



The whole approach

Wholecrop

While grain crops remain the backbone of UK arable production, wholecrop cereals can play a key role in rotations with rising demand underpinning a range of new marketing opportunities. *CPM* takes a look at the options.

By Rob Jones and Janine Adamson

Statistics suggest that renewable gas could heat up to 15M homes in the UK each year by 2050, with energy crops providing around two thirds of the demand, according to Britain's largest gas distribution network, Cadent.

Furthermore, this rapid growth in biogas interest offers significant opportunities for UK farmers and growers, as well as promising major environmental gains for the country, it believes.

The global growth trajectory for the sector is between 8% and 22% a year, says Anaerobic Digestion and Bioresources Association (ADBA) chairman, Chris Huhne. "Which when translated into the UK situation, produces some startling figures.

"Even if we expand in the UK at the lowest projected growth rate of the International Energy Authority (IEA) for the world as a whole, that'd mean an

additional 500 AD plants in the country by 2030," he points out.

"If we grow at the higher rate, we'd be looking at an extra 2000. But at the end of 2023, the UK had around 723 plants, so this is a substantive projected increase. Even on the lowest IEA predictions, the industry would overtake the nuclear sector in producing energy during the 2030s," explains Chris.

Food vs fuel

Angela Battle, feedstock director for Future Biogas, believes food and energy production can exist comfortably side by side. "Biomethane produced via AD is a scalable solution to gas decarbonisation and growing crops for it can help farms to achieve a neutral or even negative carbon footprint, while also allowing for the adoption of wider cropping rotations.

"Gaps between energy and food crops can be filled with cover crops capable of holding plant nutrients, water and helping to build soil organic matter. Therefore, introducing AD and sustainable farming practices into an arable production system provides multiple opportunities to help build soil organic carbon and restore the soil-carbon sink potential for future generations," she continues.

According to Angela, growing bioenergy crops provides significant diversification opportunities for growers too, supporting them to make long-term changes. "The growth in AD not only provides an opportunity for change, it also supports the essential transition required to safeguard food production,

“ Given hybrid rye’s benefits, it’s no surprise the UK area has increased. ”

protect and enhance the environment, and adapt to ever changing demands from market and supply chains."

At its new, unsubsidised sites, Future Biogas plans to pay growers a fixed premium above the crop price for the adoption of sustainable farming practices for the duration of a feedstock agreement. "This will assist growers in their transition to more environmentally-sensitive farming and away from reliance on government subsidies," suggests Angela.

She adds that maize remains very popular as a feedstock for AD and is a viable break crop in arable rotations which provides shelter from the volatility of commodity markets. "A lot of

our farmers are looking to reduce their exposure to commodity markets to 50% or less and maize can really help.

"With nitrogen being one of the biggest emission factors on farm, being able to use digestate helps growers to reduce their reliance on artificial inputs, helping to lower their emissions. There are also some good SFI options which can be stacked along with the crop payment including no insecticide (CIPM4) and winter cover following maize (SOH4)," adds Angela.

Rory Hannam, KWS UK technical manager for hybrid crops, says wholecrop cereals are a viable alternative option to maize and can provide significant agronomic,



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► environmental and economic benefits.

"Most arable growers are aware of the benefits of growing maize in the rotation – there was a significant increase in the maize area in 2024 as growers struggled to get autumn cereals in and spring seed was in short supply.

"There's a growing market for grain maize, but a lot was grown as wholecrop and while some of this was traded from arable farm to dairy producer as animal feed this last year, the vast majority found its way into AD," he points out.

"Wholecrop maize has become pretty much the staple energy crop for AD in the UK, but there are good alternatives including hybrid rye and hybrid barley that, depending on individual farm circumstances, can fit

into the rotation well and offer significant benefits beyond production."

Rory believes it's unlikely that farmers will grow a wholecrop cereal as a speculative crop. "You're either going to have identified a particular management or agronomic requirement for growing it, or, there's a sound economic proposition such as an AD plant nearby with significant demand.

"Equally, you're probably not going to grow wheat as a wholecrop when demand is so high for grain and if prices are strong. While it might be a fallback in a difficult blackgrass year, planning to grow wheat as wholecrop with all the upfront investment required isn't a sound strategy," he stresses.

But when it comes to wholecrop rye, there are solid reasons for growing it from an agronomic point of view, he says.

"Given hybrid rye's benefits, it's no surprise the UK area has increased from 25,000-35,000ha annually just four years ago, to around just under 50,000ha today. Approximately 50% of this is used for biomass to produce feedstock for AD plants.

"It's one of the most drought-tolerant crops available and is typically well suited to lighter, drier, drought-prone soils, particularly in areas of low rainfall, as well as being suited to heavier land with many farming businesses in that situation now considering the crop.

"In fact, some of the highest wholecrop yields tend to come from regions with higher rainfall and heavier soils," he notes.

Rory adds that growing rye for

wholecrop can be a useful option for grassweed management within an arable rotation given the crop's quick spring vigour, tall plant height and the fact it's usually harvested in June before blackgrass seed sets, helping to minimise weed seed return.

"Depending on the timing of harvest, this might also allow for a second energy crop to be grown such as energy beet or maize, or provide an early entry for oilseed rape. Another option might be to put in a cover crop which provides soil cover during winter, before a following spring crop.

"Another positive for the early harvest is that it tends to be drier in June helping to minimise potential compaction and soil erosion which can result from harvesting maize later in the autumn."

Watch-outs

While there are benefits to including wholecrop rye in the rotation, it's important to highlight a couple of 'watch outs', he says. "Whole-cropping rye removes potassium from the soil as the potassium isn't bled back into the profile as it would with a crop left to mature for grain harvest.

"Depending on the soil indices, potassium fertiliser may then have to be applied to bring the numbers back up to an appropriate level as to not have a negative effect on the following crop. Also, in some scenarios, the regrowth of cut rye can cause an allelopathic effect which may lead to issues in establishing the next crop," comments Rory.

Rye fits well with energy beet or maize in the rotation and can be utilised in biogas

Variety selection

Variety choice is important for hybrid barley and a series of UK-based field trials suggest new KWS variety, Inys, offers promise, says the firm's Kate Cobbold.

"There's a definite yield advantage for Inys over the leading hybrids currently available in the UK with good yield stability plus thicker plant stands and deeper rooting – exactly what we were hoping to see.

"UK trials also indicate that Inys has a much more vigorous growth habit in the early stages of development with up to 40% greater ground cover," she adds.

Hybridisation is an equally important part of the equation when selecting rye varieties for wholecrop and biogas production, Rory Hannam adds.

"Currently in the UK, our varieties are

classed as dual purpose, in that they can be grown for grain or wholecrop. The ear contributes to roughly 50% of the final wholecrop yield, so by producing varieties with more grains per ear, we've been successful in improving yield since we hybridised the portfolio.

"Standout rye varieties include KWS Igor, KWS Serafino and KWS Tayo. In trials with Agrii, all three produced outstanding wholecrop yields with Igor and Serafino topping 50t/ha at 34% DM.

"Our breeders are also developing biomass-only varieties which will be particularly suited to wholecrop markets. This is an exciting development that growers and end users should look out for during the next few years," he concludes.



Trials indicate KWS Inys hybrid barley has a vigorous growth habit in its early stages of development with up to 40% greater ground cover.



KWS' Rory Hannam believes it's unlikely farmers will grow a wholecrop cereal as a speculative crop.

plants to balance the high productivity of energy beet or maize substrates – providing an alternative nutrient source for the bacteria and stabilising gas output, he adds.

“Used alongside maize, rye has a synergistic effect by improving the gas yield, as it increases the length of time for the maize to produce methane in the digester.

“By mixing 25% hybrid rye with 75% maize, plant managers can increase gas output by nearly 15% more than from maize used alone. However, combined gas yield declines when the proportion of rye used rises above this level.”

Top gas yields

Rory says harvesting when the crop is at 30-35% dry matter produces the best gas yields and reduces costs compared with rye produced for grain. “Depending on the season, you may be able to save on using a late-season PGR and a T3 fungicide application.”

Apart from that, growing hybrid rye as wholecrop is very similar as growing for grain, he notes. “Rye has a lower nitrogen requirement compared with other cereal species, with the total nitrogen requirement ranging

from 100 to 150kgN/ha.

“This is usually split across two timings, with 40-50kg applied during tillering in late February/early March and the rest once stem extension has started a month or so later.”

In terms of disease threats, Rory highlights brown rust as the main concern for UK rye crops, whereas mildew can reduce yield if left untreated. “In general, most rye crops being grown for wholecrop may only require two fungicide applications. A T3 will only be financially viable in a high brown rust year as the crop is harvested at the milky ripe stage and not taken for grain,” he says.

According to KWS UK hybrid crops product manager, Kate Cobbold, hybrid barley grown as wholecrop offers a similar opportunity to rye. “Hybrids generally have greater vigour than conventionally-bred varieties and this results in the highest biomass which then provides the best gas yields.

“If weed control is a higher priority, hybrid barley offers some specific advantages over hybrid rye. As farmers increasingly battle with blackgrass, hybrid barley can help reduce grassweed pressure considerably.”

This is because hybrid barley has a bigger root system than conventional barley, so can compete with grassweeds below ground, she says. “It gets going very early in the spring which allows it to better compete with grassweeds above ground.

“While both hybrid rye and barley are competitive in the early stages, as hybrid rye grows, it develops a more open canopy so isn't as good as hybrid barley at suppressing grassweeds in spring.

“Hybrid barley is much better in this respect with more compact tillering and a dense crop canopy. Equally, because hybrid rye is better suited to earlier drilling than ▶



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Hybrids generally have greater vigour than conventionally-bred varieties which results in high biomass and therefore the best gas yields, says KWS' Kate Cobbold.

► hybrid barley, it potentially gives less time to create a stale seed bed for weed control.”
Kate says the other advantage of hybrid barley is that if market conditions change and the value of grain barley becomes more attractive, there could be more opportunities for marketing barley than rye. “Demand for rye for use in feed for pigs and poultry is growing and there’s a much healthier grain market than a few years ago, but barley is established in demand and has a much greater infrastructure built around it,” she concludes. ■

Making more of mustard

Understanding which regenerative agriculture practices can be applied to growing mustard is the aim of a 4-year research project funded by Unilever to support production of Colman’s Mustard.

The work, which is led by PhD student Charlotte Robb at Rothamsted Research, is collaborating with the English Mustard Growers (EMG) group to evaluate actions such as intercropping and wildflower margins.

The goal is to improve pest management, facilitate a reduction in insecticide use while increasing biodiversity, says Charlotte. “We want to understand which specific tools can support growers to utilise the benefits of regenerative agriculture.”

For the work, commercial field-scale experiments will be supplemented by controlled field plot trials at the Rothamsted Research farm and in controlled-environment field simulators.

But in the first instance, it’s about ascertaining where growers are in terms of sustainable practice, says project supervisor, Dr Sam Cook. “Hopefully we can optimise the techniques already being used while potentially encouraging the adoption of further actions.

“It’s about comparing approaches and outcomes



PhD student Charlotte Robb is investigating which regenerative agriculture practices can be applied to growing mustard.

and identifying potential areas for gains,” she explains.

As such, the first part of the work involves surveying the EMG group to establish a benchmark. Once this has been conducted, the practical side of the research can begin.

In terms of project outputs, it’s hoped a quick and easy biomonitoring approach can be developed. “Working with the growers, this will be co-designed so that they themselves can assess the impact of selected regenerative agriculture practices,” concludes Charlotte.

The project is being co-supervised by Dr Alice Mauchline from the University of Reading.