Rice variety guide 2020–21
a compilation of Primefacts from the DPI website

David Troldahl, Compiling Editor
Research & Development Agronomist, NSW DPI, Yanco
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Introduction

NSW Department of Primary Industries (NSW DPI) has for many years played a major role in independent agricultural research in NSW, including all aspects of rice growing.

For the past five years, the rice partnership between NSW DPI, Sunrice and Agrifutures Australia has funded the rice breeding and rice quality side of research. NSW DPI also researches the agronomy, water, nutritional and pest and disease management aspects of the rice crop through separately funded projects, which have been in areas identified by NSW DPI as needing research; these have been supported by Agrifutures Australia.

NSW DPI Research and Development teams conduct applied, scientifically sound, independent research to advance the profitability and sustainability of our farming systems.

This publication is a collection of Primefacts that NSW DPI has published as outputs from the agronomy, crop nutrition and water use research projects. The Primefacts cover the selection of varieties for their agronomic and quality attributes as well as crop nutrition. Each variety has an individual Primefact and they are all collated in this book to allow growers to make an informed choice of what to grow.

NSW DPI also has two flagship publications for Australian rice growers: The Rice crop protection guide and the Rice growing guide, which are published each year along with the Rice field guide to pests, diseases and weeds in southern New South Wales. These are all part of the ongoing support to the local rice industry from NSW DPI.

All these publications can be found on the NSW DPI website (https://www.dpi.nsw.gov.au/agriculture/broadacre-crops/summer-crops).
Rice variety guide 2020–21

David Troldahl, Research & Development Agronomist, Yanco
Peter Snell, Rice Breeder, Yanco
Brian Dunn, Research Agronomist, Yanco Rice Extension, AgriFutures funded

Important management practices

- Plant a mix of varieties over a range of sowing dates and sowing methods to minimise the risk of a cold event reducing grain yield across all your crops.
- Sowing on time provides the best chance of avoiding sterility from cold at microspore and helps maximise whole grain yields with maturity occurring during mild temperatures.
- Use the NIR Tissue Test Service at panicle initiation (PI) to determine nitrogen topdressing requirements.
- Use red edge imagery, yield maps or cut/fill maps to target sampling in different zones. NDVI (normalised difference vegetation index) can only detect differences where PI nitrogen levels are below 80 kg N/ha.
- Start increasing water depth after PI so that 25–30 cm is achieved on the high side of the bays at microspore. Microspore occurs approximately 14–18 days after PI.
- For maximum whole grain millout consider grain development stage, field layouts and forecast weather conditions to determine the appropriate time for draining.

Table 1. Summary of rice yields (t/ha) 2019–20 season compared with five-year averages by region.

<table>
<thead>
<tr>
<th></th>
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<th></th>
</tr>
</thead>
<tbody>
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<td>Reziq</td>
<td>11.75</td>
<td>12.13</td>
<td>10.00</td>
<td>9.81</td>
<td>9.68</td>
<td>8.98</td>
<td>10.25</td>
<td>10.23</td>
<td>10.95</td>
<td>11.22</td>
</tr>
<tr>
<td>Sherpa</td>
<td>10.57</td>
<td>–</td>
<td>9.72</td>
<td>–</td>
<td>10.48</td>
<td>10.80</td>
<td>10.08</td>
<td>–</td>
<td>10.29</td>
<td>10.80</td>
</tr>
<tr>
<td>Opus</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>9.92</td>
<td>9.56</td>
<td>10.19</td>
<td>7.91</td>
<td>10.11</td>
<td>8.93</td>
</tr>
<tr>
<td>Langi</td>
<td>9.39</td>
<td>10.01</td>
<td>8.80</td>
<td>6.00</td>
<td>8.56</td>
<td>5.94</td>
<td>–</td>
<td>–</td>
<td>9.17</td>
<td>9.11</td>
</tr>
<tr>
<td>Topaz</td>
<td>9.22</td>
<td>10.06</td>
<td>8.13</td>
<td>5.30</td>
<td>9.33</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>8.92</td>
<td>9.45</td>
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<tr>
<td>Doongara</td>
<td>11.59</td>
<td>11.88</td>
<td>10.03</td>
<td>–</td>
<td>9.43</td>
<td>8.38</td>
<td>–</td>
<td>–</td>
<td>11.34</td>
<td>11.70</td>
</tr>
<tr>
<td>Koshikari</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>7.58</td>
<td>7.70</td>
<td>6.95</td>
<td>–</td>
<td>7.46</td>
<td>7.70</td>
</tr>
<tr>
<td>Illabong</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>11.05</td>
<td>10.28</td>
<td>4.22</td>
<td>–</td>
<td>10.80</td>
<td>10.28</td>
</tr>
<tr>
<td>Viand</td>
<td>9.95</td>
<td>9.56</td>
<td>9.34</td>
<td>10.08</td>
<td>9.13</td>
<td>10.00</td>
<td>5.20</td>
<td>0.93</td>
<td>9.56</td>
<td>9.55</td>
</tr>
<tr>
<td>All varieties</td>
<td>11.05</td>
<td>11.67</td>
<td>9.49</td>
<td>9.17</td>
<td>9.79</td>
<td>9.31</td>
<td>9.88</td>
<td>7.85</td>
<td>10.25</td>
<td>10.60</td>
</tr>
</tbody>
</table>

*Less than five years of commercial data. Plant Breeder’s Right granted by IP Australia. Yield data provided by SunRice Grower Services
Table 2. Rice variety agronomic characteristics 2020–21

<table>
<thead>
<tr>
<th>Variety</th>
<th>Yield potential</th>
<th>Maturity (days different to flower than Reiziq)</th>
<th>Seedling vigour 1 = weak 5 = strong</th>
<th>Cold stress tolerance 1 = weak 5 = strong</th>
<th>Shattering tolerance 1 = prone 5 = resistant</th>
<th>Lodging susceptibility 1 = prone 5 = resistant</th>
</tr>
</thead>
<tbody>
<tr>
<td>ReiziqA</td>
<td>100</td>
<td>Standard</td>
<td>4</td>
<td>1</td>
<td>1</td>
<td>5</td>
</tr>
<tr>
<td>SherpaA</td>
<td>106</td>
<td>−3</td>
<td>3</td>
<td>5</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>Opus</td>
<td>99</td>
<td>0</td>
<td>3</td>
<td>4</td>
<td>4</td>
<td>3</td>
</tr>
<tr>
<td>Langi</td>
<td>93</td>
<td>−2</td>
<td>3</td>
<td>3</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>TopazA</td>
<td>87</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Doongara</td>
<td>100</td>
<td>3</td>
<td>3</td>
<td>1</td>
<td>3</td>
<td>5</td>
</tr>
<tr>
<td>Koshihikari</td>
<td>85</td>
<td>3</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>1</td>
</tr>
<tr>
<td>Illabong</td>
<td>108</td>
<td>3</td>
<td>2</td>
<td>3</td>
<td>5</td>
<td>3</td>
</tr>
<tr>
<td>ViandA</td>
<td>97</td>
<td>−12</td>
<td>4</td>
<td>3</td>
<td>3</td>
<td>2</td>
</tr>
</tbody>
</table>

Yield potential – is based on results from experiments conducted in commercial fields. Yield as compared with ReiziqA at recommended sowing time and average growing conditions.

Maturity – days to flowering is from experiment measurements located in commercial fields across sowing methods, regions and at commercial nitrogen rates.

Seedling vigour – TopazA and Illabong have weak seedling vigour, so extra care is required at sowing to ensure good establishment.

Tolerance to cold stress – variety tolerance to cold at the reproductive stage. Rating is based on a variety’s inherent cold tolerance and plant height. Tall varieties gain less protection from deep water (25–30 cm) at microspore. Excess nitrogen increases susceptibility to cold-induced sterility.

Shattering tolerance – Variety tolerance to shattering is an important trait when delayed harvest occurs. It is important to give highest harvest priority to shattering prone varieties.

Lodging – lodging varies between seasons. In some seasons most varieties will lodge to some extent. Semi-dwarf varieties are most resistant to lodging, whilst tall-strawed varieties such as Koshihikari and YRK5 are susceptible and should only be drill sown.

Aerial sowing increases lodging potential in all varieties compared with drill-sowing. Lodging due to ‘haying-off’ is a result of draining rice too early before harvest and reduces yield and wholegrain millout.

Ideal sowing time – planting within the recommended sowing window (Table 3) allows fast, uniform crop establishment, highest probability of limited cold stress at microspore, and high grain quality at harvest.

The sowing windows are based on the performance of each variety in previous seasons and long-term average temperatures. Sowing before the recommended window can increase cold risk even more than sowing later.

The longer a crop grows before permanent water is applied, the slower the crop develops. It is important that crops planned for delayed permanent water are sown earlier than conventional drill crops to account for the delay. Aerial sown and dry broadcast crops should be sown later as they develop the fastest (Table 3).

Table 3. Recommended sowing/first flush dates for rice varieties, regions and sowing methods.

<table>
<thead>
<tr>
<th>Variety</th>
<th>MIA/CIA – Ideal sow/first flush time</th>
<th>Murray Valley – Ideal sow/first flush time</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Aerial / dry broadcast</td>
<td>Drill</td>
</tr>
<tr>
<td>Koshihikari, Doongara, Illabong</td>
<td>20 Oct to 5 Nov</td>
<td>10 to 25 Oct</td>
</tr>
</tbody>
</table>

# Do not aerial sow or dry broadcast Koshihikari or YRK5 as this will increase lodging potential
Recommended sowing rates

Rice growers should aim to achieve plant populations between 100 to 200 plants/m². Research shows that plant populations between 40 and 400 plants/m² achieve similar grain yields. Rice plants increase tillering and the number of grains per panicle to compensate for low plant density.

Rice should not be sown at rates higher than 150 kg/ha for any variety or sowing method.

To establish 200 plants/m² requires a maximum sowing rate of 150 kg/ha at a seed establishment percentage of 40–60%.

As little as 20% establishment will result in 100 plants/m², which is sufficient to achieve maximum grain yield.

Recommended sowing rates are based on seed size and varietal establishment percentages (Table 4). Smaller seeded varieties, such as Opus, have more seeds per kilogram, so using a lower sowing rate will achieve the same plant population.

Table 4. Sowing rates (kg/ha) required to meet plant population recommendations based on seed size and establishment vigour.

<table>
<thead>
<tr>
<th>Variety</th>
<th>Sowing rate (kg/ha)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reiziq, Illabong &amp; Topaz</td>
<td>150</td>
</tr>
<tr>
<td>Sherpa, Langi &amp; Viand</td>
<td>130</td>
</tr>
<tr>
<td>Opus, Koshihikari &amp; Doongara</td>
<td>120</td>
</tr>
</tbody>
</table>

Increasing sowing rates to compensate for poor field layout, unsatisfactory seedbed preparation or unreliable sowing method is rarely successful and not recommended.

Research has shown that lodging is increased by high plant populations in varieties with a high lodging potential.

Sowing rates may be decreased by 15–25% in reliable establishment conditions without compromising yield.

Variety characteristics

**Reiziq** – A semi-dwarf medium grain variety that has elongated grain length and high yield potential. It has strong establishment vigour and is resistant to lodging, but is moderately susceptible to cold temperatures during the reproductive period. Early harvest is recommended as it is a loose threshing variety with potential for shattering if left to stand in the field. Whole grain yields are relatively high.

**Sherpa** – A semi-dwarf medium grain variety that has high cold stress tolerance and moderate establishment vigour. It has high yield potential and maintains grain yield levels in cooler seasons, particularly in the Murray Valley. Sherpa is a hard threshing variety with good straw strength and is resistant to lodging.

**Opus** – A semi-dwarf short grain sushi variety that is only grown in the Murray Valley. Local experience generally indicates good yields, but it can occasionally be unpredictable. It has moderate establishment vigour, is resistant to lodging, but is moderately resistant to cold temperatures during the reproductive period. It is a pubescent variety and is susceptible to straighthead with symptoms present as floret sterility.

**Langi** – A semi-dwarf long grain soft cooking (low amylose) variety that is only grown in the MIA (Murrumbidgee Irrigation Area) and CIA (Colleambally Irrigation Area). It has moderate establishment vigour, cold stress tolerance and is moderately resistant to lodging. Early harvest is recommended, as it is a loose threshing variety with the potential for shattering if allowed to stand in the field.

**Topaz** – A semi-dwarf fragrant long grain variety that is only grown in the MIA and CIA. It has weak establishment vigour and care should be taken to ensure good establishment. Topaz is resistant to lodging, but is susceptible to cold temperatures during the reproductive period, which can significantly reduce grain yield. It must be sown at the correct time and deep water applied during the microspore period. It is also susceptible to straighthead.
Illabong – A semi-dwarf Arborio-style medium grain variety that has a high grain yield potential. It has moderate establishment vigour and sowing rates should be increased if the germination percentage is reduced due to post-flowering conditions experienced by the seed crop (you will be notified at seed issue). It has moderate cold stress tolerance and is moderately resistant to lodging.

Doongara – A semi-dwarf long grain hard cooking (high amylose) variety that has a low glycaemic index (GI) and is resistant to lodging. It is susceptible to cold temperatures during the reproductive period and must be sown at the correct time and have deep water applied during the microspore period. It is also susceptible to straighthead.

Koshihikari – A tall-strawed short grain premium Japanese variety. It is susceptible to lodging if high rates of nitrogen are applied pre-permanent water and should not be aerial sown. It is lower yielding, but a premium is paid to compensate. Reduce total applied nitrogen by 50% compared with Reiziq® and apply no more than 60% of total nitrogen pre-permanent water to minimise lodging. It is a very pubescent variety and is susceptible to straighthead with symptoms present as floret sterility.

Viand® – A short-season semi-dwarf medium grain variety, which has a similar yield potential to Reiziq® and provides a rice cropping option when late water allocations are allocated or after a canola or barley crop harvest. It has strong establishment vigour and is moderately resistant to cold temperatures during the reproductive period but is moderately susceptible to lodging. Viand® is better suited to drill sowing and nitrogen application split between pre-permanent water and PI to reduce lodging in high yielding crops.

**District variety experiment results**

All new varieties are tested across a range of years and locations within southern NSW before they are released. The performance of new varieties is compared with that of standard commercial varieties over a number of years and each variety’s response to different agronomic and commercial growing conditions is measured. The agronomic recommendations for each variety at release are based on the results of these district experiments.

Before release, each variety must also be assessed in the cereal chemistry laboratory and in taste testing trials to meet the strict quality characteristics and taste requirements of our customers in the marketplace. On the basis of their yield performance and the grain quality assessments from these experiments, a very small number of varieties ‘pass the grade’ to be new releases for growers.

Each year all the recommendations for all the varieties are reviewed to incorporate commercial experience and responses to different climatic and growing conditions.

**Acknowledgements**

We acknowledge the input provided by the SunRice Grower Services team in updating this publication.

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**Disclaimer:** The information contained in this publication is based on knowledge and understanding at the time of writing (July 2020). However, because of advances in knowledge, users are reminded of the need to ensure that information upon which they rely is up to date and to check currency of the information with the appropriate officer of the Department of Primary Industries or the user’s independent adviser.
Reiziq® growing guide

June 2020, Primefact 1644, 2nd edition

Brian Dunn, Research Agronomist, Yanco Agricultural Institute

Reiziq® is a semi-dwarf medium grain rice variety that has elongated grain length.

**Yield potential**

Reiziq® has a high potential grain yield (Table 1).

Table 1. Grain yield of Reiziq® from research experiments and commercial fields

<table>
<thead>
<tr>
<th>Variety</th>
<th>District</th>
<th>5 year experiment avg yields (t/ha)</th>
<th>5 year grower avg yields (t/ha)</th>
<th>Top 20% of growers 5 year avg yield (t/ha)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reiziq®</td>
<td>MIA/CIA</td>
<td>12.5</td>
<td>11.4</td>
<td>13.5</td>
</tr>
<tr>
<td></td>
<td>MV</td>
<td>11.6</td>
<td>9.9</td>
<td>12.4</td>
</tr>
</tbody>
</table>

**Establishment vigour**

Experiments show Reiziq® to have strong establishment vigour.

**Sowing method and date**

All sowing methods are suitable for growing Reiziq®. The recommended sowing and first flush windows for Reiziq® are listed in Table 2.

Table 2. Target sowing and first flush dates for Reiziq® across different sowing methods and regions

<table>
<thead>
<tr>
<th>Variety</th>
<th>MIA/CIA - Ideal sow/first flush time</th>
<th>Murray Valley – Ideal sow/first flush time</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Aerial / Dry Broadcast</td>
<td>Drill</td>
</tr>
</tbody>
</table>

Sowing Reiziq® earlier or later than recommended will increase the risk of exposure to low temperatures during microspore and flowering, which can reduce grain yield. Recommended
sowing times are aimed at ensuring the critical microspore and flowering periods align with the period of least risk of low temperatures (Figure 1).

Figure 1. Recommended sowing and first flush dates for Reiziq® and the subsequent panicle initiation (PI), microspore (MS) and flowering timings when sown in the recommended period for each district and sowing method. Hatched area shows time of least risk of low temperatures.

<table>
<thead>
<tr>
<th></th>
<th>October</th>
<th>November</th>
<th>December</th>
<th>January</th>
<th>February</th>
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</thead>
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<tr>
<td>MIA &amp; CIA</td>
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<td>Drill</td>
<td>Sowing</td>
<td>First flush</td>
<td>PI</td>
</tr>
<tr>
<td>Murray Valley</td>
<td>Aerial</td>
<td>Drill</td>
<td>Sowing</td>
<td>First flush</td>
<td>PI</td>
</tr>
</tbody>
</table>

**Sowing rate**

It is recommended that Reiziq® be sown at 120 to 150 kg/ha for all sowing methods, aiming to establish between 100 to 200 plants m². The lower seed rate can be used in reliable establishment conditions with accurate seed placement, without compromising yield.

**Cold tolerance**

Reiziq® has a moderate tolerance to cold stress during the early pollen microspore and flowering reproductive periods.

**Plant height**

Reiziq® is on average 81 cm in height at commercial nitrogen rates.

**Lodging potential**

Reiziq® has moderate resistance to lodging but it can be induced by applying excessive nitrogen pre-permanent water (PW). The impact of pre-PW nitrogen application rates on lodging of Reiziq® is shown in Figure 2.

**Grain shattering**

Early harvest of Reiziq® is recommended as it is susceptible to shedding grain once the crop is mature. It is the most prone of all current commercial varieties for shattering.

**Nitrogen management**

Reiziq® is a durable variety with a long plateau before grain yield declines or lodging becomes a problem from excess nitrogen application (Figure 2).

In warm seasons maximum grain yield can be achieved by applying all the required nitrogen pre-PW. However, in seasons where low temperatures occur during microspore or flowering excess pre-PW nitrogen can increase sterility and reduce grain yield.
It is recommended to apply between 220 and 350 kg/ha urea to Reiziq® pre-PW. Fields with a history of legumes may require less pre-PW nitrogen and some continuous cropped fields with heavy clay soils may require more pre-PW nitrogen.

As it is difficult to determine exactly how much nitrogen should be applied pre-PW, aim to apply 80 to 90% of the total required nitrogen pre-PW and then top up at PI if required.

Any major nitrogen variability within the field should be addressed with variable rate pre-PW nitrogen applications. Red edge imagery of previous rice crops grown in the field are a good resource for identifying within field nitrogen variability.

Soil type can have a large influence on a crops pre-PW nitrogen requirements. Self-mulching clay soils can require more nitrogen than lighter textured red-brown earth soils (Figure 3).

Figure 3. Grain yield of Reiziq® over a range of pre-PW nitrogen rates from two experiments on different soil types (no PI nitrogen applied). Both soil types had an intensively cropped history.
**Panicle initiation nitrogen**

For maximum grain yield with reduced lodging it is important to use red edge imagery and the NIR Tissue Test to determine PI nitrogen topdressing rates. Higher than required nitrogen rates applied at PI can increase lodging and reduce profitability.

Applying higher than required rates of nitrogen prior to permanent water increases a rice crops susceptibility to cold stress more than extra nitrogen applied at panicle initiation.

**Harvest**

Be prepared to commence harvest of Reiziq\(^b\) as soon as the grain moisture drops to 22%. Delaying harvest after the crop is mature will increase the risk of grain shedding and lodging and reduced grain quality.

**Acknowledgements**

Tina Dunn and Mark Groat are thanked for their contributions to this document.

Data presented and utilised in the development of this growing guide was obtained from the ‘Rice variety nitrogen and agronomic management’ project, PRJ-009790, 2015–20. This project has joint investment from AgriFutures and NSW DPI.
Sherpa\textsuperscript{\textregistered} growing guide

June 2020, Primefact 1645, 2\textsuperscript{nd} edition

Brian Dunn, Research Agronomist, Yanco Agricultural Institute

Sherpa\textsuperscript{\textregistered} is a semi-dwarf medium grain variety that has good cold stress tolerance.

Yield potential

The grain yield potential of Sherpa\textsuperscript{\textregistered} is 106\% of Reiziq\textsuperscript{\textregistered}.

Table 1. Grain yield of Sherpa\textsuperscript{\textregistered} from research experiments and commercial fields.

<table>
<thead>
<tr>
<th>Variety</th>
<th>5 year experiment average yields (t/ha)</th>
<th>5 year grower average yields (t/ha)</th>
<th>Top 20% of growers 5 year average yield (t/ha)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sherpa\textsuperscript{\textregistered}</td>
<td>12.8</td>
<td>10.3</td>
<td>12.6</td>
</tr>
</tbody>
</table>

Establishment vigour

Experiments show Sherpa\textsuperscript{\textregistered} to have moderate establishment vigour.

Sowing method and date

All sowing methods are suitable for growing Sherpa\textsuperscript{\textregistered}. The recommended sowing and first flush windows for Sherpa\textsuperscript{\textregistered} are listed in Table 2.

Table 2. Target sowing and first flush dates for Sherpa\textsuperscript{\textregistered} across different sowing methods and regions.

<table>
<thead>
<tr>
<th>Variety</th>
<th>MIA/CIA - Ideal sow/first flush time</th>
<th>Murray Valley – Ideal sow/first flush time</th>
</tr>
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<tbody>
<tr>
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<td>Aerial / Dry Broadcast</td>
<td>Drill</td>
</tr>
<tr>
<td>Sherpa\textsuperscript{\textregistered}</td>
<td>25 Oct to 10 Nov</td>
<td>20 Oct to 5 Nov</td>
</tr>
</tbody>
</table>

Sowing earlier or later than recommended will increase the risk of exposure to low temperatures during microspore and flowering, which can reduce grain yield. Recommended sowing times are aimed at ensuring the critical microspore and flowering periods align with the period of least risk of low temperatures (Figure 1).
Figure 1. Recommended sowing and first flush dates for Sherpa\textsuperscript{a} and the subsequent panicle initiation (PI), microspore (MS) and flowering timings when sown in the recommended period for each district and sowing method. Hatched area shows time of least risk of low temperatures.

<table>
<thead>
<tr>
<th>MIA &amp; CIA</th>
<th>Murray Valley</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aerial</td>
<td>Aerial</td>
</tr>
<tr>
<td>Drill</td>
<td>Drill</td>
</tr>
<tr>
<td>DPW</td>
<td>DPW</td>
</tr>
<tr>
<td>Sowing</td>
<td>Sowing</td>
</tr>
<tr>
<td>First flush</td>
<td>First flush</td>
</tr>
<tr>
<td>PI</td>
<td>PI</td>
</tr>
<tr>
<td>MS</td>
<td>MS</td>
</tr>
<tr>
<td>Flower</td>
<td>Flower</td>
</tr>
</tbody>
</table>

### Sowing rate

It is recommended that Sherpa\textsuperscript{a} be sown at 110 and 130 kg/ha for all sowing methods, aiming to establish between 100 to 200 plants m\textsuperscript{2}. The lower seed rate can be used in reliable establishment conditions with accurate seed placement, without compromising yield.

### Cold tolerance

Sherpa\textsuperscript{a} has a high tolerance to cold stress during the early pollen microspore and flowering reproductive periods.

### Plant height

Sherpa\textsuperscript{a} is on average 84 cm in height, 3 cm taller than Reiziq\textsuperscript{b}.

### Lodging potential

Sherpa\textsuperscript{a} is moderately resistant to lodging but it can be induced by applying excessive nitrogen pre-permanent water (PW). The impact of pre-PW nitrogen application rates on lodging of Sherpa\textsuperscript{a} is shown in Figure 2.

### Grain shattering

Sherpa\textsuperscript{a} has moderate susceptibility to shedding grain once the crop is mature. It does not shed grain as easily as Reiziq\textsuperscript{b}.

### Nitrogen management

Sherpa is a durable variety with a long grain yield plateau before yield declines or lodging becomes a problem from excess nitrogen application (Figure 2).

In warm seasons maximum grain yield can be achieved by applying all the required nitrogen pre-PW. However, in seasons where low temperatures occur during microspore or flowering excess pre-PW nitrogen can increase sterility and reduce grain yield.

It is recommended to apply between 220 and 350 kg/ha urea to Sherpa\textsuperscript{a} crops pre-PW (Figure 2). Fields with a history of legumes may require less pre-PW nitrogen and some continuous cropped fields with heavy clay soils may require more pre-PW nitrogen.
As it is difficult to determine exactly how much nitrogen should be applied pre-PW, aim to apply 80 to 90% of the total required nitrogen pre-PW and then top up at PI if required.

Any major nitrogen variability within the field should be addressed with variable rate pre-PW nitrogen applications. Red edge imagery of previous rice crops grown in the field are a good resource for identifying within field nitrogen variability.

Sherpa has similar nitrogen requirements to Reiziq to reach its maximum grain yield potential (Figure 3).

Figure 2. Sherpa grain yield (average, 10 and 90 percentile) and average lodging score (0=standing, 10=flat) results for pre-PW nitrogen application rates (no PI applied nitrogen). Results from 188 plots in 21 experiments conducted over 5 seasons covering a range of soil types, fertility levels and sowing methods.

Figure 3. Average grain yield for Sherpa compared to Reiziq across a range of pre-PW nitrogen application rates.
Panicle initiation nitrogen

For maximum grain yield with reduced lodging it is important to use red edge imagery and the NIR Tissue Test to determine PI nitrogen topdressing rates. Higher than required nitrogen rates applied at PI can increase lodging and reduce profitability.

Applying higher than required rates of nitrogen prior to permanent water increases a rice crops susceptibility to cold stress more than extra nitrogen applied at panicle initiation.

Harvest

Be prepared to commence harvest as soon as the grain moisture drops to 22%. Delaying harvest will increase the risk of lodging which can cause difficult harvesting conditions and reduce grain quality.

Acknowledgements

Tina Dunn and Mark Groat are thanked for their contributions to this document.

Data presented and utilised in the development of this growing guide was obtained from the ‘Rice variety nitrogen and agronomic management’ project, PRJ-009790, 2015–20. This project has joint investment from AgriFutures and NSW DPI.

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Opus\textsuperscript{a} growing guide

June 2020, Primefact 1646, 2\textsuperscript{nd} edition

Brian Dunn, Research Agronomist, Yanco Agricultural Institute

Opus\textsuperscript{a} is a semi-dwarf short grain sushi variety only grown in the Murray Valley.

**Yield potential**

The yield potential of Opus\textsuperscript{a} is the same as Reiziq\textsuperscript{b}.

<table>
<thead>
<tr>
<th>Variety</th>
<th>5 year experiment average yields (t/ha)</th>
<th>5 year grower average yields (t/ha)</th>
<th>Top 20% of growers 5 year average yield (t/ha)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Opus\textsuperscript{a}</td>
<td>11.8</td>
<td>11.1</td>
<td>11.6</td>
</tr>
</tbody>
</table>

**Establishment vigour**

Experiments show Opus\textsuperscript{a} to have moderate establishment vigour.

**Sowing method and date**

All sowing methods are suitable for growing Opus\textsuperscript{a}. The recommended sowing and first flush windows for Opus\textsuperscript{a} are listed in Table 2.

Table 2. Target sowing and first flush dates for Opus\textsuperscript{a} across different sowing methods in the Murray Valley

<table>
<thead>
<tr>
<th>Variety</th>
<th>Murray Valley - Ideal sow/first flush time</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Aerial / Dry Broadcast</td>
</tr>
<tr>
<td>Opus\textsuperscript{a}</td>
<td>20 to 31 Oct</td>
</tr>
</tbody>
</table>

Sowing earlier or later than recommended will increase the risk of exposure to low temperatures during microspore and flowering, which can reduce grain yield. Recommended sowing times are aimed at ensuring the critical microspore and flowering periods align with the period of least risk of low temperatures (Figure 1).
Sowing rate

It is recommended that Opus® be sown at 100 to 120 kg/ha for all sowing methods, aiming to establish between 100 to 200 plants m⁻². The lower seed rate can be used in reliable establishment conditions with accurate seed placement, without compromising yield.

Cold tolerance

Opus® has a moderately high tolerance to cold stress during the early pollen microspore and flowering reproductive periods.

Plant height

Opus® is a similar height to Reiziq®, on average 81 cm.

Lodging potential

Opus® is moderately resistant to lodging but it can be induced by applying excessive nitrogen pre-permanent water (PW). The impact of pre-PW nitrogen application rates on lodging of Opus® is shown in Figure 2.

Grain shattering

Opus® is moderately resistant to shedding grain once the crop is mature.

Nitrogen management

Opus® is a durable variety with a long plateau before grain yield declines or lodging becomes a problem from excess nitrogen application (Figure 2). However, as it is a variety used for making sushi, lower grain protein levels are required, to access high value markets.

To ensure grain protein is within required levels, plan for a 70:30 split between PW and PI applied nitrogen.

It is recommended to apply between 220 and 300 kg/ha urea at pre-PW to Opus® crops. Fields with a history of legumes may require less pre-PW nitrogen and some continuous cropped fields with heavy clay soils may require more pre-PW nitrogen.

Any major nitrogen variability within the field should be addressed with variable rate pre-PW nitrogen applications. Red edge imagery of previous rice crops grown in the field are a good resource for identifying within field nitrogen variability.
Figure 1. Recommended sowing and first flush dates for Opus A and the subsequent panicle initiation (PI), microspore (MS) and flowering timings when sown in the recommended period for each sowing method in the Murray Valley. Hatched area shows time of least risk of low temperatures.

Sowing rate
It is recommended that Opus A be sown at 100 to 120 kg/ha for all sowing methods, aiming to establish between 100 to 200 plants m². The lower seed rate can be used in reliable establishment conditions with accurate seed placement, without compromising yield.

Cold tolerance
Opus A has a moderately high tolerance to cold stress during the early pollen microspore and flowering reproductive periods.

Plant height
Opus A is a similar height to Reiziq A, on average 81 cm.

Lodging potential
Opus A is moderately resistant to lodging but it can be induced by applying excessive nitrogen pre-permanent water (PW). The impact of pre-PW nitrogen application rates on lodging of Opus A is shown in Figure 2.

Grain shattering
Opus A is moderately resistant to shedding grain once the crop is mature.

Nitrogen management
Opus A is a durable variety with a long plateau before grain yield declines or lodging becomes a problem from excess nitrogen application (Figure 2). However, as it is a variety used for making sushi, lower grain protein levels are required, to access high value markets.

To ensure grain protein is within required levels, plan for a 70:30 split between PW and PI applied nitrogen. It is recommended to apply between 220 and 300 kg/ha urea at pre-PW to Opus A crops. Fields with a history of legumes may require less pre-PW nitrogen and some continuous cropped fields with heavy clay soils may require more pre-PW nitrogen. Any major nitrogen variability within the field should be addressed with variable rate pre-PW nitrogen applications. Red edge imagery of previous rice crops grown in the field are a good resource for identifying within field nitrogen variability.

Results from a nitrogen rate by timing experiment show that maximum grain yield for Opus A can be achieved with split nitrogen applications (Figure 3).

The pre-PW and PI nitrogen split treatments produced equal or higher grain yield to when all urea was applied pre-PW and also resulted in lower grain protein levels (Figure 3). There was no lodging in the experiment.

Figure 2. Opus grain yield (average, 10 and 90 percentile) and average lodging score (0=standing, 10=flat) results for pre-PW nitrogen application rates (no PI applied nitrogen). Results from 150 plots in 15 experiments conducted over 5 seasons covering a range of soil types, fertility levels and sowing methods.

Figure 3. Grain yield results (blue bars) and grain protein levels (red lines) for Opus A from a nitrogen rate by timing experiment conducted at Jerilderie in 2017/18.
Panicle initiation nitrogen

For maximum grain yield with lower grain protein and reduced lodging it is important to use red edge imagery and the NIR Tissue Test to determine PI nitrogen topdressing rates. Higher than required nitrogen rates applied at PI can also increase grain protein levels and lodging and reduce profitability.

Grain protein

Opus is a short grain variety used to make sushi which requires specific grain quality attributes. Protein levels of paddy grain below approximately 6.9% are preferred, but high value markets require paddy protein levels below approximately 6.4%.

Nitrogen management is very important for achieving maximum grain yield without unnecessarily increasing grain protein levels in order to access high value markets.

Harvest

Be prepared to commence harvest as soon as the grain moisture drops to 22%. Delaying harvest will increase the risk of lodging which can cause difficult harvesting conditions and reduce grain quality.

Further reading

Effect of sowing rate, nitrogen rate and application timing on grain yield and protein of short grain rice (2019) Brian Dunn, Tina Dunn, Craig Hodges and Chris Dawe. Southern NSW Research Results 2019, NSW Department of Primary Industries; 155-158

Acknowledgements

Tina Dunn and Russell Ford are thanked for their contributions to this document.

Data presented and utilised in the development of this growing guide was obtained from the ‘Rice variety nitrogen and agronomic management’ project, PRJ-009790, 2015–20. This project has joint investment from AgriFutures and NSW DPI.

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Langi growing guide

June 2020, Primefact 1647, 2nd edition

Brian Dunn, Research Agronomist, Yanco Agricultural Institute

Langi is a semi-dwarf long grain variety that has soft cooking (low amylose) properties.

**Yield potential**

The yield potential of Langi is 93% of Reiziq.

Table 1. Grain yield of Langi from research experiments and commercial fields

<table>
<thead>
<tr>
<th>Variety</th>
<th>5 year experiment average yields (t/ha)</th>
<th>5 year grower average yields (t/ha)</th>
<th>Top 20% of growers 5 year average yield (t/ha)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Langi</td>
<td>11.9</td>
<td>9.2</td>
<td>11.5</td>
</tr>
</tbody>
</table>

**Establishment vigour**

Experiments show Langi to have moderate establishment vigour.

**Sowing method and date**

All sowing methods are suitable for growing Langi. The recommended sowing and first flush windows for Langi are listed in Table 2.

Table 2. Target sowing and first flush dates for Langi across different sowing methods and regions

<table>
<thead>
<tr>
<th>Variety</th>
<th>MIA/CIA - Ideal sow/first flush time</th>
<th>Murray Valley – Ideal sow/first flush time</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Aerial / Dry Broadcast</td>
<td>Drill</td>
</tr>
</tbody>
</table>

Sowing earlier or later than recommended will increase the risk of exposure to low temperatures during microspore and flowering, which can reduce grain yield. Recommended
sowing times are aimed at ensuring the critical microspore and flowering periods align with the period of least risk of low temperatures (Figure 1).

Figure 1. Recommended sowing and first flush dates for Langi and the subsequent panicle initiation (PI), microspore (MS) and flowering timings when sown in the recommended period for each district and sowing method. Hatched area shows time of least risk of low temperature.

<table>
<thead>
<tr>
<th></th>
<th>October</th>
<th>November</th>
<th>December</th>
<th>January</th>
<th>February</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>5 10 15 20 25</td>
<td>3 6 9 12 15 18</td>
<td>24 27 30</td>
<td>3 6 9 12 15 18</td>
<td></td>
</tr>
<tr>
<td>MIA &amp; CIA</td>
<td>Aerial</td>
<td>Drill</td>
<td>Sowing</td>
<td>First flush</td>
<td>PI</td>
</tr>
<tr>
<td></td>
<td>DPW</td>
<td>Aerial</td>
<td>Drill</td>
<td>Sowing</td>
<td>First flush</td>
</tr>
</tbody>
</table>

**Sowing rate**

It is recommended that Langi be sown at 110 to 130 kg/ha for all sowing methods, aiming to establish between 100 to 200 plants m². The lower seed rate can be used in reliable establishment conditions with accurate seed placement, without compromising yield.

**Cold tolerance**

Langi has a moderate tolerance to cold stress during the early pollen microspore and flowering periods.

**Plant height**

Langi is on average 87 cm in height, 6 cm taller than Reiziq⁽⁹⁾.

**Lodging potential**

Langi has intermediate resistant to lodging and it can be induced by applying excessive nitrogen pre-permanent water (PW). The impact of pre-PW nitrogen application on lodging of Langi is shown in Figure 2. Langi will also lodge if left in the field once mature for an extended period before harvest.

**Grain shattering**

Early harvest of Langi is recommended as it is susceptible to shedding grain once the crop is mature. It is the second most prone of all current commercial varieties for shattering.

**Nitrogen management**

Langi nitrogen applications should be split 70:30 between pre-PW and PI to reduce lodging and cold susceptibility risks. Applying higher than required rates of nitrogen pre-PW increases a rice crops susceptibility to cold stress more than extra nitrogen applied at panicle initiation.
It is recommended to apply between **200 and 270 kg/ha urea** at pre-PW to Langi (Figure 2). Fields with a history of legumes may require less nitrogen pre-PW and some continuous crop fields with heavy clay soils may require more nitrogen.

Any major nitrogen variability within the field should be addressed with variable rate pre-PW nitrogen applications. Red edge imagery of previous rice crops grown in the field are a good resource for identifying within field nitrogen variability.

Figure 2. Langi grain yield (average, 10 and 90 percentile) and average lodging score (0=standing, 10=flat) results for pre-PW nitrogen application rates (no PI applied nitrogen). Results from 149 plots in 13 experiments conducted over 5 seasons covering a range of soil types, fertility levels and sowing methods.

Langi has similar nitrogen requirements to Reiziq® to reach its maximum yield potential (Figure 3), however it requires different timing of the nitrogen inputs.

Figure 3. Average grain yields for Langi compared to Reiziq® across a range of pre-permanent water nitrogen applications.
**Panicle initiation nitrogen**

Langi produces a high grain yield with less lodging and reduced cold susceptibility when nitrogen is split between pre-PW and PI.

For maximum grain yield with reduced lodging it is important to use red edge imagery and the NIR Tissue Test to determine PI nitrogen topdressing rates. Higher than required nitrogen rates applied at PI can increase lodging and reduce profitability.

**Harvest**

Be prepared to commence harvest of Langi as soon as the grain moisture drops to 22%. Delaying harvest after the crop is mature will increase the risk of grain shedding and lodging and reduced grain quality.

**Acknowledgements**

Tina Dunn from NSW DPI is thanked for her significant contributions to this document.

Data presented and utilised in the development of this growing guide was obtained from the ‘Rice variety nitrogen and agronomic management’ project, PRJ-009790, 2015–20. This project has joint investment from AgriFutures and NSW DPI.


Topaz

Growing Guide

June 2020, Primefact 1483, 3rd edition

Brian Dunn, Research Agronomist, Yanco Agricultural Institute

Topaz is a semi-dwarf fragrant long grain variety that is only grown in the MIA and CIA.

Yield Potential

The yield potential of Topaz is 87% of Reiziq.

Table 1. Grain yield of Topaz from research experiments and commercial fields in the MIA and CIA

<table>
<thead>
<tr>
<th>Variety</th>
<th>5 year experiment average yields (t/ha)</th>
<th>5 year grower average yields (t/ha)</th>
<th>Top 20% of growers 5 year average yield (t/ha)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Topaz</td>
<td>11.0</td>
<td>8.9</td>
<td>10.9</td>
</tr>
</tbody>
</table>

Establishment Vigour

Experiments show Topaz to have the poorest establishment vigour of all varieties. Care must be taken with seed placement and surface drainage to ensure adequate establishment.

Sowing Method and Date

All sowing methods are suitable for growing Topaz. It requires a similar number of days to reach flowering as Reiziq and has the same recommended sowing and first flush windows (Table 2).

Table 2. Target sowing and first flush dates for Topaz across different sowing methods in the MIA and CIA

<table>
<thead>
<tr>
<th>Variety</th>
<th>MIA/CIA - Ideal sow/first flush time</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Aerial / Dry Broadcast</td>
</tr>
<tr>
<td>Topaz</td>
<td>25 Oct to 5 Nov</td>
</tr>
</tbody>
</table>

Sowing Topaz earlier or later than recommended will increase the risk of exposure to low temperatures during microspore and flowering, which can reduce grain yield. Recommended sowing times are aimed at ensuring the critical microspore and flowering periods align with the period of least risk of low temperatures (Figure 1).
Figure 1. Recommended sowing and first flush dates for Topaz\textsuperscript{a} and the subsequent panicle initiation (PI), microspore (MS) and flowering timings when sown in the recommended period for each district and sowing method. Hatched area shows time of least risk of low temperatures.

<table>
<thead>
<tr>
<th>MIA &amp; CIA</th>
<th>October</th>
<th>November</th>
<th>December</th>
<th>January</th>
<th>February</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aerial</td>
<td>5 10 15</td>
<td>5 10</td>
<td>3 6 9</td>
<td>12 15 18</td>
<td>24 27 31</td>
</tr>
<tr>
<td>Drill</td>
<td>Sowing</td>
<td>First flush</td>
<td>PI</td>
<td>MS</td>
<td>Flower</td>
</tr>
<tr>
<td>DPW</td>
<td>First flush</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Sowing rate**

It is recommended that Topaz\textsuperscript{a} be sown at 130 and 150 kg/ha for all sowing methods, aiming to establish between 100 to 200 plants m\textsuperscript{-2}. The lower seed rate can be used in reliable establishment conditions with accurate seed placement, without compromising yield. Although Topaz\textsuperscript{a} has a small grain size and more seeds per kg than Reiziq\textsuperscript{a}, the same sowing rate as Reiziq\textsuperscript{a} is required to account for the variety's poor establishment vigour.

**Cold tolerance**

Topaz\textsuperscript{a} has low tolerance to cold stress during the early pollen microspore and flowering periods. It must be sown in the recommended window with particular attention paid to water management.

Water levels should be kept low during tillering to encourage shorter plants and then increased to a depth of at least 25 cm after panicle initiation through until mid-flowering.

**Plant height**

Topaz\textsuperscript{a} has a similar height to Reiziq\textsuperscript{a}, on average 81 cm.

**Lodging potential**

Topaz\textsuperscript{a} is resistant to lodging but it can be induced by applying excessive nitrogen pre-permanent water (PW). The impact of pre-PW nitrogen application rates on lodging of Topaz\textsuperscript{a} is shown in Figure 2.

**Grain shattering**

Topaz\textsuperscript{a} is moderately resistant to shedding grain once the crop is mature.

**Nitrogen management**

Topaz\textsuperscript{a} has a similar nitrogen requirement to Reiziq\textsuperscript{a} to reach its maximum yield potential. However, due to its high susceptibility to low temperature induced sterility, nitrogen applications should be split 70:30 between pre-PW and PI to reduce cold susceptibility risks.

It is recommended to apply between 220 and 270 kg/ha urea at pre-permanent water (PW) to Topaz\textsuperscript{a} crops. Fields with a history of legumes may require less pre-PW applied nitrogen and some continuous cropped fields with heavy clay soils may require more pre-PW nitrogen.
Any major nitrogen variability within the field should be addressed with variable rate pre-PW nitrogen applications. Red edge imagery of previous rice crops grown in the field are a good resource for identifying within field nitrogen variability.

Topaz has similar nitrogen requirements to Reiziq to reach its maximum yield potential (Figure 3), however it requires different timing of the nitrogen inputs to reduce its susceptibility to low temperatures over the reproductive period.
Panicle initiation nitrogen

Topaz<sup>®</sup> produces a high grain yield with reduced cold susceptibility when nitrogen is split between pre-PW and PI.

For maximum grain yield with reduced lodging it is important to use red edge imagery and the NIR Tissue Test to determine PI nitrogen topdressing rates. Higher than required nitrogen rates applied at PI can increase lodging and reduce profitability.

Harvest

Be prepared to commence harvest as soon as the grain moisture drops to 22%. Delaying harvest will increase the risk of lodging which can cause difficult harvesting conditions and reduce grain quality.

Acknowledgements

Tina Dunn from NSW DPI is thanked for her significant contributions to this document.

Data presented and utilised in the development of this growing guide was obtained from the 'Rice variety nitrogen and agronomic management' project, PRJ-009790, 2015–20. This project has joint investment from AgriFutures and NSW DPI.
Illabong growing guide

June 2020, Primefact 1650, 2nd edition

Brian Dunn, Research Agronomist, Yanco Agricultural Institute

Illabong is a semi-dwarf Arborio style medium grain variety with high yield potential only grown in the Murray Valley.

Yield potential

The yield potential of Illabong is 108% of Reiziq⁰.

Table 1. Grain yield of Illabong from research experiments and commercial fields in the Murray Valley

<table>
<thead>
<tr>
<th>Variety</th>
<th>4 year experiment average yields (t/ha)</th>
<th>4 year grower average yields (t/ha)</th>
<th>Top 20% of growers 4 year average yield (t/ha)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Illabong</td>
<td>12.3</td>
<td>10.8</td>
<td>12.3</td>
</tr>
</tbody>
</table>

Establishment vigour

Experiments show Illabong to have weak establishment vigour. Care must be taken with seed placement to ensure adequate establishment.

Sowing method and date

All sowing methods are suitable for growing Illabong. The recommended sowing and first flush windows for Illabong are listed in Table 2.

Table 2. Target sow and first flush dates for Illabong across different sowing methods in the Murray Valley

<table>
<thead>
<tr>
<th>Variety</th>
<th>Murray Valley - Ideal sow/first flush time</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Aerial / Dry Broadcast</td>
</tr>
<tr>
<td>Illabong</td>
<td>15 to 31 Oct</td>
</tr>
</tbody>
</table>

Sowing earlier or later than recommended will increase the risk of exposure to low temperatures during microspore and flowering, which can reduce grain yield. Recommended sowing times are aimed at ensuring the critical microspore and flowering periods align with the period of least risk of low temperatures (Figure 1).
Illabong growing guide

Figure 1. Recommended sowing and first flush times for Illabong and the subsequent panicle initiation (PI), microspore (MS) and flowering timings when sown in the recommended period for each sowing method in the Murray Valley. Hatched area shows time of least risk of low temperatures.

<table>
<thead>
<tr>
<th>October</th>
<th>November</th>
<th>December</th>
<th>January</th>
<th>February</th>
</tr>
</thead>
<tbody>
<tr>
<td>5 10 15 20 25 31</td>
<td>5 10</td>
<td>3 6 9 12 15 18 21 24 27 31</td>
<td>3 6 9 12 15 18</td>
<td></td>
</tr>
</tbody>
</table>

Murray Valley
Aerial Drill DPW
First flush
Flower

Sowing rate
Illabong should be sown between 130 and 150 kg/ha for all sowing methods, aiming to establish between 100 to 200 plants m². Sowing rate may vary from year to year depending on the germination percentage of the seed, check with SunRice for details.

Cold tolerance
Illabong has a moderate tolerance to cold stress during the early pollen microspore and flowering periods.

Plant height
Illabong is on average 85 cm in height, 4 cm taller than Reiziq.

Lodging potential
Illabong is moderately resistant to lodging but it can be induced by applying excessive nitrogen pre-permanent water (PW).

Grain shattering
Illabong is resistant to shedding grain after maturity.

Nitrogen management
Illabong nitrogen applications should be split 70:30 between pre-PW and PI to reduce cold susceptibility risks. Applying higher than required rates of nitrogen pre-PW increases a rice crops susceptibility to cold stress more than extra nitrogen applied at panicle initiation.

It is recommended to apply between 160 and 250 kg/ha urea to Illabong pre-PW to reduce cold susceptibility. Fields with a history of legumes may require less nitrogen pre-PW and some continuous crop fields with heavy clay soils may require more nitrogen.

Any major nitrogen variability within the field should be addressed with variable rate pre-PW nitrogen applications. Red edge imagery of previous rice crops grown in the field are a good resource for identifying within field nitrogen variability.
Illabong growing guide

Illabong has lower nitrogen requirements than Reiziq\(^b\) to reach its maximum yield potential, (Figure 3) and it requires different timing of the nitrogen inputs.

Figure 3. Average grain yields for Illabong compared to Reiziq\(^b\) across a range of pre-permanent water nitrogen applications.

**Panicle initiation nitrogen**

Illabong produces a high grain yield with less lodging and reduced cold susceptibility when nitrogen is split between pre-PW and PI.
For maximum grain yield with reduced lodging it is important to use red edge imagery and the NIR Tissue Test to determine PI nitrogen topdressing rates. Higher than required nitrogen rates applied at PI can increase lodging and reduce profitability.

An experiment at Jerilderie in the 2019/20 season showed the split nitrogen treatment produced a higher grain yield than when all the nitrogen was applied pre-PW to Illabong (Figure 4).

Figure 4. Grain yield for Reiziq and Illabong from a nitrogen rate by timing experiment conducted at Jerilderie in the 2019/20 season.

Harvest

Be prepared to commence harvest as soon as the grain moisture drops to 22%. Delaying harvest will increase the risk of lodging which can cause difficult harvesting conditions and reduce grain quality.

Acknowledgements

Tina Dunn from NSW DPI is thanked for her significant contributions to this document.

Data presented and utilised in the development of this growing guide was obtained from the ‘Rice variety nitrogen and agronomic management’ project, PRJ-009790, 2015–20. This project has joint investment from AgriFutures and NSW DPI.

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Doongara growing guide

June 2020, Primefact 1587, 3rd edition

Brian Dunn, Research Agronomist, Yanco Agricultural Institute

Doongara is a semi-dwarf long grain hard cooking (high amylose) variety that has a low glycaemic index (GI) and is resistant to lodging.

Yield potential

The yield potential of Doongara is similar to Reiziq(A).

Table 1. Grain yield of Doongara from research experiments and commercial fields in MIA and CIA

<table>
<thead>
<tr>
<th>Variety</th>
<th>5 years experiment average yields (t/ha)</th>
<th>5 year grower average yields (t/ha)</th>
<th>Top 20% of growers 5 year average yield (t/ha)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Doongara</td>
<td>12.4</td>
<td>11.3</td>
<td>13.3</td>
</tr>
</tbody>
</table>

Establishment vigour

Experiments show Doongara to have moderate establishment vigour.

Sowing method and date

All sowing methods are suitable for growing Doongara. The recommended sowing and first flush windows for Doongara are listed in Table 2.

Table 2. Target sowing and first flush dates for Doongara across different sowing methods in the MIA and CIA

<table>
<thead>
<tr>
<th>VARIETY</th>
<th>MIA/CIA - Ideal sow/first flush time</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Aerial / Dry Broadcast</td>
</tr>
<tr>
<td>Doongara</td>
<td>20 Oct to 5 Nov</td>
</tr>
</tbody>
</table>

Sowing earlier or later than recommended will increase the risk of exposure to low temperatures during microspore and flowering, which can reduce grain yield. Recommended sowing times are aimed at ensuring the critical microspore and flowering periods align with the period of least risk of low temperatures (Figure 1).
Figure 1. Recommended sowing and first flush dates for Doongara and the subsequent panicle initiation (PI), microspore (MS) and flowering timings when sown in the recommended period for each district and sowing method. Hatched area shows time of least risk of low temperatures.

<table>
<thead>
<tr>
<th>Sowing rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>It is recommended that Doongara be sown between 100 and 120 kg/ha for all sowing methods, aiming to establish between 100 to 200 plants m². The lower seed rate can be used in reliable establishment conditions with accurate seed placement, without compromising yield.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Cold tolerance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Doongara has low tolerance to cold stress during the reproductive period and must be sown in the recommended window with particular attention paid to water management.</td>
</tr>
</tbody>
</table>

| Water levels should be kept low during tillering to encourage shorter plants and then increased to a depth of at least 25 cm after panicle initiation through until mid-flowering. |

<table>
<thead>
<tr>
<th>Plant height</th>
</tr>
</thead>
<tbody>
<tr>
<td>Doongara has a similar height to Reiziq at 81 cm.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Lodging potential</th>
</tr>
</thead>
<tbody>
<tr>
<td>Doongara is resistant to lodging, due to its short height and strong stem strength.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Grain shattering</th>
</tr>
</thead>
<tbody>
<tr>
<td>Doongara has moderate susceptibility to shedding grain once the crop is mature.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Straighthead susceptibility</th>
</tr>
</thead>
<tbody>
<tr>
<td>Doongara is susceptible to straighthead which reduces grain yield. Symptoms present as floret sterility, particularly in low nitrogen areas. Severe straighthead has the characteristic parrot beaking symptoms and missing florets (See Primefact 1346; Straighthead in Australian rice crops).</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Nitrogen management</th>
</tr>
</thead>
<tbody>
<tr>
<td>Doongara nitrogen applications should be split 70:30 between pre-PW and PI to reduce cold susceptibility risks. Applying higher than required rates of nitrogen pre-permanent water (PW) increases a rice crops susceptibility to cold stress more than extra nitrogen applied at panicle initiation.</td>
</tr>
</tbody>
</table>

| It is recommended to apply between 220 and 270 kg/ha urea at pre-PW to Doongara (Figure 2). Fields with a history of legumes may require less nitrogen pre-PW and some continuous crop fields with heavy clay soils may require more nitrogen. |
Doongara growing guide

Any major nitrogen variability within the field should be addressed with variable rate pre-PW nitrogen applications. Red edge imagery of previous rice crops grown in the field are a good resource for identifying within field nitrogen variability.

Figure 2. Doongara grain yield (average, 10 and 90 percentile) and average lodging score (0=standing, 10=flat) results for pre-PW nitrogen application rates (no PI applied nitrogen). Results from 68 plots in 9 experiments conducted over 5 seasons covering a range of soil types, fertility levels and sowing methods.

Doongara has similar nitrogen requirements to Reiziq to reach its maximum yield potential (Figure 3), however it requires different timing of the nitrogen inputs due to its high susceptible to low temperature induced sterility.

Figure 3. Average grain yields for Doongara compared to Reiziq across a range of pre-permanent water nitrogen applications.
**Panicle initiation nitrogen**

Doongara produces a consistently high grain yield with lower susceptibility to cold when nitrogen is split between pre-PW and PI.

For maximum grain yield with reduced lodging it is important to use red edge imagery and the NIR Tissue Test to determine PI nitrogen topdressing rates. Higher than required nitrogen rates applied at PI can increase lodging and reduce profitability.

**Harvest**

Be prepared to commence harvest of Doongara as soon as the grain moisture drops to 22%. Delaying harvest after the crop is mature will increase the risk of grain shedding and lodging and reduce grain quality.

**Acknowledgements**

Tina Dunn from NSW DPI is thanked for her significant contributions to this document.

Data presented and utilised in the development of this growing guide was obtained from the 'Rice variety nitrogen and agronomic management' project, PRJ-009790, 2015–20. This project has joint investment from AgriFutures and NSW DPI.

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Disclaimer: The information contained in this publication is based on knowledge and understanding at the time of writing (July 2020). However, because of advances in knowledge, users are reminded of the need to ensure that information upon which they rely is up to date and to check currency of the information with the appropriate officer of the Department of Primary Industries or the user’s independent adviser.
Koshihikari growing guide

June 2020, Primefact 1486, 3rd edition

Brian Dunn, Research Agronomist, Yanco Agricultural Institute

Koshihikari is a short grain premium Japanese variety that demands a high premium. It is a tall variety that is susceptible to lodging and should not be aerial sown.

Yield potential

The yield potential of Koshihikari is 86% of Reiziq.

Table 1. Grain yield of Koshihikari from research experiments and Murray Valley commercial fields

<table>
<thead>
<tr>
<th>Variety</th>
<th>5 year experiment average yields (t/ha)</th>
<th>5 year grower average yields (t/ha)</th>
<th>Top 20% of growers 5 year average yield (t/ha)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Koshihikari</td>
<td>10.1</td>
<td>7.5</td>
<td>9.1</td>
</tr>
</tbody>
</table>

Establishment vigour

Establishment experiments show Koshihikari to have moderate establishment vigour.

Sowing method and date

Koshihikari should only be drill sown as it is more prone to lodging when aerial sown.

Drill sown crops have better root anchorage and resistance against stem bending which reduces their lodging susceptibility. The recommended first flush windows for Koshihikari are listed in Table 2.

Table 2. Target first flush dates for Koshihikari across different management methods in the Murray Valley

<table>
<thead>
<tr>
<th>Variety</th>
<th>Murray Valley - Ideal first flush time</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Aerial / Dry Broadcast</td>
</tr>
<tr>
<td>Koshihikari</td>
<td>Do not aerial sown</td>
</tr>
</tbody>
</table>

Sowing earlier or later than recommended will increase the risk of exposure to low temperatures during microspore and flowering, which can reduce grain yield. Recommended
sowing times are aimed at ensuring the critical microspore and flowering periods align with the period of least risk of low temperatures (Figure 1).

**Figure 1. Recommended first flush times for Koshihikari and the subsequent panicle initiation (PI), microspore (MS) and flowering timings when sown in the recommended period for each sowing method in the Murray Valley. Hatched area shows time of least risk of low temperatures.**

<table>
<thead>
<tr>
<th></th>
<th>October</th>
<th>November</th>
<th>December</th>
<th>January</th>
<th>February</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aerial</td>
<td>5 10 15</td>
<td>20 25 31</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Drill</td>
<td></td>
<td></td>
<td>3 6 9 12</td>
<td>15 18</td>
<td>21 24 27</td>
</tr>
<tr>
<td>DPW</td>
<td></td>
<td></td>
<td>3 6 9 12</td>
<td>15 18</td>
<td>21 24 27</td>
</tr>
</tbody>
</table>

**Sowing rate**

It is recommended that Koshihikari be sown at 100 and 120 kg/ha, aiming to establish between 100 to 200 plants m². The lower seed rate can be used in reliable establishment conditions with accurate seed placement, without compromising yield.

**Cold tolerance**

Koshihikari has a moderately high tolerance to cold stress during the early pollen microspore and flowering reproductive periods.

**Plant height**

Koshihikari is on average 94 cm in height, 13 cm taller than Reiziq[^1].

**Lodging potential**

Koshihikari is highly susceptible to lodging which is made worse by applying excessive nitrogen pre-permanent water (PW).

**Grain shattering**

Koshihikari is resistant to shedding grain after maturity.

**Straighthead susceptibility**

Koshihikari is susceptible to straighthead which reduces grain yield. Symptoms present as floret sterility, particularly in low nitrogen areas. Severe straighthead shows the characteristic parrot beaking symptoms and missing florets (See Primefact 1346; Straighthead in Australian rice crops).

**Nitrogen management**

Nitrogen management of Koshihikari presents a trade-off between grain yield and lodging.

As Koshihikari is a variety used for making sushi, lower grain protein levels are required to access high value markets. To maximise grain yield, reduce lodging and ensure grain protein is within required levels, plan for a 50:50 split between pre-PW and PI applied nitrogen.
It is recommended to only apply between **100 and 150 kg/ha urea** to Koshihikari pre-PW and topdress at PI. Fields with a history of legumes may require less nitrogen pre-PW and some continuous crop fields with heavy clay soils may require more pre-PW nitrogen.

Any major nitrogen variability within the field should be addressed with variable rate pre-PW nitrogen applications. Red edge imagery of previous rice crops grown in the field are a good resource for identifying within field nitrogen variability.

**Figure 2.** Koshihikari grain yield (average, 10 and 90 percentile) and average lodging score (0=standing, 10=flat) results for pre-PW nitrogen application rates (no PI applied nitrogen). Results from 84 plots in 9 experiments conducted over 5 seasons covering a range of soil types, fertility levels and sowing methods.

Koshihikari produces a high grain yield with reduced susceptibility to lodging and lower grain protein levels when nitrogen is split between pre-PW and PI (Figure 3).

**Figure 3.** Grain yield results (blue bars), lodging scores (green bars, 10=Flat) and grain protein levels (red lines) for Koshihikari from a nitrogen rate by timing experiment conducted at Jerilderie in 2017/18.
Results from a nitrogen rate by timing experiment conducted at Jerilderie in 2017/18 season show that high grain yields with reduced lodging and lower grain protein levels can be achieved for Koshihikari by using split nitrogen applications (Figure 3).

**Panicle initiation nitrogen**

For maximum grain yield with reduced lodging and lower grain protein it is important to use red edge imagery and the NIR Tissue Test to determine PI nitrogen topdressing rates. Higher than required nitrogen rates applied at PI can significantly increase lodging and protein levels and reduce profitability.

**Grain protein**

Koshihikari is a short grain variety used to make sushi which requires specific grain quality attributes. Grain protein levels of paddy grain below approximately 6.9% are preferred, but high value markets require paddy protein levels below 6.4%.

Nitrogen management is very important for achieving maximum grain yield without unnecessarily increasing grain protein levels in order to access high value markets.

**Harvest**

Be prepared to commence harvest as soon as the grain moisture drops to 22%. Delaying harvest will increase the risk of lodging which can cause difficult harvesting conditions and reduce grain quality.

**Further reading**

Effect of sowing rate, nitrogen rate and application timing on grain yield and protein of short grain rice (2019) Brian Dunn, Tina Dunn, Craig Hodges and Chris Dawe. Southern NSW Research Results 2019, NSW Department of Primary Industries; 155-158  

**Acknowledgements**

Tina Dunn and Russell Ford are thanked for their contributions to this document.

Data presented and utilised in the development of this growing guide was obtained from the ‘Rice variety nitrogen and agronomic management’ project, PRJ-009790, 2015–20. This project has joint investment from AgriFutures and NSW DPI.

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Viand® growing guide

June 2020, Primefact 1484, 4th edition

Brian Dunn, Research Agronomist, Yanco Agricultural Institute

Viand® is a semi-dwarf medium grain variety that is shorter in growth duration than our current medium grain varieties.

Yield potential

The yield potential of Viand® is 97% of Reiziq®.

Table 1. Grain yield of Viand® from research experiments and commercial fields

<table>
<thead>
<tr>
<th>Variety</th>
<th>5 year experiment average yields (t/ha)</th>
<th>5 year grower average yields (t/ha)</th>
<th>Top 20% of growers 5 year average yield (t/ha)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Viand®</td>
<td>11.1</td>
<td>9.6</td>
<td>11.7</td>
</tr>
</tbody>
</table>

Establishment vigour

Experiments show Viand® to have strong establishment vigour.

Sowing method and date

Viand® should only be drill sown as it is more prone to lodging when aerial sown.

Viand® is earlier to flower than Reiziq® and needs to be sown later for microspore to occur during the period with the highest probability of warm temperatures (Figure 1).

Do not practice delayed permanent water if Viand® receives its first flush later than the recommended window. Delayed permanent water slows crop development which increases the risk of cold susceptibility and a late harvest.

Table 2. Target first flush dates for Viand® across different management methods and regions

<table>
<thead>
<tr>
<th>Variety</th>
<th>MIA/CIA - Ideal first flush time</th>
<th>Murray Valley – Ideal first flush time</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Drill</td>
<td>Delayed permanent water</td>
</tr>
<tr>
<td>Viand®</td>
<td>5 to 20 Nov</td>
<td>25 Oct to 10 Nov</td>
</tr>
</tbody>
</table>
Sowing rate

It is recommended that Viand™ be sown between 110 and 130 kg/ha, aiming to establish between 100 to 200 plants m². The lower rate can be used in reliable establishment conditions with accurate seed placement, without compromising yield.

Cold tolerance

Viand™ has a moderate tolerance to cold stress during the reproductive period.

Plant height

Viand™ is 4 cm taller than Reiziq™.

Lodging potential

Viand™ is moderately susceptible to lodging which can be further induced by applying excessive nitrogen pre-permanent water (PW).

Grain shattering

Viand™ has moderate susceptibility to shedding grain once the crop is mature.

Nitrogen management

Viand™ nitrogen applications should be split 70:30 between pre-PW and PI to reduce lodging and cold susceptibility risks. Applying higher than required rates of nitrogen pre-PW increases a rice crops susceptibility to cold stress more than extra nitrogen applied at panicle initiation.

It is recommended to apply between 200 and 270 kg/ha urea at pre-PW to Viand™ (Figure 2). Fields with a history of legumes may require less nitrogen pre-PW and some continuous crop fields with heavy clay soils may require more nitrogen.

Any major nitrogen variability within the field should be addressed with variable rate pre-PW nitrogen applications. Red edge imagery of previous rice crops grown in the field are a good resource for identifying within field nitrogen variability.
Viand® has similar nitrogen requirements to Reiziq® to reach its maximum yield potential (Figure 3), however it requires different timing of the nitrogen inputs.

Figure 3. Average grain yields for Viand compared to Reiziq® across a range of pre-permanent water nitrogen applications.

Panicle initiation nitrogen

Viand® produces a high grain yield with less lodging and reduced cold susceptibility when nitrogen is split between pre-PW and PI. An experiment at Jerilderie in 2017/18 season showed the split nitrogen treatments all produced a similar grain yield to when all the nitrogen was applied pre-PW, but with less lodging (Figure 4).
For maximum grain yield with reduced lodging it is important to use red edge imagery and the NIR Tissue Test to determine PI nitrogen topdressing rates. Higher than required nitrogen rates applied at PI can increase lodging and reduce profitability.

Figure 4. Grain yield and lodging score results from a Viand® nitrogen rate by timing experiment conducted at Jerilderie in 2017/18. The green bars are grain yield (t/ha @ 14%) and the blue bars are the lodging score (0=standing, 10=flat) for the range on nitrogen treatments applied pre-PW and at PI.

Harvest

Be prepared to commence harvest as soon as the grain moisture drops to 22%. Delaying harvest after the crop is mature will increase the risk of grain shedding and lodging which can cause difficult harvesting conditions and reduced grain quality.

Acknowledgements

Tina Dunn from NSW DPI is thanked for her significant contributions to this document.

Data presented and utilised in the development of this growing guide was obtained from the ‘Rice variety nitrogen and agronomic management’ project, PRJ-009790, 2015–20. This project has joint investment from AgriFutures and NSW DPI.

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