Spring Barley

GROWING FOR THE MARKET

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Limagrain
As growers, we are comfortable with agronomic considerations but perhaps the jargon of the end-users is less familiar, so we hope this Marketing Lowdown will help.

**Provisioning Genetic Solutions for Growers**

Just how much bigger can the UK spring barley crop get? And where will all of that barley go? Which varieties will perform and which varieties will be in demand?

Up until 2012, the spring barley area was relatively steady at about 600,000 ha. Autumn 2012 was one to forget and as a consequence the spring barley crop area leapt to over 900,000 ha in 2013. Plantings did fall back in 2014, but concerns about blackgrass and the ‘three crop rule’ have ensured that the area hasn’t fallen below 650,000 ha since; indeed it has shown a steady increase to the estimated 685,000 ha planted last spring, with surveys suggesting a further increase in 2017.

The domestic demand for malting barley is relatively steady at between 1.75 and 2.0 million tonnes. Even without a further increase in the spring crop, this means that we will have a significant surplus from harvest 2017. Any surplus will have to be exported or find its way into animal feed. There is always export demand, although another desperate bad French harvest is possible, it is unlikely so unless you are close to a port with established export potential, over reliance on a premium for export is a risky strategy.

**So what about variety choice?**

Whenever we discuss spring barley, we always focus on the malting markets and the malting varieties. We should never overlook the fact that a lot of spring barley is grown on mixed farms for home use, or is destined to go into local feed homes. Here, grain yield, specific weight and straw yield, are king. These growers should look closely at the feed credentials of varieties, as not all malting barleys make the best feed varieties.

For the majority of growers and particularly those in Scotland and the north, the domestic demand for brewing and distilling will drive variety choice. Dual purpose varieties are always the best bet and non-GN varieties are a must for the distilling market, but before planting, it is always advisable to talk to your local traders and maltsters to be sure of growing the right varieties to the specifications they require.

**Non-GN**

Glycosidic Nitriles (GN) are produced at high levels by some barley varieties when they are malted. The use of these varieties in the distilling industry can, under certain conditions, produce significant levels of a potentially harmful compound called ethyl carbamate. The synthesis of these compounds is controlled by a small piece of DNA. Its identification has allowed Limagrain UK to select varieties that do not produce Glycosidic Nitriles. These varieties are described as non-GN varieties and are now those preferred by the distilling industry.

**Grain Distilling**

Grain distilling uses malted barley, but with the addition of unmalted grains, which are steam cooked under pressure to make the starch more soluble in water. Following fermentation, the wort is distilled in a Patent or Coffey still, in a continuous process.

**Malt Distilling**

Malt whisky is made from malted barley, water and yeast. Batch distillation of the spirit follows a traditional fermentation process. Maltsters typically buy barley at less than 1.65% grain nitrogen for malt distilling.

**Table 1: Limagrain Variety Market Options**

<table>
<thead>
<tr>
<th>Variety</th>
<th>Malting Approval for Brewing Use</th>
<th>Malting Approval for Distilling Use</th>
<th>Overall Malting</th>
</tr>
</thead>
<tbody>
<tr>
<td>CONCERTO</td>
<td>F</td>
<td>F</td>
<td>F</td>
</tr>
<tr>
<td>ODYSSEY</td>
<td>F</td>
<td>F</td>
<td>F</td>
</tr>
<tr>
<td>OCTAVIA</td>
<td>F</td>
<td>F</td>
<td>F</td>
</tr>
<tr>
<td>SIENNA</td>
<td>F</td>
<td>F</td>
<td>F</td>
</tr>
<tr>
<td>LG OPERA</td>
<td>T</td>
<td>P</td>
<td>P</td>
</tr>
<tr>
<td>OLYMPUS</td>
<td>N</td>
<td>N</td>
<td>N</td>
</tr>
<tr>
<td>BELGRAVIA</td>
<td>N</td>
<td>N</td>
<td>N</td>
</tr>
</tbody>
</table>

**Dual Purpose Varieties**

Dual purpose malting barley is that, after testing by the IBD, have proved to be suitable for both brewing and malt distilling. The specific requirements of the two markets can be quite different, particularly in the levels of grain nitrogen required. Malt distillers typically need barley with a nitrogen content below 1.65%, whereas brewers look for nitrogen content of between 1.65% and 1.85%. Growers should check the specific requirements of their chosen end-market and tailor their agronomy accordingly.

**Marketing Lowdown**

Limagrain data. May be suited of growing the right varieties to the specifications they require.
<table>
<thead>
<tr>
<th>Feature</th>
<th>Opera</th>
<th>Sienna</th>
<th>Octavia</th>
<th>Concerto</th>
<th>Odyssey</th>
<th>Olympus</th>
<th>Belgravia</th>
<th>Ovation</th>
<th>Westminster</th>
</tr>
</thead>
<tbody>
<tr>
<td>Specific weight (kg/hl)</td>
<td>66.2</td>
<td>70.4</td>
<td>66.2</td>
<td>68.8</td>
<td>68.0</td>
<td>66.4</td>
<td>68.2</td>
<td>66.1</td>
<td>69.8</td>
</tr>
<tr>
<td>Screenings % 2.25 mm</td>
<td>2.6</td>
<td>1.8</td>
<td>1.7</td>
<td>1.4</td>
<td>1.6</td>
<td>2.3</td>
<td>2.1</td>
<td>1.6</td>
<td>-</td>
</tr>
<tr>
<td>Screenings % 2.5 mm</td>
<td>6.9</td>
<td>4.1</td>
<td>4.1</td>
<td>3.2</td>
<td>4.1</td>
<td>5.7</td>
<td>5.1</td>
<td>4.3</td>
<td>-</td>
</tr>
<tr>
<td>Nitrogen content (%)</td>
<td>1.35</td>
<td>1.42</td>
<td>1.38</td>
<td>1.45</td>
<td>1.42</td>
<td>1.47</td>
<td>-</td>
<td>1.38</td>
<td>-</td>
</tr>
<tr>
<td>Water extract (kg/ha)</td>
<td>316.2</td>
<td>315.6</td>
<td>316.1</td>
<td>316.0</td>
<td>314.0</td>
<td>312.3</td>
<td>-</td>
<td>-95.4</td>
<td>-</td>
</tr>
<tr>
<td>Glycosidic Nitrile (GN)</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td><strong>YIELD AND MARKET COMMENT</strong></td>
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<tr>
<td>New to the AHDB Recommended List 2017/18. A very high yielding non-GN variety under testing for both brewing and distilling.</td>
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<tr>
<td>High yielding non-GN dual use malting spring barley with provisional IBD approval for both brewing and distilling.</td>
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<tr>
<td>Full approval by the IBD for brewing and malt distilling. Octavia is a high yielding variety, specifically in the key growing regions of the east and north.</td>
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<tr>
<td>Concerto is a market leader, fully IBD approved for brewing and distilling. An established variety for which there is good demand.</td>
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<tr>
<td>Odyssey is a high yielding fully IBD approved variety for brewing and distilling.</td>
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<tr>
<td>Olympus has provisional approval by the IBD for the malt and grain distilling category. In the north, Olympus outyields Belgravia by 1%.</td>
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<tr>
<td>Belgravia is the only feed barley with full IBD approval for malt and grain distilling.</td>
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<tr>
<td>The highest yielding spring barley with full IBD approval for both brewing and distilling.</td>
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<tr>
<td>An ideal distilling variety with good specific weight, low screenings and high enzyme activity.</td>
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</tr>
<tr>
<td><strong>QUALITY COMMENT</strong></td>
<td>Good grain quality attributes combined with a very high hot water extract and low grain nitrogen.</td>
<td>Good grain characteristics combined with very low nitrogen % and very high hot water extract.</td>
<td>Good grain characteristics combined with very low nitrogen % and very high hot water extract.</td>
<td>High specific weight, low screenings, low grain N and very high hot water extract.</td>
<td>Low screenings, good specific weight, low grain nitrogen, with high hot water extract.</td>
<td>Non-GN variety with good grain quality, combined with a high grain nitrogen.</td>
<td>An ideal distilling variety with good specific weight, low screenings and high enzyme activity.</td>
<td>Very high yields compensate for a lower specific weight than traditional feed varieties.</td>
<td>Good grain quality with a bold grain and low sieving losses.</td>
</tr>
<tr>
<td>Tilling potential*</td>
<td>Medium / High</td>
<td>Medium / High</td>
<td>Medium / High</td>
<td>Low / Medium</td>
<td>Medium</td>
<td>Medium</td>
<td>Medium</td>
<td>Medium / High</td>
<td>Medium</td>
</tr>
<tr>
<td>Resistance to lodging</td>
<td>6</td>
<td>7</td>
<td>6</td>
<td>6</td>
<td>6</td>
<td>7</td>
<td>7</td>
<td>7</td>
<td>7</td>
</tr>
<tr>
<td>Straw height (cm)</td>
<td>72</td>
<td>79</td>
<td>77</td>
<td>79</td>
<td>75</td>
<td>75</td>
<td>80</td>
<td>73</td>
<td>83</td>
</tr>
<tr>
<td>Ripening (+/- Concerto)</td>
<td>-1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>-1</td>
</tr>
<tr>
<td>Resistance to lodging</td>
<td>8</td>
<td>7</td>
<td>6</td>
<td>8</td>
<td>8</td>
<td>9</td>
<td>8</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>Mildew</td>
<td>(9)</td>
<td>9</td>
<td>9</td>
<td>8</td>
<td>9</td>
<td>9</td>
<td>9</td>
<td>(8)</td>
<td>(9)</td>
</tr>
<tr>
<td>Yellow rust</td>
<td>(6)</td>
<td>(7)</td>
<td>(8)</td>
<td>8</td>
<td>8</td>
<td>(8)</td>
<td>8</td>
<td>8</td>
<td>6</td>
</tr>
<tr>
<td>Brown rust</td>
<td>5</td>
<td>5</td>
<td>5</td>
<td>3</td>
<td>6</td>
<td>6</td>
<td>5</td>
<td>6</td>
<td>6</td>
</tr>
<tr>
<td>Rhynchosporium</td>
<td>5</td>
<td>6</td>
<td>6</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>Ramularia</td>
<td>6</td>
<td>8</td>
<td>7</td>
<td>6</td>
<td>6</td>
<td>7</td>
<td>6</td>
<td>5</td>
<td>7</td>
</tr>
<tr>
<td><strong>AGRANOMIC / DISEASE COMMENT</strong></td>
<td>Sienna has a very good agronomic profile, good straw characteristics, combined with solid disease resistance and excellent grain quality. Sienna has agronomic attributes considered important for the feed sector.</td>
<td>A shorter strawed variety with very good disease resistance for key diseases of the north. Rhynchosporium and Ramularia similar maturity to Concerto.</td>
<td>Good resistance to lodging and brackling. Good mildew resistance. Ramularia levels should be monitored and robust fungicide treatment considered, for control of this yield robbing disease.</td>
<td>Short, with good brackling resistance. Good all-round disease resistance. Nitrogen applications may need to be reviewed if aiming for high grain nitrogen contracts.</td>
<td>Olympus has good lodging resistance and an improved disease resistance profile.</td>
<td>Stiff strawed variety with good resistance to brackling. Excellent resistance to mildew, combined with good resistance to Rhynchosporium and Ramularia.</td>
<td>Ovation offers good straw characteristics combined with a good disease resistance package. Monitor for leaf rusts and treat appropriately.</td>
<td>Long, relatively stiff straw with good resistance to brackling. Very good resistance to all diseases, especially mildew, Ramularia and Rhynchosporium.</td>
<td></td>
</tr>
<tr>
<td>Overture x Tantarn</td>
<td>Chronic x Genie</td>
<td>Odyssey x SY Universal</td>
<td>Ministrel x Westminster</td>
<td>Concerto x Quench</td>
<td>Genie x Tesla</td>
<td>Ministrel x Westminster</td>
<td>Odyssey x Tesla</td>
<td>NSL 97-5547 x Barke</td>
<td></td>
</tr>
</tbody>
</table>
Sienna has the best specific weight on the AHDB RL 2017/18 - a trait seen consistently across all types of trial.

Breeder’s Comment

Sienna is also a desirable feed variety, particularly as long-time favourites, such as Westminster, Kelim and Waggon have now been removed from the AHDB RL 2017/18.

Sienna is similar to Westminster and shares many of the agronomic attributes considered of high importance by livestock farmers. Sienna offers excellent straw characteristics, in combination with a strong disease resistance package, which accounts for the variety’s very good untreated yield in trials.

Straw quantity and quality are important attributes for livestock growers and should be taken into consideration, along with high grain yield, when decision-making.

The following chart provided by Agrii – Throws Farm shows both grain and straw yield for a range of spring barley varieties in trials, in 2015.

Varieties with a high specific weight not only produce attractive samples, but offer security for on-farm performance. They appear more robust in terms of yield performance, especially in years of induced stress, due to delayed nutrient treatments or erratic weather patterns and drought situations.

Sienna has the best specific weight on the AHDB RL 2017/18.

Sienna has relatively tall straw like Concerto, but offers good resistance to lodging and brackling.

The variety has a good disease resistance profile backed up by its high untreated grain yield in trials.

The drive for higher yields in new varieties seems to correlate to a fall in specific weights. Sienna bucks this trend and has the best specific weight on the new AHDB RL 2017/18. Specific weight is an important agronomic attribute to growers in the feed sector.

Both high grain yield and high straw yield (within green box) are important considerations for livestock farmers when selecting varieties. Sienna, Olympus and Ovation have shown very high yield potential in trials and higher tillering capabilities, suggesting higher straw yield potential.

Sienna has the best specific weight on the AHDB RL 2017/18.
**BELGRAVIA CONCERTO**

- **Straw Height (cm)**: 8
- **Resistance to Lodging**
  - Ramularia: 9
  - Brown Rust: 9
  - Mildew: 8
  - Rhynchosporium: 6
  - Mildew: 9
  - Yellow Rust: 8
  - Brown Rust: 5
  - Rhynchosporium: 4
  - Ramularia: 6

- **Ripening (+/- Concerto)**
  - Ripening: 9
  - Ripening (+/- Concerto): 9

**DISEASE RESISTANCE**

- **Specific Weight**
  - OLYMPIUS: 66.4
  - CONCERTO: 66.8
  - BELGRAVIA: 68.2

- **Nitrogen Content (%)**
  - OLYMPIUS: 1.38
  - CONCERTO: 1.39
  - BELGRAVIA: 1.42

**Breeder's Comment**

- Concerto continues to be the benchmark variety for the malting and distilling industry, since its introduction in 2009. It produces high yields of malting quality grain, suitable for the majority of outlets, both in the UK and abroad.

**Olympus**

- **Straw Height (cm)**: 6
- **Resistance to Lodging**
  - Ramularia: 9
  - Brown Rust: 9
  - Mildew: 8
  - Rhynchosporium: 6
  - Mildew: 9
  - Yellow Rust: 8
  - Brown Rust: 5
  - Rhynchosporium: 4
  - Ramularia: 6

- **Ripening (+/- Concerto)**
  - Ripening: 9
  - Ripening (+/- Concerto): 9

**DISEASE RESISTANCE**

- **Specific Weight**
  - OLYMPIUS: 66.4
  - CONCERTO: 66.8
  - BELGRAVIA: 68.2

- **Nitrogen Content (%)**
  - OLYMPIUS: 1.38
  - CONCERTO: 1.39
  - BELGRAVIA: 1.42

**Breeder's Comment**

- Olympus is an exciting malting barley with promising yield and quality, approved by the IBD for both malt and grain distilling.

**Ovation**

- **Straw Height (cm)**: 6
- **Resistance to Lodging**
  - Ramularia: 9
  - Brown Rust: 9
  - Mildew: 8
  - Rhynchosporium: 6
  - Mildew: 9
  - Yellow Rust: 8
  - Brown Rust: 5
  - Rhynchosporium: 4
  - Ramularia: 6

- **Ripening (+/- Concerto)**
  - Ripening: 9
  - Ripening (+/- Concerto): 9

**DISEASE RESISTANCE**

- **Specific Weight**
  - OLYMPIUS: 66.4
  - CONCERTO: 66.8
  - BELGRAVIA: 68.2

- **Nitrogen Content (%)**
  - OLYMPIUS: 1.38
  - CONCERTO: 1.39
  - BELGRAVIA: 1.42

**Breeder's Comment**

- Olympus offers significantly higher yields than the current market-leading variety for this sector - Belgravia.

- Olympus shows consistently high yields over seasons and regions - a valuable asset in our increasingly variable climate.

- In the north, Olympus out-yields Concerto by 10% and Belgravia by a significant 12%.

**Oxbridge**

- **Straw Height (cm)**: 6
- **Resistance to Lodging**
  - Ramularia: 9
  - Brown Rust: 9
  - Mildew: 8
  - Rhynchosporium: 6
  - Mildew: 9
  - Yellow Rust: 8
  - Brown Rust: 5
  - Rhynchosporium: 4
  - Ramularia: 6

- **Ripening (+/- Concerto)**
  - Ripening: 9
  - Ripening (+/- Concerto): 9

**DISEASE RESISTANCE**

- **Specific Weight**
  - OLYMPIUS: 66.4
  - CONCERTO: 66.8
  - BELGRAVIA: 68.2

- **Nitrogen Content (%)**
  - OLYMPIUS: 1.38
  - CONCERTO: 1.39
  - BELGRAVIA: 1.42

**Breeder's Comment**

- Olympus is shorter than Odyssey with good straw attributes, combined with a good disease resistance profile and a similar maturity to Concerto.

**Westminster**

- **Straw Height (cm)**: 6
- **Resistance to Lodging**
  - Ramularia: 9
  - Brown Rust: 9
  - Mildew: 8
  - Rhynchosporium: 6
  - Mildew: 9
  - Yellow Rust: 8
  - Brown Rust: 5
  - Rhynchosporium: 4
  - Ramularia: 6

- **Ripening (+/- Concerto)**
  - Ripening: 9
  - Ripening (+/- Concerto): 9

**DISEASE RESISTANCE**

- **Specific Weight**
  - OLYMPIUS: 66.4
  - CONCERTO: 66.8
  - BELGRAVIA: 68.2

- **Nitrogen Content (%)**
  - OLYMPIUS: 1.38
  - CONCERTO: 1.39
  - BELGRAVIA: 1.42

**Breeder's Comment**

- Westminster continues to offer growers competitive yields on-farm, with good agronomic attributes.
Spring Barley yield potential has increased significantly in the last ten years with breeders pushing for higher yields, combined with good agronomic characteristics and end-use attributes. New varieties added to the AHDB Recommended List are 10%+ higher yielding than Concerto, which was introduced in 2009, with malting varieties now having equal or better yield potential than standard feed varieties – thanks to breeders’ influence on germplasm.

Limagrain UK have a very successful breeding programme and are interested in driving the additional yield benefits of new varieties and the improved agronomic attributes, which may influence variety performance, both on-farm and with the end-user.

It is important that growers recognise that additional yield improvements may have implications on how we grow spring barley, to achieve both high yield and the contractual specifications of the chosen end market. Limagrain continue to invest in trials: both internally and externally with other parties, to evaluate the agronomic requirements of the spring barley crop and the subtle differences between varieties, to ensure both high yield and end-use specifications are met. Areas of interest include: sowing date, seed rate, tillering ability and additional nitrogen strategies – all key attributes necessary for ensuring good crop performance, which we will now look at in more detail.

Limagrain do not advise definitive seed rates for spring barley and can only suggest suitable seeding rates based on a breeder’s knowledge of the variety, gained through previous experience of drilling date, soil conditions and yield performance on the farm are even more important for establishing final target populations.

Limagrain have carried out trials for three consecutive years looking at drilling date and sowing rate, in both Scotland and England, to determine applicable seed rate figures. Chart 1 (below) shows a three year data set from a trial site in Norfolk for a range of Limagrain varieties compared to the control varieties; Concerto and Propino, at three seed rates with a standard 350 seeds/m².

Drilling date certainly appears to have an influence on final yield potential, but we think it’s important to stress that very early drilling should only be pursued if weather and soil conditions, including temperature, allow for good germination and plant establishment. Patience is a virtue, especially regarding the sowing of any spring crop, and waiting until conditions are favourable, is essential.

The conclusion of three years of work suggests that a starting point of 350 seeds/m² would appear to be the optimum for most varieties in ideal growing conditions. This figure can then be either increased or decreased depending on the situation, as outlined previously, this would concur with standard seed rates of around 325 - 375 seeds/m² being used by growers on-farm today.

Limagrain have a theory that if spring barley yields have increased by 10%+ then perhaps the conventional approach to the crops fertiliser regime should be investigated to see if additional yield performance can be obtained with higher rates of nitrogen. Of course, this is not straightforward, as the final grain nitrogen % cannot be compromised, especially if growing for the malt distilling market, which requires a low grain nitrogen content.

Exploring datasets from trials in 2015 and 2016 of tiller counts vs. yield performance, it is very evident that establishing and more importantly ensuring a final tiller count of around 775/m² will ensure full yield potential. A lower tillering variety, such as: Concerto, will achieve very high yields if this target figure is met, and consideration for either a higher seeding rate or additional nitrogen inputs if plant counts are low, should be implemented. Certainly, Concerto suffers severely if low tiller counts are obtained, whereas the newer varieties would appear to compensate better, due to the higher tiller counts achievable from lower plant counts, if the season dictates.

Interestingly, trials would suggest that final tiller counts can be pushed over 1000/m² in very fertile soil conditions. Results would suggest no additional yield performance over the 775/m² final tiller target, and additional negative agronomic traits may be induced, such as lower specific weights, increased lodging and disease pressure.

Limagrain have been recording tiller counts for several years in Scotland, and data very strongly suggests that newer varieties are producing higher tiller counts, with the benefit of increased yield. Varieties with higher tiller counts also show benefits in situations of stress, i.e. drought, and show that they will compensate where plant numbers are low, whereas low tillering varieties are limited in their capacity to compensate. Interestingly, the target final tiller number in the AHDB Barley Growth Guide is 775/m² (3 shoots/plant), and by looking at both trials and farm plant populations this appears to be underachieved in many situations, suggesting that full yield potential is not being reached.

Limagrain have a comprehensive database for variety tiller counts, and Chart 2 (above) shows that the newer varieties, over three years, do have higher tiller counts than the older control varieties; Concerto and Propino. Exploring datasets from trials in 2015 and 2016 of tiller counts vs. yield performance, it is very evident that establishing and more importantly ensuring a final tiller count of around 775/m² will ensure full yield potential. A lower tillering variety, such as: Concerto, will achieve very high yields if this target figure is met, and consideration for either a higher seeding rate or additional nitrogen inputs if plant counts are low, should be implemented. Certainly, Concerto suffers severely if low tiller counts are obtained, whereas the newer varieties would appear to compensate better, due to the higher tiller counts achievable from lower plant counts, if the season dictates.

Interestingly, trials would suggest that final tiller counts can be pushed over 1000/m² in very fertile soil conditions. Results would suggest no additional yield performance over the 775/m² final tiller target, and additional negative agronomic traits may be induced, such as lower specific weights, increased lodging and disease pressure.

Higher grain nitrogen contents, as required by the brewing and grain nitrogen contracts, should offer opportunities for driving additional yield potential with higher rates of nitrogen, while still achieving the specific grain nitrogen %. The importance of what market you are growing for and the grain nitrogen content required cannot be underestimated, as this will dictate both variety choice and agronomic practice.

Nitrogen Interaction continues overleaf.
The newer varieties; Olympus, Octavia and Sienna are compared to Concerto – looking at three seed rates, with a standard nitrogen treatment of 120 kg/ha against a higher nitrogen rate of 150 kg/ha (Chart 3).

Points of interest:
- Higher nitrogen rate of additional 30 kg/ha at growth stage 12-20 gave a yield increase over standard nitrogen rate, over all seed rates.
- Additional nitrogen to the lower tillering varieties; Concerto and Olympus, at the lower seed rate (250 seeds/m²) increased both tiller number and final yield significantly.
- Higher tillering varieties; Octavia and Sienna, were able to compensate for low seed rates.
- Nitrogen increased yield potential by enhancing plant health, ear fertility, grain size and extended grain fill period.
- Seed rate and nitrogen rate would appear to have no influence on final specific weight.
- Sienna has excellent specific weight in all trials.

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