



Challenges and opportunities

Innovation Climate Change

Agriculture faces some tough times ahead as a result of climate change, according to a recent webinar. But farmers are uniquely placed to be part of the solution and CPM readers are urged to get involved and make a difference.

**By Tom Allen-Stevens
and Lucy de la Pasture**

2020 has been a growing season that most growers will want to put firmly behind them but the climate extremes that it exemplified are likely to increase as the climate becomes warmer. The challenges and opportunities that climate change presents were discussed in a recent webinar hosted by The Farmers Club and British Crop Production Council (BCPC).

“Climate change is set to remodel UK Agriculture and the countryside,” said Stephen Howe, chairing the session. “Most growers have experienced the implications first-hand — particularly the financial cost and worries it can bring — after one of our wettest winters and autumns, followed by a spring and early summer drought.”

Evidence of the climatic change comes from recent Met Office statistics which reveal the past decade holds eight high temperature records compared with just one low-temperature record, he pointed out.

Only game in town

NFU's climate change advisor Dr Ceris Jones described the ambition of reaching Net Zero as “the only game in town.” She highlighted that although policy was a key driver for reducing greenhouse gas (GHG) emissions, the impact the weather was having on farm is also a factor — with 60% of businesses affected by adverse weather events over the past 10 years.

“We're only at the start of the Net Zero journey but achieving it will bring benefits to farm businesses and the country in general.”

Growing crops that are more resilient is one way of surviving the mixed bag of threats and opportunities that climate change presents, said Prof Steven Penfield, group leader of Genes in the Environment at the John Innes Centre (JIC).

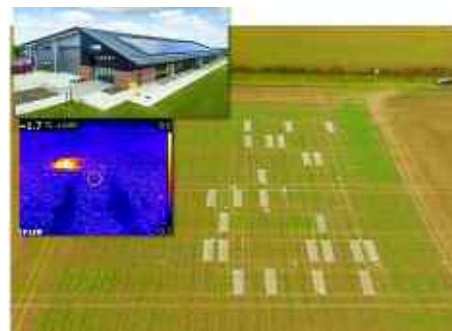
He used oilseed rape as an example of a crop where performance can vary widely from season to season due to weather variations.

“Average OSR yields can fluctuate by 1t/ha which impacts the grower by a potential £340/ha but, from a wider perspective, a lower yielding year can cost the UK economy £200M,” he said.

Research at JIC has found that temperature during Oct and Dec is correlated to high OSR yield — with a warm Oct and a cool Dec leading to higher yields. In contrast early winter warming poses a threat to OSR yields, with a combination of a cool Oct followed by a warm Dec resulting in yield depression.

“The tipping point is at the end of Oct when warm temperatures go from having a positive effect on yield to a negative one. It's at this time that the apex of the OSR plant goes from forming leaves to forming flowers, which requires cool temperatures to deliver.”

The researchers have been looking at temperature effects in different ways, developing a protocol where individual plots can be heated in the field and monitored



Scientists at John Innes Centre are assessing the seasonal effects of temperature in OSR using innovative techniques to artificially warm plots in field trials.

“ We’re only at the start of the Net Zero journey but achieving it will bring benefits to farm businesses and the country in general. ”

using thermal imaging techniques. Steven believes that this sort of research will be useful to help growers adapt to changing climatic temperatures.

“Trials have shown that further warming above today’s October temperatures (11°C) delay flowering but don’t appear to affect yield. It is most likely that cooler temperatures in Oct (historically 7.5-8°C) cause yield reductions but are now very rare, having virtually been eliminated by climate change.”

JIC are also using controlled environment rooms to simulate different growing seasons. The trials show that warm weather during winter leads to smaller and less organised inflorescences and a lower number of seeds on the main raceme.

Growers can limit variability from season to season by selecting the right genetics, he explained. “By looking at the variability of different varieties across all of the AHDB’s Recommended List trials, it’s possible to find the varieties least affected by a change in temperature.

He suggested growers should consider selecting varieties with low variability, in

addition to higher yield. “We found Castille was most stable under different temperature regimes over the winter so this could be used in future breeding programmes to improve resilience.”

Ross Newham, operations director at NIAB’s East Malling Research believes sustainable intensification could release small amounts of ‘special’ land to deliver climate change objectives.

“The climate problem presents us with challenges at the very root of our production systems — much of which are a compromise between food production and biodiversity — but also gives us a huge opportunity to address import substitutions (as the climate extends growing seasons/cropping possibilities) with sustainable intensification.”

Ross believes science will be a fundamental help to shape the future and enable sustainable intensification. “The science of beneficial soil organisms will help mitigate phenomena such as yield fade after a first season crop; breeding of more resilient varieties which will grade better and so help reduce food waste; and breeding. ■

Step forward to save the planet



The quest is on to find the Climate Change Champions for 2021.

Agriculture is uniquely placed to be part of the solution to climate change, according to NFU, as both an emissions source and a sink. Arable farmers have a special responsibility to protect carbon reserves already in their soils and vegetation, and many have already started on their journey to net zero.

This is where CPM’s Climate Change Champions step in. We’ve already identified nine growers making a palpable difference through what they’re doing with their farming practices — see overleaf to find out who they are.

Now the quest is on to find the Climate Change Champions for 2021. We believe those individuals currently have their eyes set on this very page, although their minds will be racing with pioneering solutions for what’s described

as “the single biggest issue facing humanity”. All you have to do is step forward and nominate yourself.

Throughout 2021, we’ll be profiling in CPM a shortlist of candidates, selected from those nominees by a judging panel. The campaign is supported by NFU, and supports its goal of achieving Net Zero by 2040. Specifically, we’re looking for arable farmers with:

- **Inspirational ideas** – more than anything, this is the opportunity for those with innovative practices or novel thinking to come forward and show how these help the journey towards Net Zero.
- **Productivity push** – those using a wide variety of techniques to enhance productivity and deliver the same output or more, and those working smarter to use fewer inputs.
- **Cultivation care** – those using measures to build soil organic matter and lock carbon into the land, which may involve cultivation practice, a change in rotation or alternative land use.
- **Bio-based boldness** – farmers who have implemented measures or activities that positively displace the use of fossil fuel or other causes of greenhouse gas (GHG) emissions elsewhere in society. Examples include anaerobic digesters, solar and wind and alternative uses for agricultural products that lock up carbon.



Agriculture is uniquely placed to be part of the solution to climate change, says Minette Batters.

Net Zero isn’t a journey farmers face on their own. It’s one that unites the entire UK farming industry towards a common goal, and CPM’s Climate Change Champions are leading the journey. This month, the 2020 champions are coming together in a top-level meeting to decide policy changes and priorities for the arable sector. There are plans to repeat this in October 2021, which is why we’re calling again for those with the ideas and the thought leadership to inspire others to step forward.

To find out more, and to nominate yourself for Climate Change Champions 2021, go to www.cpm-magazine.co.uk/climatechangechampions. Nominations close 31 Dec 2020.

Vote now for Climate Change Champion 2020

CPM readers have the chance to decide who will be the UK's first arable Climate Change Champion.

Throughout the year, we've profiled nine growers — thought leaders who have already started their journey to meet the challenging target, set by the NFU, of Net Zero emissions by 2040. They have the ideas, the progressive outlook and the determination to shape positive change.



Now it's your turn to decide which of them should be awarded the accolade of Climate Change Champion 2020. We've summarised their achievements here, while the full articles can be found on the CPM website. Use your smartphone to scan the QR code (left) or click the link on the website to score each contender on their innovative ideas, productivity push, cultivation care and bio-based boldness. Voting ends on 28 October 2020 and the winner will be announced shortly after.

CPM would like to thank our sponsors, leading agricultural suppliers who have a credible Net Zero aspiration and are working with farmers in a

partnership approach to meet this ambitious goal. They helped identify these individuals and bring them into the top-level discussion about how farming can position itself as the solution to climate change.

cpm-magazine.co.uk/climatechangechampions



Al Brooks

Facombe Estates, Hants



Innovative ideas

New ventures and changes implemented across the estate not only reduce net emissions, but harness a real commercial opportunity. A determination to drive up productivity goes hand-in-hand with a resolve to do so sustainably, with a willingness to try something new to get there. Carbon footprinting software tracks progress.

Productivity push

Enterprises across the estate dovetail, aiming for them all to perform at optimum output for minimal resource. Targeting value-added markets and driving root growth down into drought-prone soils is helping achieve this.

Cultivation care

Tillage has been reduced as part of a measured, on-going journey, aided through cover crops and sheep-grazing. Organic matter has been raised through selling off straw and replacing with biosolids, compost and manure. Diseased woodland is being sensitively replanted.

Bio-based boldness

Timber is sold into construction or turned into pellets as a renewable fuel source for biomass boilers. The estate is moving towards its own, home-sourced community heating system and is already supplied electricity through a wind turbine and solar panels. Straw is sold to power stations as a renewable fuel source.

Hamish Campbell

RA Campbell and Partners, Cotswolds



Innovative ideas

A keen eye to develop a

local market for value-added and niche products from the arable enterprise has ensured a healthy return from combinable crops. This is coupled with a resolve to bring onto the farm manure and digestate from local sources to help with its soil-improvement drive and reduce dependence on applied fertiliser. The result is a profitable business model with long term sustainability.

Productivity push

A switch into crops and varieties with lower input requirements but a similar output has helped the farm reduce its carbon footprint, while lowering reliance on pesticides and fertiliser. Water-efficient crops suit the drought-prone soils.

Cultivation care

Tillage has been reduced to a minimum, and this has gone hand-in-hand with manure and digestate applications. The result is a steady and measured improvement in soil organic matter that locks away carbon, outweighing the farm's overall emissions. The move to rye, with its adventurous roots, will sequester further carbon into the soil.

Bio-based boldness

A focus on supplying produce to local markets displaces alternatives from further afield that have a higher carbon footprint.

Nigel Harrison

MW Harrison, Wisbech, Cambs



Innovative ideas

A focus on the long-term productivity of his soils has been behind Nigel's quest to bring a different approach to his cultivations and encouraged him to take the next step and progress further. It's an approach he also advocates to his contracting clients.

Productivity push

Cultivations have been progressively reduced while

the farm has maintained its level of output. The rotation has also been opened up and there's less reliance on bought-in fertiliser and on herbicides for blackgrass control. The result is a more resilient and sustainable farming system using lower resources.

Cultivation care

Changes to cultivations have been entirely in tune with the soils and situation Nigel is faced with, to the extent of fabricating his own cultivator. These changes have gone hand in hand with a programme of building soil organic matter. It's a progressive, on-going journey of reducing impact on the soils and building their resilience that will help address concerns over Fenland soil decline.

Bio-based boldness

The farm has two wind turbines and works closely with a local AD plant.

John Hawkins

Bagber Farm, Blandford Forum, Dorset



Innovative ideas

There's a carefully thought-through and bold plan in place at Bagber Farm that's combined long term stewardship goals for the farm with delivery of a wider objective for the catchment it's in.

Productivity push

Through maximising the value the legume fallow brings to the soil, inputs to the following cereal crop can be cut to a fraction of what was used previously. Precision-application of fertiliser to the crop rows further enhances resource efficiency.

Cultivation care

One of the primary purposes of the legume fallows is to build soil carbon, while the move to strip-till drilling should ensure this is locked in place. The

agroforestry venture complements tree-planting with productive agriculture.

Bio-based boldness

The farm's biomass boiler displaces fossil fuel for energy use, and ensures the farm makes a healthy contribution towards reducing net emissions.

David Miller

Wheatsheaf Farming Company, Basingstoke, Hants



Innovative ideas

David's approach has been to manage crops in "the right way" for his farm. He's adapted techniques, centred on cover crops and no till, with experience and on-going testing providing the direction. New ideas are tailored to complement progress made.

Productivity push

The aim has been positive progress through better use of resources, looking beyond mere yield gains or margin benefits. This has been achieved through judicious application of IPM techniques and a firm focus on improving soil health, resulting in a more sustainable system.

Cultivation care

The move to direct drilling has gone hand-in-hand with cover crops. Again, a focus on soil health has been at the heart of progress, with emissions cut by 66%, and friability, worm counts and biological activity also improving.

Bio-based boldness

Wheatsheaf is one of a number of farming businesses exploring the use of biochar for its potential to capture carbon and improve soils.

Tom Pearson

Manor Farm, Caxton, Cambs



Innovative ideas

In taking the farm towards regenerative agriculture, Tom has set long-term goals and has linked delivery of his ambition to the developing technology of autonomous robots. One of the first to take these on, he's helping shape how the system evolves.

Productivity push

The farming system revolves around improving plant and soil health without compromising yields. This has been achieved through a measured introduction and roll-out, aiming to focus increasingly on the individual needs of each plant, thereby optimising output and minimising waste.

Cultivation care

The move to no-till goes hand-in-hand with changes to the rotation and cover crops, aiming to maintain all-year-round green cover and ensuring roots do the work instead of metal. Trafficking has also been minimised. The next stage is to take away heavy tractors altogether.

Bio-based boldness

While the farm is focused on achieving net zero food production, the farmhouse has a ground-source heat pump and carbon-neutral workspaces are being developed as a diversified enterprise.

Andrew Pitts

The Grange, Mears Ashby, Northants



Innovative ideas

It's not just the zest for trying out different approaches, but the rigour with which they're tested and the influential routes through which the results are shared that position Andrew as a true thought leader. The success lies in how this approach balances the economics of commercial farming with care for the long term future of the farm.

Productivity push

A dogged pursuit of improving productivity has been at the forefront of changes made at The Grange. Andrew has harnessed the best technology farming has to offer and is trialling emerging innovations in a quest to push more, sustainably from limited resources.

Cultivation care

A gradual reduction in cultivations has gone hand-in-hand with measures to build soil organic matter. Every step of the way has been tested through on-farm trials and monitored with the trusty spade. Trials and demonstrations are exploring the best ways to capture carbon with trees and agroforestry.

Bio-based boldness

Aside from The Grange's solar farm and biomass enterprises, Andrew proactively seeks out new ways to harness natural resources that not only sequester carbon but benefit local wildlife.

Clive Pullin

FH Pullin and Sons, Silverstone, Bucks



Innovative ideas

All enterprises across the farm are fully integrated, with waste from the dairy feeding arable crops, which in turn provide nearly all the feed for the dairy, resulting in minimum

need for bought-in resources and a greatly reduced carbon footprint.

Productivity push

There's been a determined focus to maximise protein content of grass silage through timely, efficient operations and careful management, optimising herd performance without the need for any bought-in soya. Well managed grazing of arable crops by sheep has maintained productivity with greatly reduced reliance on agrochemicals.

Cultivation care

All crops, apart from maize are established with zero till, with green cover maximised and a focus on well rooted crops, fixing carbon in the soil. Use of organic manures has increased soil biology, further enhancing its ability to sequester carbon.

Bio-based boldness

Waste from food factories and digestate is stored on farm and used to feed arable crops, displacing the need for nitrate fertiliser. A 250KVA roof-mounted solar array powers the dairy. Rainwater is harvested to cool milk and pre-heat water used in the milking parlour.

Charlie Steer

Grosvenor Farms, Aldford, Cheshire



Innovative ideas

A passionate advocate of the circular farm and the 4 per 1000 initiative, Charlie's clear in how these translate into practical steps that can be applied across the large arable area he looks after. Progress is guided and monitored through the Agrecalc tool.

Productivity push

There's a focus on the relationship between soil health and nutrition that has achieved raised productivity with very little bought-in fertiliser. Use of any non-organic inputs is carefully monitored and controlled, and sourced responsibly.

Cultivation care

Not afraid to experiment with different crops, changes to the rotation have allowed Charlie to reduce cultivations and build soil organic matter. Very little land is now ploughed while a Cultivations Solutions toolbar on the front of the Väderstad drill helps limit use of the farm's 6m Quivogne Tinemaster.

Bio-based boldness

Aside from the farm's solar array and use of green waste, there are targets to sequester carbon in the soil, using the Agrecalc tool to monitor progress.