

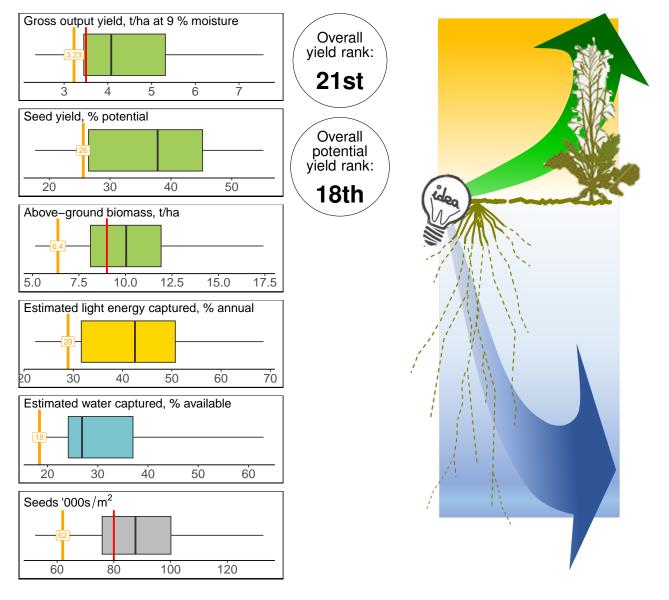
# **Entrant's Report**

# Harvest 2024

YEN User ID: OilSeed EXAMPLE Entrant name: EXAMPLE Main contact email:

Sponsor/supporter: none Sponsor/Supporter email: Field/Site name: EXAMPLE Location: East Midlands Incident energy 2023-24: 35 TJ/ha Available water: 599 mm Crop: Oilseed Rape Variety: Aurelia

**SUMMARY:** YEN entries were completed from 32 oilseed crops this year. Headline results for your entry are shown below. Your gross output of 3.2 t/ha ranked 21st. This represents 26% of its estimated yield potential of 12.6 t/ha.



# 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 Oilseed rape Guide and the AHDB Nutrient Management Guide (RB209). We hope that this helps you to identify aspects of your husbandry and growing conditions that offer possible routes to further yield enhancement.

Our approach in this report is to consider yield potentials and growing conditions for crops this season, then the conditions for and husbandry of your crop, its development, its basic resources (light energy, water and nutrients), its success in capturing these and in converting them to seed. Lastly, we use seed 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.

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# **POTENTIAL YIELDS**



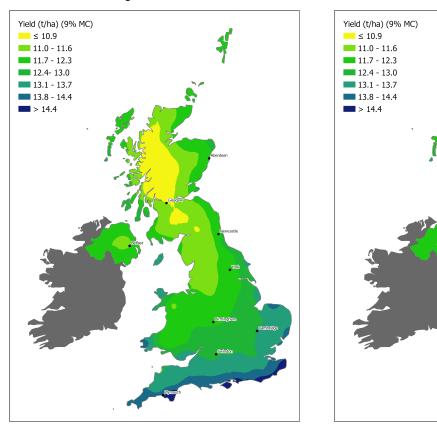
# "The YEN exists to help you to enhance your yields."

The key to high yields in YEN has been good crop growth. So the key to enhancing yields is to know what is limiting growth – solar radiation or water – and then to target improved green canopies or improved rooting accordingly.

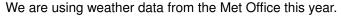
To estimate potential yields we assume a theoretically 'perfect' oilseed rape crop grown with 'inspired' husbandry on your land with this season's weather, achieving either:

- (i) **80% capture of light energy** through the season, and its conversion to 1.4 tonnes of biomass per terajoule or seed biomass at 0.7 tonnes / terajoule of solar radiation OR
- (ii) Capture 100% of the available water held in the soil to 1.5 m depth (or less if to rock) plus all rainfall from March to July, and can convert each 18 mm into a tonne of plant biomass per hectare, or 26 mm into a tonne of seed biomass per hectare. Taking the lesser of these two biomass amounts we assume that a maximum of 45% of the total biomass can be used to form seed (this is the 'harvest index'). 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. Note that we assume no damage from waterlogging, frost, heat, or lodging.

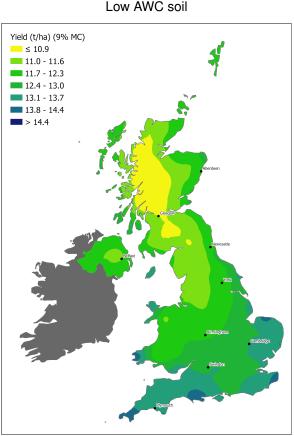
The maps below show potential yields for soils with high and low available water-holding capacity (AWC) for this year. Potential yields range from 11-13 t/ha for most arable regions for both low and high AWC soils.



Potential yields



High AWC soil

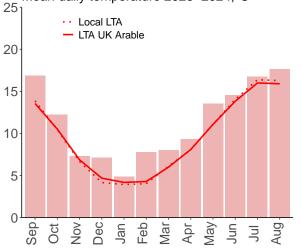


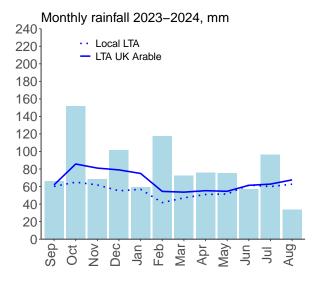
#### SEASONAL GROWING CONDITIONS

Crops sown in early August (or earlier) to beat the migration of CSFB generally produced large canopies before winter, whereas crops sown later in September to emerge after the main CSFB migration period had smaller canopies. The incredibly wet autumn and winter resulted in many crops sitting in wet soil over the winter months which has been shown to be detrimental for the yield prospects of OSR. CSFB pressure was generally not high, but there were hot spots leading to crop failures and crops with reduced vigour. The winter was mild with relatively few frosts. Phoma levels were average and light leaf spot slightly below average in England, although light leaf spot showed high incidences and severity in Scotland.

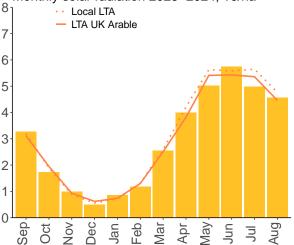
Persistently wet conditions during spring meant that many pesticide and fertiliser applications were applied at sub-optimal timings, or missed altogether. Very dull conditions during April and May are likely to have limited the number of pods and seeds that were set. Sclerotinia was reported in fields with a previous history of the disease, but infections were sparse.

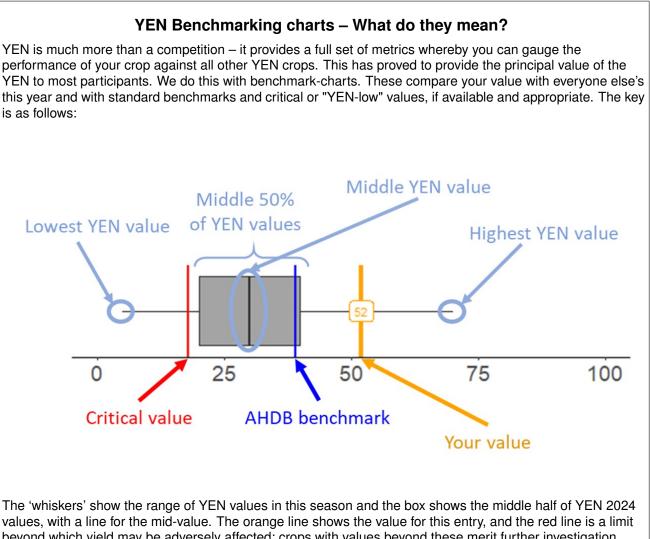
June was bright and cool which would have helped seed filling, but July was generally dull which would have limited the late seed filling and oil formation, especially in later developing crops. Stem canker indices were moderate to high on susceptible varieties, ranging from 45% to 65%. Verticillium symptoms were noted in fields with a previous history, although at similar severities to previous seasons. Clubroot was noted in fields with a previous history. Overall, weather conditions did not support high OSR yields with the wet winter and dull spring contributing to the low national average this year. Mean daily temperature 2023–2024,°C











beyond which yield may be adversely affected; crops with values beyond these merit further investigation. Blue dashed lines indicate benchmark values for a typical crop e.g from the AHDB's Growth Guides. 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.

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.

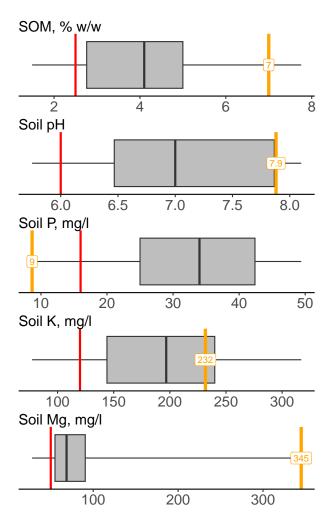
Soil pH <6 is acidic. High pH soils may require that special attention is paid to phosphorus (P) and micro-nutrient levels in leaf and grain (see later).

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 to double-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 is a key component of chlorophyll so deficient plants show inter-veinal yellowing. Temporary deficiencies often occur in dry conditions. Levels between 0-25 mg/l indicate a soil index of 0.

#### Soil analysis



# AGRONOMY

This section considers how your variety and husbandry decisions related to others entering the YEN this year. Analysis of Oilseed YEN data accumulated from 2017-2021 has shown that, although season has the largest effect on yields, the YEN is beginning to indicate husbandry practices that are associated with high yields.

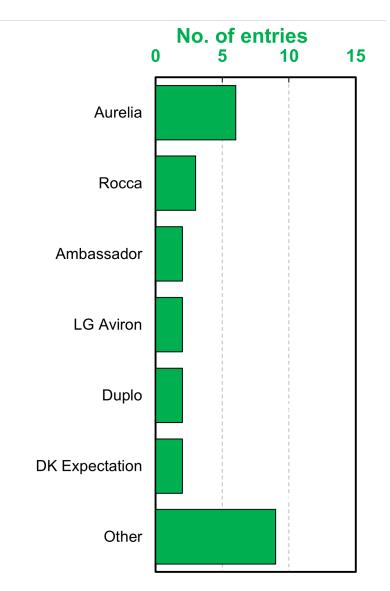
In summary, we are concluding that:

- i) Attention to detail is important:
- · seed rate is negatively associated with yield
- · no. of PGR and fungicide applications are positively associated with yield
- ii) Other high yield associations include:
- · Weather: dry, dull autumns and winters, bright springs and cool summers
- High individual plant biomass with many seeds
- Longer duration between the start of flowering and desiccation
- · Minimising nutrient deficiencies, with particular focus on P and Mg

#### Variety

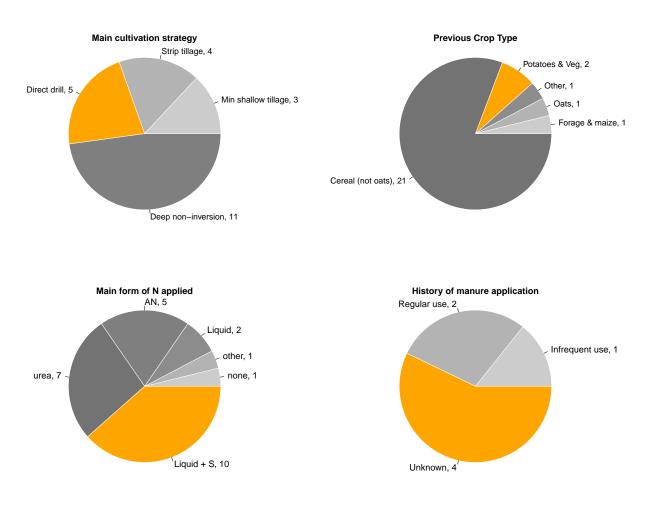
The most chosen varieties are compared in the figure below. There were 15 different varieties entered.

• Your variety was Aurelia, a Hybrid variety with a medium flowering and medium maturity date.

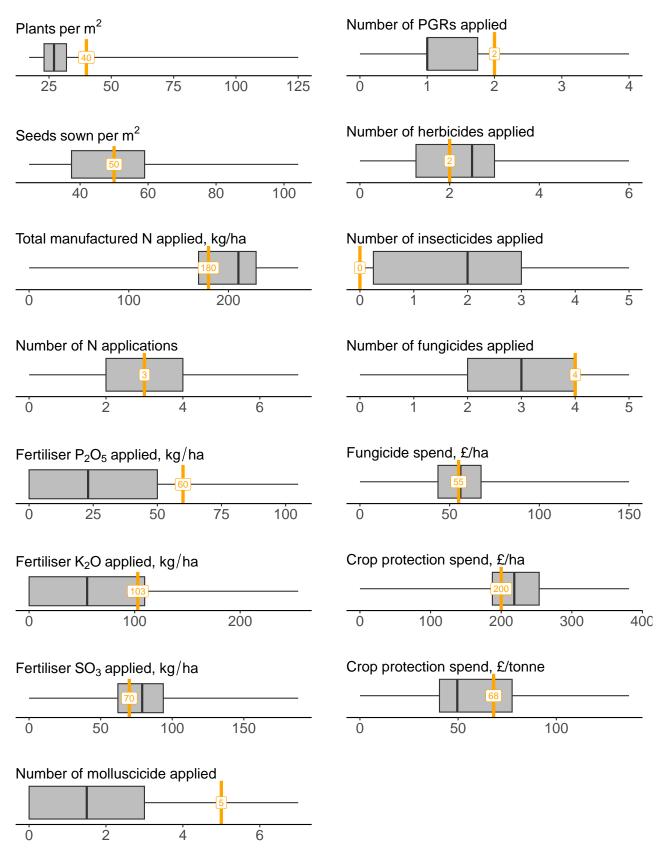


## Husbandry

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.



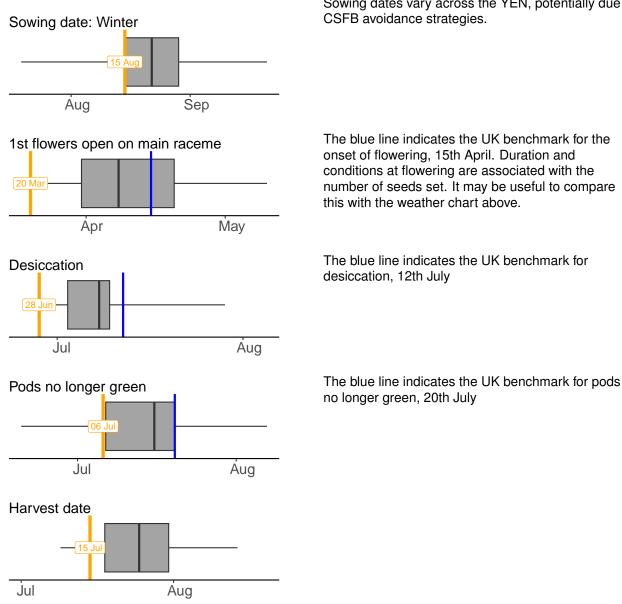
## Husbandry factors continued



# **CROP DEVELOPMENT**

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), end of pod formation (GS79) and end of seed ripening (GS89) determine the length of each phase for growth:

- · Foundation, GS10-GS31 leaf production and formation of main root axes
- Construction, GS31-GS79 stem extension, branching and pod formation
- · Production, GS80-GS89 when seeds are filled with new assimilates

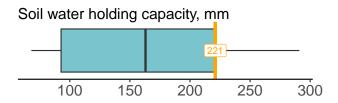


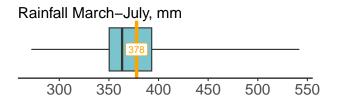
Sowing dates vary across the YEN, potentially due to

# **RESOURCES AND THEIR CAPTURE**

#### Water 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 spring and summer rainfall (March to July).

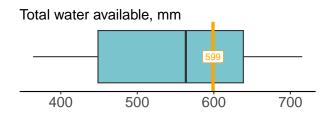


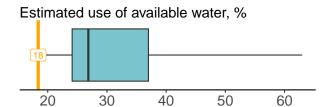


The soil water holding capacity described above assumes that crops could extract 100% of available water to a soil depth of 1.5 m (or to rock, if shallower). If sufficient roots didn't reach this depth, soil-available water would be accordingly less.

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. A high yielding crop, growing say 15 t/ha of biomass (so yielding 6 t/ha dry seed at 40% harvest index), would need to capture just over 300 mm water from soil plus rain in March - July.





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

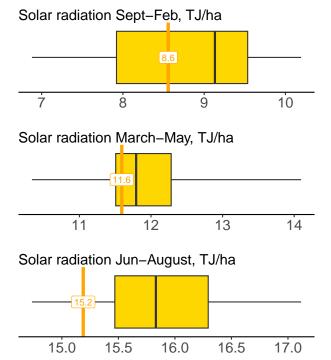
Small water use will sometimes have been due to less demand for canopy transpiration (e.g. because crop developed faster and matured earlier) or otherwise due to worse rooting or because the available water was high.

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**

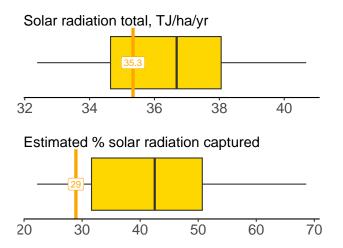
The benchmarking charts below show how the weather this year affected light energy available for this entry and other YEN crops. Solar radiation has been divided into periods that roughly equate to the three key phases of crop development reported above:

- Foundation leaf production and formation of main root axes.
- Construction stem extension, branching and pod formation.



Production – when seeds are filled with new assimilates.

Whilst we cannot yet measure light capture by YEN crops individually, by assuming your crop's conversion of light energy was 'normal' (0.4 t/TJ up to the start of stem extension, 1.1 t/TJ between the start of stem extension and seed filling and 0.4 t/TJ during seed filling), we have made crude estimates below of the likely success of your crop's canopy in capturing light.

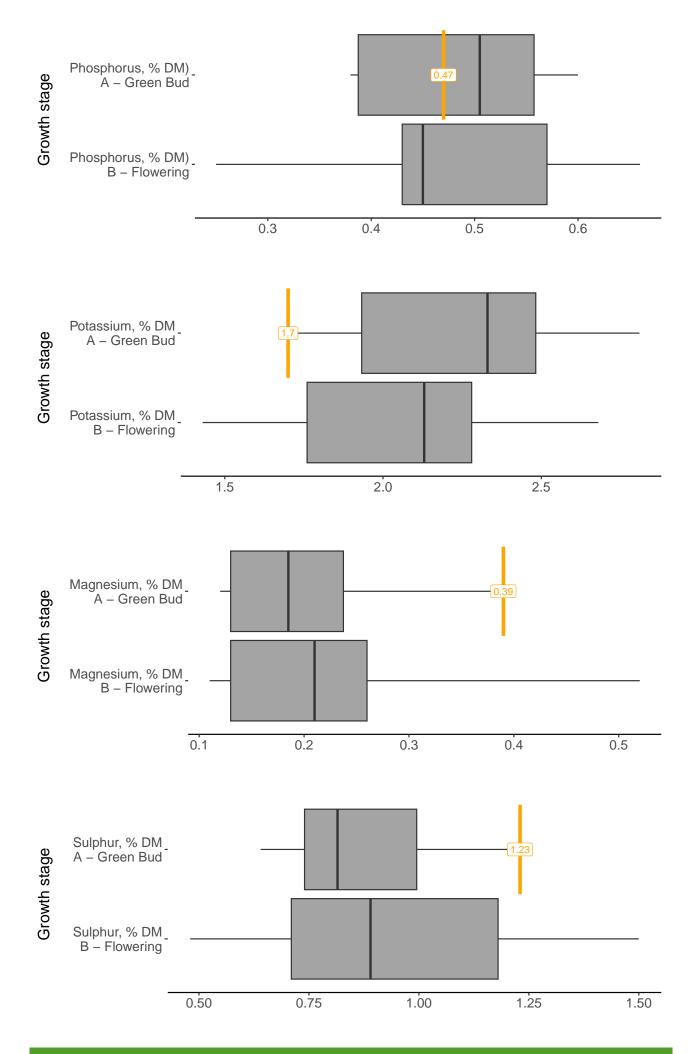


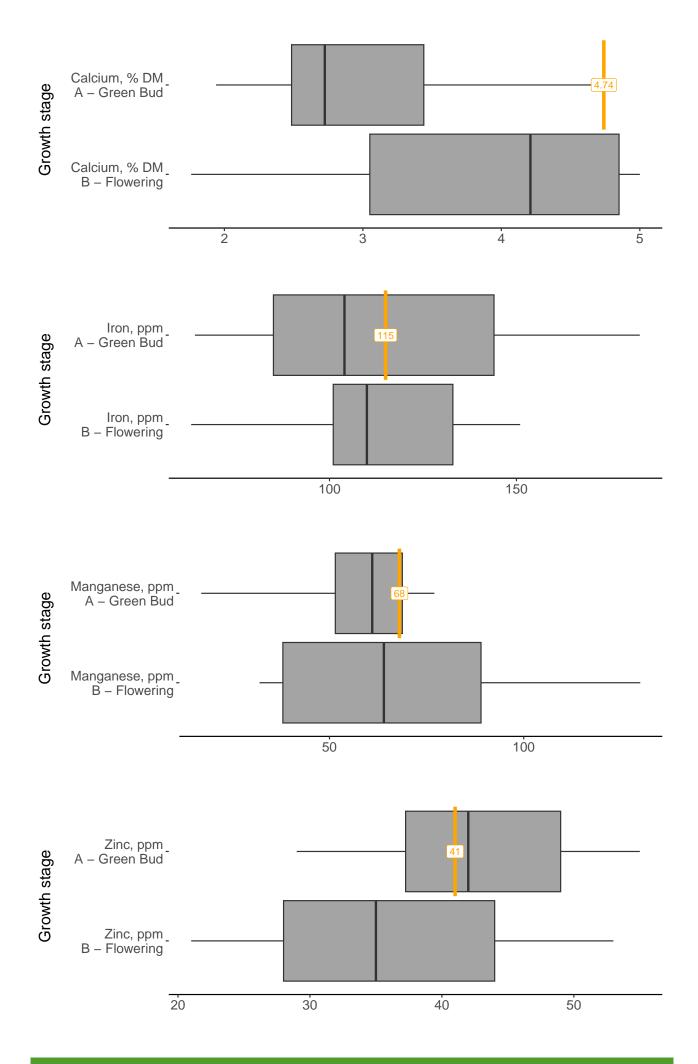
Total solar radiation across YEN entries is generally less in the north and more in the south.

We estimate that the biophysical limit for annual light capture is 80%.

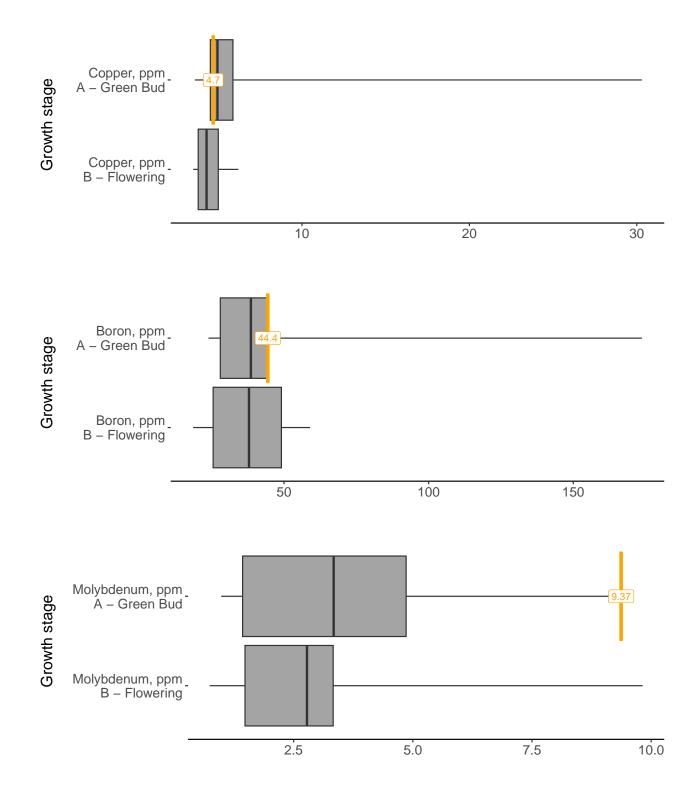
#### **Nutrient capture**

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 three pages) and seeds (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. Lancrop Laboratories provide leaf analyses for YEN. Samples are of the newest fully expanded leaf. 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.





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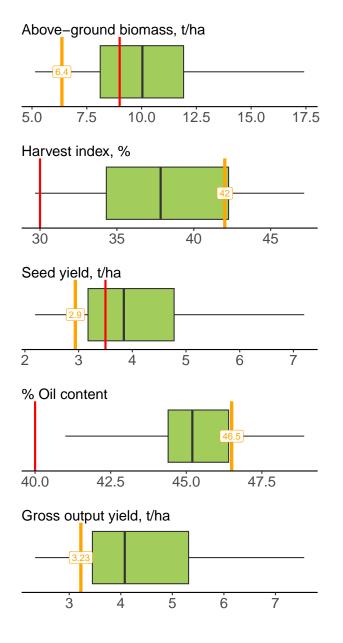
# **YIELD ANALYSIS**

#### **Yield formation**

The graphs below show the yield components, and quality parameters for your crop, determined from the samples that you provided. These tell us about the history of your crop because the key yield components are determined sequentially. These 'components of yield' help to indicate the stage(s) through the season at which your crop deviated from normal (represented by the benchmark value).

- Seeds/m<sup>2</sup>: This is determined during a 2-3 week period starting from mid-late flowering. More seeds are set when the rate of canopy photosynthesis is high.
- Thousand seed weight: Seed filling depends mainly on photosynthesis after pod development and is therefore reliant on canopy health and longevity. Relatively few sugars stored in the stem from before flowering are relocated to the seed.
- Oil content: The majority of oil is accumulated during the second half of seed filling. Therefore, prolonged healthy canopy duration and greater rate of photosynthesis during this period are important for high oil content.

Your seed yield is converted to Gross output, accounting for oil content, and is expressed as t/ha and % of potential).



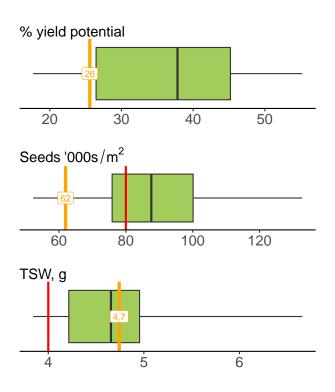
We have found that high yielding crops often have a high individual plant biomass.

Harvest index is the percentage of total biomass that was harvestable as seed.

Yields below 3.3t/ha are less than the UK long-term average.

Most oil accumulates during the second half of seed filling.

Gross output figures, are calculated from the seed yield, with an adjustment to take account of oil content.



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

Seed number is a critical yield component. At least 100,000 seeds/m<sup>2</sup> are often required to achieve a yield of 5 t/ha. Photosynthesis during a 19–25-day period after mid-flowering determines seed set

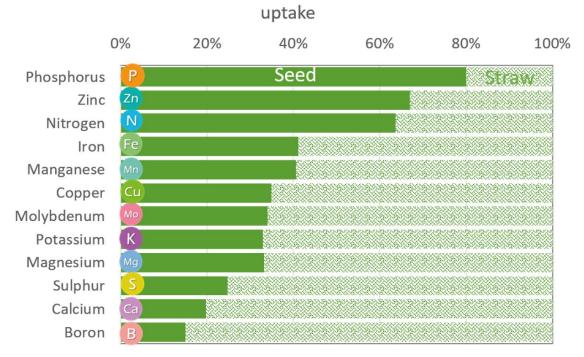
Warmth, drought, disease or early desiccation all curtail the seed-filling period. Estimates suggest a yield reduction of 1–2% for each day of seed filling lost.

# **CROP NUTRITION POST-MORTEM**

#### Seed Analyses

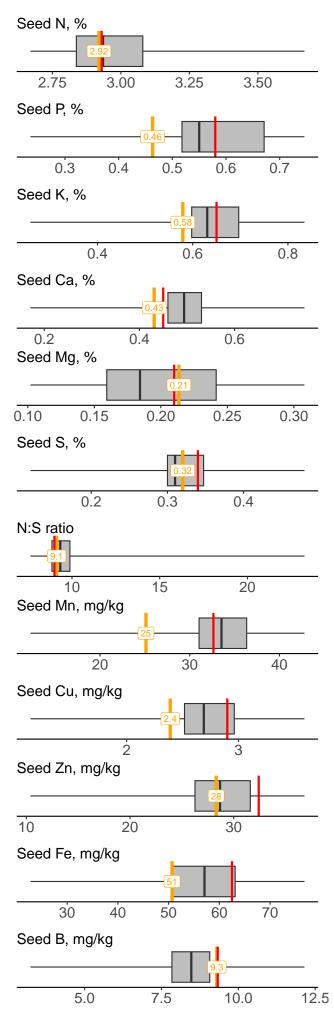
The YEN has trail-blazed use of grain analysis to provide an overall post-mortem on each crop's nutrition.

- Results from ~350 YEN OSR samples analysed suggest that the nutrients harvested in the seed for many crops is on the low side, and many crops could be deficient.
- YEN Nutrition was therefore launched in 2020 to provide an opportunity for the sharing of grain/seed analysis, yield, nutrient input data, to further our understanding 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 OSR store most of their N and P in the grain but most of their K in the straw (as estimated from analyses of feed materials).



Nutrient distribution at oilseed rape harvest, % final

- This year we are using YEN-low values (i.e. lower quartiles from all past YEN data the boundary between the bottom quarter and top three-quarters of all YEN values since 2013) as comparators 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 and Zn, so we assume they can be applied for all nutrients in all crops.
- As there is uncertainty around the critical level of each nutrient in the seed which indicates a deficiency, the following benchmarking-charts provide the best means of identifying the nutrient(s) most likely to have limited your crop compare your value with the mid-half of all the other YEN entries.
- 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.



If seed N is less than 3% this is likely to impact negatively on yield due to a low N supply.

Phosphorus values are assumed in the AHDB nutrient management guide to have a standard value of 0.9% P in seed.

Potassium values are assumed in the AHDB nutrient management guide to have a standard value of 0.55%.

Plant calcium levels tend to reflect adequacy of moisture supplies. Most of the plant's calcium remains in the stem at harvest.

Magnesium has a principal role in plants as an essential component of chlorophyll.

Sulphur is required for oil synthesis and is important for storage protein formation.

Sulphur is required in proportion to N supplies. High N:S ratios of around 9 and above indicate likely S deficiency.

Manganese regulates key enzymes involved in protein synthesis, lipid metabolism and photosynthesis.

Copper is required for production of viable pollen for seed production, maintenance of the cell wall structure and is an essential component of many proteins.

Zinc is a component of enzymes involved in photosynthesis, sugar formation and protein synthesis.

Iron is required by chloroplasts for metabolic reactions including photosynthetic electron transport and chlorophyll biosynthesis.

Boron deficiency leads to abnormal cell division, which affects growing points causing tissues to become distorted. Typical seed concentrations reported in public literature are 20 mg/kg.

# **SUMMARY**

#### The 2023-24 competition:

- Congratulations and thank you for providing the information necessary to complete this report; the collective effort of all YEN contributors serves to maximise the value of the results that can be reported and deductions made. We call this approach 'share-to-learn', and believe that the whole industry would benefit by making this approach their normal practice.
- This year, oilseed YEN consisted of 32 oilseed rape (OSR) crops (of which 26 completed and submitted their yields). The more participants we have, the more robust and confident we can be in the conclusions and comparisons that we make, both at the individual 'benchmarking' level, and when analysing the whole set of data.
- This years marks the 8th year for Oilseed YEN. As each 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.
- The winning yield (gross output) in 2024 was 7.56 t/ha (in Kent), an amazing achievement. This was also the winning % of potential yield at 55% of the potential yield of 13.69 t/ha.
- The average gross-output yield for OSR crops in Oilseed YEN in 2024 was 4.44 t/ha, which was lower than the 2023 average. DEFRA yields for 2024 have decreased from 3.11 t/ha in 2023 to 2.81 t/ha.
- In 2023-24, wet conditions over autumn and winter resulted in many crops sitting in wet soil over the winter months which has been shown to be detrimental for the yield prospects of OSR. CSFB pressure was generally not high, but there were a few hot spots leading to crop failures and crops with reduced vigour. Very dull conditions during April and May are likely to have limited the number of pods and seeds that were set. On average the number of seeds set in the YEN crops was moderate at about 87,500/m<sup>2</sup>. Previous years have shown that crops generally need >100,000 seeds/m<sup>2</sup> to have a good chance of achieving > 5t/ha. June was sunny, so early seed filling would not have been limited. However, later seed filling, and seed filling more generally for later developing crops, would have been reduced by dull conditions in July. In general, conditions this season did not support the production of high yielding oilseed rape crops.

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 & yield:

- High YEN yields have generally been associated with large plants with many seeds. Your yield arose from a low biomass and a high harvest index.

- Your crop is estimated to have had a TSW of 4.7 g, which is a normal TSW. TSW can be small either because of low storage capacity or poor conditions for filling.

- Your is crop estimated to have contained 61976 seeds/m2 at harvest, which is a low number of seeds/m2. Crops with less than 80,000 seeds/m2 may limit yield.

#### **Crop Nutrition:**

- Your grain is estimated to have had 2.92% N. Less than 2.93% indicates a need for further checks on N nutrition.

- The calculated seed N offtake for your crop was 78 Kg/ha. If oilseed N offtake is less than 100 kg/ha, yield was probably constrained by low N supply, or poor N recovery by the roots.

- Your seed is estimated to have had 0.46% P. Less than 0.58% indicates a need for further checks on P nutrition.

- Your seed is estimated to have had 0.58% K. Less than 0.63% indicates a need for further checks on K nutrition.

- Your seed is estimated to have had 0.32% S. Less than 0.34% indicates a need for further checks on S nutrition.

- Your seed is estimated to have had 25.12mg/kg Mn. Less than 32.64 mg/kg indicates a need for further checks on Mn nutrition.

- Your seed is estimated to have had 9.3mg/kg B. Less than 9.33 mg/kg indicates a need for further checks on B nutrition.

# YIELD ENHANCEMENT NETWORK RELATED INITIATIVES



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.



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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.

# legumES

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

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

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

# **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.