
Arima
the botanical
alchemist
AINHOA CADARSO

1

Intro

“Arima emerges as a testament. Biodegradable pieces designed to nurture life on fabric, turning clothing into a living ecosystem worn like armor. Naturally dyed with plants, it reclaims witch as a symbol for the countless women silenced and punished for their deep knowledge of nature, healing, and survival. Through this garment, their voices rise. Keepers of herbal wisdom, healers, guardians of the earth’s secrets.

Arima bridges nature and womanhood, honoring a bond once feared and demonized but never truly broken. It invites wearers to care for its growth, to nurture and be nurtured, creating a ritual of connection. More than a garment, it is a statement of reclaiming power, of celebrating what was nearly erased. It speaks of healing, memory, and transformation: of roots that remain strong, even when cut down.”

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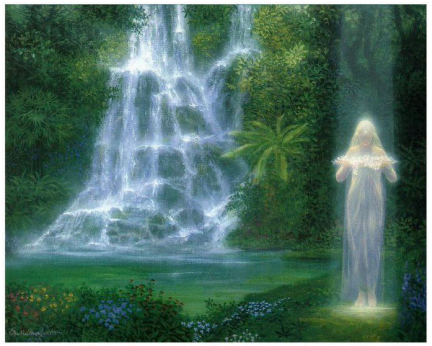
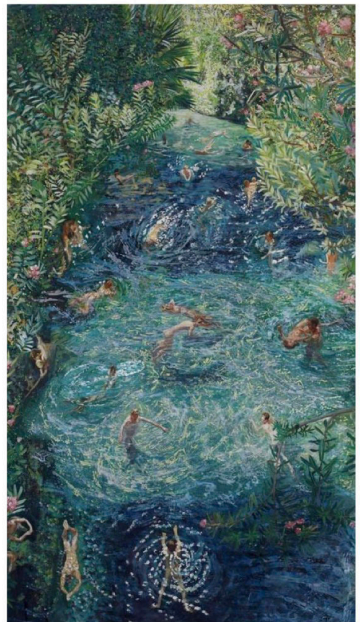
Concept

"The concept of a garment that grows and cultivates flowers blending fashion and emotional engagement. Encouraging the wearer to rethink their relationship with clothing by fostering an intimate bond with the piece."









C O N C E P T

Arima: The Botanical Alchemist is a speculative fashion piece integrating biodegradable modules that allow plants to grow on its surface, making the wearer a caretaker of a living ecosystem. It reclaims the word witch as a powerful symbol, honoring women silenced for their knowledge of nature. Through a feminist lens, it bridges nature and activism, challenging wasteful fashion practices and celebrating healing, resilience, and transformation. A living testament to women's power and connection to the natural world.

Arima: The Botanical Alchemist focuses on blending fashion, feminism, ecology, and history into a dynamic statement. It is not only a fashion design but a transformative tool for change, one that connects wearers to the long and often forgotten history of women as guardians of nature. By embodying this living, evolving garment, wearers would become active participants in both its creation and its constant state of change, much like the role women have historically played in nurturing and protecting the Earth.

The project taps into the power of symbolism, reclaiming the term "witch," often used as a negative label for women with knowledge of plants, medicine, and the natural world. The garment itself becomes a manifestation of that knowledge, not as something dangerous, but as a vital force of healing, strength, and wisdom.

By addressing contemporary fashion's wastefulness, Arima challenges the norms of fast fashion and invites a more sustainable and thoughtful approach to clothing, one that incorporates environmental consciousness and reverence for the cycles of life. The use of natural dyes and biodegradable materials further enhances the garment's connection to the Earth, making it not just an aesthetic statement but a part of an ecological movement.

This project also highlights the concept of ritual, connecting the wearer to something much larger than themselves: the heritage of women who were persecuted for their relationship with nature. In this way, The Living Garment does more than challenge fashion, it shifts the way we think about power, history, and connection to the natural world.

In essence, it's an artistic act of rebellion, a protest against the forces that seek to separate us from nature. It's a celebration of resilience, the strength of women, and the vital, ongoing dialogue between human beings and the environment.

C O N T E X T

Since this project is contextualized in the Basque Country with a very relevant past in terms of witchcraft it is important to dig into it.

The culture of witches in the Basque Country is rich, mysterious, and deeply intertwined with both historical events and local folklore. The Basque region, which spans parts of northern Spain and southwestern France, has long been associated with unique traditions, language, and a history of persecution and superstition surrounding witches.

In the Basque Country, the witchcraft tradition has roots in pre-Christian beliefs, where the natural world, including the mountains, forests, and animals, held great spiritual significance. Many of these early traditions involved reverence for nature and the natural forces, much like other European pagan practices. Over time, however, this spiritual connection with nature would become associated with witchcraft, which was later demonized by the Christian Church.

The Witch Hunts (16th-17th centuries)

During the 16th and 17th centuries, the Basque Country was a hotbed of witchcraft accusations. This was a period of intense witch hunts across Europe, spurred by the growing influence of the Inquisition and religious fervor. Basque witches were accused of practicing sorcery, often involving rituals in isolated rural areas and forests.

The Zugarramurdi Witch Trials were one of the most infamous events in Basque witchcraft history. In 1610, the Inquisition conducted a large-scale witch trial in Zugarramurdi, resulting in the execution of 40 women and the torture of hundreds.

Cultural Role of Witches in Basque Folklore

In Basque folklore, witches were believed to possess powerful abilities, such as the power to curse or heal, to control the weather, and to communicate with spirits. The Basques have their own unique mythology surrounding witches. Witches were often portrayed as both feared and revered figures, associated with the mystical and supernatural elements of Basque culture.

Witchcraft in the Basque region was often linked to the idea of a Sabbath, a night-time gathering where witches would supposedly worship the devil, practice magic, and even engage in orgies. These events, whether real or the product of Inquisition propaganda, were believed to take place in remote forests and caves. The Sabbath was seen as a space where Basque witches could subvert societal norms and engage in practices that were considered taboo.

The Basque language (Euskara) has unique terms for witches and witchcraft that reflect its deep cultural roots. For example, Akelarre. This term, which is used in many languages, refers to the traditional witch's meeting in Basque culture.

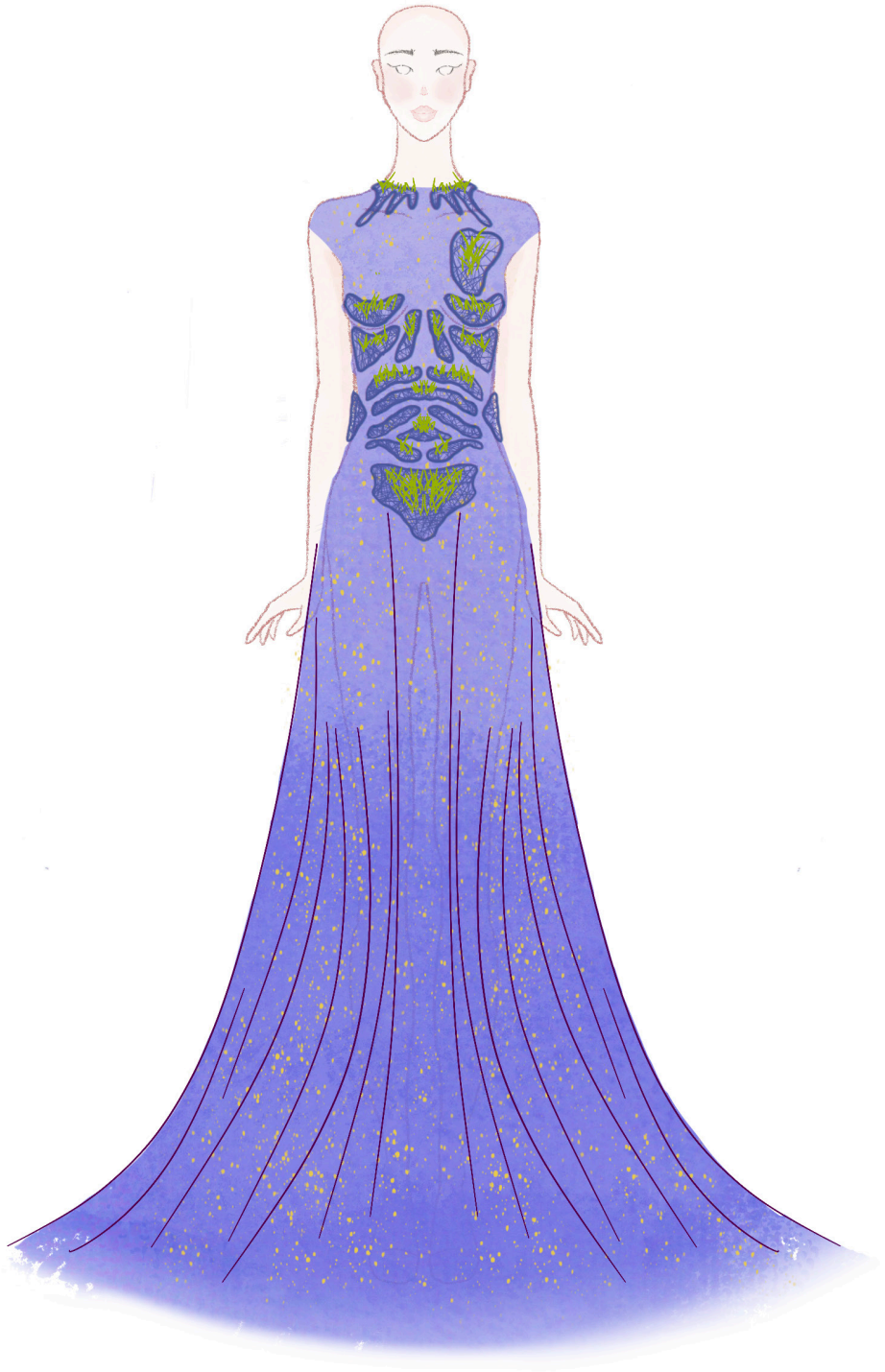
Garment design 3

D E S I G N

The base dress was envisioned to be flowy and ethereal, made with natural fabrics that respond to the movement of the body and the environment. It features a fitted bodice that gently shapes the torso, with a deep open back to evoke freedom. From the waist down, the dress expands with volume and softness, allowing the air and light to move through it, reflecting both the dreamlike aesthetic and the organic growth it's meant to support.

The design process began with a rough sketch, a spontaneous visualization of what the witch of this new era might wear. From there, the concept evolved organically, always with the understanding that the dress itself should remain visually simple.

The silhouette holds a subtle whimsical quality, inspired by the mystical figure of the witch. However, rather than drawing from fear or darkness, this design reflects a celebration of healing, wisdom, and connection to nature. It was essential that the wearer, the "good witch", could feel light, unburdened, and empowered, fully in tune with the botanical life growing from the garment.



C O N C E P T

The simplicity of the dress was essential to give space and presence to the biodegradable pots, the living modules integrated into the piece. The result is a garment that doesn't compete with its natural elements, but rather frames and amplifies them.

Each biodegradable module sewn into the dress is unique and was carefully designed to represent a different body system, symbolizing the wearer as both a caretaker and an extension of nature's intelligence. There are six distinct module designs, each inspired by a specific system of the human body:

Cardiovascular System – Circulates blood and oxygen throughout the body.

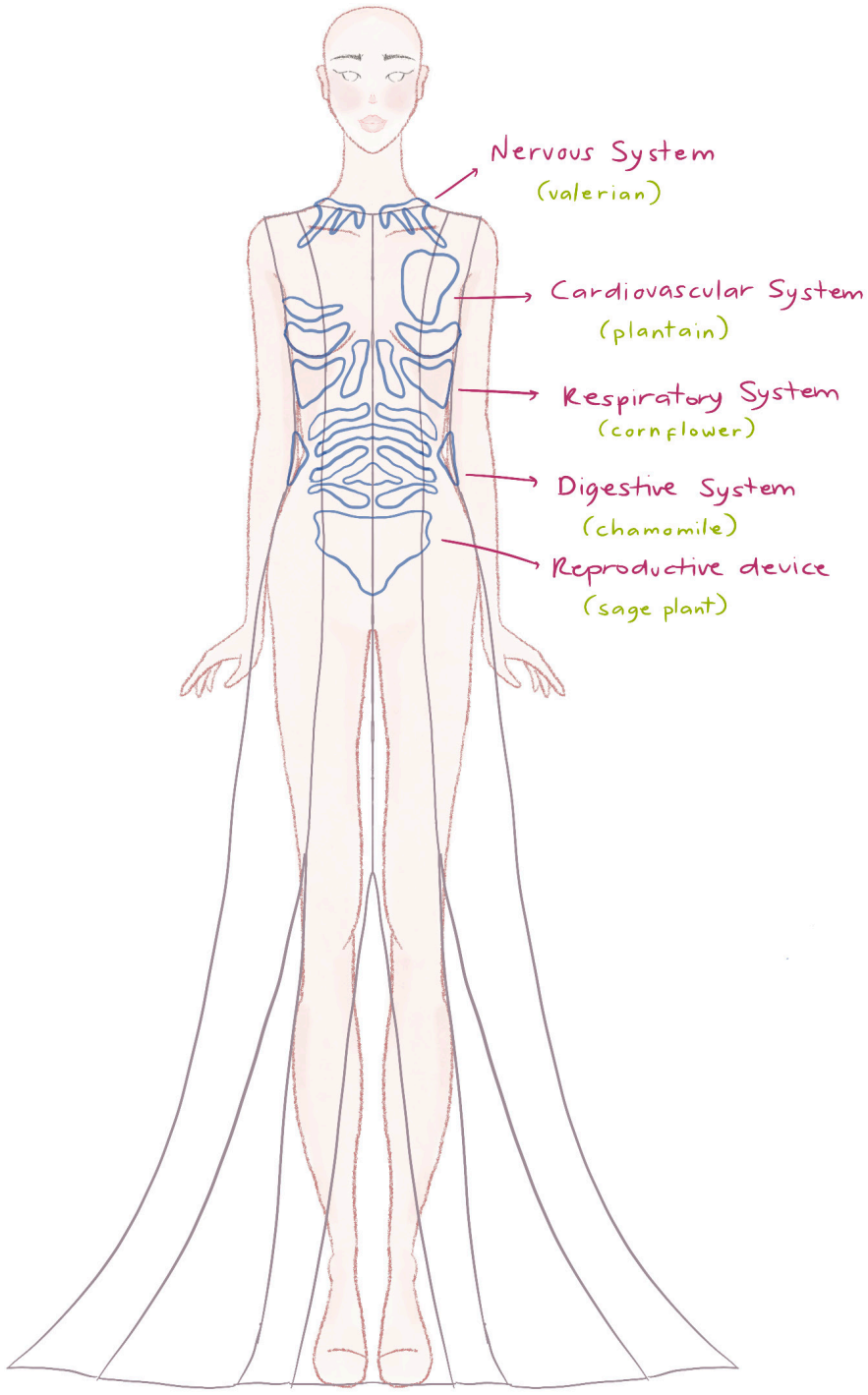
Nervous System – Coordinates sensation, movement, and communication between body and brain.

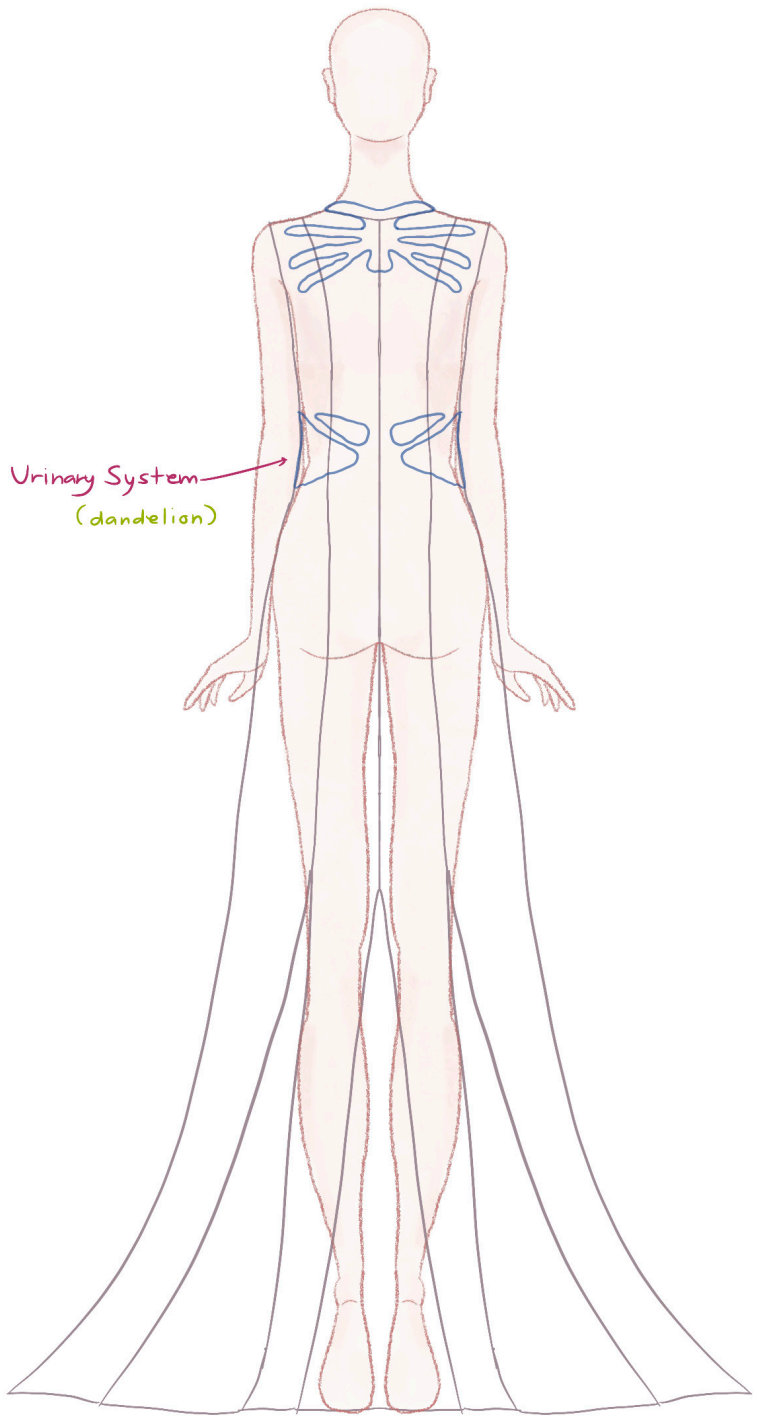
Respiratory System – Manages the intake of oxygen and release of carbon dioxide.

Digestive System – Breaks down food and absorbs nutrients.

Reproductive System – Focused here on the female reproductive system, as the project embraces and celebrates womanhood and its generative power.

Urinary System – Regulates fluid balance and removes waste from the body.

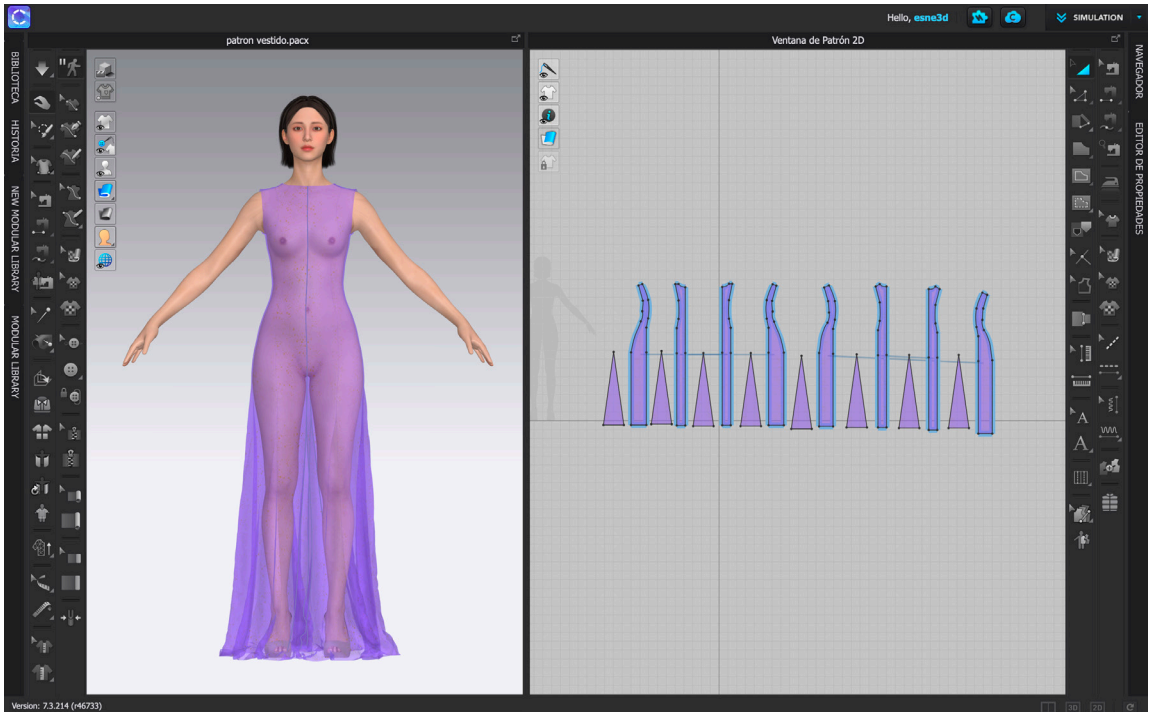

Nervous System
(valerian)
Cardiovascular System
(plantain)
Respiratory System
(cornflower)
Digestive System
(chamomile)
Reproductive device
(sage plant)


Urinary System
(dandelion)

TECHNICAL DEVELOPMENT

All six modules were designed using Grasshopper, a parametric design program, and are inspired by the venation patterns found in leaves, further reinforcing the deep connection between human biology and the plant world. (More information on the Modules Chapter)

For the technical development, the patterns of the dress were created using Clo 3D, a digital fashion design software. This allowed for precise experimentation with volume, proportion, and material behavior, ensuring the final garment aligned both aesthetically and functionally with the rest of the project's components.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Medicinal plants 4

E X P L O R I N G

A significant portion of my research has been rooted in the study of local flora surrounding the lab where I have developed this project, Basque BioDesign Center. Observing and analyzing these plants in their natural habitat has provided a deeper understanding of their potential medicinal properties and cultural significance.

Two key texts that have guided my research are Medicinal Herbs of the Basque Country and Powerful Plants. Medicinal Herbs of the Basque Country has been instrumental in offering a regional perspective on traditional herbal medicine, detailing the uses and histories of various plants native to that area. On the other hand, Powerful Plants has broadened my knowledge by exploring the transformative properties of plants from diverse ecosystems and traditions, providing a global perspective on their uses in healing and well-being.

W O R K I N G W I T H

Cornflower (Centaurea cyanus)

Recognized for its anti-inflammatory and soothing properties, particularly in eye care and skincare. It has been traditionally used to reduce eye strain, redness, and irritation. Additionally, its antioxidant properties make it beneficial for skin hydration and wound healing. Cornflower is also known for its benefits in respiratory health, as it can help relieve congestion, ease symptoms of colds, and support lung function through its mild expectorant properties.

Dandelion (Taraxacum officinale)

A powerful detoxifying plant, commonly used for liver support and digestive health. Dandelion root is rich in prebiotic fibers that aid gut health, while its leaves act as a natural diuretic, supporting kidney function and reducing water retention. It is also used to help regulate blood sugar levels.

Valerian (Valeriana officinalis)

A widely respected herb for reducing anxiety and improving sleep quality. It acts as a natural sedative by interacting with neurotransmitters in the brain to promote relaxation. Valerian root is often used to ease symptoms of stress, restlessness, and muscle tension.

Sage (Salvia officinalis)

Known for its antimicrobial and digestive benefits, as well as its traditional use in spiritual cleansing. It is often used to relieve sore throats, improve memory, and support hormonal balance. Sage is also effective in reducing excessive sweating and has been linked to cognitive health benefits. Sage is also highly regarded for its role in feminine reproductive health, where it has been used to regulate menstrual cycles, alleviate symptoms of menopause, and support overall hormonal equilibrium.

Chamomile (Matricaria chamomilla)

Renowned for its calming effects, often used in teas to promote relaxation and sleep. Chamomile also has anti-inflammatory and antispasmodic properties, making it useful for digestive discomfort, menstrual cramps, and skin irritations. It has been studied for its potential role in reducing anxiety and mild depression. It has been traditionally used to soothe digestive issues such as bloating, indigestion, and irritable bowel syndrome (IBS), due to its ability to relax the muscles of the

Plantain (Plantago major)

A versatile plant with wound-healing and anti-inflammatory properties, often used for skin care and minor injuries. Plantain leaves contain allantoin, which promotes cell regeneration and accelerates healing. It has also been used as a natural remedy for insect bites, burns, and digestive issues. Additionally, plantain has been studied for its cardiovascular benefits, as it contains compounds that may help lower blood pressure, improve circulation, and support overall heart health.

G R O W I N G
E X P E R I M E N T

To further understand the growth and adaptability of these plants, I conducted an experiment to grow them on an alternative substrate instead of soil. The goal of this experiment was to find a medium that could later be easily transplanted onto fabric for wearable plant integration. The substrate chosen for this experiment was agar agar, a gelatinous substance derived from seaweed, which provides a moist and stable environment for seed germination.

Materials and Process

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Substrate Recipe

1 liter of water mixed with 12 grams of agar agar creates the growing medium.

Handmade Greenhouse

The first stages of plant growth took place in a handmade greenhouse. This greenhouse was set up in a dark space and equipped with LED UV growing lights to control light exposure.

Seed Planting

Seeds were placed in the agar substrate, ensuring they were evenly distributed. The agar must remain consistently moist for successful germination.

Watering

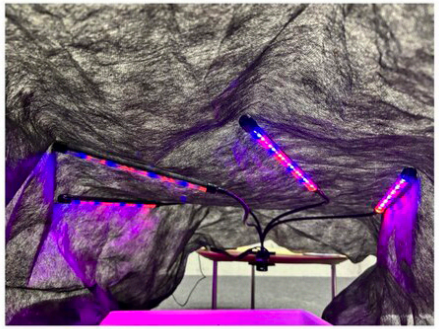
The seeds were watered twice a day to maintain proper moisture levels.

Light Exposure

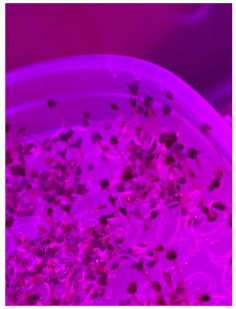
Once the first green leaf sprouted, the seedlings were exposed to LED UV lights in cycles of 8 to 12 hours per day. This exposure encouraged further growth and strengthened the plants.

Root Development and Replanting

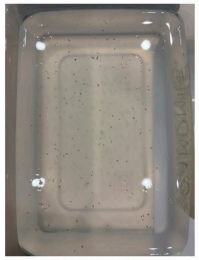
When the plants developed strong roots, they were ready for transplantation. The agar needed to remain wet throughout the process to ensure proper root formation and prevent dehydration.

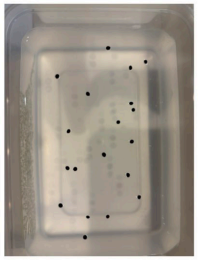


Handmade greenhouse with UV lights



First sprouts ready to receive UV light





Seeds planted onto the substrate

Plants ready to be replanted

Biochromes

NATURAL DYES

Natural dyes, derived from plants, minerals, and other organic sources, have been used for centuries to color textiles, paper, and other materials. These biochromes, or naturally occurring pigments, offer a sustainable and environmentally friendly alternative to synthetic dyes, aligning with traditional knowledge and ecological practices.

L O G W O O D

Logwood (Haematoxylum campechianum) is a tree native to Central America and the Caribbean, particularly known for its heartwood, which yields a deep, rich dye used for coloring textiles. This natural dye has a long history, especially in the 17th and 18th centuries when it became an important export for European textile industries. The dye derived from logwood, known as hematoxylin, is rich in shades of purple, blue, and black, depending on the mordant and the fabric used.

Historically, logwood was highly sought after for its ability to produce vibrant, fast colors. It was considered one of the most valuable dyes of its time, and it contributed to the development of the textile industry in Europe. The dye's use was particularly prevalent in England, where it was used to color wool and silk, especially in the creation of luxury garments.

Logwood dye became significant not only for its color but also due to the social context of its production and use. The exploitation of logwood trees took place largely in the Caribbean, where it was harvested by enslaved individuals working on plantations. The women, often enslaved or from lower social strata, used their knowledge of plant-based dyes to support their families and communities. They played a crucial role in the preparation of logwood dyes, but their contributions were overshadowed by the patriarchal structures of the time. This history highlights how, in many cultures, women have historically been the custodians of plant knowledge and natural dye practices, yet their roles in these industries were frequently erased or ignored.

M O R D A N T

Mordanting is a crucial step in the natural dyeing process, as it helps fix the dye to the fabric, improving colorfastness and intensity. A mordant is a substance that binds the dye to the fibers, ensuring that the color remains vibrant and does not wash out easily over time. Different mordants can also alter the final hue of the dye, creating a range of shades from the same dye bath.

Proper mordanting ensures that the dye adheres well to the fabric, resulting in more vibrant and lasting colors.

For my project, I used alum (potassium aluminum sulfate) as the mordant. Alum is a commonly used mordant in natural dyeing because it is relatively safe to handle and does not significantly alter the color of the dye

Steps for Mordanting with Alum:

Weigh the Fabric – The amount of mordant needed depends on the weight of the fabric. Measure the fabric's dry weight to determine the appropriate amount of alum to use.

Prepare the Mordant Bath – Fill a large pot with hot water and dissolve the appropriate amount of alum in the water. The general ratio is about 10-15% of the fabric's weight.

Soak the Fabric – Submerge the fabric in the mordant bath and let it soak for about an hour. The water should be hot but not boiling, as excessive heat can damage delicate fibers like silk.

Rinse and Dry – After soaking, remove the fabric, rinse it gently, and allow it to dry before proceeding with the dyeing process.

DYE OF THE MAIN DRESS

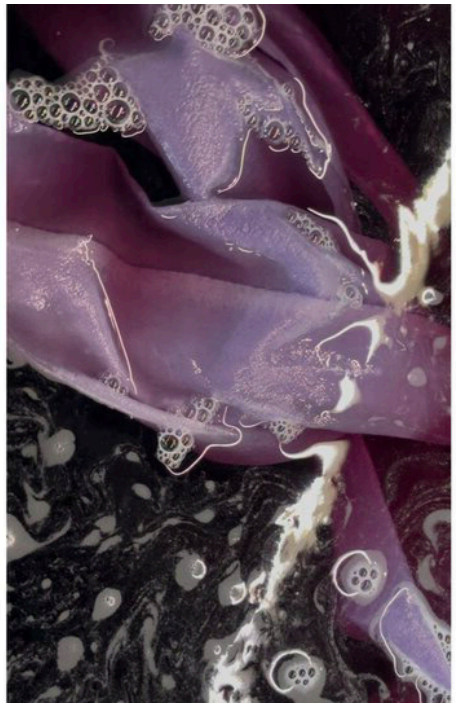
* Prepare the dye bath by adding logwood to boiling water. The boiling process is necessary for the logwood to release its color. 10% of the WOF = grams of logwood used.

* Once the color is fully extracted and the water is no longer boiling, collect with a strainer the logwood pieces so that they do not stain the fabric.

* To achieve a smooth gradient, lower the fabric into the bath gradually. The sections that need to be the most vibrant should remain in the dye bath the longest.

* Allow the fabric to absorb the dye until the desired shade is achieved.

* Rinse the fabric with cold water and let it air dry.



DYE OF THE SECTIONS

* For specific sections of the dress that needed a deeper purple shade, a second dye bath was prepared using double the amount of logwood. 20% of the WOF = grams of logwood used.

* The fabric pieces were submerged in the concentrated dye bath and left to absorb the color.

* Collect with a strainer the logwood pieces so that they do not stain the fabric.

* Once the desired deep purple tone was reached, the fabric was rinsed in cold water and left to air dry.

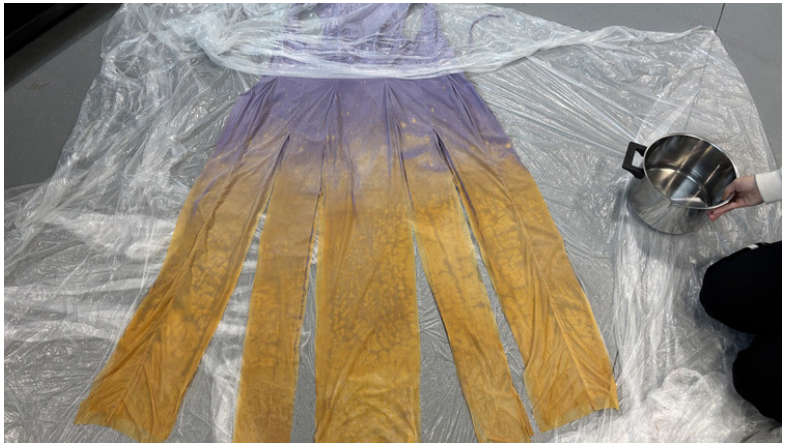
A L T E R A T I O N S

My design features a gradient effect, transitioning from a yellow-orange hue at the bottom of the dress to violet at the top. To achieve this color scheme, I first conducted swatch tests to understand how the dyes interacted with silk and how they could be layered effectively.

For the dress to have the violet tone the PH level of the fabric has to be, what it is considered, “normal”. This means that when testing the PH level of the dye water the level needs to be neutral (7).

To achieve the yellowish color, the PH level needs to be altered into a more acid level (3-4).

To further manipulate the pH level of the dye and enhance color variation, I experimented with citric acid.



6

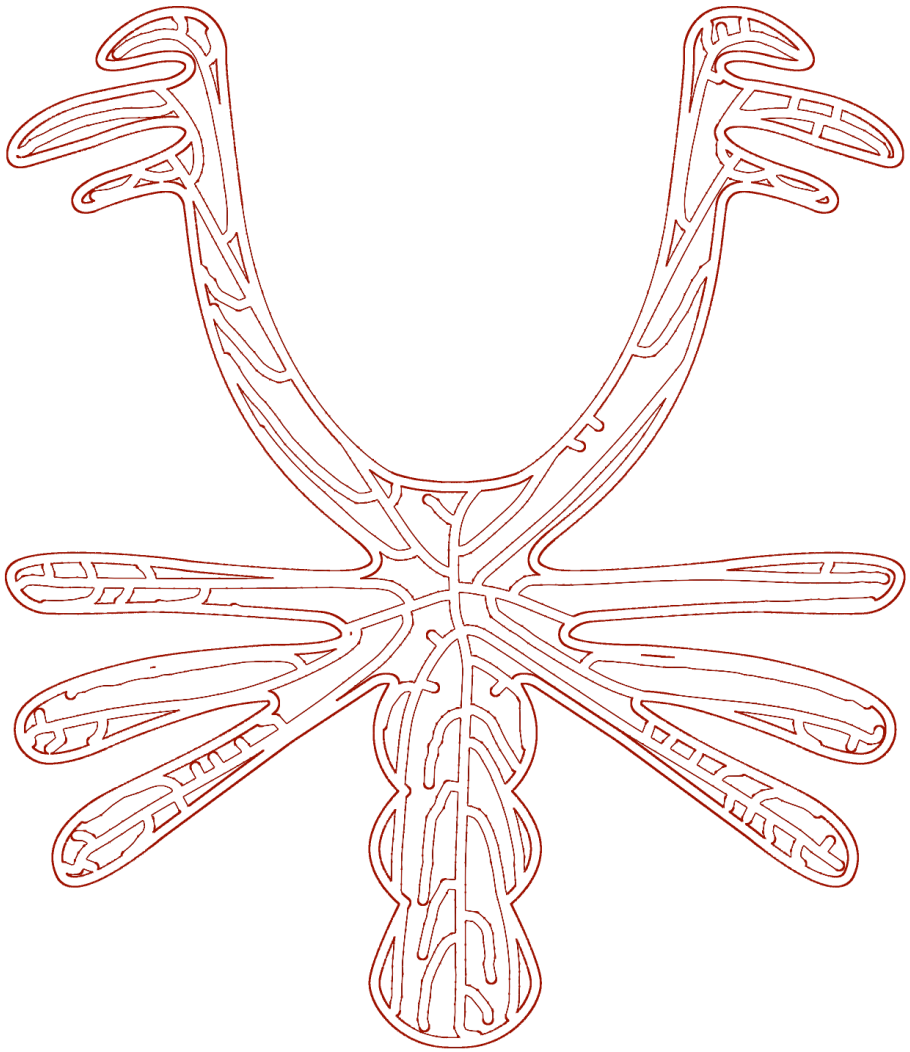
Modules

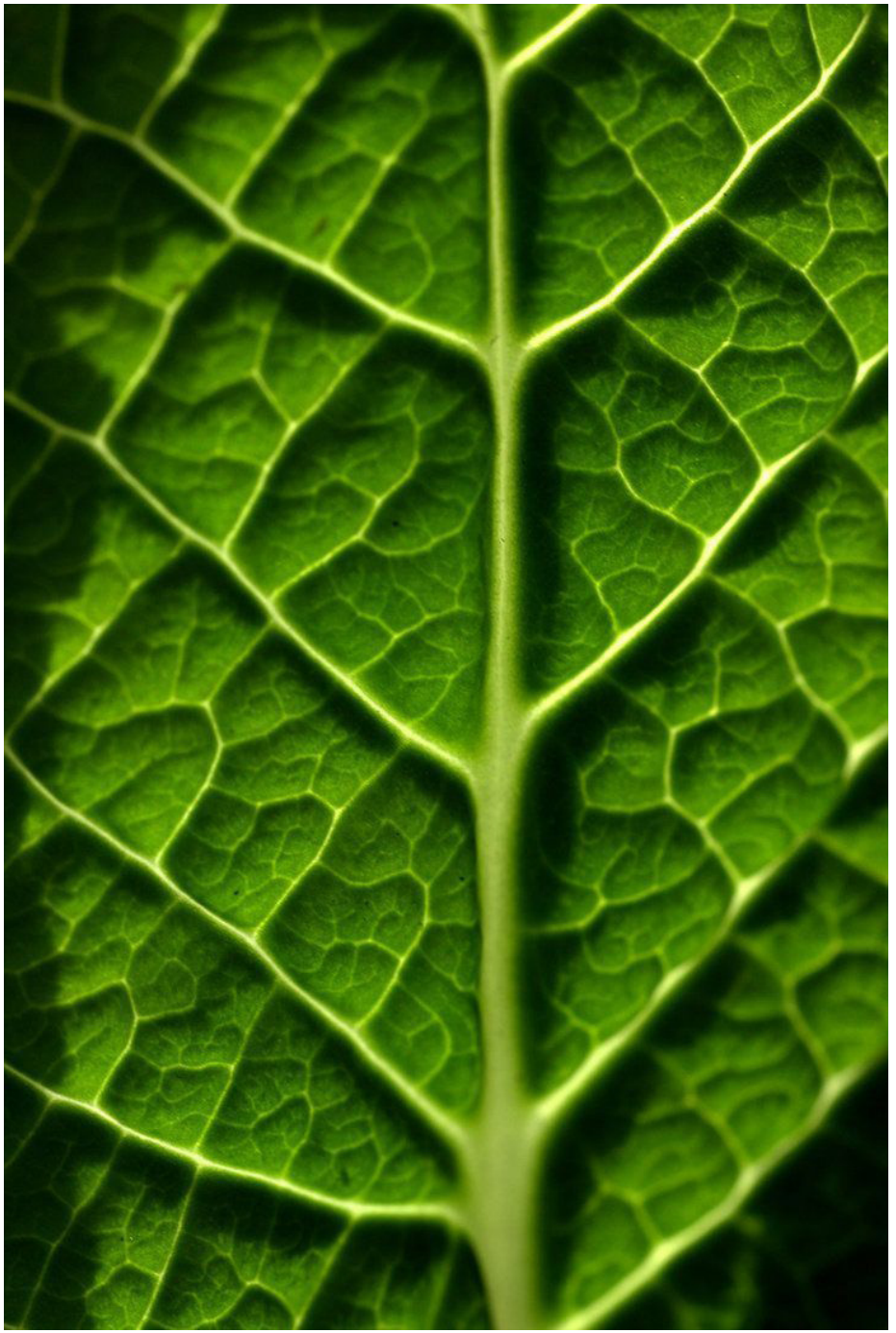
BIODEGRADABLE POTS

The biodegradable pots are not only functional growing spaces; they serve as poetic vessels that connect the human body to the natural world. Their placement on the garment is not random—they are designed to align with specific bodily systems, turning the wearer into both caretaker and symbolic representation of ecological interdependence.

Each module represents one of six body systems: nervous, cardiovascular, respiratory, digestive, reproductive, and urinary. These are the systems that keep us alive—processing, connecting, cleansing, regenerating. By assigning a plant to grow from each system, the garment transforms the body into a nurturing ecosystem, blurring the line between biology and botany, between the human and the plant.

The design of each module was developed through a parametric design approach, inspired by the venation patterns found in leaves. These natural branching structures guide the shape of the pots, creating organic and intricate forms that echo the way nutrients flow through a plant. This connection between botanical systems and body systems reinforces the symbiosis at the core of the garment. The modules are intentionally unique, each one shaped slightly differently, reflecting the diversity and irregular beauty found in both the human body and the plant world.





PARAMETRIC DESIGN

To bring the biodegradable modules to life, I worked with the parametric design software Grasshopper, a powerful visual programming tool integrated with Rhino. As mentioned earlier, the pattern for the modules was inspired by the venation of leaves, the intricate, branching structures that distribute nutrients and water throughout a plant. This natural system offered not only a conceptual base but also a visually rich and functional geometry for the modules.

The design process began with basic outline sketches created in Adobe Illustrator, where I established the silhouette and scale of each module. Once the outlines were defined, I imported them into Grasshopper to build the inner pattern structure.

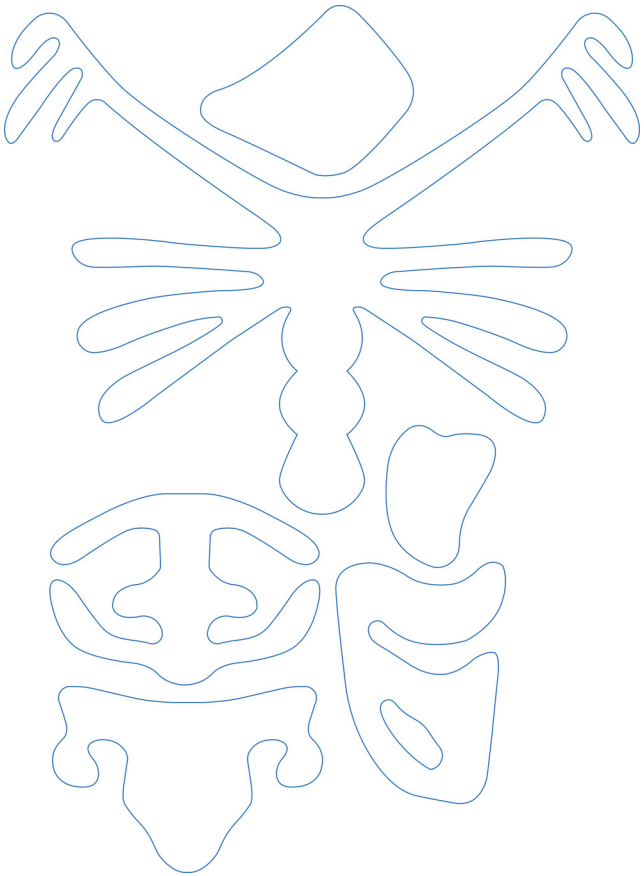
To achieve the complex venation-inspired geometry, I used a plugin called Parakeet, a versatile toolset within Grasshopper that allows for the generation of sophisticated parametric patterns. Parakeet offers a wide range of generative design options, and by adjusting its parameters, I was able to customize the pattern density, flow, and direction to reflect both the anatomical inspiration and the needs of each module.

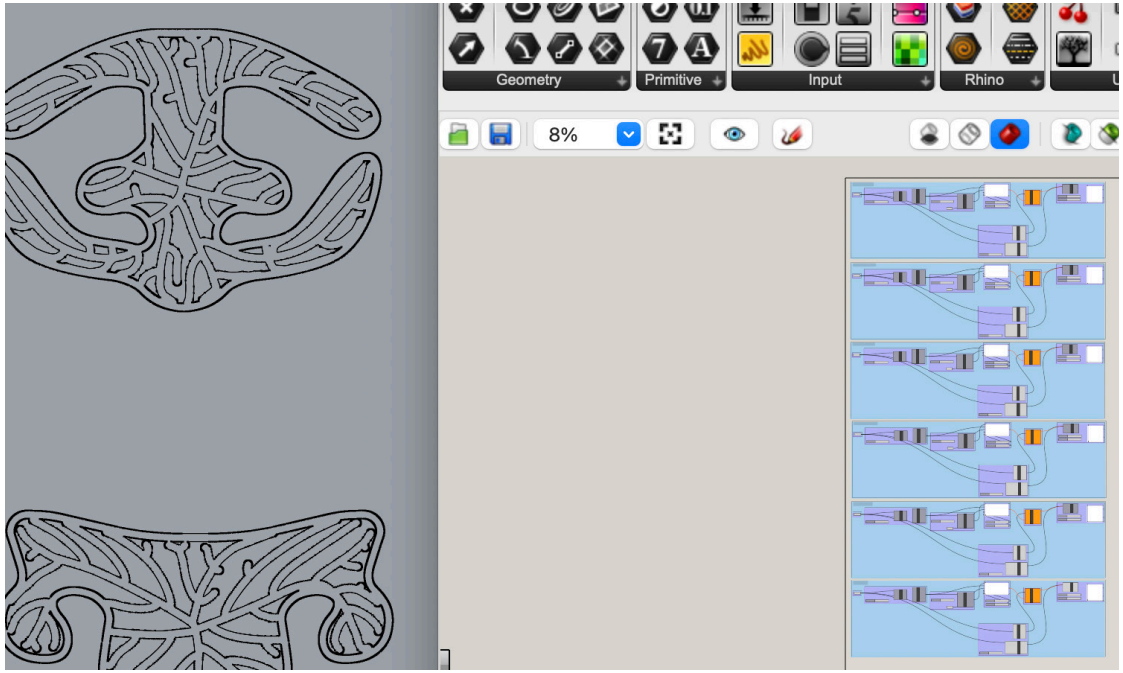
C O N C E P T

The concept was to fabricate molds for the pots, cut precisely with a laser cutter using the Grasshopper designs. This approach would maintain the delicacy and complexity of the original modules while solving the collapse issues faced during 3D extrusion. Once the molds were ready, natural-based bioplastic could be poured into them, taking the shape with high fidelity.

This method offered greater flexibility: if a pot didn't form perfectly, it could simply be remade without needing to restart the whole fabrication process from zero. It brought an adaptable and modular quality to the production, matching the evolving and organic spirit of the garment.

Shifting to bioplastics and laser-cut molds preserved the connection to nature while enhancing technical precision, a perfect reflection of the balance between the natural and the digital that defines the project.

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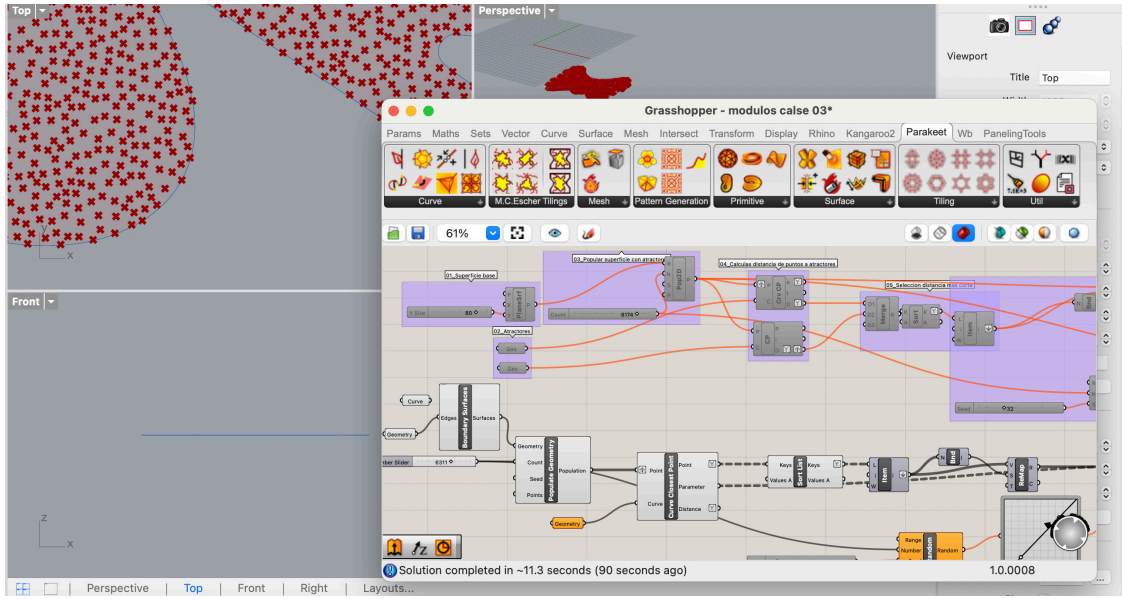
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BIOSILICONE

The next step was to create the biosilicone, a natural, flexible material that would form the biodegradable pots. The recipe was simple but effective, composed of gelatin, water, and glycerin and cooked like any other bioplastic (heat all the ingredients in a pot).

To stay aligned with the project's sustainable and nature-rooted concept, I turned to the leftover dye bath water used previously to dye the fabric of the dress (the logwood-based dye). This solution not only integrated the concept more cohesively but also introduced a cyclical element, reusing material from another phase of the process.

However, this method presented a new challenge: logwood is sensitive to pH levels, and the gelatin in the biosilicone recipe lowered the pH, turning the originally deep violet dye into a yellow tone. To counteract this, I added a small amount of sodium carbonate to neutralize the pH and restore the original hue. This subtle chemical adjustment brought the color closer to the desired shade and opened up new possibilities.

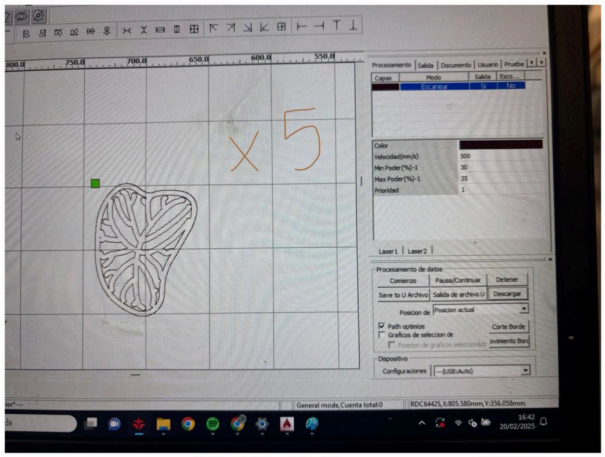
33% water
33% gelatin
33% glycerin
1 drop of natural preservative

M O L D S

With the decision to shift toward bio-plastic casting and the biosilicone ready, the next step was to prepare the molds. Since these molds needed to be reusable and durable, the material used was methacrylate.

To reduce material use and remain sustainable, I sourced scrap acrylic pieces from the laser workshop. A 5mm thickness was chosen for the final molds, thin enough to be cut efficiently, yet thick enough to hold the engraved detail.

Speed: 500 mm/s
Min. power: 30
Max. power: 35
Run 5 times to obatin the perfect depth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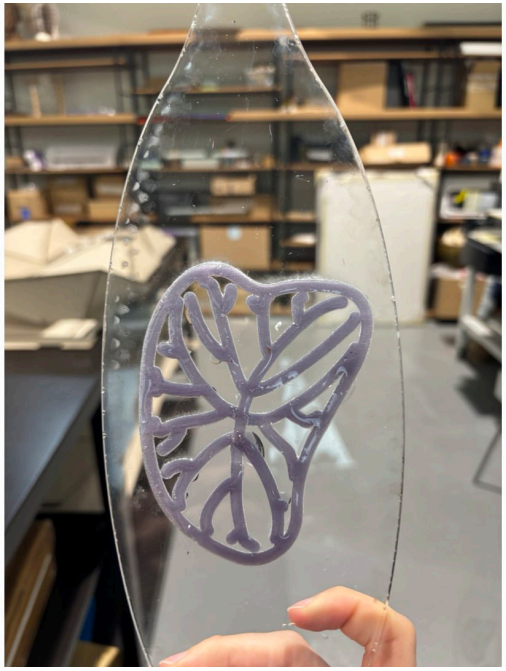

“In essence, it’s a protest against the forces that seek to separate us from nature. It’s a celebration of resilience, the strength of women, and the vital, ongoing dialogue between human beings and the environment.”

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the botanical alchemist

AINHOA CADARSO

FABRICADEMY FINAL PROJECT

ARIMA: THE BOTANICAL ALCHEMIST

Basque BioDesign Center

Biodiseño & Tecnología

FABRICADEMY

textile and technology academy