

Interreg   
2 Seas Mers Zeeën  
Horti-BlueC  
European Regional Development Fund



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# Horti-BlueC

## Newsletter 1

September 2019



# Project Introduction

## Newsletter 1

- Start Date: 02 February 2018
- Duration: 45 months
- Partners: 9 (UK, France, Belgium, Netherlands)
- Budget: €3.4 million
- Grant funded: 60%



The Interreg 2 Seas area, highlighted in blue

Horti-BlueC aims to create a 'sustainable greenhouse' for the commercial cultivation of strawberries and tomatoes in the 2 Seas region. This will involve the up-cycling of byproducts from current practices. Spent media will be heat-treated to produce biochar for reuse in growing media. The CO<sub>2</sub> from the heat treatment will be recycled into the greenhouse as a plant fertiliser. Horti-BlueC will investigate the use of chitin from shellfish waste to improve the yield and health of fruit crops. Horti-BlueC aims at decreasing the use of chemical crop protection and fertilizers, reduce CO<sub>2</sub> emissions and provide new circular economy solutions in the 2 Seas area.

Horti-BlueC has received funding from the Interreg 2 Seas programme co-funded by the European Regional Development Fund under Specific Objective 4.2 Both the Province of Antwerp and the Province of East-Flanders are co-funding ILVO and Proefcentrum Hoogstraten for this project. This Specific Objective focuses on increasing the adoption of new circular economy solutions across all sectors relevant to the 2 Seas area.

Dear Reader,

The Interreg 2 Seas Horti-BlueC consortium is proud to present our first Annual Newsletter. Besides introducing the project and reporting on the first events and results, we invite you to the upcoming event in Hoogstraten (B) on November 19th

The main goal of Horti-BlueC is the development and adoption of innovative solutions related to blue growth and circular horticulture. The cooperation between the partners and observer partners is key to successful innovation. At our project meeting at ECN-TNO in Petten (NL) in June 2018, bags, vessels and buckets with materials were exchanged and distributed between partners, to start processing residual materials into building blocks for sustainable greenhouse cultivation.

Interaction with policy makers and other target groups is important, and we were able to present the project at the Growing Media Europe conference at the European Parliament in Brussels in Nov. 2018 and during the Interreg 2 Seas Mid Term Event in Gent (April 2019). We have held a number of user group meetings and will continue to do so over the next two years. Please feel free to get in contact with us in case you have suggestions or questions, or if you want to share your experiences with us.

**Bart Vandecasteele,**  
ILVO (Horti-BlueC Lead Partner)



The Horti-BlueC team  
Petten, Netherlands



Spent coir that was used  
as feedstock for biochar  
production

Proefcentrum Hoogstraten event:  
November 19th 2019  
**[Register here](#)**

Meet the Horti-BlueC team and find out more about the project at

# Proefcentrum Hoogstraten

November 19<sup>th</sup> 2019



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## Address

Voort 71  
2328 Meerle  
Hoogstraten  
Belgium



## Details

### Events for Stakeholders and the general public

1.30pm - 3.30pm - All are welcome

This includes an introduction to the project, visit to the greenhouses and visualisation with four steps:

1. Focus of the Horti-BlueC project
2. Visualisation on co-production of bio-energy and biochar
3. Results of the Horti-BlueC tomato trials
4. Visit to the Horti-BlueC strawberry trials

**Please click on link below to register attendance to this event:**

[Register here](#)

## Contact

For any information or queries email:  
[bart.vandecasteele@ilvo.vlaanderen.be](mailto:bart.vandecasteele@ilvo.vlaanderen.be)

ILVO performs policy-supporting scientific research for a sustainable agriculture and fishery in an economic, ecological and social perspective. ILVO is part of the Flemish Government's Agriculture and Fisheries Policy Area. ILVO has more than 75 years of fundamental and applied research experience, and is equipped with large infrastructure, including 200 experimental fields, many (accredited) analysis and detection labs, and a pilot food processing plant.

For Horti-BlueC, ILVO is investigating the added value of plant fibers, compost, biochar and chitin based on renewable resources, for use as sustainable growing media. Recycling marine and agronomic waste are key topics in circular horticulture.

Biochar is the solid remains from the pyrolysis of organic matter in an oxygen depleted environment. Biochar is an extremely stable solid and can be added to soil in order to sequester carbon dioxide from the atmosphere and so help to mitigate climate change. Biochar also improves the fertility of acidic soil, and its porous nature can retain water and water-soluble nutrients, providing a habitat for beneficial soil micro-organisms. However, there is a concern that biochar can increase the pH of growing media to harmful levels. More research is needed to investigate different methods of biochar production using a range of feedstocks, and Horti-BlueC is pioneering this field.



ILVO is running greenhouse trials using strawberry plants grown in different batches of biochar and chitin, focusing on nutrient use efficiency and disease suppression.

**ECN TNO**  
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The Netherlands Organisation for Applied Scientific Research (TNO) connects people and knowledge to create innovations that boost the competitive strength of industry and the wellbeing of society in a sustainable way. ECN>TNO is the energy research arm of TNO. A key aim of energy research is 'toward CO<sub>2</sub> neutral fuels and feedstocks', to enable a smooth, safe and efficient transition from traditional energy sources towards renewable CO<sub>2</sub> neutral energy carriers. This is the focus of ECN>TNO's contribution to Horti-BlueC.

ECN > TNO has extensive experience in biomass conversion. One of the processes we have developed is the co-production of bioenergy and biochar from biomass. A wide range of agro-residues can be used: wood, straw and grass and spent peat or coir-based greenhouse substrates. These residues are heated in the ECN>TNO test facilities to produce a combustible gas which can be used for energy generation, plus a porous carbon product – biochar - which can be used as peat replacement in growing media.

For Horti-BlueC ECN>TNO will test and characterise a number of different feedstock materials. Following these pilot studies, ECN>TNO will provide quantities of selected biochar products to project partners for growing trials. The results of these trials will provide ECN>TNO with valuable feedback for further optimisation of biochar production processes for final functional biochar production.

**Heat treated Shrimp peels**



200°C



255°C



300°C

Charles Violette Institute is a research laboratory in agrofood and biotechnology at the University of Lille, France. Our research is in the field of biotechnology and sustainable processes and focusses on the production of bioactive peptides by enzymatic hydrolysis of food proteins. We are developing innovative and eco-friendly processes for the selective extraction of functional biomolecules, the identification and characterization of biomolecules, food safety, food quality and the valorization of co-products.

By participating in this project, the Institute will develop new skills and scientific activities, as well as forging scientific collaborations for academic and industrial partnerships in marine biorefinery.

## ADAS

### Newsletter 1

ADAS exists to provide ideas, specialist knowledge and solutions to secure our food and enhance the environment. At ADAS, we understand food production and the challenges and opportunities faced by organisations operating in the natural environment. We are UK's largest independent provider of agricultural and environmental consultancy, rural development services, research and development, and policy advice. Our great strength is our breadth and depth of expertise. We offer a unique combination of insight and practical experience, supported by robust, informed, science-based information, which allows us to deliver real solutions.

Biochar and chitin are valuable materials that can be produced from byproducts from within the 2 Seas area. These have significant potential to improve the productivity of commercial strawberry and tomato production, whilst reducing the reliance of these sectors on unsustainable peat-based composts. At ADAS we are running pilot trials to explore the potential for chitin and biochar amendments for tomato and strawberry production.

For strawberry, we have established a crop in a range of peat and peat-free substrates with chitin and biochar to examine the impact of media composition in commercial strawberry production. We wish to test whether biochar and chitin supplementation can reduce the crop's requirement for nutrient feed, and whether these amendments can improve the performance of peat-free substrates. We will measure vegetative crop growth, yield and fruit quality over the course of the season. We will also measure substrate condition and slumping to test the shelf life of the course of two-seasons growth.

For Horti-BlueC, the Charles Violette Institute will utilise its expertise in enzymatic hydrolysis to develop an eco-friendly and safe process for the extraction of high quality chitin from shellfish waste. The laboratory will also bring its expertise in process scale-up for the enzyme-assisted extraction of chitin.



For tomato, we have three trials looking at biochar and chitin addition in tomato production. Trials have been established to test whether biochar and chitin can improve the performance of crops grown in coir media. A trial crop will also be inoculated with powdery mildew to test whether enhanced resistance to fungal disease development may offer a potential to reduce pesticide inputs. Crop photosynthesis, vegetative growth and yield will be measured over the course of the season. The trials at ADAS will be used to define the scope of commercial trials of novel substrates in the 2020 season. By highlighting the potential for these materials to improve the productivity of horticultural crops we hope to promote the uptake of these materials in commercial production.



Horti-BlueC strawberry trials at ADAS

Agaris offers both professional growers and hobby gardeners a wide range of high-quality potting soils, decorative mulches and soil improvers for plants, mushrooms, fruit and vegetables. With more than 1,000 substrate types available, our products are tailored to each customer, allowing them to improve both quality and profitability, and ensure a healthy crop. By investing in innovation, quality and great service, we want to make an important contribution to a more sustainable agriculture – viable for the grower, healthy for the consumer and good for the environment.

For Horti-BlueC, Agaris will utilise expertise and know-how on the selection of raw materials for growing media production, the characterization and quality assessment of growing media, the production of growing media, including additions (such as fertilizers, chalk and biologic additions), packaging properties and after-production properties.

Agaris will gain insight into careful selection of sustainable raw materials for growing media, resulting in demonstrations of these growing media in important horticultural markets and contributions to better grower satisfaction, consumer health and overall better societal benefits.



# Cato

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CATO Engineering is a private owned company active in three fields: general engineering services, execution of projects for third parties and providing carbon dioxide (CO<sub>2</sub>) capture plants. The main market where CO<sub>2</sub> capture can be used is in greenhouse horticulture. Captured and cleaned CO<sub>2</sub> is used as a natural fertilizer in the greenhouse to increase the growth of crops. This allows growers to produce their own CO<sub>2</sub> in a cheaper and more reliable way compared to current industry standards (e.g. liquid CO<sub>2</sub>).



For Horti-BlueC CATO will focus on Energy and Environmental technology; specifically gas conditioning and cleaning of CO<sub>2</sub> from biogas, flue gas or other sources. Cleaning can entail removal of VOC, siloxanen, H<sub>2</sub>S, SO<sub>x</sub> or NO<sub>x</sub> and other pollutants. CATO expertise is process design and the technical and commercial development from idea to practical installation.



CATO will gain first-hand experience using different NO<sub>x</sub> removal technologies for flue gas applications. Ultimately, we want to develop these technologies into market ready systems.



# NIAB EMR

## Newsletter 1



NIAB EMR is the leading horticultural research organization in the UK. We provide high quality applied and strategic research and development services to public and private customers. NIAB EMR's research on fruit trees, strawberries and raspberries, water use efficiency, substrate health and integrated pest management is internationally renowned. In this project, NIAB EMR will focus on the use of agricultural by-product derivatives to extend the life of coir substrate in strawberry production.



Due to soil borne diseases and better crop management the majority of strawberry production in the 2 Seas region is based on coconut coir as the growing substrate. Coconut coir is expensive and due to the expansion of its use into other horticulture applications, supply will become limited. Coir reuse therefore presents an environmentally and economically friendly solution. Strawberry growers, however, report decreased yield and quality when using the coir growing media more than once. There is evidence that amending growing media with biochar, chitin or chitin soluble derivatives such as chitosan can have positive effects on plant health and yield. At NIAB EMR we are testing whether Horti-BlueC biochar and chitin substrate amendments can mitigate this reduction in yield and quality in strawberries grown in re-used coir.

If these amendments increase strawberry yield and quality, and improve opportunities to reuse coir, this will lead to economic savings for growers, and will reduce the environmental impact of coir production and decrease waste streams from coir growing media and grow bags.

# University of Portsmouth

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The University of Portsmouth is a public university located on the south coast of England. We are ranked 21st in the UK (the Guardian University Guide 2020). 78% of our research is rated 'world leading' or 'internationally excellent' (REF 2014). Our researchers tackle some of the planet's urgent challenges.

One aim of Horti-BlueC is to investigate the use of chitin as a growing media amendment to improve crop health and crop yield in our sustainable greenhouse model. Chitin is a large biodegradable polysaccharide that is abundant in nature, in both plants and animals. Most of the chitin derived from shellfish waste goes to landfill, and its use in horticulture offers an avenue for sustainable waste management. Horti-BlueC funded PhD researcher Edward Collins is working with Dr Matthew Tallis (School of Biological Sciences) to investigate how chitin affects the yield and health properties of lettuce and tomato crops. Ed will also be working with Dr Mridula Chopra (School of Pharmacy and Biomolecular Sciences) to assess the potential health benefits (especially the phenolic content and antioxidant activity) of tomato and strawberry plants grown under different Horti-BlueC experimental conditions. Dr Alex Kao in the Faculty of Technology is using x-ray tomography to image root structures of plants grown in Horti-BlueC growing media blends. Ed is also working with academics in the Faculty of Creative and Cultural Industries to explore innovative methods for data visualisation and sonification (taking non-musical data and turning it into sound). We will use these outputs to communicate project results to all stakeholders in an informative and engaging way.

"We want to help shape the future and know it takes more than words to make a difference."

Horti-BlueC is a multidisciplinary project and will utilise the expertise of academics from four of our University Faculties – Business and Law, Creative and Cultural Industries, Science, and Technology.



Watch this space for more results, or come and talk to us at the British Tomato Conference, Warwickshire, 26th September 2019.



Moisture content of Horti-BlueC growing media blends in the butterhead lettuce trials

Tomato trials underway in the Horti-BlueC greenhouse at the University of Portsmouth



# Proefcentrum Hoogstraten

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Proefcentrum Hoogstraten (PCH) is a leading research centre in Belgium. The research centre is dedicated to practical, demonstrative research and professional consultancy to improve the cultivation of three crops, namely tomatoes, bell peppers and strawberries. The main goal of PCH is to translate and apply results of fundamental research in practical circumstances in order to improve product quality and increase the sustainable cultivation of these crops. PCH is an important link between fundamental research and growers who need a practical solution.

PCH is expert in different crop cultivation techniques for these crops, including the implementation of integrated pest management, plant propagation, water use and variety research. We will use our knowledge and expertise to find sustainable solutions to minimize production waste with recycled stone wool, coir and peat as growing substrates.



Both stonewool (used in tomato production) and coir/peat (used as a substrate for strawberry production) are made from non-renewable resources. Through participating in this project, we hope to elaborate and improve new sustainable substrates based on our own waste streams. In this way we can close the loop and move towards zero-emission production of greenhouse vegetables and fruits.

For Horti-BlueC we are testing different Horti-BlueC organic substrates, including woody fibres, biochar and chitin. We aim to improve the resilience of tomato and strawberry test crops while still maintaining production quality and quantity. We aim to close loops in crop production and use substrates based on our own waste streams. We will also investigate capturing CO<sub>2</sub> from greenhouse co-generation and translate this knowledge in the valorisation of the biochar production process in order to recycle CO<sub>2</sub>. These innovations will contribute to circular and sustainable horticulture for the future.

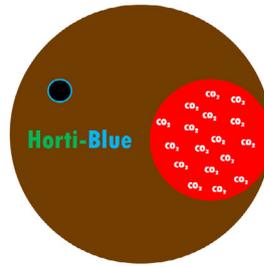


Agaris



Agaris





Read our first Horti-BlueC academic paper on the mode of action of chitin in growing media. Published in **Nature Scientific Reports**. A collaboration between **ILVO**, **UGent** and **The Netherlands Institute of Ecology**

## Horti-BlueC Collaborative Platform

We are developing an online dynamic platform to facilitate cooperation between our project stakeholders. We want to find out what you think is needed for the development and adoption of green solutions relevant to the project, so that we can organise and/or offer the necessary help.

Interactive electronic maps will help to establish contacts between stakeholders, and will include a search tool for horizon scanning and identifying potential connections within the circular economy. This platform is work in progress and will be launched later this year.

For more information on the collaborative platform or to sign up, email: [bart.vandecasteele@ilvo.vlaanderen.be](mailto:bart.vandecasteele@ilvo.vlaanderen.be)



Subscribe to our Youtube channel to keep up with the latest project videos. Click below to view the film of our opening event.



Thank you for reading our first Horti-BlueC newsletter!

Register to the Proefcentrum Hoogstraten event [here](#)

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