Field view at the Apley Estate owned by Lord and Lady Hamilton of Dalzell

Pushing yield boundaries back

Farmers were in Shropshire to look at maximising wheat and oilseed yields, **Oliver Cartwright** reports

More than 30 farmers were at a Shropshire meeting to hear about the bio-physical potential of crops alongside oilseed and wheat yield improvement.

The group were at Norton Village Hall to hear from Adrian Joynt, Apley Estate farm manager, and Pete Berry, ADAS head of crop physiology, to examine crop nitrogen requirements and yield challenges.

Mr Joynt outlined his field results on the estate, currently an AHDB monitor farm, which were entered for the Yield Enhancement Network (YEN) competition 2017.

He said they had mixed YEN results with the oilseed rape (OSR) performing better than the feed wheat - 8.9t/ha for wheat and 4.9t/ha for OSR.

The best YEN competition field yield for wheat was 15.3t/ha, while for OSR it was 6.4t/ha. Mr Joynt said the wheat variety, Reflection, where additional nitrogen, potash and a more robust T3 spray was applied, had broken even financially, but lessons had been learnt.

He said: "We had two fields side by side, treated identically right the way through, both drilled the same day with the same treatments – except more potash and 300kgs/ha of Nitrogen (N) versus 230kgs on the neighbouring field and then the T3 to try and keep the plants green for a bit longer."

He said YEN entrants would agree biomass was key and that it helped push yields further.

"This year across the whole farm we have eased seed rates up a bit," he said.

"We drilled on 22 September, 230 seeds per metre squared (m2) and for this year, albeit later, on 4 October, 315 seeds/m2, and that's quite a difference in seed rates.

"Before we started drilling seed bed conditions weren't ideal so I upped the rates anyway, but we'd already made a considered decision to lift them to try and get the biomass up.

"I just felt that maybe, with the dry spring we had last year, we didn't get enough tillers in the crop early on and keep enough through to the harvest. This year N will probably go on in four split applications and we'll see if there's an improvement."

The wheat variety entry this year is Siskin, planted after potatoes.

Farmyard muck usually goes on before potatoes but they were unable to get on until after lifting, the other difference is that field soil type is slightly stronger.

Mr Joynt said: "It looks well at the moment and there are about 230 to 240 plants per m2, a job which made for an exciting weekend!

Apley oilseed results were better on three fields, side by side, drilled over two days, although he put more N and a trace element mix on the YEN crop.

He said: "We upped it by 50 kilos from 235 to 285, and just put a trace element mix in with the flowering spray, on the basis that if we could help get more pods set then we would get more seeds.

"The YEN report said we had very good trace elements status in the farm seed analysis. What would've been interesting is if we'd sampled some seeds from plants that didn't have the trace elements, as a comparison; maybe that might be something for 2018?"

He said he would want further success before making it the farm standard.

"With the oilseed I am tempted to do something similar this time and we may look at some spring tissue tests to see if we need more trace elements, but I don't see the point in pushing up N any further."

Mr Joynt will also apply chicken manure to the OSR rather than bio-solids for 2018.

Farmers will join him and Mr Meredith to view the crops in the summer.

The group then welcomed Mr Berry who said farmers were involved with YEN "not to beat the world record but to understand more about their fields".

He said moderate improvements in several crop characteristics were required to get to 20 tonnes a hectare (t/ha) of wheat and, while plausible, accepted it was some way off, although some were achieving 16t/ha, with higher spot yields.

"We need improvements in variety and in agronomic technology to consistently achieve this 20t/ha for wheat so it is a long-term yield potential," he said.

"It's something to aim for but I don't think it's currently possible with the technology we have.

"We have targets of greater light interception and greater water capture, which is a particular challenge – at the moment most crops are getting roots down to a metre but they need to get down below 1.5m.

"That would significantly increase water capture and when you get towards 15t/ha- plus it's the water that become the most vitally constraining factor; it becomes more and more important the higher the yield."

The group discussed yield potential, however, it was recognised weather, time of rainfall and other vagaries played a decisive factor in individual seasons.

Soil health analysis, crop stress, key growth stages, sampling, headland growth, burn up and the green area index were also discussed.

Farmers heard there could be a "momentum effect" for high yielding crops – large first leaves allowed for improved photosynthesis, which helped generate larger second and thirds leaves and subsequently more tillers and so on.

With grain yields limited by the assimilate supply (the source) or by the carbohydrate demand of the grains (the sink), the group heard each sink became the next source and then in turn supported the next sink.

Mr Berry said high-yielding wheat crops had many grains, at more than 30,000 per m2, much biomass and often many ears (600 to 700 per m2), with canopy longevity to the end of June and beyond, and a deep root structure.

He said N timings seemed at least as important as the amount put on. However, higher yielding crops inevitably had a higher N requirement.

The group heard they needed to be realistic with how much N to supply in relation to expected yield, especially balancing cost against potential, and they were urged to deal with inherent yield limiting factors, including soil compaction.

Mr Berry warned of the dangers "of just going for big biomass" and "building an overlarge canopy too early, with respect to lodging risk".

The meeting heard nutrient management evolutions and healthy soil structure remained vital to help achieve yield potential with efficient use of nutrients.

Mr Berry said 6t/ha oilseed could be achieved by having 140,000 seeds and each weighing 4.5mg, or with 80,000 seeds and a seed weight of 8mg. However they heard the most likely route to success was producing more than 100,000 seeds to get to five t/ha.

"The two top YEN yielders, at over 6t/ha achieved a decent number of seeds per m2, but they also filled them well, their thousand seeds weights were around 6mg," he said.

"So once you have set lots of seeds, you still have to fill them if you want the highest yields.

"To do this you need a longer canopy duration and an effective photosynthetic rate in your canopy, that's still really important.

"Other things associated with high yields were a greater N concentration in the grain seed and less in the stem and pod wall."

He said higher yielding crops kept filling the seed, re-cycling N into the seed from the stem and pod wall, filling it for longer.

YEN data also found higher amounts of magnesium in the soil and seed, and Mr Berry said ensuring the nutrient was not limiting could be very important.

He added it was a small dataset, of 50 farm crops, so the conclusions were still viewed as preliminary.

Farmers heard the top yielders also saw plants flower earlier and they were desiccated later.

Row spacing, fungicide application, biological soil activity and combining thick stemmed plants were also raised.

"With all of this it's about balance, balancing the risk of trying to get a high yield and getting N to the crop without overdoing it and getting an over-large canopy at flowering which ends up lodging," he added.

He said he was keen to see more YEN entries and urged farmers to get involved early as there were real business benefits. All the details can be found online at www.yen.adas.co.uk

The meeting was organised by Richard Meredith, AHDB knowledge exchange manager.

Pete Berry

Adrian Joynt

YEN helps arable innovators convert good ideas into greater yields and profit.
Alongside the crops competition, it is data focused as the information given by farmers is valuable to show what constrains yields and what needs to be done to improve them.

Further details are on the YEN website or contact richard.meredith@ahdb.org.uk