for?

STEP 9: CONCLUSION AND GOODBYES

2 MINUTES

Thank the participants for taking part, the workshop is now over. You can let the participants leave now. Collect the used materials and equipment (you can have participants help you with this), wash anything that became dirty.



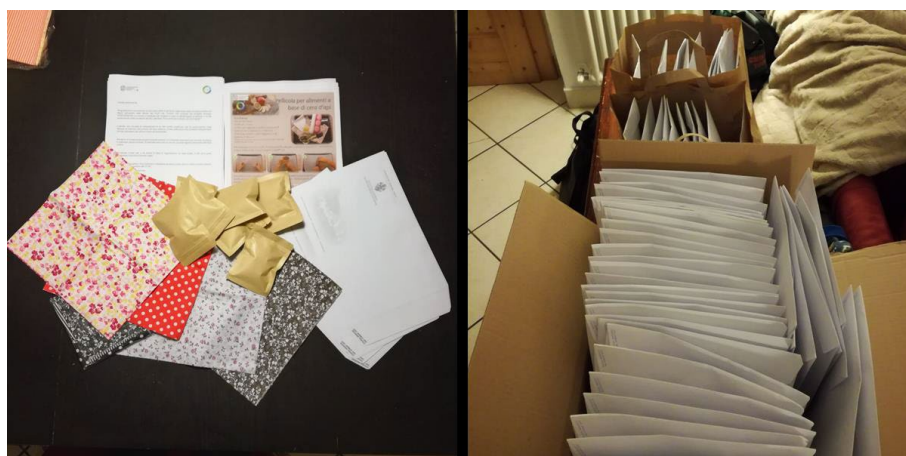
TIPS & TRICKS

Making the hands-on part last longer. In order to make the hands-on part longer you can add an extra part dedicated to decorating the wrap (since commercial packaging also have design elements) and provide the participants with some food (such as fruits, pasta, bread) in order for them to test the food wraps produced, and reflect also about it.

ALTERNATIVE: HOLDING THE ACTIVITY ONLINE

This module could also be done online, in several parts:

- When you choose this option, you should send the participants a **survey about the topic** beforehand as this will allow you to steer the focus of the audience on the challenges and start them thinking about the issues.
- **The making of the beeswax food wrap:** if you can, send the participants the workshop materials (by mail) well in advance of the activity. You can provide a printed instruction sheet (Appendix B) or the link to a how-to video (see page 7). The making of wrap can be done beforehand.
- **A follow-up webinar** (of around 1 hour) can focus on the discussion around packaging (Step 2) as connected to food waste and the environmental impact of food production. Participants can also share their experience with the making of the beeswax food wrap and show the final products. A focus on actions to prevent food losses and waste, to reduce the ecological/environmental footprint, and how to bring this in people's daily lives can be an additional element. An online visualization tool (such as Miro and Mural) can be used to gather live the inputs of the participants during the reflection session – replacing the physical options such as whiteboard and post-its.



Preparation of the material for delivering to participants to make and test their own beeswax food wrap, at Fondazione Edmund Mach (Food Lab Trentino), Italy



An example of visual reflection board used to gather participant ideas during an online webinar by Fondazione Edmund Mach (Food Lab Trentino), Italy

APPENDIX A: USEFUL LINKS

Plastic pollution

United Nations. "Feature: UN's mission to keep plastics out of oceans and marine life." Accessible at : <https://www.un.org/sustainabledevelopment/blog/2017/04/feature-uns-mission-to-keep-plastics-out-of-oceans-and-marine-life/>

Our World in Data. "Plastic Pollution." Accessible at: <https://ourworldindata.org/plastic-pollution>

World Economic Forum. "Sustainable packaging is good for profits as well as the planet." Accessible at : <https://www.weforum.org/agenda/2019/01/most-plastic-packaging-is-unrecycled-that-has-to-change/>

DW. "Plastic waste and the recycling myth." Accessible at: <https://www.dw.com/cda/en/plastic-waste-and-the-recycling-myth/a-45746469>

Kurzgesagt – In a nutshell. "Plastic pollution: How Humans are Turning the World into Plastic". YouTube. Accessible at: <https://www.youtube.com/watch?v=RS7IzU2VJIQ>

Bored Panda. "109 Time Product Packaging Was So Wrong" Accessible at: <https://www.boredpanda.com/unnecessary-wasteful-packaging/>

Beeswax

Science Direct. "Beeswax." Accessible at: <https://www.sciencedirect.com/topics/agricultural-and-biological-sciences/beeswax>

Superbee. "All About Beeswax: 9 Amazing Facts." Accessible at: <https://superbee.me/beeswax/>

Beeswax Candle Company. "Wax Removal Tips." Accessible at: <https://www.beeswaxcandleco.com/wax-removal-tips/>

How plastic was seen as a wonder material:

Verge Science. "Why graphene hasn't taken over the world... yet." YouTube. Accessible at: <https://youtu.be/lesIsKMjB4Y?t=356>

Examples of novel materials that can be used instead of plastic:

Biotrem. "About Us." Accessible at: <https://biotrem.pl/en/>

Chiara Riccio. "Muskin, the vegetable leather made from mushrooms." Lifegate. Accessible at: <https://www.lifegate.com/people/lifestyle/muskin-leather-mushrooms>

Steve Rukavina. "McGill researchers use lobster shells to make biodegradable plastic." CBC News. Accessible at: <https://www.cbc.ca/news/canada/montreal/mcgill-researchers-use-lobster-shells-to-make-biodegradeable-plastic-1.4920820>

APPENDIX B: INSTRUCTION SHEET (P. 10)

Beeswax food wrap



Beeswax is an antibacterial, waterproof, malleable substance produced by young bees when transforming sugars found in honey and thereafter secreted and used to build their hives. Beeswax is non-toxic and safe if ingested. It has several applications, from its use in the cosmetic and pharmaceutical industry, to food preservation and polishing furniture.



Materials

Thin cotton cloth

Beeswax pellets - 20 gr*

Sharp scissors

Baking mats (reusable silicone mats/cooking paper)

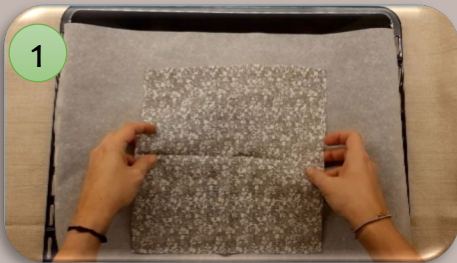
Silicone spatula

Oven tray

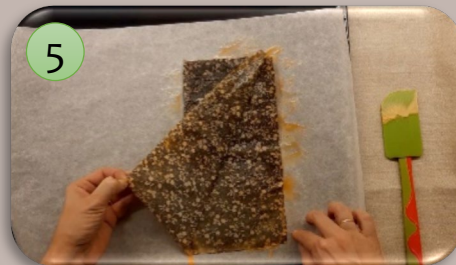
*grams for a 25x25 cm cotton piece, proportionally increase the beeswax pellets for bigger cotton pieces.



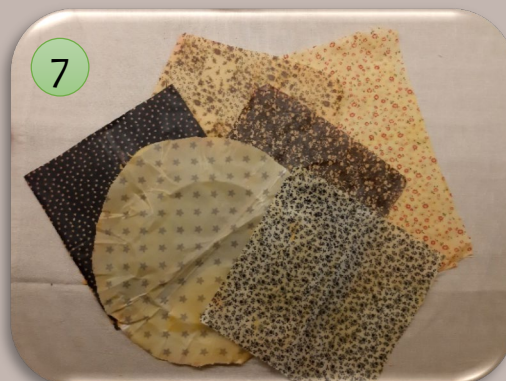
Turn on the oven at 100°C. Lay the cloth on the tray (1), distribute the beeswax on half of the cloth and fold the cloth in two**



Put the tray in the oven until the wax is completely melted. Take the tray out using oven mitts, spread the beeswax on the cloth using the spatulas very quickly *** (4). Quickly separate the two layers of the folded cloth (5) and hang the pieces on the drying rack (6).



Once dry (7), your beeswax wrap is ready to use.



**If you use bigger clothes, fold in 4.

***The beeswax hardens very rapidly, at room temperature within a couple of minutes.



Coordinated by:



Partners



OSLO METROPOLITAN UNIVERSITY
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This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 774088