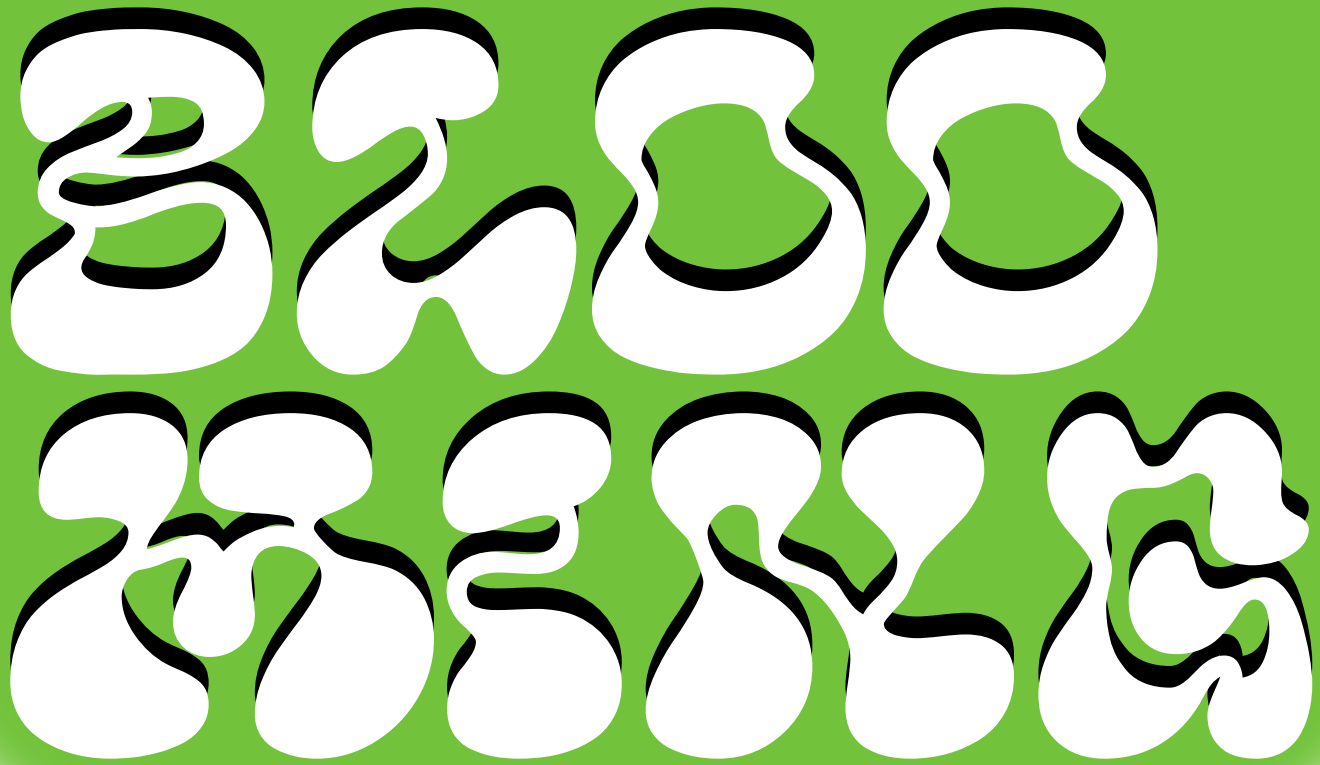
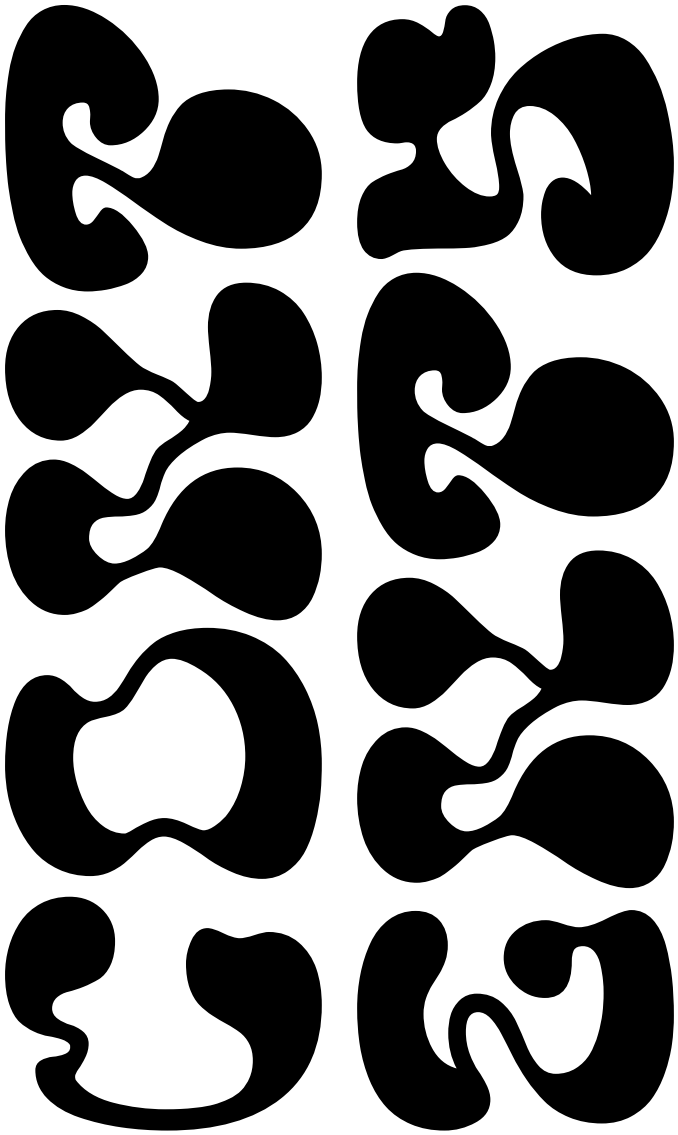


Cody Toth
Plastology
Matthias Hahn
Jonna Hille



1. intro

A candle left at a grave is an act of memory, love, and spiritual connection. It deserves to be designed with the same care we give to remembrance itself.

What if remembrance itself nourished life?

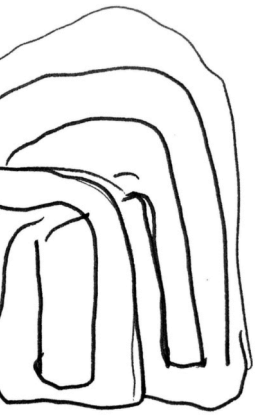
A cemetery is a deeply emotional site where we go to honour loved ones. Traditionally, candles left at graves are petroleum based plastics or paraffin that persist in the landscape long after their light is gone.

This biodegradable cemetery candle is meant to transform that ritual into one that aligns with natural cycles. It is designed for impermanence, for decomposition, and renewal.

It preserves the symbolic meaning of the candle. It can be a vessel for light, hope, spiritual transcendence, while at the same time it is also a literal vessel for life, returning to the earth and nourishing it with flowers.

When we leave a candle at a grave what are we really leaving? My thesis focuses on changing the narrative of how we leave something on purpose; something not meant to be collected afterwards, something that gives back.

By decomposing into the soil and fostering new growth, it makes the act of leaving a candle not just symbolic, but actively life-giving.



2. ideation

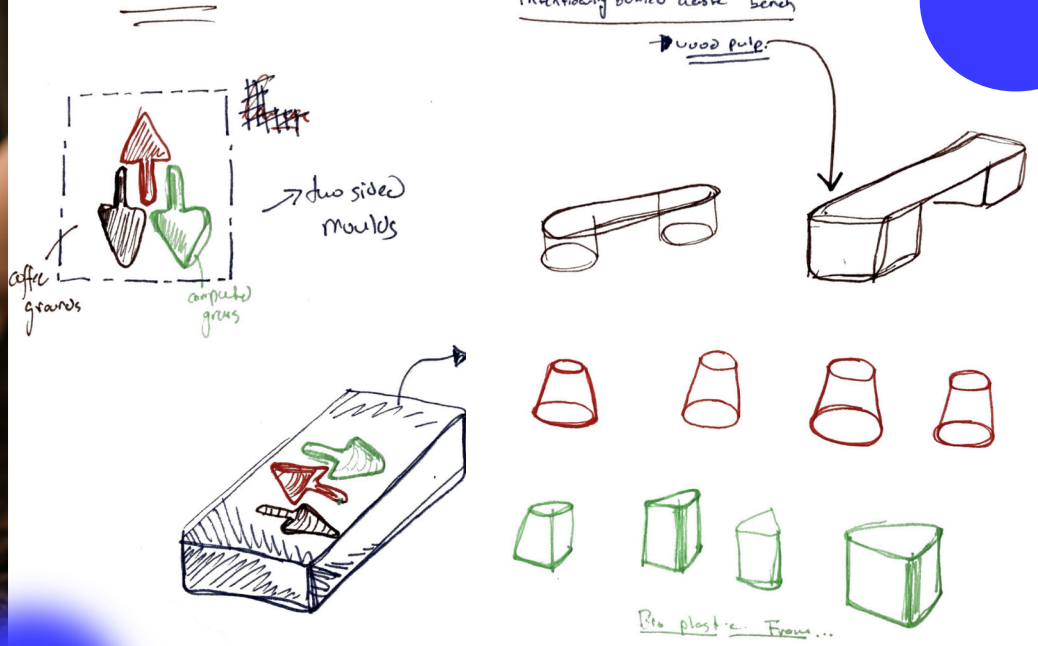
To me it was important to explore the relationship between recycling and the environment, not in the traditional sense of simply repurposing materials, but by questioning how design itself can reshape our understanding of waste and value.

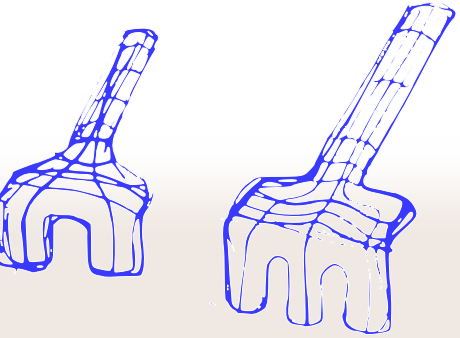
This project was aimed not at the traditional idea of what we can improve within the concept of recycling, but focused rather on speculating what the transactional relationship could look like.

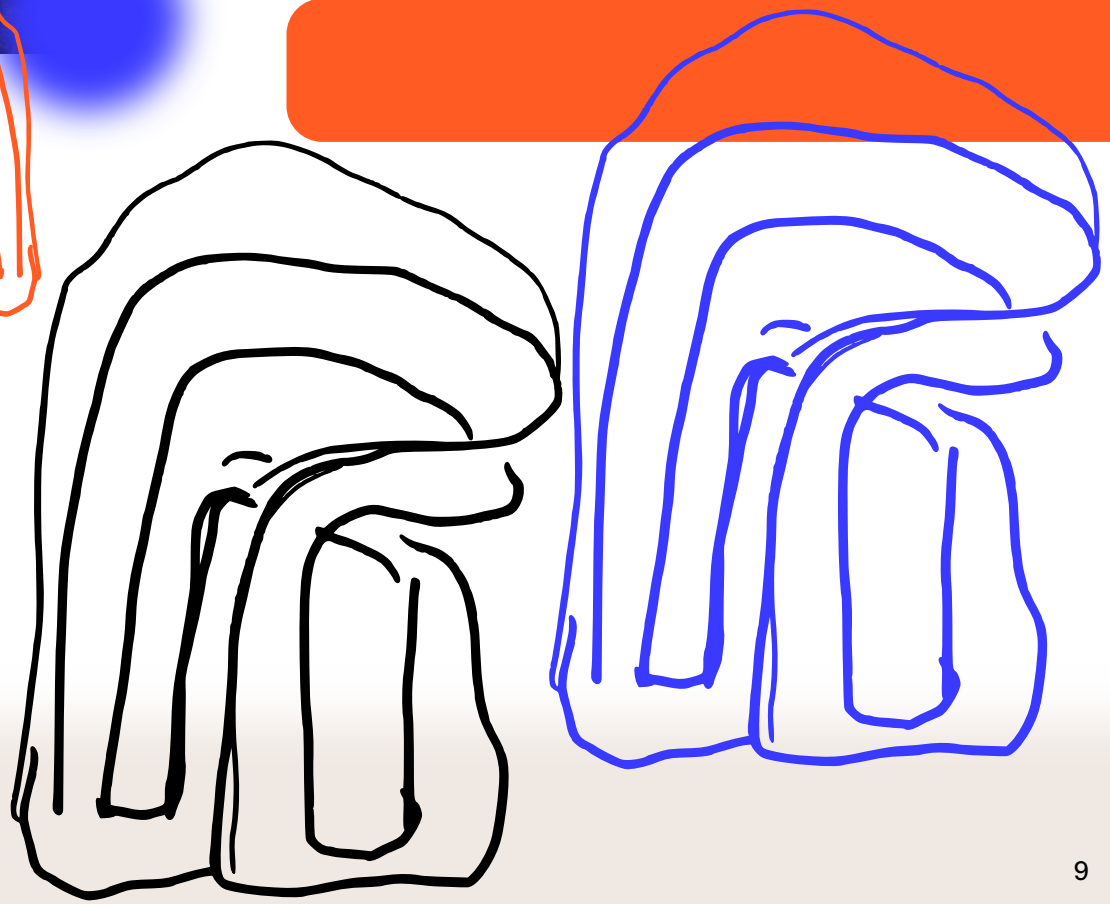
Early ideation focused on the relationship between us users and nature; wether a shovel, chair (early prototypes) or a candle; how do we focus out attention to certain products, and why. The initial ideas focused on up-cycling but eventually grew into the thesis of "giving back". Changing the lifecycle of a product form a unidirectional approach of using resources to a bilateral one.

The focus shifted later on to exploring this relationship through the lens of loss and death.

Death is a tender subject; we want to feel connected to ones who have moved on from this world. The beyond and how we treat it can be sentimental, a way to stay connected. Death in a way symbolizes our relationship with plastic as well. Our (re) use of plastic products and their lifecycles are a direct representation of the organic matter that humans are.







Early imagined ideas

Here are imagined early ideas about what these prototypes may look like, a piece of furniture that grows into nature, or shovels made out of nature designed to be discarde, focusing on the idea of giving back.

3. the candle

The thesis behind a biodegradable candle is that its design is intentional. It is meant to degrade, and isn't appropriated.

It has a reason to be discarded, or left. Impermanence is a key message within this artifact, so naturally having every portion of this candle be biodegradable.

My plan was for this to be made from orange-peel bioplastic, but naturally a design such as this one can be made with any biopolymer. It is meant to be translucent, tinted in warm amber tones.

The candle itself is Beeswax with natural wick. The base contains seeds embedded in its matrix within peat moss as it is , which keeps the seeds dry given its inability to rehydrate easily.

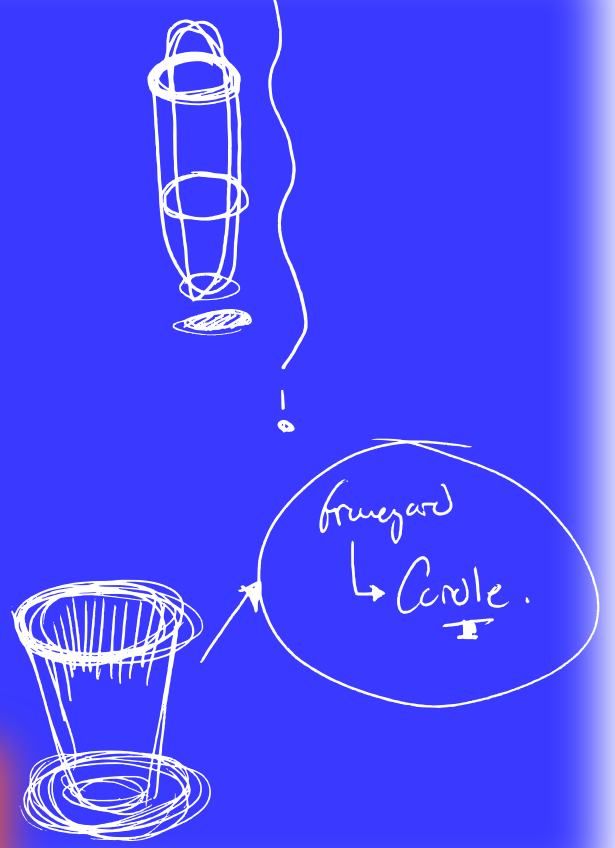
The bioplastic casing softens with heat and begins to degrade, cracking or slumping as the wax burns, an intentional mement-mori gesture. The candle can then be covered by more soil.

As the remaining casing decomposes in soil, the embedded seeds germinate. It is designed to "leave no trace" but instead give something back. Ultimately the goal would be to gain a deeper connection with the spiritual, the beyond.

Most of the candle should burn completely.

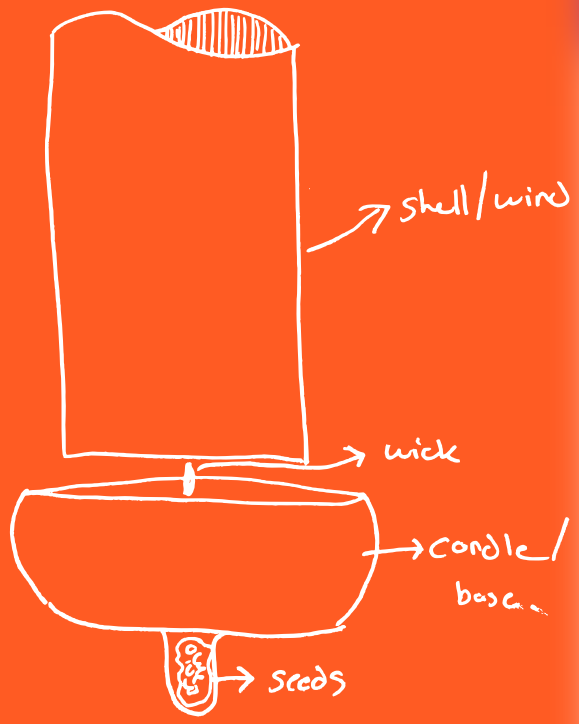
The organic shape

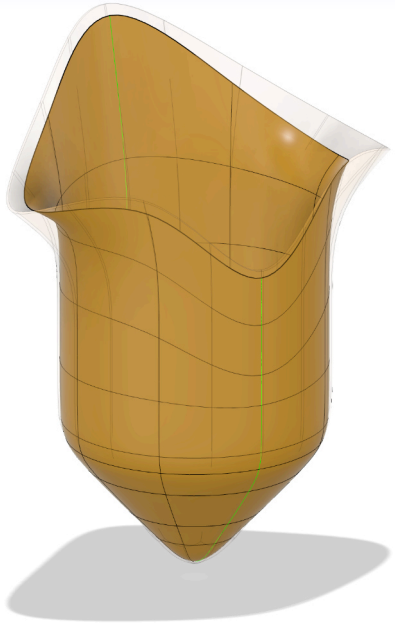
During this design process much of the focus was on integrating the artifact into its surrounding environment. The candle is meant to evoke emotion and therefore the shape is based on shapes that are familiar to the user in this setting; flowers which are also usually left at graves. This “flower” shape is also a foreshadowing of what will occur during the life cycle of this artifact.

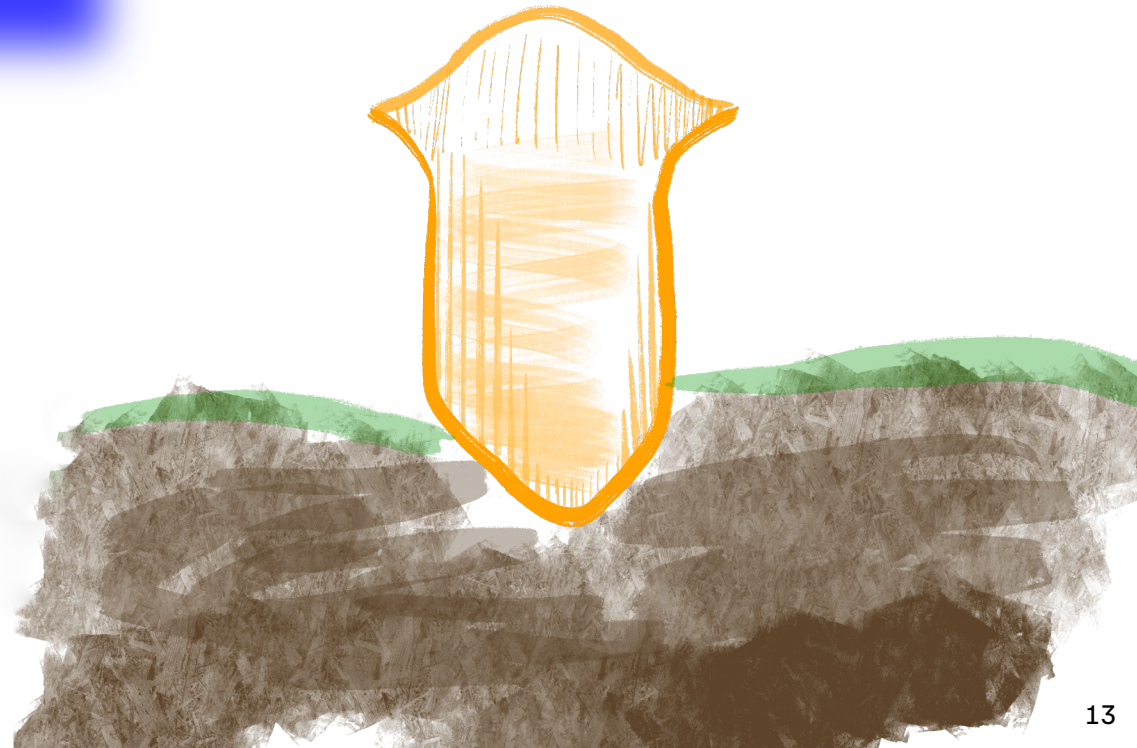


Using the candle

The shape of the candle allows it to comfortably slip into loose soil. This candle will not be digging up clay, the outer shell definitively has limitations in terms of its strength. Furthermore most shapes limit this candle from being used in less-than-great weather. Wind is fine, however, water will fill up the inside “cup” and start the degrading process, which is the end goal anyways.



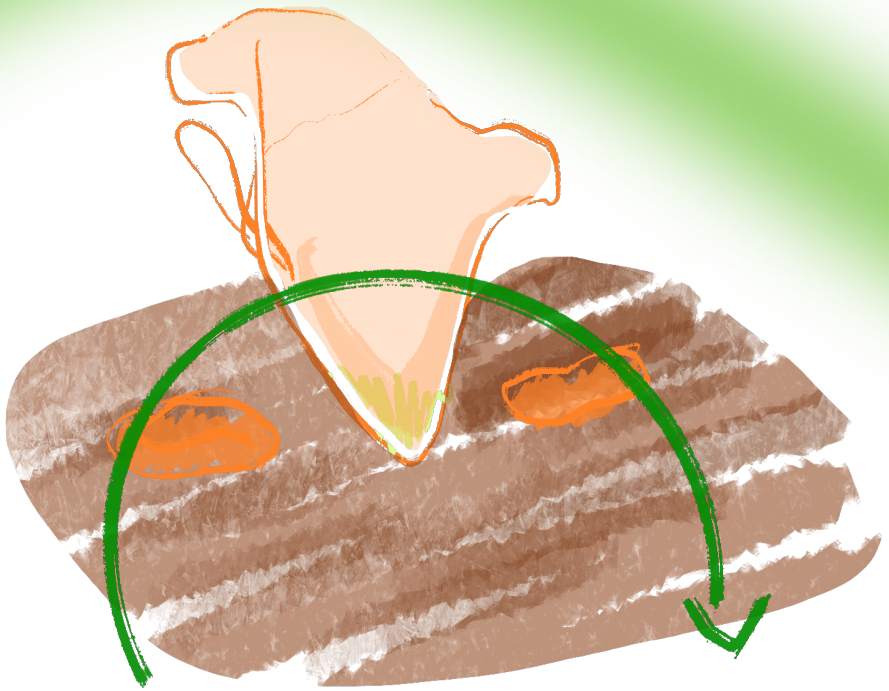




4. user journey

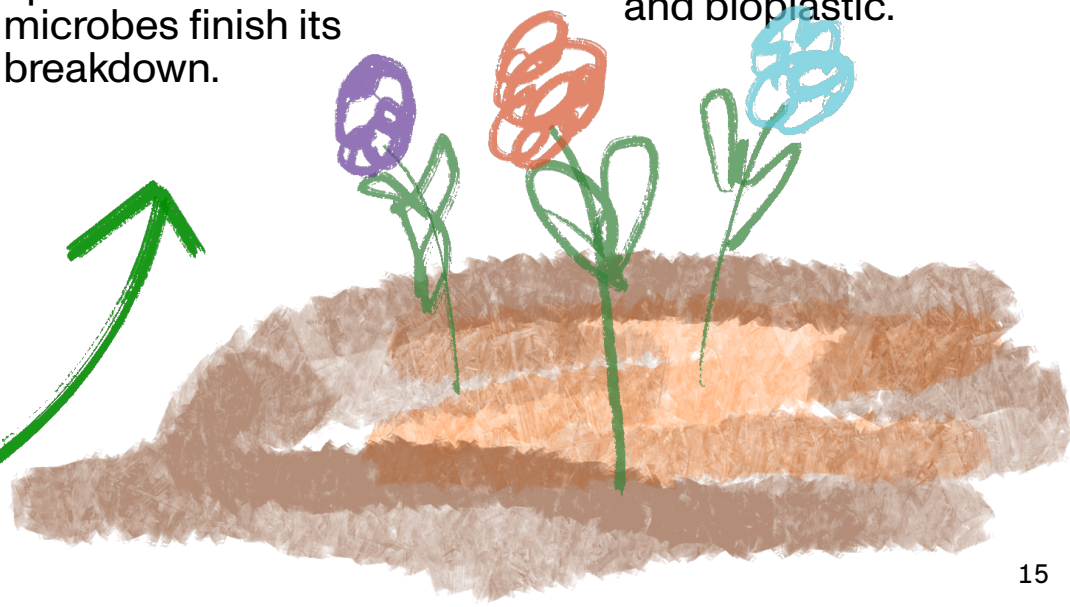
Purchase/Intention
Bought with purpose, for a visit of remembrance.

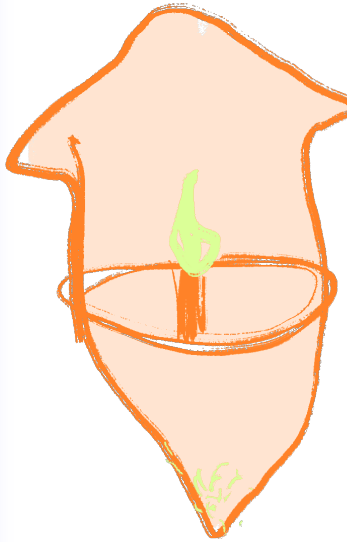
Placement
Set at the grave. The beautiful light and classic shape signal reverence and care.



Regeneration
Seeds within the material sprout, rooting in the soil enriched by the decomposing wax and bioplastic.

Decomposition
The bioplastic shrinks, slumps, and breaks apart. Rain and microbes finish its breakdown.





Burn
The wax burns slowly over hours. The casing holds the shape, gradually softening.

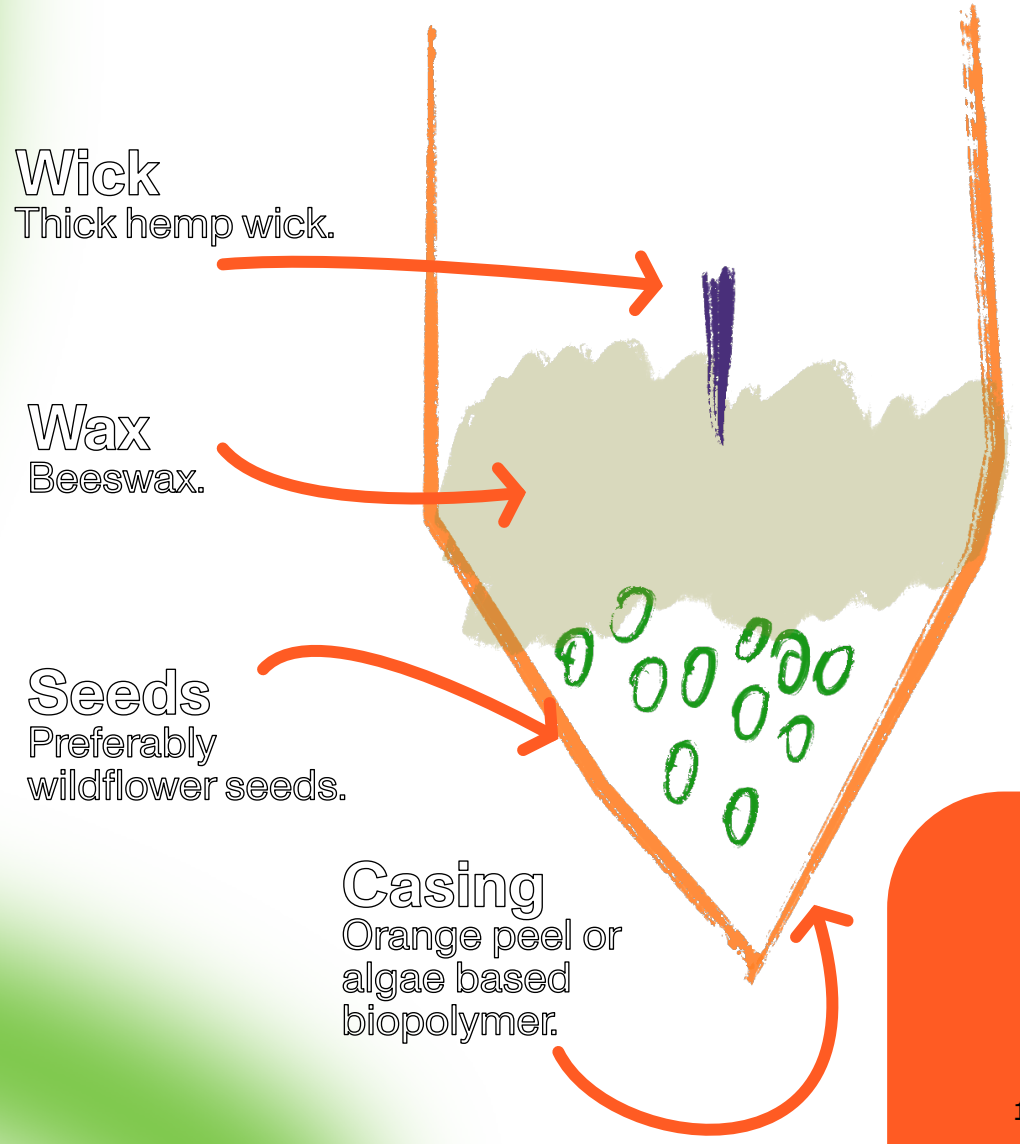
5. feasability

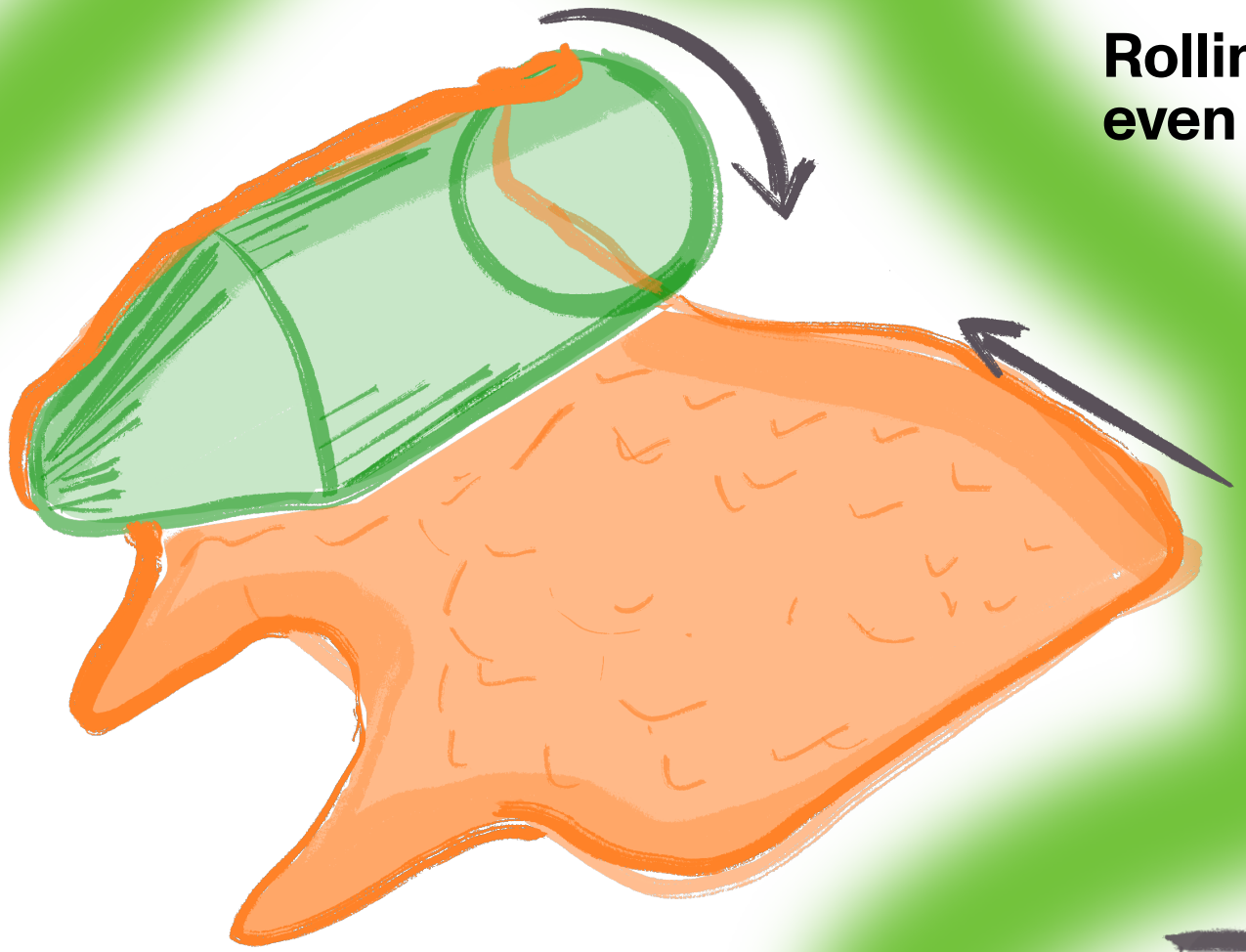
Material

Material choices also support environmental goals and technical feasibility. Beeswax burns almost completely, leaving minimal residue and attracting pollinators as it melts. An orange-peel-based biopolymer casing can be engineered to decompose fully in soil within two to four weeks. The wick typically breaks down in four to six weeks, while the beeswax itself decomposes over four to eight weeks. Structurally, the moulded form is designed to be sturdy enough to contain liquid wax while burning, yet thin and engineered to crack and collapse safely once heat has weakened it, ensuring it leaves no lasting trace in the landscape.

Anatomy

The candles biopolymer shell holds the entire structure together. It is meant to decompose with heat and time. At the bottom you will find seeds with peat moss to keep the seeds dry. Beeswax is then poured on top, with the wick in place, at a temperature near the solidification temperature in order to not harm the seeds.



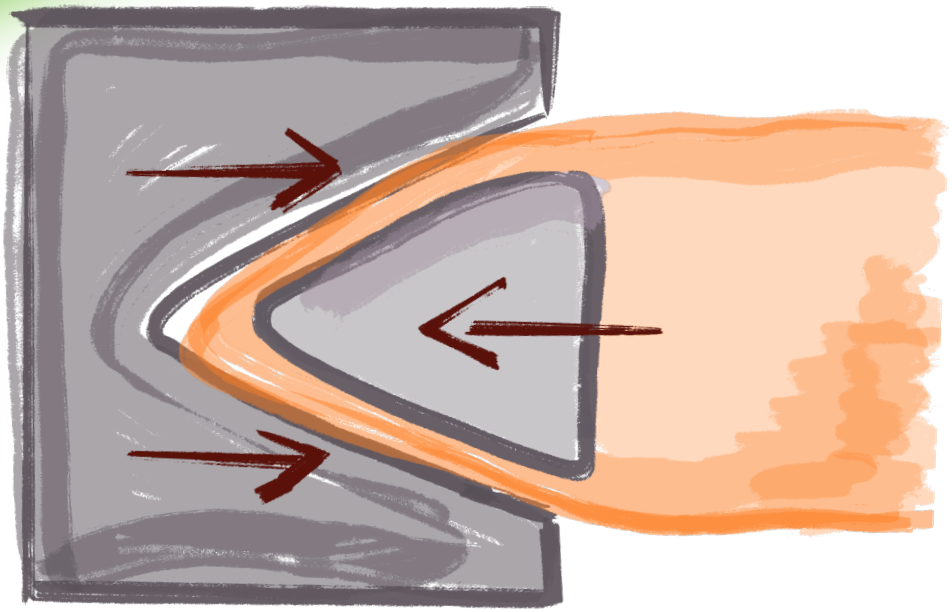


Rolling and pressing, even thermoforming.

Not too dissimilarly, the material may also be pressed into a mould with a positive and a negative form seen below. The material would then be dried out and would later on be used as the casing of the candle into which wax would be poured. I found that the casing needed to be submerged in ice water in order for it not to melt, therefore it is reasonably foreseeable that this would also need to be done with the much more heat sensitive biopolymer. Many trials with materials like bio-polyethylene, terranyl, fibernyl and PHA have shown great promise in the world of thermoforming and 3d printing with bio-polymers.

Production

Above you can see how the outside casing can be formed; one idea would be to roll a flat two dimensional version of the casing into the mould. Kind of like how hand made ice cream cones are made, there would be a mould around which the shell would be rolled. The edges that meet would overlap and be joined to produce the shape.



Biopolymers

Biopolymers derived from food and plant waste, like orange peels and algae, are increasingly seen as promising alternatives to petroleum-based plastics. They offer an appealing sustainability story: they use renewable or waste feedstocks, can be biodegradable under the right conditions, and potentially reduce the carbon footprint of disposable or short-lifespan items.

Orange peels are rich in pectin, cellulose, and essential oils. Pectin extracted from citrus waste can be processed into films and gels that are flexible, somewhat water-soluble, and biodegradable. However, pure pectin films can be brittle unless plasticizers (like glycerin) are added. Commercial-scale production of pectin-based bioplastics remains niche, partly because

extraction and purification processes can be resource-intensive if high clarity or mechanical strength is needed, but for small-scale, discardable, or artisanal products which can be water sensitive, they are quite feasible.

Algae is an even more exciting biopolymer source. Seaweeds and microalgae can produce natural polymers like alginate, agar, and carrageenan.

Algae cultivation can be very low-impac, for example, it doesn't compete with food crops for arable land. Algae-based bioplastics have been commercialized to some degree, however scalability challenges exist, such as ensuring consistent raw material supply and reducing production costs. It is clear that there is a future for these products in their niches.

6. closing

What is remarkable is the materials which are available to us, and the low tech ways we are able to produce products which have a lasting effect within their use cases. Plastics are one of the most under-rated materials available to us and we consistently under estimate their impact on design. We need to shift our understanding of plastic and how we view it to that of a magical material which will not be abundant forever. The applications of petroleum based plastics should indeed be one where absolutely necessary. The recycling of not-only higher grade plastics should be taken into account and refreshed to not merely satisfying capitalistic intentions, and alternatives be used elsewhere.

We can make many things out of many things, and this project touches on the feasibility of us discovering and using biopolymers such as algae/citrus based polymers in a not-only-diy sense. I want to especially thank MUJO lab for help with this project!