


Achieving Yield Potential in the HRZ of south-eastern Australia

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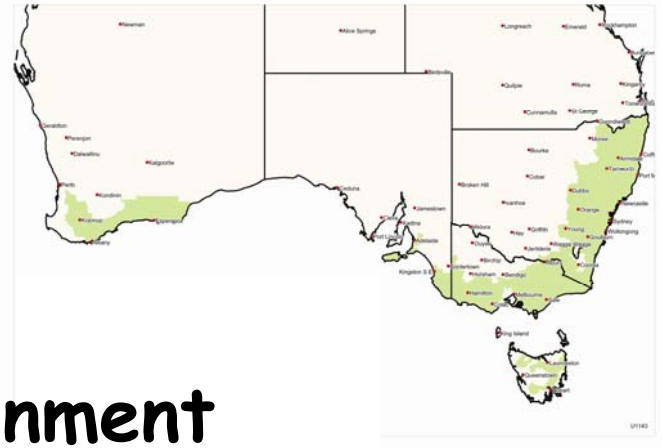
Summary



- HRZ is a new cropping environment
- Provides challenges and opportunities
- Tools are available to help understand these challenges and explore opportunities

- Area to cropping in the HRZ is expanding
- High yield potential
- Potential not being realised
- 'Imported' varieties, management practices & systems
- Better understand G x E x M

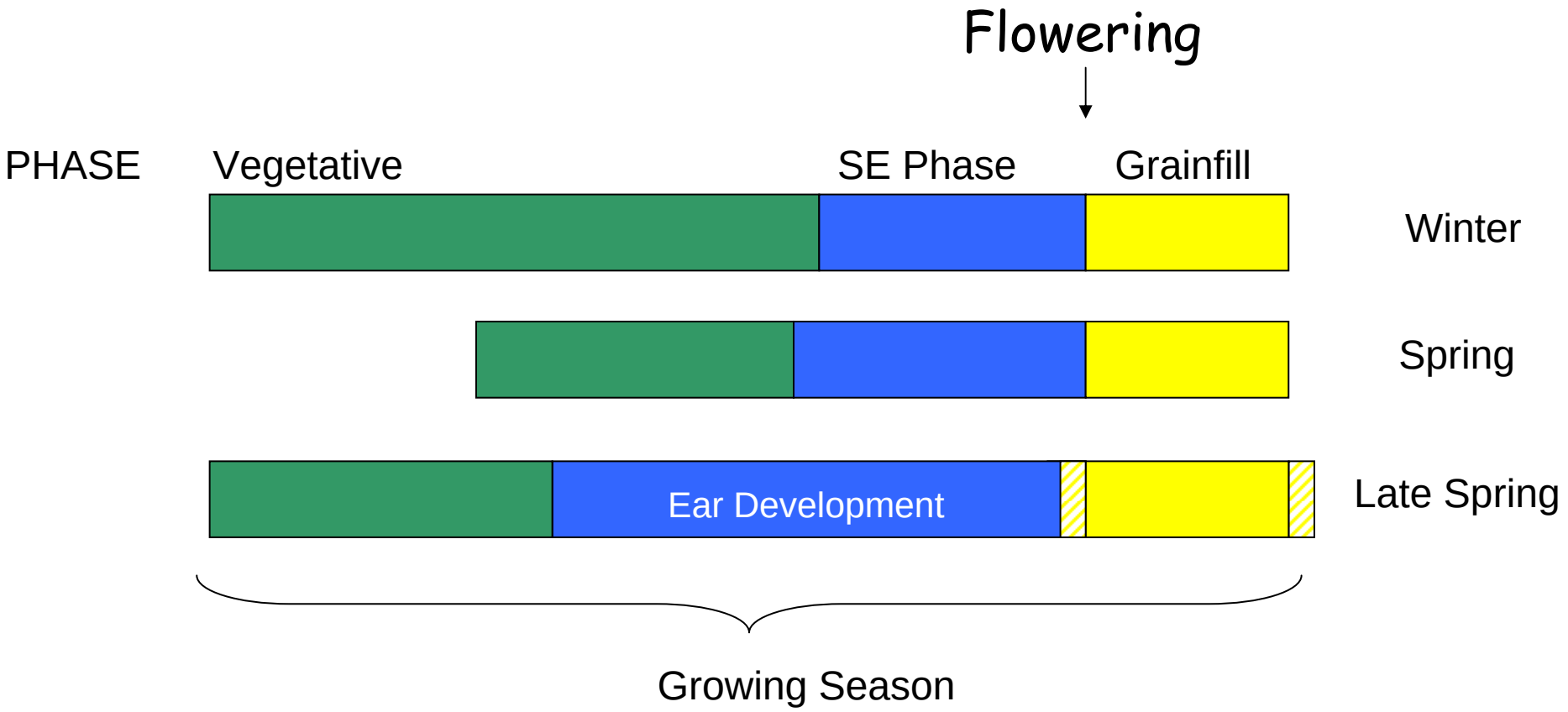
What do we know?

- Not starting from scratch
- Climate
- Soils
- Good understanding of crop growth & development
- Tools - crop simulation models

How can we use this?

1. Design crops
   - identifiy important characteristics
   - develop benchmarks for management
2. Better understand impacts of management
3. Explore options

Designing Crops for the HRZ

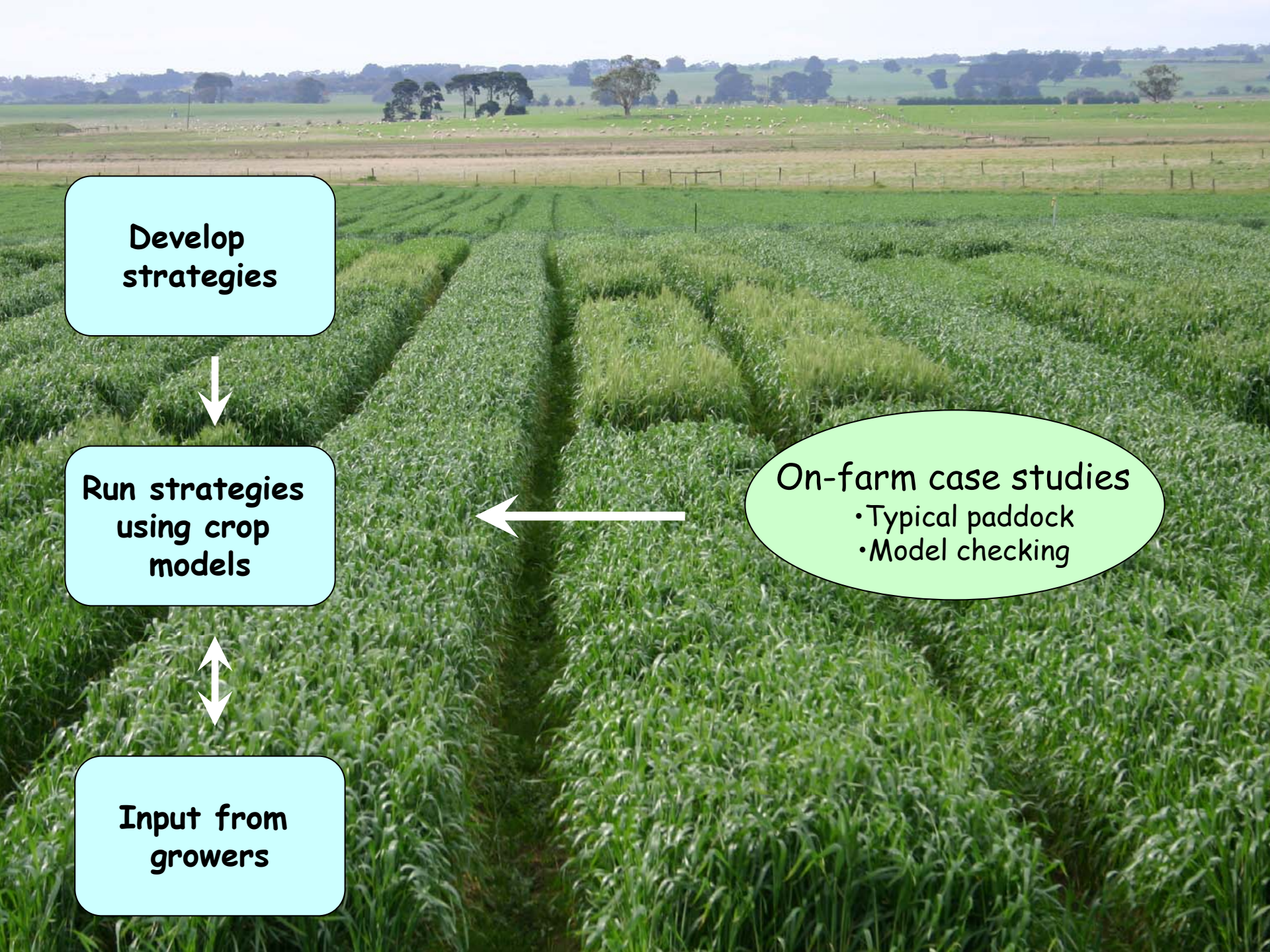


2. Impacts of Management

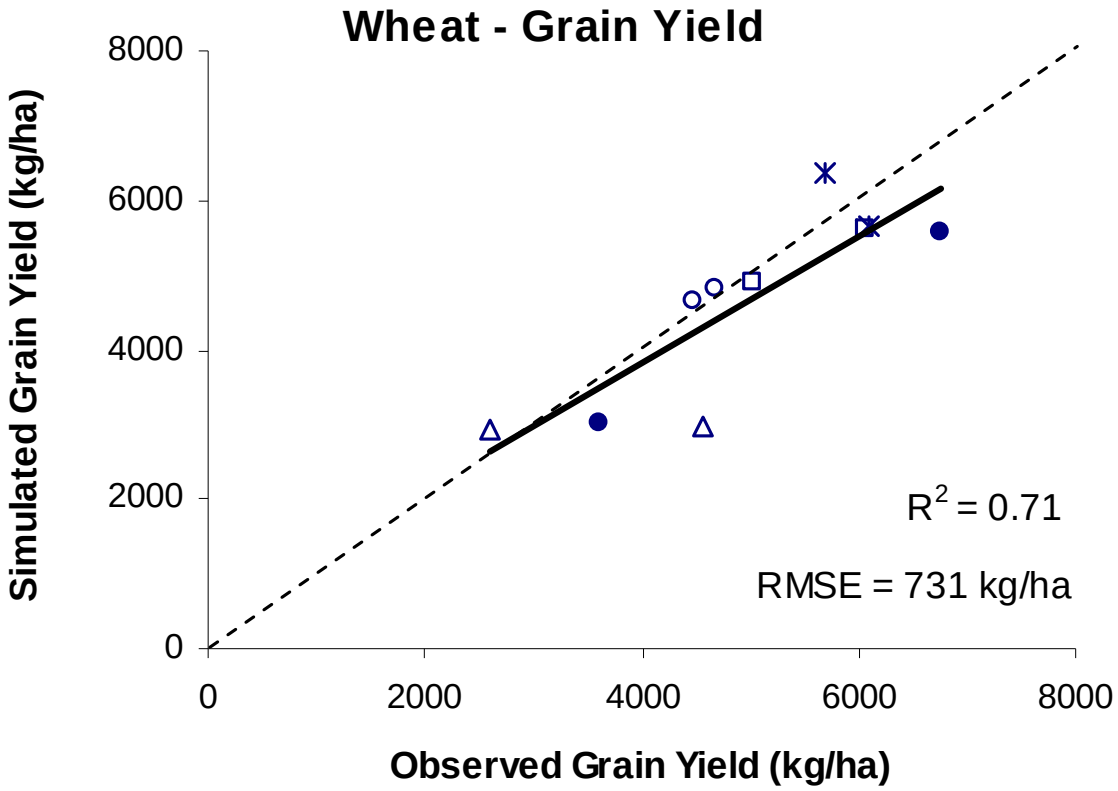
OBJECTIVE

To better understand how crops grow in the HRZ environment and how management can influence grain yield and returns for growers.

Long-term climate data and crop modelling


Develop strategies
Run strategies using crop models
Input from growers
On-farm case studies
•Typical paddock
•Model checking

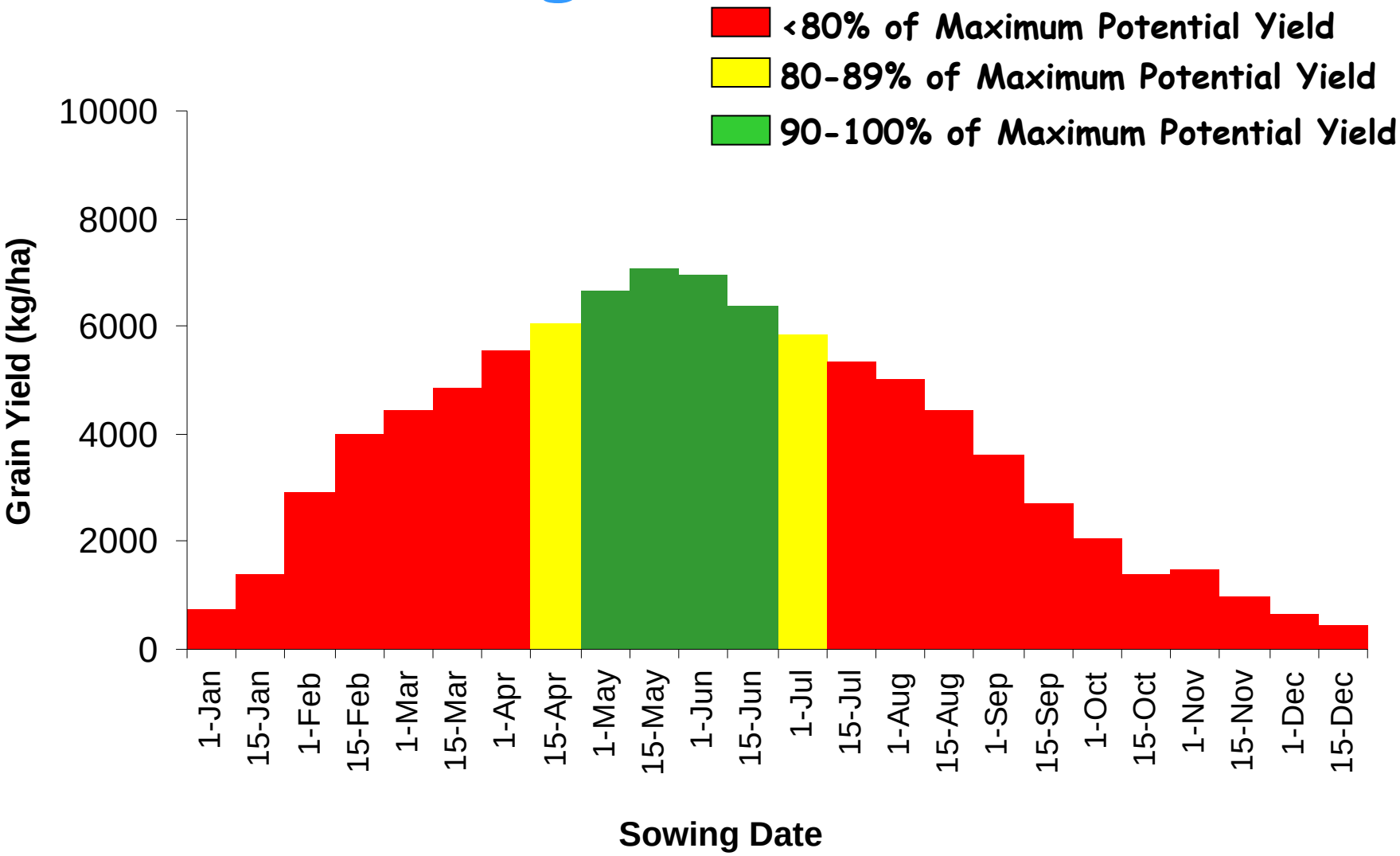
Model Performance in the HRZ



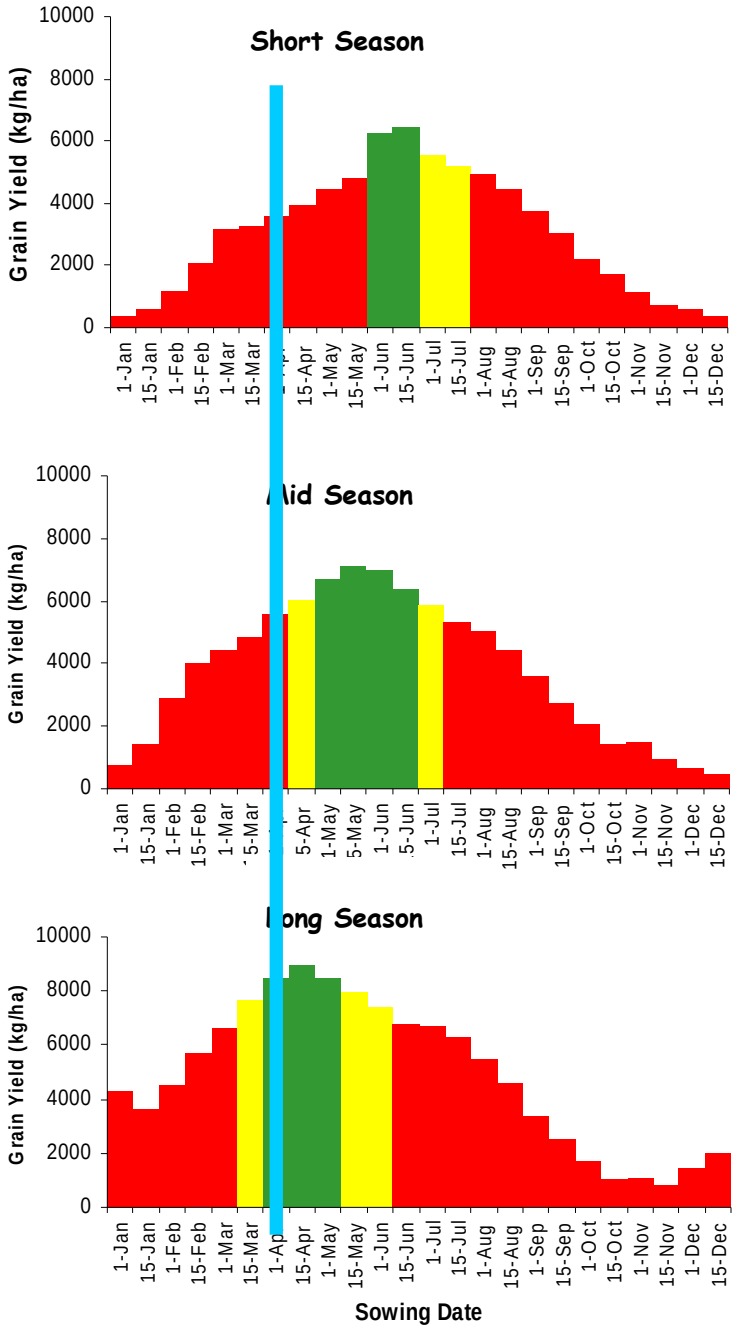
Model error was similar to other cropping regions

Wheat RMSE 731 kg grain /ha

Time of Sowing



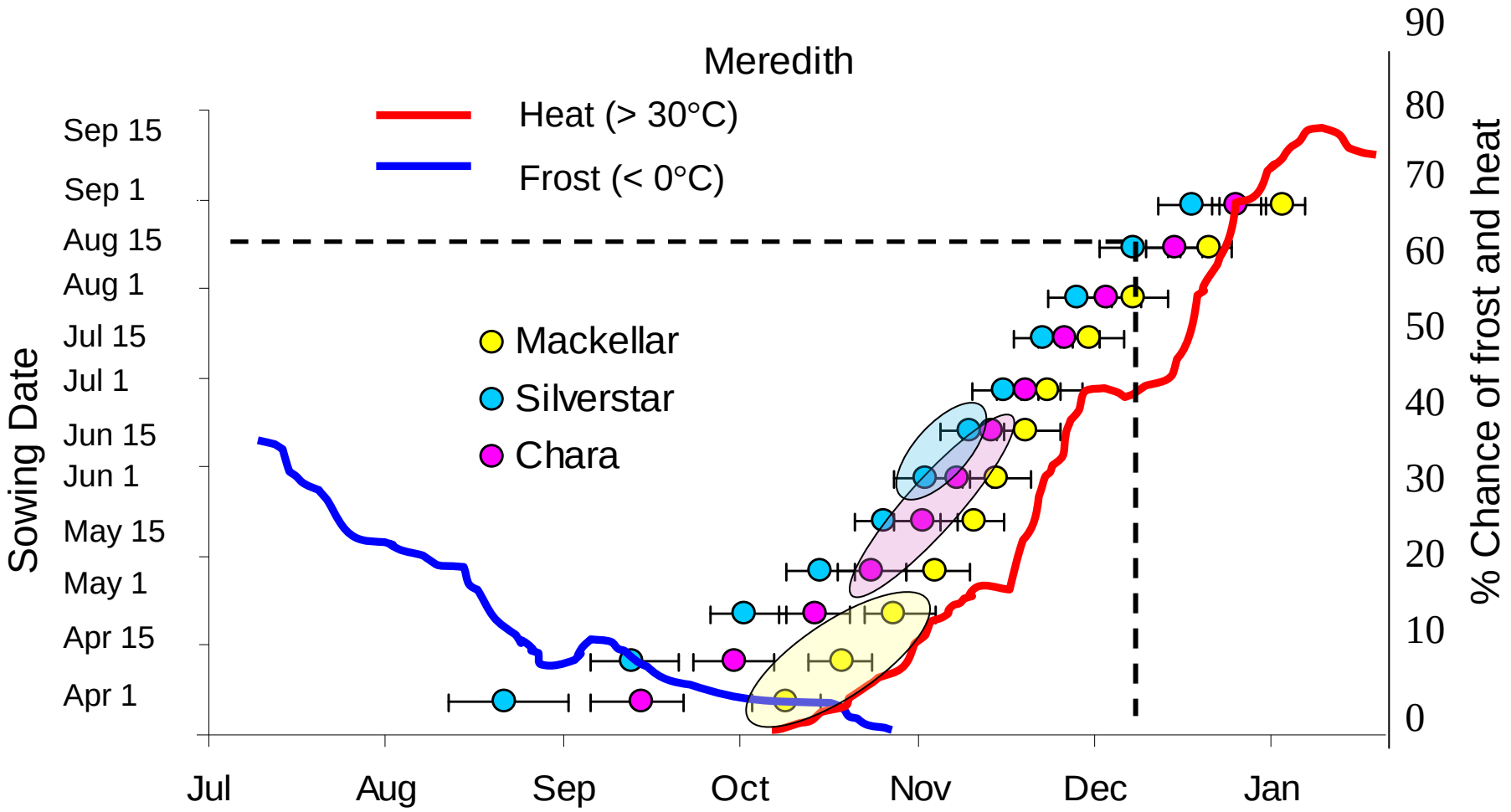
Time of Sowing



- Up to 45% yield reduction from different optimums between short and long season cultivars

- <80% of Maximum Potential Yield
- 80-89% of Maximum Potential Yield
- 90-100% of Maximum Potential Yield

Time of Sowing



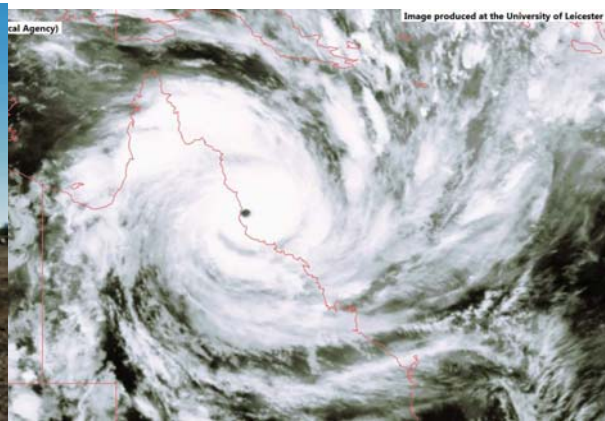
3. Explore Options

- More options in the HRZ
- Opportunity cropping
- Winter canola types
- Early sowing without frost risk
- Grazing (autumn & Spring)

Conclusion

Achieving yield potential in the HRZ will require

- Better understanding & use of resources
- Understanding constraints & opportunities
  - Better adapted varieties, management practices & systems
- Information and tools are available



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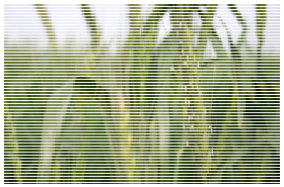
Fact Sheets

Sowing times for wheat

Meredith, Victoria

Optimum sowing time is important because to maximise grain yield the crop needs to :

- **make the most of the growing season,**
- **flower when frost risk is lower,**
- **flower when the risk of heat and drought stress is lower**



Crop Growth

The longer the growing season the more time the crop has to capture available resources such as sunlight and water and convert these into dry matter and ultimately grain. Growth before flowering allows the crop to build the physical structure that captures resources and holds the plant upright. It also sets the potential number of grains that fill from dry matter produced after flowering.

Crop Development

Growth stages need to be timed to ensure the dry matter produced is partitioned efficiently into leaf, stem, ear, roots and grain and that flowering occurs during the period of least climatic risk. Reaching the optimum flowering time is often a compromise between flowering early enough to avoid heat and drought stress, and late enough to avoid frost. Although it is impossible to determine how the season will progress, long term climate data does allow us to predict the likelihood of these events occurring at a particular time in the season for a particular location.

Options for Meredith

Flowering dates for short (e.g. Silverstar), mid (e.g. Chara) and long season (e.g. Mackellar) varieties sown at different times at Meredith in Victoria are shown in Figure 1. Varieties were sown on the 1st and 15th of each month to determine grain yield and flowering time using a crop model and 120 years of climate data. Crop yields and flowering times differed, both within and between sowing times over the years due to variations in rainfall, evaporation, temperature and radiation. The optimum sowing time is a balance between minimising climatic risk (Figure 1) and maximising resource capture (Figure 2). These factors do not necessarily coincide and growers need to decide the risks they are prepared to take to achieve a targeted grain yield.

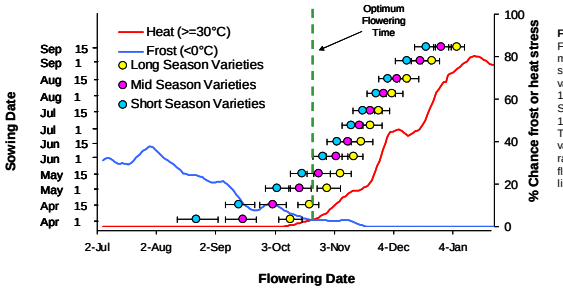


Figure 1. Flowering times for three maturity groups of wheat, short, mid and long season varieties sown on the 1st and 15th of each month. Simulations were run using 120 years of climate data. The circles represent median values and the bars show the range. Climatic risk at flowering is shown by the blue line (frost) and red line (heat).

Nitrogen for wheat

Nitrogen fertiliser strategies for Meredith, Victoria

Take Home Messages

This factsheet has been developed specifically for the climate and soils in the Meredith district.

In General:

- Nitrogen treatments that produce that highest yield increases did not necessarily give the highest economic return
- Long season wheats required more N to achieve their yield potential than the short or mid season wheats
- The most profitable strategies come from applying 50 or 100 kg of N fertiliser/ha
- There is little benefit of applying high levels of N fertiliser to short and mid season varieties when sowing into soils with high starting N

Why is nitrogen important?

Nitrogen (N) is an essential nutrient for all life forms. It is a major constituent of protein, the main building block of plants and animals. Nitrogen is essential for cell growth and the formation of chlorophyll in plants. Chlorophyll is the green pigment in plants and is responsible for photosynthesis, the conversion of sunlight into carbohydrates, biomass and grain yield.

How does nitrogen become available to the crop?

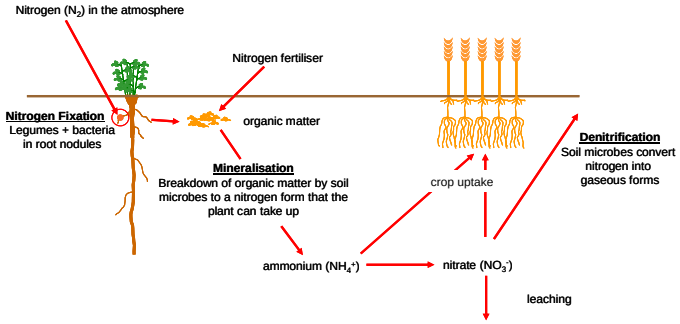


Figure 1. The Nitrogen Cycle

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