MYCOLL

A COLLABORATION FOR BETTER

SHLOKA DHRUVA

An extensive study on how a species prone to injury or death by Australian bushfires can be protected in nature, by nature through design.

AUSTRALIAN BUSHFIRES

Australia is prone to bushfires often owing to the weather conditions during a specific period every year preceded by high temperatures, low relative humidity, no rainfall & strong winds which combine to create an ideal condition for rapid spread of fire.

Heatwaves and droughts dry out the undergrowth and create conditions that increase the risk of bushfires.

Bushfires spread in three ways: direct flame contact, radiant heat and burning embers. Although bushfires take a few minutes to spread, they can smoulder for days.

Image 1: Canberra bushfires, 2003.

Image 2: Black summer, 2019-20.

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SOME SPECIES AFFECTED IN BUSHFIRES:

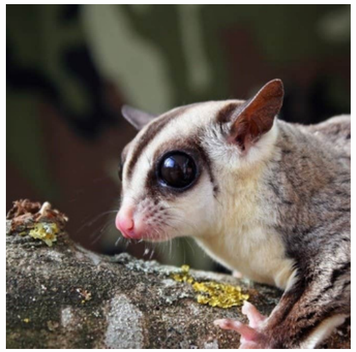

Image 3: Great Glider

Image 4: Koala

Image 5: Qoukka

Image 6:Echidna

Image 7: Kangaroo

The multiple number of species affected by bush fires are affected in various ways:

- Death due to the fires
- Succumbing to injury caused by fires
- Loss of habitat
- Loss of food
- Dehydration
- Smoke inhalation ....and more.

THE FOREST THAT WILL TAKE DECADES TO RECOVER

The **Iron Range Forest,** also known as the **Kituni-Payamu National Park** in Queensland, Australia is home to the most diverse range of wildlife seen.

In 2019, this area was hit by a cyclone leaving the area drier and filled with debris. In September, the area saw a bush fire, which did enough damage to nature & wildlife for people to speculate that the iron range forest will take decades to recover.

SPECIES IN THE IRON RANGE FOREST

Image 8: Magnificent riflebird

Image 9: Green tree python

Image 10: Rufous Spiny Bandicoot

Image 11: Fat tailed Dunnart

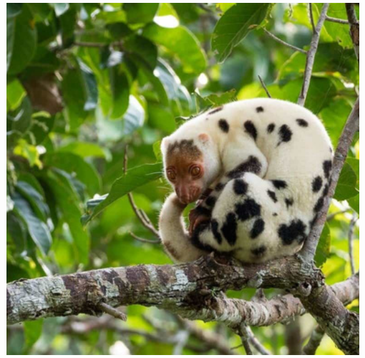

Image 12: Spotted Cuscus

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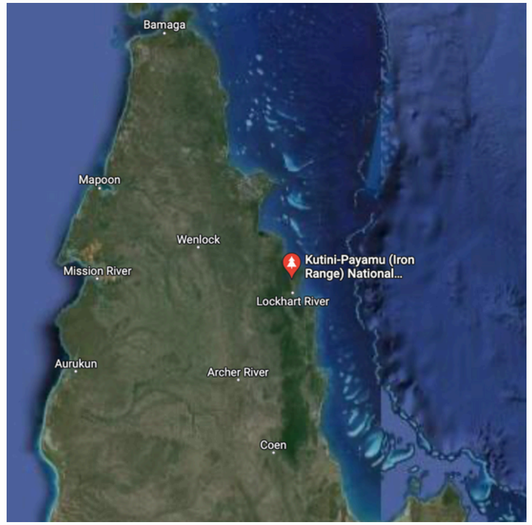

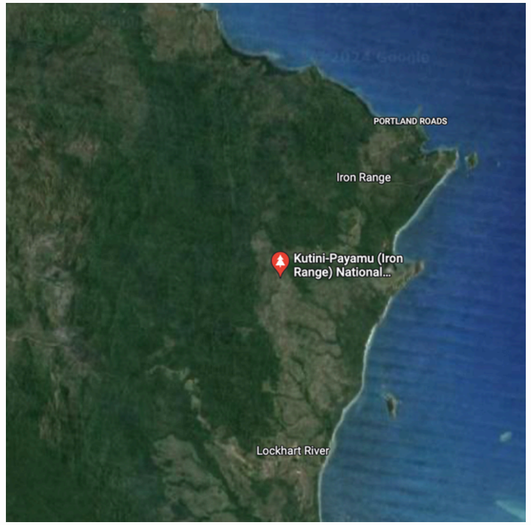

Image 13, 14, 15 & 16: The Iron Range Forest

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Image 17: The Iron Range Forest
Before fire

Image 18: The Iron Range Forest
During fire

Image 19: The Iron Range Forest
After fire

A BUSH FIRE CAN WIPE OUT THE WHOLE POPULATION

Dunnarts are nocturnal mouse-sized marsupials. The diversity occurs in the dry inland areas, which are also more prone to be affected by fires. Their large eyes give them excellent night vision to help them hunt.

Given a dunnart's home range can be as small as 50m, wildfires can wipe out an entire population.

Scientific Name: Sminthopsis
Life Span: 15-18 months
Location: Australia
Diet: Insectivorous
Type: Nocturnal
Animal Kingdom: Marsipuals
Pregnancy Span: can do for 6 months without breaks
Pregnancy Lasts: 13 days
Group: They normally survive in small groups

Image 20: Dunnart in his home.

FOOD CHAIN

Insects (Grasshoppers, Spiders, Beetles, Crickets) → Dunnarts → Feral cats / Foxes → Dingoes / Larger Carnivorous predators

Image 21: Grasshopper

Image 22: Dunnart

Image 23: Feral Fox

Image 24: Dingoes

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FUNGI

- Fungi can be single celled or very complex multicellular organisms.
- It can occur as yeasts, molds, or as a combination of both forms.
- Fungi are not plants. They are a group of microorganisms that are functional in ways more than one.
- It is an important part of soil biodiversity and this group can help to tackle global challenges, including climate change.

Image 25: Mushroom fungi

MYCELIUM

- Mycelium is a network of fungal threads or hyphae.
- Mycelia are of vital importance to the soil. They break down organic material, making its raw materials available again for use in the ecosystem.
- As the interest in mycelium grew, it is now being used in research for its use in clothing, packaging, construction & more.
- It takes anywhere from 1 week to 2 months to grow.
- Mycelium helps convert petroleum & other fossil fuels into useful nutrients for the environment. It is also water resistant, fire resistant and decomposes naturally over time.

Image 26: Mycelium

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MYCELIUM FOR THE ENVIRONMENT

Mycelium

- great fertiliser for the soil and compost
- holds a lot of carbon which keeps it out of the atmosphere
- able to break that carbon down into carbohydrates
- biodegradable and sustainable as well as fire & water resistant.
- acts as a fertiliser & worms, snails can feed on it
- mycelium threads make a network to connect plants to transfer nutrients & water

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IDEATION OF DUNNART'S EMERGENCY SHELTER

Dunnarts are small animals that are nocturnal. They tend to rest in small deep, burrow like spaces.

The potential idea here is to recreate an emergency shelter space similar to that for possible protection from bushfires for Dunnarts. The opening would be small, just enough for the Dunnart to get into, with the space being wider towards the inside, similar to that of a bagpipe.
This smaller opening would be to protect the Dunnarts from predators, as well to limit the entry of external factors.

Image 27: bagpipe instrument

Image 28: Dunnart's home

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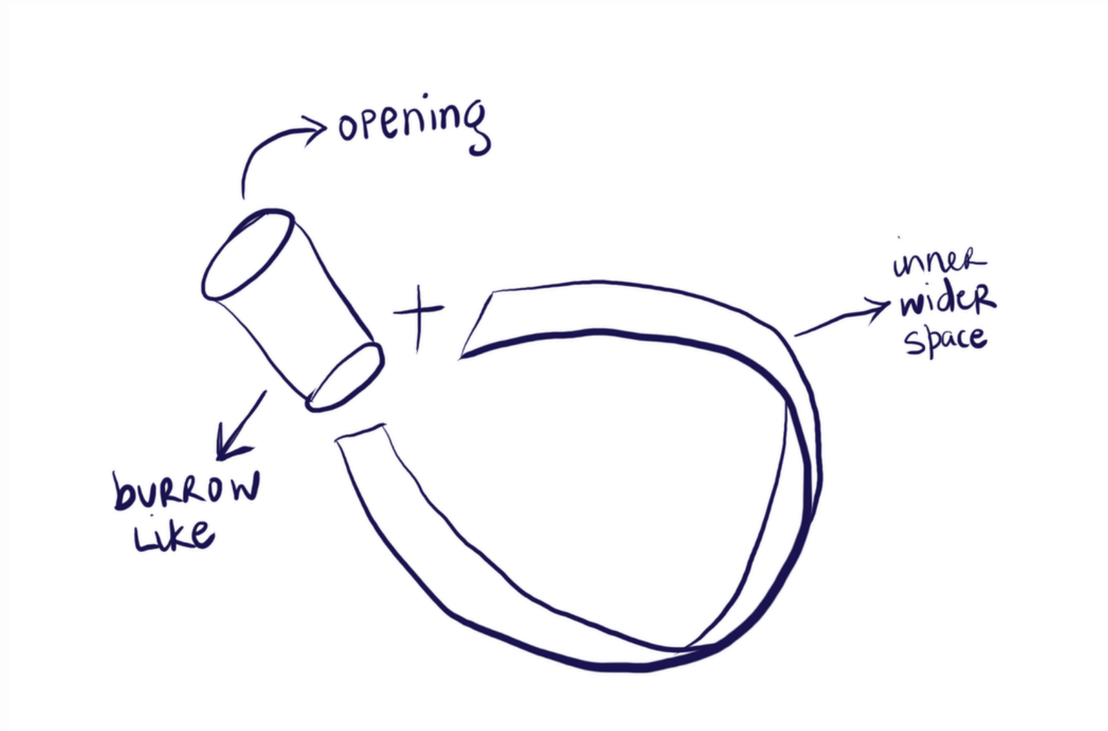
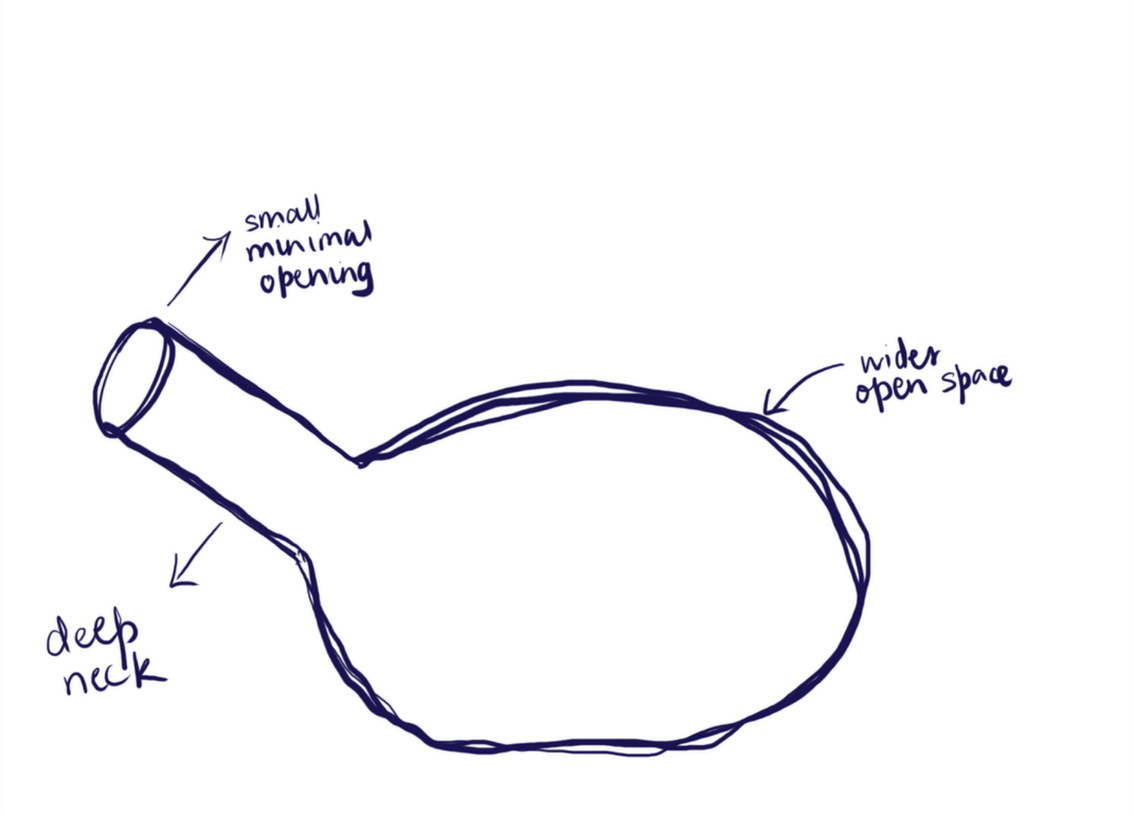

opening
inner wider space
burrow like


small minimal opening
wider open space
deep neck

PROTOTYPE PROCESS

01.

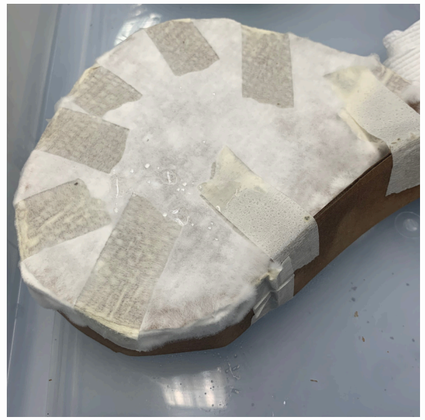
02.

03.

04.

05.

06.



07.

08.

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PROTOTYPE

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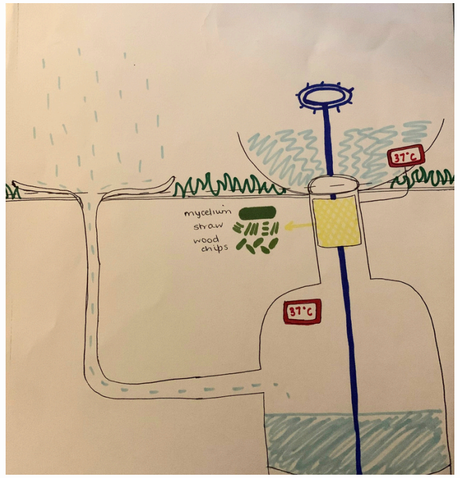
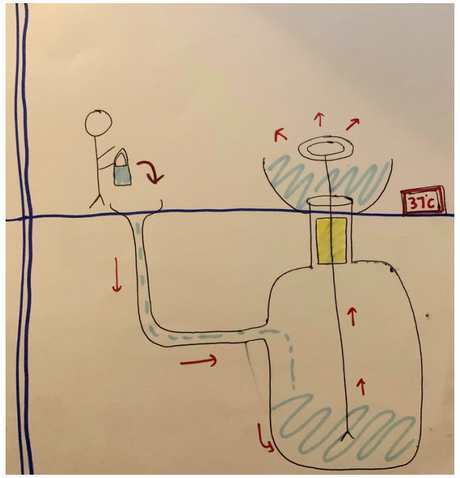
DESIGN OPPORTUNITIES

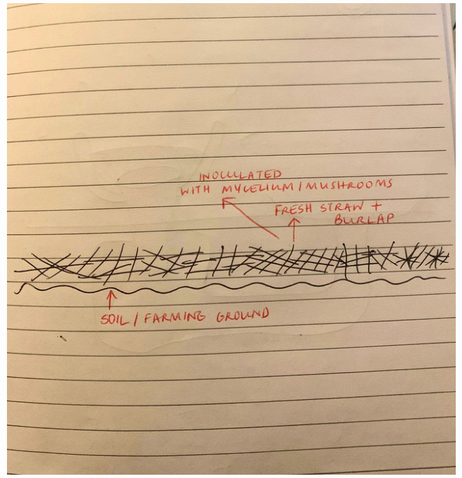
01.

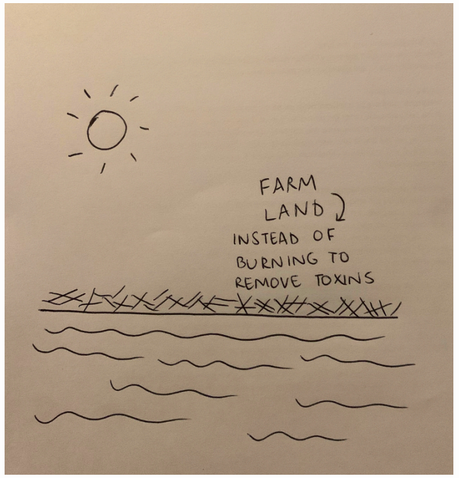




Inspired by mycofiltration, this system works like a sprinkler to dampen the area around it.

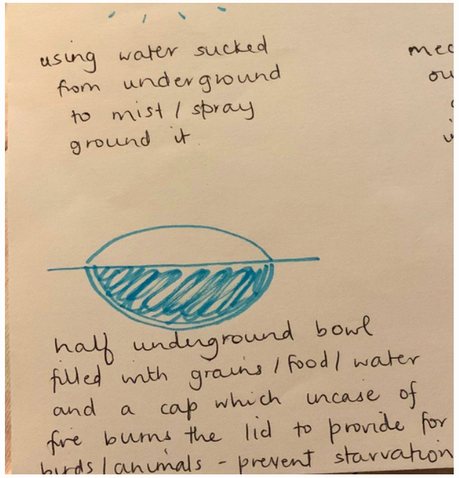
02.

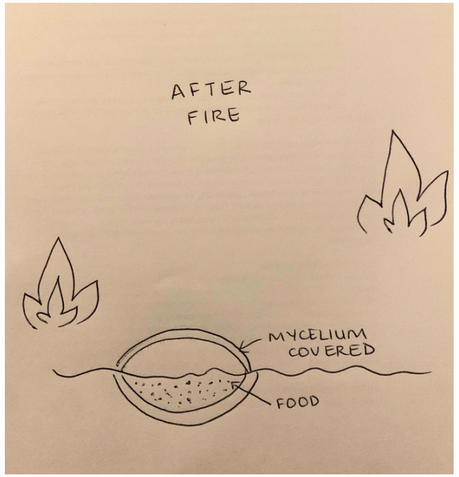




Replacing burning of farm land with mycelium to remove toxins in the soil avoiding man made fires as a method of preparing farm land.

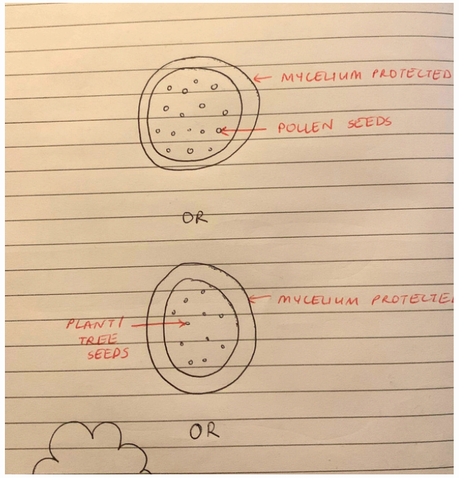
03.

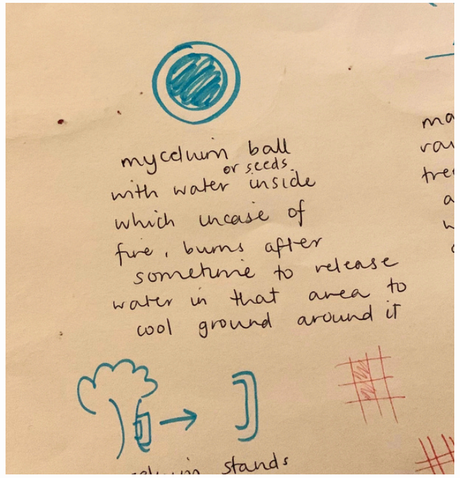




Having food stored in a mycelium cased object, where part of the object is underground that can be available to animals in the aftermath of a fire once the top half of the object burns and disintegrates.

04.

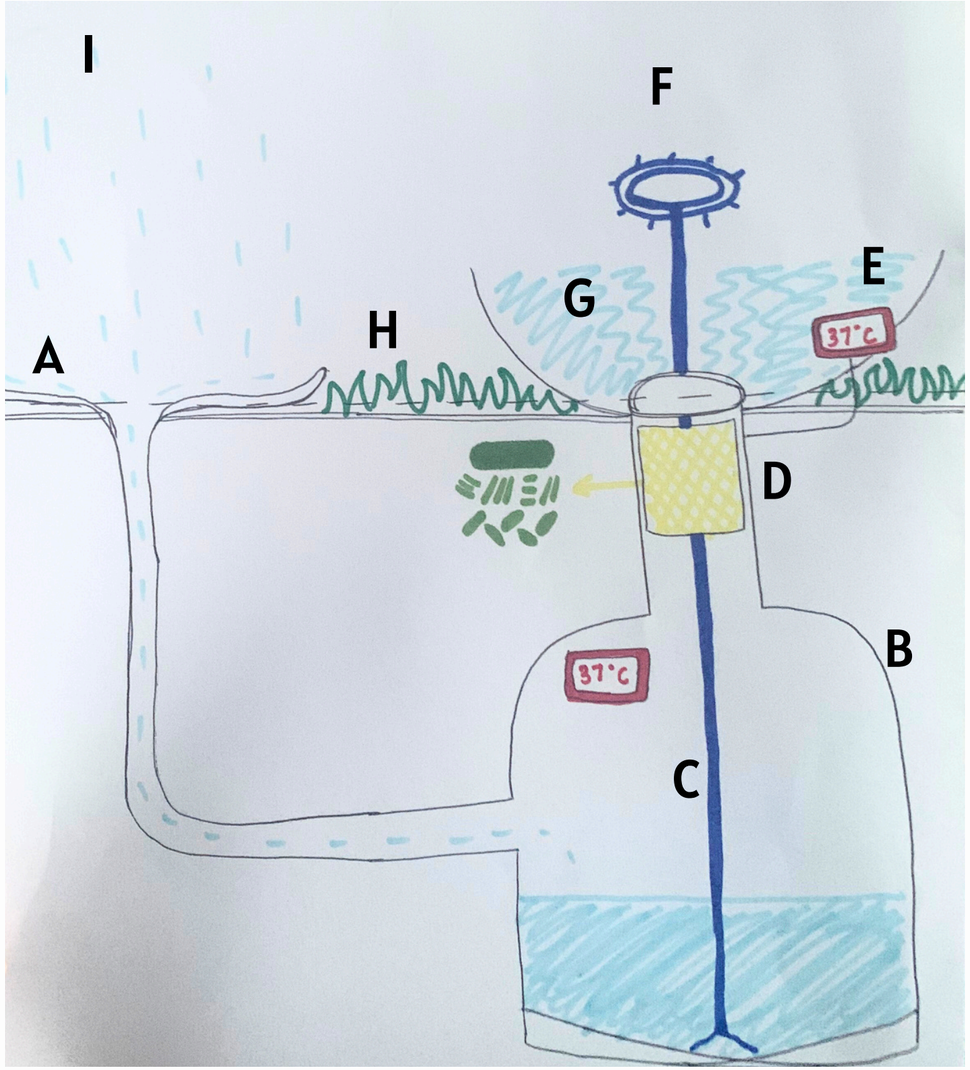




Plant seeds in a mycelium casing ball to be dropped around the forest after the bush fire occurs for regrowth of nature in the aftermath of a fire.

DAMPENING FOUNTAIN CONCEPT

A- Tray for collection of rainwater
B- Underground tanker
C- Sprinkler Column
D- Mycelium mix
E- Temperature sensor
F- Sprinkler
G- Bowl like vessel for water storage
H- Land / Grass
I- Rainwater



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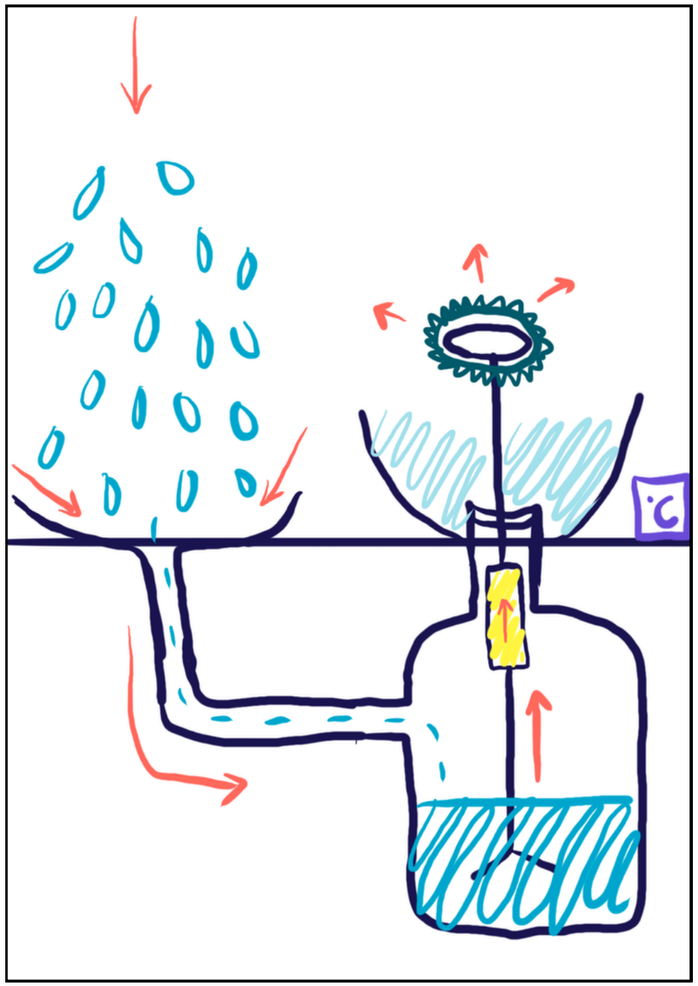
DAMPENING FOUNTAIN SYSTEM

- The tray will collect rainwater & store it into an underground tank which is where the sprinkler gets its water from. The temperature sensor will sense when the heat gets too high to send a signal for the sprinkler to turn on.

- The mycelium, straw & wood chips mix will act as a filter to cleanse the water before it is released so that it is fit for consumption.

- There is also a bowl-like structure at the mouth which provides a vessel for the water to be stored for animals & birds to drink from.



DAMPENING SYSTEM OBJECTIVES

Prevention of fire:

The ideal motive of this system is to detect high temperatures and spray it with water so that the surroundings stay damp, preventing fire ignition or spread of fire that runs further due to dry and dead ground and grass.

In case of disaster:

In the unfortunate event of a disaster or a spreading fire, this system can provide filtered water fit for consumption, saving animals and birds from dehydration which is one of the causes of death post disaster.

MYCOFILTRATION

Mycofiltration is the process of treating contaminated water by passing it through a network of mycelium.

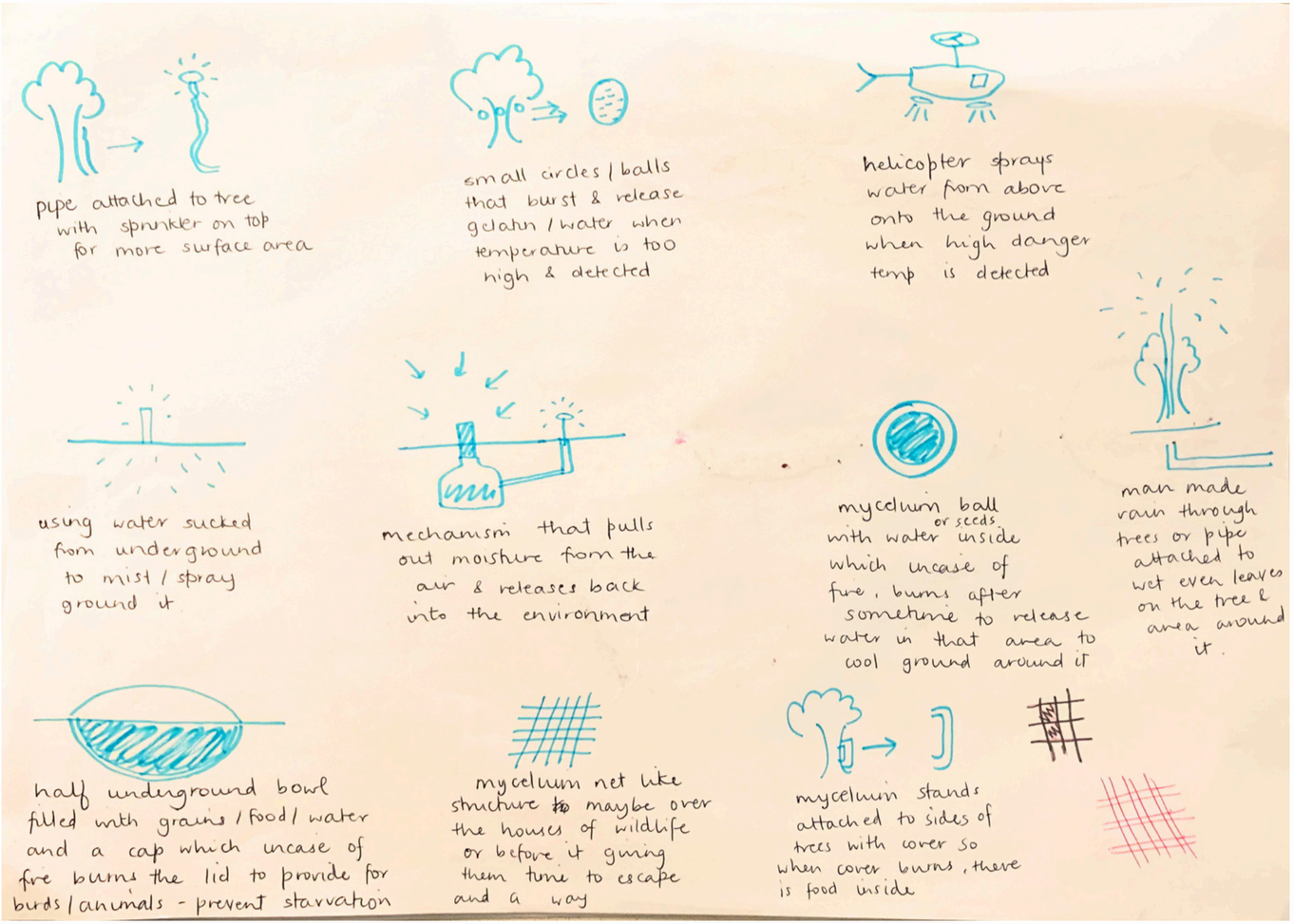
WHY THIS HELPS

Passing the water through mycelium will filter the water to make it fit for consumption by the animals & birds as well as protect them from dehydration in the event of a mishap.

THE MOTIVE

The motive is to potentially prevent forest fires by using a sprinkler system to keep the ground and surrounding grass wet so that fire does not ignite in that position or prevents it from spreading if started as one of the main reasons for spread of fire is dry ground and dry vegetation. The motive is also to use Mycelium as a filter with the technique of ‘Mycofiltration’ to provide water fit for consumption to animals and birds on the daily, as well as in the aftermath of a fire, if occurred as dehydration is one of the reasons of death too.

DEVELOPEMENT



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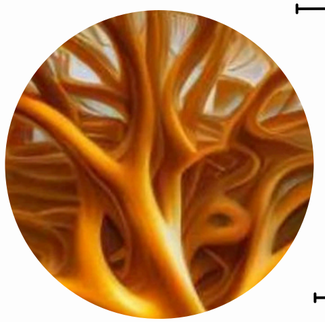
BREAKDOWN OF NAME

MY COLLABORATION



MYCOLL

MYCELIUM

COLLABORATION

COLLABORATIVE METHODS

METHOD #1

Collaborative method 1 is using **discarded textiles** which are 100% sustainable and can naturally decompose into the environment like cotton, paper, hemp etc are used to crochet or weave into small pieces which acts as a substrate for the mycelium to grow on.

METHOD #2

Collaborative method 2 is using **leaves** that are fallen on the ground as they are part of nature, available in abundance and will naturally decompose into the soil. Leaves here, would be the substrate for the mycelium to grow on.

DISCARDED TEXTILES

Discarded textiles are a serious emerging problem at hand which has only negative impacts. With over consumerism on the rise, the waste produced by discarded textiles has only been increasing and when consumers throw away textiles like old clothes, they not only waste money and resources but also end up in the landfill which can take upto 200 + years to decompose in a landfill. During this process of decomposition, these waste materials generate gas and leak toxic matter into the soil and groundwater.

FALLEN LEAVES

Every year, several leaves fall onto the ground. Although leaves are a part of nature and can be decomposed into nature again by itself, it is a good substrate to grow mycelium on as it natural, sustainable and will eventually naturally disintegrate.

Mycoll puts these leaves to the best use with the method and system to help nature.

MYCELIUM CULTURE

Mushroom liquid culture is a mixture of mycelium, the vegetative part of the fungus, suspended in a liquid growth medium. The mycelium is the source of all the genetic information needed to grow mushrooms, and the liquid culture provides a convenient way to transfer this information to the growth medium.

Image 29: Mycelium culture

MYCELIUM CULTURE & MYCOLL

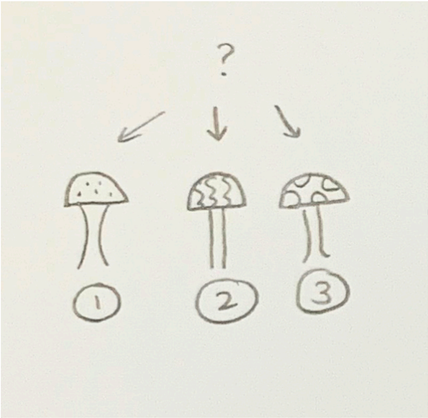
Based on Elise Elsacker's research and trials to make 'BioKnit', a structural figure with the use of 3D textile printing and mycelium liquid, we know that mycelium culture works well integrated with textiles as a medium.

Reference: https://www.eliseelsacker.com/research/bioknit-strategies-for-living-textile-architectures

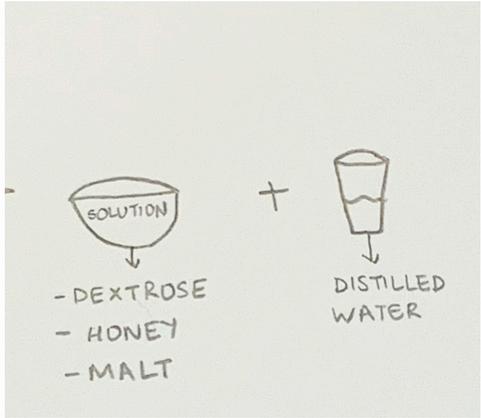
The mix used for this is 'the mycocrete paste' and is consisted of beechwood sawdust (10.2%) soaked with water (10.2%) and inoculated with mycelium spawn (2%) described above under cultivation of mycelium and sawdust, mixed with the additives paper powder (4.6%), paper fibre clumps (4.6%), water (65.6%), glycerin (1%) and xanthan gum (1.6%).

Reference: https://www.frontiersin.org/articles/10.3389/fbioe.2023.1229693/full

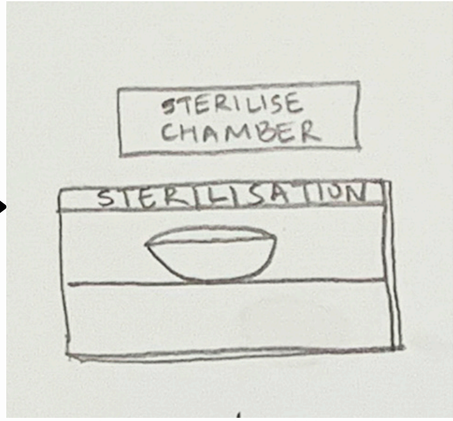
CULTURE MAKING PROCESS



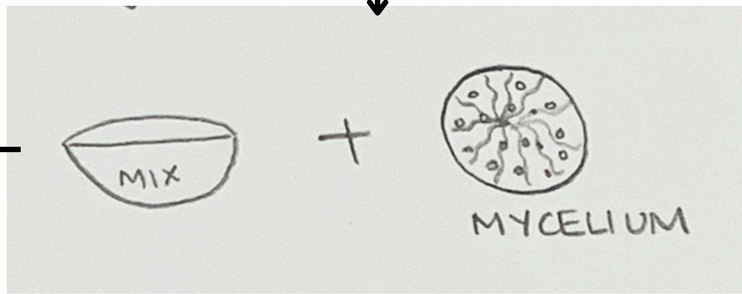
choose the right strain



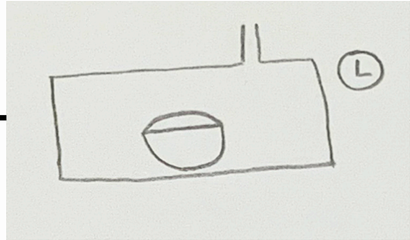
mix a nutrient rich solution with distilled water



put it under sterilisation



introduce mycelium strain in the mix

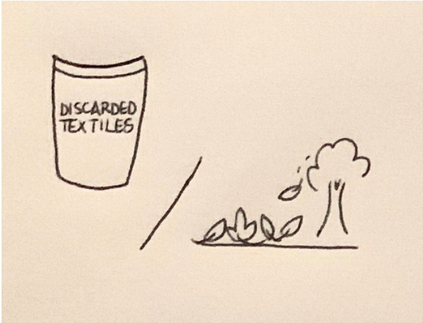


wait for the strain to grow in a dark, warm space

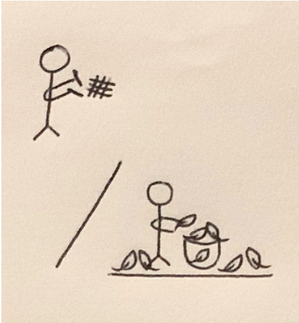
liquid culture is now ready for use

MYCOLL

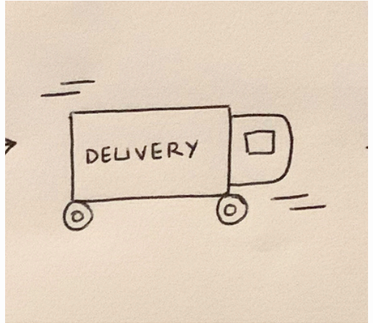
MYCOLL SYSTEM



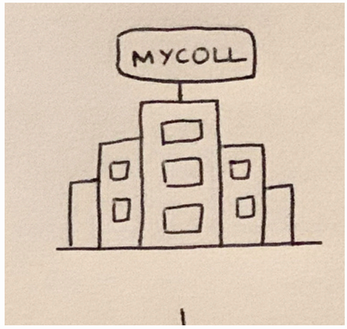
a 100% sustainable discarded textiles bin / fallen leaves



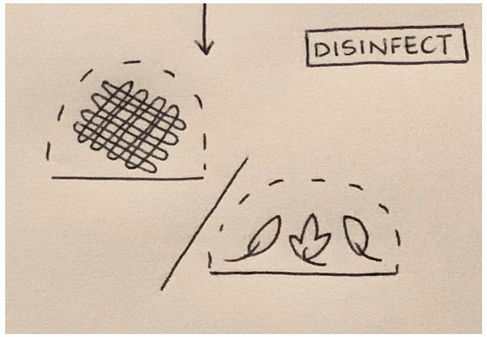
public engagement - weave or crochet textile / collect fallens leaves



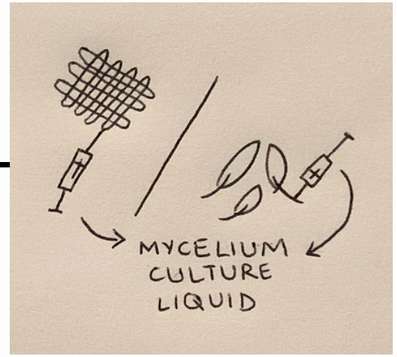
mail it off to Mycoll organisation



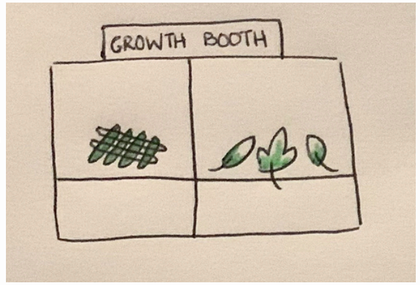
Mycoll organisation



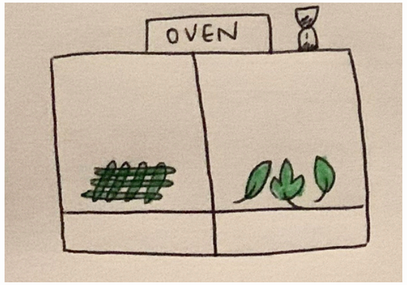
disinfect material



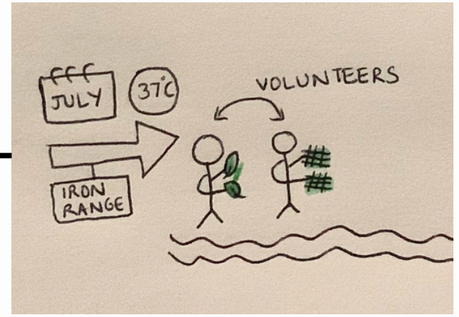
inject mycelium culture liquid in the material



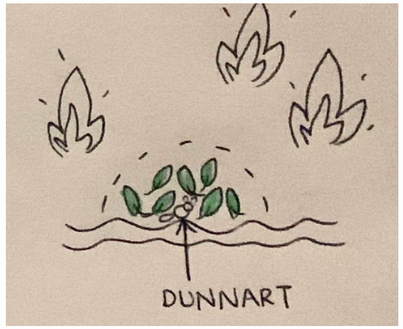
leave for a few days to grow in a sanitised chamber



bake material with mycelium growth



in the month of July, volunteers will go with mycoll to the iron range forest & drop them



in case of fire, Dunnarts are protected in their homes

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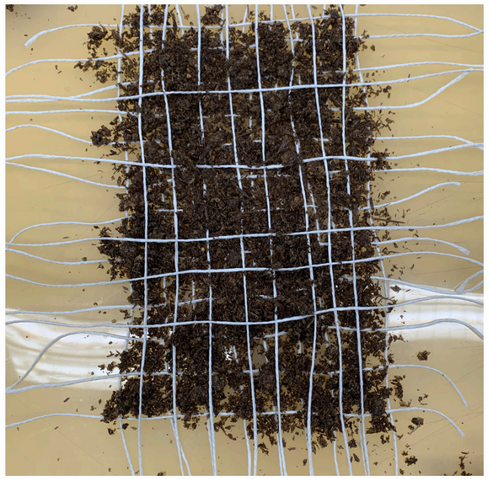
FABRICATION TECHNIQUE I
NATURAL STRAW

	16/04	18/04	23/04	BAKED 30/04
FRONT				
BACK				

MYCOLL

FABRICATION TECHNIQUE 2
NATURAL HEMP

	16/04	18/04	23/04	BAKED 30/04
FRONT				
BACK				

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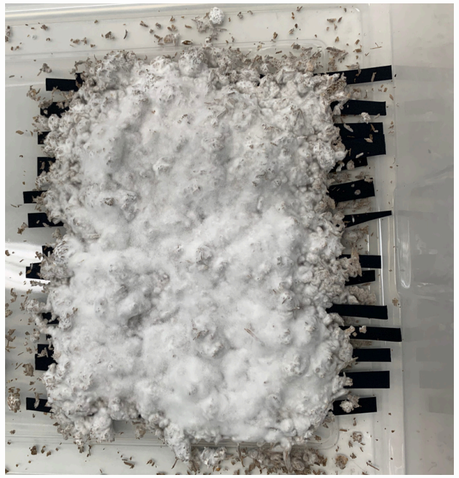
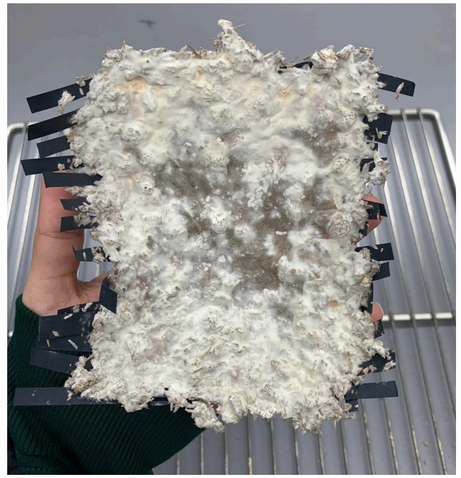
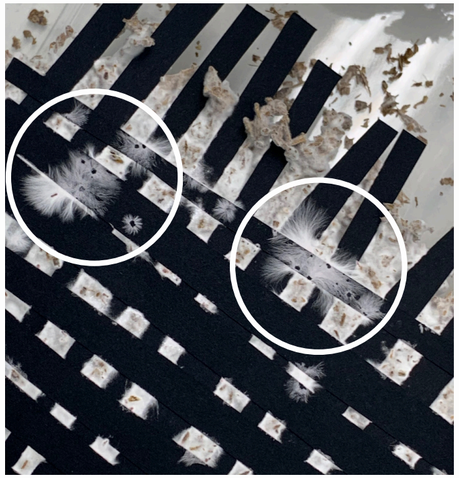
FABRICATION TECHNIQUE 3
PAPER

	23/04	26/04	30/04	BAKED 02/05
FRONT				
BACK				

MYCOLL

FABRICATION TECHNIQUE 4
CROCHETED YARN

	23/04	26/04	30/04	BAKED 02/05
FRONT				
BACK				

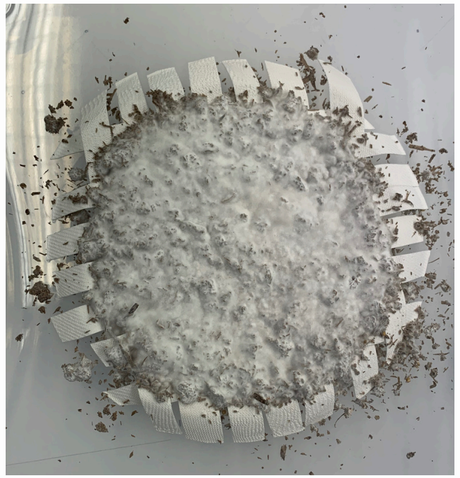
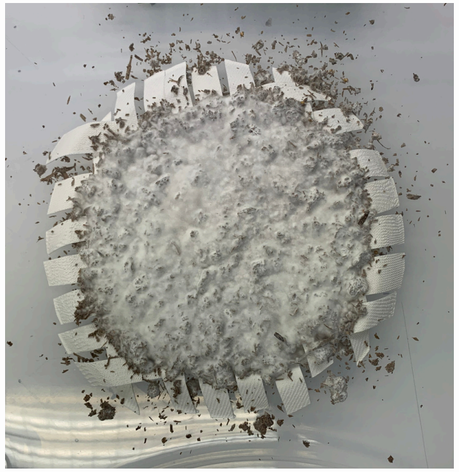
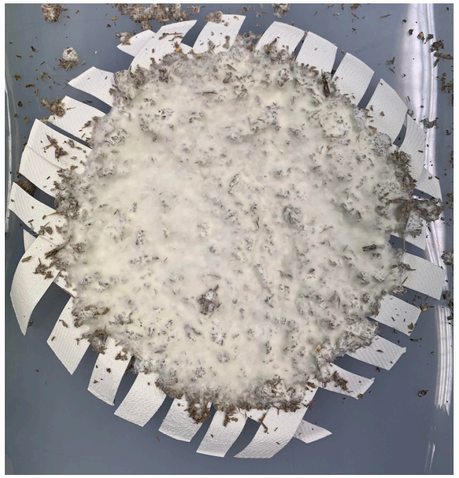
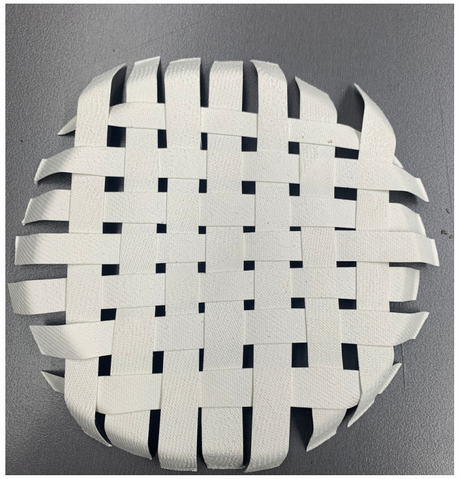
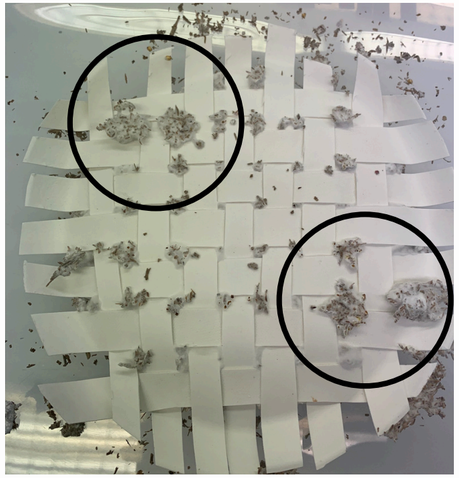
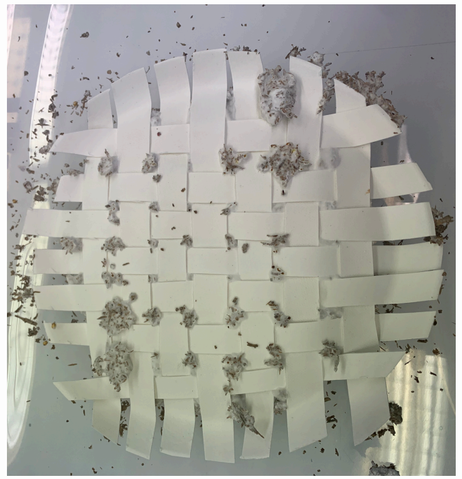
MYCOLL

FABRICATION TECHNIQUE 6
A PILE OF LEAVES

	26/04	30/04	02/05	BAKED 07/05
FRONT				
BACK				

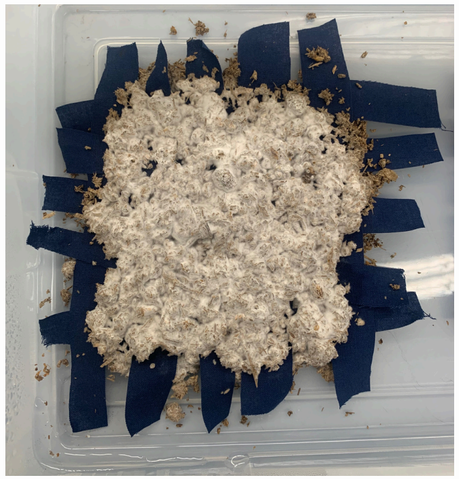
MYCOLL

FABRICATION TECHNIQUE 7
BAMBOO

	07/05	14/05	16/05	BAKED 21/05
FRONT				
BACK				

MYCOLL

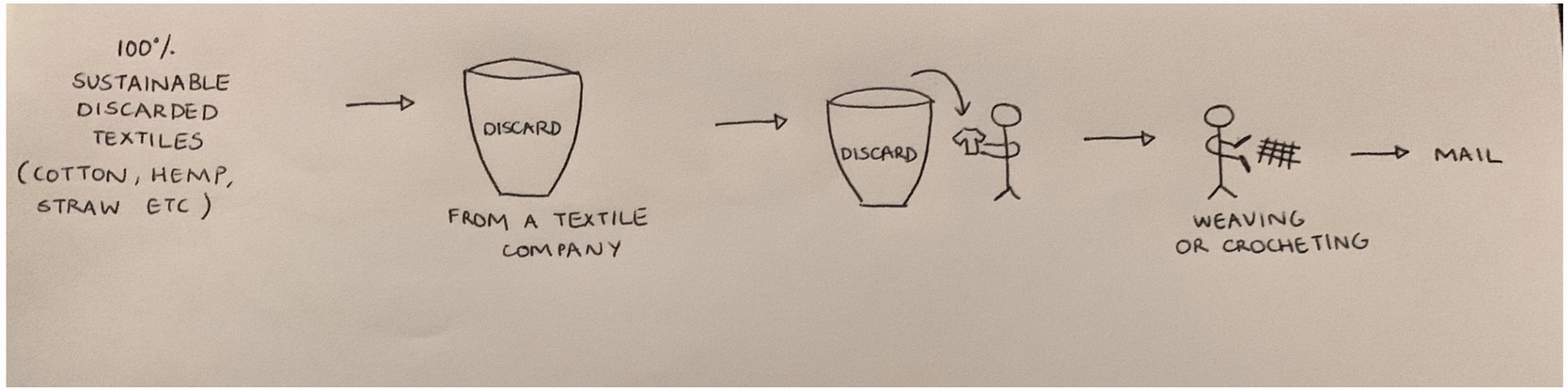
FABRICATION TECHNIQUE 8
WEAVED ORGANIC COTTON

	07/05	14/05	16/05	BAKED 21/05
FRONT				
BACK				

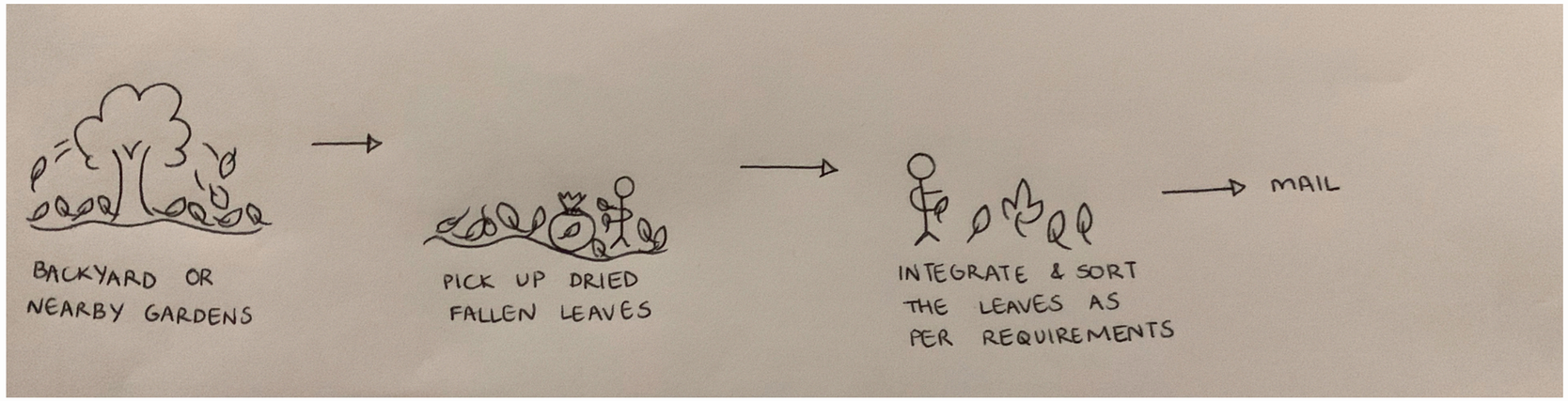
MYCOLL

PUBLIC CONTRIBUTION FOR PRODUCTION OF MYCOLL

METHOD #1

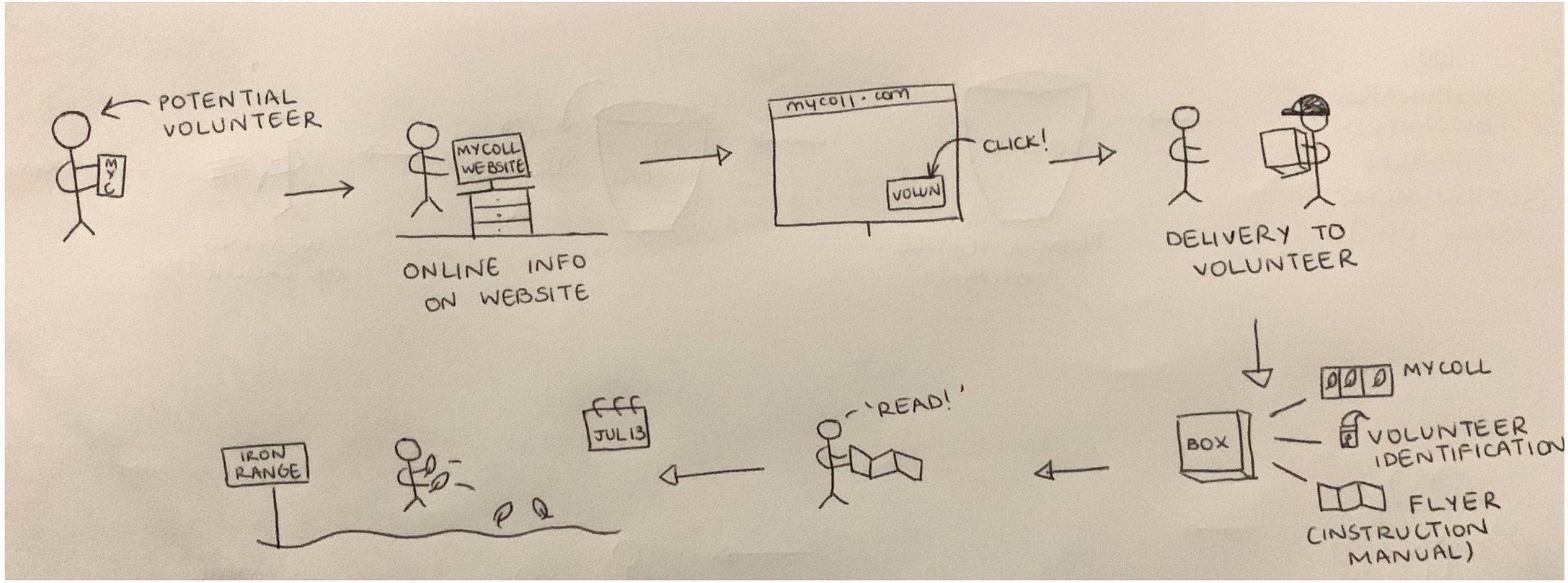


METHOD #2



MYCOLL

PUBLIC CONTRIBUTION AS VOLUNTEERS



KIT INCLUSIONS

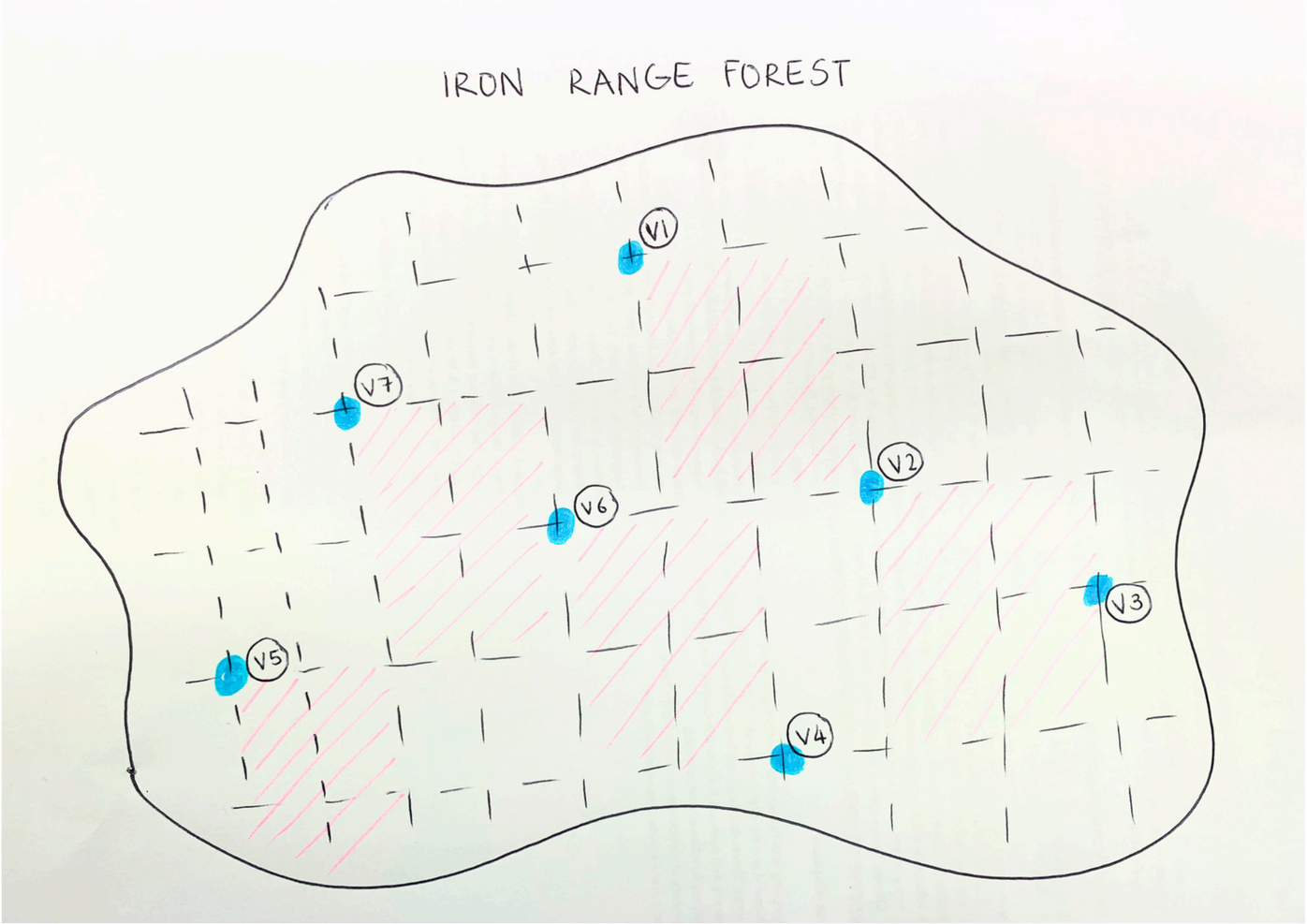
All volunteers will receive a package which includes:

- Mycoll Pieces - in a safe and well packaged container.
- Brief about Mycelium, Mycoll and its care and handling instructions.
- Handbook on Mycoll & the organisation.
- Instruction Manual.
- Map of Iron Range Forest.
- Co ordinates of the Location for that Volunteer & the area they have to cover.
- GPS tracker for the co ordinates + area to be covered.
- Volunteer Identification.
- Temperature Sensor.

DEPLOYMENT OF MYCOLL BY VOLUNTEERS

On a volunteer receiving a kit, each will be allotted certain co ordinates as their start point and a certain area to be covered by them where Mycoll will be dropped.

Multiple such volunteers, and multiple locations should cover a major area of the forest - focusing on areas where Dunnart's are found to be more present.



MYCOLL

WEATHER CONDITIONS

Cape York Peninsula has a tropical climate.

Mycoll deployment month

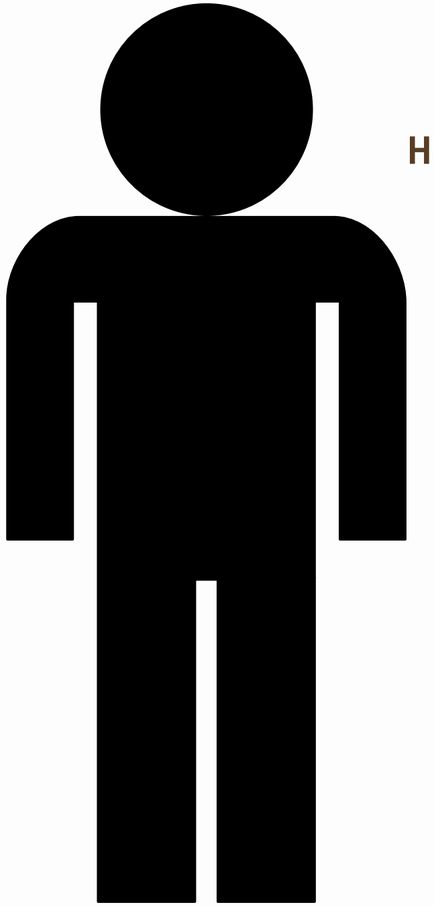
DECEMBER JANUARY FEBRUARY MARCH APRIL MAY JUNE JULY AUGUST SEPTEMBER OCTOBER NOVEMBER

heavy monsoons
average of 250mm rainfall in a day
between 25 to 30 degrees celcius

dry season
hot winds
between 27 to 38 degrees celsius

hottest months
prone to bush fires
40 degrees celcius

MYCOLL



HUMAN

HAND

MYCOLL

MYCOLL

MYCOLL

MYCOLL & HUMAN

Mycelium once baked, removes the moisture from the mycelium and kill the mycelium so that it stops growing and there is no longer a living growing object.

Upon baking, as the moisture is being removed from the mycelium-substrate object, the object also warps and bends a bit, making it ideal for the purpose of Mycoll and being over the Dunnart's home in a slight cup shaped form.

Once it is baked, it becomes harder and does not crumble individually. There is no reaction with the human skin to either the Mycoll object or the skin (unless allergic or under special circumstances) and there is no requirement for the area or the hands to be sterilised as the mycelium is not a living object anymore.

DECOMPOSITION

Mycelium - about 40 days
Cotton - between 7 to 150 days
Natural Straw - between 14 to 42 days
Natural Hemp - about 350 days
Bamboo - between 120 days to 300 days
Yarn - about 250 days
Paper - between 60 to 200 days
Leaves - about 2 years
Cut up or Smaller pieces of Leaves - about 350 days

DESIGN VISUALISATION

MYCOLL

DESIGN VISUALISATION

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DESIGN VISUALISATION

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DESIGN VISUALISATION

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DESIGN VISUALISATION

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www.mycoll.com.au

HOME ABOUT US COLLABORATE FAQ'S

MYCOLL

A COLLABORATION FOR BETTER

CONTACT US SEARCH

With Australia facing bush fires often, a lot of animals who call those areas home, alongside nature are destroyed. MYCOLL, as an organisation is taking cautious steps to control the damage beforehand, using Mycelium* and 100% naturally sustainable materials as a substrate. We urge individuals, to give their contribution to Earth & other Earthlings by collaborating with us using our two proposed techniques to save species from going extinct during bush fires, without the use of toxins, unsustainable materials or damaging the forest further. This is your chance to give back to Earth. Collaborate with us & join the mission.

COLLABORATIVE TECHNIQUE 1:
DISCARDED TEXTILES

COLLABORATIVE TECHNIQUE 2:
FALLEN LEAVES

ABOUT MYCELIUM

OUR COLLECTION BIN LOCATIONS

OUR PROCESS

HOW YOU CAN COLLABORATE

WHO THIS WILL HELP & HOW

VOLUNTEER OPPORTUNITIES

REFERENCES

Image 1: https://www.nma.gov.au/defining-moments/resources/canberra-bushfires
Image 2: https://www.climatecouncil.org.au/resources/burning-issue-black-summer-film-all-australians-must-see/
Image 3-7: https://a-z-animals.com/animals
Image 8-11: https://a-z-animals.com/animals
Image 13-16: https://www.google.com/maps/place/Kutini-Payamu+(Iron+Range)+National+Park+(CYPAL)
Image 17: https://lockhart.qld.gov.au/kutimi-payamu-iron-range-national-park/
Image 18 & 19: https://www.cairnspost.com.au/
Image 20-24: https://a-z-animals.com/animals
Image 25: https://www.cbc.ca/natureofthings/features/fungi-are-responsible-for-life-on-land-as-we-know-it
Image 26: https://www.kew.org/read-and-watch/fungi-hidden-dimension
Image 27: https://houseofscotland.nz/products/junior-playable-bagpipes
Image 28: https://atthecreek.com.au/julia-creek-dunnart/
Image 29: https://www.midwestgrowkits.com/the-beginners-guide-to-using-mushroom-liquid-cultures

THANK YOU

MYCOLL