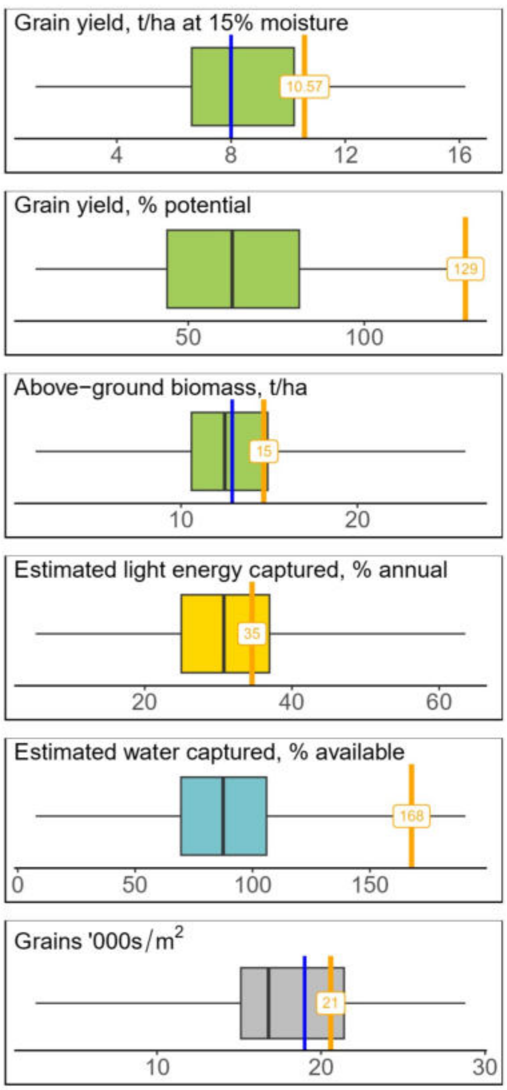
Entrant's Report
Harvest 2022

YEN User ID: [redacted]
Entrant name: [redacted]
Main contact email: [redacted]
Sponsor/supporter: [redacted]
Sponsor/Supporter email: [redacted]

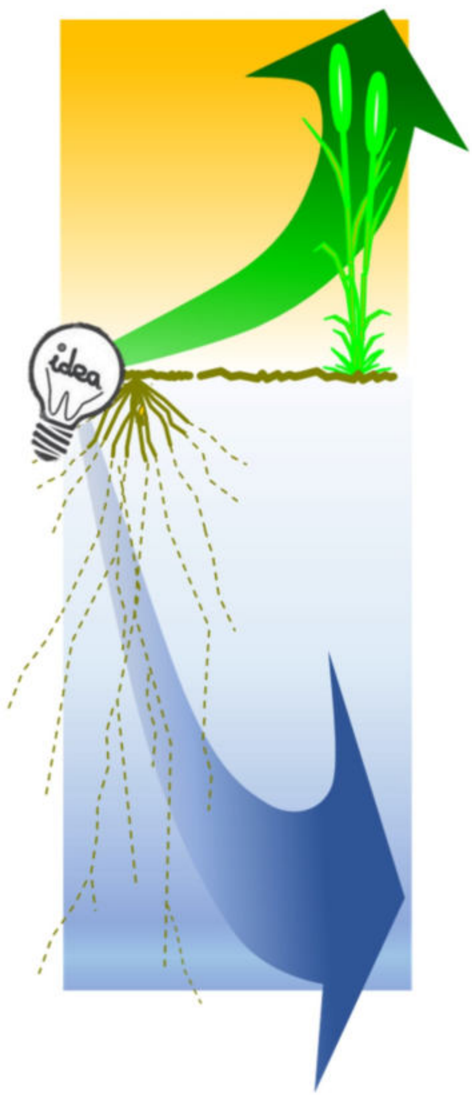
Field/Site name [redacted]
Location: [redacted]
Incident energy 2021-2022: 35 TJ/ha
Available water: 175 mm
Crop: Spring Barley
Variety: Laureate

SUMMARY: Barley YEN entries were completed from 41 fields in 2022. Headline results for your entry are shown in benchmark diagrams below. Your yield of 10.6 t/ha ranked 8th within all barley YEN entries. This represents 129% of its estimated yield potential of 8.2 t/ha, which ranked 1st within all barley YEN entries this year.



Barley yield rank: **8th**

Barley potential yield rank: **1st**

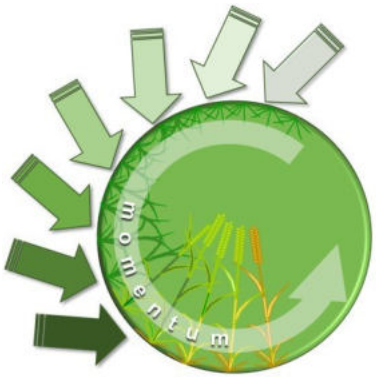


CONTENTS

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 Barley Growth Guide, AHDB Nutrient Management Guide (RB209) and the Teagasc Barley Guide. 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 to consider yield potentials and growing conditions for crops grown in this season, then the conditions of your crop, its development, its basic resources (light energy, water and nutrients), 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 benchmarking diagrams in this report only include the data set submitted by the YEN data submission deadline. Reports produced using data submitted after this deadline show an entrants value in comparison to this previously referenced data set.



"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

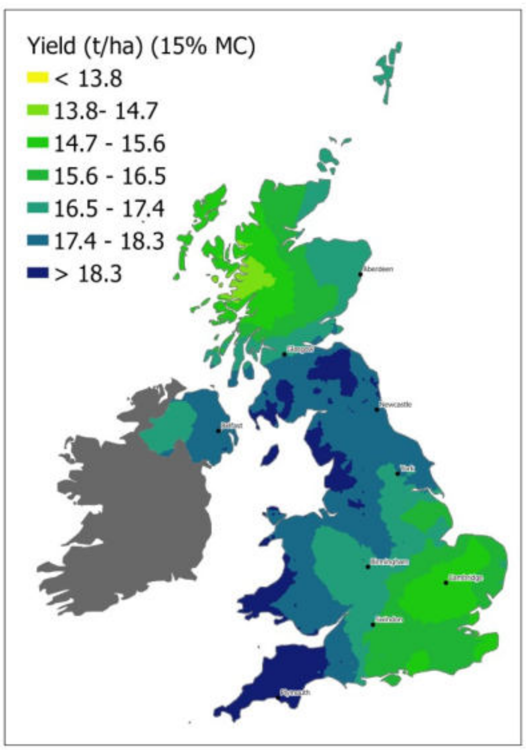
(ii) **Capture all of the available water (winter barley) or 75% of the available water (spring barley)** held in the soil to 1.5m depth (or rock if less) plus all rainfall from April to July, and conversion of each 18mm into a tonne of biomass per hectare.

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 average temperatures for the UK, and no damage from waterlogging, frost, heat, or lodging.

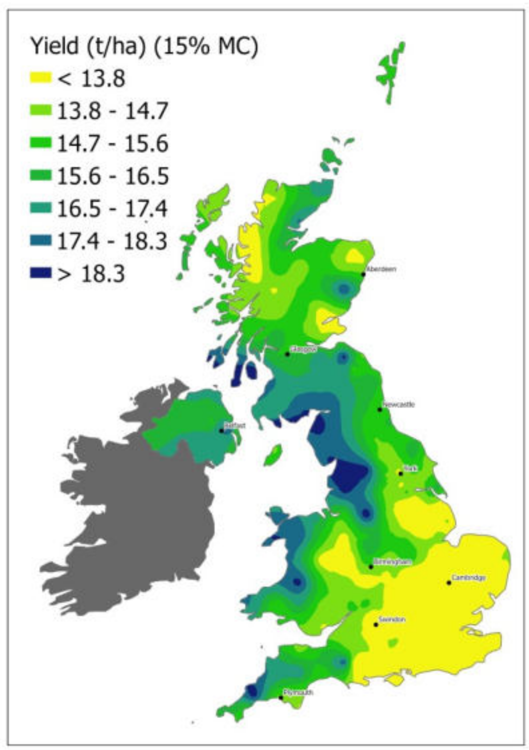
The maps below show the potential grain yields for autumn and spring sown crops (i.e. before or after 1st Feb) on retentive soils this season. For this we assume deep soils with no irrigation. They ranged from 12 t/ha upwards so, on most soils, high yields were theoretically possible almost everywhere.

2022 Potential yields

Autumn sown on retentive soil (260 mm AWC)



Spring sown on retentive soil (260 mm AWC)



We are using weather data from DTN™ this year. Note we do not have long term met data from DTN so cannot show a map of long-term average yield potentials.

SEASONAL GROWING CONDITIONS

The adjacent graphs show the monthly temperatures, rainfall and solar radiation for your area in 2022 compared to your regional long-term average (LTA), and the average for all UK arable areas (1981-2010, from the Met Office).

In most parts of the UK, weather and soil conditions in autumn 2021 were favourable for establishment with above average temperatures recorded during September and October. Most winter barley crops were drilled according to plan and emerged quickly. Pre-emergence herbicides were applied in a timely fashion with good conditions.

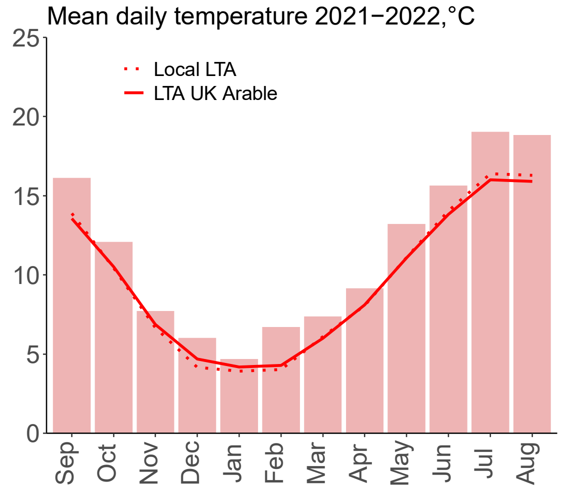
The winter was dry and relatively mild with mean temperatures 0.5-2.5℃ above average in December and February resulting in crops continuing to grow slowly throughout the winter months. Whilst aphid numbers were higher in some regions in the Autumn, this did not result in a significant number of crops displaying BYDV symptoms.

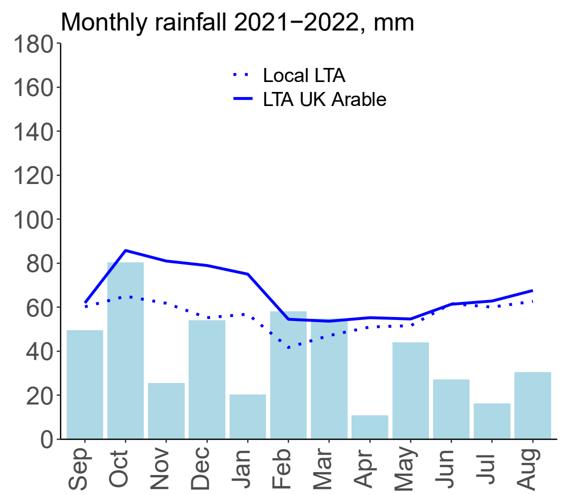
Spring conditions were favourable for early spring barley establishment with above average temperatures throughout much of February, March and April. However, rainfall was below average from March to August and the very dry conditions in April made later spring barley establishment more challenging. The cooler conditions resulted in poorer emergence of spring weeds in established winter crops and emerging spring crops. Where pre-emergence herbicides were applied to spring barley, they generally showed poor efficacy due to the weather conditions.

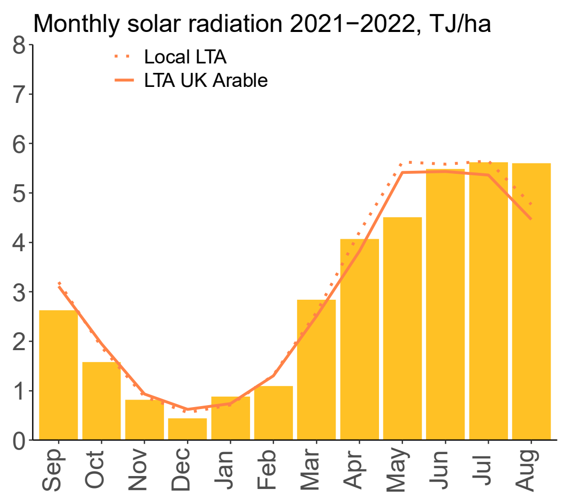
The lack of rainfall also contributed to increased tiller loss in some winter crops and reduced tillering in spring crops. Timing nitrogen (N) applications was not straightforward, and in many situations there were delays in nutrient uptake due to the dry conditions. This contributed to late secondary tillering when rain arrived in May that proved problematic later in the season. On a positive note, the dry conditions resulted in limited development of foliar disease in most barley crops, with any disease present in higher pressure situations adequately controlled by commercial fungicide programmes. The incidence of lodging was also low.

Warm temperatures in June and early July, as well as a particularly dry July, resulted in an exceptionally early harvest and low grain moisture content with the winter barley harvest beginning in early July and spring barley harvest beginning in mid-July.

In general winter barley yields were above average and, despite the dry spring conditions, grain numbers were not low. Nationally, spring barley yields were also above average, however low plant populations or compromised tiller production or retention, meant yield potential was restricted in some crops, particularly on light soil types.

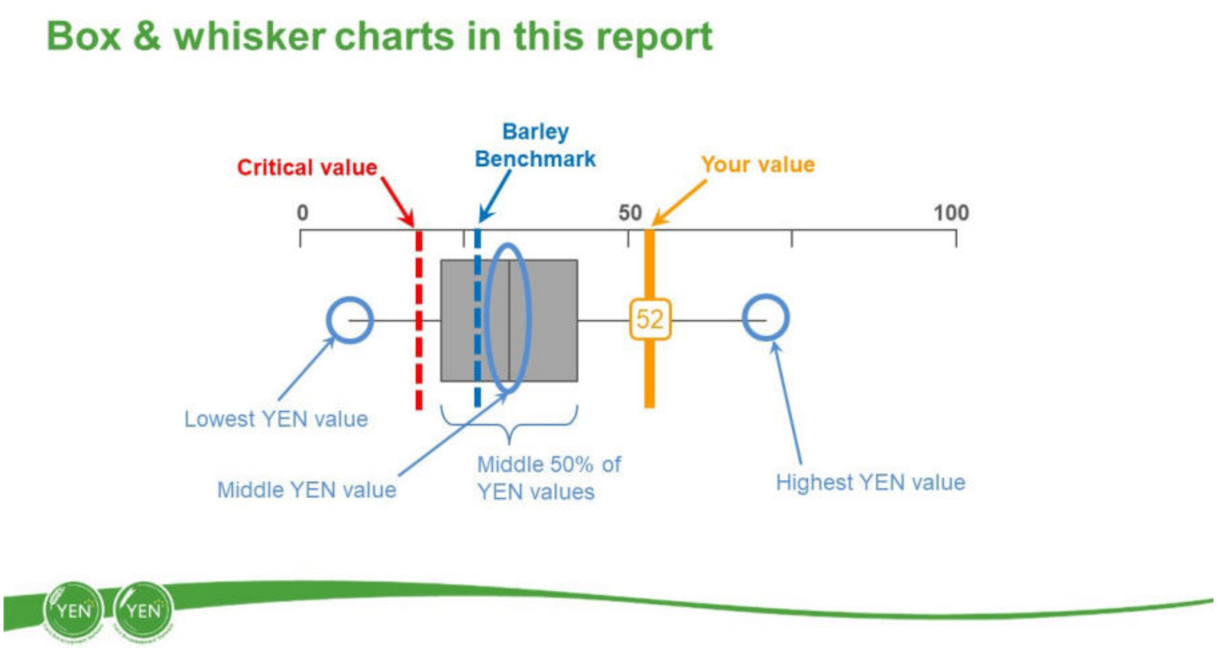






YEN Benchmarking charts – What do they mean?

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 this season whilst the grey box shows the middle half of YEN 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 lines indicate the benchmark value, and this will be specific to whether your crop was a winter or spring crop. These benchmarks are taken from the AHDB Barley Growth Guide or from the Teagasc Spring Barley Guide. The Teagasc guide is based on data collected through a detailed programme of assesments which was carried out on replicated field plots of a two-row spring barley variety (Quench) at three sites (Carlow, Wexford and Cork) in Ireland from 2011-2013. "Benchmarks" have been taken from the Teagasc guide in instances where data was not available from the UK. The average yield of these benchmark crops was 8.3 t/ha, and as such these shouldn't be used as targets, but more as indicators of the characteristics of these crops. Benchmarks taken from the Teagasc Spring Barley guide are indicated witha an * next to the text. For some parameters, the dataset is very small, so please treat results with caution.
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.

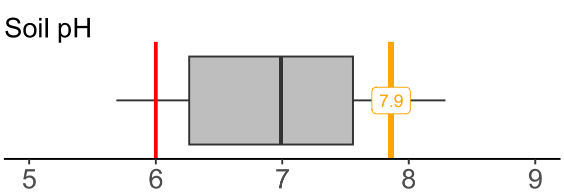
Soil description and nutrition analysis

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.

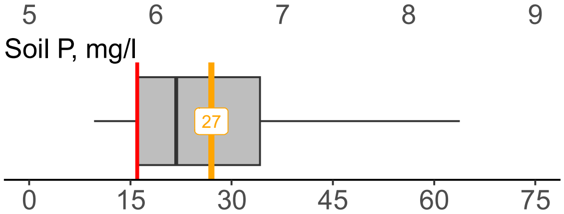
Good soil descriptions are vital in allowing us to estimate soil water holding capacity and, along with summer rainfall, the water available to your crop (see Benchmark charts in the section on 'Resources & their Capture').

Topsoil analyses provided by NRM also tell us about soil status for pH, P, K and Mg, as reported on the next page. 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.

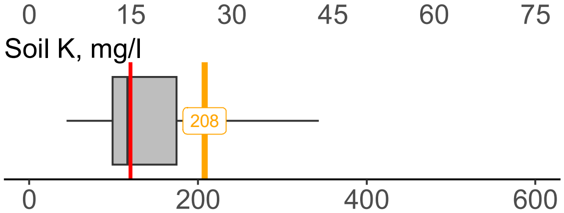
Soil analysis



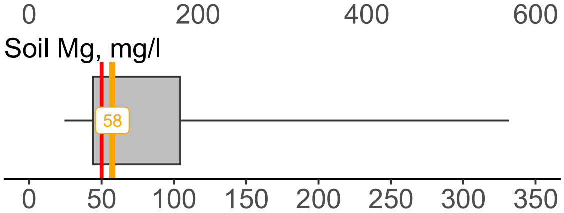
Soil pH <6 is acid. High pH soils may require that special attention is paid to phosphorus (P) and micro-nutrient levels in leaf and grain (see later).



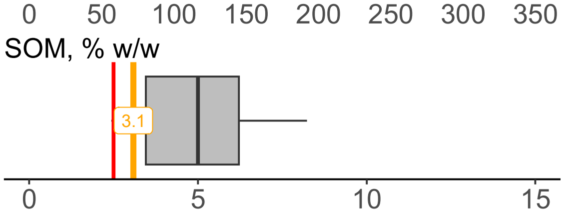
Only a small difference separates P Index 0 (<=9) and 2 (>=16). High yields are possible at P index 1 but fresh P is also usually required. Use grain P (see page 21) to check if P was sufficient.



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.



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.



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.

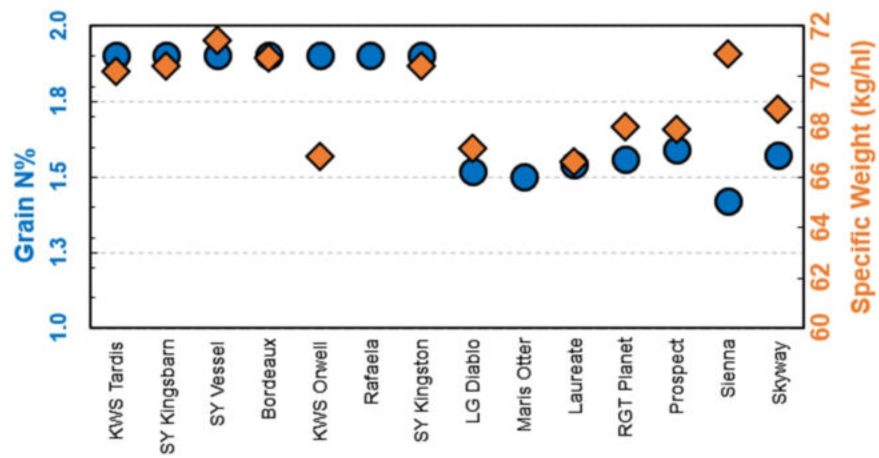
This section considers how your variety and husbandry decisions related to others entering the YEN this year. The spring barley and winter barley databases are growing, but it is too early to analyse the data comprehensively. Note that the multi-year YEN dataset, which comprises of mostly wheat crops suggests that individual effects on grain yield of variety choice or husbandry decisions 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 frm the best performing farms. In summary, we are concluding that:

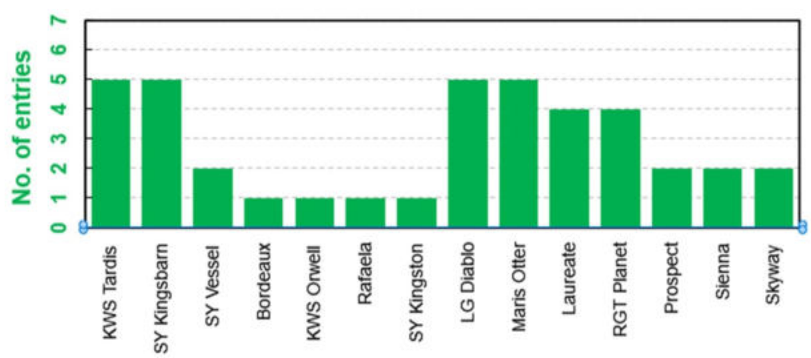
- **High yields** are not restricted to just one part of the UK.
- **Attention to detail** is important
- **Large yields come from large crops**. . . i.e. taller with more fertile shoots
- **Best yielding seasons** had dry, bright autumns and winters, bright springs and cool summers
- **Good nutrition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

The following charts show how the husbandry of your entry related to all other YEN entries in 2021-22 season.

Variety

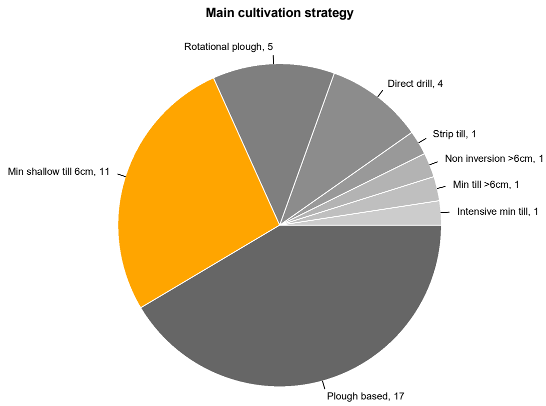
Barley YEN entries this season included 15 different varieties. The graphs below indicate the array of specific weights and grain N contents seen in Recommended List varieties, which are important to consider based on the crop's end market.

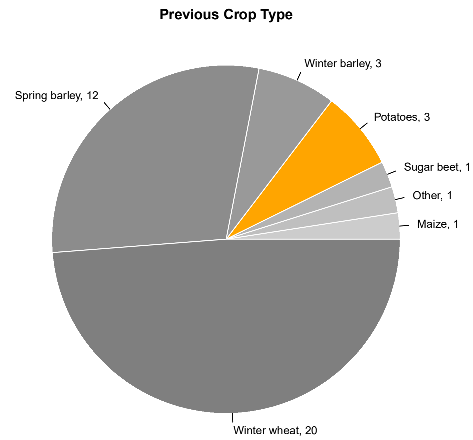


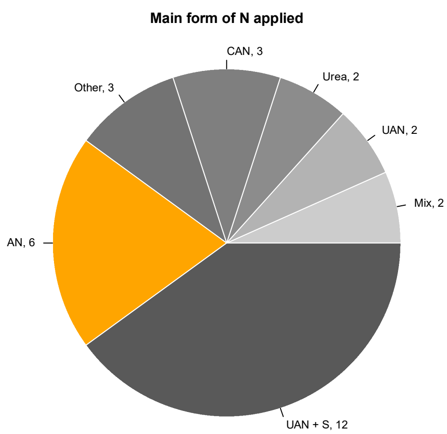


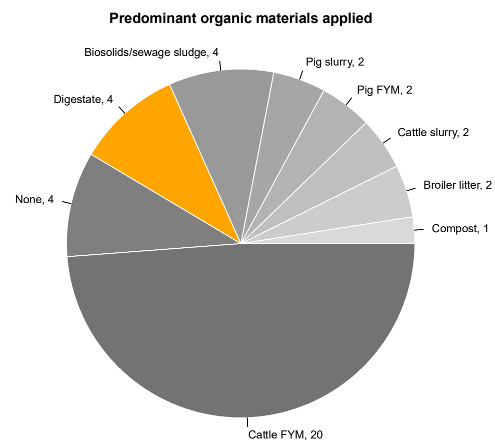
Husbandry

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.

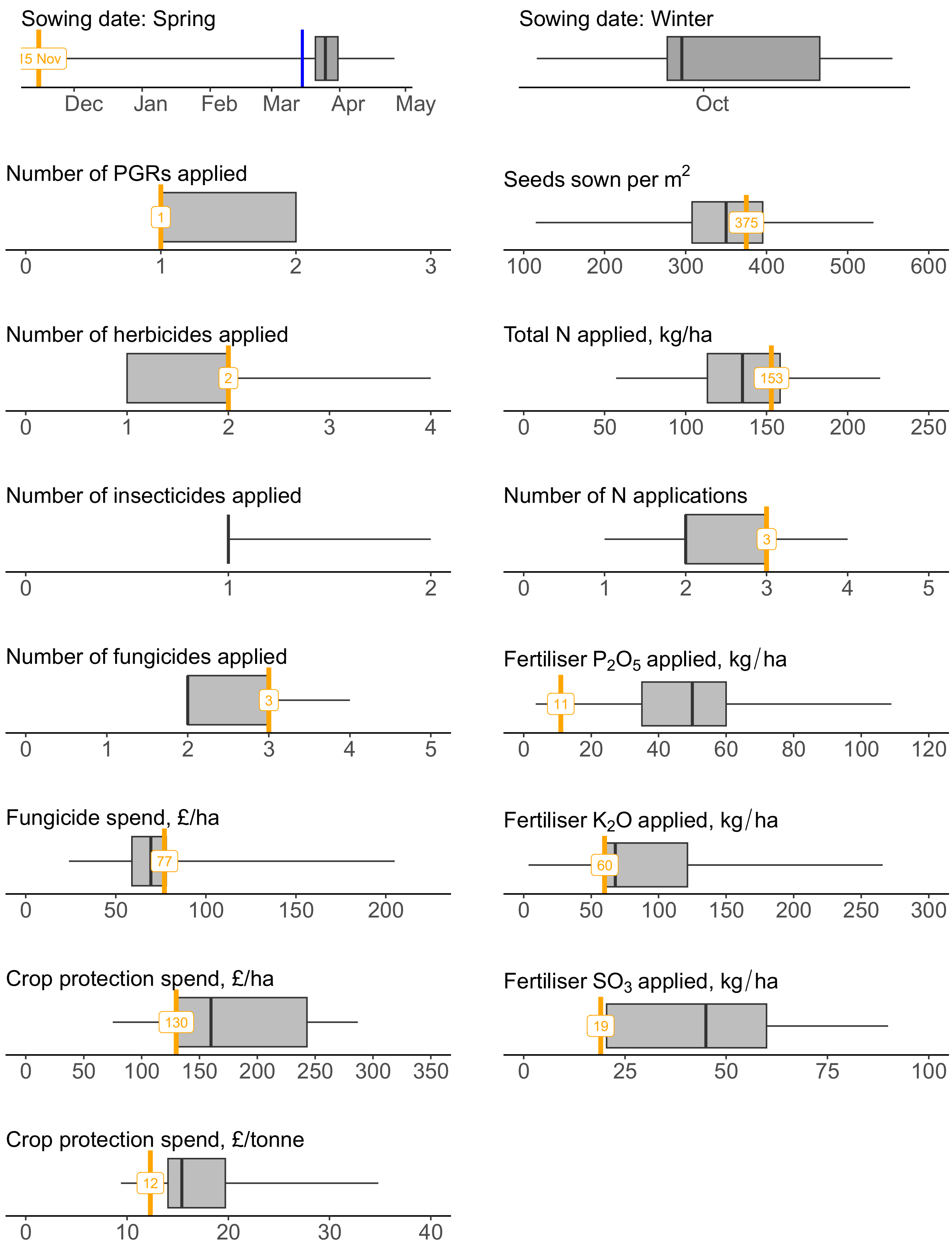








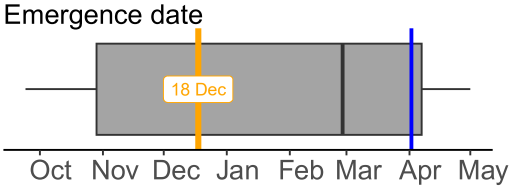
Husbandry factors continued



The following charts show how your entry developed through the 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:

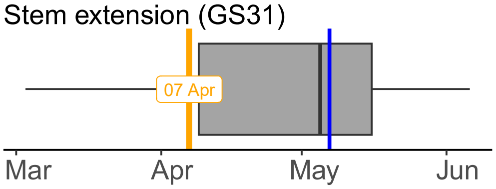
- Foundation, GS10-GS31 – when tillers and main root axes are formed.
- Construction, GS31-GS61 – when yield-forming leaves, ears and stems are formed, including soluble stem reserves.
- Production, GS61-GS87 – when grains are filled, both with new assimilates and reserves redistributed from stems.

Emergence date



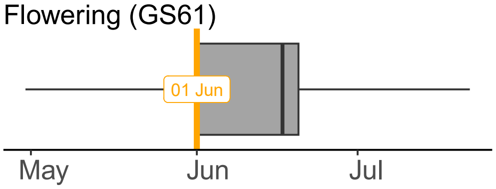
The wide range of emergence dates is due to the inclusion of winter and spring barley crops. 50% emergence in barley is normally completed 150 day degrees (oC days) after sowing. Deep sowings take longer.

Stem extension (GS31)



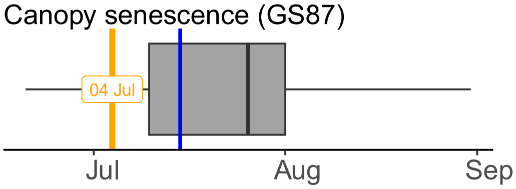
Stem extension triggers faster growth because the stem provides a new sink for assimilates.

Flowering (GS61)



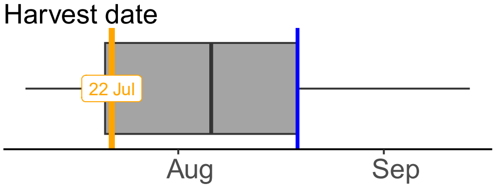
Flowering signals the start of grain formation. Delays in flowering, due say to cold weather after ear emergence, may cause growth to pause.

Canopy senescence (GS87)



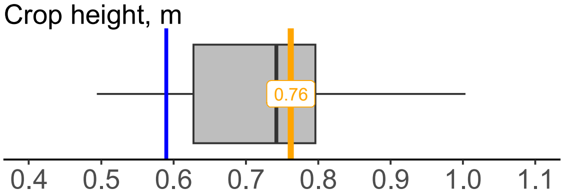
Ideally for high yields, canopies would stay mostly green for 45 days after flowering. No further growth can occur after the canopy has fully senesced.

Harvest date



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

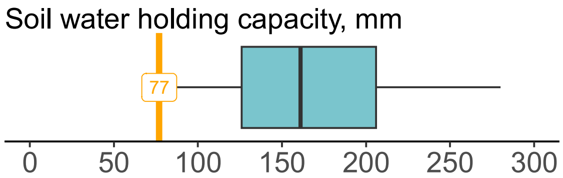
Crop height, m



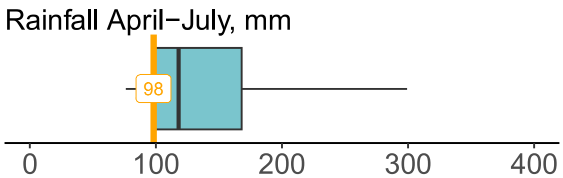
We measure height on the harvest ‘grab’ samples, and omit samples which look to have been cut above ground level.

Water capture

This page shows how weather this year affected the water available for your crop and other crops entered in the Barley 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).

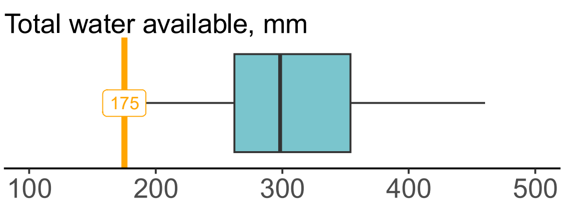


Deep soils hold water to a great depth; we assume roots can access all easily held water (to 2 bar suction) to a depth of 1.5m (or to rock, if shallower) for winter barley or 75% of the water for spring barley. If enough roots didn't reach to this depth, capture of soil-available water will have been accordingly less.

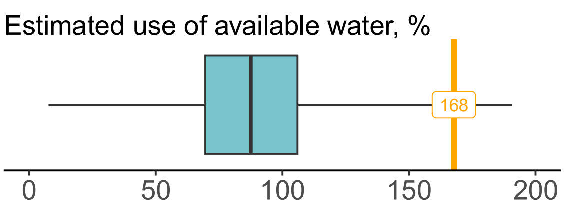


After winter drainage stops, spring and summer rainfall is held in the topsoil until it is evaporated or transpired by the crop's canopy.

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).



Low 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.

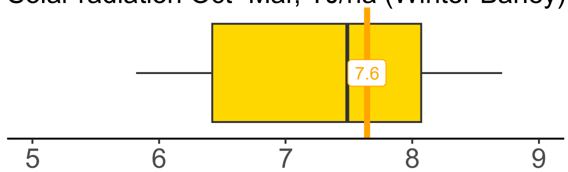
A high yielding crop, growing say 15 t/ha of biomass (so yielding 9.5 t/ha grain at 54% harvest index), would need to capture ~300 mm water from soil plus summer rain. If your estimated use of available water exceeds the total water available, this may be good news! It either suggests that your crop's 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.

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:

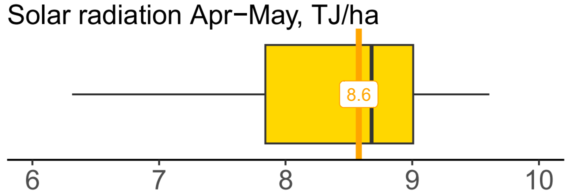
- Foundation – when tillers and main root axes are formed

Solar radiation Oct−Mar, TJ/ha (Winter Barley)



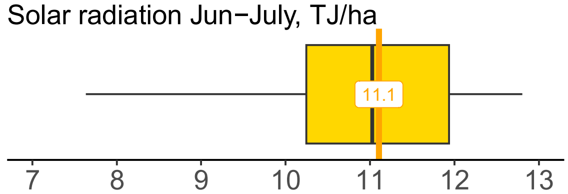
- Construction – when yield-forming leaves, ears and stems are formed, including soluble stem reserves

Solar radiation Apr−May, TJ/ha



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

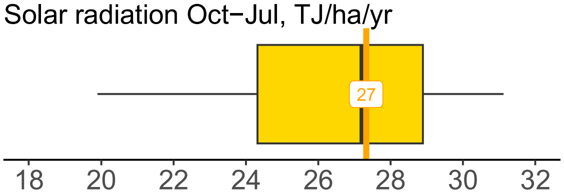
Solar radiation Jun−July, TJ/ha



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.

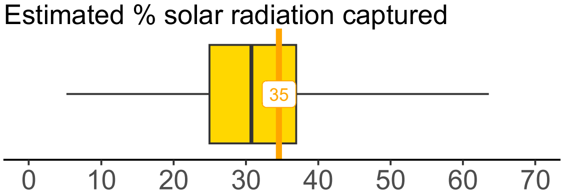
Whilst we cannot yet measure light capture by YEN crops individually, by assuming your crop’s conversion of light-energy was ‘normal’ (1.2 tonnes/TJ), we have made a crude estimate below of the likely success of your crop’s canopy in capturing total light-energy for the 12 months of this season.

Solar radiation Oct−Jul, TJ/ha/yr



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

Estimated % solar radiation captured



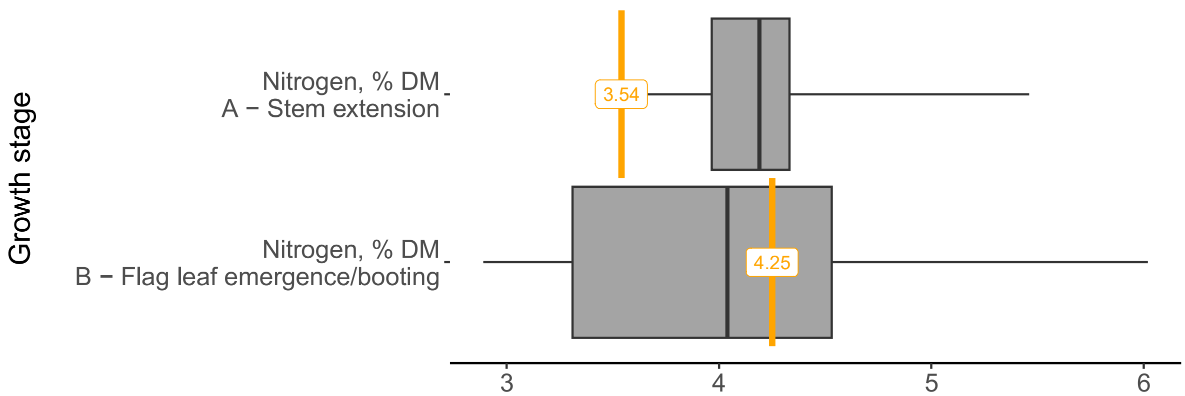
We take the biophysical limit of annual light interception as 60%. Average light capture tends to be poor if a crop’s lifespan is short.

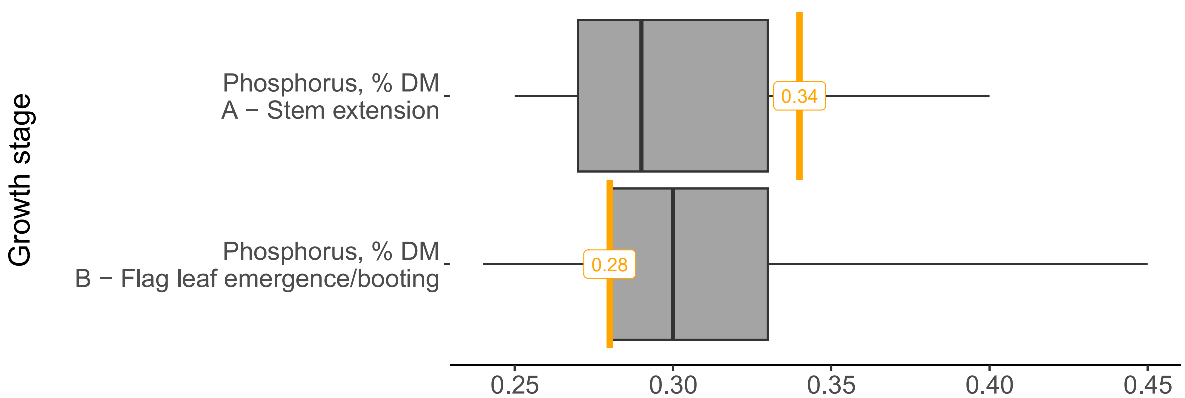
Nutrient capture

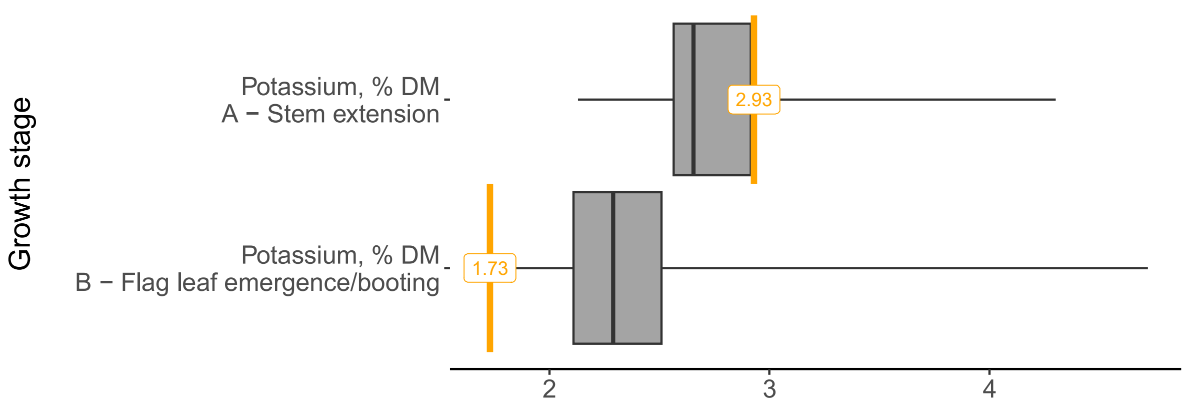
Whether nutrient capture was sufficient to support full conversion of light and water is best deduced from nutrient concentrations in crop tissues – both leaves (next four pages) and grains (later section).

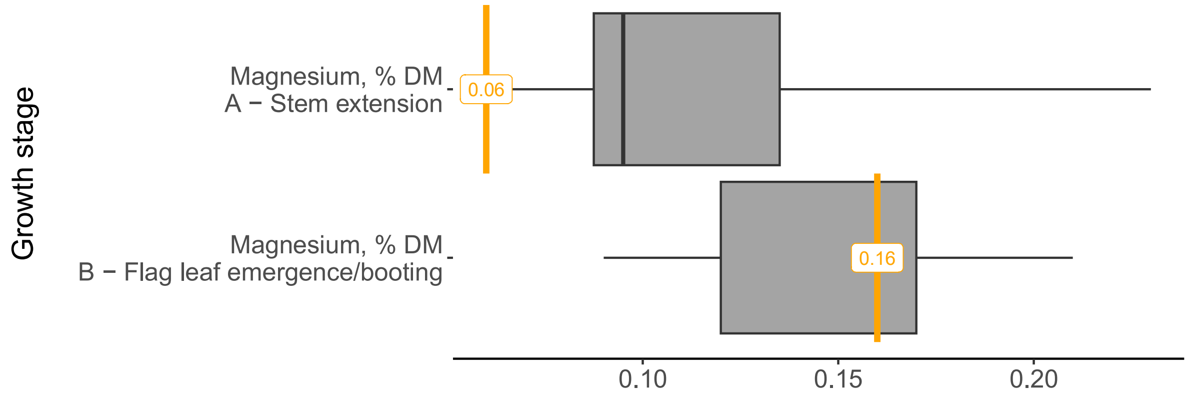
No critical thresholds or benchmarks are shown for leaf analyses because these change through a crop's life and are still uncertain. However, the benchmarking diagrams should enable you to compare your crop's levels with all other YEN entries this year, analysed at the same growth stages.

Lancrop Laboratories provide leaf analyses for YEN. Samples are of the newest fully expanded leaf.

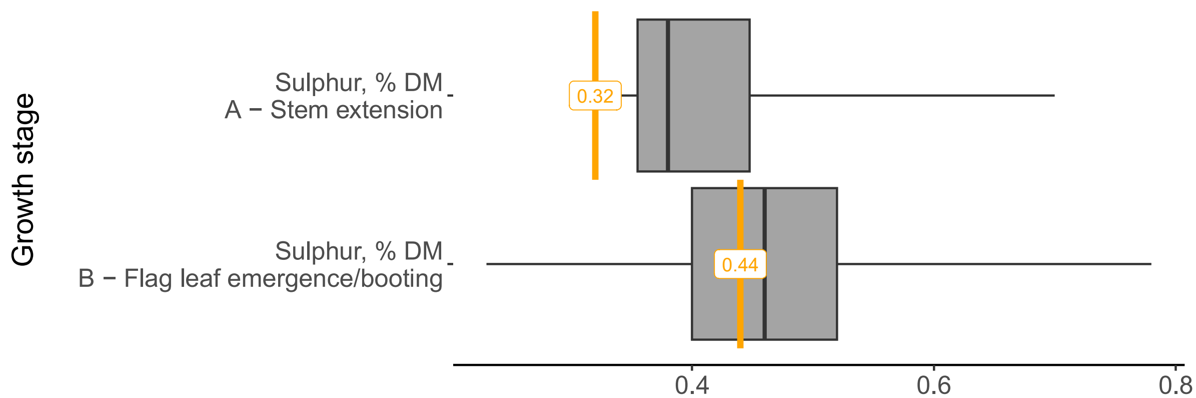




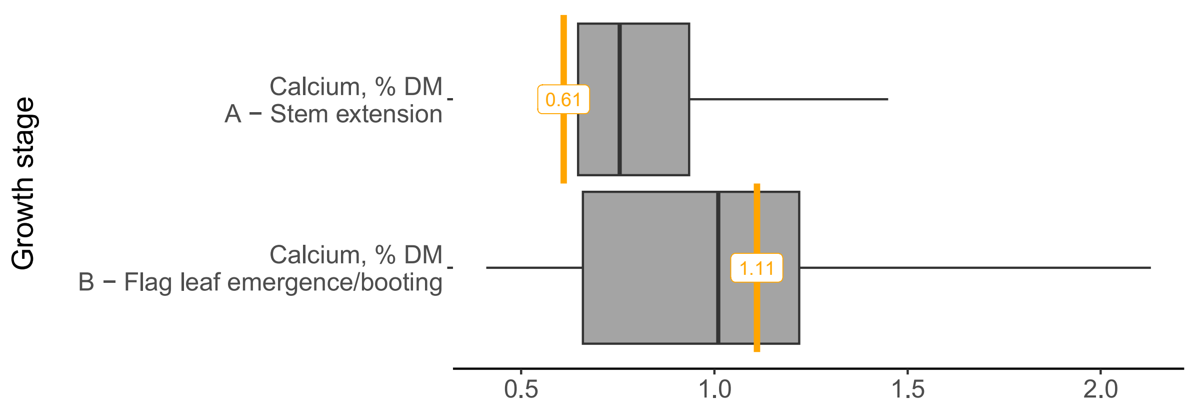




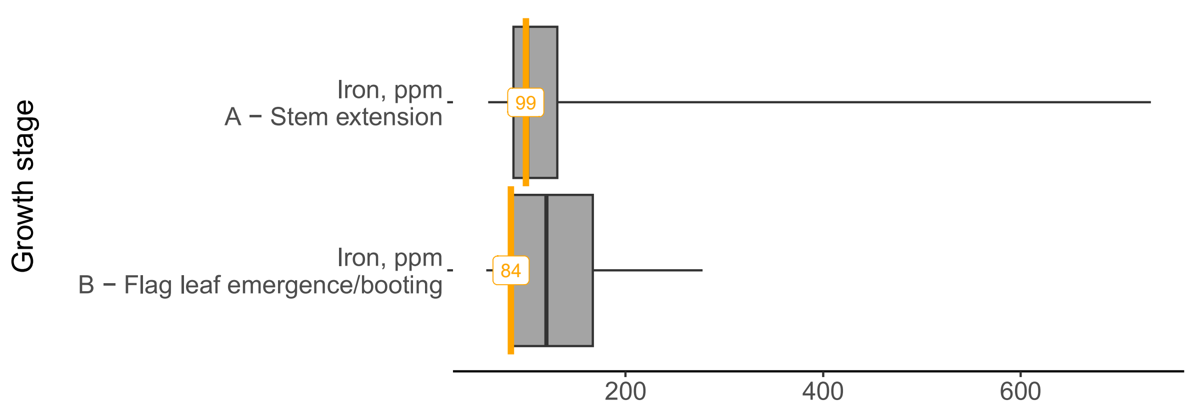
Growth stage
Magnesium, % DM
A − Stem extension
Magnesium, % DM
B − Flag leaf emergence/booting
0.06
0.16
0.10
0.15
0.20



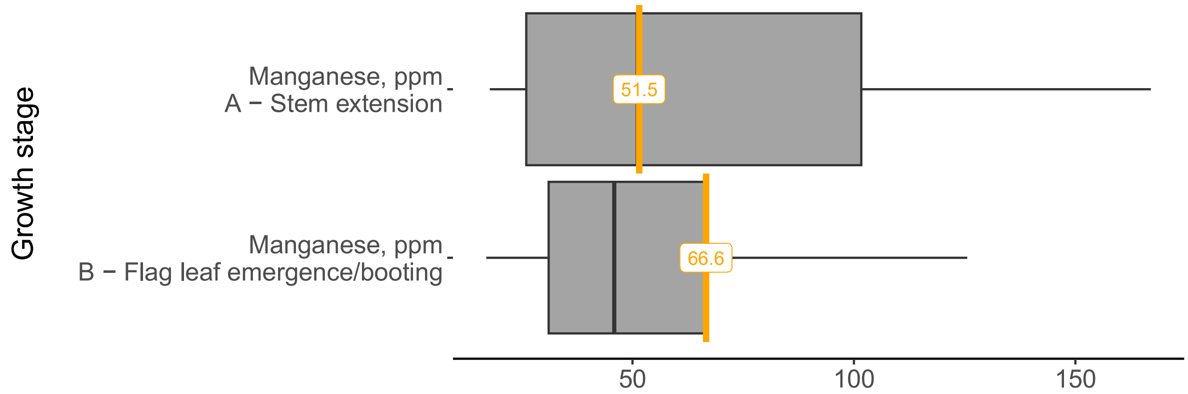
Growth stage
Sulphur, % DM
A − Stem extension
Sulphur, % DM
B − Flag leaf emergence/booting
0.32
0.44
0.4
0.6
0.8

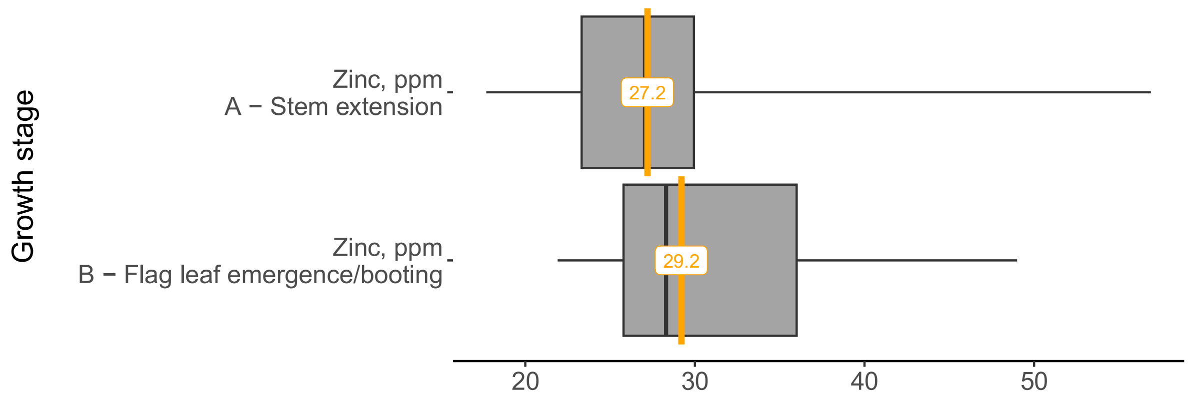


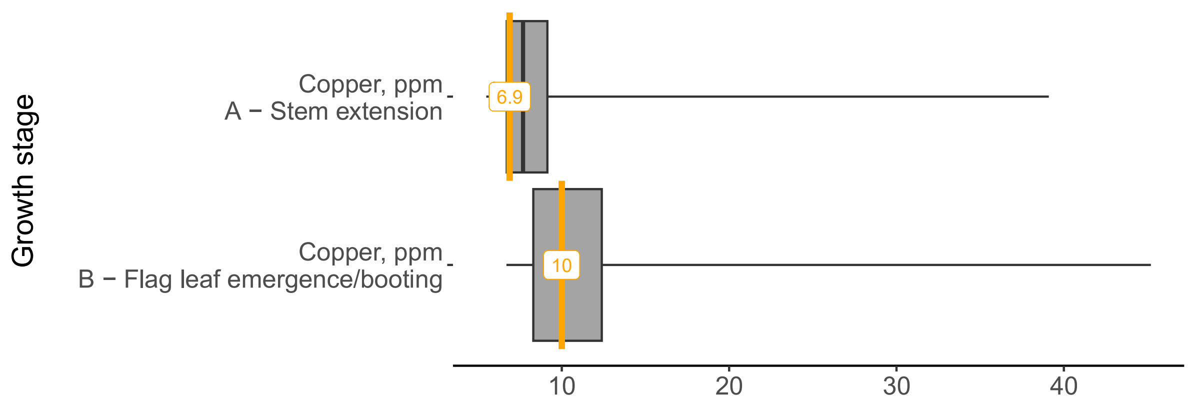
Growth stage
Calcium, % DM
A − Stem extension
Calcium, % DM
B − Flag leaf emergence/booting
0.61
1.11
0.5
1.0
1.5
2.0

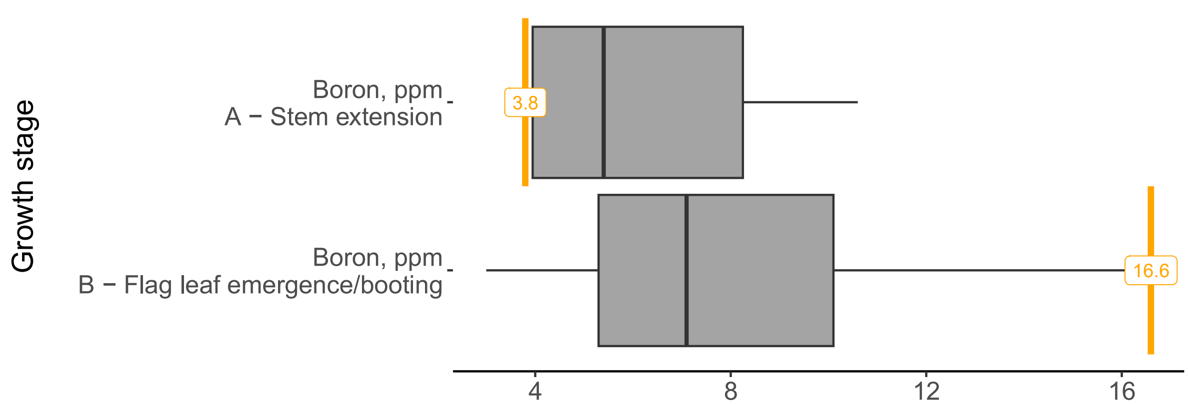


Growth stage
Iron, ppm
A − Stem extension
Iron, ppm
B − Flag leaf emergence/booting
99
84
200
400
600


Growth stage
Manganese, ppm
A − Stem extension
Manganese, ppm
B − Flag leaf emergence/booting
51.5
66.6
50
100
150


Growth stage
Zinc, ppm
A − Stem extension
Zinc, ppm
B − Flag leaf emergence/booting
27.2
29.2
20
30
40
50


Growth stage
Copper, ppm
A − Stem extension
Copper, ppm
B − Flag leaf emergence/booting
6.9
10
10
20
30
40


Growth stage
Boron, ppm
A − Stem extension
Boron, ppm
B − Flag leaf emergence/booting
3.8
16.6
4
8
12
16

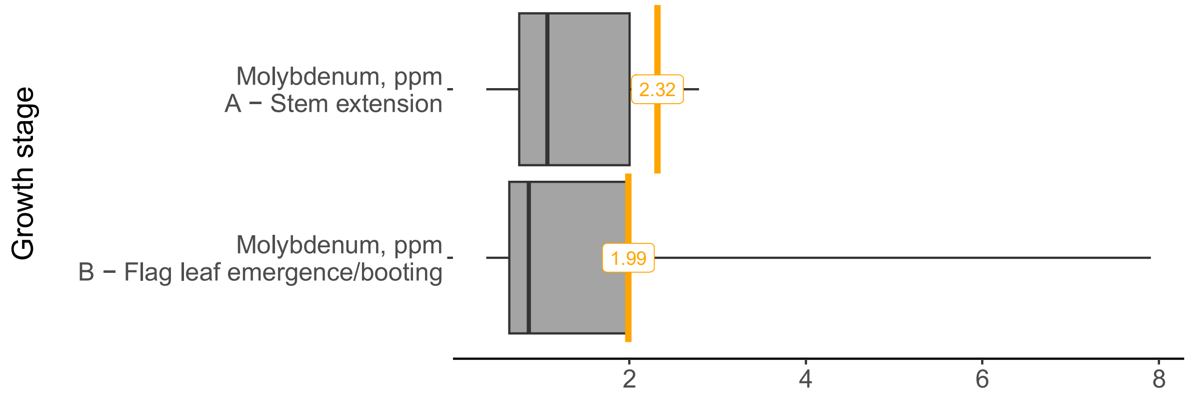
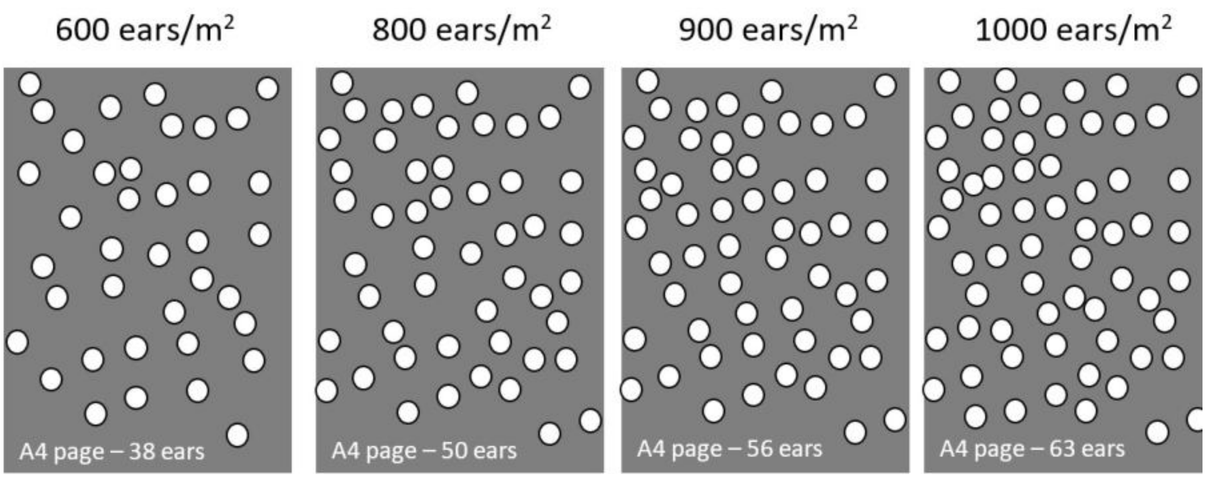

Growth stage
Molybdenum, ppm
A − Stem extension
Molybdenum, ppm
B − Flag leaf emergence/booting
2.32
1.99
2
4
6
8

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:

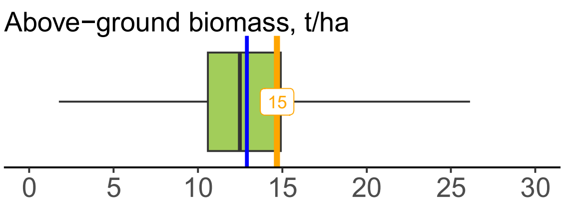


Yield formation

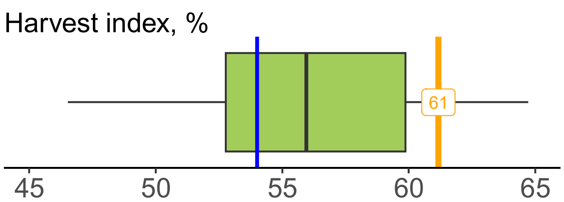
The whole-crop samples that YEN entrants provide all have their components counted and weighed and results are shown in the following charts, assuming that each sample was representative of the whole area from which grain yield was determined.

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.

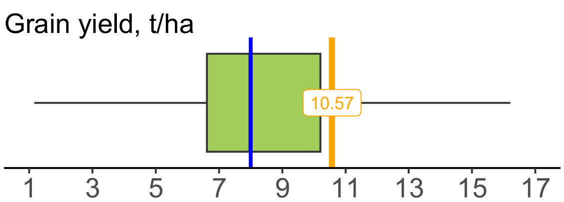
Your grain yield (expressed as t/ha and % of potential) is shown below along with biomass and harvest index, in relation to all other YEN entries.



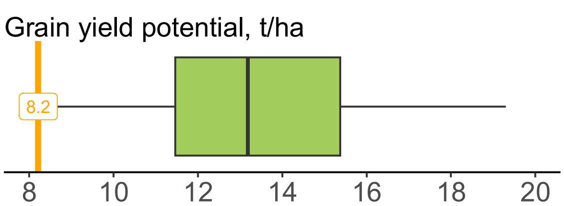
YEN experience has been that high biomass relates to high yields.



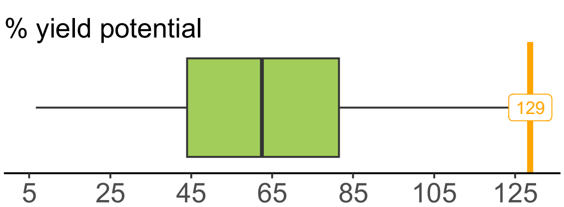
Harvest index is the percentage of total biomass that was harvestable as grain. Years with high fertile shoots tend to have low harvest index.



Spring barley yields about 20 per cent less than winter barley, although the difference is smaller in the North than in the South



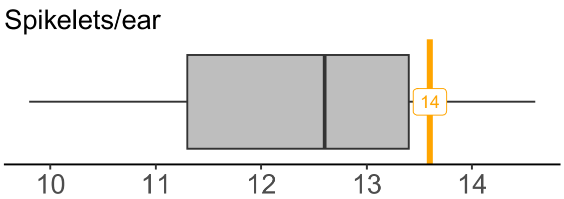
YEN yield potential reflects light energy and water available at your site this year, expressed in t/ha.



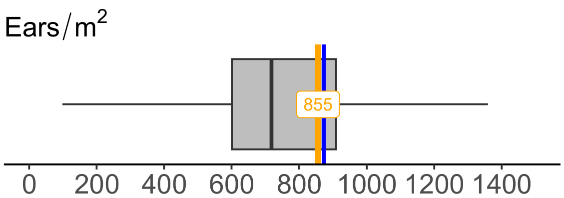
Any YEN entry exceeding 100% of its estimated potential must have found more light or water than was estimated at this site, or must have grown with exceptional efficiency.

Yield components

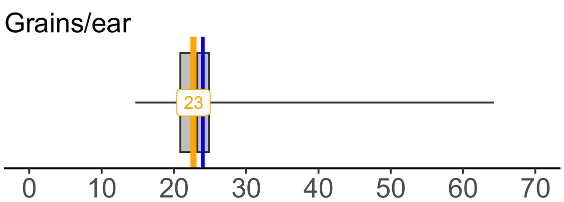
Whole crop yield analysis can also tell us about the history of your crop because the different components are determined sequentially. So comparing components of yield for your crop in the following charts with those of other YEN entrants should help to indicate the stage(s) through the season at which your crop deviated from others and from normal (represented by the AHDB or Teagasc Benchmarks, (winter barley) or green lines (spring barley).



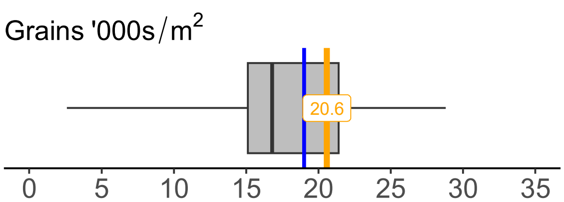
Numbers are crucial for barley because it is not flexible in the number of grains it sets per spikelet.



Ears per m^2 depend on plant establishment, then tillering, and then the survival of each shoot during stem extension. Maximising the number of fertile shoots (i.e. ear numbers) is critical for barley yields due to yield being sink limited.



Grains per ear are set in the 2-3 weeks before flowering. Barley is less able to compensate for low ear numbers by increasing grain number.



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

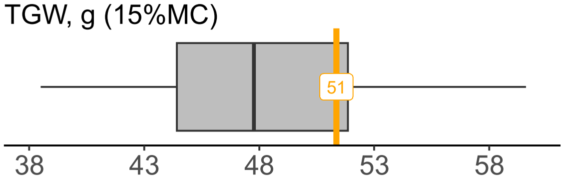
Grain formation and size

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 20-50% of assimilates for grain growth and most of the protein from senescing leaves is also redistributed to form grain protein.

We have not measured stem sugars in YEN so far, but it is possible to assess them using a refractometer. Stem storage of sugars depends on shoot numbers and sunshine levels in May being good.

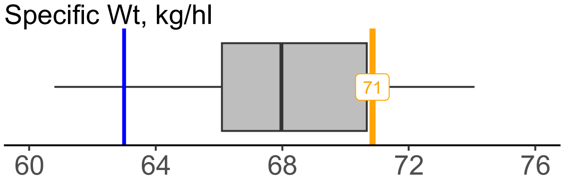
If grain number per m^2 is low (see above), or if conditions during early grain-fill are limiting, final grain filling, hence yield, may be constrained even if later conditions are good – this is sometimes described as 'sink' limitation. We try to use analysis of grain volume and grain density to deduce whether crops were limited by sink (well filled grains) or limited by availability of source during grain filling (partially filled grains). It should be recognised that barley crops are commonly sink limited.

TGW, g (15%MC)



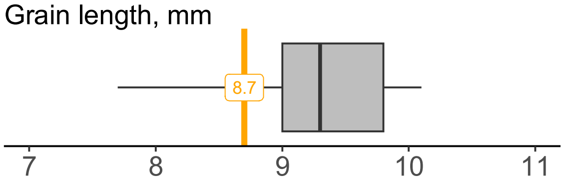
Thousand grain weights (TGW) depend on early grain expansion to set up the potential grain size and then on continuing supplies of photosynthates to replace grain water with starch.

Specific Wt, kg/hl



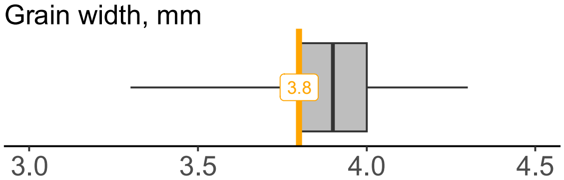
Specific weight is a measure of individual grain density and how the grains pack together.

Grain length, mm



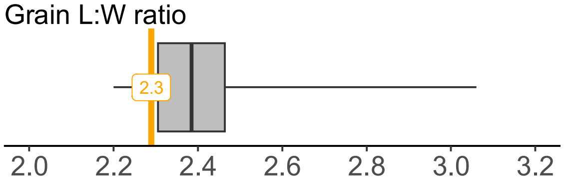
Grain length is set before grain width, and tends to indicate potential grain storage capacity.

Grain width, mm



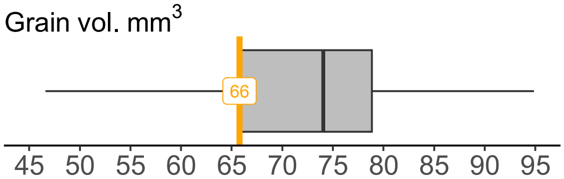
Grain width reflects the success with which grain storage capacity is filled.

Grain L:W ratio



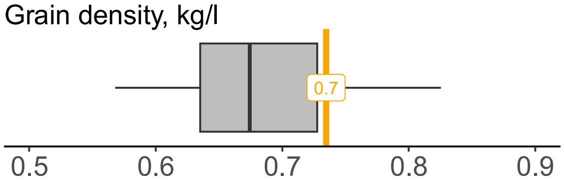
A high ratio indicates that the grain may not have achieved its potential for filling set soon after flowering.

Grain vol. mm^3



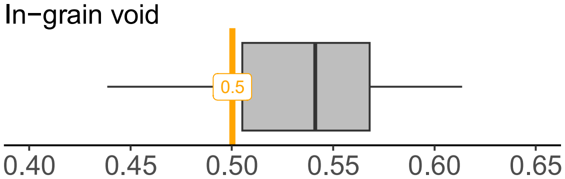
Grain volume here is the product of length and cross-sectional area, assuming grains are ovoid, so this volume includes the grain's 'crease'.

Grain density, kg/l



We think high density - >1 kg/l - may indicate that grain filling was constrained by storage capacity (volume) - often termed 'sink limitation'.

In−grain void

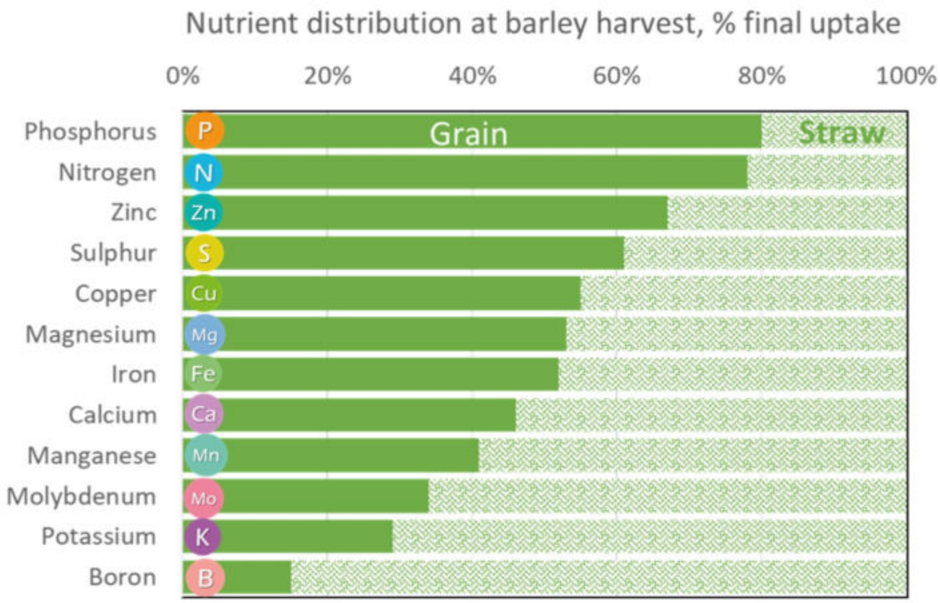


The density of starch, the main grain constituent, is 1.5, so it is possible to estimate the proportion of grains' unfilled volume. This includes the crease.

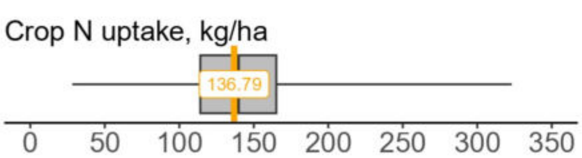
CROP NUTRITION POST-MORTEM

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

- Results from >300 YEN barley samples analysed up to last year 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 deficiency has been most common.
- YEN Nutrition was therefore launched in 2020 to help to remedy these deficiencies in all combinable crops – further details and registration are available 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 and P in the grain but most of its K in the straw. These proportions are estimated from published tables of average feedstuff analyses.

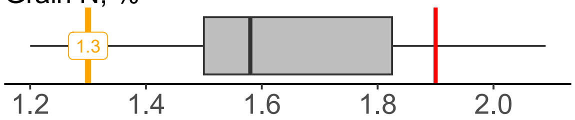


- We now use YEN-low (i.e. lower quartiles from all past YEN data – the boundary between the bottom quarter and top three-quarters of values) as comparators for all nutrients in all crops. We find YEN-low values to be very similar to critical thresholds of N, P, S and Mn in wheat, as well as to less certain critical values of K, Mg, Cu & Zn, so we assume they can be applied for all nutrients in all crops.
- The following benchmarking-charts and YEN-low values provide the best means of identifying the nutrient(s) most likely to have limited your crop.
- Critical grain N levels are variety-dependent so it's best to compare your value with the value reported in the AHDB Recommended List for that variety. If the observed grain N levels are significantly less or more than the RL value, we take this to indicate that this crop was under- or over-supplied with nitrogen. However, market requirements for malting crops will obviously affect grain N% and that should be accounted for with the interpretation.



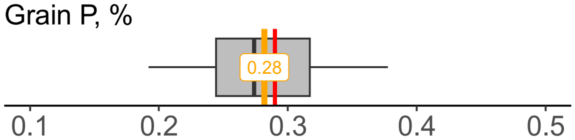
Total crop N uptake can be useful in judging the efficiency of your N management. The N uptake in spring barley at harvest is typically 25 to 30 per cent less than that of winter barley, but it depends on fertiliser management and target end use. Crops grown for feed, rather than for malting, have higher fertiliser N applications and greater N uptake values.

Grain N, %



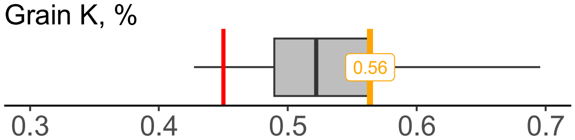
Barley market specifications for the distilling/brewing industry include: malt distilling (below 1.66%), brewing (1.60-1.86%) and grain distilling (above 1.85%)

Grain P, %



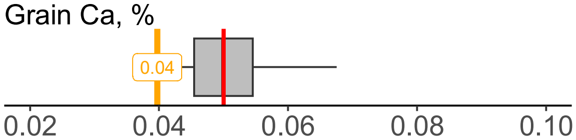
Recent work has shown grain P analysis can provide a useful check on sufficiency of phosphorus. Values less than the YEN low value of 0.28% could indicate further checks on P nutrition are required.

Grain K, %



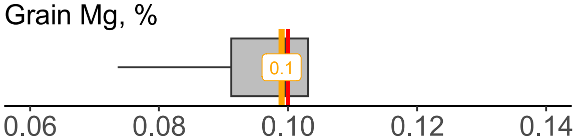
RB209 assumes a standard value of 0.56% potassium (K) in grain. Values less than the YEN low value of 0.43% could indicate further checks are needed.

Grain Ca, %



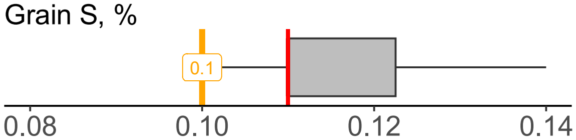
Calcium nutrition relates to the crop's use of water. However, almost all the crop's calcium remains in the straw at harvest, so we are yet to learn whether grain calcium can tell us about the crop's water status.

Grain Mg, %



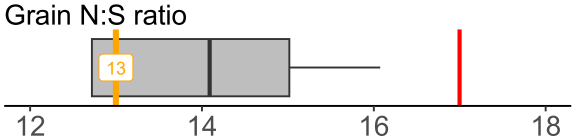
Low grain Mg levels are less than 0.1%, which may provide a useful guide for when to check on soil levels and crop symptoms.

Grain S, %



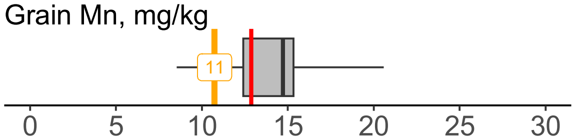
S is required in proportion to grain protein (especially glutenin) formation. Grain with <0.12% S may indicate deficiency.

Grain N:S ratio



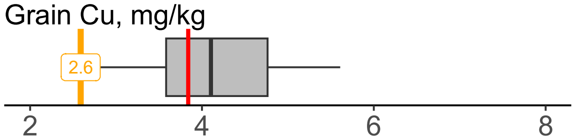
The higher the N:S ratio, greater than about 17, the more likely the crop is to have suffered from sulphur deficiency.

Grain Mn, mg/kg



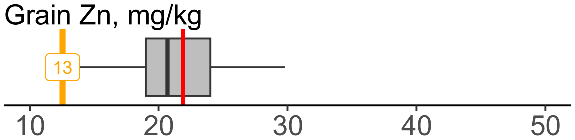
Low Manganese (Mn) values in grain are <13mg/kg for barley – and it appears that Mn deficiency is more common in barley crops than wheat.

Grain Cu, mg/kg



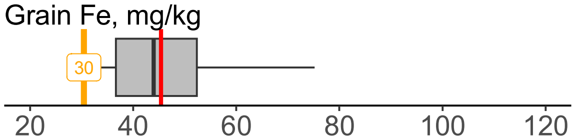
Low copper (Cu) values in grain are <3.9mg/kg for barley.

Grain Zn, mg/kg



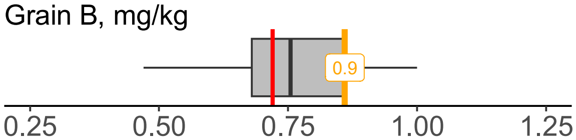
Zinc (Zn) values below 23mg/kg are classed as low, but whether these should be treated as limiting is uncertain.

Grain Fe, mg/kg



Whilst grain iron (Fe) may prove useful with further experiment, we are unsure about interpretation. The YEN low value of 44mg/kg can be used as a guide.

Grain B, mg/kg



Most Boron is kept in the straw at harvest. Previous YEN boron values have varied hugely with season, so grain analysis may not be useful for assessing boron sufficiency.

The 2021-22 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.
- We are pleased provide this separate Cereal YEN report for barley. We hope that being able to benchmark your crops against other barley crops is both useful and informative.
- The winning spring barley yield was 11t/ha with a crop of Laureate grown in Hampshire. The winning % of potential yield was achieved with another crop of Laureate, grown in Lincolnshire which achieved 129% of the calculated potential yield.
- For winter barley, the highest yielding crop was KWS Tardis grown in Lincolnshire which achieved a phenomenal yield of 16.2t/ha. For the highest % of potential yield, this was achieved by a crop of Bordeaux grown in Fife, which achieved 117% of the calculated potential yield.
- Clearly there is an element of luck in achieving high yields at a particular site in any particular year. However, it is striking that some farms are consistently achieving high yields, and several farms have achieved YEN Awards over several seasons. We are coming to recognise that there is an important 'farmfactor' which plays 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.
- In terms of physiology, high barley yields have been shown to result from achieving many grains/m2, primarily from many ears/m2.
- In general winter barley yields were above average in 2022 and, despite the dry spring conditions, grain numbers were not low. Nationally, spring barley yields were also above average, however low plant populations or compromised tiller production or retention, meant yield potential was restricted in some crops, particularly on light soil types.

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

SPECIFIC COMMENTS ON THIS ENTRY

Resource capture, growth and yield:

- Your entry yielded 10.6 t/ha, the benchmark spring barley yield is 8.3 t/ha.

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

- Our target for annual light interception by annual crops (whether sown in autumn or spring) is 60% compared with 34.6% achieved by this crop.

- Maximising fertile shoots is critical for barley yields. Your crop achieved fewer ears than the benchmark 873 ears/m2.

- Your crop is estimated to have had a TGW of 51g. TGW can be small either because of low storage capacity or poor conditions for filling.

- Specific weight is a measure of individual grain density. Large, well filled grains have a high malt extract potential. Your crop achieved a higher specific weight than the benchmark of 63kg/hl.

Crop Nutrition:

- Your soil is estimated to be pH 7.9.

- Grain N content of this crop was low for Laureate, indicating a likely inadequate N supply or fertilising for a lower market requirement.

- We estimate that a crop yielding 7t/ha would require approximately 140 kg N/ha. For higher yielding crops, an additional 20 kg N/ tonne is required. We estimate that uptake of 211 kg/ha of N was required for your crop, compared with the 137 kg/ha taken up.

- Your grain is estimated to have had 0.28%P. Less than 0.29% indicates a need for further checks on P nutrition.

- Your grain is estimated to have had 0.1% Mg. Less than 0.10% indicates a need for further checks on Mg nutrition.

- Your grain is estimated to have had 11 mg/kg Mn. Less than 12.88 mg/kg indicates that manganese uptake was probably limiting.

- Your grain is estimated to have had 13 mg/kg Zn. Less than 21.9 mg/kg indicates that zinc uptake was probably limiting.

- Your grain is estimated to have had 2.6 mg/kg Cu. Less than 3.8 mg/kg indicates that copper uptake was probably limiting.

Review of Oilseed YEN

Out of 45 entries in 2022 gross output of oilseed rape crops ranged from 3.4 t/ha to 8.9 t/ha, with the winning crop located in Lincolnshire achieving an impressive 8t/ha yield along with an oil content of 48.5%. On average crops achieved 61% of potential yield which ranged from 7.0 t/ha to 12.5 t/ha. Crops generally established well, with adequate moisture minimising CSFB damage. Dry conditions in spring would have restricted canopies becoming too large, although conditions may have hampered N uptake in some crops. Sunny April conditions along with rainfall in May were conducive for setting high seed numbers. The majority of seed filling took place in June which was sunnier and only slightly warmer than average - giving a high rate of photosynthesis helping seed filling and oil formation. Oilseed YEN also included 10 Linseed entries this year – it has been great to see the number of entries increase and develop our understanding of linseed physiology and yield potential.

Wheat Quality Competition

The YEN Wheat Quality Award, sponsored by UK Flour Millers, is taking place again in 2022. All Group 1 wheat entries which provided a large grain sample have been entered and the best are being short-listed. Following breadmaking analysis and assessment, the winners will be announced during the Awards Dinner evening on Tuesday 24th January 2023 (see below).

AHDB events

Several AHDB Monitor Farms entered the YEN competition for 2022 and YEN will be included in a number of upcoming monitor farm meetings, please visit the AHDB website for more details.

YEN Nutrition

YEN Nutrition was initiated in 2020 because YEN data had indicated that the majority (>80%) of crops have inadequate nutrition, one way or another. This new YEN connects anyone – farmers, advisors, suppliers and academics in the UK or abroad – seeking to improve nutrition of any grain crop – cereal, oilseed or pulse. Membership begins with grain analysis and grain nutrient benchmarking on six or more fields. Further details are available here.

YEN Zero

With the industry targeting net zero emissions by 2040, YEN Zero was initiated in 2021 with the overarching aim of creating a community of farmers and key players from across the agricultural industry to compare field-scale carbon footprints across farms, and build understanding of the issues and opportunities for making progress. Further details are available here.

'YEN is ten' Conference and Awards dinner

If you haven't done so already, please register and come to the YEN's tenth birthday conference at East of England Arena, Peterborough on 24th January 2023. You can Register for the YEN Conference here.

CONTACTS

Please send any comments, observations or queries to the contacts below.

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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 2023.