REROOT

SS24, Reka, Ramita

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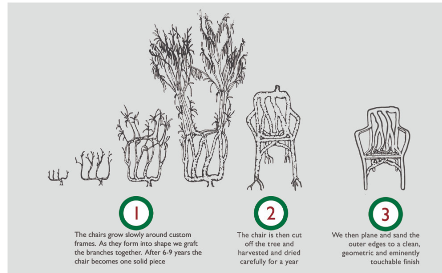
Branch behaviour in response to environmental stimuli

Challenging accepted methodologies of crafting, the UK-based team has adapted old techniques of plant sculpting to grow their collection. Their aim is to mould growing trees into furniture. Each individual piece of furniture is grown from a single tree that has been guided using a frame to direct its form.

Currently Full Grown has three limited edition chairs.They also grow young tree branches into lampshades or tables. At the end each piece is then harvested, dried out, and planed before it's ready for sale.



Full Grown team's collection of chairs created with trees

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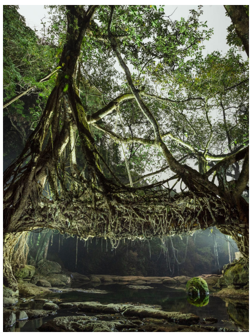
Root behaviour in response to environmental stimuli

Living root bridges in Meghalaya, which is a state in North East India. It can be found in the vicinity of Cherrapunjee (one of the wettest place on earth). There are about 11 root bridges where the most famous one is the "double-decker" bridge. The structures are handmade from the aerial roots of rubber fig trees by the Khasi and Jaiñtia people of the mountainous terrain along the southern part of the Shillong Plateau, which is two and a half hours drive away from Shillong, the capital of Meghalaya.

Once mature, some bridges can have as many as 50 or more people crossing, and have a lifespan of several hundred years.



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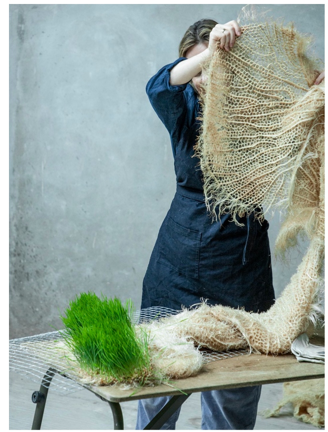
<u>Root behaviour</u> in response to environmental stimuli

There is a need to systematically understand plant root behaviour and explore new fabrication parameters. For controlling the organism's growth, can be a part of the final artefact, Digital biofabrication is our tool of experimenting ways to create materialized patterns that vary in structural properties. This can help stretch the possibilities of what living organisms can ofer for design. For example, digital fabrication has proved to be useful in producing detailed structures and thus creating a habitat for living organisms

Project of Rootfull

Diana Scherer



Zena Holloway

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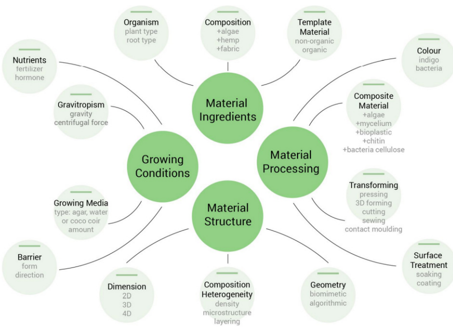
Root behaviour in response to environmental stimuli

Plant root growth can be altered by introducing obstacles in the path of growth. This principle is used in design to produce planar grid structures composed of interweaving roots.

Roots do not passively grow, but move and observe. Their movements allow them to better search for food and space to live and adapt intelligently to their environment. Moreover, roots twist their forms in response to the form and direction of the barriers faced in the growing direction. Other important variables infuencing the root behaviour and the properties of the final outcome are type and amount of growing media and water. A certain level of drought helps roots elongation, while too much water slows down their process, “making the roots lazy”



Taxonomy to support tinkering activities with plant roots

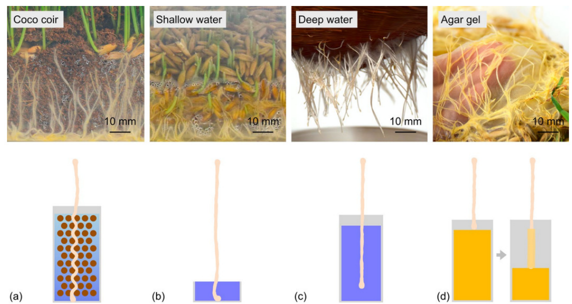


Fig. 6 Root behaviour in different growing media. **a** Roots grow through coco coir fibres and particles, winding down, elongating fast. **b** Roots grow to the bottom of the container, elongating more slowly, compared to growing in coco coir. **c** Roots stay at a certain length, elongating more slowly, compared to growing in coco coir. **d** Roots consume water in agar gel and leave a dry membrane to embrace roots

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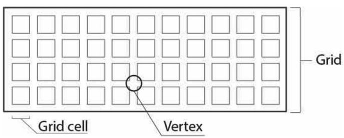
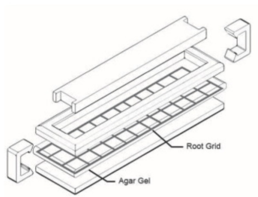
Root behaviour in response to environmental stimuli

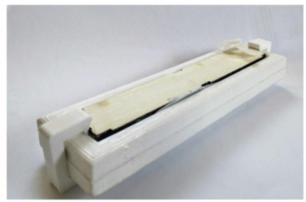
The plant setup had three components: (1) a digitally fabricated (i.e. 3D printed or laser cut) template to guide the root growth, (2) Forflora universal potting soil, and (3) 0.27 g/cm2 of seeds.

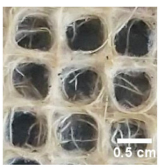
Tests were performed on five different root configurations to quantify the effects of (micro)structure on mechanical perfor- mance.

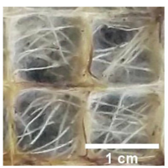
 The load distribution of the root structures is much poorer than that of single roots because of the interactions between roots.

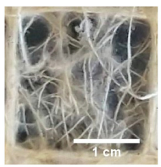


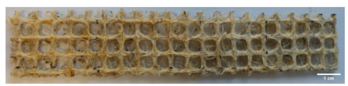


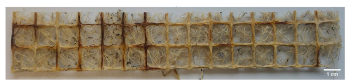












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Method

The digital tools are used to design and fabricate the 2D templates which direct the root plants to form a predefned patterns and a textile-like material. To create 3D structures, either by giving emphasis to the “process” design, or reinterpreting the template as a 3D-printed structure which ultimately builds a composite material together with plant roots.

The potential lies in the following aspects:
- speed: In 1 or 2 weeks, garden cress and wheat roots are able to grow fast and easiy. Therefore, there is a potential to fabricate a number of prototipes for testing.
- 3D-formability: first we tried show the potential of plant roots with fabricated 3D forms.
- glue-ability: Roots have the ability to connect and hold themselves and other structures.

Diana Scherer's work process

Experiment 01

Kresse planted : 01/05/2024

Kresse planted : 14/05/2024

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Experiment 02

Kresse planted : 01/05/2024

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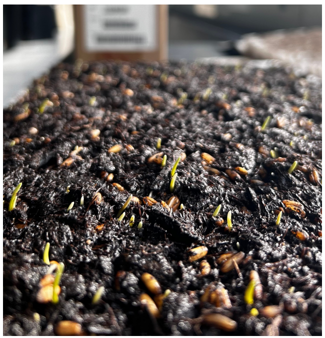
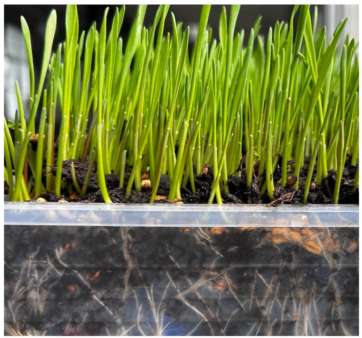
Experiment 03





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Experiment 03

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Experiment 03

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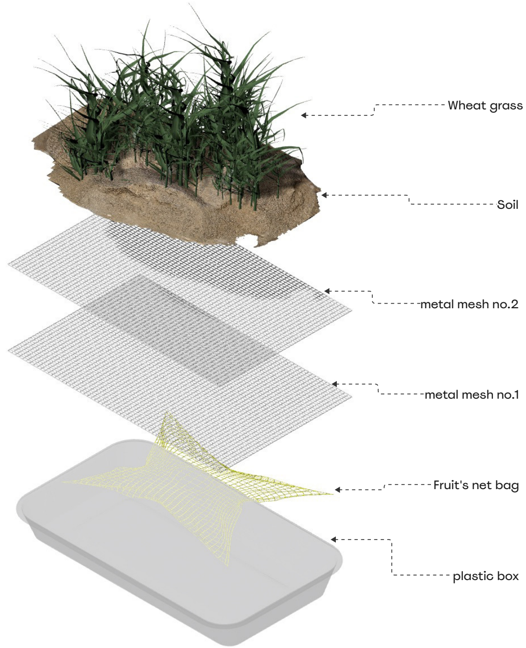
Experiment 04



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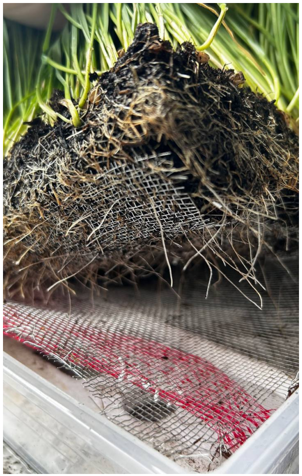
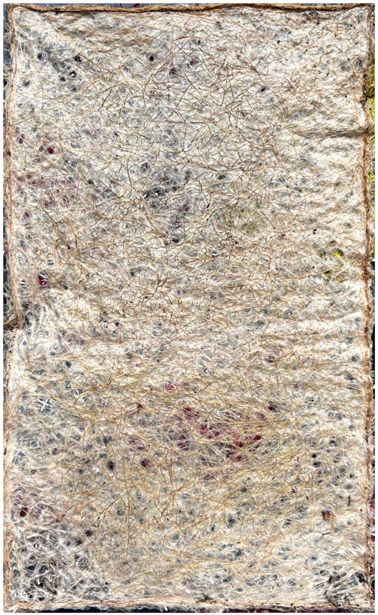
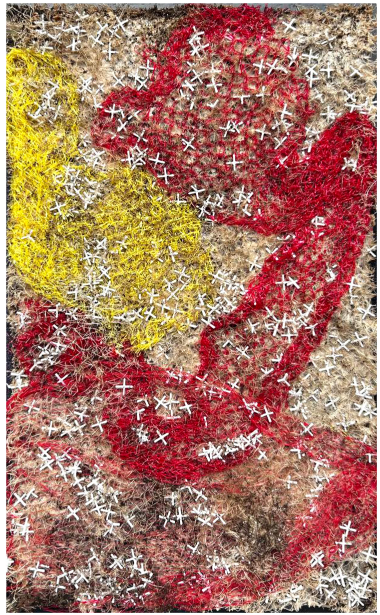
Experiment O4



Experiment O4





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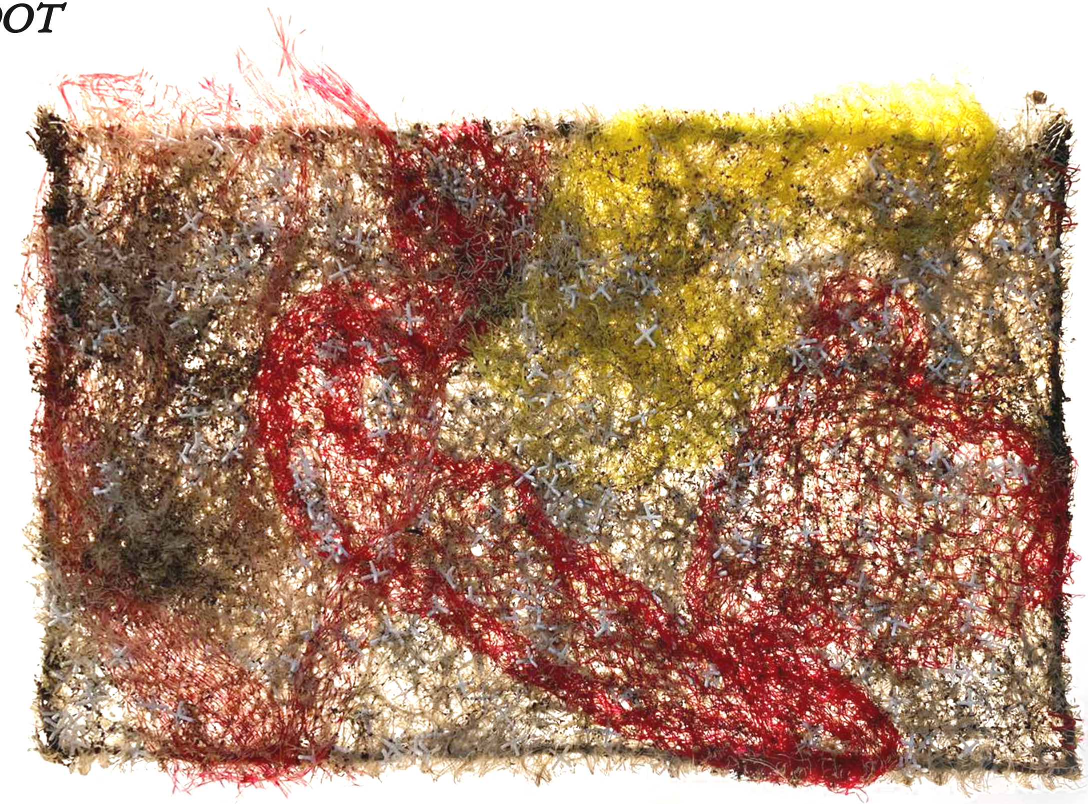

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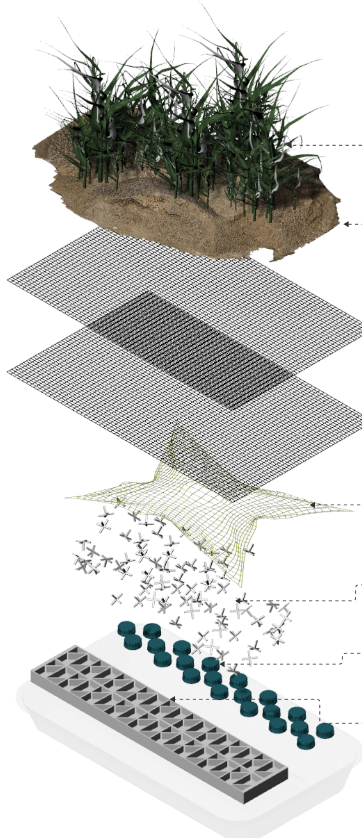
Experiment 05



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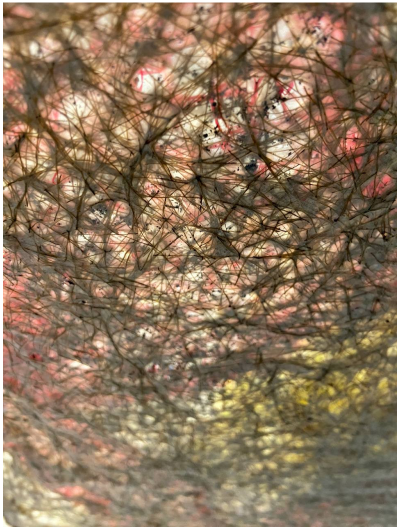

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