



EXTENDING STAKEHOLDER ENGAGEMENT



GREEN HORIZONS

Colin Patrick explains the agronomy of Explorer barley at a combined growers event with AB InBev, Viterra UK Ltd and Crisp Malting





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- + Green Horizons Survey Results
- + Agrii's Action Plan for extending stakeholder engagement
- + Where next for your farm?
- + Glossary of terms

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A BACKGROUND AND INTRODUCTION

GREEN HORIZONS

Green Horizons is Agrii's commitment to sustainable food production, and to taking a lead on principles and practices that can help to create a robust future for UK agriculture.

At its centre is our Five Point Plan to help prepare for, and meet, the challenges of tomorrow, while ensuring that agriculture remains sustainable and profitable.

The **Five Point Plan** covers the action we are taking in each of the following areas:



Increasing farm productivity and viability



Providing integrated whole farm solutions



Improving soil resilience



Enhancing the environment



Extending stakeholder engagement

An Insight Report that pulls together all of the projects, research and ongoing work that Agrii is involved in, within each area, has been produced for each of the five points of the plan. This report focuses on **extending stakeholder engagement**.

THE CHALLENGE:

- + Lack of understanding of where food comes from
- + Impact of regulation on crop agronomy
- + Diverse areas of the food chain working independently

Our ambitions under this section of the Green Horizons Five Point Plan are covered in detail in this report. **In summary, they are to:**

Increase engagement with NGOs, food processors, government, scientific institutions and the public **SECTIONS 1,2,3,5**

Digitally enable all customers via an integrated personalised portal including technical information **SECTION 3**

Expand virtual iFarm events and trial tours **SECTIONS 3**

Create a crowd sourcing programme for innovation sharing with customers **SECTION 3**

Develop a 'Green Horizons Network' to enable knowledge exchange among our customers and between Agrii and our customers **SECTION 3**

"The opportunities we have to add value to consumers, processors and growers alike are vast. But only if all parts of the supply chain from research to retail work together to identify the most promising avenues, harness the available genetic and agronomic resources, and develop the varieties and growing systems that make the most of them.

This is where our unique national research and development network really comes into its own, with the potential to move cutting edge food science as rapidly and effectively as possible from the laboratory bench to commercial production in the field."

Colin Lloyd, Agrii Head of Agronomy

When it comes to increasing sustainability and the future resilience of the agricultural food chain, there's lots of chat, lots of documentaries and lots of reports.

AGRII'S PRIORITY IS TO MAKE CHANGE HAPPEN.

We are looking to have greater consultation, collaboration and partnerships with a broader representation of agriculture, horticulture, amenity, forestry and ornamental stakeholders.

Our customers are increasingly asking for, and are open to discussion and advice on how to regenerate soils, improve ecosystems and create a more balanced and sustainable farmed environment. Our partnerships and collaboration start on farm. Agrii is a vital link in the chain, but consultation with many stakeholders has been challenging, as we are often seen as part of the problem, rather than an integral part of the solution; providing practical research and development, on-farm advice and innovative greener inputs.

In order to facilitate change, we are actively seeking a dialogue, collaboration and partnership with those looking to connect with the farming community. We want to listen to their needs alongside those of stakeholders, to develop a common understanding and ultimately effect sustainable strategies on-farm.

As a national company working across both crop and livestock sectors, we are uniquely positioned to tap into the voice of the farmer, provide farm feedback to various initiatives and concepts, helping partners to avoid pitfalls, test solutions and support implementation with our customers.

We already work with a number of valued partners on a variety of initiatives, and under the Green Horizons initiative we are looking to extend this engagement to additional interested parties.

AGRII IS WORKING TO EXTEND ENGAGEMENT WITH STAKEHOLDERS AT ALL STAGES OF THE FOOD SUPPLY CHAIN

This document is structured around the different parts of the chain.



Agrii collaborates with a range of research and academic institutions. On the following pages are some examples.

AHDB/BSPB

(Agriculture and Horticulture Development Board/British Society of Plant Breeders)

- + Official Recommended List and National List Trials that form part of the data set for the Recommended Lists.
- + Variety x fertiliser trials intended to inform an update to RB209 regarding modern milling wheat varieties.
- + Partner in SceptrePlus project for vegetables sharing trials results on a confidential basis.

AHDB SBCSR

- + Investigations to improve understanding and efficiency of uptake of maleic hydrazide sprout suppressant.

ADAS

- + Glyphosate resistance project.
- + Design and analysis of Agrii's Digital Technology Farm and Green Horizons tramline trials.

IMPERIAL COLLEGE LONDON

- + Agrii has funded a PHD student looking into detecting pre-symptomatic *Septoria* through RGB drone imagery.

LANCROP

- + Collaboration looking at various aspects of soil health and accurate measurement.
- + Leaf sampling project.

MEMBERS OF AGRII STAFF SIT ON VARIOUS PGRO AND AHDB COMMITTEES

The latter includes barley and wheat variety committees, the Cereals and Oilseeds Board and Potatoes Integrated Crop Management Treater Group. Agrii staff are also members of the Nematicide Stewardship Programme.

"I sit as one of the two agronomists on the wheat variety committee for the AHDB where I work with other volunteer specialists to evaluate recent developments and decide which varieties should be added or removed from the Recommended List. The contribution made by each member to this independent panel helps to encourage the development of genetic resilience and productivity in wheat varieties grown in the UK."

Mark Dewes, Sustainable Farming Lead

WORK ON HARICOT BEANS WITH WARWICK INNOVATION CENTRE

In 2021, Agrii and the University of Warwick's research commercialisation wing, Warwick Innovations, signed a contract to promote the commercial production of UK haricot beans developed by scientists at the University of Warwick.

Professor Eric Holub, from Warwick's Crop Centre, part of the School of Life Sciences, has bred three haricot bean varieties which are adapted for growing in the UK climate and are more suited to standard farm machinery.

Under the new contract, Agrii will carry out pre-commercial field trials and detailed research to enable a

proof-of-concept and move towards creating a growing model which fits with progressive UK broad acre farming systems.

Growing haricot beans on a commercial scale in the UK will offer a low food miles alternative supply model to those currently imported from North America and some African countries. Haricot beans could also make a valuable contribution towards achieving climate goals in the food sector, improving soil structure and helping to extend farm rotations through offering a short season, nitrogen fixing break crop, desired by UK growers.



WATER COMPANIES

- + Cover crop trials e.g. at South Farm, Tarrant Hinton (please see Insight Report 2 for case study).
- + Biobed demonstration day at Throws Farm.
- + Collaboration to develop the RHIZA Connect app to support land users within the Anglian Water catchments.
- + Monitoring of the Colne Valley catchment as part of Anglian Water's development of an 'Intelligent Catchment' approach. This combines local weather, drain flow and soil moisture monitoring data from sensors within the catchment to improve water quality (see case study).

FERA AND GAME AND WILDLIFE CONSERVATION TRUST

- + Project on aphid and BYDV threshold modelling.
- + GWCT ongoing monitoring of School Farm (Leicestershire) catchment to improve the effectiveness of cultivations see: <http://allertonresearch.blogspot.com/2021/03/soil-moisture-and-management.html>

UNIVERSITY COLLEGE DUBLIN

- + Key partner for the CONSUS project and source of endophytes in trials (see box below).

FOCUS ON: THE CONSUS PROJECT

The CONSUS project is a five-year, €17.6 million collaborative digital, precision agriculture and crop science research partnership between University College Dublin and Origin Enterprises, supported through the Science Foundation Ireland (SFI) Strategic Partnership Programme. The project will harness the leading expertise of UCD in data and agricultural science together with Origin's integrated crop management research, systems, advisory and knowledge exchange networks, to develop the next generation of digital tools for use by the farmer and agronomist. Extending across a wide variety of work programmes, CONSUS aims to bring digital agronomy into its own over the coming 10-15 years.

CASE STUDY LOCAL DATA INFORMS LAND MANAGEMENT TO PROTECT WATER QUALITY

A new partnership project to provide local weather data to inform land management decisions and protect water quality has just been launched in Essex's River Colne Catchment.

Anglian Water has worked in partnership with Agrii and Dutch technical experts at RMA to create a new weather app called **RHIZA Connect**, which helps highlight areas of common interest such as protecting soil and water resources. The app combines information from weather stations, as well as in-field moisture sensors and other data like the amount of water flowing in field drains. It uses this to provide farmers and land managers with localised information to help decide when to undertake certain operations, such as spraying, applying fertiliser or cultivating fields, while also keeping them informed of changes in the catchment and connected watercourses.

The data will also help Anglian Water manage its own water abstraction and treatment activities, as Catchment Advisor for Essex and Suffolk Gary Hodgetts explains: "This project is part of Anglian Water's wider commitment to catchment management, and we want to utilise remote sensors to help turn the Colne Valley into an 'intelligent catchment' for the benefit of everyone. We hope that what is trialled and developed here can be rolled out to other catchments in the Anglian Water region.

"While assisting land management decisions and raising awareness of catchment conditions (water stress, suitable conditions for pests and diseases etc.) **RHIZA Connect** will

also help Anglian Water forecast risks to our abstraction activities. Weather affects raw water quality and availability which ultimately influences our ability to utilise it. The app provides highly localised, at a glance data that is simple to use to highlight the pressures and constraints put on farmers by changing weather patterns, helping our staff understand the pressures that land managers are under."

Nick Winmill of Agrii explains that not only does the app measure key environmental parameters, but it adds additional data from drain flow sensors and soil moisture probes where available.

"This means that we can improve decision making with hard data, a process known as decision support," he says. "This allows farmers to make more informed decisions about key inputs and the timing of operations to ensure we are not increasing the risk of pollution, for example by applying fertiliser or disturbing the soil when it is at risk of washing away."

The first farmers began to use the app towards the end of last year and the rollout will continue throughout this summer. However, the first discussions about how Anglian Water could use its own weather stations, together with the 230+ operated by Agrii, to improve the way farmers manage water across its river catchments, began in 2016.

"We currently have around 120 farmers using the app and over the coming year we hope to increase that. This truly collaborative project not only helps protect raw water quality but also allows farmers to emphasise how they utilise local decision support tools and protect natural resources for the benefit of all – something which should be emphasised to customers and other stakeholders," stresses Gary.





LINKING ENVIRONMENT AND FARMING

WORKING WITH LEAF

As part of its mission to promote sustainable farming, LEAF facilitates a network of Demonstration Farms and Innovation Centres across the UK, whose work supports the research, evidence and development of Integrated Farm Management (IFM). The in-depth research that is carried out at Agrii's iFarms and Technology Centres alongside our Green Horizons initiative led to the accreditation of Throws Farm as a LEAF Innovation Centre in 2021.

"We are hugely proud to become a LEAF Innovation Centre. It recognises our commitment as a company to providing farmers with the latest research, advice and technology to build strong, resilient and profitable businesses. Pushing forward the science and technology to support more sustainable farming underpins our five-point Green Horizons sustainability manifesto. The LEAF Network offers a far-reaching and effective platform to accelerate knowledge and uptake of more sustainable farming practices and we are delighted to be part of it."

Ruth Mann, Agrii Head of Integrated Crop Technologies

AGRII SCHOLARSHIP

As part of our commitment to the continual improvement of our people, we invest significantly in employee development and welcoming new talent to the business.

Since 2017, we have run scholarship opportunities for undergraduate students interested in pursuing a career in agriculture. Working closely with Harper Adams, Reading and Newcastle Universities, we have so far welcomed three students into the business, undertaking a 12 month placement across all areas of agronomy.

The business and its people are built on the foundations of integrity, attitude and resilience, and this is what we look for when welcoming new people into the business.

From undertaking the scholarship, students have returned to the business in a variety of roles and continue to work towards their careers in agronomy, R&D and seed. By working closely with the top agricultural universities, we aim to provide the future generation an insight into the role of agronomy, and also welcome new talent into the industry.

"A brilliant opportunity to gain an invaluable insight into the UK crop production industry"

Poppy Bunting, Scholarship Placement Student 2019-2020
(now Trainee Seed Agronomist/Seed Specialist)

"An exciting and varied opportunity enabling you to expand your own interests"

Amy Watkins, Scholarship Placement Student 2018-2019
(now Sustainability Project Manager)

MY EXPERIENCE AT AGRII



MONTHS 1-3

Seed Department

This section of the placement was predominantly a sales role, where you get to experience working in an office environment pricing orders from customers and buying groups. Here, you really gain an understanding of different crop varieties and prices, along with the logistics involved in treating seed to be sent out to farm.

MONTHS 4-7

Technical Support

After month 3, you are able to move office to Throws Farm Technology Centre. Here, you get the opportunity to work alongside the technical team, learning about the different products available on the market. You may have the chance to attend manufacturer meetings, and be involved in discussions on the different products coming to the market.



MONTHS 8-12

R&D Department

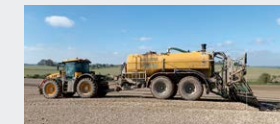
Through spring and into summer, you will begin to get involved in trials work. This will involve preparing for trials, assisting with days out spraying, and assessing crops. This section of the placement enables you to travel with the trials team to different sites, and develop an understanding of how trials are managed.



THROUGHOUT

Additional Opportunities Available

What makes this placement different to any other opportunity, is the degree of flexibility you are given to develop your interests. Your line managers are always open to suggestions, so don't be afraid to ask if you want to try something new for a day. Agrii has some of the best agronomists in the country, so being able to crop walk with them in an invaluable opportunity. Be prepared to communicate and ask. Everyone is extremely helpful.



MY EXTRA OPPORTUNITIES

Throughout my time on placement, I gained experience in crop walking with different agronomists all over the country. Studying a degree in Geography and Environmental Management meant I was also looking to gain some environmental and sustainability experience. Although not part of the job description, this placement enabled me to gain experience with an ACS consultant, and get involved in a sustainability project, working towards my dissertation at University.

Amy Watkins – scholarship placement student 2018-2019
(BSc Geography and Environmental Management, Harper Adams University)

THE HARPER ADAMS SOIL AND WATER MANAGEMENT CENTRE

An industry-led centre for soil and water management that delivers sustainable improvements in farming and ecosystem efficiency through better knowledge coordination, transfer and development.



THE NEED:

In 2008 Professor Dick Godwin published a report for the Royal Agricultural Society of England (RASE) on "The current status of soil and water management in England". This report highlighted some serious challenges facing UK soils and the lack of investment in them, a decline in the number of soil scientists and the lack of soil science research.

The report was incredibly timely as it was published just when we had had a wet autumn/winter resulting in fields either not drilled or compromised yield-limited crops. Suddenly there was widespread interest again in drainage, ditching and improving soil resilience.

Agrii along with a number of industrial partners met with Dick Godwin (who had just moved from Cranfield to Harper) and following much discussion, the concept of an industry-led soil centre based at Harper Adams evolved during 2011. In addition to Dick's report, what drew in this broad support for a centre was the recognition that:

- + Soils play a vital role in agricultural productivity, water conservation and the other ecosystem services on which human and environmental health, wealth and wellbeing depend.
- + In recent years their crucial role had been well-recognised in Defra's 2009 Strategy for Soils as well as the EU's Thematic Strategy for Soil Protection (2006).
- + The UK Low Carbon Transition Plan (2009) further underlined the important role of soils in addressing the challenge of climate change, and the Natural Environment White Paper (2011) established the target of managing all of England's soils sustainably by 2030.
- + The compelling (and ongoing) food security and environmental agendas demanded determined action to reverse the serious erosion of UK soil and water management research, education and extension activities that has taken place over the past 30 years.

WHERE ARE WE NOW?

Ten years on and, although these challenges are now far more widely recognised, they are still very much the resultant Harper Adam's Soil and Water Management Centre's core drivers, which are:

TO COORDINATE NATIONAL RESOURCES:

- + Acting as a central focus and contact point for information and expertise.
- + Keeping the subject firmly on the agenda at all levels and in all sectors.
- + Bringing existing knowledge together in a comprehensive library.
- + Providing a forum for establishing essential research and development priorities.

TO TRANSFER EXISTING EXPERTISE:

- + Promoting best practice in agronomy, machinery and field traffic management.
- + Supporting essential college, undergraduate and post-graduate education.
- + Making practical educational, training and advisory materials widely accessible.
- + Coordinating farm-based workshops, training and demonstration projects.

TO DEVELOP ESSENTIAL RESEARCH WORKING ACROSS ALL SECTORS TO IDENTIFY GAPS IN KNOWLEDGE:

- + Investigating specific challenges and improvement opportunities.
- + Instigating applied research to meet industry and ecosystem needs.
- + Funding a well-planned range of research and development studies and projects.



The annual Soil and Water Conference takes place in January each year.

The public face of the Soil and Water Management Centre is the annual conference which each year aims to deliver topical subjects pulling together the latest research, but always combining this with practical application using farmer case studies. The winter 21/22 conference focused on the completion of a unique ten-year project on tillage and traffic at Harper. The afternoon part of the conference was focused on carbon accounting, attempting to bring some clarity to our understanding of what, on the face of it, could bring additional value to farming but asked the question of what else we need to know first about carbon in our soils?

1

RESEARCH INSTITUTIONS AND PROJECTS

THE UK CENTRE FOR ECOLOGY & HYDROLOGY (UKCEH) IS AN INDEPENDENT, NOT-FOR-PROFIT RESEARCH CHARITY BASED IN WALLINGFORD, OXFORDSHIRE AND WITH SITES IN EDINBURGH, BANGOR AND LANCASTER



UK Centre for Ecology & Hydrology

It is the UK Centre of Excellence for integrated research into the terrestrial and freshwater environments. UKCEH employs 500 scientists undertaking integrated monitoring and research to provide solutions to pressing environmental challenges, including sustainable food production, tackling climate change and reversing biodiversity loss. UKCEH can trace its history back to the 1960s when it undertook the pioneering work linking the use of organochlorine pesticides to egg shell thinning in falcons. In more recent years, UKCEH has worked in partnership with farmers and the farming industry to develop practical management prescriptions to reverse biodiversity loss, promote healthy soils and protect the wider environment. This partnership has played a major role in providing a robust evidence base for UK agri-environmental policy. UKCEH is about to embark on a major new research initiative to support the transition of productive UK agriculture to net-zero greenhouse gas emissions whilst enhancing biodiversity, soil health and water quality ('net zero+').

Marek Nowakowski, an environmental consultant working with Agrii, has been working with UKCEH for some 30 years. Over the course of these years the practical observations and farming knowledge of Marek, coupled with the systematic work of the scientists at UKCEH, have resulted in a whole body of work that has helped deliver a number of valuable contributions to improving the environmental footprint of farming.

This work started with the Buzz Project (2002-2007) which brought together policy makers, the farming industry and scientists

to undertake a national-scale, replicated experiment exploring the benefits of a range of new habitats, including pollen and nectar and wild bird food, that formed the basis of the original stewardship programme. The most effective of these habitats were then rolled together and tested under commercial conditions on a large farm in Buckinghamshire – the **Hillesden Project (2005-2017)**. This was one of the largest agri-environmental experiments ever undertaken, in which the 2,500 acre estate was split into fifteen 'farmlets' of around 165 acres each. Each farmlet was assigned to one of three agri-environmental strategies:

- + **Business as usual** where no land was taken out of production for environmental enhancement.
- + **Entry level** – where 3% of the lowest yielding and difficult to farm land was taken out of farming and some basic habitats were created, such as simple grass margins.
- + **Entry level plus** – where 8% of land was taken out of production and a wide range of wildlife habitats were created.

Each of these strategies was replicated five times across the farm. The impacts on biodiversity, crop yield and margins were monitored for 12 years and compared with neighbouring farms (see graphs). A sister project on the nearby **Waddesdon Estate** measured the benefits of agri-environmental habitats on a wide range of ecosystem goods and services, including water quality, soil carbon and greenhouse gas emissions.

AB15 – the original concept of a crop that could achieve these objectives and deliver pollinator benefits to the environment came

from Marek and developed into a proven practical solution with Defra funding a three year research project with UKCEH.

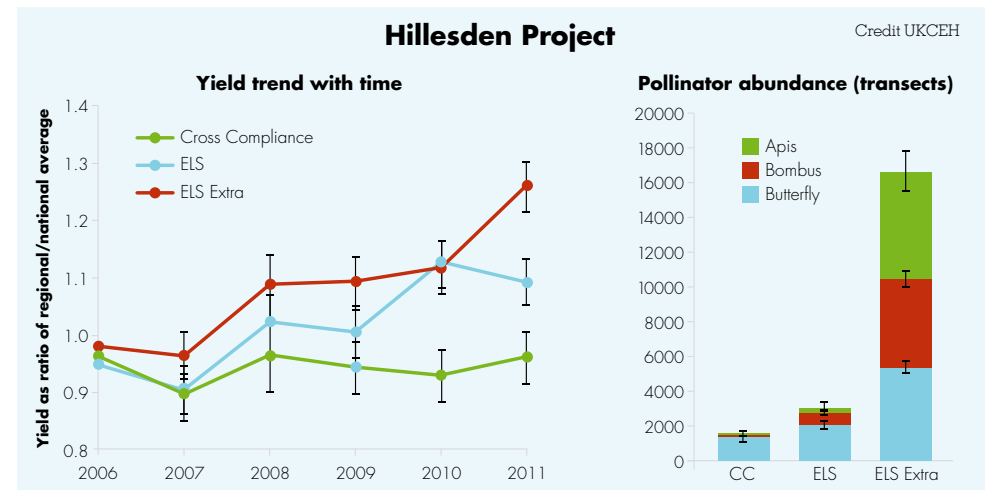
The increasing need to balance sustainable food production with other competing demands on agricultural land led to the **ASSIST** Project, which is led by UKCEH and Rothamsted with partners including Agrii, and with practical advice and guidance from Marek. This project has shown the benefits of early engagement and partnership with farmers and the farming industry to combine the best environmental practices with the best agricultural practices.

Within the **ASSIST** project Agrii has been able to take an in-depth scientific look at soil health and really move forward our understanding of soil biology using cutting edge DNA sequencing. Work has also been carried out with UKCEH to develop a way of

benchmarking soil health, to be used as part of Agrii's Soil Resilience Strategy (please see **Green Horizons Insight 1**).

The work with UKCEH has also moved into helping us develop a greater understanding of the environmental pesticide risk. This has resulted in a '**pesticide hazard review tool**' with Agrii providing the pesticide options, including tank mix programmes. The result is a biodiversity '**hazard traffic light system**'.

Moving forward as we look to build an Agrii position in sustainable food production, our relationship with UKCEH will move from one of being "something of interest" to an essential pillar. The value all rests on our ability to work with scientists to help bring practical solutions to the agricultural, carbon and environmental challenges that will face us over the coming years.



INTEGRATED PEST MANAGEMENT (IPM) WINTER BEANS TRIAL WITH PGRO

Habitat creation and the pest/predator relationship is a form of crop protection that is difficult to strike a balance with.

As part of our Green Horizon trials, we have been working with the Processors and Growers Research Organisation (PGRO) to examine cultural controls for pea and bean weevil and bruchid beetle in a crop of winter beans. Using a mixture of wild bird mixes, lucerne and grass margins (with/without wildflowers) to surround the bean crop, we have been examining how effective the habitats have been at reducing pest damage.



Insect populations and their diversity in the main crop and trap crop were also assessed, to explore how far the insects were travelling across the field.

Trap crop A contained the highest insect diversity, and within the crop, population diversity seemed to increase with distance from trap crop B.

The utilisation of natural pest control is still very much in its infancy. Working collaboratively with organisations like PGRO, UKCEH and others, we hope to develop our understanding of this complex science, to reduce our reliance on crop protection products, and also increase biodiversity levels on farm.

You can read more about natural pest control in **Green Horizons Insight Report 3**.



Adult bruchid beetle in field bean crop

A BIT ABOUT PGRO

The Processors and Growers Research Organisation (PGRO) is the UK's centre of excellence for peas and beans. PGRO has a highly valued track record of providing up to date information and project work based on solid, reliable research.



Agrii was one of the founder members of the Pea Yield Enhancement Network (YEN) set up by PGRO. Agrii staff sit on the PGRO Pulses Panel, the remit of which is to oversee the research done by PGRO and to evaluate current problems such as pests and diseases.

1

RESEARCH INSTITUTIONS AND PROJECTS

RESEARCH INTO TIMING OF MALEIC HYDRAZIDE APPLICATION FOR POTATO GROWERS

Trials commissioned by Sutton Bridge Crop Storage Research (SBCSR) and performed by SBCSR with support from Agrii have found that higher water rates in combination with applications early or late in the day result in higher tuber residue values.

Maleic hydrazide has the potential to reduce sprout growth over long storage durations, reducing the need for post-harvest treatments that are, in comparison, relatively costly. Ensuring the crop absorbs sufficient active substance to have the desired effect while observing maximum residue levels, however, has been the subject of research.

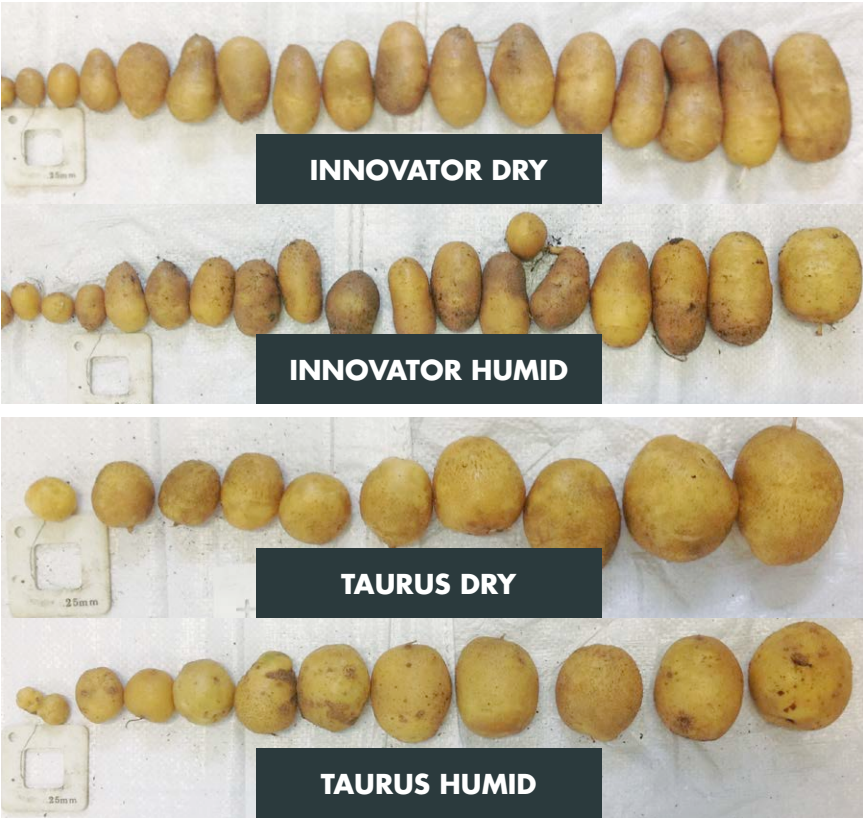
A study in 2006 found that while the detected residues were often well below the maximum limit, there were instances that could be considered problematic. The authors found this to be a result of poor application practice. More information on conditions suitable for optimal application was therefore considered of value to growers.

A further trial by SBCSR and Agrii in 2021 (S1056) sought to consider the importance of humidity in promoting absorption. Maintaining high humidity levels for a 24-hour period after application resulted in a three-fold and highly significant increase in tuber maleic hydrazide residue concentration. The effect was similar in both varieties used in trial – Taurus and Innovator – but was within the permitted limit.

While such conditions are unlikely to occur in the field, they demonstrate that humidity is an important factor in optimising applications. We know from earlier research that plant hydration is important to ensuring that maleic hydrazide is transported around the plant. This begins on the leaf and, it is proposed, that by extending drying time through higher humidity, the absorption time was also increased.

The results indicate that the timing of maleic hydrazide applications should also take account of drying conditions. Yield differences between dry and humid conditions were not significant in either of the varieties used in the trial.

Maleic hydrazide has the potential to help reduce sprout growth over long storage durations.



Progeny tubers from a selected pot of each variety used in the trial highlighted that there were no negative yield or size consequences of maleic hydrazide.

The Sutton Bridge research unit has now closed but we look forward to continuing the work and possible future partnerships with the former researchers from Sutton Bridge going forward.

Agrii is very pleased to be working alongside key industry manufacturers as part of our Green Horizons trials work and wider initiative.

As part of our Green Horizons commitment, we want to ensure we are looking beyond our own operations, and examine how the products we take onto farm meet our sustainability commitments. Therefore, we are in continual discussion with manufacturers on the measures they are taking to improve the sustainability of their businesses and products, to minimise the environmental footprint of farming practices and food production.

THE GREEN HORIZONS CHALLENGE PROJECT

One of the key areas of trials work specifically being carried out as part of Green Horizons, is the Green Horizons Challenge Project. This aims to bring together all of the elements of the Green Horizons Five Point Plan to develop and demonstrate 'the field of the future'. The project is supported by a range of manufacturers, and on the following pages we summarise some of the sustainability objectives of these manufacturers, and the work that they're doing to achieve these goals.

There's more information about the specific work being done under the Challenge Project in Insight Report 2 – follow the link:

www.agrii.co.uk/greenhorizons/the-environment/

AIM: To devise a way of growing a high yielding winter wheat with reduced conventional inputs, supported by 'green technologies' and following Integrated Pest Management principles.

OBJECTIVE: To achieve as close an economic outcome as possible to conventionally grown wheat, with a lower carbon footprint.

R&D AREAS TO BE INCLUDED AS PART OF THE CHALLENGE PROJECT:

- + Varieties/genetics
- + Cover crops
- + Healthy soils
- + Crop nutrition/
Nutrient Use Efficiency
- + Environmental improvement
- + Integrated Pest Management
- + Biosolutions
- + Water resource quality improvement

As well as the Green Horizons Challenge Project, there are a large number of field-scale experiments being run as part of the Green Horizons Initiative.

Many of these are being run by Agrii alone, or Agrii with a range of different partners. The following trials are being run with the same partners as the Challenge Project (Corteva, FMC, UPL, Bayer, Interagro and BASF):

TRIAL SET 1:

Crop Protection/Biostimulants/ Adjuvants/Micros Variety x Fungicide Choices Trials

(Agriifocus, West Lutton & Lenham).

Each trial this year has a Green Horizons focus and includes the following four programmes across 14 varieties at each site:

1. Untreated
2. Standard fungicide programme
3. Reduced rate fungicide programme
4. Reduced rate fungicide programmed bolstered with biosolutions

TRIAL SET 2:

Nitrogen Use Efficiency

Two winter wheat tramline trials utilising ADAS Agronomics investigating the following treatments:

1. 100% Nitrogen
2. 80% Nitrogen
3. 100% Nitrogen + nitrification inhibitor
4. 80% Nitrogen + nitrification inhibitor

In addition to the above Nitrogen Use Efficiency trials, we are also looking at a replicated trial on Liqui-Safe at Midloe Grange where there are three varieties of winter wheat, each following a bean crop and a fallow.

The Green Horizons Challenge Project project is being supported by:





UK & Ireland 2030 goals

FOR FARMERS

- + **LEAF Resilient and Ready project** – 3 year programme following 4 farmers implementing sustainable farming practices – communication and training to wider audience on findings.
- + **Product stewardship** – training for smallholders on grassland product use and application at a variety of livestock shows.
- + Continue longstanding participation in the **Closed Transfer System** working group to make these technologies, which reduce spillages and potential point source contamination, available to all farmers by 2030. **easyconnect:** <https://easyconnect.tech>
- + **Promote best practice** when applying Corteva products through Corteva's Lean and Earn initiative e.g. **Learn-and-earn-CPD-points:** www.corteva.co.uk/tools-and-advice/Learn-and-earn-CPD-points.html
- + **Continue to develop** the range of biological products that offer benefits to the farmer and meet changing consumer demands.



READ: The full Corteva Sustainability Report can be viewed here: https://www.corteva.com/content/dam/dpagco/corteva/global/corporate/files/sustainability/DOC-CORTEVA_2020_SUSTAINABILITY_REPORT_v2-Global.pdf

FOR THE LAND

- + **Promote Corteva products** such as Optinyte™ technology which maximizes the yield potential of the crop while reducing nitrogen leaching and reducing greenhouse gas emissions.
- + **Corteva and LEAF Resilient and Ready project**, investigating sustainable farming systems on 4 farms, monitoring the changes to soil health, biodiversity and water quality over 3 years following advice and guidance from Corteva, LEAF and other independent experts.
- + **Development of holistic approach** and Integrated Farm Management (IFM).
- + Targeting blueprint, help and advice for large number of farmers.
- + Aiming to remove idea that farming sustainably = lower profitability.
- + End goal is LEAF Marque accreditation and/or LEAF Demo farm.

FOR COMMUNITIES

- + **LEAF Education Patronage**, outreach to c.70,000 children, 100% positive feedback from teachers including the Farmer time and Open Farm Sunday initiatives.
- + **STEM engagement** with local community.
- + Participate in Food and Farming events such as the Suffolk School Farm and Country Fair – 4,000 attendees.

FOR OPERATIONS

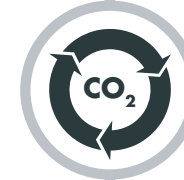
- + Continue to develop **High-Load formulations** that offer more hectares for a given pack size e.g. Starane Hi-Load, Dow Shield 400, Herb Flo 500.
- + Corteva has **reduced the use of plastic** in seed packaging by 60% (8 tons of plastic) thanks to a solution adopted in its plant in Sissa, Italy.
- + A new section of Mozzanica gas pipeline was opened to drastically cut pollution (Oct 2019).
- + **Packaging improvements** on the way for UK & Ireland farmers.



“We are continuously striving to improve yield and quality through the development of cleaner and greener adjuvant and biostimulant solutions to benefit water, soil, seed and leaf.”

Interagro prides itself on sourcing the best, high quality materials that perform in the field, and is committed to developing solutions that reduce carbon emissions for a sustainable future. The Interagro team is continuously looking at company systems and processes to ensure that products are biodegradable and are as kind to the environment as possible.

Interagro is at the start of its carbon-neutral sustainable journey and the company is currently mapping out its supply chain from procurement and formulation of raw materials through to delivery to customers. Once this process has been complete it will give the company a full understanding of its total carbon footprint.



PIPELINE PRODUCTS:

- + Greener products
- + Better labelling
- + Organic raw materials where possible
- + Safety of operations
- + Full traceability

PHASE 1

Determine carbon footprint for the business, and identify emission source.

PHASE 2

Carbon reduction plan produced, and action plan set out.

PHASE 3

Look at the carbon footprint of the product range.

Reducing impact of products by reducing storage and transportation.

Liaising with a number of organisations and sponsoring sustainability initiatives.





- + **Physical volumes of products:** UPL is endeavouring to reduce physical volumes through formulations that allow an active to be presented more efficiently or through products with high active loadings.
- + **Biosolutions will play a key part in maintaining crop production:** as many chemical actives go through the renewal process, most that are allowed to be kept will have their end point reduced in some way. Biosolutions will be an important part of maintaining this end point.
- + **Promoting Integrated Pest Management:** looking to collaborate with BASIS, UPL will offer online modules promoting and educating around IPM.
- + **Product sourcing and transportation:** Products are manufactured at more than 44 sites globally, meaning that product sourcing and transportation varies considerably. Although all are set within the framework of UPL's sustainability goals.
- + **Packaging:** UPL is looking to include a higher proportion of recyclable plastic in its packaging, where compliant with industry standards.

2025 TARGET:

Reduce manufacturing environmental footprint from baseline FY2019-20.



Reduce 25% specific CO₂ emissions



Reduce 20% specific water consumption



Reduce 20% specific waste disposal



60% sustainable sourcing

ZEBA: A PRODUCT FOR IMPROVED SOIL HEALTH

Zeba is a UPL product already available on the market that enhances soil conditioning and moisture retention. UPL is also looking at ways to enhance the microflora of the crop rhizome to help with crop health and establishment.

For more information, go to the sustainability section of the UPL website: <https://www.upl-ltd.com/sustainability>



BASF is aiming to phase out all challenged products within five years of initial classification to de-risk the product portfolio



“Agriculture should be seen as a solution to climate emissions rather than the problem, and healthy soils are the foundation on which this is built.”

- + **Integrated Pest Management (IPM):** BASF is working with DEFRA and Natural England officials to ensure wider non-product use decisions are recognised as Integrated Pest Management (IPM) and looking at how this could be recorded.
- + **Carbon footprint of products:** Even though crop protection products roughly only account for 1-2% of the average arable farm's carbon footprint, BASF is working to get a carbon footprint for each of its products – project output due at the end of 2021.
- + **Packaging:** BASF product boxes are made from 100% recycled material. The introduction of the 'Ecopack' cans in 2016 has reduced the total amount of plastic, and used more uniform materials in packaging to increase recyclability.
- + **Soils:** BASF is working with a range of stakeholders to influence government policy on soils. BASF has also been working with an independent soil scientist for a number of years to develop its activities.

For more information, please go to the sustainability section of the BASF website here: <https://www.basf.com/global/en/who-we-are/sustainability.html>

THE THREE PILLARS OF BASF CARBON MANAGEMENT:



Increase process and energy efficiency, reduce nitrous oxide emissions



Develop breakthrough technologies for low-emission production



Increase the share of renewable energies in power supply



2 MANUFACTURER PROFILES



CARBON INITIATIVE Already launched in U.S. and South America, Bayer's carbon initiative is aiming to help growers generate revenue for adopting specific climate smarter practices. This is also now starting out in the UK this year, on a joint venture, in which the Agrii R&D department is involved. This year, six UK farmers have entered the project to evaluate the adoption of climate friendly farming.

Bayer is aiming for a 42% reduction in scope 1 & 2 emissions (please see glossary) by 2030 (from 2019 baseline).

Activities include:

- + Offsetting emissions by purchasing from verified sources.
- + Creating a sustainable product supply.
- + Promoting product responsibility.
- + Reducing emissions by engaging with suppliers.

Bayer's aims are:

- + For operations to be 100% carbon neutral by 2030, through energy efficiencies, a shift to green energy and compensation.
- + To empower 100 million smallholder farmers.
- + To benefit biodiversity, soil health and water conservation.
- + To reduce agriculture's impact on the environment.
- + To work towards a carbon zero future for agriculture.

Bayer is utilising scientific models to evaluate the potential environmental impact of crop protection products on air, soil and water. By 2030, Bayer aims to reduce the environmental impact of plant protection products by 30%.

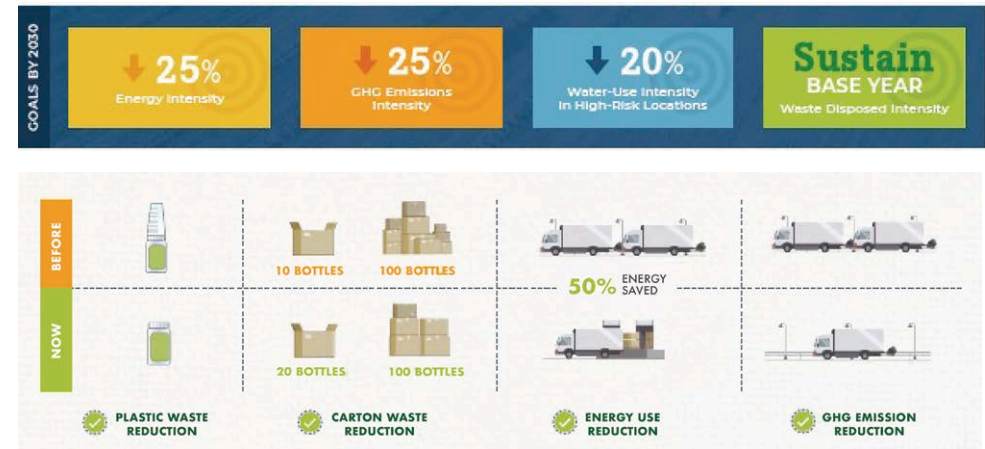
Similarly to Agrii's Green Horizons Manifesto, Bayer's focus is on meeting the UN's Sustainable Development Goals.

More information on the sustainability section of the Bayer website: <https://www.bayer.com/en/agriculture/sustainable-agriculture>



ENVIRONMENTAL RESPONSIBILITY

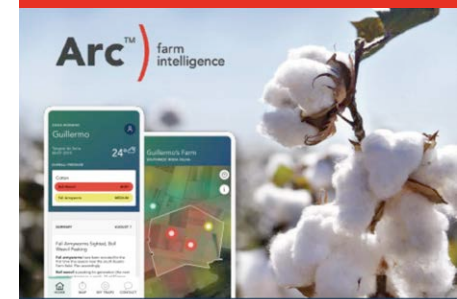
FMC has set four 2030 goals to limit environmental impact from its manufacturing sites.



FMC's determination is highlighted through its 'Resilient. Ready.' Sustainability Report which can be viewed here: <https://www.fmc.com/en/sustainability/sustainability-report-2020>

INNOVATIVE SUSTAINABLE SOLUTIONS

ARC is a platform for pest monitoring, helping growers to be more precise in their insecticide application and comply more easily with regulations.



REDUCTION IN PACKAGING

By removing cylinders from packaging, waste has significantly been reduced already, saving 300kg/year of plastic waste – that's the equivalent of 43,000 plastic shopping bags!

RENEWABLE POWER

Two of FMC's largest sites in France and Belgium are run on 100% green electricity.



WORKING WITH ORIGIN: AGRII'S PARENT COMPANY

ORIGIN SUSTAINABILITY REPORT

As a business, we have a responsibility to act with the rest of the supply chain to mitigate the impact of climate change, safeguard our environment and feed the growing population. This year, Agrii's parent company, Origin Enterprises PLC, published its inaugural sustainability report 'Nurturing Growth'. This recognised the deep interdependence between environmental and social issues and set out a framework to help make the Group and its supply chain more sustainable and equitable.

Nurturing Growth complements our original ambitions within the Green Horizons manifesto, providing a comprehensive framework to support a reduction in Group wide greenhouse gas (GHG) emissions, protect water quality and implement a zero waste to landfill policy.

To achieve its ambitions, Origin is implementing an Environmental Management System to an internationally recognised ISO 14001 standard and has committed to setting greenhouse gas emissions reduction targets that are in line with what climate science states is necessary to limit global warming.

Two new systems welcomed to support Origin's targets:

- + Science based targets (SBTI)** – a carbon emission target set in line with the scale of reduction required to keep global temperature rise below 1.5°C (based on pre-industrial temperatures).
- + Environmental Management System (EMS)** – a system that enables organisations to create policies to comply with the government regulations in the ISO 14001 standard.

By improving the sustainability of of its own operations, Origin will continue to provide sustainable and innovative advice, with the backing of environmentally responsible operations and products. Each year, Origin will continue to report on its progress as part of its ongoing commitment to sustainable food production.

FRAMEWORK FOR ACTION



*Net-zero emissions are reached when anthropogenic (i.e. human-caused) emissions of greenhouse gases to the atmosphere are balanced by anthropogenic removals over a specified period.

COLLABORATION WITH ORIGIN BUSINESSES



Agrii's Throws Farm Technology Centre now hosts a permanent amenity turf area with half laid down as golf green and half as playing pitch. Trials started in 2021.



We are now in the second year of trials looking at products produced by our sister company, Fortgreen.

Products being tested include adjuvants, water conditioners, biostimulants, seed treatments and a number of biopesticides. "With the cutting edge science of the specialist laboratory and glasshouse facilities at our sister company Fortgreen, we are screening the largest possible range of biosolutions for fast-tracked field trials at our Technology Centres and iFarms across the country" Amy Watkins, Agrii Sustainability Project Manager



Collaboration across numerous R&D projects including CONSUS endophytes, amino acids, micronutrition, seed, seed treatments, trial design and analysis.



Successful collaboration with Origin Fertilisers in trialling the Agrii-Start range. Ongoing work looking at different Wolftrax micronutrition options. All work focused on improving nutrient use efficiency, reducing emissions and lowering carbon footprint.

3 FARMERS, GROWERS AND AGRII STAFF

GREEN HORIZONS FARMER NETWORK

Sustainability is an exciting yet daunting term for many. It's a term that is receiving a lot of coverage throughout the industry and which everybody is expected to act on.

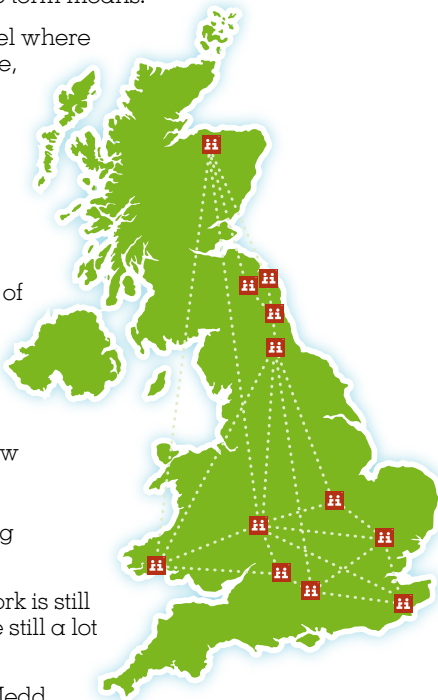
Following from our Green Horizons survey responses (please see **page 31**), it is clear what a broad range of things the term 'sustainability' means to different people, and it seems there is a strong understanding of what the term means.

However, how do we get to a level where our food production is sustainable, and what does that look like? These are the ultimate questions everybody wishes there was an answer to, and it is these questions that our Green Horizons Farmer Network is seeking to address.

Our Farmer Network is made up of 12 farmers throughout the UK who are all at different stages of their journey to sustainable food production. From experimenting with the use of biosolutions to understanding how to reach net zero, each farmer is taking their own route towards how they see their farm becoming more sustainable.

Starting in March 2021, the network is still in its initial phases, and there are still a lot of developments to be made.

You can read more about Luke Medd, one of our network farmers, on **page 19**.



INCREASING DIGITAL ENGAGEMENT

When we launched Green Horizons, one of the key things we wanted to do was to extend engagement with farmers and growers beyond the physical events that we hold, to make more joined-up information about Green Horizons-related topics available to them online, and across a much broader range of media. There are a number of ways in which we're working to do this:

WEBINARS

Alongside our iFarm and Technology Centres in the field, we now run a complementary series of webinars throughout the year, focusing on a broad range of sustainability and future farm resilience related topics. The current programme and previous online events can be viewed at www.agrii.co.uk/events.

VIRTUAL TOUR ONLINE R&D EXPERIENCE

We have created a new online experience that opens up the depth and breadth of Agrii R&D to growers, on demand. The new platform enables growers to log in and see updates from their local iFarm, regional Technology Centre and from across specialist units within Agrii. Find out more at www.agrii.co.uk/events.

ONLINE NROSO EVENT PROGRAMME

We have run a physical NROSO events programme for many years, and for the first time in the 2020/21 season we also ran an online event. We will continue to run online NROSO events this year and in future years.







DEVELOPMENT OF CUSTOMER PORTAL

We are in the process of developing our customer portal into a much broader resource, where customers will be able to access the latest trials information, alongside their own farm information and RHIZA data.

PODCASTS

Our podcast series 'Tramlines' has now been running for over a year, with more than 20 episodes and thousands of downloads. There are podcast episodes on a wide range of Green Horizons related topics including stewardship, enhancing habitats for bees and soil health. You can listen on your usual podcast platform or at www.agrii.co.uk/tramlines-podcast

Agrii's first digital events in 2020 helped to widen engagement with customers on subjects such as sustainability in agriculture and new environmental land management schemes. The figures below provide a snapshot of the increased engagement that was achieved by holding online events in 2020.

	 and local Autumn events	 and local Summer events	 Annual OSR events	 Livestock event
 In person events 2018/19	Customers 369 Staff 147	Customers 1807 Staff 637 <small>Some people attend multiple events</small>	Customers 345 Staff 120	NO EVENT
 Virtual events 2020	Customers 587 Staff 256	Customers 862 Staff 215 <small>Lower numbers but different attendees</small>	Customers 358 Staff 137	Customers 153 Staff 83

THE YIELD ENHANCEMENT NETWORK – YEN

The Yield Enhancement Network – or YEN – is an ADAS initiative that connects agricultural organisations and farmers who are striving to improve crop performance. Networks are open to any interested individual or organisation – commercial, academic or other. YEN networks exist to help any member from the UK, Europe or beyond to close the gap between their current and potential performance.

YEN ZERO

As part of the NFU’s ambition for agriculture across England and Wales to become net zero by 2040, we have been exploring how farmers can begin working towards this goal whilst also maximising productivity. Many organisations throughout the supply chain are also trying to work toward this same goal, so as part of our commitment to work collaboratively, we have joined the latest of the ADAS YEN family – YEN Zero. The network creates a space where knowledge can be shared, metrics can be agreed and mitigation strategies communicated.

Starting initially with a pilot year, we hope that by being a part of this network, a greater understanding of measuring and actioning a reduction in greenhouse gas emissions will be gained. We have entered five Green Horizons farms into the project, who are all keen to understand how they compare to similar farming enterprises throughout the country and start identifying areas where changes can be made.



WHAT IS NET ZERO?

Net zero is about balancing Greenhouse gases (GHGs). Focusing on both reducing emissions and increasing offsets (levels of sequestration), it is about ensuring that the amount we emit is no more than the amount that is taken away.

You can read more about net zero and what can be done in Green Horizons Insight Report 2.

AGRII INNOVATION AWARD

When we originally put together the Green Horizons Manifesto, one of our aims was to launch a crowd-funded innovation programme. This has evolved into the Agrii Innovation Award, which was launched in 2021.

The winner of our inaugural Innovation Award was Luke Medd from West Whorley Hill in County Durham. On his farm, Luke is aiming to improve soil health and reduce reliance on chemical controls, whilst enhancing biodiversity and increasing the future sustainability of the farm.

You can read more about why Luke was the winner of the 2021 Award in **Green Horizons Insight Report 3**.



Luke Medd (right) and Alan Medd (left)

Together with the local Agrii team, Luke is now using the Agrii Soil Resilience Strategy to determine what the farm’s starting soil conditions are like. They have carried out a full physical assessment and have worked with Lancrop to analyse the soils’ overall nutrient status, biological health and carbon levels. They’re now comparing different management strategies on the fields in question – utilising a no till approach in some areas and a conventional approach with a plough, power harrow and combination drill in others.

Initial results highlighted that a plough pan was present across all four plot sites. A plough pan is a hard, cement-like layer in the subsoil which prevents surplus water draining away freely and restricts root growth – it can be caused by ploughing regularly to the same depth. The team decided that the best option would be to carry out remedial works using a low-disturbance Ryetec Restorer subsoiler. They then used a Ryetec Ma/Ag SSP low disturbance disc drill to sow the crops in the no till area. The team are using the Agrii Soil Resilience Strategy and different cultivations to explore the question of how to ensure that soils are set up correctly for direct drilling.



Using a Ryetec Ma/Ag SSP low disturbance disc drill in the project fields

RHIZA DIGITAL ENGAGEMENT THROUGH RHIZA

Digital tools such as pest and disease models are a key aid for Integrated Pest Management because they guide users to inspect and protect their crops based on risk rather than on calendar and/or crop phenological stage alone.

Models for diseases of potatoes will soon become available via the RHIZA Connect app and many more are currently under evaluation by our R&D team and speciality crops experts at RHIZA and Agrii.

On RHIZA Connect, the disease risk is displayed in a very simple and intuitive manner over a period of seven days, including current day, previous two days and forecast for the next four days. There are four colour-coded levels of risk:

Low (green)

Moderate (yellow)

High (orange)

Very high (red)

These, together with the spray conditions, as seen in Figure 2, help planning for the best timing of intervention.

Next spring, the *Septoria* risk tool will once again be accessible via a widget on the Contour dashboard. This tool provides additional information to support decision making for better fungicide choice and dosage for *Septoria* control at timings following stem extension.

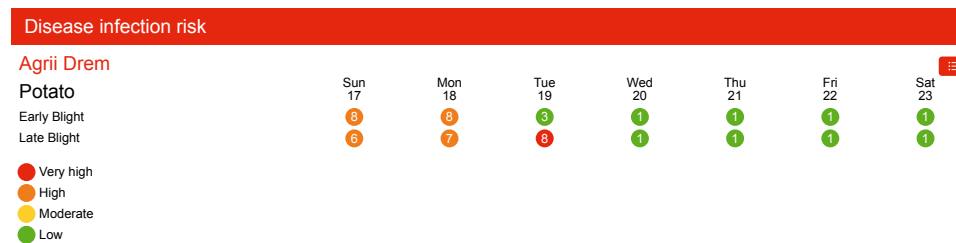


Figure 1: Disease risk for disease of potato.

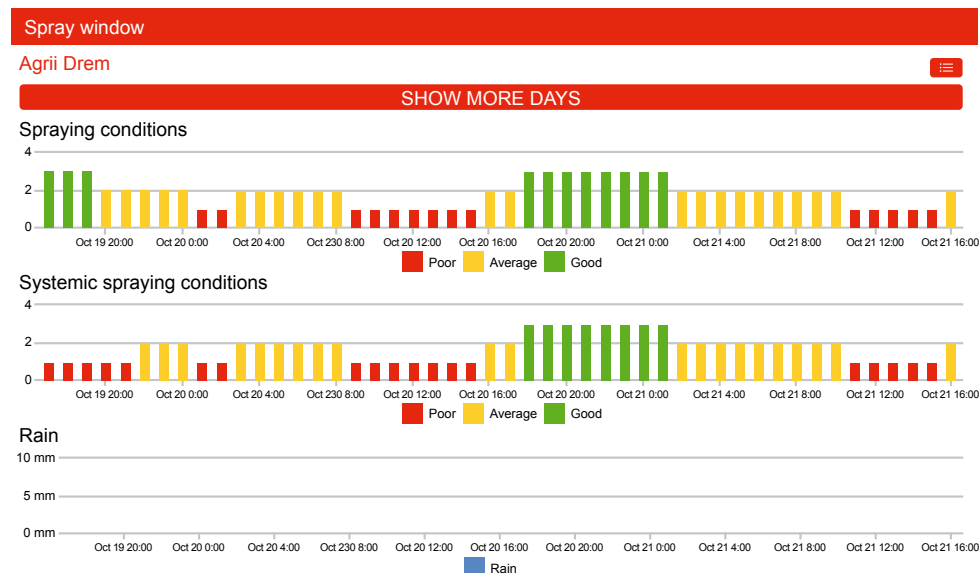


Figure 2: Effect of weather conditions on the suitability of applying a plant protection product.

To download the RHIZA brochure: <https://www.agrii.co.uk/wp-content/uploads/2021/03/Rhiza-A4-digital-brochure-compressed-1.pdf>

RHIZA CONNECT

This is an app that provides a platform for viewing weather station data from across the country, two- and eight-day weather forecasts, spraying conditions forecasting, soil moisture information and crop disease forecasting.

Please speak to your usual Agrii contact for more information on how to access the app.

RHIZA

This is Agrii's digital and precision farming partner, bringing together the combined capabilities of SoilQuest and IPF to deliver digital tools and precision farming services to 750K Ha across the UK.

CONTOUR

A digital platform that offers a range of precision farming features, allows farmers to view their data in one place and provides variable rate planning functionality.

Contour Mobile is a scouting app that allows growers and agronomists to crop walk using RHIZA 'layers'.

iq INTERNAL AGRONOMIST TRAINING

Agrii's iq training programme is an industry-leading initiative to support new talent in agriculture.

ESTABLISH: Provides the practical and theoretical training to support you to gain your BASIS Certificate in Crop Protection and FACTS qualifications.

ENHANCE: Involves a number of elements that will combine and add real value to you and your role as a qualified agronomist. Covering both practical and classroom based training, led by experts in their field.

EDUCATE: Additional formal qualifications such as BASIS diploma.

6 YEARS ON FROM LAUNCHING iq:

49 colleagues have passed their BASIS qualification

58 have passed FACTS

Since 2019, **138** employees have been on BASIS training. This includes FACTS, soil and water management, advanced quality of soils and many more.

ENVIRONMENTAL TRAINING

As part of iq, every year we run an internal environmental training course for our agronomists, to supplement existing knowledge and share the latest scientific and legislative information.

This course covers topics such as selecting sites for flower mixes, habitat management, understanding the insect 'hungry gap', and making the best use of government payment schemes. This year the training covers additional topics around carbon management and markets.

REDUCING AGRII'S ENVIRONMENTAL IMPACT

Around the Agrii business, staff from all departments have been working hard to help reduce our company environmental impact.

This page highlights just some of the work we're doing to reduce our carbon footprint and to try and make Agrii a more sustainable business.

Initiatives at most of our offices:

- + Only china cups are used for hot drinks.
- + Refillable bottles are used for meetings and glass drinking glasses are used for water fountains.
- + Plastic and cardboard recycling is done on a regular basis, with many offices choosing to recycle additional materials such as sweet/snack packaging locally.



LOGISTICS

We have invested in electric vehicles which will be used initially in summer 2022 for local deliveries around depots.



MARKETING

We introduced biodegradable coffee cups and cold drinks cups made from plant-based materials, at iFarm events, at the start of 2019. The service provider (Vegware) collects the cups from a central location to commercially compost them.

Agrii pens given away at events are now made from plant-based materials. The Agrii customer journal is now sent out in a paper envelope rather than plastic packaging.

We introduced stringent print standards in 2020 for all of our customer literature and marketing materials. These include using vegetable based inks, carbon balanced paper, World Land Trust Certification and pulp from FSC® certified and traceable sources.

In 2022 we are introducing the use of more sustainable display materials at internal and external events.

Please get in touch if you'd like any more information.

SAVING...



All Agrii offices and depots are now powered with electricity from renewable energy suppliers.



The team at Throws Farm Technology Centre have bought their own composter for food waste, which is also clearly signed for visitors.



We are working towards the ISO14001 accreditation, which will demonstrate Agrii's commitment to good environmental practices.



4 PROCESSORS AND END USERS

ENGAGEMENT AND COLLABORATION ACROSS THE AGRI-FOOD CHAIN

As part of our work under the Green Horizons Initiative we are continually working to engage with processors and end users, including supermarkets, to improve connectivity, understanding and collaboration between different areas of the agri-food chain.

In this section we provide some examples of current work.

The number of projects that we're involved with is growing all the time.

Please visit www.agrii.co.uk/greenhorizons for the latest news.



MCDONALD'S AND MCCAIN GB WATER AND IRRIGATION SUSTAINABILITY PROJECT

In 2021, RHIZA Environmental Services supported a leading group of 10 potato growers in a water and irrigation sustainability project for McDonald's, managed by McCain GB.

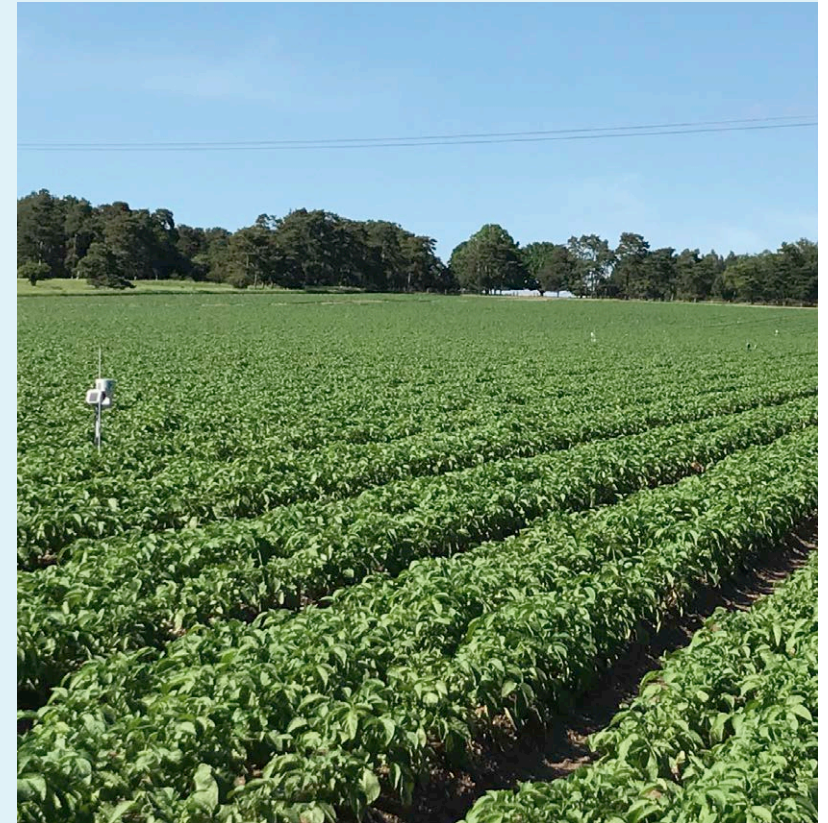
The initiative is part of both McDonald's and McCain's* 2020 global sustainability strategies, which include measures to tackle issues such as resource use efficiency.

The project involves growers across Norfolk, Cambridgeshire, Yorkshire and the West Midlands, under the supervision of potato consultant Dr Mark Stalham. Across the participating farms, Agrii has supplied nearly 100 soil moisture stations with data made available through the RHIZA Connect app and website dashboard.

The data has been used to accurately compare restricted (dry), scheduled according to need (standard) and excessive (over-wet) irrigation regimes within the same run of the field. The project is due to continue in 2022.

*Visit www.mccain.com/sustainability/reports-downloads.

Elveden Estate – showing a series of soil moisture stations



NEW AND EMERGING MARKETS

“Rather than relying on traditional grain and oilseed production, we need to think differently and far more broadly as we move into an increasingly uncertain food production future in the UK.” Peter Smith, Agrii Innovation Crop Consultant.

HEALTHY CROPS – CONSUMER TRENDS

Reports by the Smart Protein Project state that European consumption of plant-based foods increased by **49%** over the two year period **2018 to 2020**. This resulted in a market size of 3.6 billion Euros from 2.4 billion Euros.

Agrii is invested in alternative cropping choices that can contribute societally to improve our food choices in an informed healthy manner.

For example, some naked barleys contain up to four times the amount of resistant fibre compared to the mainstream cereal crops. Some lines have this combined with high levels of beta glucan which results in a barley grain with ‘superfood’ properties. The opportunity for growth in this market is with us currently as food processors continue to drive research into how they can add these lines to their ingredient range. These naked types also benefit from being used as ‘wholegrains’ as they are milled, or used, whole, due to the husk naturally separating at harvest.

Resistant fibre is also present in combining peas and other legumes such as haricot beans and chickpeas.

These are increasingly being used in the plant protein sector of the food market as consumers look to move part of their diet to plant-based food. The increased satiety associated with these types of food could be a major contributor to future food systems directed at weight loss and health generally. It could be in the form of a meat substitute or a plant-based protein extracted product in a new area of the market that we haven’t yet envisaged.

Only the most cost effective crops will suit this market. However, Agrii is well placed through an evolving testing system on these crops for robustness to UK conditions, overall return to growers and suitability to a fast moving and exciting food market.

FOOD BARLEY

Food barley is a new and evolving story for Agrii. This is solely targeted at the human chain where the product offers a very high nutritional profile to the consumer. Currently a naked type, this is also naturally lower yielding, but grain buybacks have been created to provide growers with at least as much gross margin opportunity as that of malting barley. Please get in touch with your usual Agrii contact for more details.

WHAT IS RESISTANT FIBRE?

Also referred to as resistant starch, this is a form that can’t be digested in the small intestine. This means that it is classified as a type of fibre. It passes through the small intestine intact and is then fermented in the large intestine, where it produces short chain fatty acids (SCFA) which act as an energy source for cells in the colon and encourage ‘good’ bacteria.

A combination of a slower digestive system and increased satiety (making you feel fuller for longer), aided by good levels of beta glucan and improved gut fermentation, increases health whilst also encouraging insulin sensitivity – improving glucose control, thus helping to control incidence of type 2 diabetes. Foods that lead to an increase in the number of SCFAs in the colon are also thought to be beneficial to health through prevention of the development of abnormal cells in the gut, potentially reducing the incidence of colon cancer.

Peter Smith talks at a national food chain innovation event held at the Agrii Throws Farm Technology Centre.



Please see page 30 for more information on the work that we’re doing as part of the Love Wholegrains and Pulses Initiative, to bring together information and resources for people and organisations at all stages of the food chain.

4 PROCESSORS AND END USERS



CASE STUDY EXPLORER BARLEY

The story of Explorer barley involves organisations and individuals at all stages of the supply chain. Explorer is a variety of spring barley with high free amino nitrogen (FAN) and high diastatic power (the activity of enzymes that convert starch to sugars), which make it ideally suited to the Budweiser production process. The famous Budweiser recipe requires malt from varieties with a higher nitrogen content than normal in UK practice.

The collaboration between Agrii, Viterra UK Ltd (previously Glencore), Crisp/Boortmalt and AB InBev began in 2014 and has grown exponentially. Explorer is the only UK-grown variety of malting barley approved for Budweiser brewing and is only available to contracted growers. It wasn't grown in the UK prior to this collaboration because the nitrogen content of malting barley required by maltsters in the UK is traditionally lower than that seen with Explorer. By 2020, 85,000 tonnes of Explorer grain, grown by around 300 farmers, had been contracted. Prior to this, most of the barley required for UK Budweiser was obtained as malt from continental Europe.

100% of the barley used to brew Budweiser in the UK, for UK consumption, is now sourced from British growers.

Sourcing grain locally ensures a short supply chain, excellent provenance and consistent quality and supply. It enables the building of close relationships with growers for mutual benefit, security and improvement. It also has environmental benefit, reducing the carbon footprint of production. In terms of wider uncertainty and external challenge, it means that less reliance is placed on imports. Developing a British supply chain has been good for farmers, good for the environment and good for business.

AB InBev requires 40,000 tonnes of barley for its two breweries at Magor in South Wales and Samlesbury in Lancashire to brew all of the Budweiser required for UK consumption. 17 million bottles and cans of Budweiser are produced each week in the UK at these two breweries.

"Agrii works in partnership with plant breeder Secobra to screen varieties from their European and UK breeding programmes to evaluate how they are adapted to UK climatic conditions, measure their competitiveness against industry standards and test for quality to meet the demands of UK consumers. This enables us to bring varieties like Explorer to the market for the benefit of the whole supply chain."

Lee Robinson, Agrii Executive Director of Seed



CASE STUDY EXPLORER BARLEY

EXPLORER AGRONOMY

Explorer is well suited to a range of soil types, but particularly to heavier land (where grain nitrogen tends to be higher) than is traditionally considered ideal for malting crops. It also demands a less than traditional approach to agronomy. Growers can push yield with late nitrogen application and without having to worry about nitrogen levels that would traditionally be too high for UK malting.

Explorer is a continental type of barley with very fast speed of development and must not be sown before March. Like many continentally-bred varieties, Explorer takes off rapidly from March or early April sowing and is noticeably more early maturing than most.

Its speed of development makes it especially competitive against blackgrass and other

grassweeds. Explorer's very early maturity makes it an ideal entry crop for oilseed rape. It is a good variety for a grower who is looking to open up their rotation and get the benefits from spring cropping.

"Having grown Explorer spring barley since 2015, we have found that its ability to come out of the ground running, and excellent competitiveness, have allowed us to establish a very useful spring crop on heavy Northamptonshire soils.

The backup from Agrii gives us the confidence to commit up to one third of our annual cropping to Explorer, showing significant improvements in the control of blackgrass whilst still providing respectable margins." explains Nick Paton, of Wakefield Estate.



"The fact that we are part of a group able to supply 100% of the Explorer needed for UK production of Budweiser from British farms is great for British agriculture, and makes me proud to be part of this industry."

**Nick Paton,
Wakefield Estate**



Explorer newsletter, survey and marketing leaflet

Colin Patrick explains Explorer agronomy at the Growers Day



COMMUNICATION TO THE PUBLIC

An important part of the Explorer barley story has been communication to the wider farming community and to the general public.

The project partners have done this in a range of ways including press releases, social media, Open Farm Sunday events (public) and internal events (iFarm open days).



4 PROCESSORS AND END USERS

STRAWBERRY SHELF-LIFE EXTENDED BY BIOLOGICALS

A trial conducted at the Agrii fruit iFarm located in East Malling has shown that strawberry plants that received either Botector, a biological fungicide containing *Aureobasidium pullulans*, or the biostimulant ProAct, containing the harpin alpha-beta protein, produced fruit with greater shelf-life potential than those receiving a conventional crop protection programme involving synthetic fungicides.

The news will likely be welcomed by growers fearful that the withdrawal of synthetic fungicides will lead to an increase in post-harvest losses through a deterioration in shelf life and skin blemishes, explains Richard Killian, Agrii fruit agronomist who managed the trial.

Crops treated with a five-spray programme of Botector (*Aureobasidium pullulans*) had an average 15% incidence of *Botrytis cinera* compared with 48% for the industry standard five-spray treatment. Disease incidence was assessed at seven days after picking in ambient storage.



Image taken during the shelf-life assessment work (7 days ambient temperature).

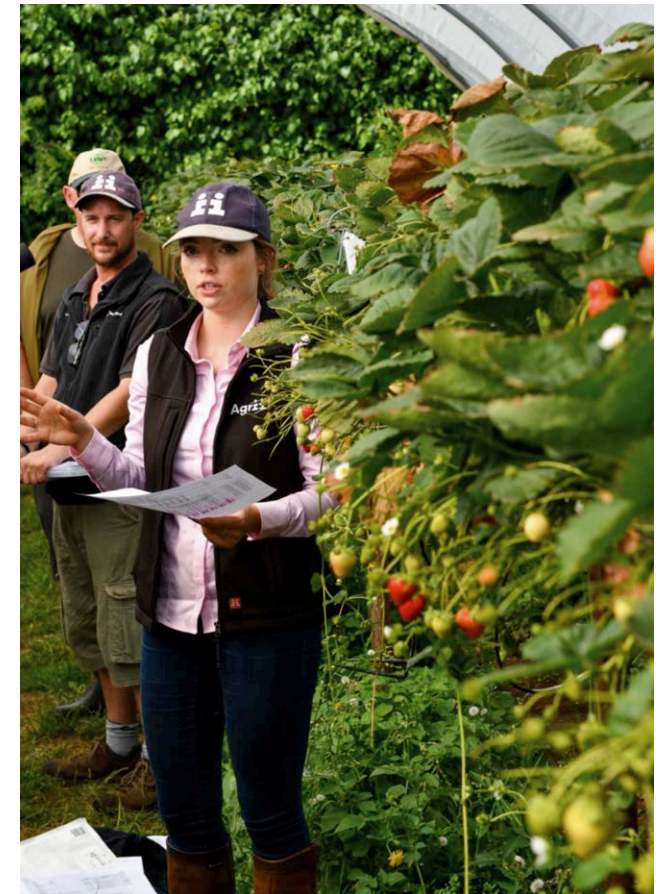
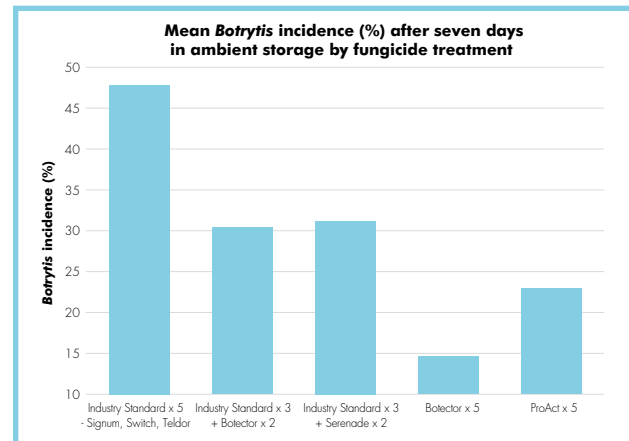
“The results were compelling. *Botrytis* incidence in plots receiving five applications of the biofungicide Botector was significantly less than seen in those receiving a five-spray programme comprising Signum (boscalid + pyraclostrobin), Switch (cyprodinil + fludioxonil) and Teldor (fenhexamid).” Richard Killian Fruit Agronomist & Technical Lead



The performance of Botector was also investigated as part of a programme with Signum, Switch and Teldor. Where Botector was applied as the final two sprays in a five-spray programme, the incidence of disease was found to be lower than in the standard programme.

The results suggest Botector can be used as part of a programme alongside conventional fungicides and possibly other biologicals such as Serenade ASO (*Bacillus amyloliquefaciens* strain QST 713) or even as a stand-alone treatment depending on the disease pressure, explains Mr Killian.

“We see Botector as bringing much-needed flexibility to crop protection strategies, with its one-day harvest interval and no residue benefits. While the objective of this trial was to compare its efficacy with that of the commercial standard, more work is needed to determine its best place in a programme or whether it can reliably provide protection on its own,” says Mr Killian.



Agrii Fruit Trials Coordinator Emily Dimond presents results from a fungicide comparison trial at the Agrii iFarm at East Malling.

The results will give growers confidence to increase the role of biological fungicides within programmes without fear that yield, or quality will be compromised, believes Mr Killian.

“There is still much to learn about biological plant protection products as well as how conditions at application, and how they are applied, influence performance, but with every trial our understanding improves. Growers can rest assured that we are looking hard at the potential of biologicals in all their guises,” says Mr Killian.

Identifying those for which actual performance matches that claimed has taken on greater emphasis as the rate at which conventional products have been withdrawn has accelerated. “Understanding how a mode of action works is only one consideration, assessing performance requires first-hand experience and robust trials,” adds Mr Killian.

While the performance of biofungicides remains the subject of great interest, the contribution other forms of biological treatments can make to crop health is the focus of ongoing studies for Agrii.

A product that has delivered a consistently strong performance is ProAct, (*harpin alpha-beta protein*). It has been the subject of extensive trials given the role of harpin proteins in eliciting defensive pathways that promote growth and nutrient absorption.

“We know from earlier work that the increased calcium assimilation promoted by regular applications of ProAct results in crops with higher marketable yields and longer shelf-life, so we included it in the trial mainly out of curiosity,” says Mr Killian.

Peer reviewed studies have confirmed the benefits of applying harpin alpha-beta proteins in supporting root development while commercial studies have investigated their role in supporting growth through flowering and fruit development or during periods of stress.

“Making sense of biological products is often about applying them at the suitable phenological stage. ProAct has consistently delivered positive results in the form of increased marketable yields, less frost damage and greater shelf-life through increased fruit firmness, so we felt it was worth including in the trial,” he says.

Its performance needs further investigation, concedes Mr Killian, but he believes it serves as further evidence that both growers and advisers are yet to fully utilise the potential that biological products in all their guises can make to crop production.

NEW REGULATIONS

Currently, biostimulants are not the subject of a formal EU or UK regulation and are instead covered by a definition issued by the European Biostimulant Industry Council. This covers a multitude of



products ranging from seaweed extracts, to amino acids, to growth-promoting bacteria and fungi. This will change in 2022 when the EU introduces the Fertilising Products Regulation (2019/1009) which will include biostimulants as a defined category. This means manufacturers will be able to obtain CE marks for products that meet the regulatory standard. While this will bring much-needed legal rigour to the category across the EU, it is not yet clear how, if, or when the UK might choose to align with these regulations.

Until biological products are the subject of a more defined legal text, it falls to those using them to assess their potential usefulness. This may involve product comparison and application trials, but it also goes far deeper, explains Mr Killian.

“A plant’s natural stress response mechanisms are the subject of ongoing international investigation in several cropping plants. There is peer reviewed evidence that when triggered appropriately these can make

a meaningful contribution to reducing the impact of disease while promoting yield and quality,” says Mr Killian.

“As synthetic plant protection products are withdrawn from the market, the need to better understand how biologicals can be used in a financially viable manner to maintain crop yield and quality increases. We see it as part of our responsibility to growers to develop this knowledge. Experience so far is encouraging,”

Richard Killian, Agrii fruit agronomist

Agrii is involved in a range of initiatives to communicate to the public, where food comes from and the role that farming can play in reducing greenhouse gas emissions and improving the natural environment. We have included some examples in this section.

OPEN FARM SUNDAY

Every year Agrii attends a number of Open Farm Sunday events across the UK.

For the last two years we have provided goody bags for the events containing wildflower seeds and bee bombs (see image below). The goody bags also contain a children's activity book with lots of information and puzzles relating to food and farming, and explaining the journey that our food takes to get from farm to fork. These activity books also outline some of the environmental and resilience challenges that our farmers and growers face today and into the future.



GREEN HORIZONS INSIGHT EVENT

As part of the Green Horizons Initiative we will be hosting an annual Insight Event so that organisations and individuals throughout the agricultural supply chain can share their sustainability ambitions and roadmaps.

Please visit www.agrii.co.uk/ghevent2022 for more information.



LEAF (Linking Environment and Farming) OPEN FARM SUNDAY IS THE FARMING INDUSTRY'S ANNUAL OPEN DAY.

It's a great opportunity for farmers to welcome the public onto their farm to discover real farming first hand. Hosting an event helps people to realise and appreciate the work that farmers do to produce safe, nutritious food, sustainably, to high standards, while enhancing the natural environment.

With global environmental and health challenges climbing higher up the wider

public agenda in recent years, there has been a huge surge in interest in the countryside, nature, food provenance, sustainably sourced food and cooking from scratch.

Open Farm Sunday provides a huge opportunity to provide hands-on practical information about where our food comes from, dispel myths and make a positive impact on visitors.

STATISTICS FROM LEAF

The 2019 Open Farm Sunday follow-up survey showed the positive and lasting impact that LEAF Open Farm Sunday has:

97% of visitors said that it had made them appreciate more the work that farmers do

85% reported that it had changed the way they think about farming

93% said they felt more connected with the farmers who produce our food

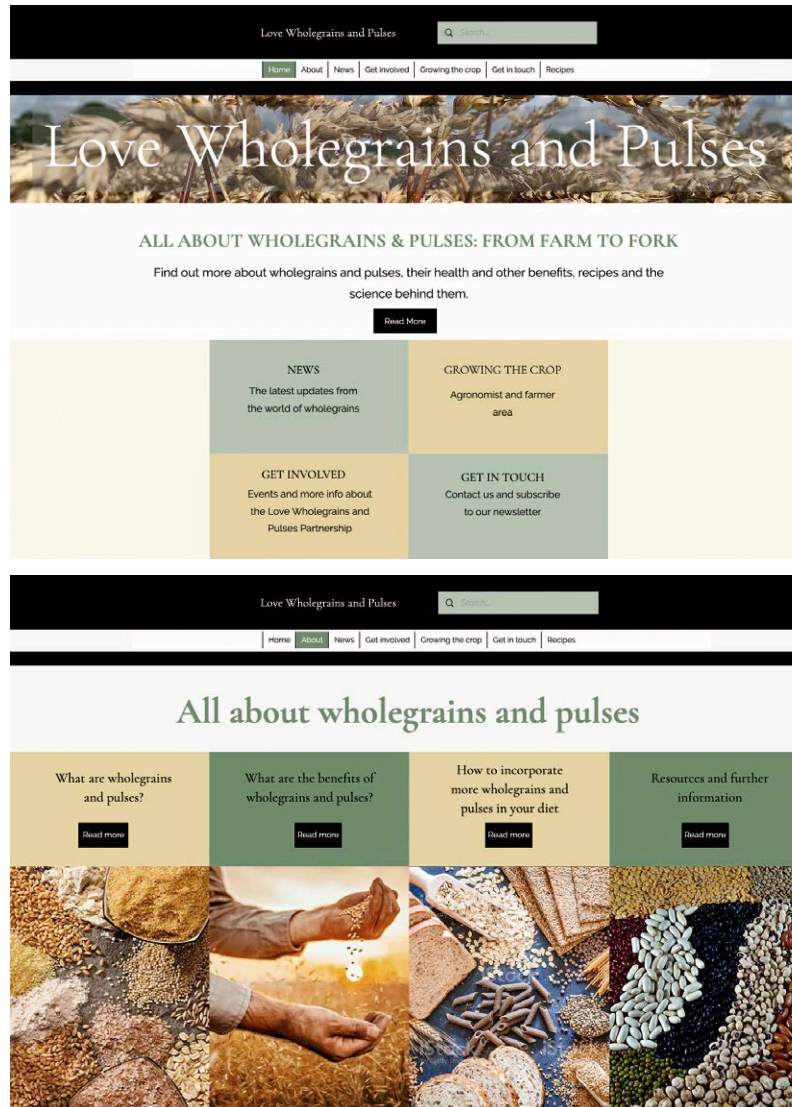
LOVE WHOLEGRAINS AND PULSES INITIATIVE

An important driver for UK agriculture in the search for alternative crops involves the human health benefits that those crops may offer. In recent years, dietary fibre, sometimes referred to as resistant starch or resistant fibre (please see **page 28**) has been identified as a key contributor to human health. Agrii is invested in developing existing and alternative cropping that can contribute societally to improve food choices in an informed, healthy manner.

Wholegrains and pulses are both rich in resistant fibre, and as part of our work to increase stakeholder engagement at all stages of the food chain, we have set up a new initiative called Love Wholegrains and Pulses. The aim of the initiative is to form a partnership of organisations and individuals from across the agricultural supply chain and beyond, who are passionate about the diverse benefits of wholegrains and pulses.

At the centre of this initiative, is the new partnership website at **www.lovewholegrainsandpulses.co.uk**. This website:

- + Provides basic information on wholegrains and pulses in the UK and communicates their benefits to the wider public.
- + Provides a central repository for the latest scientific information and news on wholegrains and pulses to the public and interested parties at different stages of the food chain.
- + Provides technical information on growing wholegrains and pulses in the UK to farmers and their agronomists.
- + Provides a hub for the project partners to engage with each other and collaborate on new ideas and initiatives.



If you'd like to get involved, or have any feedback on the Love Wholegrains and Pulses website or wider project, please get in touch at info@agrii.co.uk, or you can also use the contact form on the new website.

Visit the Love Wholegrains and Pulses website here:
www.lovewholegrainsandpulses.co.uk

CASE STUDY ENGAGING WITH THE PUBLIC AT BYRES FARM

JW Smith is a mixed arable and livestock business in Moray, near the village of Fochabers. It is run by Bill Smith and his family and is also one of the farms in the Green Horizons Farmer Network.

In 2016, Bill and his wife Helen created a unique facility to allow children and the public to see first hand what happens on a real working farm. The family's dedication to educating people on how food gets from field to fork and showcasing Scottish farming has seen a growing number of people walking through the gates every year.

PLOUGHING MATCH

In November 2021 the family hosted the Moray Ploughing Match on a stubble field. In an adjacent field of established cover crop (fodder radish and white mustard), they ran a small tillage event which give local machinery dealerships an opportunity to demonstrate different tillage equipment working in cover crops.

Through the existing Byres Farm connections, the event attracted a lot of members of the public who enjoyed finding out about the art of ploughing and the principles of growing cover crops, and even prompted a few avid gardeners to start thinking about how to grow cover crops in their "veg patches" next year.

FOCUS ON SUSTAINABILITY

The team at Byres Farm have been focusing on improving their soil health for many years. By practising direct drilling where possible, maintaining winter cover and including livestock in the rotation, considerable improvements have been made to soil organic matter levels. Part of the farm is on very light blow away sand, which previously caused issues with wind erosion being so close to the coast. However, with increases in Soil Organic Matter (SOM) levels over the years, the team have noticed a huge reduction in the impact wind has to their farmland.

"Before making these changes, our spring barley crop was experiencing burn out during the summer months, where the lack of water availability was limiting crop growth. Since introducing some of these practices to improve soil health, we have noticed a large increase in the overall resilience of our soils, so heavy rainfall events and dry summers now have much less of an impact on the crop" explains Bill Smith. Winter covers have also enabled Bill to identify where there are good and bad areas within a field, using the mulch crop as a identifier for the following spring crop.

You can read more about the activities at Byres Farm at www.byresfarm.co.uk including the farm experiences offered to the public, family groups and school

children. You can also hear about some of the key soil health and sustainability learning experiences from Bill himself in Agrii's Tramlines Podcast episode entitled 'A Farmer's View on Green Horizons' – listen now at

www.agrii.co.uk/tramlines-podcast or on your usual podcast platform.

"Cover crops seemed to be a good link between town and country and everyone felt they had learnt more about modern farming."

Bill Smith, Byres Farm

One of the activities run at Byres Farm is a weekly group for babies and toddlers in the story barn. The team also runs a weekly group for older children to learn about what has been happening on the farm and to engage with the animals. Meeting on a weekly basis gives the children a real insight into the farming seasons and where their food comes from.



BRINGING IT ALL TOGETHER

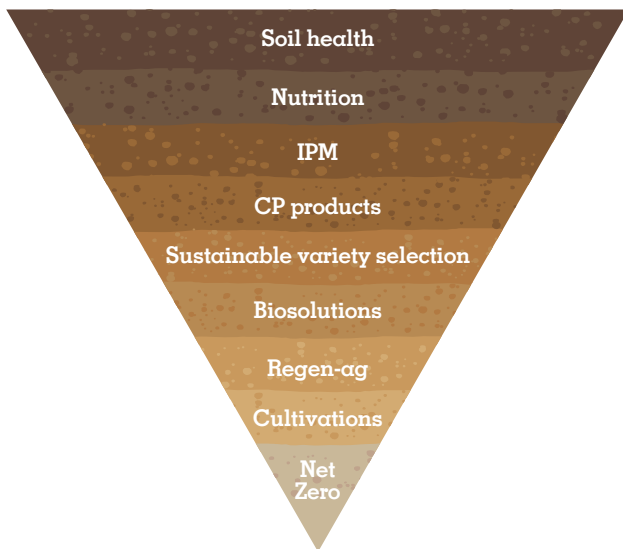
GREEN HORIZONS SURVEY RESPONSES

At the end of 2021, we carried out a survey among the agricultural community to get as broad a range of feedback as possible to help us shape the future of our Green Horizons Initiative. We have also repeated the same survey among Agrii staff.

Here, we summarise some of the key results from the survey.

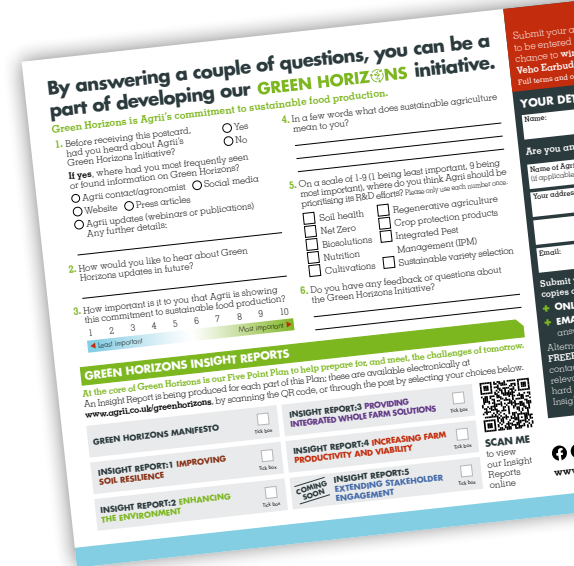
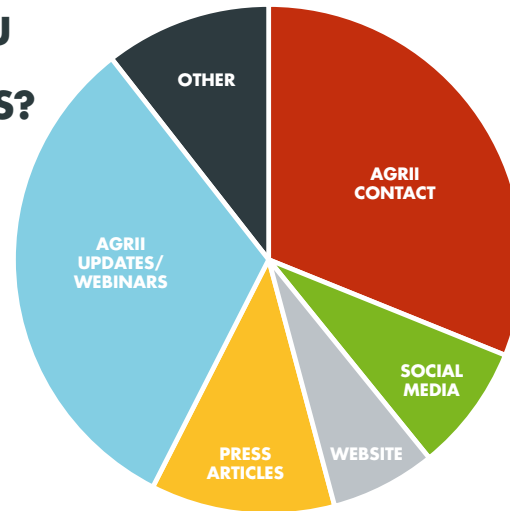
WHERE DO YOU THINK AGRII SHOULD BE FOCUSING ITS R&D EFFORTS?

The results from this question will help us to determine the areas in which to focus our Green Horizons work and trials over coming years.

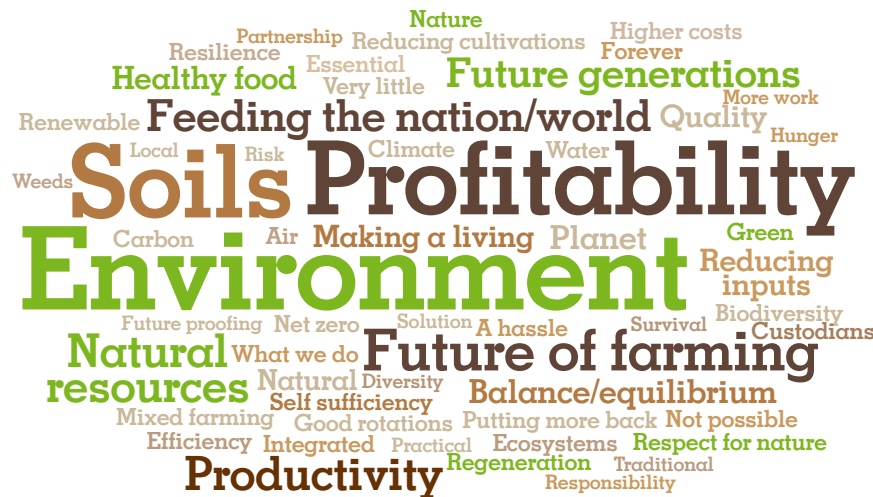


WHERE HAVE YOU HEARD ABOUT GREEN HORIZONS?

The answers to this question highlighted the importance of enhancing engagement digitally (more information on actions being taken in this regard is on page 18 of this document).



WHAT DOES SUSTAINABILITY IN AGRICULTURE MEAN TO YOU?



“Making sure the soil is kept in good condition for future generations.”

“Looking after the long-term fertility and stability of our core resource – soil.”

“The future”

“Sustainable farming means healthy businesses, producing healthy produce in a healthy environment, all alongside each other.”

“Achieving high quality food production alongside excellent soil standards.”



BRINGING IT ALL TOGETHER

Agrii actions relevant across all five Insight Reports:

- + Green Horizons Challenge Field of the Future reduced input R&D Project (more detail in Insight Reports 2 and 3, as well as on **page 13** of this Report).
- + Agrii annual Innovation Award Scheme (please see **page 19** of this Report and Insight Report 4 for more information).
- + Fast-track biosolutions screening programme (more detail in Insight Reports 2 and 3).
- + Accredited environmental training (please see **page 21** of this Insight Report and Insight Report 2 for more information).
- + Extended enterprise benchmarking (please see Insight Report 4).
- + General company drive towards net zero (please see **page 19** of this Report for more information).
- + Target of 100% of Agrii trials to include an IPM element by 2022 (please see Insight Report 3 for more information).

Agrii's Action Plan for Extending Stakeholder Engagement

Action	Audience seeking to increase engagement with	Details	Timescale	Where to go for more information?
Work to develop relationships with processors and end users	Processors End users	We continue to explore new relationships with processors and supermarkets.	Ongoing	Please contact info@agrii.co.uk .
Expansion of virtual iFarm events and trial tours	Farmers and growers Wider farming community Agrii staff	We made further investment in our virtual events platform in 2021 and have an ongoing online programme of webinars and iFarm events planned into the future.	Ongoing	Please visit www.agrii.co.uk/events to view upcoming online events and view past webinars and other online material.
Develop and run annual Agrii Innovation Award (this has replaced the Crowd Sourcing Programme)	Farmers and growers Agrii staff	The Innovation Award scheme was launched in 2021 and will be repeated annually.	Ongoing	Please see page 19 of this Report and Insight Report 4 for more information.
Develop virtual NRoSO training programme	Farmers and growers	We developed an online NRoSO training course for the 2020/21 season. Online Agrii NRoSO courses are running for the 2021/22 season. We plan to continue to offer the possibility of completing the annual training course online going forward.	Ongoing	Please visit www.agrii.co.uk/events to view this year's NRoSO training course dates (online and physical courses).
Develop a Green Horizons Network to enable knowledge sharing among our customers and between Agrii and customers	Farmers and growers	Green Horizons Farmer Network was launched in 2020/21 and will continue to be supported through the Green Horizons Initiative.	Ongoing	Please see page 18 of this Insight Report or Insight Report 4 for more information.
Increase engagement with the public on farming and sustainability related topics	General public	Launch of Love Wholegrains and Pulses Project. Continued support of Open Farm Sunday. Continued engagement in Green Horizons related topics through social media and the Green Horizons blog at www.agrii.co.uk/greenhorizons .	Spring 2022 Ongoing Ongoing	Please see www.lovewholegrainsandpulses.co.uk or section 5 of this Insight Report for more information.
Continue to run internal Agrii Environmental Training Programme and extend this to farmers and growers	Agrii staff Farmers and growers	Continue to run the annual Agrii environmental training programme and seek accreditation to expand this to an external audience.	Ongoing	Please see page 21 of this Insight Report and Insight Report 2 for more information.
Continue engagement with manufacturers and continue to monitor environmental commitments	Manufacturers	Continue working with manufacturers on joint projects to reduce environmental impact.	Ongoing	Please see section 2 of this Insight Report.
Implement projects to take Agrii towards net zero	Agrii staff	Continue to encourage the development of projects that reduce Agrii's environmental footprint in offices and business-wide.	Ongoing	Please see section 3 of this Insight Report for more information.
Continue and further develop Agrii's work with research and academic institutions	Research and academic institutions Students General public	Continue all existing projects. Seek to develop new projects. Communicate work and results on social media and in press.	Ongoing	Please see section 1 of this Insight Report for more information.
Digitally enable Agrii customers through development of customer portal	Farmers and growers	Development of new customer portal.	End of 2022	Please see section 3 of this Insight Report for more information.

This Action Plan will be continually updated as our work progresses. You can view updates at www.agrii.co.uk/greenhorizons

WHERE NEXT FOR MY FARM?

WHERE NEXT?

For more information on anything that you've read in this brochure, or to discuss how we can better increase stakeholder engagement, please get in touch with your usual Agrii contact, call us on 0845 607 3322 or email info@agrii.co.uk

This Insight Report is one of five produced as part of Green Horizons: Agrii's Commitment to Sustainable Food Production.

Find out more at:
www.agrii.co.uk/greenhorizons



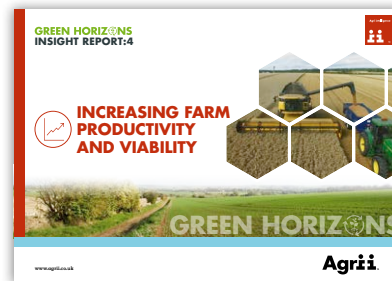
INSIGHT REPORT:1
IMPROVING SOIL RESILIENCE



INSIGHT REPORT:2
ENHANCING THE ENVIRONMENT



INSIGHT REPORT:3
PROVIDING INTEGRATED WHOLE FARM SOLUTIONS



INSIGHT REPORT:4
INCREASING FARM PRODUCTIVITY AND VIABILITY



This is INSIGHT REPORT:5
EXTENDING STAKEHOLDER ENGAGEMENT

This document completes the five Insight Reports in our Green Horizons series.

We'll be continually updating these reports with new work – for the latest information please go to: www.agrii.co.uk/greenhorizons

Agrii Innovation Award:

An annual award set up as part of the Green Horizons Initiative to celebrate and reward new ideas about how agriculture can become more sustainable and resilient.

Biobed:

A structure designed to remove pesticides from the water used to rinse sprayers.

Biosolutions (or biologicals):

A biological or naturally occurring solution to a problem. In this context – the possibility of utilising naturally occurring organisms for pest control.



Biostimulants:

A plant biostimulant is any substance or micro-organism applied to plants, seeds or the root environment with the intention of stimulating natural processes, to benefit nutrient use efficiency and/or tolerance to physical (abiotic) stress and/or crop quality traits. This effect is independent of the substance's nutrient content. This means that a biostimulant's main role should not be to provide fertilisation or pesticidal activity. This definition is currently under debate/review.

Carbon footprint:

The amount of greenhouse gas emissions released into the atmosphere as a result of the activities of a particular individual, organisation, or community.



Carbon markets:

These are marketplaces through which regulated entities can obtain or surrender emissions permits or offsets to meet regulatory targets. They are a mechanism by which carbon emitters can offset their unavoidable emissions by purchasing carbon credits emitted by projects set up to actively sequester carbon or reduce emissions.

Carbon sequestration:

Carbon dioxide is the most commonly produced greenhouse gas. Carbon sequestration is the process of capturing and storing atmospheric carbon dioxide. It is one method of reducing the amount of carbon dioxide in the atmosphere with the goal of reducing global climate change.

CONSUS Project:

A five-year collaborative digital, precision agriculture and crop science research project partnership between University College Dublin and Origin Enterprises, supported through the Science Foundation Ireland (SFI) Strategic Partnership Programme. Please see [page 7](#) for more information.

Contour:

A digital platform that offers a range of precision farming features, allows farmers to view their data in one place and provides variable rate planning functionality. Contour Mobile is a scouting app that allows growers and agronomist to crop walk using RHIZA 'layers'.



Digital Technology Farms (DTFs):

The DTF project is a farmer-led initiative involving Agrii growers, their agronomists and digital agronomy specialists, RHIZA. Digital technologies are put through their paces on 10 Digital Technology Farms throughout the country, the idea being that they will demonstrate their most profitable use and provide the broadest base for future improvements.



Ecosystem services:

The many and varied benefits to humans provided by the natural environment – for example natural pollination of crops, clean air, human mental wellbeing and mitigation of extreme weather events.

Greenhouse gases (GHGs):

Gases that contribute to the greenhouse effect (or warming of the earth's atmosphere) by absorbing infrared radiation. Greenhouse gases trap heat – they let sunlight pass through the Earth's atmosphere, but prevent the heat that the sunlight brings from leaving the atmosphere. Many GHGs occur naturally in the atmosphere, while others are synthetic. Carbon dioxide, methane and nitrous oxide are all naturally occurring greenhouse gases, however human activity has led to their rapid release into the atmosphere – accelerating the greenhouse effect.

Green Horizons Challenge Project:

An Agrii project supported by a number of manufacturers, which aims to bring together all of the elements of the Green Horizons Five Point Plan to develop and demonstrate 'the field of the future'. Please see [page 13](#) for more information.

Green Horizons Farmer Network:

A network (currently of 12 farmers) throughout the UK, set up through the Green Horizons Initiative, who are all at different stages of their journey to sustainable food production, and are sharing ideas and results. Please see [page 18](#) for more information.

Integrated Pest Management (IPM):

The careful consideration of all available plant protection methods and subsequent integration of appropriate measures that discourage the development of populations of harmful organisms, while keeping the use of PPPs and other forms of intervention to levels that are economically and ecologically justified. IPM offers a toolbox of techniques that can be tailored to different cropping systems, climatic conditions, pest pressure and availability of solutions. By using a combination of techniques to manage a combination of approaches to crop threats, IPM can be seen as a systems based approach where the entire system effect is greater than the sum of individual components.





iq training programme:

Agrii's internal training programme for all staff to support new talent in agriculture. Please see **page 21** for more information.

LEAF:

Linking Environment and Farming – an organisation dedicated to



delivering more sustainable food and farming. LEAF's vision is a global farming and food system that delivers climate positive action, builds resilience and supports the health, diversity and enrichment of our food, farms, the environment and society. Please see **www.leaf.eco** for more information.

Net Zero:

Refers to the balance between the amount of greenhouse gases produced and the amount removed from the atmosphere. We will reach net zero when the amount we add is no more than the amount taken away. The NFU has set the goal of reaching net zero greenhouse gas (GHG) emissions across the whole of agriculture in England and Wales by 2040.

Nutrient (or Nitrogen) Use Efficiency (NUE):

A measure of how well plants use available mineral nutrients. NUE can be defined as yield (biomass) per unit of nutrition input.

Resistant fibre:

Also referred to as resistant starch, this is a form that can't be digested in the small intestine. This means that it is classified as a type of fibre. It passes through the small intestine intact and is then fermented in the large intestine, where it produces short chain fatty acids (SCFA) which act as an energy source for cells in the colon. Foods that lead to an increase in the number of SCFAs in the colon are thought to be beneficial to health through prevention of abnormal cells in the gut.



RHIZA:

This is Agrii's digital and precision farming partner, bringing together the combined capabilities of SoilQuest and IPF to deliver digital tools and precision farming services to 750K Ha across the UK.

RHIZA Connect:

This is an app that provides a platform for viewing weather station data from across the country, two- and eight-day weather forecasts, spraying conditions forecasting, soil moisture information and crop disease forecasting. Please speak to your usual Agrii contact for more information on how to access the app.



YEN Zero:

Part of the Yield Enhancement Network (YEN), an ADAS Initiative, YEN Zero is a network where knowledge on how agriculture can reach net zero, can be shared, metrics can be agreed and mitigation strategies communicated.

Zero residue food production:

This term refers to the use of organically derived biopesticides and biofertilisers to protect crops and augment their growth.

KEY WORDS:

Scope 1, 2 and 3 are terms used to categorise the different kinds of carbon emissions a company creates in its own operations, and in its wider value chain.

This terminology first appeared in the Greenhouse Gas Protocol of 2001 and today, these terms form the basis for mandatory greenhouse reporting in the UK.

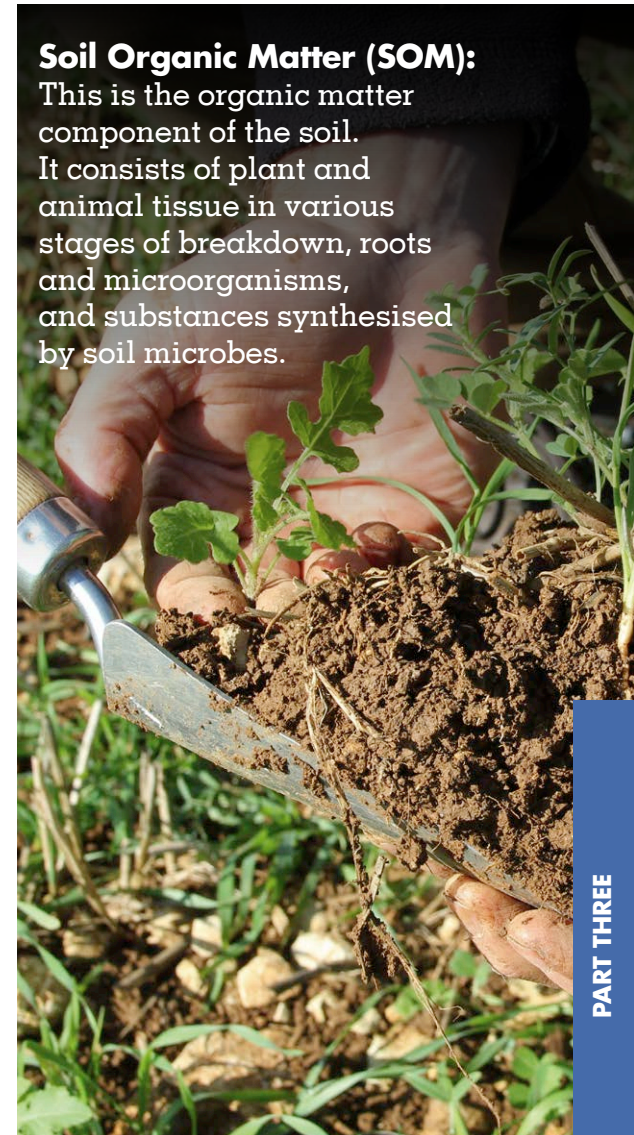
SCOPE 1 – all direct emissions from owned or controlled sources (eg. fuel consumption for company vehicles).

SCOPE 2 – all indirect emissions from a third party (eg. purchased electricity).

SCOPE 3 – all other indirect emissions that occur in the supply chain (e.g. purchased goods, investments, transportation and distribution).

Soil Organic Matter (SOM):

This is the organic matter component of the soil. It consists of plant and animal tissue in various stages of breakdown, roots and microorganisms, and substances synthesised by soil microbes.





FIND OUT MORE ABOUT GREEN HORIZONS:

Visit www.agrii.co.uk/greenhorizons or scan the QR code

Contact us at: info@agrii.co.uk

Go to www.agrii.co.uk/events to sign up for our latest Green Horizons webinars and view past events

THE GREEN HORIZONS FARMER NETWORK

This network of like-minded Agrii customers is working collaboratively, sharing knowledge and answering its own questions around how to produce sustainable and profitable food. Please get in touch for more information about how to get involved.

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