

“ We’re  
really working hard to  
future-proof our  
varieties. ”

# Talking about a rye-revolution

## Technical Insiders view

**As the real benefits of including hybrid rye in the rotation start to surface, CPM reviews KWS’ latest offering, KWS Tayo.**

**By Charlotte Cunningham**

**It’s no secret that modern agriculture faces a number of challenges. Most recently, with a global focus on climate change teamed with needing to feed a growing population, it’s been left in the hands of the industry to find solutions that can increase yield while reducing environmental impact.**

From a cropping perspective, although rye has been around for some time, perhaps the full scope of its benefits are only just coming to light.

KWS has had a firm foot in the global rye market for a number of years and sees it as a profitable solution to many of these key challenges. “In my view, the UK has huge ongoing issues at the moment which comprise a combination of losing a lot of OSR area, a reduction in available effective ag chemicals, pressure on sugar beet and relatively high wheat production costs —

particularly second wheat,” says John Burgess, maize and hybrid rye product manager. “This, alongside disease resistance challenges, make for quite a difficult time for growers.

“However, this is where rye comes in quite nicely — giving growers another option to lengthen rotations, lower input costs and actually produce quite a profitable crop.”

### Options available

And KWS are adding to the options available for growers with its new high-yielding hybrid candidate variety — KWS Tayo — which is currently undergoing AHDB trials. “Tayo is a 100% F1 hybrid type. Some breeders will use a mix of hybrid and conventional, but we only sell 100% F1 as this ensures superior evenness of the canopy which in turn helps with the speed of ripening,” he says.

Looking at the data available so far from AHDB, KWS Tayo has a treated yield of 112%, a Hagberg of 257 and a protein content of 9.9%. “In terms of lodging, rye is a tall crop, so we do have a programme to dwarf it. As varieties like Tayo come through, they have bigger ears which makes the crop heavier, so it’s important to have a stiff stem.”

John says that brown rust is the only real disease issue for rye, but official scoring data is not yet available. “That said, the latest AHDB ratings suggest our

portfolio of varieties are significantly more tolerant, so we’re expecting the same level of control from Tayo.”

Thinking about marketing, KWS Tayo can be used for wholecrop, but it’s effectively a grain variety, explains John. “We know most rye is grown for wholecrop, but we want to change that and think about supplying rye for grain. In the northern hemisphere, 90% of our varieties are grown for grain, so UK growers can be confident that we know what we’re doing.”

While milling demand for rye is limited at the moment in the UK, where KWS Tayo ▶



*Hybrid rye gives growers an option to lengthen rotations, lower input costs and actually produce quite a profitable crop, says John Burgess.*





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*Hybrid rye has proved to be a high yielding and cheaper crop to grow for Colin Mitchell.*

► could be really beneficial is in the feed market for pigs and poultry, he says. "In countries like Denmark, Spain and Germany, rye

is becoming an established component of pig rations. It can be fed as meal, liquid or pellet-based feed and is high in dietary fibre which promotes gut health and efficient feeding.

"Some of these certain dietary fibres can help boost immunity, particularly against diseases like salmonella which is a major problem for pig and poultry producers.

"As well as this, rye is 2-3% lower in crude protein than wheat, which leads to less nitrogen in the slurry — good for both animals and the environment.

And on that thought chain, John believes that that 'environmentally-friendly' food production is going to be a major focus for both farmers and end

## PollenPlus – how it works

PollenPlus is a KWS-patented enhanced restorer gene Rfp1 used in hybrid rye to produce large quantities of pollen.

By producing pollen in such large quantities, it improves the rate of fertilisation thereby providing effective protection against ergot — something KWS hybrid ryes have come renowned for.

But looking at the science, how exactly does this gene work?

Two mechanisms are vital in hybrid rye breeding: cytoplasmic male sterility (CMS) and the restorer genes, explains KWS seed breeder, Peer Wilde. "The discovery of CMS heralded in a new era in rye breeding as it enabled pollination to be controlled cost-effectively for the first time."

CMS is a condition under which a plant is unable to produce functional pollen. "These genotypes can therefore not pollinate other plants. They are used as seed parents for later hybrids. In contrast however, breeders can ensure selective pollination by a pollen parent that has the desired traits; a principal requirement in successful hybrid breeding."

To produce seed for high-yielding KWS hybrid varieties, the seed and pollen parents — which are in turn

the product of extensive crossing — are selectively crossed with each other. Only the pollen parent produces functional pollen that also contains the completely dominant restorer gene Rfp1. Progeny from crossing the seed and pollen parents (F1 generation) are then fertile again.

The advantage of this pollen production being restored by Rfp1 is that it provides KWS' hybrid rye varieties with effective protection against ergot. "This feared disease may occur if there's insufficient pollen when the rye is in flower," explains Peer. "The ergot spores can then occupy the rye's open flowers. The first signs of infestation are sticky droplets, termed honeydew, on the ear. The actual ergot then develops later."

"It's dark violet, elongated and can grow to a length of 6cm. Just small amounts of the alkaloids in the ergot can harm both consumers and animals, which is why there are official limits on their content in harvested goods.

"If those limits are exceeded, the purchaser makes price deductions and can even refuse the batch in full."

users, opening up a unique opportunity for varieties like KWS Tayo. "Rye delivers nitrogen and agrochemical savings without compromising yields, which is great for growers. But more importantly, when fed as a feed source to livestock, this benefit passes down through the whole production chain."

One of the biggest marketable benefits of rye is its lower input requirement, making it a really economic second cereal option too. "We're talking about an average nitrogen reduction of 45% compared with wheat," he explains. "When we apply these benefits to the food chain, Sainsbury's are an example of an end-user who have implemented a low carbon initiative. In products like pork, per kg of meat, using rye leads to a direct reduction in the amount of carbon involved in production."

As well as the actual rye grain, the increased straw production also offers a better income revenue. "On average, Tayo produces around 20% more straw than wheat," says John.

### Future proof

"We're really working hard to future-proof our varieties. Net zero is the clear direction of travel and less support also means that rotational income is vital. We can't do that with the current model, so something has to change, and rye looks like it could be the answer to some of the key challenges at the moment."

Looking at the market scope for KWS Tayo, Frontier's Chris Piggott says it's a really exciting variety. "New rye varieties have been slow coming over the past few years, largely due to quite a stable market — in terms of end users — meaning those new additions haven't been as necessary."

"However, that's changing. We've been following the progress of Tayo for a few years and the step up in its breeding makes variety choice really quite simple. Previous varieties have



*Chris Piggott says KWS Tayo is a really exciting variety.*

had high yields, but not brought that grain quality to the table, but Tayo does — it's a really impressive variety.

"There's a growing interest in rye, so having something that's very new and has progressed so much in terms of the yields we've previously seen, is very useful for expanding that market even further."

From a seed trade perspective, KWS Tayo ticks every box, says Chris. "The only thing we're not quite sure of yet is how resistant Tayo is to brown rust as the detail isn't available, so we're watching and waiting at the moment. However, based on everything we've seen so far, it's unlikely to be an issue."

"Brown rust is definitely something to be wary of in rye, but if you take a look at KWS' breeding programme, it's never been an issue in older varieties, so we expect the same from such a progressive, new offering."

A standout feature of the variety is the PollenPlus gene — something that's patented by KWS — he adds. "This gene aids the over production of pollen which in turn reduces ergot risk. This is a huge advantage to growers as ergot is something that's seen a lot more commonly seen in rye than other cereals."

Chris notes that there doesn't seem to be a location bias ►



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A greater focus on NUE could open doors for hybrid rye, says Eric Anderson.

► either, with successful performance in trials in Scotland, right the way down the country. “Tayo seems to be incredibly flexible in terms of maturity, which makes it a good choice for a wide range of growers.”

Focusing more on that end user and Chris says there's a lot of work being done currently in terms of the feed value of rye grain. “We've seen more of an interest in rye grain contracts — there's a stable market for milling rye and that continues. But where there's a real area of growth at the moment is within the feed compounder markets. The evidence emerging so far shows it can be an incredibly beneficial feed source, primarily for pigs.”

Colin Mitchell, business manager at the Meikleour Estate, Perthshire, has been monitoring the benefits of including rye in the rotation over the past four years. “We're on really light land here, which makes getting good yields from traditional cereal crops quite tricky. So four years ago we took a punt on hybrid rye and planted 30ha of a KWS variety, without a market for it. However, it did really well and was very cheap to grow, which made it worth sticking with.”

“The hybrid aspect of rye is really attractive — its incredibly vigorous and seems to suck up moisture from deep in the soil which seems to make for a much more consistent crop.”

As well as its consistency, compared with traditional cropping like wheat and OSR, one of the main benefits of growing hybrid rye is



KWS Tayo is a 100% F1 hybrid type.

that it requires significantly less inputs, he says. “We're all thinking about our environmental impact at the moment, and we know for certain that the carbon footprint of rye is much lower than wheat. The nitrogen requirement is only 150kg/ha, compared with 200 – 220 kg/ha for winter wheat, which not only reduces inputs costs but is also important because the estate is in a nitrate vulnerable zone.”

“Rye also requires fewer, cheaper, fungicides. In terms of how this is all reflected financially, rye is around £100/ha cheaper for us to grow than wheat.”

## Yield potential

This year, they're growing KWS Tayo and while it's too early to comment on the performance of the variety, so far so good, says Colin. “The good thing with hybrid types is that the yield potential is amazing. This, teamed with lower inputs, all adds to that bottom line. As long as I can keep the markets, I'll be keeping rye in the rotation for a long time.”

Also pleased with KWS Tayo's performance in the field is Scottish Agronomy's Eric Anderson. “One of the big things with this new hybrid variety is that the yield improvement superior to any other grain at present, and in our Scottish Agronomy trials, hybrid rye has shown to have the potential to be higher yielding than winter wheat.”

Eric says KWS Tayo's disease resistance and the PollenPlus gene are really important qualities for those looking to sell to the grain market. “While a variety can never promise to eliminate something like ergot, having a gene that significantly mitigates the risk is fundamentally important for rye grain growers.”

From a distiller end user perspective, interest in rye is also growing, he adds. “The historical view of cereal development in distilling has been two dimensional: agronomic yield because this is what the grower needs to maintain profitability and alcohol yield because this is what the distiller needs.”

“Rye alcohol yields are typically within 7% of soft wheat standards but the big advantage is that rye is opening up an entirely different flavour profile in the end product and the market for rye whisky is growing.”

From a Scottish legislative perspective, reducing agriculture's carbon footprint is something that's being talked about more and more, and Eric reckons this drive on reducing nitrogen inputs could open doors for rye — namely, KWS Tayo. “Recently in



Where KWS Tayo could be really beneficial is in the feed market for pigs and poultry.



KWS Tayo can be used for wholecrop, but it's effectively a grain variety.

Scotland following a consultation a Scottish nitrogen balance sheet will be established. No doubt the results of this will drive a political agenda in terms of ensuring nitrogen use efficiency in agriculture, and in this context, rye has a huge opportunity. For the level of N applied, the grain yield achieved is continually larger in rye than it is in other cereal crops like wheat and barley. Furthermore, rye only requires 300 litres water/t of grain yield, compared with 400 litres water/t yield of wheat. Fundamentally, increasing rye productivity with lesser nitrogen and fungicide inputs will reduce the crops carbon footprint relative to other cereals.” ■

## KWS Tayo at a glance

### Yield (% treated controls)

|                   |     |
|-------------------|-----|
| Fungicide-treated | 112 |
| Number of trials  | 6   |

### Grain quality

|                         |      |
|-------------------------|------|
| Protein content (%)     | 9.9  |
| Hagberg falling number  | 257  |
| Specific weight (kg/hl) | 77.6 |

### Agronomy

|                                 |       |
|---------------------------------|-------|
| Lodging (%)                     | -     |
| Straw length (cm)               | [126] |
| Ripening days (+/- SU Mephisto) | [+1]  |

Source: AHDB Winter rye Descriptive List 2021/22 [ ] = limited data

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