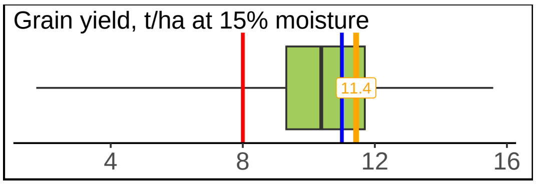
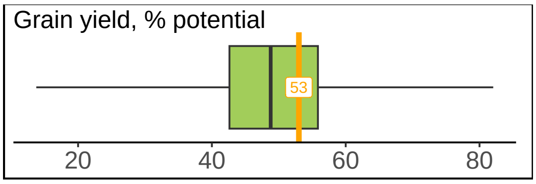
Entrant's Report

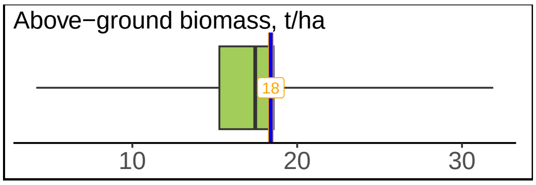
Harvest 2024

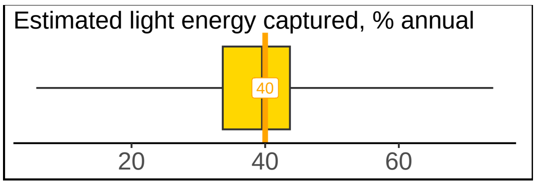
YEN User ID: Cereal EXAMPLE	Field/Site name: EXAMPLE
Entrant name: EXAMPLE	Location: West
Main contact email:	Incident energy 2023-24: 38 TJ/ha
Sponsor/supporter: EXAMPLE	Available water: 489 mm
Sponsor/Supporter email:	Crop: Winter Wheat
	Variety: Champion

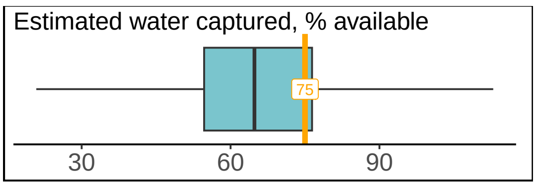
SUMMARY: YEN entries were completed from 83 cereal crops this year of which 29 barley and oats entries are reported separately. Headline results for your entry are shown in benchmark diagrams below. Your yield of 11.43 t/ha ranked 23rd within all YEN entries. This represents 53% of its estimated yield potential of 21.6 t/ha, which ranked 18th within all YEN entries in 2024 of all 55 wheat, rye and triticale potential yields.

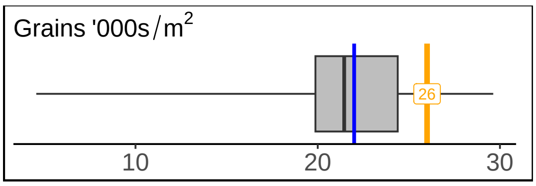










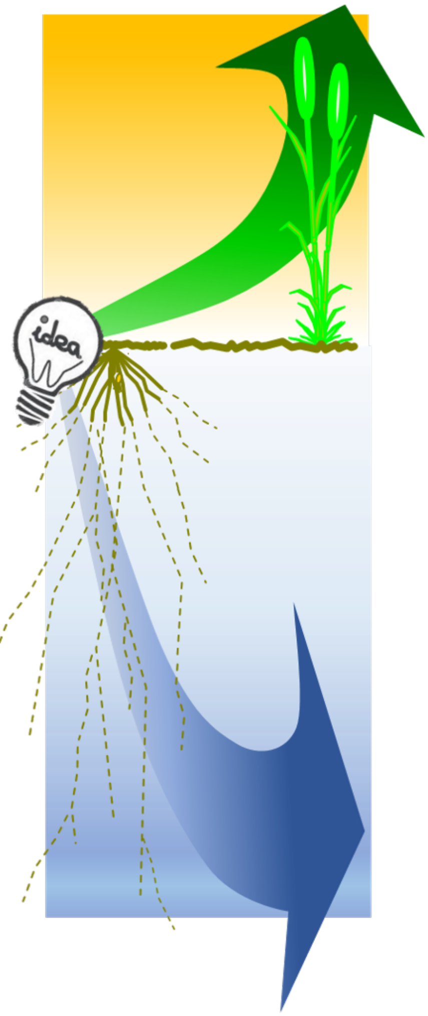


Overall yield rank:

23rd

Overall potential yield rank:

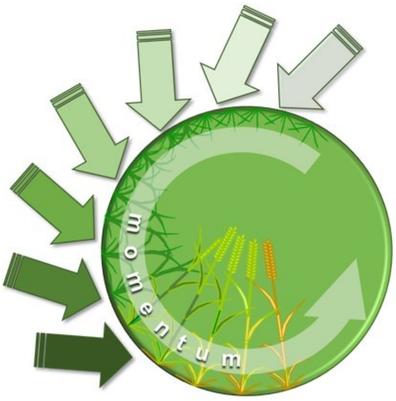
18th



CONTENTS

Our detailed analysis of your yield result is provided in the following pages, including comparisons with other YEN entries and with benchmarks taken from the AHDB Wheat Growth Guide, the AHDB Nutrient Management Guide (RB209) and the AHDB Recommended List. We hope that this helps you to identify aspects of your husbandry and growing conditions that offer possible routes to further yield enhancement on your land.

Our approach in this report is first to consider growing conditions and potential yields for crops grown in this season, then the conditions for and husbandry of your crop, its development, its basic resources (light energy, water & nutrients), and its success in capturing these and in converting them to grain. Lastly, we use grain analysis to provide a post-mortem on your crop's limiting components and nutrition.



"The YEN exists to help you to enhance your yields."

The key to high yields amongst YEN entries has been called 'momentum' – maximising growth by avoiding setbacks. So, our approach to enhancing yields is to work out what limits growth – light energy, water, nutrients, or storage capacity – and then develop ideas to build better canopies, better roots, more storage, or better nutrition throughout growth.

To estimate potential yields, we assume a theoretically 'perfect' variety grown with 'inspired' husbandry on your land with this season's weather, achieving either:

(i) **60% capture of light energy** through this season (including some in August), and its conversion to 1.4 tonnes of biomass per terajoule, or

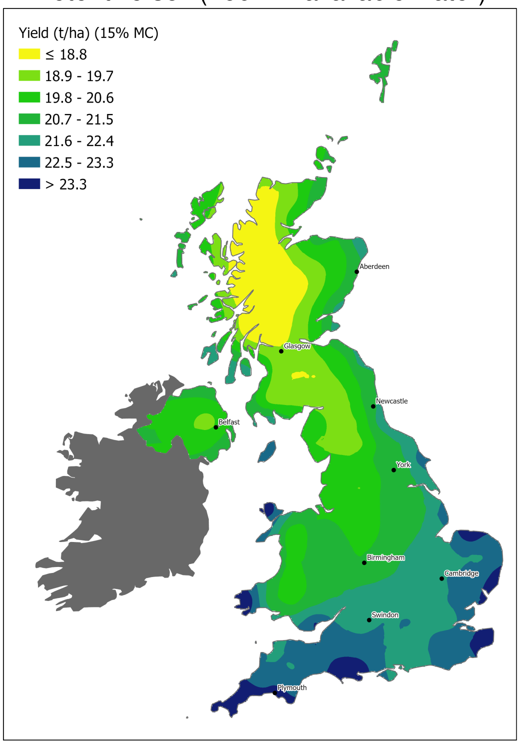
(ii) **Capture of all the available water** held in the soil to 1.5 m depth (or to rock if less) plus all rainfall from April to July, and conversion of each 18 mm into a tonne of biomass per hectare. Our model of potential yield estimates potential growth on a daily basis; this identifies impacts of water limitation more precisely than the cruder monthly estimates we made in previous YEN reports.

Taking the lesser of these two biomass amounts, we assume that a maximum of 60% can be used to form grain, this is the 'harvest index'. Note that we assume no damage from waterlogging, frost, heat, or lodging.

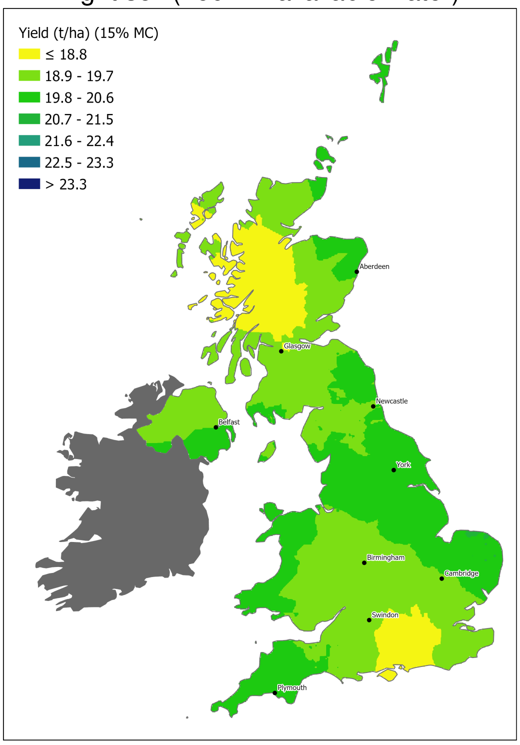
The maps below show the potential grain yields for autumn sown cereals on retentive and light soils this year. For this we assume deep soils with no irrigation. Potential yields in arable areas ranged from 18 t/ha upwards so, on most soils, high yields were theoretically possible almost everywhere.

2024 Potential yields

Retentive soil (260mm available water)



Light soil (160mm available water)



We are using weather data from the Met Office this year.

In summary:

The adjacent graphs show the monthly temperatures, rainfall and total solar radiation for your area through this growing season compared to your regional long-term average (LTA) and the average for all UK arable areas (1981-2010, from the Met Office).

• Good moist seedbeds after harvest 2023 allowed good crop (& blackgrass!) establishment if drilled before mid-October but then it turned wet, so any late drillings struggled.

• Field drains ran by December. Then storms caused flooding on already wet fields. Soil nutrient retention overwinter was poor.

• A January cold snap enabled some cultivations on the frost, and some Kerb applications, but then the resuming mild and wet winter favoured many diseases.

• Early spring drillings were only possible on light soils. Any later drillings occurred in catchy conditions.

• Spring septoria pressure was high, especially in thick canopies of early crops. The warm March also allowed rusts to establish early, especially brown rust.

• Although the warm spring advanced initial pest development, rain and dull conditions limited prevalence of aphids, orange wheat blossom midge & other insects

• The wet & windy spring, plus saturated ground, prevented or delayed T0 & T1 fungicide applications.

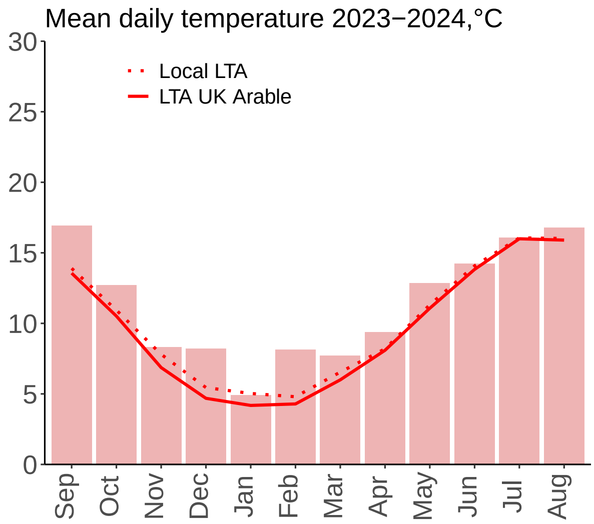
• Late April and May turned warmer, particularly in Scotland, enabling some soil drying and delayed sowings. But May was still dull. Warmth before T2 then built brown rust pressure and shortened septoria's latent period, & rains splashed infections upwards, so top leaves were often infected as they emerged.

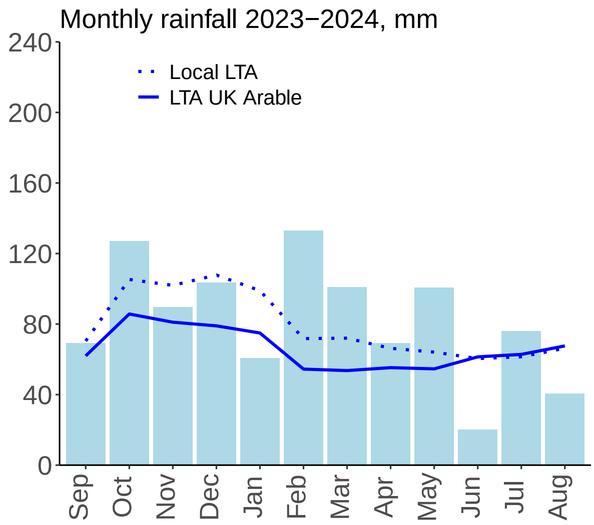
• T2 sprays were often curative for septoria and some farms struggled to control brown rust, so this was then seen in regions and varieties not often affected.

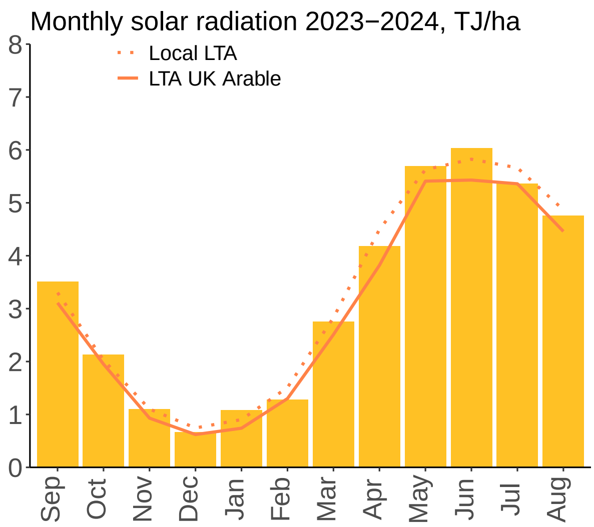
• Rain after T2 applications increased septoria pressure further, causing some growers to strengthen their T3 fungicide choice to protect canopies into grain filling.

• June was dry and bright but then July was dull in the South East and North.

• A dry August allowed an easier though poorer harvest in England than in recent years. Yields and proteins were generally low, with some samples showing ergot.

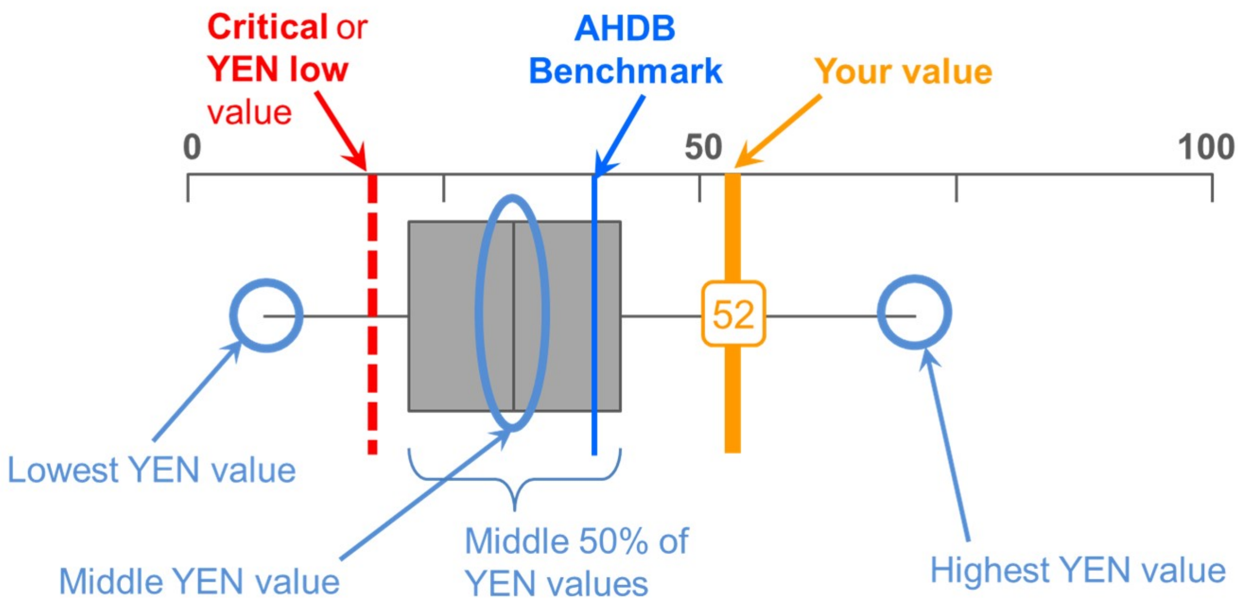






YEN Benchmarking charts – What do they mean?

YEN is much more than a competition – it provides a full set of metrics whereby you can gauge the performance of your crop against all other YEN crops. This has provided the principle value of YEN to most participants. We do this with benchmark charts. These compare your value with everyone else's this year and with standard benchmarks and critical values, if available and appropriate. The key is as follows:



The 'whiskers' show the range of YEN values in 2024 whilst the grey box shows the middle half of values, with a line for the mid-value. The orange line shows the value for your entry, and the red line is a limit beyond which yield may be adversely affected; crops with values beyond this merit further investigation. Blue dashed lines indicate benchmark values e.g. from the AHDB's Growth Guides. Benchmark charts throughout this report summarise data provided for all YEN wheat crops (they exclude barley and oats, and any wheat data entered past the submission deadline).

Note that 'Dynamic Benchmarking' is available to all YEN members via the YEN website. This means you can compare your own yield or grain nutrient data with subsets of all other YEN crops selected by crop type, soil type, location or year back to 2013. The 2024 season data will be made available from April 2025.

Soil description and nutrition analysis

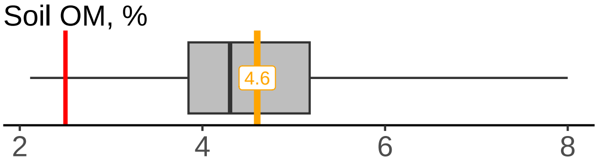
Your soil's capacity to hold available water is critical in determining your potential yields. We rely on entrants describing the soil where their YEN entry grew. We can use the UK Soil Observatory map viewer to check whether this complies with the surrounding land.

Good soil descriptions are vital in allowing us to estimate soil water holding capacity and, along with summer rainfall, the water available to your crop (see Benchmark charts in the section on 'Resources & their Capture').

Topsoil analyses tell us about soil status for pH, P, K and Mg, as reported below. The benchmarks below represent analyses provided by NRM, or recent analysis submitted by entrants. A few sites show low values for soil pH, P, K or Mg. If these are unexpected, they may need further checks, either by repeating soil analysis and by checking both leaf and seed analyses later in this report. Previous YEN leaf and seed nutrient data have indicated that UK cereal crops often experience deficiencies in one or more nutrients, and sometimes this is despite soil levels being satisfactory. So, by combined use of soil, leaf and seed analysis, the YENs now help to diagnose whether nutrient shortfalls are arising from poor supply, or poor capture by the root system.

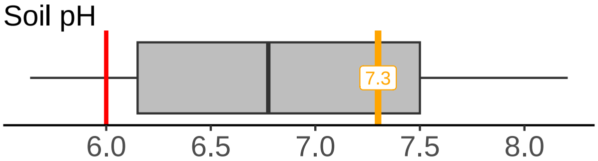
Soil analysis

Soil OM, %



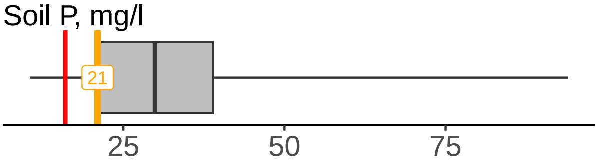
SOM supports crop performance through better nutrient availability, soil aggregation, and water holding capacity. NRM determines SOM by 'loss on ignition'. Note: other methods can give lower values.

Soil pH



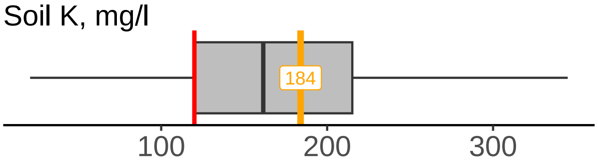
Soil pH <6 is acidic. High pH soils may require that special attention is paid to phosphorus (P) and micro-nutrient levels in leaf and grain (see later).

Soil P, mg/l



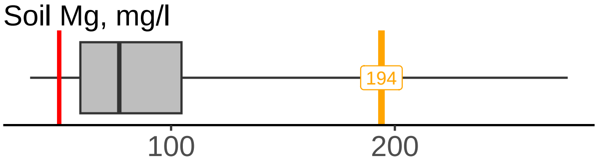
Only a small difference separates P Index 0 (<=9) and 2 (>=16). High yields are possible at P index 1 but fresh P is also usually required. Use grain P (see page 20) to double-check if P was sufficient.

Soil K, mg/l



Soil potassium (K) analysis checks on whether K supplies are likely to have been deficient for average crops. However, high yielding crops require very large amounts of K, so check using leaf and grain analysis.

Soil Mg, mg/l



Magnesium (Mg) is a key component of chlorophyll so deficient plants show striking inter-veinal yellowing. Temporary deficiencies often occur in spring if topsoils are dry, so check using leaf and grain analysis.

This section considers how your variety and husbandry decisions related to others entering the YEN this year. Note that the multi-year YEN dataset suggests that the individual effects on grain yield of variety choice or husbandry decision are relatively small; it is how these decisions (and other factors) are combined into the overall strategy on each farm that is responsible for the level of yield that tends to be achieved. Hence it should be possible to learn from the best performing farms. In summary, we are concluding that:

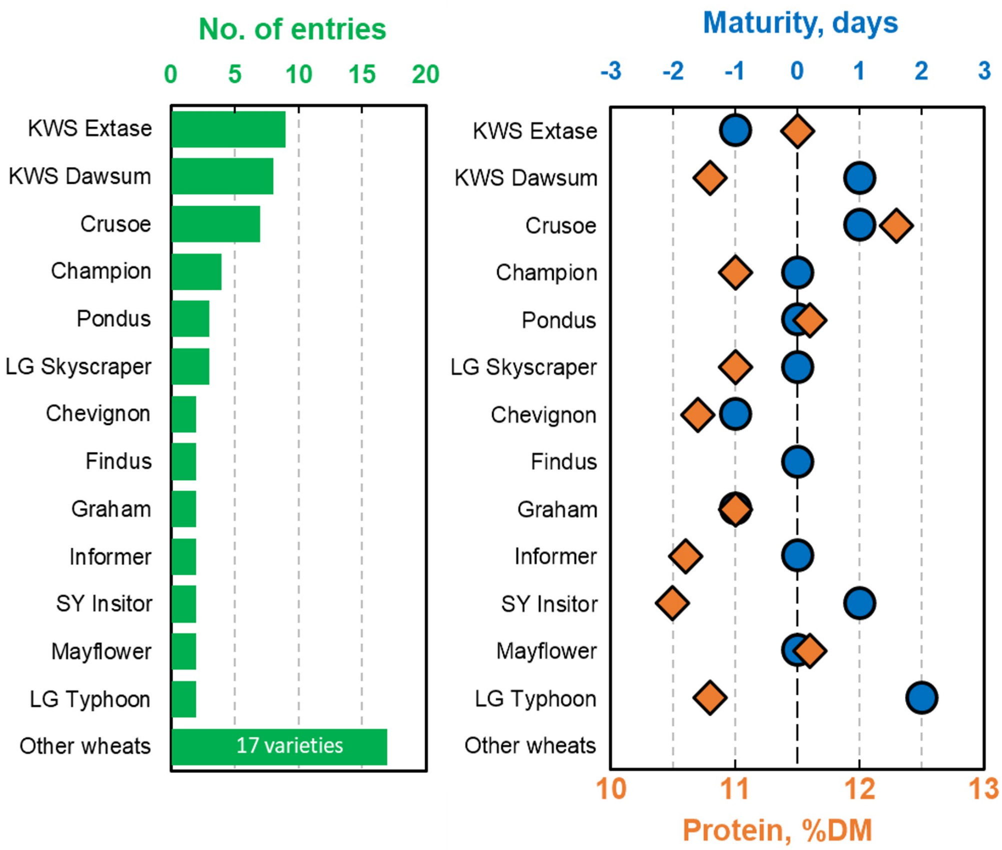
- **15 t/ha is possible almost anywhere!** High yields are not restricted to just one part of the UK.
- **Attention to detail** is important.
- **Large yields come from large crops** . . . i.e. taller crops with more fertile shoots
- **Best yielding seasons** had dry, bright autumns and winters, bright springs and cool summers
- **Good nutrition is hard:** most crops suffer nutrient deficiencies, especially of P.

Variety choice

Cereal YEN entries this year included 30 different wheat varieties, 7 barleys, and 4 oats. (Note that barley and oats entries are now reported and benchmarked separately from wheat and the minor cereals.) Many entrants used varieties that are new to the YEN this year; variety choice is a key way that YEN entrants seek to drive yield enhancement.

The most chosen varieties are compared in the figure below for their maturity and grain protein levels, as reported in the AHDB's 'Recommended Lists for cereals and oilseeds' (RL). Note that the protein contents quoted here are the norms from the AHDB RL [the lower protein content; not the 'Protein content – milling spec'].

- Your variety was Champion, which according to the AHDB Recommended List (or alternative source for some varieties) has standard duration to maturity has an average grain protein content of 11%

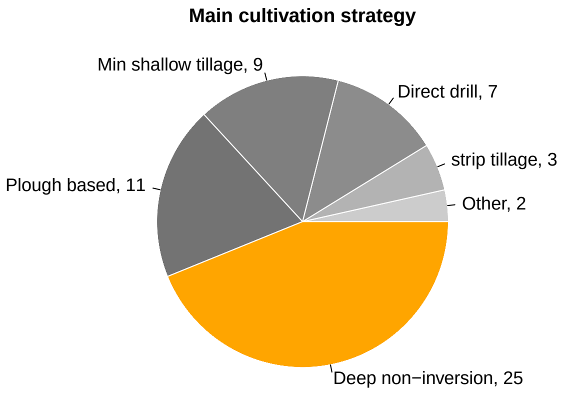


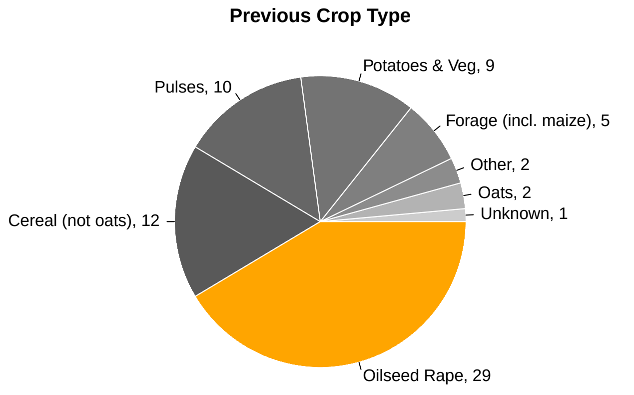
Husbandry factors

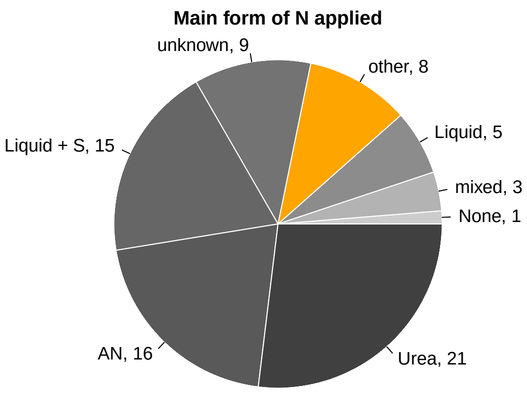
The following diagrams use orange segments or orange bars to indicate the agronomy of your crop, if known, so you can see how this relates to all other YEN entries.

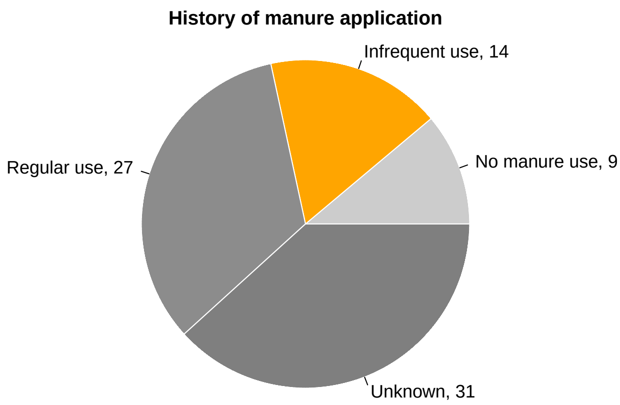
Analysis of all YEN entries since 2013 shows the following associations with grain yield (note that these do not necessarily imply causes – it may just be that farms with high yields also happen to have these traits):

Potential & Location	Yields were greater where potential yields were greater, but yields better in the N & E, even though better potential yields in the S & W.
Weather	Better yields in drier winters, warmer winters and cooler summers
Soil type & rooting depth	Better yields on more retentive soils, e.g. with more silt, and less sand. High yielding crops usually needed to capture water from >2 metres deep.
Soil analysis	Better yields with more organic matter & soil P, but pH, K & Mg not significant
Previous crop	Better yields after pulses, OSR, veg. & forage than after sugar beet, wheat or cover crop
Variety choice	Varieties with greater yields in the AHDB RL tend to mean better yields in YEN
Sowing date & rate	Less grain by 0.7 t/ha per month delay, even though late crops were sown with more seed .. so minus 0.5 t/ha per 100 more seeds / m2 sown
Organic manure use	~0.3 t/ha more grain if used, with poultry or digestate being best
N fertiliser use	6 kg more grain per kg N (about 'break-even' in £/ha) or 0.3 t/ha more per N application
P, K, S, micronutrient or biostimulant use	More grain with more S applied. No significant associations with other nutrient applications
Forms of N fertiliser	Yields don't differ between liquid or solid products
PGR use	0.8 t/ha more grain per PGR application
Seed treatment use	Significant associations (but not a simple story!)
Pesticide use	0.6 t/ha more grain per fungicide application. This & yield also associated with no. of insecticide & herbicide applications.
Variable costs & Margins	Estimated growing costs in YEN varied hugely (£120 - £1,200/ha!) but this associated weakly with yield, so Gross Margins linked strongly with yields.

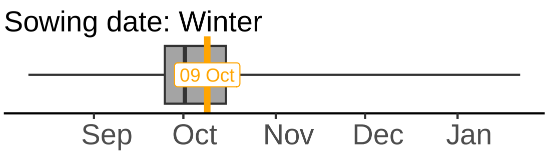


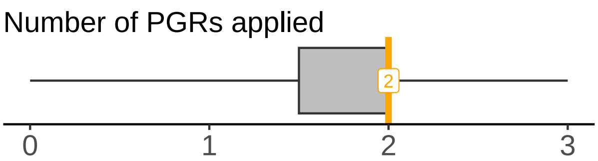


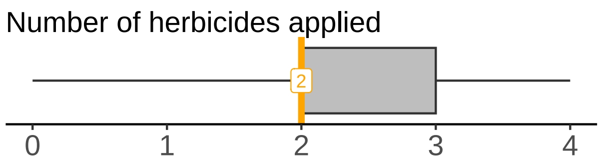


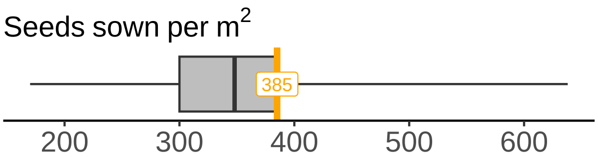


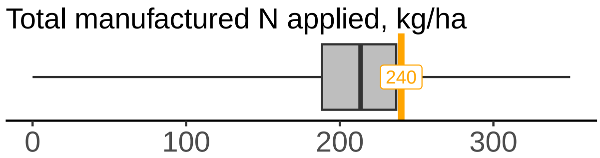
Husbandry factors continued

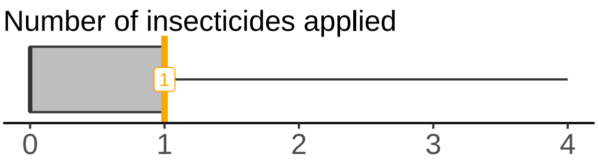


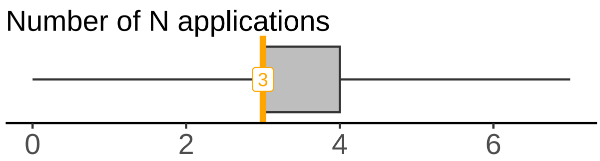


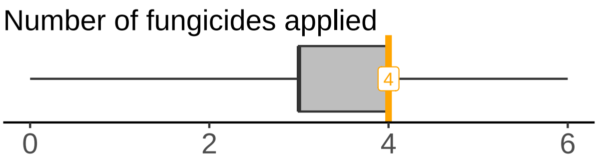


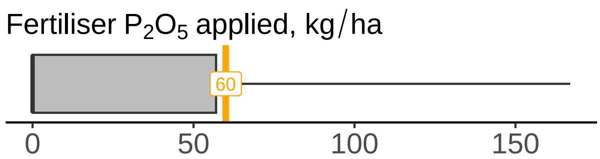


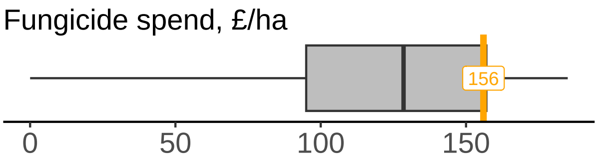


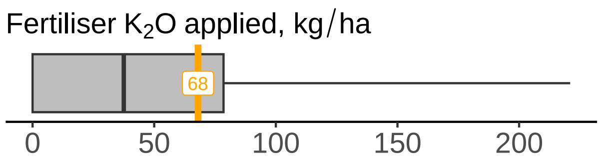


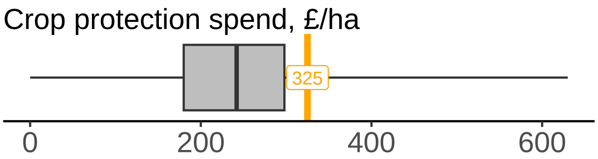


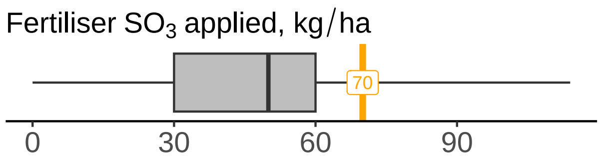


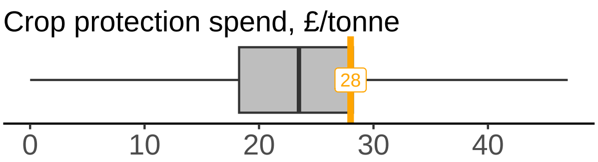










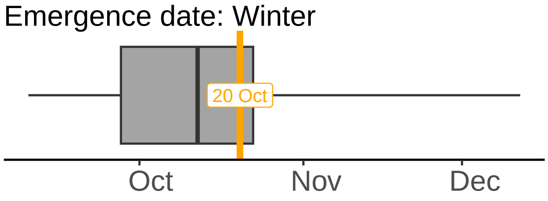


CROP DEVELOPMENT

The following charts show how your entry developed through the 2023-24 season, compared to all other YEN entries and Benchmarks. The cardinal stages of emergence (GS10), start of stem extension (GS31), flowering (GS61) and full senescence (GS87) determine the length of each phase for growth:

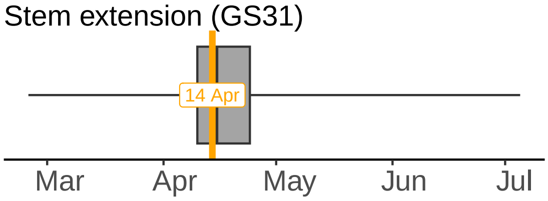
- Foundation, GS10-GS31 – when tillers and main root axes are formed.
- Construction, GS31-GS61 – when most yield-forming roots, leaves, ears and stems (including soluble stem reserves) are formed.
- Production, GS61-GS87 – when grains are filled, both with new assimilates and reserves redistributed from stems.Canopy survival is key to high yields.

Emergence date: Winter



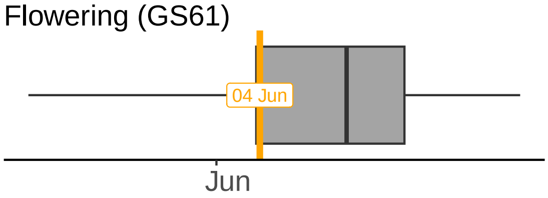
Emergence dates of winter wheats entered in YEN 2024 ranged from September to December but on average sowing and emergence dates were normal.

Stem extension (GS31)



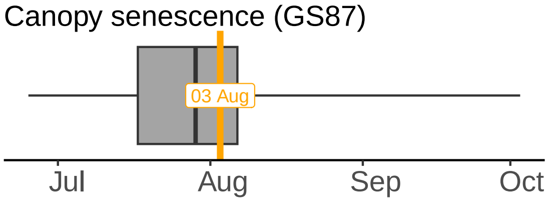
Stem extension triggers faster growth because the stem provides a new sink for assimilates.

Flowering (GS61)



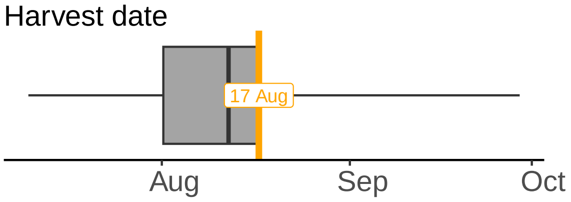
Flowering signals the start of grain formation. Delays in flowering, due say to cold weather after ear emergence, may cause growth to pause.

Canopy senescence (GS87)



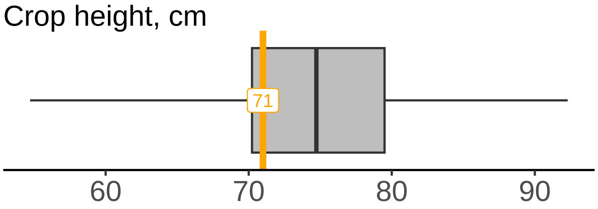
No further growth can occur after the canopy has fully senesced.

Harvest date



Harvest dates are highly susceptible to rain patterns through August & September.

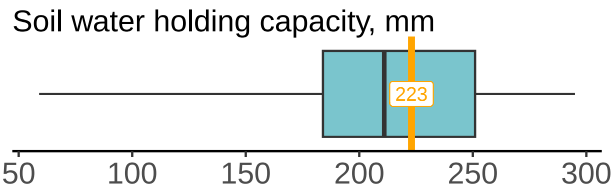
Crop height, cm



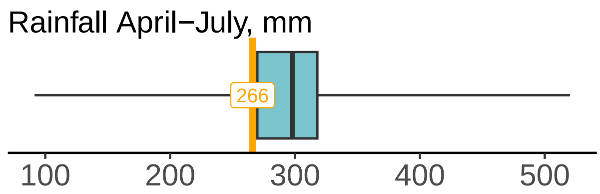
We measure height on the harvest 'grab' samples. We omit measuring samples which look to have been cut above ground level. Taller crops tend to yield better.

Water availability and capture

This page shows how weather this year affected the water available for your crop and other crops entered in the YEN. Water is supplied through the main growing period from concurrent rainfall and also from water stored in the soil. UK soils almost always refill with water over-winter. Water potentially available to each crop through the summer includes all this soil water plus the summer rainfall (April to July).

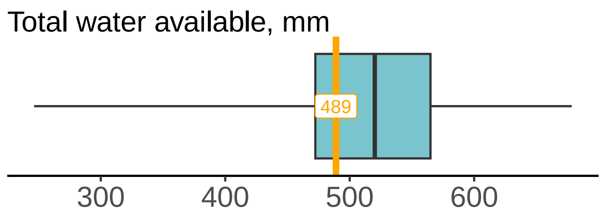


Deep soils hold water to a great depth; we assume roots can access all easily held water (to 2 bar suction) to a depth of 1.5 m (or to rock, if shallower). If enough roots didn't reach to this depth, capture of soil-available water will have been accordingly less.

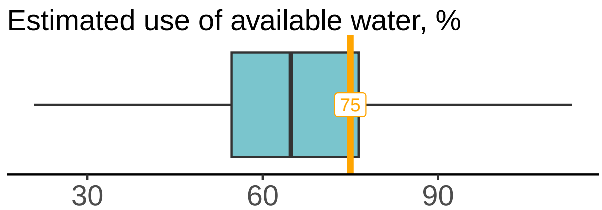


After winter drainage stops, spring and summer rainfall is held in the topsoil until it is evaporated or transpired by the crop's canopy.

Whilst we cannot yet measure water captured by YEN crops individually, by assuming your crop's conversion of water to total biomass was 'normal' (20 mm water for each t/ha biomass formed), we have made crude estimates below of the likely success of your crop's root system in capturing water.



Total water is the sum of your soil's water-holding capacity and your summer rainfall (both shown above).



Small water use will sometimes have been due to less demand for canopy transpiration (e.g. because crop developed faster and matured earlier) or otherwise due to worse rooting.

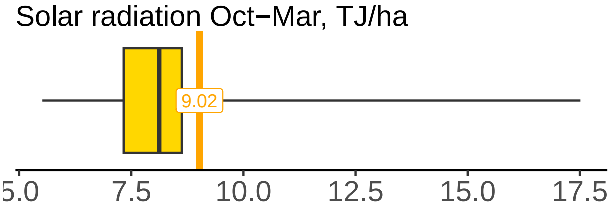
If your estimated use of available water exceeds the total water available, this may be good news! It either suggests that your crop's roots were more efficient than normal, or that your soil description was overly pessimistic: i.e. your soil apparently managed to provide more water than we estimated was possible from your soil's texture, stone content and depth.

A high yielding crop, growing say 20 t/ha of biomass (so yielding 12 t/ha grain at 15% moisture and 51% harvest index), would need to capture ~400 mm water from soil plus summer rain. Given that most of the UK's arable area often receives only 200-250 mm summer rainfall (from April to July), a large proportion of the water for high yielding crops must come from that held in the soil since the winter, mainly in the subsoil.

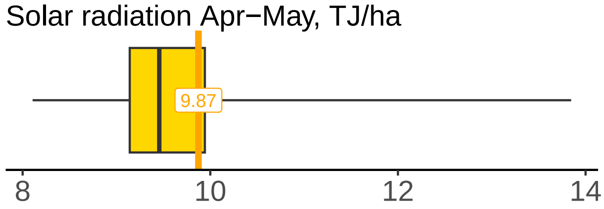
Energy capture

The benchmarking charts below show how weather this year affected light energy available for this entry and other YEN crops. Solar radiation has been divided into periods that roughly equate to the three key phases of crop development reported above:

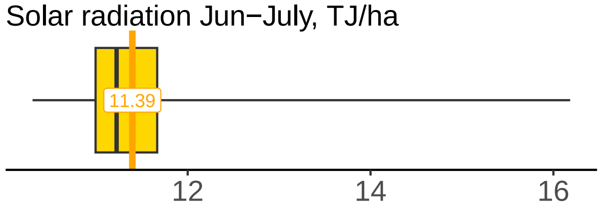
- Foundation – when tillers and main root axes are formed.



- Construction – when most roots, leaves, ears and stems are formed, including soluble stem reserves.

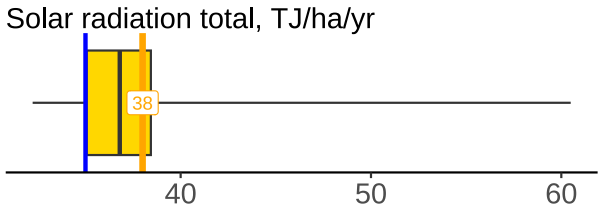


- Production – when grains are filled, both with new assimilates and reserves redistributed from stems.

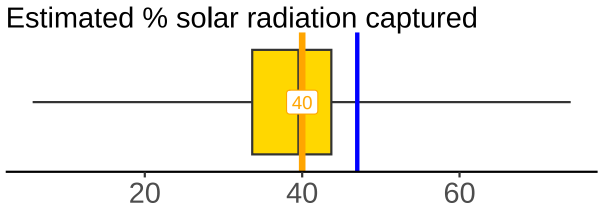


Solar radiation in September last year and August this year has been omitted, because few crops were green during those months, but crops could have achieved greater total biomass, and possibly also grain biomass, if they maintained green canopies during any part of these two months.

Whilst we cannot yet measure light capture by YEN crops individually, by assuming your crop's conversion of light-energy was 'normal' (1.2 tonnes/TJ), we have made a crude estimate below of the likely success of your crop's canopy in capturing total light-energy for the 12 months of this season.



Total solar radiation across YEN entries is generally less in the north and more in the south.

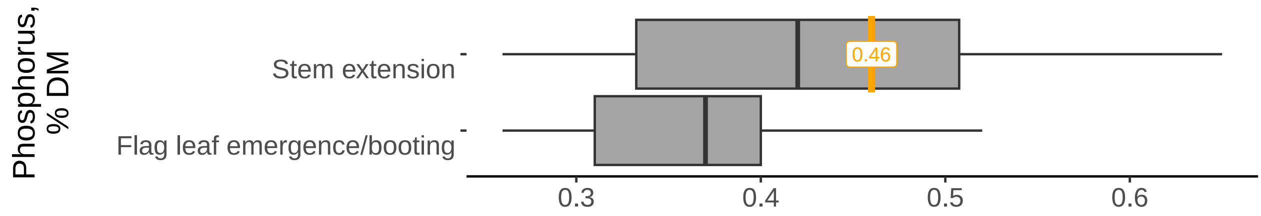


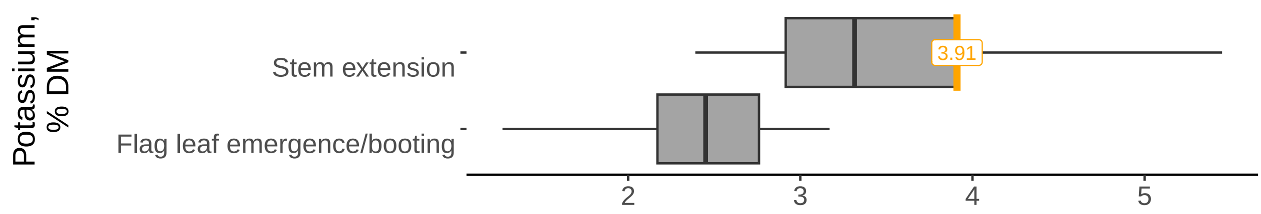
Average light capture tends to be poor if a crop's lifespan is short. The benchmark wheat crop yielding 11 t/ha intercepts 47% of annual solar radiation.

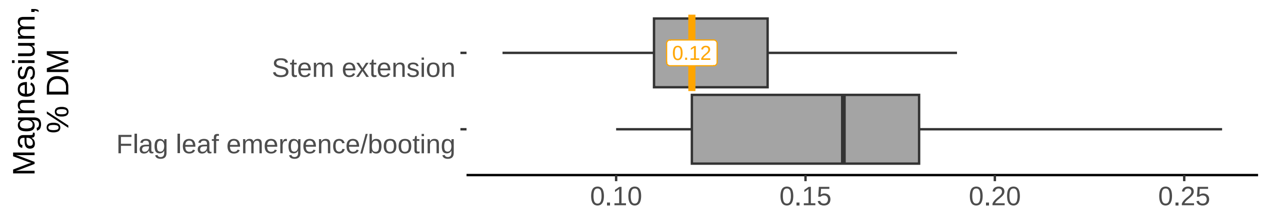
Nutrient capture

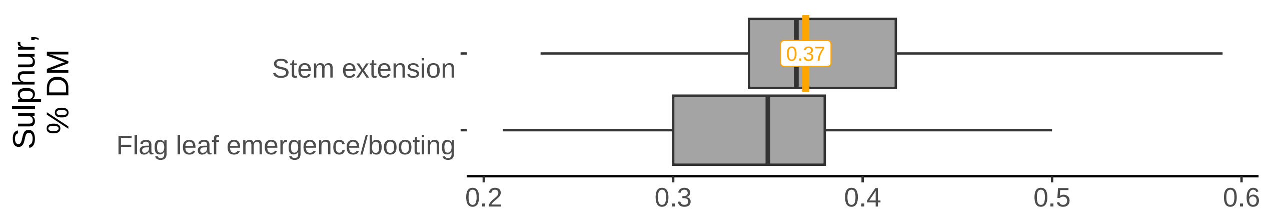
Whether nutrient capture was sufficient to support full conversion of light and water is best deduced from nutrient concentrations in crop tissues – both leaves (next two pages) and grains (later section). No critical thresholds or benchmarks are shown for leaf analyses because these change through a crop's life and are still uncertain. However, the benchmarking diagrams should enable you to compare your crop's levels with all other YEN entries this year, analysed at the same time. If a nutrient result does not appear on the charts, it could be that it exceeds the maximum or minimum limit of detection. Consult your Lancrop report for more info.

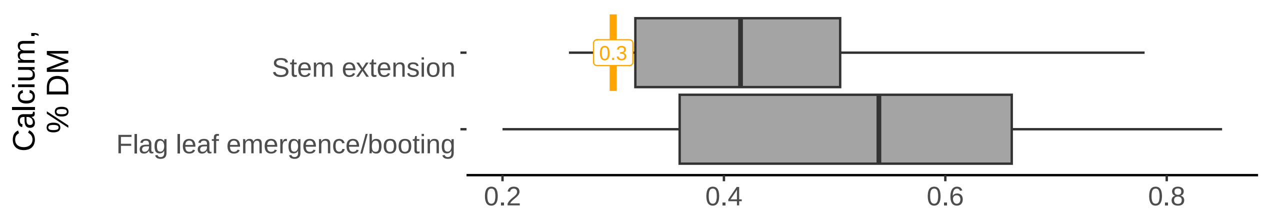
Lancrop Laboratories provide leaf analyses for YEN. Samples are of the newest fully expanded leaf. Leaf N% was not measured in 2024.











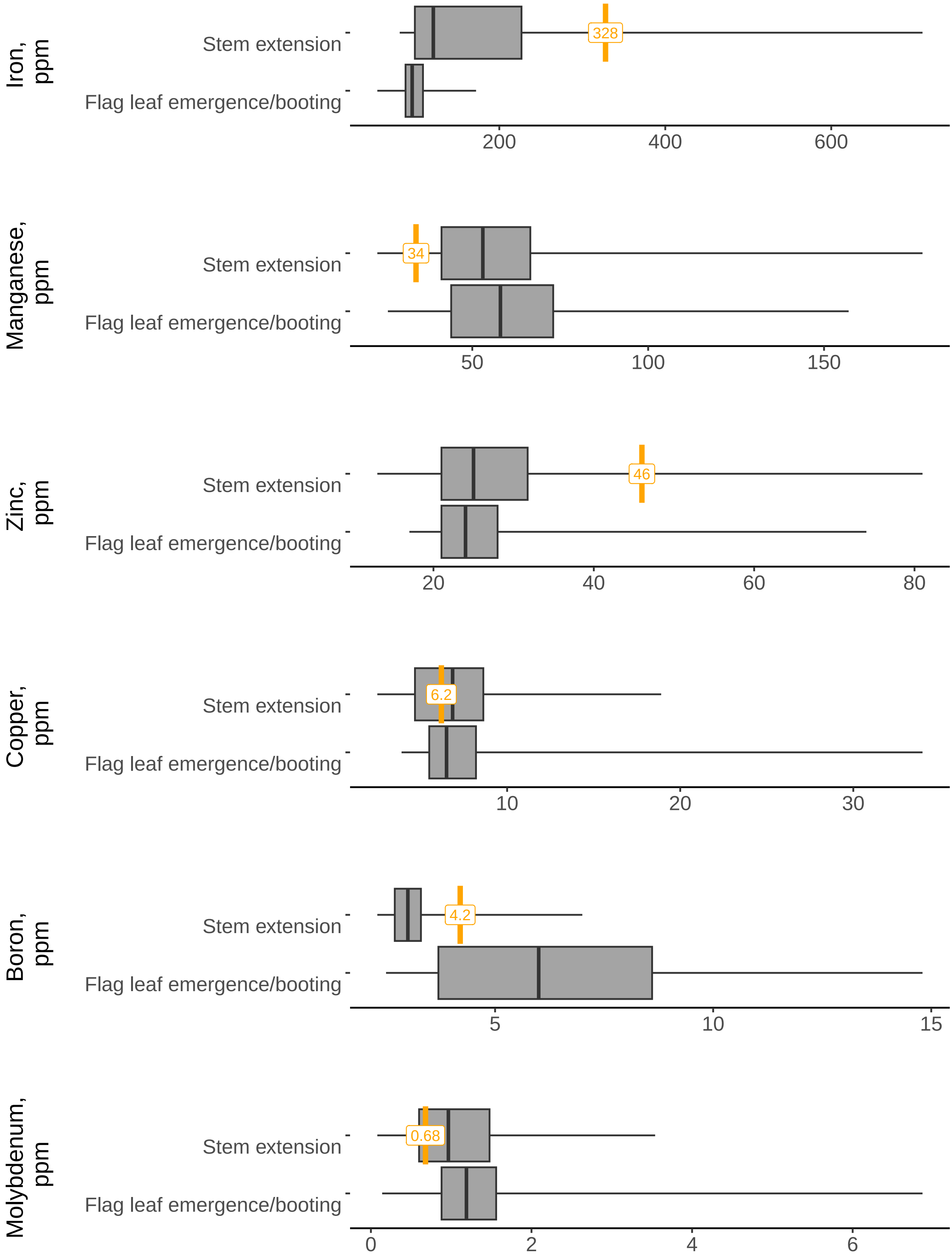
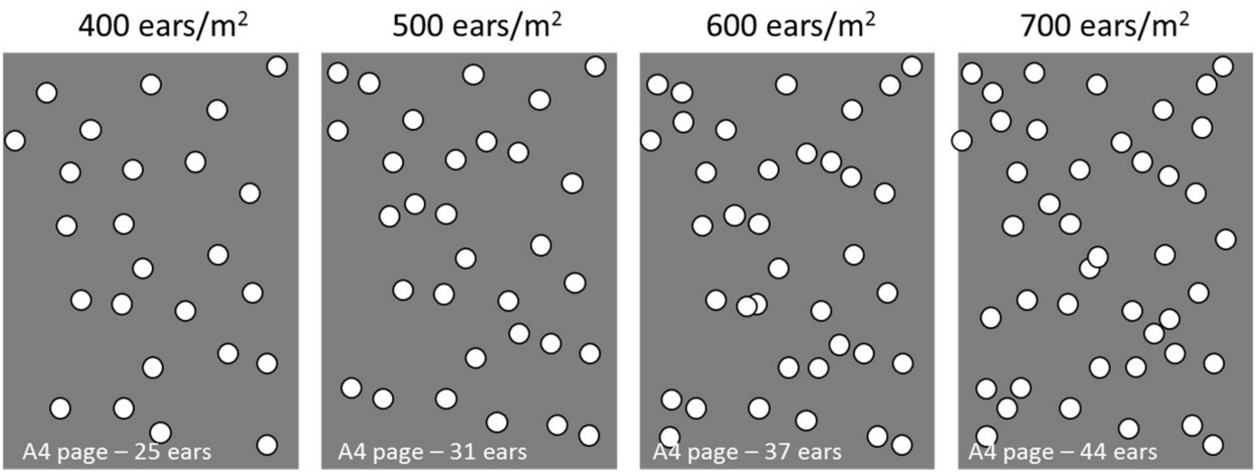

Iron, ppm
Stem extension
Flag leaf emergence/booting
328
200
400
600
Manganese, ppm
Stem extension
Flag leaf emergence/booting
34
50
100
150
Zinc, ppm
Stem extension
Flag leaf emergence/booting
46
20
40
60
80
Copper, ppm
Stem extension
Flag leaf emergence/booting
6.2
10
20
30
Boron, ppm
Stem extension
Flag leaf emergence/booting
4.2
5
10
15
Molybdenum, ppm
Stem extension
Flag leaf emergence/booting
0.68
0
2
4
6

Image of this entry

Images are a very efficient way of collecting lots of information. An overhead photo taken during grain filling gives an impression of canopy size, nutrition and health, as well as providing an independent assessment of ears per m^2 (see diagram below). An overhead photo taken at the start of stem extension is similarly useful.

An A4 sheet of paper in your image can help to assess ear numbers per m^2, as shown here:

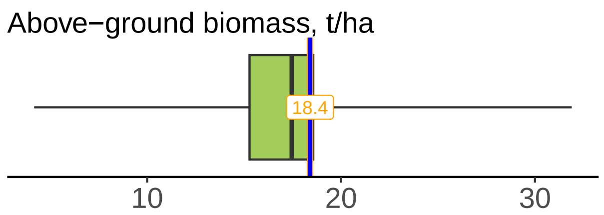


Yield formation

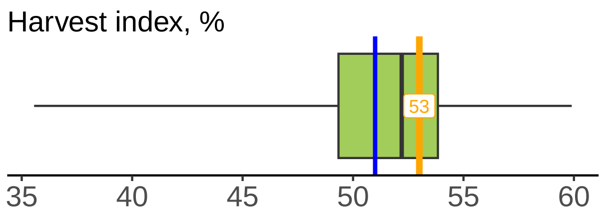
The whole-crop samples that YEN entrants provide all have their components counted and weighed and results are shown in the following charts, assuming that each sample was representative of the whole area from which grain yield was determined. [All area-related values are derived from the validated grain yield.]

Total biomass production indicates the success with which a crop captured its key resources, light-energy and water, and the harvest index (the proportion of total biomass that was harvestable) indicates how this biomass was apportioned to grain. Since grain growth happens last, harvest index also indicates how late growth related to early growth.

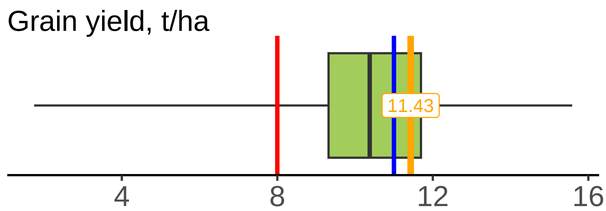
Your grain yield (expressed as t/ha and % of potential) is shown below along with biomass and harvest index, in relation to all other YEN entries and to the AHDB Benchmark grain yield of 11.0 t/ha.



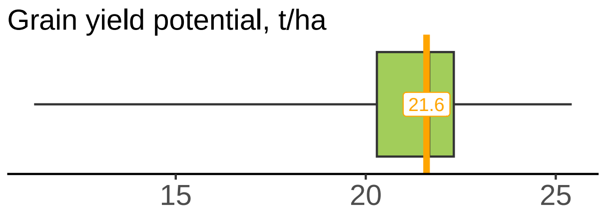
YEN experience has been that high biomass relates to high yields.



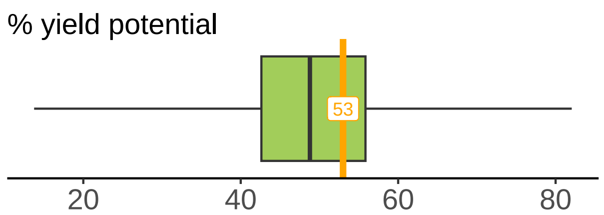
Harvest index is the percentage of total biomass that was harvestable as grain. Years with high fertile shoots tend to have low harvest index.



Yields of less than 8 t/ha can often be unprofitable, depending on prevailing grain prices.



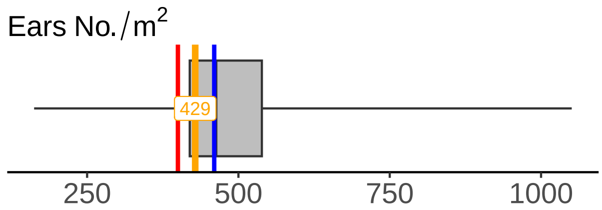
YEN yield potential reflects light energy and water available at your site this year, expressed in t/ha.



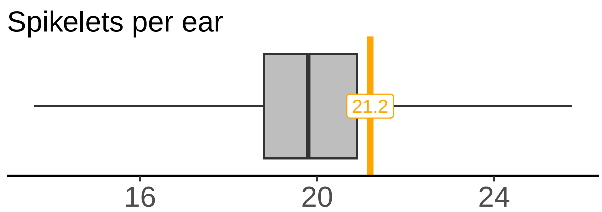
Any YEN entry exceeding 100% of its estimated potential must have found more light or water than was estimated at this site, or must have grown with exceptional efficiency.

Yield components

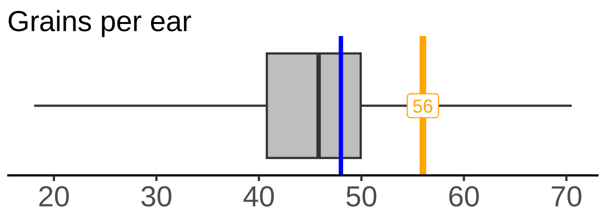
Grab sample analysis tells the story of your crop because the different yield components are determined sequentially, first shoots, then ears, then grains per ear, then grain weight. Comparing your yield components with those of other YEN entrants should indicate the stage(s) through the season at which your crop deviated from others and from normal (represented by the AHDB Benchmarks, blue lines).



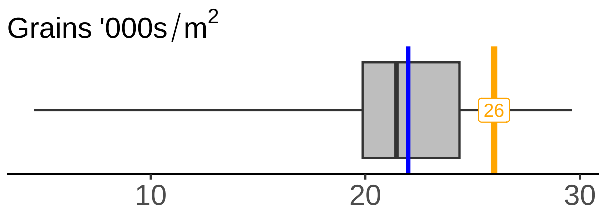
Ears per m^2 depend on plant establishment, then tillering, and then the survival of each shoot during stem extension.



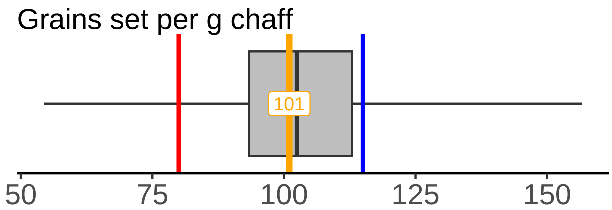
Spikelet numbers are determined between GS30 (ear at 1cm) and GS31 (1st node). Numbers are crucial for barley but not for wheat because wheat is flexible in the number of grains it sets per spikelet.



Grains per ear can be less than normal either through compensation for high ear numbers or if May was dull.



High yields almost always depend on grain numbers per m^2 being high (>25,000/m^2) through combining good ear numbers with adequate grains per ear (above).



High grains/g chaff indicates that conditions around flowering time were good for photosynthesis. Less than 80/g is poor.

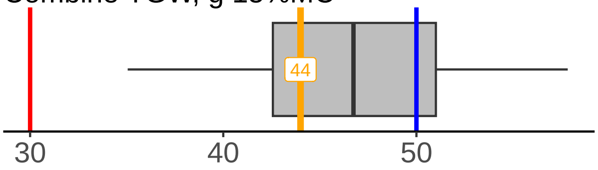
Grain formation and size

We use your combine-harvested grain sample to provide the analysis of grain size and grain filling on the next page. Grain filling depends mainly on photosynthesis after flowering, therefore it largely relies on the health and longevity of the green canopy, but sugars stored in the stem can also provide 2-4 t/ha of assimilates for grain growth and most of the protein from senescing leaves is also redistributed to form grain protein (benchmark 1.1 t/ha).

We have not measured stem sugars in YEN so far, but it is possible to assess them using a refractometer (giving a so-called ‘Brix reading’). Stem storage of sugars depends on shoot numbers and sunshine levels in May being good.

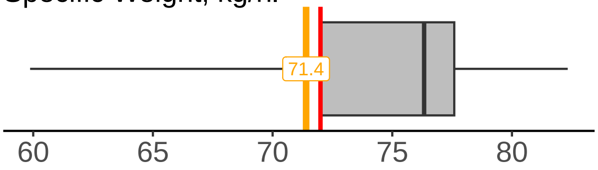
If grain number per m^2 is low (see above), or if conditions during early grain-fill are limiting, final grain filling, hence yield, may be constrained even if later conditions are good – this is sometimes described as ‘sink’ limitation. We try to use analysis of grain volume and grain density to deduce whether crops were sink limited.

Combine TGW, g 15%MC



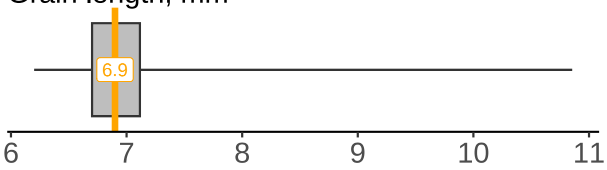
Thousand grain weights (TGW) depend on early grain expansion to set up the potential grain size and then on continuing supplies of photosynthates to replace grain water with starch.

Specific Weight, kg/hl



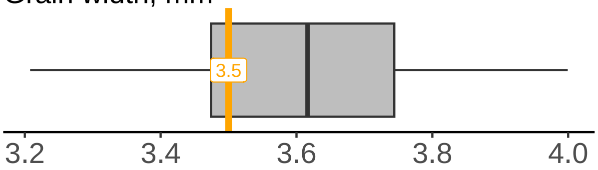
Specific weight is used as a quick indicator of flour extraction and shows weights of bulk grain for storage & transport.

Grain length, mm



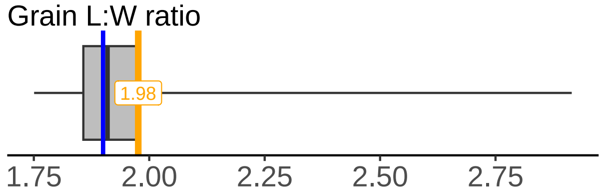
Grain length is set before grain width and tends to indicate potential grain storage capacity.

Grain width, mm



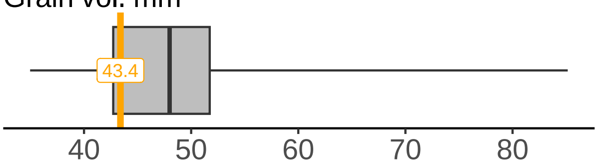
Grain width reflects the success with which grain storage capacity is filled.

Grain L:W ratio



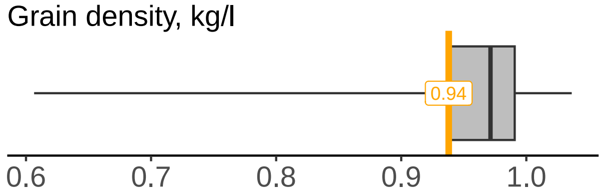
A high grain L:W ratio indicates that assimilate supply for grain filling did not fully satisfy the grains' potential storage capacity.

Grain vol. mm^3



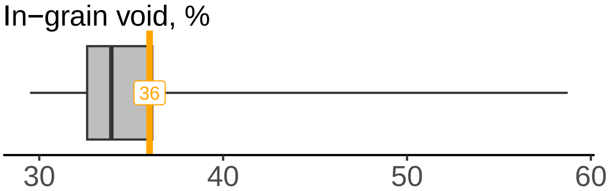
Grain volume here is the product of length and cross-sectional area, assuming grains are ovoid, so this volume includes the grain's 'crease'.

Grain density, kg/l



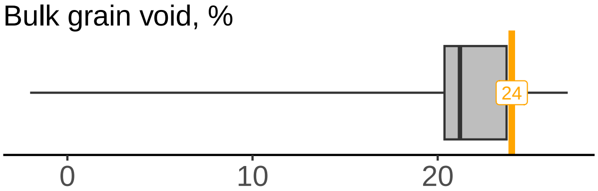
Low density grains indicate that grain filling was not constrained by storage capacity (volume) – so they were not 'sink limited'.

In−grain void, %



The density of starch and protein, the main grain constituents, is 1.47, so it is possible to estimate the proportion of grain volume, including the crease, that was unfilled. Most years have averaged 33% in-grain void.

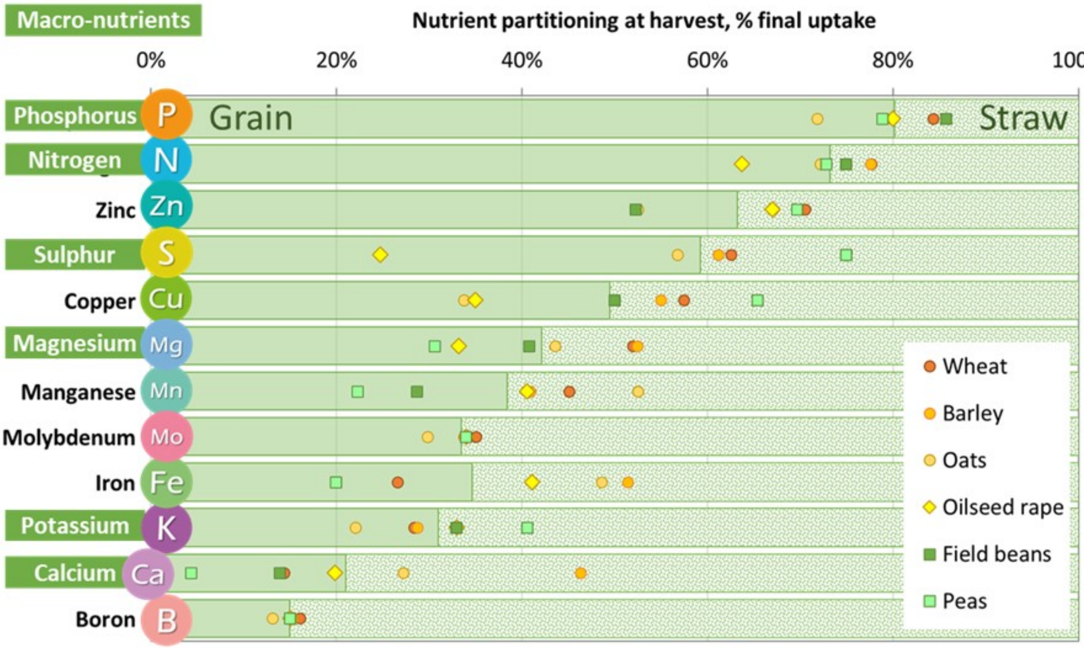
Bulk grain void, %

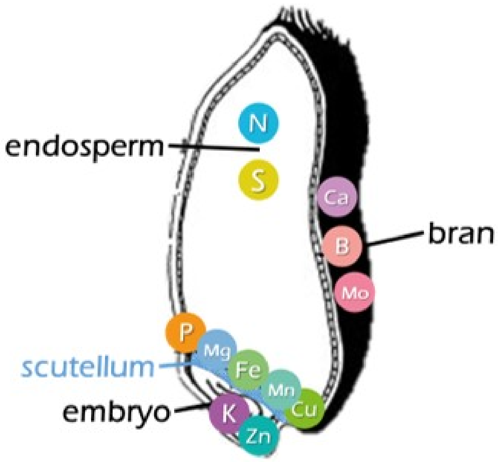


Did you know more than half of a load of grain is air?! High specific weight is achieved by having both dense grains and small voids between grains (under standard packing conditions). Bulk void is affected by grain shape and packing.

The YEN has trail-blazed use of grain analysis to provide overall post-mortems on a crop's nutrition.

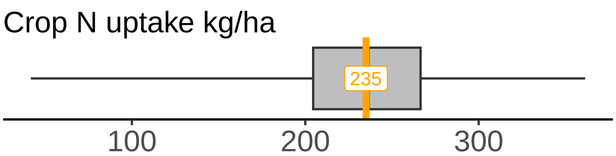
- Results from >2,000 YEN cereal samples suggest that nutrient deficiencies are very common (using the 8 critical values that we know so far); >80% of crops showed deficiencies, and >50% showed two or more deficiencies! Phosphorus (P) deficiency has been most common.
- YEN Nutrition was launched in 2020 to help remedy these deficiencies – see further details here
- Crop nutrients differ in how they are shared between grain and straw at harvest. The graph below shows how different crop species store most of their N & P in the grain but most of their K in the straw (as estimated from analyses of feed materials).



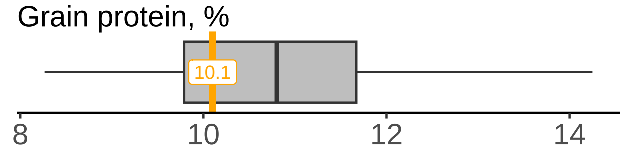


A wheat grain showing where each of the 12 essential nutrients is most concentrated.

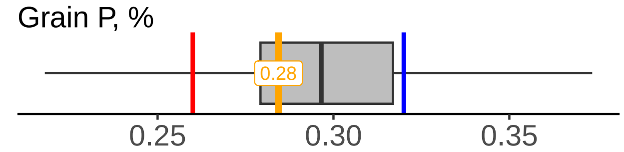
- We use YEN-low values (i.e. lower quartiles from all past YEN data as comparators (red lines) for all nutrients in all crops. We find YEN-low values to be very similar to known critical thresholds of N, P, S and Mn in wheat, as well as to less certain critical values of K, Mg, Cu & Zn, so we use them for all nutrients in all crops.
- The following benchmarking-charts and YEN-low values (denoted by the red line) provide the best means of identifying the nutrient(s) most likely to have limited your crop.
- Critical grain protein (or N% x 5.7) levels are variety-dependent so it's best to compare your value with the value reported in the AHDB Recommended List for that variety (see page 7). If the observed protein level is significantly less or more than the RL value, we take this to indicate that this crop was under- or over-supplied with nitrogen.



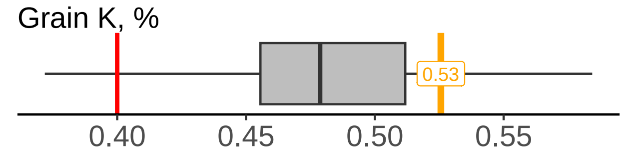
Total crop N uptake can be useful in judging the efficiency of your N management. NB: a typical wheat crop captures ~60 kg/ha N from the soil plus 60% of its fertiliser N.



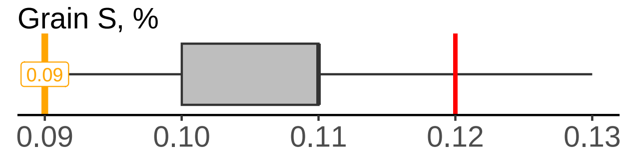
Protein (N% x 5.7) similar to a variety's protein value given on the AHDB RL (see page 7) indicates optimal N nutrition. Less or more indicates deficiency or excess.



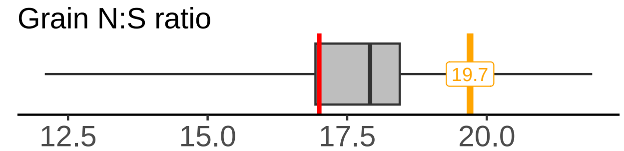
YEN-low values are much less than the critical value shown by recent research (0.32%), suggesting the difficulty of ensuring good P supply and capture.



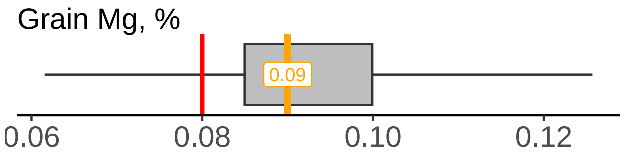
RB209 assumes a standard of 0.54% potassium (K) in grain. Less than 0.38% indicates a need for further checks on K nutrition, especially by soil analysis but also by analysing leaves or straw (see page 13).



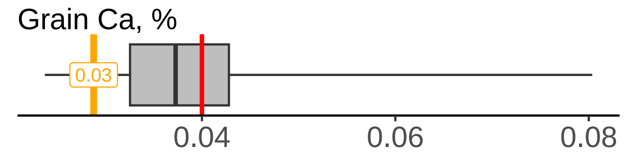
S is required in proportion to grain protein formation (especially for gluten). Milling varieties need more sulphur than feed varieties.



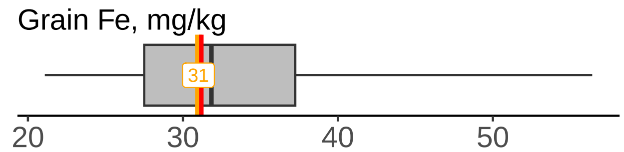
A high N:S ratio (greater than about 17) indicates the crop was affected by sulphur deficiency.



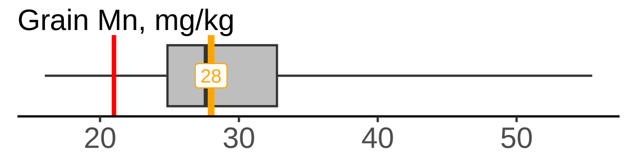
YEN data from previous years show higher grain Mg (& grain K) in brighter summers.



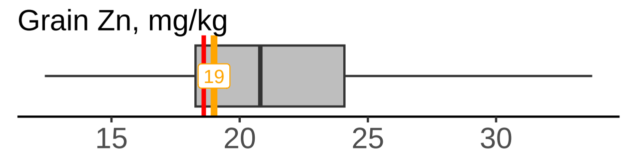
Calcium nutrition relates to the crop's use of water. However, almost all the crop's calcium remains in the straw at harvest, so we are yet to learn whether grain calcium can tell us about the crop's water status.



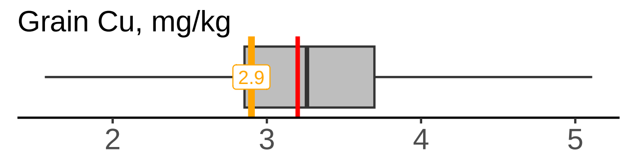
We currently have no guidelines for grain iron (Fe) interpretation. Average Fe has been around 40 mg/kg in previous years of YEN.



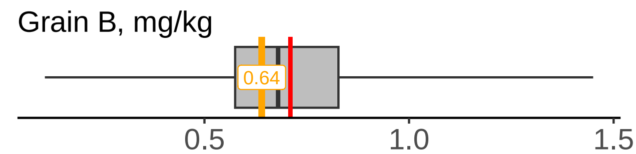
Literature shows low manganese (Mn) values in grain are <20 mg/kg. If crops show low grain manganese, leaf Mn should be checked – see Page 13.



Zinc (Zn) deficiency has been rare in YEN crops. Values below 15 mg/kg are considered deficient. Grain zinc appears to inter-relate with nitrogen availability.



Grain copper (Cu) less than 3 mg/kg may be too low. Few YEN samples have been this low.



Most Boron is kept in the straw at harvest. YEN grain boron values have varied hugely with season, so leaf analysis may best indicate boron sufficiency.

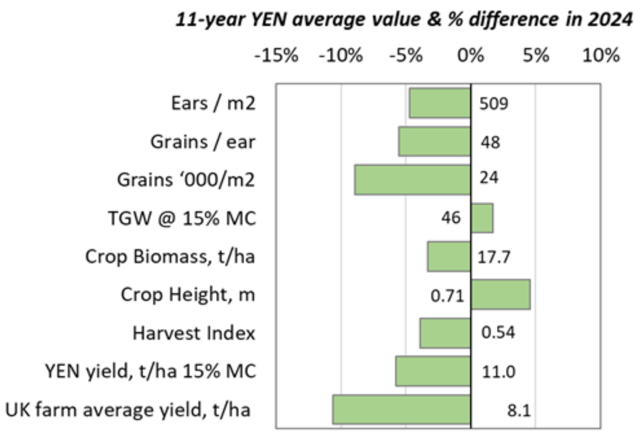
The 2023-24 competition:

- Many congratulations for providing the information necessary to complete this report; the collective efforts of all YEN contributors serve to maximise the value of what can be reported and the deductions that can be made for everyone – we call this approach 'learning by sharing' and believe that the whole industry would benefit by making this approach their normal practice.
- YEN crops come from all over the UK, and 28% came this year from across Europe including from Poland, Denmark, France & Germany. All these data are invaluable; the more data we have, the more robust and confident we can be in the comparisons we make, both when 'benchmarking' and when analysing associations within the whole set of data.
- The winning field yield in 2024 was 15.6 t/ha (again in Lincolnshire). As each YEN year passes and as more YENs develop, we are increasingly struck by the farm-to-farm differences; some farms are consistently achieving high yields, and several farms have achieved YEN Awards over several seasons. It is evident that a 'farm factor' is playing a big part in governing yield levels. This gives real value to being a YEN participant – through having an opportunity to compare with and learn from others who consistently perform very well.
- Estimated UK farm average yields in 2024 were ~10% less than the 11-year average for winter cereals, but only slightly low for oats. Winter cereals in YEN showed smaller yield decreases than the UK farm averages and spring cereals showed increases (although numbers of entries were small). Once again, YEN yields of all cereals far exceeded farm averages:

Cereal yields in 2024	Winter wheat	Winter Barley	Spring Barley	Oats
Defra farm yield estimate, t/ha	7.28	6.36	5.74	5.41
Change from previous 11 years	-11%	-9%	0%	-2%
Average YEN yield in 2024, t/ha	10.39	8.37	10.22	7.75
Change from previous YEN average	-5%	-9%	+39%	+13%

- Over all twelve years of the YEN, high yields associate with high ear numbers and high total biomass; the latter is more important than harvest index in explaining yields. Hence the importance of striving for good light and water capture.

- In 2023-4, although establishment was generally satisfactory, poor overwinter and spring conditions depleted nutrient availability so that numbers of ears and grains were low, and although grain growth compensated in the bright June, disease proved difficult to control and thus final biomass and harvest index were both low, leading to a disappointing grain yield with poor quality.
- Overall, after a promising start, wheat crops in 2024 encountered wet, warm and windy conditions. Although their potentials were as good as ever, clairvoyance would have been needed to pre-empt all of their nutritional and biotic challenges.



Comments on the next page are generated automatically from your data, with the aim of highlighting particular features of your crop which may point out routes to yield-enhancement on this land in future.

SPECIFIC COMMENTS ON THIS ENTRY

Resource capture, growth and yield:

- High YEN yields have generally been associated with high biomass production. Your yield arose from a normal total biomass and a high harvest index.

- Our target for annual light interception by annual crops (whether sown in autumn or spring) is 60% compared with 40% achieved by this crop.

- Your crop is estimated to have a specific weight of 71 kg/hl. Less than 72 kg/hl is poor, indicating increased transport costs and poor flour extraction.

Crop Nutrition:

- Uptake of 180 kg/ha is required to build a canopy that fully intercepts light. However, beyond yield of 9 t/ha, an additional 23 kg N/tonne is needed to form grain protein. We estimate that uptake of 236 kg/ha of N was required for your crop, compared with the 235 kg/ha taken up.

- Your grain is estimated to have had 0.28%P. Less than 0.32% indicates a need for further checks on P nutrition.

- Your grain is estimated to have had an N:S ratio of 20. Ratios greater than 17 indicate that the crop probably suffered from sulphur deficiency.

- Your grain is estimated to have had 2.9 mg/kg Cu. Less than 3.2 mg/kg indicates that copper uptake was probably limiting.

YEN Zero connects growers and stakeholders in sharing data and testing ideas to reduce greenhouse gas (GHG) emissions from crop production. To join the network, and benchmark GHG emissions from your fields, fill out the webform on the YEN Zero webpage and we will contact you.

YEN Nutrition provides multi-field, multi-crop grain nutrient analysis and benchmarking to guide crop nutrition and input strategy across the farm. To order your YEN Nutrition pack for 2024 seed/grain samples please visit – https://yen.adas.co.uk/yen-nutrition-signup and we will contact you.

YEN Dynamic Benchmarking is a free tool to help any current or past YEN entrant compare their YEN results across farms, fields, crops, and years, so they can improve their future decision-making. Data from 2024 will be available from March '25.

Imagine a library where you can also meet the authors and experts in their respective fields – this is what we want to facilitate in FarmPEP.FarmPEP aims to provide easier access to the latest research and best practices as well as to experts who can benefit you. Access the site FarmPEP.

IPM NET is a free farm research network to improve and promote IPM, through updates, events & IPMNET Hubs. Use the QR code to join. Click to register for upcoming free IPMNET Conference 2025, 13 February 2025 (here) and IPMNET BYDV Hub Webinar on 29 January 2025 (here).

The NCS project aims to unlock the benefits of pulses in UK agriculture. Farmers can baseline their farms through the Farm Carbon Toolkit and, as Pulse Pioneers, can be paid to run pulse field trials, monitored through YEN.

The LegumES project seeks to increase legume cropping and consumption by showing the wider benefits of legumes. Participatory Farmers are being recruited with financial support to test benefits in farm trials. Anyone interested should email Thomas.Wilkinson@adas.co.uk.

CONTACTS

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Or email yen@adas.co.uk for general enquiries.

@adasYEN

YEN SPONSORS

The YEN was initiated by industry and is entirely industry funded. We are most grateful to all our sponsors. They not only provide funding but they are fundamentally involved in management of the YEN and in supporting individual farms in making their YEN entries. The YEN would not exist without them!

Visit www.yen.adas.co.uk for sponsors' details, news updates and to register for 2025.