

SIGNaal

News from the Dutch Foundation for Innovation in Greenhouse Horticulture (SIGN)

The Living Lab in Bleiswijk serves as an incubator for entrepreneurs, educational institutions, students and designers eager to explore sustainable and circular uses for plant-based waste materials. As part of SIGN, the Lab focuses on facilitating the reuse and valorisation of waste streams from the horticulture sector.

With its experimental space and facilities, the Living Lab offers collaboration partners a unique opportunity to conduct research without hefty investments in facilities like machinery and storage. Equipped with a creative office space, a practical workshop and access to a range of systems and equipment, the Lab is ideal for both pilot-scale and larger-volume upscaling projects.

a binder. Using the pneumatic workshop press at the Living Lab, she pressed several A5 panels to perfect the recipe. In collaboration with Circlefied, a larger panel was then pressed and laser-cut into bee hotel components on the BRM laser cutter. Known as flowerboard, this material is finished with a bio-based coating that makes it stronger than plasterboard and comparable to standard particle board.

Biodiversity-boosting biotiles

Beert Atsma of Natoere developed the 'biotile' at the Living Lab: a biotope carrier made from mycelium grown on horticultural waste that serves as substrate and pots for native endangered plant species. The aim is to boost biodiversity by placing these biotiles in places such as embankments alongside railway lines. Natoere is currently setting up a pilot project in Eindhoven, and further steps are being taken in the development of the tile for infrastructure applications.

Collaborations

In its first year, SIGN primarily conducted its own projects on the site. In 2023, the collaborations below were launched at the Living Lab.

Bee hotels

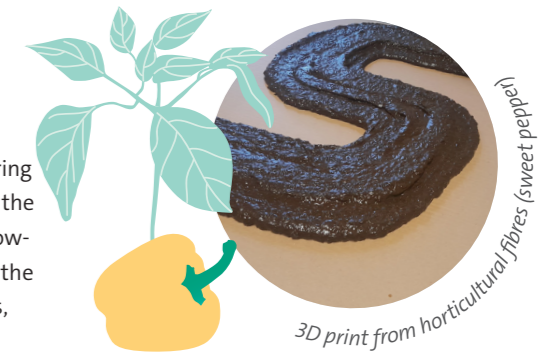
On behalf of Groot Packing and SIGN, Sofia Castelein produced several bio-based bee hotels out of 92% rose waste, with tannin as



Biotile: modular biotope carrier

Chicory root juice

The Keep Food Simple Foundation is exploring methods for processing chicory roots from the Bonaventura nursery into juice, purée or powder at the Living Lab, with the aim of using the natural bitterness as an ingredient in juices, beverages or consumer ingredients.



3D print from horticultural fibres (sweet pepper)

3D printing with horticultural waste

In partnership with Shelduck.co, lab manager Elise van Nunen explored 3D printing possibilities using waste streams. Shelduck.co is a pioneer in 3D printing in biomass (plant residues) and has developed a unique printer for this. Nine different fibres were tested for this application, resulting in a 3D-printed letter, made from sweet pepper stems!

Fermentations

VARTA is investigating fermentation methods for waste juices and fibres from crops such as tomato, chrysanthemum, rose and alstroemeria, with the aim of stabilising their shelf life on site. The juices can be used as circular fertilisers and the fermented fibres for purposes such as improving the root biome.

Valorising Brussels sprout residues

Research commissioned by Primeale United was conducted at the Living Lab on the valorisation of waste streams from Brussels sprout cultivation (stems and leaf residues). These streams were pressed, dried and ground into powder. Analyses were then performed to reveal the nutrient and vitamin C content of the sprout powder. Test panels were produced from the fibres of the stems. Primeale United is currently exploring ways to further develop this application.



Pressed Brussels sprout panels



Fermentation vessels (bioreactors) for use at nurseries

Exploring wood substrate

An exploration of the reuse of wood substrate (Cultilene), for example as a medium for mushroom cultivation. Laila van Kestem conducted various experiments at the Living Lab to determine whether edible mushrooms can be grown on spent wood substrate.



Mushroom cultivation on spent wood substrate

Rose cardboard

Trials are under way at the Living Lab for processing these fibres into bio-cardboard, run by Sofie Castelein on behalf of Groot Packaging.



Packaging made with rose stem waste



A range of fibres and pressed juices available

THEME NO 01
WINTER 2024



Living Lab

Experiments with waste

Knowledge sharing

In addition to encouraging research into waste stream valorisation, the Living Lab actively promotes knowledge sharing, practical learning and communication.

Inspiration weeks

In collaboration with Greenport West-Holland, SIGN organised an inspiration week on biomass processing techniques. The seminar 'Treating waste streams in a central system' in Uden on 18 September attracted around 40 visitors. The first part consisted of presentations by Michiel Penninx (Penninx Strawberries), Ben Rooijackers (Circulair Centrum Zuid) and Leo Verbeek (BioVerbeek). This was followed by a tour of the Newfoss biorefinery factory, where fibres and dry materials are separated and processed into products such as insulation and construction panels.

On 20 September, the seminar 'Pre-treating horticultural waste streams for bio-based applications' was held at the Living Lab in Bleiswijk. Presentations were given by Marloes Arksteijn (Province of South Holland), Matthijs Dijkshoorn (Dijkshoorn Bleiswijk B.V.), Tine van Laere (Ghent University), Alexander van Tuyl van Serooskerken (WUR Plant Research) and Koen Meesters (WUR-FBR), followed by a demo fair showcasing a range of processing machines and examples of semi-finished products.



Collaboration with Lentiz

Students from Lentiz Westland, in collaboration with VARTA, experimented with alternative substrates at a nursery, with the Living Lab watching from the sidelines. On the last day of term, the students visited the Living Lab for a tour and brainstorming session on circularity and the valorisation of waste streams.

Lentiz Oostland supported SIGN in a trial using spent mushroom substrate as a peat substitute in strawberry cultivation. This collaboration with Lentiz is being continued in 2024 around the themes of biodiversity and water quality-enhancing floating wetlands.



Lentiz students gained hands-on experience with alternative fibres for use as peat substitutes. (NextGen substrate fibres, collaboration with VARTA, GroeiBalans, Practoraat Circulaire Tuinbouw and SIGN)



Strawberry trial with reused mushroom compost by Lentiz students from Practoraat Circulaire Tuinbouw



*Twin press for separating juice and fibres. For videos of available equipment, visit the Living Lab website.



Knowledge institutions, 'bioneers', entrepreneurs and regional stakeholders come together at inspiration weeks organised by SIGN in collaboration with Greenport West Holland

Exhibitions and presentations

The working methods and projects of the Living Lab were presented at Oostlanddag (Bleiswijk), the Waste Streams Innovators' Network (Barendrecht), the Platform Tuinbouw Reststromen Info Fair (Venlo), Innovation Expo 2023 (Rotterdam) and during a factory visit on circular horticulture by Ministry of Infrastructure & Water Management State Secretary Vivianne Heijnen at Beyond Chrysanthemum (Hoek van Holland).



Minister Van der Wal, Innovatix 2023



R&W State Secretary Heijnen on a factory visit



Information fair at Brightlands Campus Greenport Venlo

Other initiatives supported at the Living Lab

- SPRIND Biomanufacturing Challenge: Green Pearl Innovation is tasked with demonstrating, within ten months, that mixed waste streams can be converted into valuable molecules.

- MNext (a collaboration between Avans and HZ): biocomposite made of mycelium as biodegradable insulation material for construction.

- VLAIO Zero Waste programme collaboration: valorisation of horticultural waste, including pressing and supplying dry materials, as well as creating factsheets.

- SIA RAAK: Fermentations and biostimulants from pressed juices (with expertise input from SIGN and a voucher scheme for processing

waste streams, e.g. using the SIGN twin-screw press)*.

- SIA RAAK: circular fertilisers field lab

- An inventory of plastic-free waste streams for scaling up applications, together with Platform Tuinbouw Reststromen.

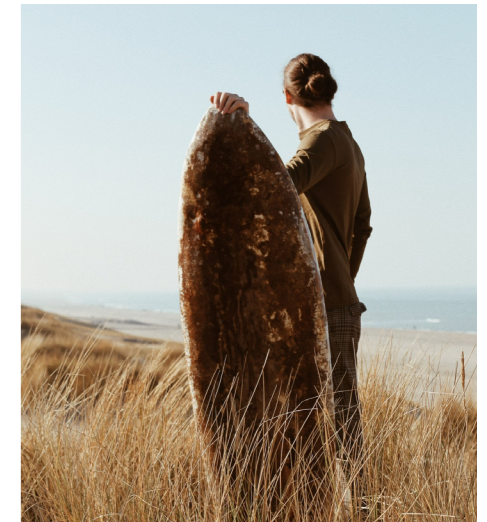
- Compostboard: a fully-compostable board material based on natural fibres and sweet pepper fibres.

- Entrepreneurs are working on creating circular fertilisers from pressed sweet pepper juices, transforming waste into valuable fertiliser.

- Various startups and 'bioneers', including VanHier, Studio Cartier, BIOVISI, Eco Consult, Natoere, WORK4NATURE and WasteBar, are working on projects at the Living Lab.



Horticultural entrepreneur award for waste streams (Studio Cartier)



Top: Surfboard made of mycelium and waste streams (Studio Cartier, InHolland)
Bottom: SIA RAAK circular fertilisers

Interested?

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The Living Lab is located at the Dijkshoorn Recycling centre, where it offers additional options for experimental space, waste streams and equipment.

The NextGen Substrate Fibres project is co-funded by the Province of South Holland.

SIGN collaborates with the Ministry of Agriculture, Nature and Food Quality on innovations that address social themes.



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