



FOOD, COOKING AND STEM

**A selection of simple experiments
using food items,
kitchen equipment,
cooking processes,
and STEM.**



Smart leftovers
Turning waste into sustainability



How to reach us

-  www.science-on-stage.eu
-  www.science-on-stage.eu/teachingmaterials
-  www.science-on-stage.eu/newsletter
-  www.science-on-stage.eu/countries
-  info@science-on-stage.eu

-  [scienceonstageeurope](https://www.facebook.com/scienceonstageeurope)
-  [@scienceonstage](https://twitter.com/scienceonstage)
-  [scienceonstageeurope](https://www.instagram.com/scienceonstageeurope)
-  [scienceonstageeurope](https://www.youtube.com/scienceonstageeurope)

About us

Science on Stage Europe brings together science teachers from across Europe to exchange best practice and teaching ideas and concepts with passionate colleagues from over 30 countries. Science on Stage Europe believes that the best way to improve science teaching and to encourage more schoolchildren to consider a career in science or engineering is to motivate and inform their teachers. The non-profit organisation was founded in 2000 and reaches 100,000 teachers Europe-wide.

Credits

The authors have checked all aspects of copyright for the images and texts used in this publication to the best of their knowledge.

Cover illustration by Gabriela Coelho and Kristina Dovalova

HEALTH AND SAFETY

Due caution should be taken with all recipes in terms of cleanliness when dealing with food that is to be consumed.

In addition, particular care should be taken when using hot ovens or hobs, when adult supervision is appropriate.

Special attention should be paid to possible allergies that may exist when handling certain foods.



Index

FOREWORD

LEFTOVER

APPLE PEEL

Apple tea, apple peel cider, apple skin chips, other ideas5

EGGSHELLS

Garden fertilizer, plant container8

PINEAPPLE

Pineapple cake and herbal infusion10

BANANAS

Banana cake, banana bacon, additional ideas13

ORANGE AND LEMON PEELS

Candied orange peels, air freshener, cleaner16

POTATO SKINS

Potato crisps18

TEA AND TEA BAGS

Plant fertilizer, rice flavour19

A WORMERY

Fertilizer from waste20

REFERENCES



Foreword

Food is a fundamental part of our daily lives and, at the same time, a significant source of waste. However, food scraps, often considered waste, are full of potential to teach valuable lessons in science and sustainability. This booklet is the 6th in a set of books that use food and its preparation as a means of learning scientific concepts. This booklet aims to transform the way we view and utilise food waste by incorporating it as a learning tool that aligns with the UN's Sustainable Development Goals (SDGs).

This booklet allows:

- Promote sustainability by teaching sustainable practices for the full use of food, reducing waste and contributing to a healthier planet.
- Allows you to use food scraps as raw material to explore scientific concepts, such as nutrition as well as physical and chemical properties of food.
- It allows students to be sensitized about the importance of reducing food waste and its relationship with the preservation of natural resources.

This booklet is directly linked to several SDGs, including:

SDG 1: Eradicating Poverty

By maximising the use of food, we promote practices that can help alleviate food insecurity and support communities in need.

SDG 2: Zero Hunger and Sustainable Agriculture

Encourages the full use of food, promoting a more sustainable approach and less waste.

SDG 3: Health and Well-being

Making full use of food contributes to more complete nutrition, promoting the health and well-being of individuals.

SDG 4: Quality Education

By teaching sustainable practices and scientific concepts, the project contributes to a quality education that prepares students for future challenges.

SDG 12: Responsible Consumption and Production

Encourages responsible consumption practices by utilising food waste in creative and effective ways.

SDG 13: Action against Global Climate Change

Reducing food waste contributes to reducing greenhouse gas emissions associated with food decomposition.

SDG 15: Life on Land

Composting and the efficient use of food waste help preserve terrestrial ecosystems, improving soil quality and promoting biodiversity.

David and Rute



[Food, Cooking and STEM booklets](#)

Leftover: Apple peel



"Eat an apple on going to bed, and you'll keep the doctor from earning his bread."

The peel of apples has antioxidant properties due to its constitution rich in polyphenols. Polyphenols are substances characterized by having one or more hydroxyl groups attached to one or more aromatic rings. In addition, the bark is also rich in fibre.



There are many recipes available, here is a selection.

Apple tea

Scientific concepts that can be explored:

- Boiling point
- Techniques for separating a heterogeneous mixture (filtration)
- Graphical representation of temperature variation with heating
- If a kettle is used, the heating performance can be determined by knowing the mass heat capacity of the water (suitable for secondary school students).

Apple peelings can make a soothing drink by steeping the peel in boiling water with the addition of a cinnamon stick and honey. Different coloured apples can be used to brew up different colours of the drink; try red apples to make a lovely pink beverage.

Ingredients:

Apple peels, water, cinnamon, sugar or honey (optional).

Preparation:

- Boil water, add the apple peels and cinnamon stick and let it infuse for 10-15 minutes.
- Strain and sweeten with honey if desired.





Apple cider vinegar

Here's a reason to save the apple cores along with the peels. Mixed with sugar and submerged in water, it's easy to turn apple scraps into a batch of DIY apple cider vinegar.

Scientific concepts that can be explored:

Alcoholic fermentation - a biological process in which sugars such as fructose are converted into energy with the production of ethanol and carbon dioxide.

Acetic fermentation - a chemical reaction that consists of the partial oxidation of ethyl alcohol, with the production of acetic acid. This process is used in the production of vinegar.

pH and acids and bases – the concept of acids and bases and the pH scale can be explored using common ingredients in our kitchens.

Ingredients:

- 500 g apple cores and peels of organic apples
- 2 tablespoon sugar
- 1 l water
- 1 tablespoon vinegar

Equipment:

Pot (1 l), tablespoon, 1 large jar (2.5 l), paper towels, grater, household clingfilm, strainer, jug, 2 small jars (1 l), gauze, scissors, 2 elastics bands, funnel, small vinegar bottle (0.2 l)

Preparation:

1st day:

- Boil 1 l of water (to kill the undesirable microorganisms) in the pot for at least 3 minutes, add two tablespoons of sugar (in hot water it will dissolve very quickly) and cool to room temperature.
- Grate 500 g apple cores and peels so that the sugar from the apples can go into the water.
- Add them into the big jar and pour the solution with the sugar over the apples.
- Cover the jar with clingfilm and tighten with elastic band.
- Leave at room temperature.

After 3 weeks

- Strain the contents of the jar.
- Cover the jar with a gauze to avoid dust and insects.
- Tighten with an elastic band and leave at room temperature.

After 6 weeks

- Separate the vinegar from the sediment and pour it into bottles.

You can find all the information in the **Science on Stage project "An apple a day keeps the climate ok"** from the authors Sarah Eames (United Kingdom), Renata Flander (Slovenia), Dagmar Isheim (Germany).

<https://www.science-on-stage.eu/material/apple-usage#vinegar>

<https://www.science-on-stage.eu/sites/default/files/2022-09/worksheet-apple-vinegar.pdf>



Apple skin chips

Scientific concepts that can be explored:

Convection: The air fryer uses the convection method to cook food. Warm air quickly circulates around the apple peels, allowing them to cook evenly and crisp up.

Conduction: Heat is also transferred directly to the shells where they are in contact with the surface of the air fryer basket.

Evaporation: During the cooking process, the water contained in the apple peels evaporates, resulting in a crunchy texture. This happens because the heat causes the vaporization of the water present in the shells. Children can calculate the water mass and calculate the percentage of water in apple peels by weighing them before and after they are dehydrated.

Energy Efficiency: The air fryer is an energy-efficient tool for cooking. The concept of power and performance can be explored. Students can compare, for example, the energy consumed by an air fryer or an oven to heat a certain volume of water. Secondary school students can seek to devise an experimental protocol to calculate the performance of these machines.

Another good way to get the fibrous content consumed is to cook the apple peels in order to eat like crisps.

Ingredients: Apple peels and sugar.

Preparation: Wash the peels well, spread on a baking sheet, sprinkle with sugar and bake at 100 °C to crisp. Alternatively, place them in the air fryer at 180 °C for about 9 minutes.



Extra ideas

Additive to a smoothie

Apple peels bring a big boost of fibre, along with extra sweetness, to smoothies. Keep them stored in a resealable bag in the freezer. Then, when you are ready, add them to your other smoothie ingredients and blend the drink. In summer, the fact that the peels are frozen cools the smoothie even more.

Extra filling for pancakes, muffins and cakes

Chop up peels and add them to your next batch of pancakes, waffles, muffins or cakes. The peels add a subtle apple flavour and will boost the fibre content of any of these dishes. Pair them with cinnamon to keep everything tasting like apple pie.

Leftover: Eggshells



Eggs are possibly one of the most versatile foods. Eggs can be eaten in almost all meals, breakfast, lunch and dinner. Recipes cover a huge range of tastes from custardy desserts to omelettes and, of course, baking. In addition to the “inside” of an egg the eggshell can be useful too but is so often thrown away.

The eggshell of a chicken is primarily composed of ceramic materials with a relatively small proportion of organic substances (including proteins). It is mainly made up of calcium carbonate (94%), with minor amounts of calcium phosphate, magnesium carbonate, and organic matter.

Garden fertilizer

Eggshells can have many uses, including correcting the pH of soils in agriculture. Ground eggshells mixed into the soil enrich the substrate of the plants.

Scientific concepts that can be explored:

Chemical reactions – promote the chemical reaction of calcium carbonate with hydrochloric acid and explore the reaction products (carbon dioxide, water and calcium chloride).

Forces – use an egg and study its resistance and the shape of the catenary.

Density – use eggs to study density.

pH – use the eggshell to exploit the pH.

Various activities can be found in the booklet Food, Cooking and STEM Section 3 "Eggs-Experiments"

<https://www.science-on-stage.eu/material/food-cooking-and-stem-section-3-eggs-experiments>

An example of an activity: after using the egg for cooking, take the two halves of the shell and put them in a glass of water. One floats and the other sinks! Why is that? This can be an interesting discussion to put to the students.





Eggshells are rich in calcium. Calcium is a necessary element for plant health and breaking up your cracked eggshells and mixing them in with the soil in your garden will help boost this essential soil mineral. So, eggshells boost the health of your plants. Adding calcium to the soil, increases the soil pH. Adding a calcium fertilizer will “lime” the soil, meaning it will make the soil more alkaline.

NOTE: Adding eggshells is beneficial if your soil is too acidic, but harmful if it is already too basic.

Plant container

Using half eggshells as containers for starting plants or displaying mini plants with small root systems are a great eco-friendly alternative to plastic pots. Moreover, the shells can be directly transplanted into the garden.



Extra information:

We can reuse eggshells and also mollusc shells.

For more information, see the project "Making cement from mussel shells", a unit of the Science on Stage Act Now project for the UN Sustainable Development Goals.

<https://www.science-on-stage.eu/material/3-rs-making-cement-mussel-shells>



Leftover: Pineapple

Pineapple cake and herbal infusion



Scientific concepts that can be explored:

pH Testing – Measure the pH of pineapple juice with pH strips and compare with other fruits like orange and lemon.

Chemical tests – This recipe can be used to determine the amount of vitamin C in pineapple and compare it with other fruits. This is a common practical activity in biology classes.

Ingredients

- 3 eggs
- 1 cup of regular flour (150 g)
- 3/4 cup of corn flour (100 g) or oat flour or lentil flour
- 1/4 cup of sugar (70 g)
- 3/4 cup of vegetable oil (140 g)
- 1 cup of pineapple peel (170 g)
- 2 teaspoons of baking powder (10 g)
- 1/2 cup of herbal infusion

For the herbal infusion

- Dehydrated apple peel
- Dehydrated pineapple or other fruits
- Mint leaves
- Cinnamon stick

Cooking process

Prepare the pineapple peel:

- Peel and wash the pineapple
- Cut into small pieces.
- Crush
- Bring to a low heat (if necessary, add water) for 2 hours.
- Crush again and add 2 to 3 tablespoons of grated coconut for each pineapple.



- If the pineapple has low sugar content, add 2 or 3 tablespoons of brown sugar and continue cooking until most of the fibre is cooked (about 2 to 3 hours).

Prepare the herbal infusion

- Boil water in a kettle or saucepan.
- Place the dehydrated apple peel, pineapple, or other fruits, mint leaves, and cinnamon stick in a teapot or heatproof container.
- Pour the boiling water over the ingredients in the teapot.
- Let the infusion steep for 5-10 minutes, depending on desired strength.
- Strain the infusion into cups or mugs and optionally, sweeten with honey or sugar to taste.

Prepare the cake

- Preheat the oven to 180 °C.
- In a mixing bowl, beat 3 eggs with sugar until obtaining a homogeneous mixture.
- Gradually add vegetable oil, herbal infusion, and flour to the egg-sugar mixture, alternating between them until well combined.
- Once the batter is smooth, fold in the prepared dehydrated pineapple mixture.
- Finally, add the baking powder and gently mix until evenly distributed in the batter.
- Grease a cake pan with butter and dust it with flour to prevent sticking.
- Pour the cake batter into the prepared pan, spreading it evenly.
- Bake in the preheated oven for 20-30 minutes or until a toothpick inserted into the centre comes out clean.
- Once baked, remove the cake from the oven and allow it to cool in the pan for a few minutes before transferring it to a wire rack to cool completely.
Once cooled, slice and serve your delicious herbal-infused pineapple cake!



Science of Sustainable Baking

This interdisciplinary baking endeavour aims to utilize fruit peels, with a primary focus on pineapple peels, to create valuable resources, pioneering a shift toward a more sustainable food system. By harnessing the nutritional and functional potential of fruit peels, this baking initiative aims to mitigate food waste, minimize environmental impact, innovate in baking product development, and promote a circular economy.



Through collaborative research spanning various disciplines, this initiative seeks to advocate for waste reduction, enhance nutrition, and involve communities in sustainable baking practices, ultimately paving the way for a more sustainable food future.

Educators can adapt the baking project's principles to their classes, fostering hands-on learning, critical thinking, and a deeper understanding of sustainability and the circular economy. This approach can empower students to become more environmentally conscious and actively engaged citizens.

Nutritional Benefits

Utilizing pineapple peel reduces food waste by using a part that is often discarded. Pineapple peel is often underestimated, but it is a source of nutrients and fibres that can be beneficial for health. Here are some of the nutritional characteristics of pineapple peel:

- is rich in dietary fibre, which is essential for digestive health. Fibre helps regulate bowel movements, prevent constipation, and support overall digestive system health.
- contains enzymes, such as bromelain, that can aid in protein digestion. Bromelain also has anti-inflammatory properties and may have benefits for joint health.
- contains vitamins and minerals, such as vitamin C, vitamin A, calcium, and potassium.
- the presence of antioxidants can help neutralize free radicals in the body, aiding in protection against oxidative stress and contributing to cellular health.

Adding shredded coconut to the crushed peel adds flavour and texture, while also providing essential fatty acids and additional dietary fibre.

Eggs are an excellent source of protein and essential nutrients. Oil, when used in moderation, contributes to the texture of the cake, and provides unsaturated fatty acids.

Controlling the amount of sugar and fat in the recipe helps make the cake healthier, contributing to the prevention of health problems such as diabetes and heart disease.

Choosing good-quality flour, including acorn flour, oats, or lentils, increases the fibre and essential nutrient content in the cake.

Importance of the Cooking and Preparation Techniques

Beating the batter to reduce air contributes to a denser texture and reduces the need to add large amounts of fat to the cake.

Baking at a controlled temperature of 180°C helps maintain the nutritional properties of the ingredients and prevents the formation of unwanted compounds associated with higher temperatures.

Note from the authors

The recipe is designed to use the pineapple peel, which, after being boiled and blended with the cooking water, adds more flavor and nutrients to the cake. Typically, the peel of one pineapple is boiled in about a liter of water for approximately 20 minutes, then blended and strained before being used in the recipe. In our case, in addition to the strained water, we used the pulp that remained after straining. The idea behind this is to minimize waste and align with sustainability principles, which we actively promote.

Authors: Ilda Moreira and Maria Henriques

Leftover: Bananas



Most of us are content with the inside of a banana and will reject the fruit when it is overripe and beginning to soften. Not only does the fruit offer itself now as an ingredient for a delicious banana cake, but the skin is also a rich and useful source of nutrients.

Scientific concepts that can be explored

When we use banana peels to make a cake, we can explore several scientific concepts. While we raise awareness among children of the need to reduce our ecological footprint, we can give them the opportunity to learn how to measure rigorously (something fundamental in science) and to practice calculating percentages.

Quantity measurements – measure the mass of the banana with the peel and then just the peel.

Percentages – Calculate the percentage by mass that the peel represents.

Scientific method – We can use an optical illusion, with two bananas, to demonstrate the crucial importance of measuring and comparing accurately. In science, relying solely on our eyes can be misleading. To obtain reliable results, it is essential to use rigorous measurements and appropriate tools.

Start the trick by presenting the two bananas to the audience, one above the other vertically. Ask a spectator to point out which banana is smaller. After the spectator chooses, ask him to help you stretch the smaller banana until it is the size of the other one. Show the bananas vertically again, one on top of the other, but now switch the order (the one that was stretched and was initially on top is now on the bottom). Play with the audience and say, now I think we have stretched it too far.



Explanation: This illusion is commonly known as the Jastrow illusion. It is an optical illusion where two identical figures are placed next to each other. Although they are both the same size, one appears to be larger. When the positions of the two shapes are reversed, the impression of which is the larger is also reversed.



Scientists are not yet certain what causes one figure in the Jastrow illusion to appear larger than the other. The fact that the shorter side of one figure is next to the longer side of the other somehow tricks the brain into perceiving one shape as longer and the other as shorter, although it is unclear exactly why this is so.



Banana cake

If you find yourself with over-ripe bananas, here is a way to use them up. You can find many recipes just using the fruit, but this recipe uses everything!

Ingredients

- 125g salted butter, softened, plus extra for the tin (or 125g unsalted butter plus ¼ tsp salt)
- 4 very ripe bananas
- 200g golden caster sugar
- 2 eggs, beaten
- 2 tsp vanilla extract
- 100ml Greek-style yogurt
- 300g white spelt flour or plain flour
- 1 tsp baking powder
- 1 tsp bicarbonate of soda
- 75g walnuts, roughly chopped

Preparation

- Preheat your oven to 180 °C (160 °C fan /gas 4). Grease and line a 900g loaf tin.
- Cut off the ends of the bananas and discard them.
- Roughly chop the bananas, including the peel, and blend them in a food processor or blender until smooth. Set the mixture aside.
- In a large bowl, use an electric hand whisk or stand mixer to cream the butter and sugar with a pinch of salt until the mixture is light and creamy, around 4-5 minutes.
- Add the eggs one at a time, beating well after each addition.
- Then, mix in the vanilla extract, yogurt, and banana puree.
- Gradually add the flour, baking powder, and bicarbonate of soda, mixing until just combined.
- Fold in the chopped walnuts.
- Pour the batter into the prepared loaf tin and bake for 50-60 minutes until a skewer inserted into the center comes out clean.
- Let the cake cool in the tin on a wire rack for 15 minutes before removing it from the tin to cool completely.

Reference: <https://www.bbcgoodfood.com/recipes/banana-peel-breakfast-cake>



Banana peel bacon

Ingredients

- 2 banana peels
- 2 tbsp coconut aminos (or soy sauce)
- 1 tsp olive oil
- 1/4 tsp paprika
- 1/4 tsp garlic powder
- 1 tsp maple syrup
- pinch of salt

Preparation

- Wash the banana peels very well and pat them dry.
- Tear the banana peels into strips.
- Using a spoon, remove the inner flesh from each banana peel.
- In a pan, create your marinade by combining coconut aminos or soy sauce, olive oil, paprika, garlic powder, maple syrup, and salt. Mix well. Coat both sides of the banana peels with the marinade and let them sit for 10-15 minutes.
- Cook the banana peels in a pan on medium-high heat for 2-3 minutes on each side until they are slightly charred.
- Remove from the heat and enjoy as a bacon substitute!

Banana as a shoe polisher

The inside of a banana skin can be used to polish leather shoes and bring up the shine. Simply take a sample of the skin and rub it on your dirty shoe. Then with a dry cloth rub off any of the “dampness” and your shoes will be shining like new again.

Other uses

Skin care with bananas

Hair health with bananas

Household cleaning with bananas

Gardening with bananas

Leftover: Orange and lemon peels



Orange peels, often discarded as waste, hold immense potential in the realm of recycling and sustainability. Rich in essential oils, vitamins, and fibres, these citrus peels can be transformed into valuable resources, reducing waste and promoting environmental health.

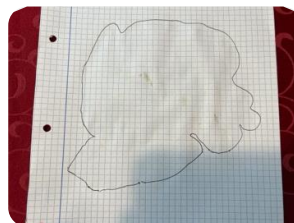
Scientific concepts that can be explored:

Titration – By using an orange and a lemon, learners can determine which of the two has a higher total acid content. Lemons generally have about 3.5 times more acid compared to oranges. This is an activity that can be done in chemistry classes.

Reference: <https://edu.rsc.org/in-search-of-solutions/oranges-and-lemons/1156.article>

Density – It is possible to study the density by placing oranges in a container in water and verify that they float. Remove the peel from the orange and check that it now sinks. Use this fruit to explore density.

Geometric shapes, perimeter, area, volume and sensitivity of measurements – Use oranges and lemons, approximately spherical fruits, to explore how to calculate volume using perimeter or diameter, determine the surface area using graph paper (see images below); use graph paper from different areas to discuss the sensitivity of the measuring instruments. Idea from the Italian project presented in 2019: **Exploring area and volume** (Italy).



Explore more ideas in the "Lemons and oranges" project of Science on Stage: www.science-on-stage.eu/material/oranges-and-lemons

Webinar "Oranges and Lemons": <https://youtu.be/eHBHg6tJtBA>



Candied orange peels with chocolate

Ingredients

- 100 g orange peels (without the white pith)
- 360 g sugar
- 5 cups of water
- Juice of 1/2 lemon
- 50 g dark chocolate
- 100 g sugar (for dusting)

Preparation

Trim the peels (pith removed) and cut them into strips (ca. 5 mm wide). Place them in a jar, cover them with water, cover and refrigerate for 2 to 3 days, changing the water 3 times a day.

Drain the peels, pour them into a saucepan with boiling water and cook them over low heat for about 30 minutes.

Drain the peels and set them aside.

In the same pan, add the sugar, water and lemon juice and bring to a boil, stirring with a wooden spoon until the sugar dissolves. As soon as it boils, add the peels and simmer for about 1 hour or until the syrup thickens slightly and the peels are soft.

Remove the peels with a slotted spoon, spread them out on an oven tray lined with parchment paper and let dry for around 24 hours.

Once dry, sprinkle them with sugar and mix well so they are completely coated.

Dry them again, until there are no traces of moisture, and they are very loose. Melt the chocolate in the microwave and dip the tips of the orange peels in the melted chocolate.

Refrigerate to harden.

Source: <https://www.pingodoce.pt/receitas/cascas-de-laranja-cristalizadas-com-chocolate/>

Air Freshener

Orange peel contains a significant amount of an essential oil that mainly consist of limonene. This compound has a strong, pleasant citrus scent that can overpower and mask unpleasant odours.

It is possible to freshen up the kitchen after cooking by placing orange peels in a saucepan with water and letting it simmer for a few minutes. You can also add cinnamon sticks and cloves.

Cleaner

Orange and other citrus peels have the perfect concentration of limonene to cut through grease and condition wooden surfaces.

Simply take the peel from one medium size orange for every 1/2 cup of water and let simmer for 15 minutes. Let the liquid cool and pour into a spray bottle for a natural way to clean surfaces.

Leftover: Potato skins



Most people throw away the peelings from their potatoes but the skins themselves contain many nutrients and fibres.

Scientific concepts that can be explored:

Pressure – Using a sharp knife or a vegetable peeler we are removing the skin from the potato without wasting too much. We can take advantage of the act of peeling potatoes to make children aware of the need to remove only the peel avoiding waste, which happens when we are not careful or use a knife that is not very sharp. We can also explore the concept of pressure, since the blades of the knife or vegetable peeler have a small area so that when we apply a force the pressure is high and you can cut easily.



Potato crisps

Recipe

This is the simplest of recipes to convert those peelings into a delicious snack. The crisps take 15 minutes to make and can be cooked in the oven or an air fryer. All you need are the potatoes, olive oil and seasoning.

Make sure your potatoes are clean before you start.

Potato peels don't keep very well so it's best to cook them straight away, or you can store them underwater in a fridge for up to 24 hours but remember to dry them before you start.



- Heat your oven to 200 °C.
- Using a vegetable peeler, peel the skin from your potatoes. Ideally in long strips at least 6-8 cm in length.
- Pat the peelings dry with kitchen paper or a clean kitchen towel.
- Put in a bowl and mix in a little olive oil and maybe as an extra your choice of seasoning and spices. Salt and pepper are probably the minimum but dried herbs and spices like paprika, oregano or mixed herbs may suit you. It is worth experimenting to find something that you really like. Toss everything together until evenly coated.
- Spread on a lined baking tray and cook in a single layer for around 8-10 minutes until golden and crisp. Keep an eye on them and remove any that look ready, being careful not to overcook.

Leftover: Tea and Tea bags



The use of tea, it seems, began with its medicinal applications. This drink, prepared from the infusion of tea leaves, has been known for millennia.

Black tea is obtained from an oxidation-reduction reaction from the tea plant which is called *Camellia sinensis*.

Scientific concepts that can be explored:

pH indicator – Black tea can be considered a pH indicator due to the presence of natural colourful compounds with pH-dependent colours.

Black tea is a beverage that is highly appreciated all over the world. Often tea and infusions are sold in small sachets used only once. We can reuse them in different ways, here are some examples:

- The inside of tea bags is organic matter that we can put in a wormery.
- Used tea bags are great for reducing puffiness around the eyes. Start by soaking two tea bags in warm water. Then, place them in the refrigerator to cool for a few minutes. Finally, lie back and relax with a tea bag on each eye for about five minutes.
- Enhance the flavour of rice or any grain by using a tea bag. Just place the tea bag in a pot of boiling water for a minute or two to let the flavour infuse. Then, use the tea-infused water to cook your grain as usual. For instance, try using jasmine tea to add extra aroma to jasmine rice.
- You can repurpose used tea bags as air fresheners. Just add a few drops of our favorite essential oil to the completely dry tea bags and put them in places such as drawers or wardrobes or any other place we want to perfume.

Leftovers: A wormery



Wormeries, or worm composting systems, are a fascinating and efficient way to recycle food leftovers and organic waste.

Scientific concepts that can be explored:

Microbial activity: Study the role of bacteria and fungi in breaking down organic matter.

Chemical processes: Explore the chemical changes that occur during decomposition.

Humus formation: Understand the formation of humus and its importance in soil structure and fertility.

Worm anatomy: Study the anatomy of composting worms

Worm behaviour: Observe worm behaviour in response to different environmental conditions, such as moisture, temperature, and light.

Soil pH: Measure the pH changes in soil due to vermicomposting.



Earthworms can eat up to 75% of their own body weight per day and turn waste into rich and fertile soil. Worms break down organic matter like leaves and grass into things that plants can use. When they eat, they leave behind castings that are a very valuable type of fertilizer. Add scraps such as apple cores, banana peels, citrus peels or pears to the wormery daily. Do not use meat, poultry, fish, dairy, potato chips, candy, oils, oranges, lemons, and limes because these are not good for the worms.



The photos show a wormery and the stages whereby the contents are broken down into a mud-like solid fertilizer and a brown liquid fertilizer. Details on the internet of different home-made wormeries are shown at the end of this article.



1.



2.



3.



Tiger worms are often recommended as the best and most active worms to use in a wormery.

Extra information:

<https://runwildmychild.com/wormery/>

<https://www.woodlandtrust.org.uk/blog/2020/05/how-to-make-a-wormery/>



References

Exploring the intersection of food, cooking, and STEM can be a fascinating investigation to undertake with students. Testing the effectiveness of food waste utilization methods offers a practical opportunity to apply scientific concepts in real-life situations. This booklet provides just a selection of ways to repurpose food scraps. It's worthwhile to conduct further research online, but always with a scientific mindset, testing and verifying the results. This approach not only promotes sustainability but also can lead to rich and meaningful classroom discussions. Here are some links with more information on this topic.

World Food Programme

<https://www.wfp.org/stories/5-facts-about-food-waste-and-hunger#>

Uses of Citrus peels

<https://www.limoneira.com/12-creative-ways-to-use-citrus-peels/>

Using food waste

<https://lomi.com/blogs/news/what-can-we-do-with-wasted-food>

Information on wormeries

<https://runwildmychild.com/wormery/>

<https://www.woodlandtrust.org.uk/blog/2020/05/how-to-make-a-wormery/>

Notes



FOOD, COOKING AND STEM



SCIENCE ON STAGE EUROPE

THE EUROPEAN NETWORK FOR SCIENCE TEACHERS

