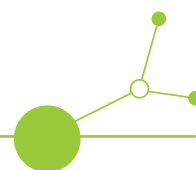


A2.2. EMPOWERING CITIZENS TO PRODUCE OWN BIOBASED PRODUCTS

Instructions for homemade biobased products



Version 2
November 2024





CONTENT

Homemade apple cider	3
Face toner and peeling made from grape's residues	4
Homemade production of herbal tincture and balm	6
Utilization and possibilities of using the egg shell	7
Utilization of textile materials for fruit/vegetable packaging	8
Utilization of the remains of floriculture production through direct processes of processing into a finished product	9
Possibilities of using herbs to produce biocosmetics	12
Possibilities of using essential oils in everyday life	15
Possibilities of using biochar	17
Mushroom cultivation on wood	19
Extending the life of wood and wooden products	20
Fruit leather from apple pomace	24
Bioeconomy and 3D printing: the convenient use of bioplastics	26
Biocosmetics from plants: a recipe for making biocosmetics from oat flour	28
The colors of photosynthesis	30
What is composting and what are its benefits? How to composte: a guide to composting at home	32
Upcycled food products	36
Utilization of wool for producing useful equipments and desing objects	44
Buzzing garden	49
Exploring the bioeconomy and non-traditional crops	59
Earthworm compost (vermicompost)	58
Homemade fertilizer from coffee	58



INSTRUCTIONS FOR HOMEMADE BIOBASED PRODUCTS

Instructions for homemade biobased products are guidelines or step-by-step processes for creating everyday items using natural, renewable, and biodegradable materials. These products are alternatives to conventional items made from synthetic or petroleum-based materials, which are often non-renewable and can be harmful to the environment. The aim of biobased products is to reduce reliance on fossil fuels, minimize environmental impact, and promote sustainability.

Key Points:

- **Natural Ingredients:** Biobased products are made using ingredients derived from plants, animals, or other natural sources. These ingredients are renewable and can break down naturally without harming the environment.
- **Sustainability:** The focus is on using materials that are sustainable, meaning they can be replenished naturally and have a lower environmental footprint compared to conventional materials.
- **Biodegradability:** Many biobased products are biodegradable, meaning they can decompose naturally by microorganisms, reducing waste and pollution.
- **Health and Safety:** Homemade biobased products often avoid harmful chemicals found in conventional products, making them safer for personal use and better for indoor air quality.

Benefits:

- **Environmental Impact:** Reduces pollution and waste by using materials that are part of the natural carbon cycle.
- **Renewable Resources:** Relies on materials that can be sustainably harvested or produced.
- **Personalization:** Allows individuals to create products tailored to their preferences, such as scent or texture.
- **Cost-effective:** Often more economical than purchasing commercial products, especially when using readily available ingredients.

Overall, instructions for homemade biobased products empower individuals to make eco-friendly choices, reduce their carbon footprint, and contribute to a more sustainable lifestyle.



A. Homemade apple cider

The goal of the following instructions is to make your own cider at home. Cider is a fermented alcoholic beverage made from apple juice. For its production, it is advisable to combine different varieties of apples. The production process is similar to the production of wine and not to beer, as many people mistakenly believe. It is good to use 100% apple juice, but it is also possible to add for example pears, or dilute the juice with water.

What we need:

- Apples
 - Approximately 15 kg for about 5-6 liters of juice
 - Use apples with peel
 - Bruised apples can be used as well
 - Do not wash - remove only coarse dirt
 - Best during apple season - use different varieties
- Clean container
- Fermentation lock
- Juicer

Process:

1. Remove coarse dirt from the apples without washing them, as the surface contains yeasts necessary for the fermentation process.
2. Juice the apples using a juicer. *
3. Pour the obtained juice into a clean container suitable for fermentation. Try to minimize the air content in the container.
4. Seal the container with a fermentation lock. Pour water into a fermentation lock.
5. Store sealed container in a place with a temperature of 15-20°C for 7-10 days. Fermentation should start within 24 hours.
6. After 10 days, check the fermentation process. Pour the juice into clean containers and leave them in a cool place (approx. 10 °C) for 2-3 months to complete the final fermentation.
7. After this period, your cider is ready for consumption. It is recommended to store it in a cool place. In the refrigerator, the cider lasts up to six months, but it is best to consume it within 2 months. It tastes the best chilled with ice cubes.

Enjoy your homemade cider!

* After juicing the apples, the solid matter (the residue) can be dried and used as feed for domestic animals (e.g. horses).



B. Face toner and peeling made from grape's residues

The goal of the following instructions is to create natural cosmetics at home. We will focus on making the face toner and the peeling. For production, we will use grape seeds from blue grapes and additional ingredients such as floral water obtained by distillation with flower extracts (e.g. lavender, rose petals), and cold-pressed grape seed oil, which can be made at home or purchased in high organic quality.

Grape seeds are rich in polyphenols, which have strong antioxidant effects, protecting the skin from free radicals and oxidative stress. They also contain vitamin E, known for its antioxidant properties and ability to regenerate the skin. The flavonoids present in the seeds have anti-inflammatory and antioxidant effects helping to protect skin cells and reduce inflammation. Linoleic acid, an essential fatty acid found in seeds, promotes hydration and skin elasticity and has anti-inflammatory effects. Other ingredients include minerals such as zinc, copper and iron, which are important for skin health.

1. Face toner

What we need:

- Grape seeds from blue grapes
- Floral water*
- Mortar and pestle
- Containers for finished toner

Process:

1. Let the obtained seeds from blue grapes (preferably organic) dry naturally or use a fruit dryer.
2. Use a mortar and pestle to grind the dried seeds into a fine powder.
3. Pour the floral water into a clean container.
4. Add the desired amount of grape seed powder to the container with water (2g of grape powder per 1 liter of floral water are recommended).
5. Close the container and shake well to mix the powder with the water.
6. The final product does not require special storage conditions. Shake the liquid before each use. Any sediment formed is not a defect of the product.
7. Apply the face water to a cotton pad and use it as a toner or makeup remover. Do not rinse off with water after application.

** Floral water*

What we need:

- Pot with a lid
- Heat-resistant stand (e.g. ceramic muffin tin)
- Bowl for collecting floral water (should not be too wide - just so it does not touch the edges of the pot)
- Herbs/flowers to be processed - approx. 5 handfuls
- Ice bag



Process:

1. Place the stand in the pot.
2. Pour water into the pot: approx. 2-3 cm from the bottom of the pot and soak the herbs in this small amount of water. Check occasionally to prevent burning herbs during distillation!
3. Place the bowl on the stand to collect the floral water. Cover the pot with the lid upside down. The bowl should not touch the pot or the lid.
4. Bring the water to a boil. Once boiling, place the ice bag on the lid and reduce the heat to maintain a gentle boil. Distill for about 20 minutes, no longer.
5. After 20 minutes, turn off the heat and let the pot cool down. Carefully remove the bowl from the pot - the floral water is ready.

2. Peeling

What we need:

- Grape seeds from blue grapes
- Cold-pressed grape seed oil
- Mortar and pestle
- Containers for mixing and for the finished peeling
- Natural essence (optional)

Process:

1. Let the obtained seeds from blue grapes (preferably organic) dry naturally or use a fruit dryer.
2. Use a mortar and pestle to grind the dried seeds into a powder (does not have to be a fine powder).
3. Pour the grape seed powder into a clean container (according to the desired amount of peeling).
4. Add grape seed oil and mix thoroughly. Adjust the amount of powder or oil to achieve the desired consistency.
5. Add few drops of natural essence to give it a pleasant fragrance. (Optional)
6. Store the final product in a clean, sealable container. The peeling does not require special storage conditions.
7. Use the peeling on the face once a week. Apply the desired amount to the face and gently massage in circular motions. Leave it on for a moment and then rinse off with warm water. The peeling can also be used to soften the skin of the whole body. The application procedure is the same.

Enjoy your homemade natural cosmetics!



C. Homemade production of herbal tincture and balm

We will show you how to simply and effectively use the healing power of nature to prepare your own balms and tinctures. These natural products are a great way to take care of your health and well-being with the help of gifts that nature offers us. The process is simple and suitable even for beginners, so don't worry if you're just starting with homemade production. Get ready for a creative and useful activity that will bring you not only pleasure, but also practical use in everyday life.

1. Balm

What we need:

- Beeswax
- Coconut oil
- Olive oil
- Rosemary
- Calendula (fresh and dried)
- Essential oils (e.g. mint, tea-tree; be cautious with thyme and motherwort)
- Containers for the finished balm
- 2 bowls
- Wooden spoon, ladle, scissors, knife

Process:

1. In a water bath, melt beeswax together with coconut and olive oil (ratio 1:1:1).
2. Add fresh calendula flowers and chopped rosemary to the melted mixture. Cook everything together, stirring occasionally, for 10 minutes.
3. Let the mixture stand for 24 hours.
4. After 24 hours, reheat the mixture in a water bath and bring it to boil, then strain it through a sieve with larger holes to prevent clogging.
5. Add essential oils to the mixture.
6. Keep the mixture warm in the water bath over low heat.
7. Prepare the containers for the balm, add dried calendula to containers as a decoration.
8. Pour the balm into the containers using suitable kitchen utensils. Close the containers once the balm has solidified. The balm is now ready for use.

The balm has regenerative and moisturizing effects. It can be used as a lip balm, for treating herpes and also as a balm for dry hands, face, insect bites, injuries, or rashes.



2. Tincture

What we need:

- Green walnuts
- Alcohol
- 4l jar
- Cloves
- Whole cinnamon
- Star anise
- Vanilla bean
- Sugar

Process:

1. Add longitudinally cut walnuts in the jar, filling it 3/4 full.
2. Add a package of cinnamon, cloves, star anise and a split vanilla bean.
3. Add sugar to taste (not too much to avoid making the tincture too sweet).
4. Pour alcohol over the mixture.
5. Stir and place the jar in a sunny spot for 3 weeks, stirring occasionally.
6. After 3 weeks, strain the mixture and pour it into suitable containers/bottles.

The tincture helps to remove and expel intestinal parasites from the digestive system. Take it 3 times a day, 30 drops (1 teaspoon) at least 15-30 minutes before meals. If you experience any painful stomach cramps, symptoms or other persistent problems, stop using the tincture. Shake the tincture well before each use to mix it properly.

WARNING: The tincture contains alcohol, so it is not recommended to drive immediately after consumption.

D. Utilization and possibilities of using the egg shell

The utilization of eggshells in the context of bioeconomy presents an opportunity to convert what is typically considered waste into valuable resources. Eggshells, which are primarily composed of calcium carbonate and protein fibers, can be repurposed in various innovative ways that align with sustainable practices and the principles of bioeconomy.

3. Skin cleansing and rejuvenation

Process:

1. Eggshell powder is mixed with sour cream (30% mm) and applied to the skin.
2. It is necessary to wait 15 minutes and rinse well.



3. Repeat the procedure twice a week.
4. Preparation of the shell:
 - i. The shell needs to be boiled for 10 minutes and then roasted for 10 minutes in the oven at 175°C. After that, grind them into a fine powder in a grinder.

4. Natural fertilizer

Process:

1. This procedure requires the collection of eggshells, so it is best to place them in a container in the air where they will dry naturally. Crush the husks by hand and sprinkle them on the ground or in the ground. The shells need a longer period to release calcium into the soil, so it is ideal to do this in the fall as an additional supplement in the spring.
2. For plants such as tomatoes, peppers and eggplants, this calcium addition is extremely important in
3. preventing flower and fruit rotting.
4. The same shells can also be used as protection against pests, especially snails. It is necessary to sprinkle the scales around the plant at a distance of 5 cm, and the sharp pieces will stick to the intruder and he will be prevented from doing further damage.

5. Eggshell tea

Thermally process the shells by drying them in the oven for 20 minutes at 250 °C, then cover them with boiling water and leave them to cool. Strain the solution and use it to water house plants. That way they will get the necessary minerals.

6. Easter egg

It is necessary to make two small holes on both ends of a fresh egg - pierce the yolk with a toothpick and shake the egg to mix the egg white and yolk. Blow everything out from the inside.

E. Utilization of textile materials for fruit/vegetable packaging

The purpose of this instructions is to sew a recycled bag from old curtains, which can be used instead of plastic bags for fruits, vegetables or other purposes. All materials used in this product are recycled and are a combination from manmade materials and natural bio-based materials, that were no longer suitable for use. A bag like this can be used for years, you can repair it, renew it and wash it normally, which is why it is such a good alternative for a normal plastic bag.



What we need to make a bag:

- Old sheer curtains (vintage lace curtains, flower embroidered curtains or any other transparent material)
- Yarn from natural material (hemp, flex, raffia, wool, cotton yarn)
- Other materials for decoration (buttons from used clothes, old clothes, bio-based scraps...)
- Scissors for textile
- Needle
- Sewing machine
- Tape
- Safety clip

Process

The bag:

1. Cut out a rectangular shape from the curtain. Determine the size yourself and keep in mind that we will fold the piece of fabric in half, so that the bag will be half the size at the end.
2. Do not sew with an ordinary straight stitch, but choose a strong elastic stitch, so that your bag will support the weight of fruits and vegetables.
3. Turn your bag inside out and fold the edge inwards. Sew with the same strong plastic stitch.

The rope:

4. Cut 3 yarns about 80 cm long and knit them into a regular braid. Since the yarns are long, help yourself by taping them to the table before knitting.
5. Once the braid is made, use a safety clip and thread it through the edge of the bag. To get into the edge of the bag, use the holes of the curtains.
6. Knot both ends of the yarn together, so that the bag can be opened and closed.

Decoration:

7. Use your imagination and decorate your bag with old buttons, scraps from bio-based materials, used clothes etc.

F. Utilization of the remains of floriculture production through direct processes of processing into a finished product

The purpose of utilizing the remains of floriculture production through direct processes of finishing and processing into a finished product is to minimize waste, promote sustainability, and create value-added



biobased products. Floriculture production generates a significant amount of organic waste in the form of stems, leaves, petals, and other plant materials that are often discarded as byproducts. By

implementing direct processes to finish and process these remains, they can be transformed into useful products, thereby reducing environmental impact and maximizing resource efficiency.

What we need:

- 1 egg white
- Superfine sugar
- Edible flowers such as violets, begonias, pansies, rose petals, etc. (the amount depends on the size of the flowers)

Process:

1. Beat the egg white until frothy.
2. Using fresh-picked flowers, paint each flower individually with the beaten egg white using an artist's
3. paintbrush.
4. Once thoroughly coated, sprinkle with superfine sugar and place on a wire rack to dry.
5. The flowers are completely dry when stiff and brittle to the touch, free of moisture. This could take 12 to 36 hours depending on humidity.
6. To speed up drying, you can place the candied flowers in an oven with a pilot light overnight or in an oven set at 150 to 200 degrees F with the door slightly open for a few hours.

1. Making potpourri from flowers

1. Pick fragrant, untreated roses early in the morning after the dew has evaporated for the best scent retention.
2. Remove any damaged petals and separate the petals from the stems.
3. Lay the rose petals in a single layer on a flat surface in a warm, dark, and dry location for 2-3 days until fully dried.
4. Oven-Drying Method: Alternatively, you can place the rose petals in a very cool oven (set at the lowest temperature) until they are completely dried.
5. Once dried, store the rose petals in a sealable glass container until you are ready to use them for making potpourri.
6. Creating Potpourri: Combine the dried rose petals with other scented ingredients like spices (cinnamon, cloves), herbs (rosemary, lavender), or essential oils to personalize your potpourri blend.

2. Soap for hands

Ingredients:

- Soap base - 1000g
- Macadamia vegetable oil-16g



- Pigment - 10g
- Mica gold powder - 4g
- The smell of vanilla-5g
- The smell of sweet orange - 2g
- Et. Oif your choice - 3g
- Alcohol

Process:

1. Melt the soap base in a laboratory beaker in a water bath.
2. When the base is melted, add oil and fragrance and separate into two laboratory beakers. In one glass, add pigment, and in the other, gold mica powder
3. First, pour soap with color into the silicone mold, spray with alcohol to remove air bubbles and leave for a few minutes to set. Pour soap with gold powder, spray with alcohol and leave it to harden.
4. Remove from the mold and the soap is ready.

3. Balm for dry skin

What we need:

- Jojoba oil, 40g
- Shea butter, 80g
- Hazelnut oil, 60g
- Macadamia oil, 60g
- Wax, 24g
- Essential oils

Process:

1. Heat the water in a water bath to a temperature of 65-70 °C.
2. In a previously disinfected laboratory beaker of 500 mL, weigh the specified amounts of base vegetable oils and add wax. Then place the glass in a water bath and heat until a homogeneous liquid is obtained (approx. 20 min).
3. Then take the glass out of the bath and mix the solution for a few minutes, after which add the given amount of essential oils. Mix everything together, pour more liquid into previously disinfected plastic pots and leave the mixture to cool.

4. Repellent

What we need:

- Natisol 60 g



BIOECO-UP

- Aqua purificata 220.8 g
- Geogard 221 2.4 g
- ESSENTIAL OILS:
 - lemon eucalyptus 4.5 g
 - tea tree 4.5 g
 - Javanese citronella 4.5 g
 - lavender 3 g
 - cloves 0.3

Process:

1. Combine Natisol (60 g) and Aqua purificata (220.8 g) in a suitable container. Mix them thoroughly to ensure they are well blended.
2. Add Geogard 221 (2.4 g) to the base solution created in step 1. Stir well to ensure even distribution of the preservative.
3. Add Essential Oils and stir the mixture thoroughly to ensure that the essential oils are evenly dispersed.
4. Storage and Application:
5. Store the repellent in a suitable container with proper labeling.
6. Before each use, shake the repellent well to ensure all ingredients are mixed properly. Apply as needed, avoiding contact with eyes and sensitive areas.

G.Possibilities of using herbs to produce biocosmetics

Everyone uses cosmetics, but a large number of people use cosmetics that are not entirely healthy for their bodies, and that have synthetic ingredients. Thanks to the goodness that nature offers us (herbs), we have the opportunity to simply create our own unique biocosmetics, which are fully natural, as effective as store substitutes, and are created from exactly the products we like.





1. Queen's of Hungary water (tonic)

What we need:

- 100 ml glass bottle (sterilized)
- Flowers/herbs (a sprig of fresh rosemary, dried Damask rose petals, dried lavender flowers), but you can choose many other, e.g., calendula/hibiscus/cornflower petals, a sprig of sage/mint
- Raw apple cider vinegar (or another chosen vinegar); optionally, you can use store-bought apple cider vinegar, but the tonic won't have all its properties

Process:

1. Fill the bottle with your chosen flowers/herbs until it is $\frac{1}{4}$ full.
2. Pour raw apple cider vinegar until it reaches 1 cm from the bottom of the bottle and shake vigorously. Top off the bottle with demineralized water and shake it vigorously again.
3. Set aside on a sunny windowsill for a week.
4. The tonic can be used directly from the bottle or you can strain out the herbs/flowers before using.

2. Flower salt scrub

What we need:

- Flat jar (sterilized)
- Fine-grained pink Kłodawa salt (or other rock salt)
- Shea butter
- Coconut oil
- Sweet almond oil
- Chosen essential oil (optional - for fragrance)



Process:

1. Fill $\frac{3}{4}$ of the jar with fine-grained salt.
2. Melt the oils and shea butter together in a water bath.
3. Add the oil mixture to the jar with the salt and stir it with a spoon. In the final product, there should be no layer of oil phase on the surface of the salt.
4. Finally, you can add 5-7 drops of your chosen essential oil.



3. Flower and magnesium bath salt

What we need:

- Flat jar (sterilized)
- Coarse/fine-grained Kłodawa salt (or other rock salt)
- Epsom salt/magnesium chloride
- Selected dried flowers/herbs (cornflower, calendula, rose, hibiscus, sage, lavender)
- Optional: about 5 ml of any oil and essential oil for fragrance

Process:

1. Layer the flowers/herbs and the salt mixture in thin layers in the jar.
2. Optionally, you can sprinkle the top layer of salt with about 5 ml of oil (which serves as a base for the essential oil) and add 5-7 drops of chosen essential oil.

4. Light face cream (oil/water)

What we need:

- small cream jar (sterilized)
- 7 g of various oils (e.g., apricot, avocado, sweet almond)
- 3 g olive oil wax OLIVEM (acts as an emulsifier to combine oil and water), any emulsifier can be used
- 20 g of chosen hydrosol or distilled water
- frothing whisk

Process:

1. Heat the water and the oil mixture with the emulsifier separately in a water bath. It's important that both phases are at similar temperatures.
2. Once both phases are melted, vigorously whisk the oil phase and slowly add the water phase in a thin stream until a smooth, homogeneous consistency is achieved.
3. Pour the warm product into the jar and leave it to cool so the extra water evaporates. Close the jar after the product has cooled.

Notes:

- Using refined oils results in a smoother and easier-to-achieve consistency.
- The cream does not contain preservatives, so to extend its shelf-life and prevent mold, keep the finished product in the refrigerator/use a spatula to scoop it/add 2 drops of essential oil.



H. Possibilities of using essential oils in everyday life

For the most part, essential oils sold in stores are highly synthetic products, which can negatively affect human well-being. Using natural oils to create your own massage oils, toothpaste, mosquito-fighting products or perfumes is a solution to many of the problems affecting today's society.



1. Massage oil

What we need:

- 100 ml glass bottle (sterilized)
- Mix of chosen base oils
- Chosen essential oil

Process:

Pour about 3/4 of a bottle of a mix of base oils. To this, add 10-15 drops of essential oils per bottle.

Notes:

- mix of apricot oil and sweet almond oil as a base oil is the most versatile combination
- addition of avocado oil to base oils will make it more oily and take longer to absorb and the blend will be more nourishing and has anti-wrinkle properties
- for a relaxing effect you can use a combination of lemon, bergamot or lavender essential oils
- floral-citrus blend or tangerine is also a good choice for massage oil



2. Tick, insect and mosquito repellent

What we need:

- 100 ml glass bottle (sterilized)
- vodka
- lemongrass or lavender infusion, optionally distilled water
- 3 chosen essential oils (lavender, lemon, lemongrass, eucalyptus, mint)

Process:

Pour vodka until it reaches 1 cm from the bottom of the bottle and add 5 drops each of three different essential oils (e.g., lavender, lemon, lemongrass, eucalyptus, mint - do not exceed 3 oils with 5 drops each). Fill the bottle with flower infusion up to the neck (about 75 ml). Shake vigorously.

3. Roll-on perfume

What we need:

- glass roll-on bottle (sterilized)
- Mix of chosen base oils
- Chosen essential oil

Process:

Pour about 3/4 of a bottle of a mix of base oils. To this, add 10-15 drops of essential oils per bottle. Mix all the ingredients.

Notes:

- sweet almond oil as a base oil is the most versatile choice
- This is a blend of oils, personalized with selected scents, with a base of oils like in the massage oil (sweet almond is recommended). An interesting combination is patchouli with citrus, with a higher concentration of essential oils than in the massage oil.

4. Toothpaste

What we need:

- flat jar (sterilized)
- 2 teaspoons of coconut oil (if you don't like the taste of coconut oil, you can use refined one, which is tasteless)
- 2 teaspoons of baking soda (sodium bicarbonate)
- Optionally, add xylitol for anti-cavity properties.



- Finally, you can add essential oils to enhance the flavor.

Process:

Mix all the ingredients in a jar.

I. Possibilities of using biochar

1. Biochar

The production of biochar involves controlled combustion of biomass (carbonization) with limited oxygen supply by gradually adding biomass and finally - water. This method does not allow for energy recovery

as it would reduce the quality of the biochar. The goal is to obtain charcoal in amount equal to half of the burned biomass. The carbon balance in the material cycle is not positive, so biomass carbonization is the only way to preserve such a large amount of carbon (up to 50%). Historically, only the genesis of brown coal and hard coal was a similar process.

What we need:

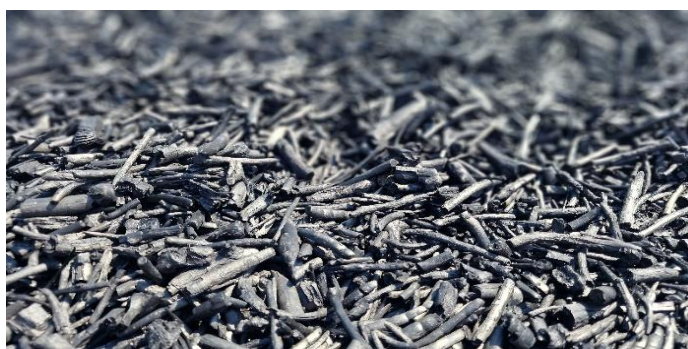
- Wood biomass, e.g. dry wood, plant residues
- Boiler or pit dug in the ground
- Availability of water
- The possibility of lighting a fire (also legislative)

Process:

1. The carbonization process can be carried out in a pit dug in the ground or in a boiler. Wood is placed at the bottom of the boiler and then set on fire.
2. As the combustion process lasts, additional wood is added to the sides of the firebox to avoid gas emissions. Adding too much wood at the start will also produce unnecessary smoke.
3. At the end of the process, the kiln is quenched with water. After the flames disappear, if the upper part of the material has not completely burned, it should be separated and used in the next carbonization process. The obtained biochar can be stored in a dry place.



BIOECO-UP



Notes:

- Biomass for biochar production can include wood and plant residues. For wood, a year of aging/drying under a roof is recommended, and if it has about 20% moisture, so it is suitable for the carbonization process. The wood species does not matter, but the fraction is crucial - preferably fine branches. The thicker the wood (over 5 cm in diameter), the longer the process lasts, and there is a risk of gas emissions. For autumn biochar production, goldenrod mowed in spring is recommended, as well as bird cherry, which produces hard biochar. Never burn wet biomass.
- It is estimated that 4-5 tons of biomass can produce about 1 ton of charcoal.
- The carbonization temperature reaches about 700 degrees Celsius. In the case of a clean process, combustion does not emit toxins into the atmosphere. Biomass should be added in small amounts and maintained at a high temperature, then the emissions are minimal. Lowering the combustion temperature will result in higher emissions. Initially, the biomass releases volatile organic compounds, which are then burned, providing heat to continue the process. The key element is controlling the temperature and oxygen supply. Too much oxygen can cause complete combustion of the biomass instead of carbonization, which lowers the quality of the charcoal, and gases may be released into the atmosphere. Therefore, biomass is gradually added to maintain a constant temperature and limited oxygen supply.
- Raw biochar can be applied at a rate of up to 2 tons per hectare. Any higher dose can bind nitrogen from the soil. On good soils, where the amount of carbon is sufficient, biochar may not have noticeable effects, but the lower the soil quality, the more noticeable the effects. Legumes respond very well to biochar, while cereals respond less so. Biochar can also be used as a feed additive, for example, for chickens.



- In Poland, conditions for locating the process must be met: the kiln used for the process must be situated at least 10 meters away from buildings, 100 meters from forest lines, and 4 meters from neighboring plots.

J. Mushroom cultivation on wood

Cultivation of mushrooms in the context of bioeconomy presents an opportunity to create your own supply of mushrooms in your back yard or cellar. Wood is an excellent alternative and a natural environment for mushrooms to grow on, it harnesses the natural relationship between mushrooms and wood. Mushrooms mainly thrive on dead organic material; therefore, wooden logs present an ideal growth medium.

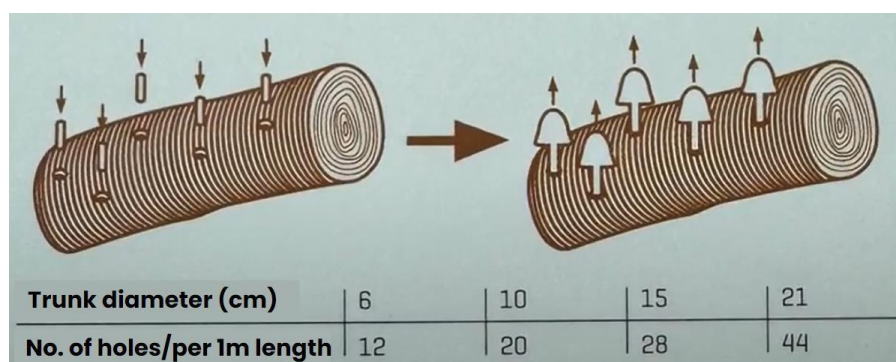
What do we need:

- Log of (Beech, Oak, Hornbeam or chestnut).
- Mushroom growing kit ([Mycelium on wooden plugs](#)).
- Controlled environment (humidity between 70-80%; temperatures between 15-20°C).
- Driller with 7mm drill bit.
- Melted paraffin or beeswax.

Instructions for growing mushrooms with mycelium on plugs:

1. Coniferous and fruit wood is not suitable.
2. The trunks should be healthy and not brittle, and the bark intact.
3. Drill 7 mm diameter holes around the circumference of the trunk into which the mycelium-coated plugs are inserted. Coat the openings of the filled holes with melted paraffin or beeswax, also coat the ends of the trunks (see picture below).

Place the trunks in a shady place in the garden where they can get soaked by the rain. It is important that the trunks do not dry out, but at the same time they should not get soaked. Avoid places where water is held and strong winds blow. Wet cellars are also suitable for the overgrowing stage. The overgrowing process takes at least 12 months!





K. Extending the life of wood and wooden products

Wooden products provide a storage pool of wood-based carbon. To maintain this property, it is essential to extend their utility also after the original use of wooden products is no longer possible.

Recovering the spent wood (ie. wood that has already been through at least one use) is a sound strategy, fully integrated into the current cascade system.

Recovered wood products represent not only sustainability gains but also tangible economic benefits.

What is spent wood?

- Wood after the end of its primary life
- Recovered wood
- Post consumed wood
- Old furniture
- Construction debris
- Packaging material

Classification of recovered wood:

- **Class AI:** Wood that is in its natural state and may have undergone only mechanical treatment and is not contaminated with chemicals.
- **Class AII:** Glued wood treated with surface coatings. Adhesives and coatings do not contain halogenated hydrocarbons or wood preservatives.
- **Class AIII:** Exfoliated wood treated with coatings containing halogenated hydrocarbons but not containing biocidal wood preservatives.
- **Class AIV:** Degraded wood treated with wood preservatives (railway sleepers, telephone poles, fences. This class includes wood which cannot be classified in the lower three classes, with the exception of wood containing PCBs.

Class	Intended application
A I	Material use (energy possible)
A II	Material use (energy possible)
A III	Energy use (material use only with prior processing)
A IV	Energy use in large-scale combustion facilities
PCB	Non-hazardous disposal



USE of recovered wood:

RECYCLING PROCESS	CLASSES OF SPENT WOOD				SPECIFIC REQUIREMENTS
	AI	AII	AIII	AIV	
wood chips intended for the manufacture of wood composites	YES	YES	(YES)	NO	Class AIII wood may only be used if the surface layer has been removed
production of synthetic gases	YES	YES	YES	YES	wood processing in Class AIV is only allowed in licensed installations
production of activated charcoal	YES	YES	YES	YES	wood processing in Class AIV is only allowed in licensed installations
energy production	YES	YES	YES	(YES)	wood treatment in Class AIV shall only be permitted in installations with good quality exhaust gas filtration

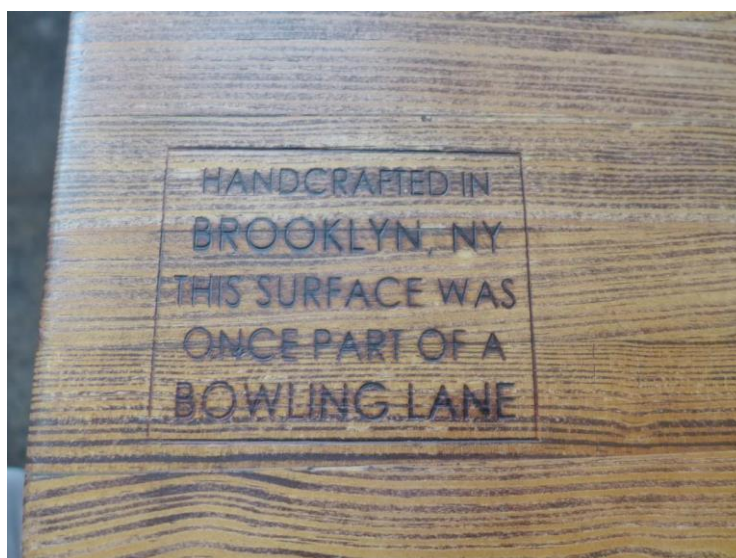


Figure 1: example of reused bowling lane into a table



Figure 2: Window frames pre-designed to be easily removed, dissembled and reused.



Figure 3: Old window frames can serve as decoration.



BIOECO-UP



Figure 4: Door made from spent wood



Figure 5: Old wooden door reused into a table.



Figure 6: Reuse of railway thresholds example 1.



Figure 7: Reuse of railway thresholds example 2.



Figure 8: Reuse of railway thresholds, example 3.



Figure 9: Reuse of wooden pallets, example 1.



Figure 10: Reuse of wooden pallets, example 2.



Figure 11: New windows frames, from old ones (M SORA)

L. Fruit leather from apple pomace

Fruit leather can be used in a similar way to conventional leather and is a plant-based substitute for animal or synthetic leather. Currently, it is mainly used for decorative purposes, bags, gift wrapping or decorative gift items.

It is a material produced from **apple pomace** with the addition of fillers, a plasticiser, a humidity regulator and salt (CaCl₂). The apple pomace is pre-cooked to prevent fermentation and mixed with the additives to form a homogeneous mixture. This mixture is spread evenly on trays or moulds and dried. The dry fruit leather is pressed to a standard thickness of 1-1,5 mm and treated with waxes to obtain a water-repellent surface.

Fruit leather can be produced as:

- A semi-finished product for further processing.
- Decorative material.



- Part of packaging or protection layer for packaging (*with appropriate additives as cellulose fibres and fabrics*).



Figure 12: Examples of uses for fruit leather: book covers, glasses cases, decorative accessories.

The production of fruit leather can be carried out in small-scale own processing, e.g. as a complementary activity on the farm. In the production of fruit leather, we may have apple peels, pits, etc. as residues, which we remove by filtration. These materials can be dried and ground and returned to the process in the form of added filler, cellulose fibres. In this way, the residues can be used and the loop closed.

Recipe for making fruit leather

The main raw material stream for the production of fruit leather is apple pomace, which is a by-product of the processing of apples into apple juice. **Apple pomace needs to be processed as soon as possible** as it is subject to fermentation. To prevent fermentation, the pomace is subjected to a temperature treatment. The fruit pulp is preserved by the addition of **citric acid**, from which the fruit leather is further prepared. When it is not possible to process the pomace immediately, the pomace must be dried to a sufficiently low moisture content.

The production process of fruit leather follows the following steps (Figure below):

1. Preparation of the apple base.
2. Preparation of the leather compound.
3. Application and drying of the leather compound.
4. Pressing of the leather
5. Impregnation.



PREPARATION OF THE APPLE BASE:

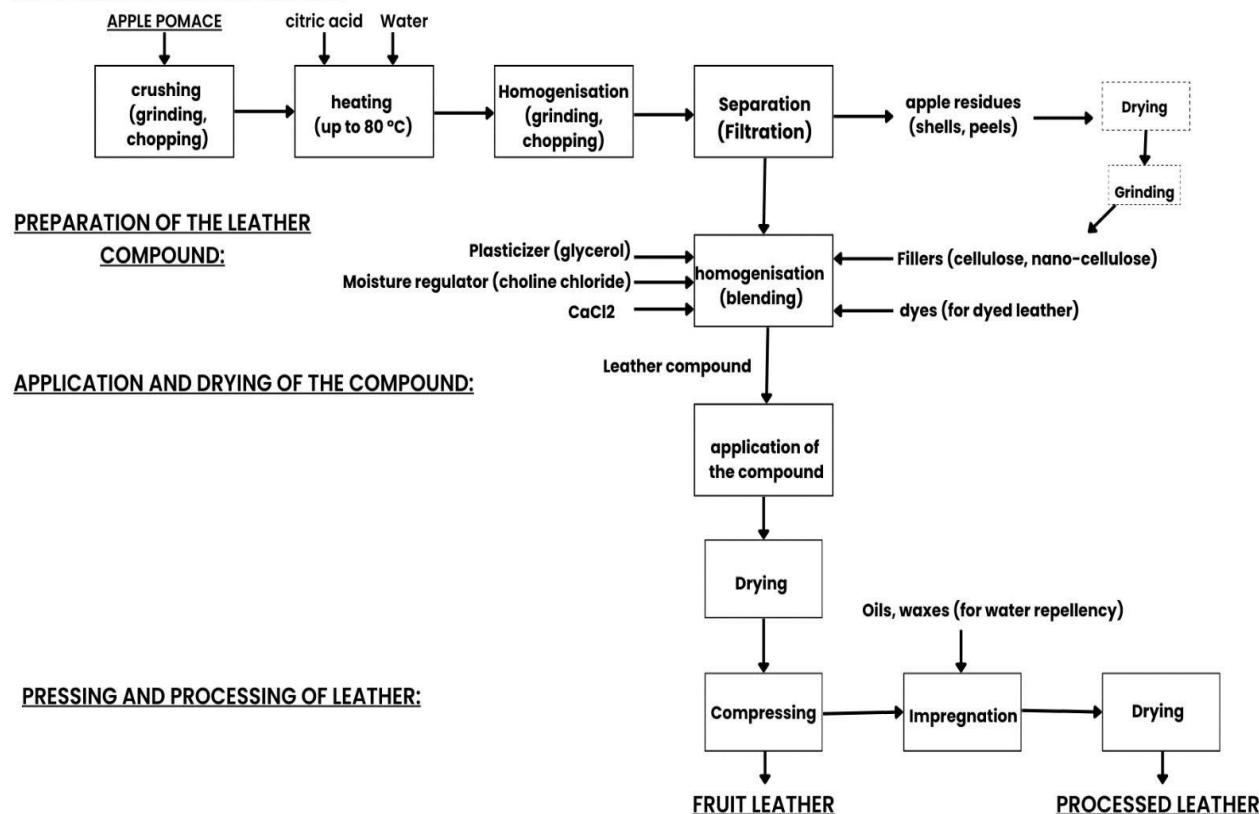


Figure 13: Schematic representation of fruit leather production (prepared by Katja Makovšek, Institute of Chemistry).

Rational production volume (quantity assumptions):

Processing 250-500 kg of apples yields 175-350 kg of juice and 75-150 kg of pomace (30 %), which can be processed at farm level. To facilitate the production of fruit leather, the calculation of the quantity assumptions for raw materials is made for 74 kg of apple pomace.

To make a stable apple purée from 74 kg of apple pomace, 1.85 kg of citric acid is needed. Next, 24 kg of filler (cellulose, microcrystalline), 1 kg of glycerol, 0,6 kg of choline chloride and 0,4 kg of CaCl₂ are added to the homogeneous apple pulp. For the preparation of the coloured leather, colouring agents are added. After drying, the prepared mixture yields 12 to 15 kg of fruit leather.

To prepare 1 kg of fruit leather, 5 to 6 kg of pomace and 0,25 kg of additives are used.

M. Bioeconomy and 3D printing: the convenient use of bioplastics

Instructions for homemade biobased products

The purpose of this instructions is to set up a small hydroponic plantation for in house growing vegetables and herbs in a very limited space and using biobased and biodegradable plastics. The design of the hydroponic container proposed is very flexible, can be replicated as many times as it would be required, in



order to grow a hydroponic “tower” to suits everybody’s requirements for the home grow production. In this tutorial, the plants can be grown using water and some hydroponic fertilizer, some of which can be also self-produced at home. The material used for 3D printing should be, as in the tutorial, PLA (polylactic acid) which is a polymer obtained from renewable resources and which, at the end of its life, in the event that the hydroponic tower is no more in use, or somehow breaks, can be disposed of in the compost bin, without creating additional plastic waste. All-in-all this is a convenient way to efficiently grow a vegetable garden in a very tiny space, producing everybody’s own salad, basil, or strawberries, without using unknown and dangerous substances.

What we need to make a hydroponic tower:

- A 3D printer: while many 3D printers are now available for a small price, note that in many places, such as in libraries or local community centers, there are shar3ed facilities that often offer also some consultancy to first users.
- 3D printing PLA filament (color of choice)
- Seeds (or grown tiny plants maybe already in soil)
- Water
- Hydroponic fertilizer (you can buy it on local flower shops or try to do it yourself with your wastes)
- An immersible water pump with timer
- Some flexible tubing

1. The hydroponic tower:

Process:

1. Export the STL File from our folder
(https://drive.google.com/drive/folders/1nqFXmQ3TzbRnQDAioAkrjPrFPTYh_YNQ, courtesy of <https://www.thingiverse.com/thing:5929335>).
2. Choose Your Parameters: The next step is then deciding on the different parameters of your object and the printing process. This includes deciding on the size and placement of your print. If you are not an expert, you can seek advice at makers center for this.
3. Create the Gcode: You will then import the STL file into a so-called slicing software. The slicing software will convert the information from the STL file into a Gcode, which is a specific code
4. containing exact instructions for the printer.
5. PRINT! Print all the components, and repeat the holding segment and the crates as many times as you need them.

2. The vegetable garden assembly:

Process:

1. Once all the components are ready, assemble them in the tower. The tower should be placed onto a conveniently sized water container into which the immersible pumps should be placed.
2. The pump output should then be connected to a flexible tubing long enough to get to the highest level



of the tower.

3. The pump should be connected to electricity (or to a small solar powered battery system) with a timer.
4. Place a plant in every single crate: you can mix as many plants as you want in the same tower: try and alternate bulk a tiny plant so that they do not interfere too much one with the others.
5. Fill the water tank with water and hydroponic fertilizer (depending on the number of plants and how big they will grow, the water and fertilizer should be re-supplied every couple of weeks up to every 4 weeks)
6. Start the pump: the pump should not work continuously, but in alternate cycles: for example, 30 minutes of and 5 on. The appropriate cycles you can find it depending on how many plants you have and how big they grow.
7. Enjoy your vegetable and herbs! Fresh strawberries, salads, basil, parsley and whatever you might prefer in your kitchen.
8. Have fun

N. Biocosmetics from plants: a recipe for making biocosmetics from oat flour

For those who aim to avoid fossil-based materials and prepare their own eco-friendly and skin-friendly biocosmetics at home using simple ingredients and procedures. The aim is to minimize waste, promote sustainability and create biobased products with added value. If you want to pay attention to your environment and the health of your skin, following our procedure you can make three different examples of personalized biocosmetics. You just have to choose the fruit juice to start with: do you want an anti-aging cream? Choose a grape juice; do you want an antioxidant serum? Choose a pomegranate juice; do you want an anti-inflammatory and soothing cosmetic? Choose a chamomile decoction.

1. Oatmeal and Fruit facial Serum

What we need:

- 5 g oat flour (about 1 teaspoon)
- 100 mL boiling water (about 1/2 cup)
- fruit juice or decoction (or a 1:1 mixture of yogurt and fruit juice or decoction)

Process:

1. In a small saucepan, add the oat flour to the boiling water and stir continuously for 10 minutes, until it thickens slightly.
2. Strain the mixture through a fine sieve (you can also use a thin cloth) to separate the liquid mixture from the thicker mixture.
3. To the liquid mixture and add 1 teaspoon fruit juice or a mixture obtained by separately mixing 1 tablespoon yogurt with a tablespoon fruit juice. Stir gently until the consistency is smooth.



How to Use: Your serum is ready! Apply it to your face, leave it on for 5 minutes and then rinse with warm water.

2. Oat and Fruit Face Cream

What we need:

- 5 g oat flour (about 1 teaspoon)
- 100 mL boiling water (about 1/2 cup)
- 1/2 teaspoon wheat germ oil
- fruit juice or decoction (or a 1:1 mixture of yogurt and fruit juice or decoction)

Process:

1. In a small saucepan, add the oat flour to the boiling water and stir continuously for 10 minutes, until it thickens slightly.
2. Strain the mixture through a fine sieve (you can also use a thin cloth) to separate the liquid mixture from the thicker mixture that is on the surface of the sieve.
3. Recover the liquid mixture and bring to a boil until its volume has decreased to a quarter of its initial volume.
4. The liquid mixture is thick and creamy, add 1/2 teaspoon of wheat germ oil and mix vigorously for about 1 minute.
5. Add 1 teaspoon of fruit juice to the mixture thus obtained. Mix gently until you obtain a homogeneous consistency.

How to Use: Your cream is ready to be applied to your face.

3. Oat and Fruit Exfoliating Face Mask

What we need:

- 5 g of oat flour (about 1 teaspoon)
- 100 mL of boiling water (about 1/2 cup)
- fruit juice or decoction (or a 1:1 mixture of yogurt and fruit juice or decoction)

Process:

1. In a small saucepan, pour the oatmeal into the boiling water and stir continuously for 10 minutes, until it thickens slightly.
2. Strain the mixture through a fine sieve (you can also use a thin cloth) and collect the thicker mixture that is left on the surface of the filter.
3. Add to the thick mixture 1 teaspoon of a solution, prepared separately, made up of 1 teaspoon of honey



and 1 teaspoon of fruit juice. Stir vigorously until you have obtained a thick and homogeneous cream.

4. Add 1 teaspoon of raw cane sugar and stir until the sugar crystals are well distributed in the mixture.

Note: the sugar crystals must remain visible and must not dissolve.

How to use: apply the cream on the face until it covers the surface of the skin, massage for 2 minutes and finally rinse with water!

0. The colors of photosynthesis

Natural pH indicator and soil pH test

The purpose of these instructions is to prepare a pH indicator for in-house measuring of the pH of aqueous solutions, by using red cabbage and its anthocyanins. Your red cabbage indicator should be dark blue. The colour of the cabbage indicator will change to red or pink if the solution is an acid and it will change to green or yellow if it is a base. It will remain purple or blue if the test solution is neutral.

This pH indicator can be used to test soil pH, an essential information to know for proper plant growth. In fact, most plants prefer a pH level of acidity (like dandelions, wild strawberries, parsley and raspberry) or alkalinity (like rosemary, lavender, and chicory) in the soil and when the pH is off balance, a plant may not be able to absorb nutrients correctly. Testing soil pH is best done in the fall before the next planting season so you have time to correct it. One way to correct soil pH is to plant a nitrogen-fixing cover crop (for mild winter climates). Another way is to use soil additives or amendments to lower soil pH (make the soil more acidic) or to raise the alkalinity increase soil pH). The type and quantity of soil amendments depend on how much the pH needs to be raised or lowered.

Another application could be pH control in small domestic pools: the pH of the pool water should always be neutral, otherwise problems may occur. As a general rule, pH should be checked at least twice a week. Water that is too acidic risks damaging the metal parts of the pool. An excessively basic pH, however, can cause irritation to the skin and eyes.

What you need to make a pH indicator:

- Head of red cabbage
- Sharp knife
- Pot to boil water in (or blender)
- Strainer or colander
- Glass bowl
- Clear cups or glasses
- Household liquids to test (vinegar, baking soda, lemon juice, soaps, bleach, ammonia,)
- Something to stir with

Process to make a pH indicator:

1. Take your red cabbage and cut off about 2-3 cups (the amount doesn't need to be exact, the more cabbage, the more indicator you will get).



2. Place the cabbage pieces inside a bowl filled with hot boiling water (you can use a microwave oven).
3. Let cool.
4. Once cooled, pour some droplets of cabbage solution into clear glasses containing the different liquids to test (do not combine different liquids, only test one substance at a time)
5. Gently stir or swirl the solution and see what happens!

Process to test soil pH with the pH indicator:

1. To test your soil, add a couple of teaspoons of garden soil to a jar with about 10 mL of the cooled cabbage water. Stir and then wait for 30 minutes.
2. After 30 minutes have elapsed, check the color in the jar. If the color is pink, the soil is acidic; if it is more on the green spectrum, your soil is alkaline.

Procedure for checking the pH of swimming pool water:

1. To test the pH of water, add 10 ml of pool water to a jar with about 10 ml of cooled kale water.
2. Mix and check the color in the jar, the color must not vary and remain blue purple.

Phycocyanin extract and blue ice lollies

The purpose of these instructions is to prepare an aqueous solution containing the natural colourant phycocyanin using Spirulina powder. The blue aqueous extract can be used to prepare blue ice lollies, ice cubes for drinks or in bread-making and other baked preparation.

What you need to extract phycocyanin from Spirulina:

- Spirulina (*Arthrospira platensis*) powder or tablet
- Spoon
- Water
- Clear cups or glasses
- Stirrer or vortex
- Syringe with a filter (or paper filter)

Process to extract phycocyanin from Spirulina:

1. Scoop out a tip of Spirulina powder with a spoon and insert it into a cup or a glass;
2. add 5 ml of water and stir vigorously;
3. use the syringe and a filter to separate the liquid from the power: the water will contain blue phycocyanin.



Process to make ice lollies with Spirulina extract:

1. Pour the Spirulina extract into your ice lolly moulds, leaving a little bit of space at the top and pop in a lolly pop stick;
2. place the moulds in the freezer for at least four hours, or until frozen solid;
3. to release the ice lollies, simply run the moulds under some warm water for a few seconds.

Procedure for making dough with Spirulina extract:

1. add the spirulina extract to the dough (bread, semolina pasta) taking care to replace the extract with an equal volume of liquid foreseen in the recipe.

P. What is composting and what are its benefits?

How to composte: a guide to composting at home

Composting is a natural, self-heating, solid-phase biological recycling process, during which organic wastematerials are degraded by aerobic microorganisms. The bioconversion of organic household waste and residues through the composting process results in a stabilised, nutrient-rich, humus-like end-product known as compost. This material is hygienically safe and can be used as a soil improver or fertiliser. Composting creates a natural source of nutrients for plants and promotes the circular use of renewable resources and thus can significantly reduce the amount of household waste disposed to landfills.



Composting is a traditional and probably the most convenient way to recycle bio-waste produced at smaller scale. Recycling food residues and other organic waste into compost provides a range of environmental benefits, including improving soil health, reducing greenhouse gas emissions, recycling nutrients, and mitigating the impact of droughts. Home composting is a great way of reducing personal waste, being greener, improving soil in farms and gardens, and making use of organic waste which would rdinarily be sent to landfill. Setting up a garden composting system can open our eyes to the amount of food that gets wasted, and make us rethink our next shopping list.



What to compost / What not to compost

Not all household waste materials are suitable for composting, even if they are bio-based or biodegradable. The table below presents a list of examples for waste materials that should and should not be composted.

 Compostable materials from the garden	<ul style="list-style-type: none">▪ wood shavings and chips, sawdust, shredded branches, twigs and bark of garden plants▪ withered flowers, cut plant stems▪ grass clippings▪ leaves▪ untreated wood▪ potting soil
 Compostable materials from the household	<ul style="list-style-type: none">▪ unprocessed fruit and vegetables leftovers (peels, leaves, stems)▪ eggshells (crushed)▪ coffee ground and tea leftovers (without filter), spices, herbs▪ overblown flowers, potted plants and their soil (without pot)▪ pets' litter (only herbivorous)
 Materials with limited suitability for composting	<ul style="list-style-type: none">▪ conifers, weeds, walnut leaf, peels of non-treated tropical fruits▪ wood ash▪ shredded uncoloured or untreated, non-glossy paper packaging, newspapers▪ undyed or untreated textiles with 100% natural ingredients (e.g. cotton, wool)
 Non-compostable materials	<ul style="list-style-type: none">▪ diseased plants▪ treated timber and large branches▪ packaging materials▪ leftovers of cooked and processed food, baked goods▪ bones, dairy products, fat, used household oils▪ content of vacuum cleaner dust bag, cigarette butts▪ litter of carnivorous and omnivorous pets▪ non-biodegradable wastes (plastics, glass etc.)

There are two broad categories of feedstock to put in the compost bin or pile: greens and browns.

Greens - the nitrogen source, colourful and wet (e. g.: grass clipping, fresh manure, garden clean out, food scraps). They provide nutrients and moisture for the compost decomposers, so they grow and reproduce quickly.



Browns - the carbon source, providing energy, absorbing excess moisture and giving structural strength to the compost pile (e. g.: brown leaves, branches, straw, paper, sawdust, woodchips). They help keep the pile porous, facilitate airflow and prevent compaction.

*How to compost**

Choosing a method

Basically, a composting system does not need to consist of anything more than a pile in the corner of the yard. Most compost piles, however, have a dedicated structure that keeps it all contained. Composting bins can be either three or four sided, with a removable front to facilitate turning. Containers can even be built of scrap wood, pallets, fencing or cement. Ready-to-use metal, wood and moulded plastic composting containers can be purchased as well.



A minimum volume of 1 m³ is required for a pile to become sufficiently self- insulating to retain heat. Heat will help reduce pathogens and allow the process to occur more quickly. This size is usually enough for the kitchen and garden waste of an average family. More containers can also be used: when a bin is full, while it is processing and curing, a second one can be started to be filled.

Different management choices can be made when building the pile. Passive composting requires less labour but more time. If there is time and space to wait for a usable product (9 to 15 months after building the pile), the process can be let work passively. If processing space and time is limited, turning and adding finished compost when forming the layers will help to speed the process. The pile can be turned with a pitchfork or shovel, which helps to break up material and better homogenise the mass.

Choosing a location

Location of the pile can have a significant effect on the composting process. It should be located in a level, well-drained area. In cool climates, putting it in a sunny spot can help trap solar heat, while shade in warmer climates may keep it from drying out. It is important to have a place protected from the rain, as too much moisture will cause rotting.

Layering the material and managing the compost

Building of a compost pile is started with a layer of coarse “browns” in contact with the soil. Then a well or depression is made in this layer and the “greens” are put into the well. The food scraps should be kept away from the outside edges of the pile, only brown material should be visible. The layer of “greens” has to be covered with a generous layer of “browns” so that no food is showing, and the pile can be finished with a



layer of soil or finished compost. These covering methods will keep insect and animal pests out of the pile and filter any odour.

Choosing the right organic materials and layering them create an optimal environment for the composting. Composting process largely depends on raw materials and environmental conditions, and several parameters affecting compost preparation (e.g. moisture content, aeration, carbon:nitrogen ratio, particle size etc.) have to be appropriately set and kept in an optimal range:

- The carbon:nitrogen ratio optimal for the nutrient requirements of microorganisms is 30:1. The mixture to be composted should therefore be formulated to approach this ratio. Too high carbon content will slow down the process.
- Sufficient amount of oxygen (air) is needed to ensure aerobic biological processes. A void volume of 20- 30% is required, which can be achieved by chopping the waste to the right size and mixing the different materials to create a loose waste mass. The simplest way to maintain oxidative conditions is turning over the pile.
- The purpose of chopping is not only to homogenise and achieve the right structure, but also to increase the surface to improve the accessibility of organic materials to degrading microorganisms.
- Controlling the moisture content is essential for the efficiency of the process, because it is required to be between 40-60% to be ideal for the degrading microorganisms.



Distributing the compost

The compost is ready for use when it has a rich brown colour and crumbles easily. This could take a few months, depending on the size of the bin or pile. Finished compost is applied to the soil at rates from 1 to 10 kg/m².

Compost is a great soil conditioner that adds nutrients and thus can reduce the need to use fertilisers. It also helps the soil retain moisture and make your plants more resistant to diseases. A pile size of 1 m³ is roughly enough for a 50-500 m² garden plot, depending on the dose of application.

*Resources: <https://www.nrdc.org/stories/composting-101#community>; <https://www.almanac.com/how-compost-guide-composting-home>

Extra ideas

Some compostable kitchen scraps can also be valorised as upcycled food products, such as tasty snacks fried in the oven, or a homemade vegetable stock/broth made by cooking and filtering the veggie scraps. In the



latter case the solid fraction can still be put in the compost bin, after the filtering. If interested, please check our instruction leaflet about the upcycled food products.

If you feel committed to composting but you are not able to set up your own composting system, you can still collect the compostable wastes separately and

- find a nearby community or municipal composting site where you can subscribe to a pickup service or drop off your organic waste, for example check [ShareWaste](#) that connects people who wish to recycle their organic waste with their neighbours who are already composting, or
- put them in organic waste collecting containers provided by the local municipality. More and more cities have programs that provide collection of organic waste on select days - check your local municipal website to see if your city has such a program.



Q. Upcycled food products

What is food upcycling?

During food production, a significant amount of waste is being produced. However, this „waste” can be used in different ways: it can go to landfill, be composted, used in biogas plants or as animal feed.

But it can be even turned into the raw material of another, high value product, for example a different food product. This is the **upcycling**: valorising, modifying materials or products to give them new value.

It is not an invention, this method has been applied for a very long time in households: bread leftover is suitable to make breadcrumbs, orange peel gives fantastic taste to the cakes or grape marc is made into brandy.

What can be upcycled?

Some ingredients can be easily found in households, they are produced daily. However, some of them are by-products of industrial food production, they are more difficult to reach. Let us show a bunch of waste which can be upcycled, most of them even under domestic conditions.



1. Tomato peel

It happens with many of us to peel the tomato for different pastas or other food, and we use only the fleshy tomato fruit. But why don't we use the peeled skin? By drying and grounding, it can be stored for a long time and used for seasoning, or as vegetable spice rubs and colourant ingredient.

It is very easy to prepare tomato skin powder, if we follow these instructions:

1. After peeling the tomatoes, arrange the skins on a wire rack placed on a cookie sheet and dehydrate in the oven at 100 °C or until completely dry and crispy. Alternatively, dehydrate the skins in a food dehydrator or spreading in a drying rack in open air under the sun.
2. Place the tomato skins in a spice grinder/coffee mill and grind. They won't become completely powdery but the particles will be quite small. If you have a large number of skins, work in batches. Store the tomato skin powder in a jar in the spice cupboard.

2. Kitchen scraps

Vegetable peels or those parts of vegetables which are not used are usually thrown away or - in a more desirable case - being composted. It is sad, as they can be upcycled and tasty snacks or useful ingredients can be made from them.



Homemade vegetable stock

Ingredients, as instructed by [Tasty.co](https://www.tasty.co):

1. Remove the tops/bottoms/skins/stems from any vegetables you are preparing and place them in a ziplock bag - they can stay frozen up to 6 months.
2. You can add a wide variety of vegetable scraps (think sweet!): onion, garlic, celery, carrot (tops, bottoms, skins), potato peel, corn cobs, winter squash, zucchini, and other squash, beet greens, fennel, chard, lettuce, parsnips, green beans, pea pods, bell peppers, eggplant, mushrooms (stems), asparagus, and herbs like dill, thyme, parsley, cilantro, and basil (including stems). Avoid adding high proportions of vegetables like cabbage, Brussels sprouts, broccoli or cauliflower as they might add a bitter taste to your stock.



3. Continue like this until bag is full.
4. Put the frozen scraps into a pot and fill the pot with water until scraps just start to float.
5. Bring water to a boil and then let it simmer for 30-60 minutes.
6. Taste it and adjust the flavour with more salt, seasonings, herbs, tomato paste.
7. Strain and pour into containers.
8. Refrigerate stock up to 4 days or freeze up to 3 months.
9. Enjoy! You can use it in soups, for cooking grains like rice in a mixture of some broth and water or adding liquid to a slow cooker meal. It's also a great base for making your own gravy.



Homemade chips from vegetable peels

Ingredients, as suggested by Tasty.co:

packed vegetable peels, such as russet potatoes, sweet potatoes, and/or large carrots 1 tsp bagel seasoning
1 tsp extra-virgin olive oil

Instructions:

- Preheat oven to 220°C. In a large bowl, toss peels, seasoning, and oil until coated. Spread peels in an even layer on a large baking sheet.
- Bake peels, tossing halfway through and watching carefully in the last few minutes, until golden brown and crisp, 10 to 15 minutes. Let cool on baking sheet.

3. Pulp from plant-based milks

Homemade plant milk is easy to prepare and one of the biggest benefits about making your own is that you control all of the ingredients. Moreover, it is much cheaper and more sustainable than buying commercial plant-based products. But what to do with the residual pulp?

Leftover pulp from nut- and seed-based milks is rich in nutritious fibre for our gut bacteria can be used in many different ways: it can be mixed in breakfast porridge, added to energy ball mixtures, muffin, pancake



or waffle batters, sweetened and layered with biscuits to make a delicious glass cream, or dried in the oven or a dehydrator, then ground and used as traditional flour in baked goods.

Milk pulp granola

Making milk pulp granola ([link](#)) is one of the tasty and nutritious ways to use up leftover pulp from homemade seed or nut milks, and there are lots of ways to customize it.

What we need:

- ¾ cup nut pulp
- ¼ cup raw almonds (roughly chopped) or hazelnuts, cashews, macadamia nuts
- ¼ cup raw pecans (roughly chopped) or pistachios, walnuts, Brazil nuts, peanuts
- ¼ cup pumpkin seeds
- 3 tbsp maple syrup or date paste 1 ½ tsp ground cinnamon
- tsp vanilla extract
- dashes salt (optional)

Process:

1. Preheat oven to 180°C and line a baking sheet with parchment paper.
2. Add pulp, nuts, and pumpkin seeds to a medium-sized bowl. Mix to combine.
3. Mix the maple syrup, cinnamon, and vanilla extract in a separate bowl.
4. Transfer the maple syrup mixture to the nuts and pulp. Mix to combine.
5. Transfer the mixture to the parchment-lined baking sheet, spreading out evenly.
6. Sprinkle with salt, if desired.
7. Bake for 25-30 minutes, tossing halfway through. It will continue to harden as it cools, so be careful not to overcook.

Fiber-rich brownie cakes ([link](#))



What we need:

- 150 g pulp (filtered from 5 batches of homemade plant-based milk, collected in freezer in a plastic container)
- 1 tsp of tapioca starch
- 1-2 tbsp of date paste / sugar / erythritol / sweetener of your choice
- 1 tbsp cocoa powder or carob powder
- 1 tbsp of pumpkin seed flour or almond flour
- 3-4 tbsp of rice flour
- 1 tsp of baking powder
- pinch of salt
- plant-based milk (amount needed depends on how dry the pulp is)
- optional: orange zest, dark chocolate chips, dried apricot cut into small pieces, raisins etc.

Process:

1. Mix the dry ingredients and add them to the pulp.
2. If using date paste as sweetener, it might be useful to mix it with 2-3 tbsp of plant milk before adding it to the other ingredients.
3. Mix it to combine.
4. If the mixture is too dry, add some plant-based milk to have a texture that will be easy to scoop into the silicone mould.
5. Adjust the sweetness of the mixture to your taste and add optional ingredients before scooping into the silicone mould.
6. Bake the cakes at 180°C for 25-30 minutes.



4. Salty, vinegary juices

Stop dumping out leftover pickle juice, olive brine, and more, and start turning them into something delicious. They can be used in thousands of ways, as they are a great addition to homemade ketchup, hummus, pasta and pizza sauces, soups, vegetable broth or even cocktails, and much more.





Dirty Martini Salad Dressing

What we need:

- ½ cup olive brine (simply a mixture of salt, vinegar and water but as olives marinate, the liquid takes on a fantastically rich and delicious olive flavour)
- ¼ cup white wine vinegar
- 5-6 pcs green olives
- 1 garlic clove, coarsely chopped
- ½ shallot, coarsely chopped 1 tablespoon lemon juice
- 1 teaspoon fresh rosemary, coarsely chopped
- ¼ teaspoon ground black pepper
- 1 cup extra virgin olive oil salt to taste

Process:

1. In a blender or small food processor, combine the olive brine, white wine vinegar, olives, garlic, shallot, lemon juice, rosemary, salt and pepper. Pulse or blend until only small pieces of the rosemary remain.
2. Slowly add in the olive oil in a steady stream while the blender or food processor is running to create an emulsification.
3. Serve over your favourite salad.

5. Brewer's spent grain

Brewer's spent grain is a by-product of beer production. It does not contain any alcohol, but it is rich in proteins and fibres. Usually, it is used as animal feed, but nowadays it gets more and more popular as ingredient of new food products. It has cereal taste, slightly nutty. Homebrewers can make tasty and nutritious bread using the spent grain and it can be a delicious addition to pie crust, banana bread, pizza dough or energy bars.

During the BIOECO-UP workshop in Szeged, Hungary, participants could taste the Brewer's Cracker, prepared in many different tastes. Granola can also be made of it.

For more information, please [visit this site](#).

6. Cascara

The well-known coffee beans are covered a cherry-like fruit, which is not used for coffee production. The term "cascara" refers to the dried fruit or husks of coffee cherries and it is used in different ways. In many cases, it is used as animal feed or being composted, although it is rich in antioxidants and polyphenols. In many places in the planet, it is consumed as tea or cold brew.



It is important to mention that cascara can be used in many other ways, as it has fruity and sourish taste it can be used as ingredient of desserts.

According to the [Secontaste](#) experts, you can prepare **cascara tea** very easily. (For more information and cascara recipes, please [visit this site](#).)

Hot steeping: 15 g cascara + 300 ml boiling water, steep for 10- 15 minutes, then strain and enjoy.

Cold steeping: 50 g cascara + 1 liter boiling water, let it cool, steep in the refrigerator overnight (12-24 hours), strain, and serve chilled.

7. Cocoa husk

Cocoa husk is the outer protective layer of the well-known cocoa bean. As only the inner part of bean is used to make cocoa powder or chocolate, the other part of the cocoa bean is removed during processing. It is sugar free, full of antioxidants, fibres and nutrients, it has intense coca taste and stimulant effect. When upcycled, it can be consumed as tea or infusion, or even can be an ingredient of cookies.

How to make cocoa husk tea? You can follow the instructions of [Amish Tea Shop](#):



What we need:

- 2 cups of water
- 1 cup of milk
- 1 cup cocoa husk
- 1/4 cup of brown sugar
- pinch of salt
- a cinnamon stick or nutmeg a few drops of vanilla extract grated chocolate (optional)



Process:

1. Take a medium size pan and add your spices with 2 cups of water. Boil some water and let it simmer on low heat for a few more minutes.
2. Add your cocoa husks and steep for 5 to 10 minutes, depending on your flavour preferences. You can also add the grated chocolate towards the end of this step.
3. Add the milk, salt, and sugar to the taste. This will ensure that your cocoa tea is sweetened and flavoured to perfection. Keep whisking until your cocoa tea reaches the desired temperature. Let the mixture simmer for a few more minutes, then turn off the heat.
4. Add the vanilla extract and mix well. You can really use this freedom to experiment with different pairings and express your creativity.
5. Pour your cocoa tea mixture through a strainer to remove the remaining solid particles. Pour into warm mugs and get ready to serve.

Finish by adding your garnishes! Try the unlimited options out there. Be the innovator of your own custom cocoa tea recipe. Can go for garnishes like yummy whipped cream, colourful marshmallows, a tiny sprinkle of cinnamon, or even a drizzle of sweet caramel sauce. This is where you can express your creativity and make your cocoa tea special.

R. Utilization of wool for producing useful equipments and desing objects

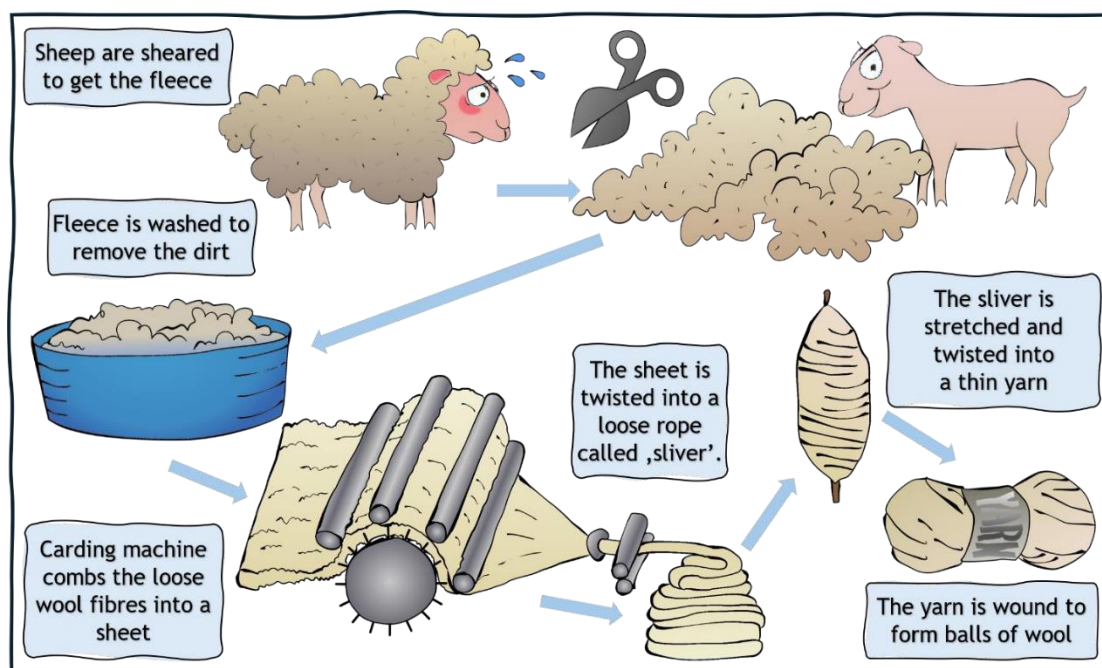
What kind of raw material is wool?

Our loveliest raw materials come from natural origin such as plant fibers or animal hair. Both have been used for thousands of years in human history, and still we have the knowledge to utilize these wonderful materials.



Fibers of plant origin are cotton, linen, hemp, we make advantage of the wavy or long fibers of the processed plants.

Fibers of animal origin: wool of sheep, lamas, alpakas, hair of angora rabbits, silk of silkworms.

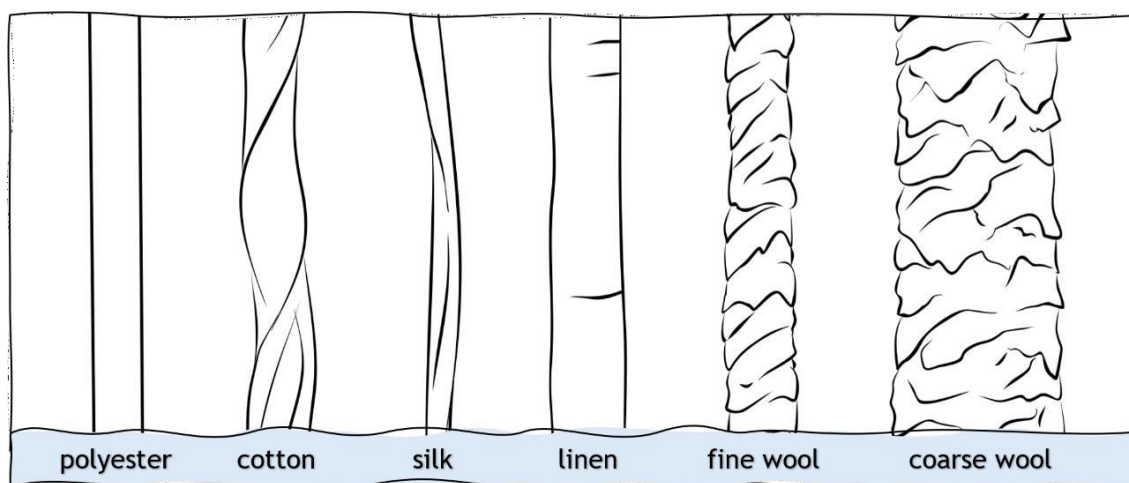


Wool, as raw material is produced in such a way that the sheep stays alive and continues to graze happily afterward. Sheep need to have their fur to be shorn in the springtime. The fleece must be cleaned with water and chemicals. Impurities of plant origin are removed after being carbonised with sulfuric acid, which process needs a lot of water. After cleaning, the fibers are carded and parallelised, this will make them suitable for spinning to end this process up with a ball of wool yarn.

At home you can use the cleaned wool itself to unleash your creative energies and produce homemade equipment and ornaments to build a connection to the nature in an everyday scale.

Why is wool so good?

The secret lies in the structure of wool. There are scutes on the surface of each strand of wool. It's like a velcro. We use these scutes by moving the wool strands on each other, to cling together as much as possible. You can see the rough surface of wool in the picture below.





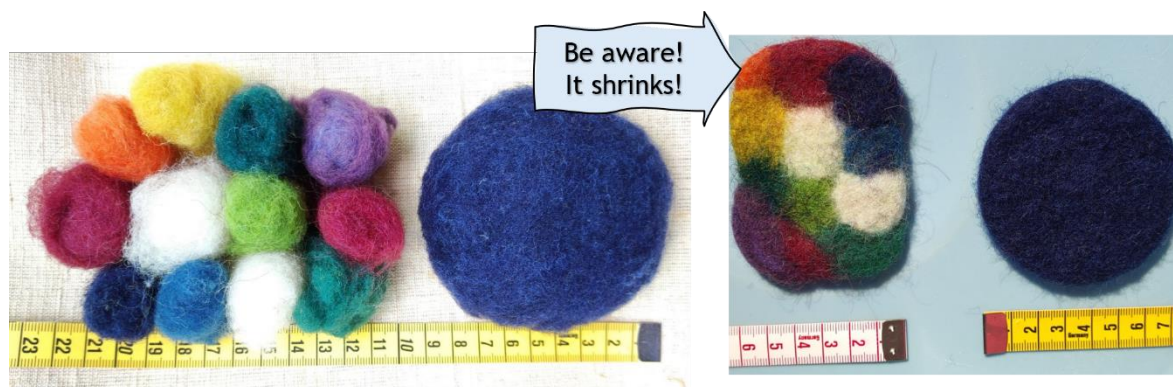
How can I use wool at home?

You can make small items like key holders, placemats or even bigger wall hangers at home on your own. You need only a few things and a lot of time and energy. But it is worth it!

How do I make it?

Wet method

1. You put together bunches of wool bits (make it thick) following a shape or a template you can cut out of a cardboard box or a piece of a thicker polyfoam sheet.
2. Use different colours in the several layers of wool, it will give a really beautiful outcome in the end.
3. Using a small amount of lukewarm water make the wool wet and using a firm soap. The soap's linolene content will do the hard work.
4. By smoothing and gently rubbing the wet, foaming wool carefully start to build the connections of the wool strands: this is called felting - at first it can fall apart from a bit harder movement - no worries: put them together and continue rubbing it.
5. After some time, the shape will be formed, it will be tougher but smaller than at the beginning - it is natural, you made the strands cling together, they are closer, their structure got into each other, they cannot be separated anymore - with a little practice you will see the ratio of the shrinkage depending on the thickness of your workpiece
6. Remove the template and from now on you can knead the piece harder to achieve its final shape and size - the more energy you put in the harder final result you get. Our ancestors who lived in felt tents made the sheets for these tents were made by tying a big log behind horses, the big sheets were screwed onto it, and it hit the ground again and again as the horses went by. Hard job!
7. At the end wash the soap out of your work in warm water, let it dry and voilá, you made something great!





BIOECO-UP

Steps of felting



Dry method

It is usually used to decorate the surfaces of the felt pieces made by the wet method. You put the layers or bulks of the decoration wool you would like to fix, and pinch them into the base by using a needle. You



BIOECO-UP

need to be determined and very cautious, because the clinging will be formed by thousands of small movements, when you physically push the strands into each other's structure.
Keep going, it will be beautiful!



Watch [this video](#) to see how we managed.

Okay, I like it. Let's give it a try!

Some ideas for you





S. Buzzing garden

Breeding bumblebees for home gardening

Introduction

Pollination is the process of transferring pollen from the anthers to the stigma in the flowers of plants so that fertilization can occur and subsequently produce a seed. This process is crucial for sexual reproduction of plants. In the conditions of the Czech Republic, about 20% of plants are pollinated by wind (windiness, wind pollination, anemogamy). The best-known representatives are all cereal species such as wheat, barley, oats and rye. However, most plants (80%) rely on insect pollen transmission (insect pollination, entomogamy). These are mainly fruit trees and agricultural crops (e.g. oilseed rape, various types of clover, etc.). If insects had no access to these plants, the fruit or seed crop would be zero or negligible. Pollinators thus play an important role in maintaining biodiversity, ensuring the growth and survival of a wide range of plant species. Without them, many plants could not reproduce successfully, leading to a decline in biodiversity and destabilising ecosystems. In addition to their ecological importance, pollinators also have an economic impact, as many agricultural crops depend on pollination for yield. Protecting pollinators and their habitat is therefore crucial not only for maintaining biodiversity, but also for ensuring stable food production and ecosystem health. Bumblebees, like bees, are pollinating insects. Without their activity, many plants would not produce fruit or seeds. The pollination capacity of bumblebees is great; one worker bumblebee can visit up to 2,000 flowers a day! If there is enough food in the area, it is very advisable and welcome to help the bumblebees by installing a suitable bumblebee house

Instructions for the bumblebees nest from Troubsko



BIOECO-UP

We have relocated, or you have relocated yourself, a young bumblebee family (*Bombus terrestris terrestris*) consisting of a mother, 10-30 workers and a brood (larvae, pupae). From the awakening of the queen from hibernation to reaching this stage, 1.5-2 months elapsed. This family will gradually grow and within two months should start to raise sexual individuals - new queens and males. Each nest develops at its own speed, which cannot be influenced, and rearing of new queens may occur earlier. The usual lifespan is 2-4 months from hatching. The presence of workers in the nest ensures that the mother no longer flies out. Female bumblebees are faithful caretakers of the brood and will not leave the nest and fly elsewhere. Do not interfere or tamper with the nest unnecessarily to avoid damaging the brood. The goose neck, which has an internal diameter of less than 18 mm, is easily clogged and therefore removed from the inlet when fitted by our bumblebees. Moreover, the bumblebees of Troubsko do not need it and find their way out more quickly when it is not there. However, we leave it loose in the nest. It gets a scent of bumblebee pheromones, which can attract queens in spring. If you find that this applies to your bumblebee, we recommend shortening it to 4-5 cm for next year and putting a wider gooseneck on this part. If the gooseneck is larger in diameter, do not remove it.



Transport

The inlet opening must be closed. Ventilation during travel may be open but is not necessary. Do not leave bumblebee hives in the car in the sun to prevent them from overheating. Have food available (sugar dough/syrup feeder and pollen feeder) until they recover from their new housing. The feeders do not need to be removed. If it is cold at the time of collection and the bumblebees are not yet flying, check the supply in the feeder and feed the bumblebees.



Location

The bumblebee is installed in a dry, shady place. Morning sun is possible until about 8 o'clock. Evening sun is not suitable as the air temperature is already high towards evening. As protection against ants, either the



BIOECO-UP

legs are used, which are placed in bowls (PET bottle caps) with oil (watch out for pets that lick the oil), liquid soap, or water with spring. Oil is only recommended because of the slower drying time. Wide bowls are not recommended because the shiny liquid attracts bumblebees, which drown in it. It is also possible to place the bumblebee on a stand with a leg fitted with glue or to hang it. However, it should not sway or move.

First days - After installing the bumblebee on the final site, open the flap completely and secure it before locking. Conversely, the vent must remain closed so that the workers are not confused by the light and learn to navigate the inlet tube to the inlet. Only when they have learned to do this and the air temperature has risen above 20°C can it be opened. Due to the fact that bumblebees have food in their hive, workers can only go out to find food after a few days. But don't expect a beehive-like operation. Workers are few and far between, and the chances of seeing one fly in are slim. Try placing a small rock, straw or leaf in the entrance hole. If the mark is removed, the worker already knows which way out and you can start learning to flap. This consists of lowering the trap gradually. The more workers the nest has, the faster the learning takes place. Ideally, day 1 fully open, day 2 closed to about 0.5 cm, day 3 fully closed. However, always close the flap at night. The hoverfly attacks the nest at night. It flies from dusk to dawn. It is better to close the flap earlier and check after dark to see if there is still a straggler. You can help them initially by tilting the bumblebee slightly forward. The flap is then lighter. When the nest gets stronger, bring the bumblebee back into balance to make the flap heavier again. The nest is not protected until the flap is fully attached. Therefore, do not prolong unnecessary learning. Workers don't like the flap and sometimes it takes them longer to open it. Often it is only by working together, with some workers pushing from the inside and others lifting from the outside. It is necessary to arm oneself and let them suffer. A small gap may help the bumblebees to lift, but it also means that the nest is not protected. Later, you can relieve the workers by lifting the flap once when you're around. Workers sometimes lose pollen grains on the flap or under-wax the flap to keep it from coming off. It is therefore necessary to clean the flap and check for leaks. Press the pollen grains into a pet-bag and freeze in a bag with limited air access. When the nest starts to rear new queens and the large queen larvae need a lot of pollen, place the pet-cup with the pollen in the nest, preferably all the way down to the brood.





Temperatures

The Great Wood Bumblebee (Green Household), the Economy Bumblebee and the Lapwing Bumblebee can cope with the usual spring and summer temperatures. The Wall Bumblebee is less thermally protected and so extra care is needed during temperature fluctuations. It is recommended to insulate it with e.g. polystyrene. In prolonged low temperatures (daily highs below 5 °C for two or more days) and severe frosts (temperatures below - 5 °C), depletion of reserves and hypothermia can occur.

If they still have a sugar feeder, this will give the bumblebees energy for warming up. If they already have an empty feeder, put a sugar solution in a pet cap with cotton wool (ideally fructose:sugar:water in a 2:1:2 ratio) on the lining. In a pinch, even plain sugar (not cane sugar) or honey. We can also seal the bumblebee for the night and transfer it to the hallway of the house or basement. In summer, when temperatures exceed 30 °C, it is advisable to cool the bumblebee with a wet cloth on which a container of water is placed and a wick to moisten the cloth. However, it always depends on the habitat. We can tell that the nest is overheating by the worker bee sitting inside on top of the lining or even outside on the hive, swirling her wings.



Pests and Death

Pests

Bumblebees have a number of pests. You can find out what to do in case of an infestation in our guide or at www.cmelaciplus.cz. There is no harm in inserting a sticky strip around the perimeter of the ventilation nets to catch any pests.

The end of the nest

After the end of the nest's life, clean the hatch mechanically, with water without chemicals, or burn it. Storage in a protected place will prolong the lifetime. It can also be painted with Balacryl or other water-based paint.

Premature Death

Sometimes the nest dies prematurely. The causes can be different. In addition to inappropriate placement in the sun and pests, bumblebees can become sick with microscopic parasites that weaken the nest, be infested with bumblebees, or poisoned by pesticides. If possible, ask neighbors not to use pesticides or notify you so that you can confine the bumblebees for the necessary time.

New Season

Next year in February/March/April, prepare the hive, fill it 2/3 full with suitable fluffy heat-resistant fill and place it with the vent closed and the flap open back on the site to be available should any of the young queens wish to return. We also recommend trying to settle a different species. For example, rock, meadow,



meadow, and robin bumblebees like to nest in bumblebee boxes. Again, you can find how to do this in our guide or at www.cmelaciplus.cz.E

T. Exploring the bioeconomy and non-traditional crops

In today's world, there is a significant emphasis on proper nutrition. Diversity and a balanced ratio of carbohydrates, proteins, and fats are essential not only for proper development but also for the optimal functioning of our bodies in this hectic and dynamic environment. In addition to traditional agricultural crops, alternative crops are increasingly appearing in our diets. These new ingredients enrich our food not only with important nutritional values but also bring variety and new flavors, revitalizing standard eating habits.

1. Safflower (*Carthamus tinctorius* L.)

Ara variety (yellow flowering), Tereza variety (red flowering)

Belonging to the Asteraceae family, safflower likely originates from Southwest Asia, where related wild species grow. It is known only as a cultivated plant. This annual plant bears a striking resemblance to thistles. At the beginning of its growth, it forms a rosette of leaves. The stem is upright, woody at the base, and reaches a height of 70 to 150 cm. It is a long-day plant and blooms with a light period of about 14 hours. Depending on the sowing date and weather conditions, it begins to flower from June to early September and continues for 3 to 4 weeks. The flowers are arranged in flower heads with a diameter of 3.5 to 4 cm. Depending on the branching intensity, there can be up to 60 flower heads on a single plant. All the flowers in the head are hermaphroditic, tubular, and range in color from yellow to red. Safflower is largely self-pollinating but is also entomophilous and produces nectar. The fruit is a white achene containing 25 to 45% oil. Today, safflower is mainly used as an oilseed crop.





Safflower oil contains up to 80% linoleic acid and is used in cooking as well as in the production of cosmetics and varnishes. In human nutrition, it plays an important role due to its high content of unsaturated fatty acids (linoleic acid) and vitamin E, contributing to the maintenance of normal cholesterol levels in the blood, and having anti-rheumatic and anti-inflammatory effects. It is used in both cold and hot cuisine.

Recipes

Curd Cream with Safflower oil

- 400 g curd
- 3 tablespoons safflower oil
- 1 teaspoon starch
- 1 teaspoon psyllium
- To taste: vanilla, sugar, paprika, fruit, horseradish

Instructions:

Using a hand mixer, whip the curd with the oil, starch, and psyllium until smooth. Add flavourings to taste



Curd Cream with Safflower oil

Bundt Cake with Safflower oil

- 350 g semolina flour
- 250 g sugar
- 3 eggs
- 1 glass safflower oil
- 1 glass milk
- 1 baking powder
- 1 vanilla sugar, cocoa



Process:

Whip the egg yolks with the sugar and oil. Add the flour mixed with baking powder, milk, and the whipped egg whites. Color a portion of the batter with cocoa. Bake in an oven preheated to 180 °C (356 °F) for 50 minutes.



2. COMMON BEAN (*Phaseolus vulgaris* L.)

Hynek variety

Belonging to the Fabaceae family, the common bean is an annual, bushy plant. The plant features purple coloration. Sparse clusters of purple flowers grow in the leaves. The fruit is a pod, also purple in color. The beans have a high content of proteins, fiber, and also calcium, iron, potassium, B vitamins, vitamin PP, and provitamin A. They also contain glucokinin, which helps reduce blood glucose levels, making them very suitable for diabetics. Due to their high fiber content, beans positively affect intestinal function and induce a feeling of fullness. Beans act preventatively against diseases of the liver, kidneys, and bladder. They help drain excess water from the body and strengthen the heart and circulatory system.



Spicy bean Spread

- 500 g red beans in brine
- 3 tablespoons mayonnaise
- 2 tablespoons olive oil
- 1 tablespoon mustard
- Salt Pepper



- Chili peppers

Instructions:

Grind the beans, then add the remaining ingredients and mix well. Serve spread on bread

Bean Salad

- 500 g beans of various shapes and sizes
- Blanched onion
- Pickles
- Pickled peppers
- Salt Pepper
- 3 tablespoons olive oil
- Sweet and sour marinade

Process:

Mix all the ingredients together and let the salad rest in the refrigerator for 24 hours.

Bean Brownies

- 300 g cooked beans, softened
- 3 eggs
- 150 g high-quality dark chocolate
- 100 g sugar
- 1 packet vanilla sugar
- 30 g cocoa powder
- 1 teaspoon baking powder
- 4 tablespoons vegetable oil (or another fat such as butter)

Process:

Gently melt the chocolate in a double boiler or water bath. Drain the cooked beans and blend them thoroughly using an immersion blender until smooth. During blending, add 4 tablespoons of oil. In a separate bowl, beat whole eggs together with sugar and vanilla sugar until thick and frothy. Combine the bean mixture with the melted chocolate, then fold in the egg mixture. Finally, add cocoa powder mixed with baking powder. Line a baking dish with parchment paper, pour in the batter, and smooth it out evenly.

Bake at 175 °C (350 °F) for approximately 35-40 minutes. Once done, let it cool completely before slicing.

Enjoy your bean brownies!

GINGERBREAD COOKIES WITH BEAN FLOUR

- 300 g all-purpose flour



- 100 g bean flour
- 140 g powdered sugar
- 50 g butter
- 4 tablespoons good quality liquid honey
- 1 teaspoon baking soda
- 1 teaspoon gingerbread spice mix
- Egg white icing for decoration

Process:

Mix all dry ingredients in a bowl, then add the remaining ingredients and knead by hand into a soft dough. The dough should be soft and pliable, similar to elastic clay. Wrap it in plastic wrap and let it rest in the refrigerator overnight. Preheat the oven to 160 °C (320 °F) and line baking sheets (you will need at least two) with parchment paper. Roll out the chilled dough on a floured surface to a thickness of about 0.5 cm, cut out shapes, and place them on the baking sheet. Bake for 8-10 minutes. Allow the cookies to cool on a wire rack.

3. Chickpea (*Cicer Arietinum* L.)

Olga variety

Belonging to the Fabaceae family, chickpea is an annual plant with a sturdy, non-prostrate stem covered with glandular hairs. The flowers are pinkish-red. The fruit is a pod containing 1-2 brown-colored seeds. It is an excellent source of carbohydrates, proteins, fiber, B vitamins, and several minerals, making it a nutritious staple in many diets.



Potato cookies with lupin and chickpea flour

- 4 medium-sized potatoes



- 180 g butter
- 150 g semolina flour
- 100 g all-purpose flour
- 50 g lupin flour
- 50 g chickpea flour
- 1 egg white
- sesame seeds, salt, cumin

Process:

Cook the potatoes in water until tender, then mash them into a puree. Let it cool down. Add butter and all the flours to the cooled potato puree, and knead into a smooth dough on a floured surface. Roll out the dough and cut into shapes. Bake the cookies at 180°C (356°F).



Chickpea cake

For one small cake:

- 400 g cooked and drained chickpeas
- 150 ml orange juice
- 1 teaspoon vanilla extract
- 4 eggs
- 200 g cane sugar
- 70 g Dutch-process cocoa powder
- 2 teaspoons gluten-free baking powder
- 1 teaspoon baking soda
- Fat for greasing the pan
- Cocoa powder for dusting dohladka



Process:

Blend the drained chickpeas until smooth, then whisk in the remaining ingredients. Preheat the oven to 175 °C (350 °F). Prepare a smaller cake pan by greasing it and dusting with cocoa powder. Pour the mixture into the pan and bake for about 50 minutes. Serve with cream (e.g., soy cream).

4. Red clover (*Trifolium pratense* L.)

..is a perennial, dicotyledonous herb from the Fabaceae family, ranging from ten centimeters to a meter in height. Red clover is renowned for its medicinal properties. Due to its strong disinfectant effects, it is used to treat diarrhea, vomiting, and food poisoning. It is beneficial for detoxifying the body and is included in cleansing herbal tea blends. It shortens and alleviates treatment for coughs, colds, bronchitis, and flu. Red clover tea from its flowers can be consumed over longer periods due to its pleasant taste. It alleviates symptoms associated with menopause, such as insomnia, hot flashes, and nausea. Its primary beneficial component is phytoestrogens, which can bind to estrogen receptors in the human body and exhibit estrogenic properties. This property is utilized to supplement declining estrogen levels in women as they age. Decreased estrogen levels in a woman's body can lead to various issues like menopausal symptoms, osteoporosis, loss of skin elasticity, and wrinkle formation. Red clover also has beneficial effects on the skin. It treats skin problems such as eczema, acne, and minor skin injuries, thanks to its disinfectant properties, which accelerate skin healing. Fresh or dried red clover flower heads can be used to prepare facial tonics or baths.

Red Clover Tea

Instructions

Pour boiling water over fresh or dried red clover flower

U. Earthworm compost (vermicompost)

Vermicompost is considered one of the highest quality fertilizers. It not only nourishes and keeps the plants in good condition, but the microorganisms contained in it also improve the properties of the soil.

Types of earthworms used in vermicomposting:

- Dung earthworm (*Eisenia foetida*) - earthworms that normally inhabit outdoor compost or manure will do well in a vermicomposter.



- California earthworm (*Eisenia andrei*) - a specially bred species that originated from the dung worm. The main advantages include higher resistance, rapid reproduction and a strong appetite. It can thus consume a large amount of residues and is the most suitable choice for vermicomposting.
- European earthworm (*Dendrobaena veneta*) - another popular type of earthworm, however, slower reproduction and processing of "food" must be expected with it.
- Common earthworm (*Lumbricus terrestris*) - an earthworm up to 30 centimeters long, which is also commonly found in outdoor soil in the garden or anywhere else.

Instructions for setting up a vermicomposter and its subsequent care:

1. Prepare a suitable container (if you do not want to buy a special vermicomposter directly, it can be a large enough plastic or wooden box, which you provide with holes for sufficient air circulation).
2. Fill the container with suitable bedding, such as peat, paper or straw. The bedding needs to be moistened.
3. Find the right place for the vermicomposter - a temperature of around 20°C and plenty of light is ideal. Move the composter as needed (for example, with the change of season).
4. Move the earthworms into their new home.
5. Start feeding the earthworms regularly - always check that they have enough food, add more if necessary. But do not feed the earthworms.
6. Don't forget to keep the bedding moist, but not completely wet (too dry bedding can be moistened with a water sprayer, and the excess water should be sucked out of wet bedding). Also ensure proper air circulation (vents should never be covered).
7. In two to three months, you can look forward to the first, properly nutritious compost.

V. Homemade fertilizer from coffee

The aim of the following instructions is to make homemade coffee grounds fertilizer. According to statistics, around 700 billion cups of coffee are drunk annually worldwide, making coffee the second most consumed beverage after tea and the second largest commercial commodity after oil. The coffee industry therefore contributes dramatically to global waste production, with an estimated 1 tonne of green coffee generating 650kg of coffee grounds, generating thousands of tonnes of this residual matter every day.

Coffee grounds are rich in organic substances such as polysaccharides, lignin, proteins, fats and other organic compounds. It is rich in nutrients such as nitrogen (2%), phosphorus, potassium and magnesium. These substances are important for improving the soil structure and its ability to retain water and nutrients. Nitrogen itself is essential for plant growth and development and also important for the production of proteins, enzymes and chlorophyll. Citrus peels can be added to increase the effect.

What we need:

- Coffee grounds,
- water,



- orange
- board, knife
- paper,
- bowl
- flowers in a pot

Process:

1. Spread the coffee grounds on paper and let them dry thoroughly (this will avoid mould)
2. Cut the orange peel into small pieces
3. Mix the coffee grounds with the orange peel pieces in a bowl
4. Scatter the mixture around the flowers and water.
5. The dried coffee grounds can be worked directly into the soil to aerate it, improve the soil structure and allow better water absorption.