

# DPI Primefact

## Rice plant population guide

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Objective plant population guidelines are essential to ensure rice grain yields reach their potential and profitability is maximised. Ten aerial and 5 drill-sown experiments were conducted over 3 seasons to investigate the effect of plant population on rice grain yield in southern NSW.

Reiziq<sup>®</sup>, Sherpa<sup>®</sup>, Langi, Opus<sup>®</sup>, Topaz<sup>®</sup> and Koshihikari were investigated. All responded similarly to plant population changes, with populations between 40 plants/m<sup>2</sup> and 600 plants/m<sup>2</sup> achieving similar grain yields (Figure 1).

As plant population decreases, the number of tillers each plant produces increases, as does the number of grains per panicle. These factors combine to maintain grain yield when plant numbers are reduced.

A plant population between 100 plants/m<sup>2</sup> and 200 plants/m<sup>2</sup> was found to be optimal for aerial and drill sowing and delayed permanent water (DPW) in southern NSW.

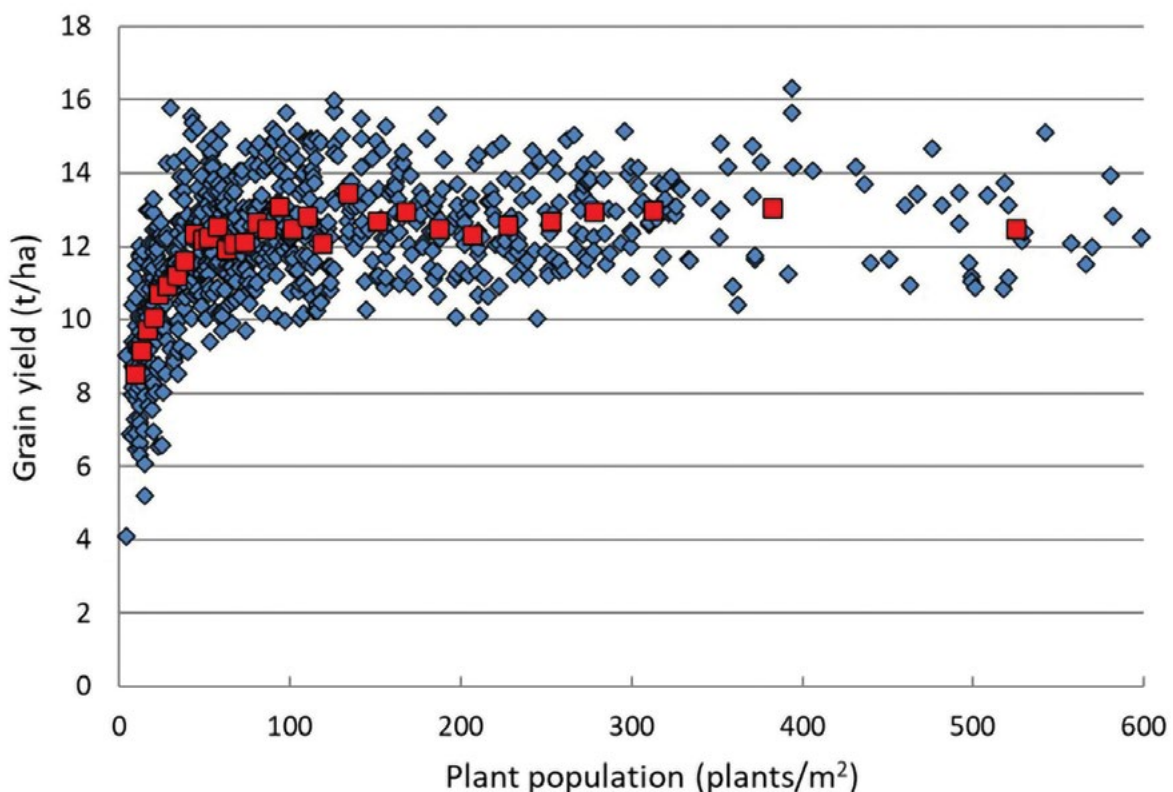


Figure 1. Grain yield response to plant population (red squares are average of 25 sites).

Plant populations as low as 30 plants/m<sup>2</sup> can achieve grain yields above 10 t/ha (Figure 2), but only when plants are uniformly distributed. Once the plant population is over 100 plants/m<sup>2</sup>, the effect of plant distribution is negligible.

The recommended upper plant population limit is 200 plants/m<sup>2</sup>. There is no advantage in having a plant population above this, especially as it will incur higher seed costs and can increase lodging.

### Sowing method

The sowing method significantly affects successful rice plant establishment.

When pre-germinated seed was aerially sown, 45% of seeds became established plants. With drill sowing, the establishment rate was 48%.

Good establishment rates can also be achieved by dry broadcasting seed, followed by a flush irrigation then allowing the soil surface to dry before applying PW.

Spreading dry seeds onto the soil surface and immediately applying PW resulted in only 21% of the seeds becoming established plants and is not recommended practice.



Figure 2. Aerial sown rice with a plant population of 37 plants/m<sup>2</sup> yielded 10.4 t/ha.



Figure 3. A row spacing of 360 mm could not maintain yield at low plant populations.

### Row spacing for drill sown rice

Row spacing between 180 mm and 270 mm is recommended for drill sown rice. Grain yield is reduced when rows are spaced wider than 270 mm as missing rows, or gaps within rows, cannot be compensated for by neighbouring plants and yield is reduced (Figure 3).

### Recommended sowing rates

Rice should not be sown at rates higher than 140 kg/ha for any variety or sowing method. For recommended sowing rates based on seed size and establishment percentage, see Table 1. To establish 200 plants/m<sup>2</sup> requires a maximum sowing rate of 140 kg/ha at a seed establishment percentage of 45%. As little as 25% establishment will result in 100 plants/m<sup>2</sup>, which is enough to achieve maximum grain yield.

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

With drill sowing, layouts must allow the flush irrigations to drain quickly, or patchy establishment will result. Sowing rates can be decreased by 15–25% in reliable establishment conditions without compromising yield.

Research has demonstrated that lodging severity increases at high plant populations in varieties with a high lodging potential (refer to NSW DPI Primefact 1561: [Lodging in rice](#)).

Table 1. Recommended maximum sowing rates required to meet plant population rates based on seed size and varietal establishment percentage.

Variety	Sowing rate (kg/ha)	1000 grain weight (g)
Reiziq <sup>Ⓛ</sup>	140	29.5
V071 <sup>Ⓛ</sup>	130	27.7
Sherpa <sup>Ⓛ</sup>	130	26.7
Viand <sup>Ⓛ</sup>	130	26.8
Langi	130	25.8
Doongara	130	25.2
Topaz <sup>Ⓛ</sup>	140*	23.6
Opus <sup>Ⓛ</sup>	110	23.6
Koshihikari	100**	24.0

\*Topaz<sup>Ⓛ</sup> has a higher sowing rate due to poor establishment vigour.

\*\*Koshihikari has a lower sowing rate due to its lodging susceptibility.

### Measuring plant number when establishment is poor

A minimum plant population of 20 plants/m<sup>2</sup> can achieve yields that cover costs, provided the plants are uniformly distributed and best management practices are followed.

At low plant populations, plant distribution is often more important than the number of plants. Therefore, to determine the plant population and distribution when there are establishment problems, use the following method.

In each zone in the field with different plant population levels, take 10 plant counts using the rice ring (0.2 m<sup>2</sup>). An average of 4 plants per ring from the 10 rings counted is needed to meet the 20 plants/m<sup>2</sup> requirement. If more than 3 of the rings have only one plant or one ring has zero plants, then re-sowing the poor establishment areas in the field is recommended.

### Acknowledgements

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