Farming's fourth revolution starts here

Technical Conferences

New Year conferences were tinged with a buzz of confidence, both for the technology the sector has to access, and how it could be applied in the field. *CPM* rounds up some highlights from Oxford and arable technical conferences.

By Tom Allen-Stevens, Lucy de la Pasture and Paul Spackman

Environment secretary Michael Gove has stated that he wants to see the UK lead the way in a fourth agricultural revolution and deliver a food and farming system that is truly sustainable and resource-efficient.

Speaking at the Oxford Farming Conference at the beginning of Jan, he said "the potential for Britain to lead in this revolution is huge". He also announced a new industry-led Food Strategy and underlined the government's commitment to support UK farms through its seven-year transition as direct subsidy falls away.

But he faced criticism for an Agriculture Bill that has little mention of food and makes very few commitments. Nor could he make guarantees on what funding UK agriculture will receive after 2020.

Technological advances

Making his second address at Oxford as environment secretary, Michael Gove called for "technological advances" in UK Farming that resonated with the conference theme World of Opportunity.

"The more sophisticated than ever analysis of big data, drone development, machine learning and robotics will together allow us to dramatically improve productivity on traditionally farmed land," he said. Such technologies would reduce the need for labour, minimise the imprint of vehicles on the soil, apply inputs more precisely, and adjust cultivation techniques more sensitively, driving resource efficiency.

He underlined government support for gene-editing as a way to "dramatically accelerate" gains secured through selective breeding in the past.

"The ability to give Mother Nature a helping hand by driving the process of evolution at higher speed should allow us to develop plant varieties and crops which are more resistant to disease and pests and less reliant on chemical protection and chemical fertiliser. They will be higher-yielding and more environmentally sustainable," stated the minister.

There are challenges, however — precision technologies, AI, robotics and data analytics all require investment. New forms of food production, such as vertical farming, are currently costly and carbon intensive. "There are important ethical, and economic, questions about gene-editing which we need to debate."

But he indicated he sees such technologies as solutions to the challenges of climate change, air pollution, soil depletion, global ▸

Michael Gove believes the potential for Britain to lead the fourth agricultural revolution is huge.

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Turn off the food production tap and we'll massively struggle to ever turn it back on again, warned Minette Batters.

▸ population growth, the stress placed on water resources, deforestation and biodiversity loss.

"Science is thus both making us aware of why agriculture needs to change and also enabling that change to meet our need," he said. Government has a role to play in regulating and supporting farming. "But no change is not an option."

This fourth agricultural revolution will underpin how Defra takes forward its responsibilities in food, the rural economy and the environment, said Michael Gove. He announced a new Food ▸

A bridge across the knowledge gap

How to bring science closer to the farm to usher in the fourth agricultural revolution, was the theme of presentations in a World of Innovation session at the Oxford Farming Conference.

Prof Cristobal Uauy, project leader in wheat genetics and genomics at John Innes Centre, spoke of the potential for gene-editing to dramatically reduce the amount of time an innovation can come to market.

"We make a genetic advance, then we hand it to the breeders and currently it takes ten years to get to the farm. The exciting thing about gene-editing is that we could get some of the latest discoveries straight into Recommended List varieties. Then we can multiply seed and have it on the farm within three years. We don't have to cross it, shuffle all the genes up and start the breeding process all over again."

Suffolk grower and AHDB Strategic farmer Brian Barker called for a scientist on every farm. "Farmers have to collaborate and get a stronger voice. If we work together and act together, we can direct the ocean liner of the breeders towards what farmers actually want."

Prof Brendan Gilmore, chair of pharmaceutical microbiology at Queen's University Belfast said scientists would welcome more interaction with farmers. "Often what happens in these situations is that you have to pull in other disciplines, which can be a challenge, but it can happen."

Cristobal Uauy is excited about how gene-editing could get some of the latest discoveries straight into Recommended List varieties.

Dr Kate Pressland of Innovative Farmers pointed out that innovation isn't just about new tech. "If a farmer hasn't used a particular technique before, that's innovative to them. That's what we often encounter first, and it should feed back through research. The research focus is on future tech, rather than on the problems farmers are actually facing."

For videos of all the presentations and addresses from the conference, go to *www.ofc.org.uk*

Open crop canopy after mid-flowering maximises OSR yield

Increasing light interception during a two-week period from mid-flowering is the key to unlocking yield potential in oilseed rape crops, according to the latest research.

Average on-farm oilseed rape yields have crept up slowly over recent years, but remain frustratingly rooted below 4t/ha. To help push this figure upwards, ADAS opened up its Yield Enhancement Network (YEN) competition to include the brassica crop over the past two seasons.

On top of AHDB Recommended List trials, which show that yields above 5t/ha should be achievable, ADAS have used a simple growth model to calculate a huge OSR yield potential of around 12t/ha.

Speaking at the recent Association of Independent Crop Consultants (AICC) annual conference near Towcester, ADAS crop research scientist Christina Clarke outlined the blueprint for reaching such figures.

One of the standout components of the blueprint is an open canopy architecture able to capture maximum solar radiation during a critical 2-3 week period from mid-flowering. This is when seed number is set, the most significant physiological component of rapeseed yield.

"If the canopy is too dense, light is reflected away from the crop during flowering, or it can't penetrate down to the lower leaves and reduces photosynthetic activity and yield," explained Christina.

She highlighted that correct canopy architecture starts with optimal plant populations, which tend to be below 30 plants/m^2 from analysis of the highest yielding YEN entries so far.

"Some achieved optimal results with as low as 15 plants/m^2, with the increased branching down the stem contributing to additional pod production and improved seed set."

Analysis has also shown the pivotal role magnesium plays, with top yielding crops produced in soils with higher Mg availability — echoed by higher Mg concentration in seeds.

She also said soil and plant tissue testing for the element is important, allowing a baseline to be set for more informed nutrient planning.

"We have also seen that input timing is much more important than quantity applied, so knowing the growth stage of the crop through the season and attention to detail are vital.

"Identifying which varieties perform better on your particular soil type or farm environment can also help improve crop performance," she added.

For more on YEN and crop momentum, turn to p66.

Christina Clarke says correct canopy architecture starts with optimal plant populations, which tend to be below 30 plants/m^2.

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David Drew criticised the draft Agriculture Bill as one that doesn't appear even to have agriculture as its centre point.

▸ Strategy that would be led by Defra's lead non-executive director, the food entrepreneur Henry Dimbleby.

But there were no pledges on food security — just a view to "conceptualise the challenge properly", with a requirement to improve the resilience of the environment. "So food security in the future should mean for example, returning soils to robust health, and improving their organic content. It should also mean keeping pollinator numbers healthy."

He repeated the government's pledge to keep farm support the same in cash terms up to the end of this Parliament. But he i ndicated farming would have to demonstrate value for money, so that the public would resist any move by his Cabinet colleagues to reduce agriculture's share of the budget in future. "I cannot, here, entirely pre-empt the outcome ofthe Government's Spending Review,"the minister noted.

Pipeline of income

However, he promised farmers a "pipeline of income" through the proposed Environmental Land Management contracts, set to replace direct subsidy. He said these should be paid through multi-annual contracts and would complement existing sources of income and existing initiatives already pursued.

"For example, the adoption of minimum tillage techniques can not only decrease costs and improve productivity but it also reduces run-off and erosion. That is a public good which contributes to improving water quality and for which farmers could be paid."

NFU president Minette Batters welcomed the new Food Strategy and indicated the NFU would play a lead role in helping to bring it together, aiming to publish a strategy by April this year. But she gave a stern warning on food security.

"Let me make it clear at Oxford in 2019. If we ever turn the food production tap off, we will massively struggle to ever turn it back on again."

Minette called the UK a "jewel in the world crown" of food production, urging a focus on health and nutrition — "there are no bad foods, there are many bad diets" — and said every news outlet also has a responsibility. "They all have an environment correspondent. What about food?"

She also urged the minister to make good on verbal pledges to maintain standards and the integrity of food allowed into the UK. "If you believe it, write it, legislate it," she said.

Shadow farming minister Dr David Drew criticised the draft Agriculture Bill as one that doesn't appear even to have agriculture as its centre point. "Where is food in this agricultural bill? It needs to be up there really well spelt out in terms of legislation," he said.

The Opposition is aiming for substantial changes to the bill, and he said he was particularly disappointed at the lack of commitments the government was prepared to make with it. "It's a bill that's long on powers, which is essentially a wish list on what they might want to happen, but very short on duties, which is what they will ensure does happen." ■

Spring barley has a strong place if you hit the spec

Rising demand for malting barley products and new plant breeding techniques will reinforce spring barley's place in many rotations over coming years, according to speakers at a Farmacy meeting in early Jan.

"Spring barley faced major challenges last season and has been regarded as a Cinderella crop in the past, but grown correctly with the right contracts in place, it has a really good place on farm," Farmacy agronomist Peter Riley told growers gathered at the St George's Distillery near Thetford in Norfolk.

"East Anglian malting barley is already a big success story; the market is expanding and there's great technology coming from breeders."

Mark Ineson from leading global malt supplier Muntons, said the firm had just announced £73m of investment over the next decade as it sought to meet rising demand for malt products produced at its sites in Stowmarket and Bridlington. He acknowledged there was uncertainty about 2019 trade given Brexit, but the underlying market remained strong, especially in East Anglia where demand exceeded supply.

End-user variety and quality requirements varied though, so he encouraged growers to avoid "recreational" growing and to tailor variety choice and agronomy to buyer specifications. Equally, if spring barley was being grown for blackgrass control, that should remain the focus, with agronomy tailored accordingly, he said.

Mark noted growers on lighter land were typically best placed to achieve the low grain nitrogen (<1.6%) required for distilling or brewing, while those on heavier land close to south coast ports could be better targeting the higher nitrogen (<1.85%) specs favoured by exporters.

"Consider your local markets, the specifications maltsters want and be clear about what can be achieved on your farm and soil type," he advised.

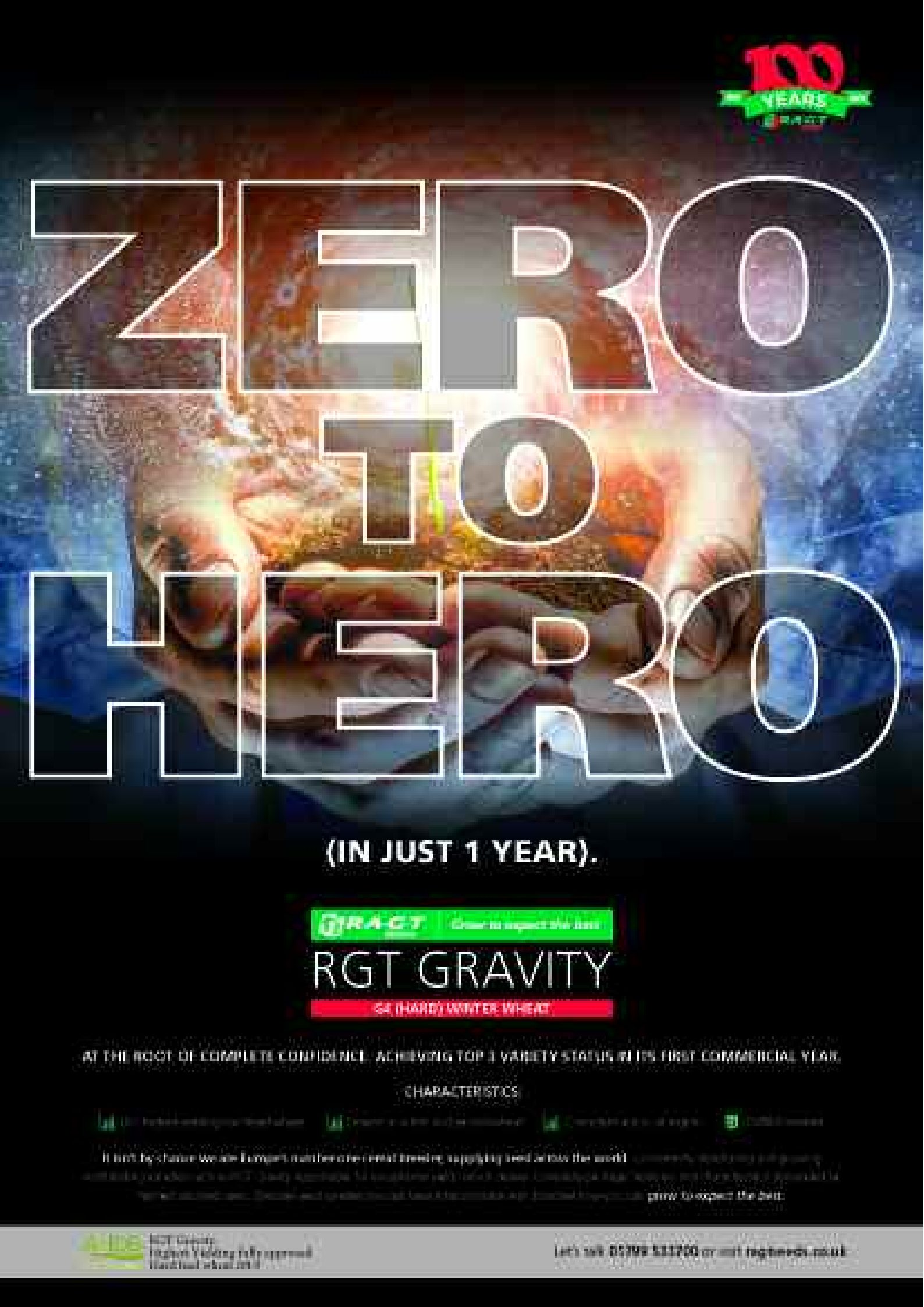
Technological improvements in plant breeding are helping bring new varieties to market more quickly, offering improved agronomics and end-user compatibility, added Cathy Hooper from RAGT.

Double-haploid breeding, for example, was used to produce leading spring barley variety RGT Planet, and took about two years off conventional breeding techniques, she said.

Growers had the opportunity to gain an insight into the distilling process at St George's distillery, home of the English Whisky Company.

Using genetic markers to identify desirable traits, such as disease resistance or yield, was another way technology was helping. She highlighted the firm's involvement with other companies and institutes in the Impromalt project, which is developing markers for quality traits to improve winter malting quality cultivars.

Work is also ongoing to develop low-GN (glycosidic nitrile) varieties for distilling, with a low-GN version of RGT Planet (currently approved for brewing) about to enter its second year of official trials and could be commercially available in 2022, she said.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