



Carbon avoidance or carbon capture? Which is the best strategy for Net Zero?

FRIDAY 12 NOVEMBER 2021

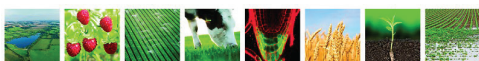
Eastern Agri-Tech

Innovation Hub



Interreg 
2 Seas Mers Zeeën
Hy4Dense

European Regional Development Fund



SARIC • SUSTAINABLE AGRICULTURE RESEARCH & INNOVATION CLUB

BASiS
2 POINTS



Carbon avoidance or carbon capture? Which is the best strategy for Net Zero?

As changeable weather and unusual 'rare events' start to become the norm, the impact of Climate Change is hard to ignore. British agriculture is not only suffering from these events, such as extremes of drought and rainfall, but needs to be part of the solution. Not only must we produce food in a sustainable manner, but we need to go even further towards carbon capture and retention. In this session we will look at the two options balancing, (1) Carbon Production Avoidance and (2) Carbon Capture. We will examine option (1) first with valorisation, prevention of landfilling/degrading material; and alternative heat and power production on farm and in production systems. Then some options for carbon capture (2) and underlying themes in the second session. We will finish with a discussion as to how well the two will complement each other: can we approach Net Zero using these strategies?

Programme

- 10:00 *Introduction: What is Net Zero and what sorts of activity lead to achievement in or from farming activities?*
Lydia Smith, Head of NIAB Innovation Farm and the Eastern Agri-Tech Innovation Hub
- 10:15 *Alternative ways of delivering Solar farming; Agri-voltaic farming*
Luke Palmer, NFU Area representative and Cambridgeshire Farmer
- 10:30 *Valorisation of waste food using insects, in dispersing a network of Bio Conversion Units, to create Local Nutrient Circularity*
Richard Small, MD of INSPRO Ltd
- 10:45 *Hydroponic Cultivation of salad vegetables; maximising the use of AgriTech to minimise soil use for short duration cropping*
Graham Taylor, Postdoctoral Research Associate, NIAB (Interreg2Seas Hy4Dense)
- 11:00 *Novel valorisations of low-grade carbon-based material into the building trade*
Omar Hiasat, Process Engineer, CAMBOND Ltd
- 11:20 *Break*
- 11:40 *Multispecies 'herbal' leys; maximising production efficiencies and reducing nutrient losses from Welsh lamb production*
Emily Cooledge, Bangor University, BBSRC-SARIC PhD Student
- 12:00 *Hemp: reintroduction of an underutilised crop with enormous potential for carbon capture and storage, with multiple market opportunities*
Nathaniel Loxley, British Hemp Alliance
- 12:15 *Pulling biodiversity and carbon sequestration options together*
Nick Padwick, Ken Hill Estate
- 12:30 *Agriforestry: What is the potential for the UK farmed environment?*
Jeremy Sweet, Sweet Environmental Consultants
- 12:45 *Panel session: Are we anywhere near achieving Net Zero from these types of initiatives?*
Chaired by Lydia Smith, NIAB
- 13:15 *End*



Speakers

Dr Lydia Smith

Head of NIAB Innovation Farm

Head of Eastern Agri-Tech Innovation Hub



Lydia Smith is Head of NIAB Innovation Farm and Eastern Agri-Tech Innovation Hub at NIAB in Cambridge UK, where she has been based since 1997. She leads Interactive farmer-facing research into sustainable farming; especially soil health, crop genetic improvement and waste minimisation. Her first roles in research were in plant pathology at ADAS and East Malling Research Station. Following a doctorate in plant microbial ecology, she subsequently lectured in soil science, crop microbial interactions, environmental biology and land reclamation at the Universities of East London and Luton.

At NIAB, Lydia's research initially centred on improvement of plant genetic resources and new methods for their utilisation and characterisation, building a portfolio of projects in Novel and Non-food Crop portfolio over 12 years. Innovation Farm was conceived and set up by Lydia, to provide a practical, grower-facing research facility, with knowledge exchange for end-users at its core.

Since 2016, she has built up the Eastern Agri-Tech Innovation Hub (www.innovationhubuk.co.uk), providing a pilot study resource to minimise waste in farming, or to reuse selected waste for new, higher value products. She remains committed to soil structure and health, specialising in crop microbial interactions of forage legumes with probiotic applications.

Luke Palmer

FC Palmer and Sons



Luke Palmer runs a 3,000 ha farm in Cambridgeshire near Stretham (FC Palmer and Sons and Director of Stowbridge Solar Ltd). He has been focusing on sustainability for some years and this has been the driver behind several innovations adopted by the farm.

The farm has been trying to seek technical advantages, be it from water management, precision farming techniques, or through using less staff for more output. The installation of his first set of solar panels answered the need to diversify income; he installed 50kw solar panel arrays before the Feed in Tariff dropped to such low levels. These have been very successful, but they are not without their foibles. The new system of PVs allied to a novel gantry-based system to farm effectively between the cells is a novel pilot system and will be up and running late in 2021/22.

FC Palmer is not really a farm that shouts about what it does, but they want people to learn from their experiences. Their recently approved IUK project will provide that opportunity and his role within the National Farmers' Union (NFU) will further help interaction with local stakeholders (in his role as Chairman of the Ely and Soham branch of the NFU). Biodiversity has increased on farm over the past five years through a range of measures; including the use of winter cover crops, field margins allied to precision agriculture and other measures.

Richard Small

MD of INSPRO Ltd



Richard trained in Agriculture at Harper Adams and Seale Hayne, Food Marketing Sciences at Sheffield and his MBA is from Warwick. For many years he practiced procurement and supply chain management with Sodexo and then within the airline sector with Cathay Pacific Airways in Hong Kong, Gate Group in Switzerland and LSG Sky Chefs in Germany. In 2006 he set up a Supply Network Solutions to facilitate cooperation between non-competitive businesses on procurement and sales. In 2017 he learnt about Black Soldier Fly and saw the opportunity to apply his experience to reduce waste throughout the supply chain and promote sustainability. With grant support from EMFF, IUK, CEFAS and LEP, InsPro Ltd (www.inspro-uk.com) has developed a Bio Conversion Unit that can be sited anywhere near 'pools' of food waste (250t pa) to immediately bio convert it into feed and fertilisers to enable Local Nutrient Circularity.

Graham Taylor

Research Scientist, NIAB



Graham joined NIAB in 2019 as a research scientist specialising in protected horticulture. His PhD was undertaken with the Horticulture and Plant Product Physiology Group at Wageningen University in the Netherlands, focusing on improving C3 photosynthesis to increase crop yields. Graham has more than 15 years of experience in academic research in diverse areas of seed, plant and soil science, as well as silviculture. He has designed and constructed hydroponic systems and high-output LED arrays for Universities in South Africa and the Netherlands. At NIAB, Graham is currently focused on conducting research on hydroponics systems and leafy salad crops for the EU Interreg project Hy4Dense, which involves growers and academic partners across the UK, Belgium and the Netherlands.

Omar Hiasat

Process Engineer, CAMBOND Ltd



Alma mater: BEng Civil Engineering at Coventry University and MSc Construction and Civil Engineering Management at Anglia Ruskin University.

Personal and Professional Goals: Commitment to improved physical health, career passion and personal satisfaction lastly, service, and social responsibility. Increase professional knowledge and training and attain a leadership role.

Achievements: At the beginning of my academics, I was not the most gifted and was falling behind with my studies. However, I persevered and showed grit towards my studies graduating with a civil engineering degree. Team member of MSDUK Innovation Challenge 2021 Smart City, Energy, Net-Zero Carbon Category Winner.

Hobbies: Jogging and lifting weights at the gym.

Skills and Areas of Expertise: Proficient understanding on structural framework and construction.

Emily Cooledge

Bangor University,
BBSRC-SARIC PhD Student



Emily Cooledge is currently undertaking her PhD on the environmental and production benefits of grazing lambs on multispecies “herbal” leys at Bangor University’s Henfaes Research Centre in North Wales. She received a BSc (Hons) in Geography from Bangor in 2018, and has previously researched the spatial variability in upland urine-patch nitrous oxide (N₂O) emissions, the carbon use efficiency of Australian soils, and the movement of foliar applied radiolabelled phosphorus in wheat. As well as studying for her PhD, Emily is also a Research Support Technician on the BBSRC-SARIC project *Restoring soil quality through re-integration of leys and sheep into arable rotations*, led by Professor Jonathan Leake at the University of Sheffield.

Nathaniel Laxley

British Hemp Alliance



Nathaniel is a founding Director of the British Hemp Alliance, which is a not-for-profit membership organisation comprised of various stakeholders that champion the agricultural and environmental opportunities for the crop. Having grown hemp under license in Sussex from 2015, Nathaniel has first-hand experience in farming hemp and understands the challenges that farmers and the industry face. He is the project coordinator of a farmer-led field lab project with ‘Innovative Farmers’ that aims to measure the impact of hemp cultivation on soil health, carbon sequestration and biodiversity, working directly with farmers to investigate the soil microbiome and the impact on production. Due to regulatory restrictions and lack of government support, there is little evidence for the impact of growing hemp and Nathaniel is working with Cranfield University and other specialists to develop a methodology in which farmers can gather samples and data for testing and validation.

Nick Padwick

Ken Hill Estate



Nick Padwick, farm manager at Ken Hill Estate in west Norfolk, is using Countryside Stewardship funding to convert land to organic production and establish marshland and wildlife corridors. He has been spearheading strategies described as regenerative farming, providing in particular an alternative to ploughing and tillage, which releases large amounts of carbon dioxide into the atmosphere.

He is creating woodland pasture for pigs, ponies and cattle, and utilising stewardship options to help with timings of cover crops and building up soil fertility. He set out to reduce reliance on synthetics and slowly wean the rest of his arable land off the chemistry.

His farm is hosting Autumnwatch on the BBC over the coming weeks and is providing an example of many schemes that could be employed to regain biodiversity within the farmed environment whilst also contributing to net zero.



Jeremy Sweet

Sweet Environmental Consultants



Jeremy has spent the last 35 years conducting research on Crop improvement and plant diseases. Much of this work was conducted at NIAB Cambridge studying sustainable crop production, integrated disease management, environmental and agronomic impacts of GM crops, and gene flow to crops and wild relatives. He was coordinator of the UK BRIGHT project which studied herbicide tolerance, and he was also coordinator of the European Science Foundation programme "Assessing the Impact of GMOs" that brought together all the major research groups in this area in Europe. He was a coordinator of the EU SIGMEA project analysing data on gene flow and gene impacts and was a participant in the EU CO-EXTRA programme and the BBSRC Gene flow project. He was work package leader in the GRACE EU project on Systematic Reviewing of the impacts of GM plants and was Vice-Chair of the EU COST action iPLANTA studying RNAi in crop improvement and crop protection. He was an advisory Board member of the EU Pegasus project on GM animals, the EU Price Project on coexistence, the DEMETRA Life project, the EU COST Action on GM trees, the ESEGMO project in Finland and he served on the Steering Committee of the Swiss NFP59 programme on GMOs. He was a member of the EFSA GMO Panel for 12 years until 2018, providing scientific opinions on the risks associated with GMO applications in the EU. He has served as chairman of the Environmental, Post Market Environmental Monitoring and GM Fish Working Groups of the EFSA GMO Panel. He was a member of the GM Insects working group and has developed a number of the EFSA Guidance Documents on ERA and risk management. He was a member of the BBSRC/Phyconet Management Board and participated in the ALGEBRA project on GM algae and in an EFSA study of RNAi GM plants. He is an author in over 50 scientific papers on GMOs, numerous plant pathology papers and editor of two books.

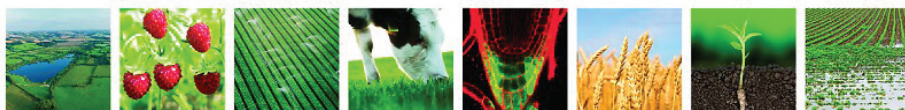
He developed his own consultancy in 2004 and is director of Sweet Environmental Consultants which provides research and advice on GMOs and Plant Health to the European Commission, European governments, FAO/UNIDO/UNEP and scientific organisations and academies of several countries. He lectures on risk assessment of GMOs on postgraduate courses at the Universities of Marche (Ancona) and Ghent, and other training courses for FAO, UNEP, EC and other organisations. He has provided training and other advisory services in European, Asian and South American countries.

He is an assessor for BBSRC/UKRI research programmes and a member of the PlantEd COST action on gene editing of plants.

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Eastern Agri-Tech Innovation Hub – linked with SARIC



The University Of Sheffield.

The Sustainable Agriculture Research and Innovation Club (SARIC) is a joint BBSRC and NERC initiative to support innovative projects that will provide solutions to key challenges affecting the efficiency, productivity and sustainability of the UK crop and livestock sectors. SARIC has made £10 million available for agricultural research in the UK, across themes of resilient crop/livestock systems and the generation of new technologies, products, tools and services. In 2019, the University of Sheffield, NIAB, Bangor University, UK Centre of Ecology and Hydrology along with other project partners were awarded a research grant to address the issue of declining soil fertility and low biodiversity in arable farms. The multidisciplinary project aims to investigate if reintroducing sheep and temporary grass-clover or multispecies 'herbal' leys, containing a diverse mix of grasses, legumes, and herbs, into arable rotations can improve soil health and subsequent crop production in arable farms in eastern England. Alongside on-going research at the five arable farms on the project, researchers at Bangor University established a new 2-ha 2-year field site at the university research farm in 2020, expanding the project and investigating the agronomic and environmental benefits of multispecies 'herbal' leys for animal health, greenhouse gas emissions, and ecosystem services as part of Emily Cooledge's PhD research.

If you would like to find out more, please visit our project website:

<http://restoringsoilquality.bangor.ac.uk/> or contact the project PI Prof Jonathan Leake (j.r.leake@sheffield.ac.uk).

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Eastern Agri-Tech Innovation Hub – linked with Hy4Dense



The Eastern Agri-Tech Innovation Hub is also a major partner in the EU Interreg 2 Seas project Hy4Dense (<https://www.interreg2seas.eu/en/Hy4Dense>). Hy4Dense is investigating how to optimise the yield of densely grown leafy salad crops (Rocket; Corn Salad/Lamb's Lettuce; and Baby Leaf Spinach) by developing a novel hydroponic system, and new production system approaches.


The introduction of novel hydroponic cultivation systems by growers offers much potential to produce high quality crops with reduced environmental impact and longer shelf-life. Hydroponics benefits growers by increased productivity and improved efficiencies of crop cultivation, while controlling diseases that influence yield and revenue. More than 90% of greenhouse cultivation of fruit vegetables has shifted to hydroponics; leafy vegetables grown at low plant density (e.g. lettuce) are starting to implement novel growing systems. However, no simple solutions are available for vegetable crops traditionally densely sown in the field such as lamb's lettuce, spinach or rocket, despite these crops being important for the local economies in the 2 Seas programme area.

This 3.5 year project, started in 2019, is close collaboration between our research partners in the UK (Essex University), Belgium (Inagro and Howest) and the Netherlands (Verify). This partnership brings together diverse knowledge and expertise on the broadly similar challenges facing the leafy salad horticultural sector across the region. The development of a novel hydroponic system for densely sown crops grown indoors enables producers to address current challenges by efficient crop cultivation management, and the capacity to mitigate diseases that reduce yield/quality and revenue. NIAB is continuously evaluating how salad varieties respond in such a dense system, and how nutrient and supplementary LED lighting recipes can be tailored to suit developmental needs. A key outcome is the improvement of existing prototypes into an efficient Deep Water Culture hydroponic system, with an emphasis on sustainability.

Technological knowledge transfer to growers and manufacturers is being actively undertaken to apply research outcomes to commercial settings. An economic viability assessment is underway to aid in decision making for farmers looking to potentially include soilless cultivation in their operations. A pilot demonstration cultivation system arising from this research is expected to be open to visitors at NIAB's Eastern Agri-Tech Innovation Hub in Soham, Cambridgeshire by the end of 2021.

To learn more about Hy4Dense, please contact graham.taylor@niab.com.

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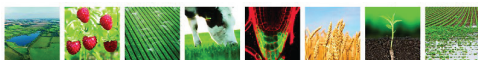
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