'Impact of farmer practice on grain quality'

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Overview

- Grain quality parameters
- Farming practices that influence rice quality
- Preliminary results

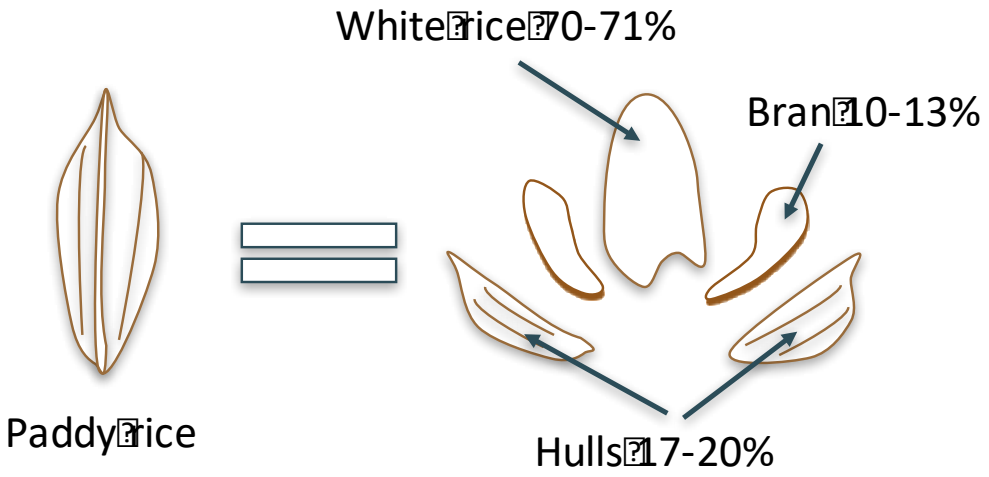
Grain Quality

Australia produces high quality grain targeted for premium markets

Farmer payments incorporate grain quality

Physical Appearance

- Whole grain yield (WGY)
- Grain dimensions & colour
- Presence of chalk

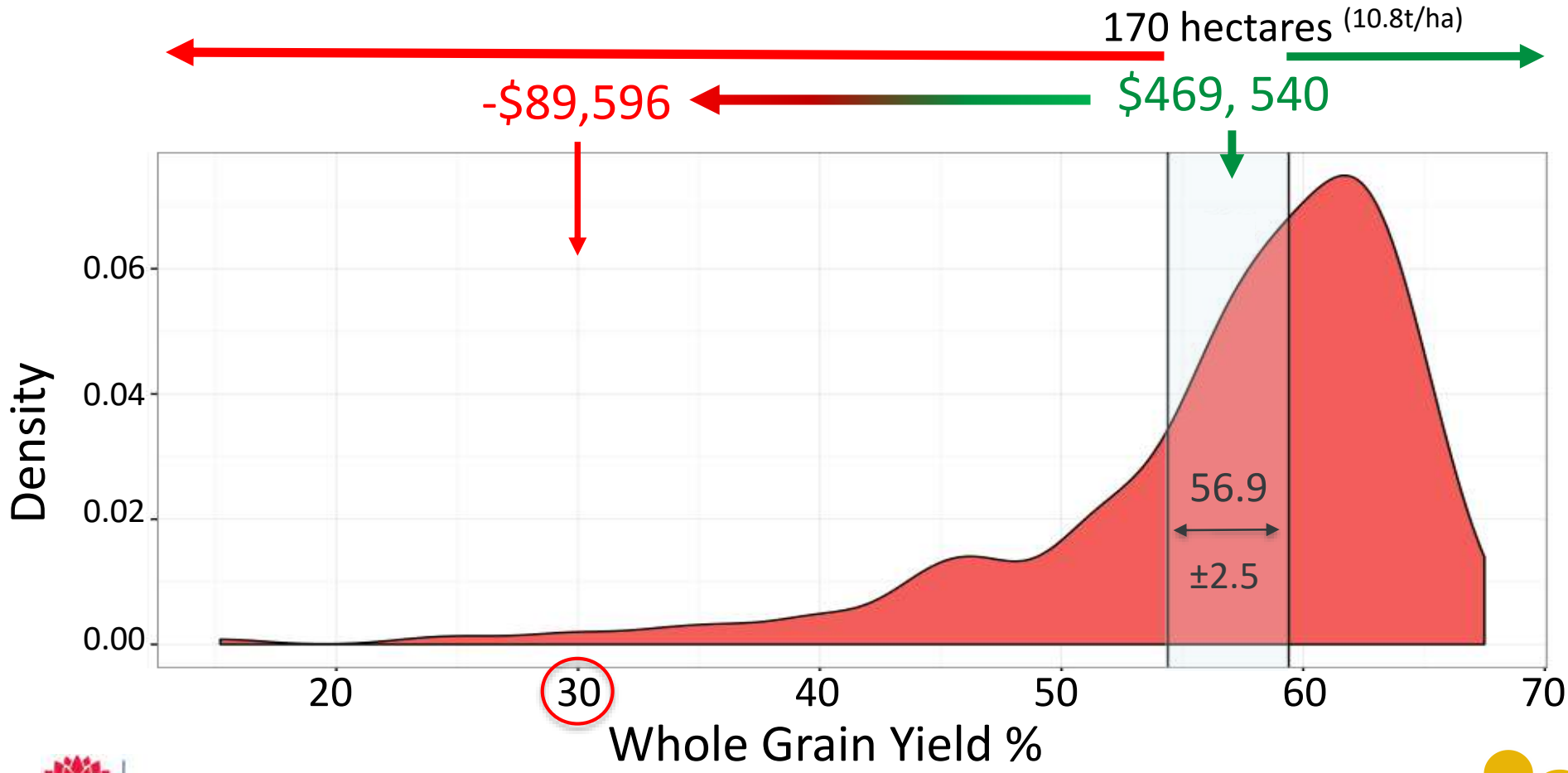


Cooking and eating qualities

- Gelatinisation temperature
- Amylose content
- Viscosity (Rapid Visco Analysis)
- Texture of cooked and stored rice

Importance of Rice Quality

Reiziq 2016 Whole Grain Yield Distribution



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*NSW DPI Rice growing guide 2016-2017 used for calculations

Grain components

Starch (~ 85-95%) , Protein (~ 4-10%), Moisture (~ 10%) and Lipids (~1%)

Starch
- Influences cooked rice texture
- Accumulation linked to chalkiness
- Doesn't account for all variation

Protein
- Increases hardness of cooked rice
- Reduces adhesiveness of cooked rice
- Reduces occurrence of chalky grains
- Increases whole grain yield

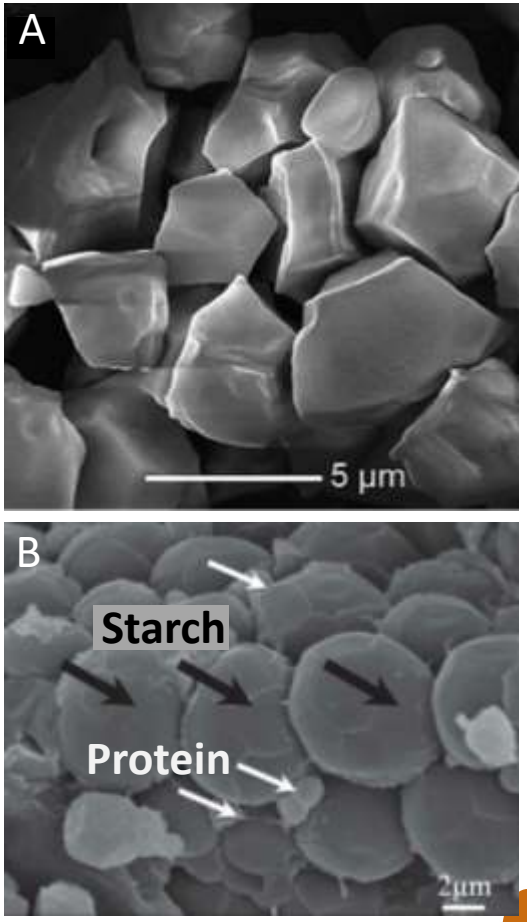


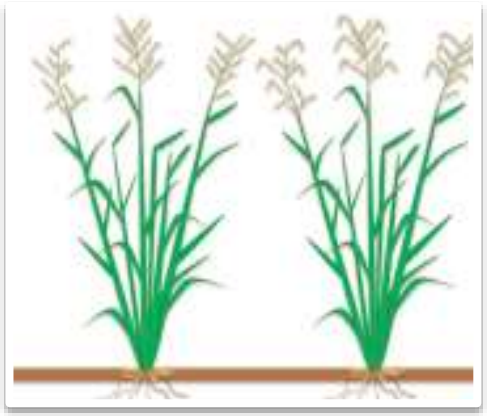
Image: Patindol et al. 2015 (A); Xi et al. 2014 (B)

Farming practices

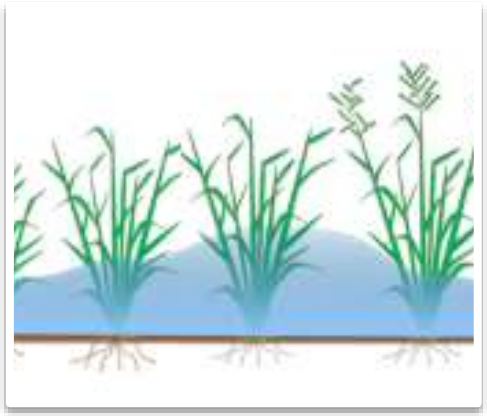
Rice quality traits associated with specific genes well researched

Grain quality research is fragmented and lack Australian focus

Farming practices of Australia's southern rice growing region;



Planting density



Irrigation protocols

Nutritional management

Irrigation protocols

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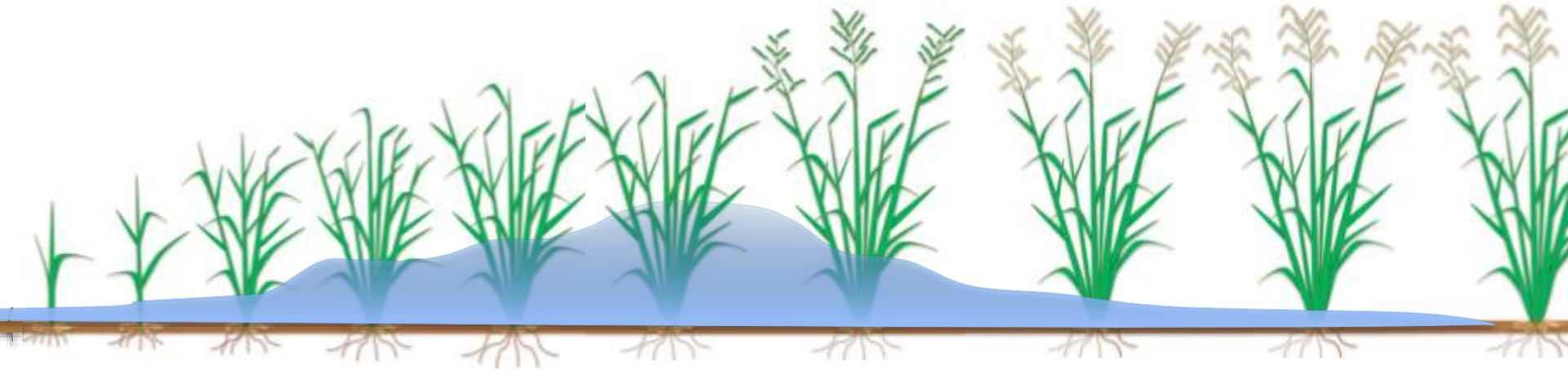
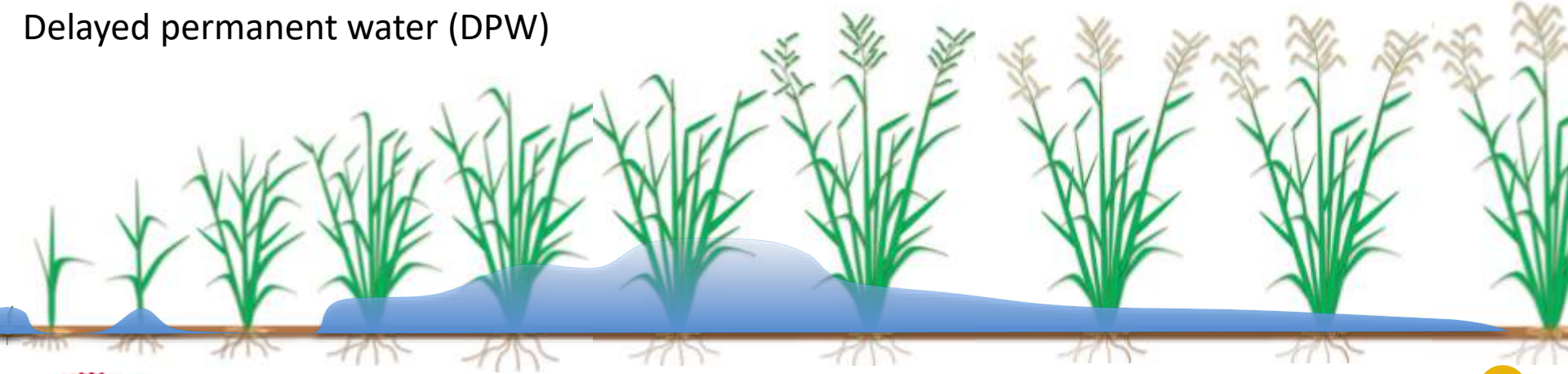
Conventional irrigation- Aerial sown or dry broadcast



Delayed permanent water (DPW)



Delayed permanent water

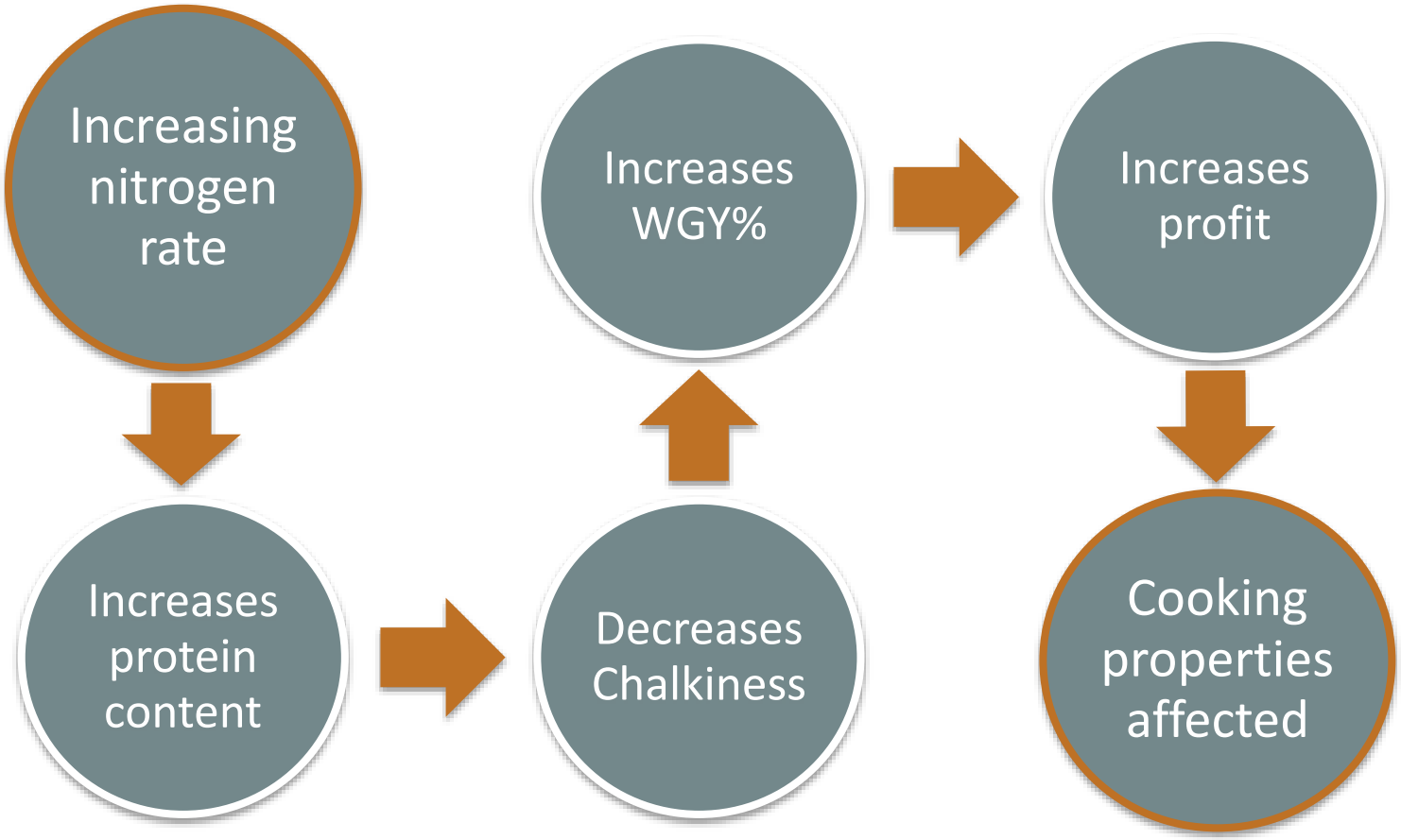
- Reduces water usage
- Higher nitrogen use efficiency
- No significant impact to yield
- Little data regarding quality

Alternative wetting and drying;

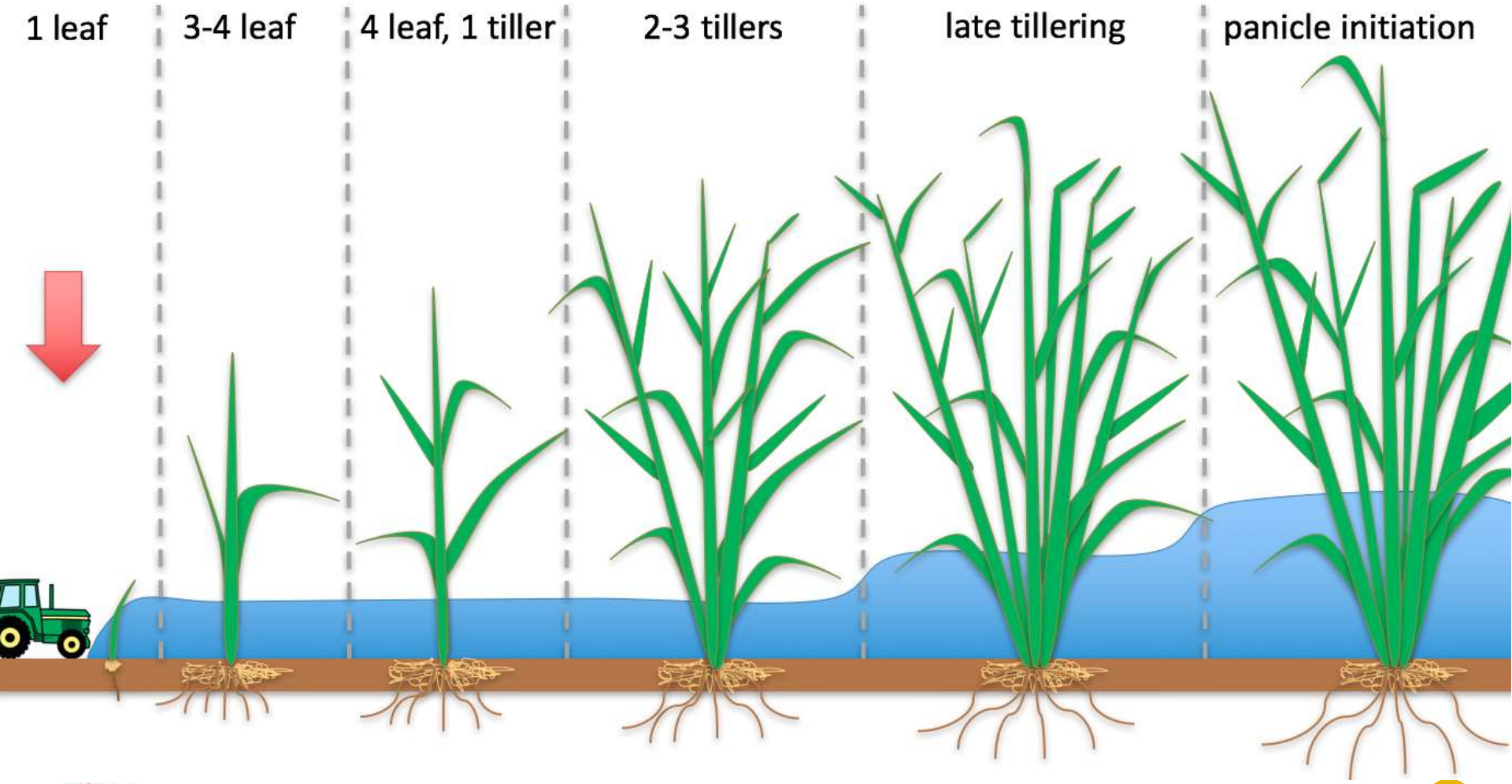
- Increased WGY%, amylose and protein content
- Response was variety dependent

How do irrigation protocols affect grain quality?

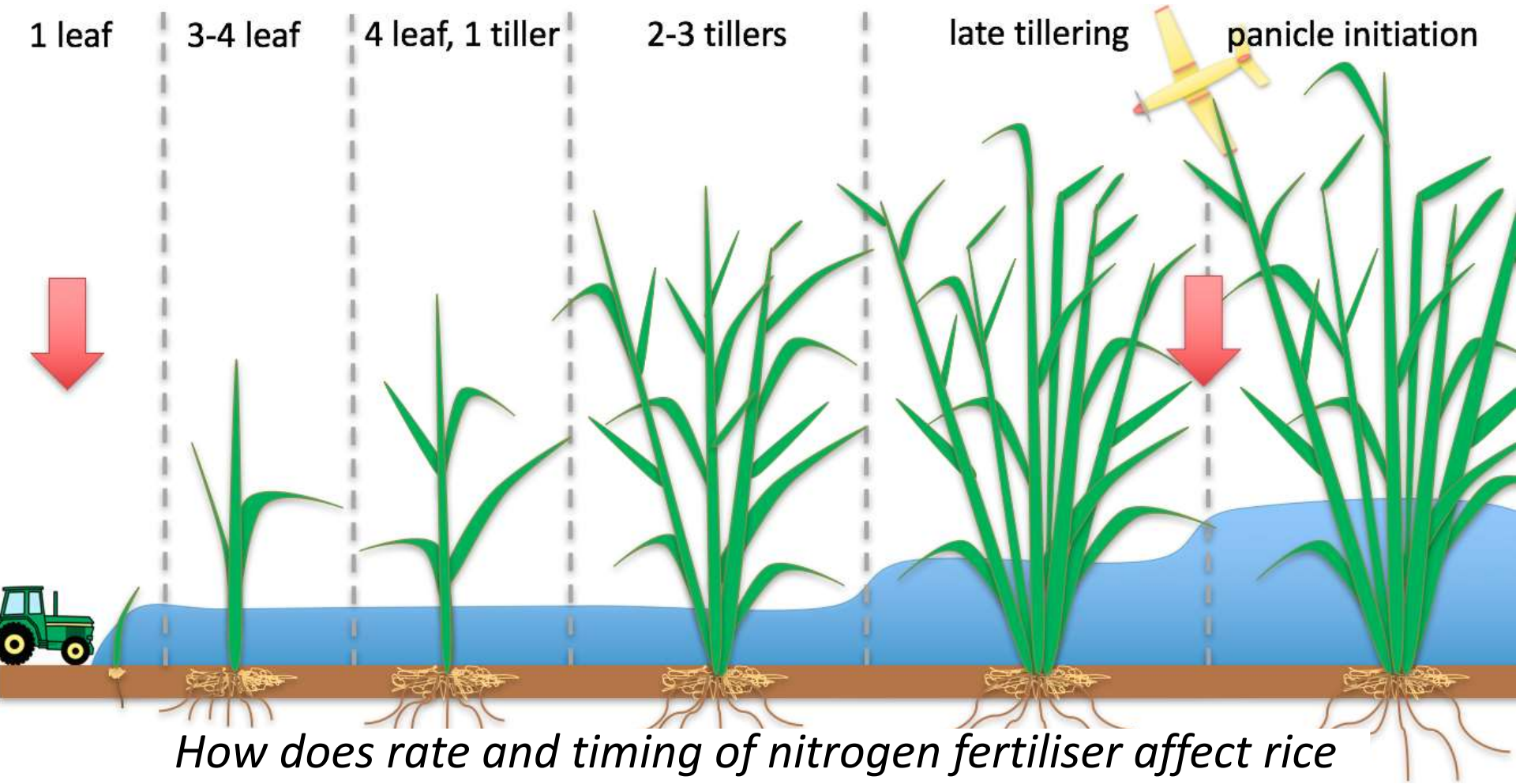
Nitrogen fertiliser



Nitrogen fertiliser

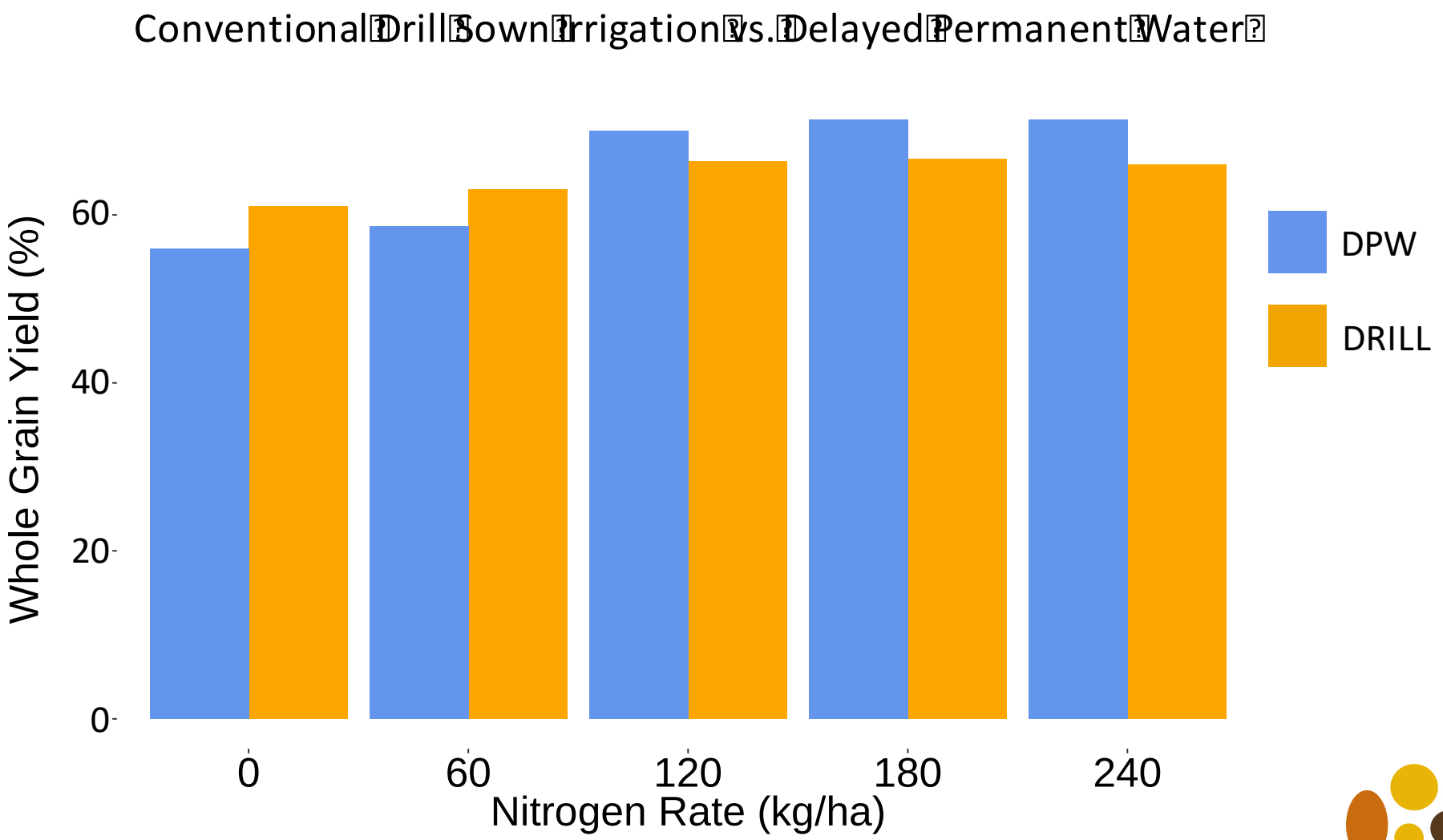


Nitrogen fertiliser



How does rate and timing of nitrogen fertiliser affect rice quality and does this vary between varieties?

Milling: Irrigation x Nitrogen



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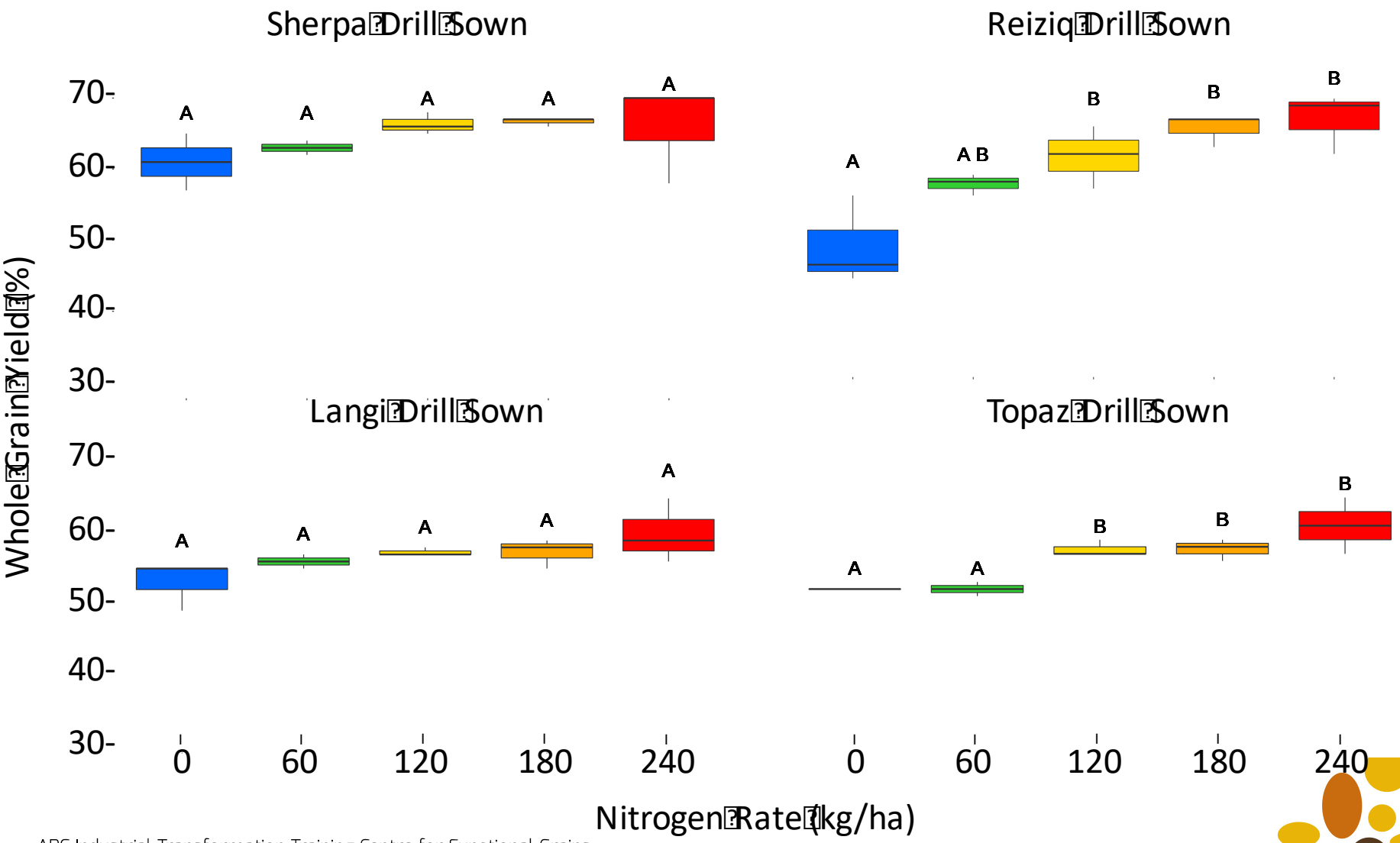

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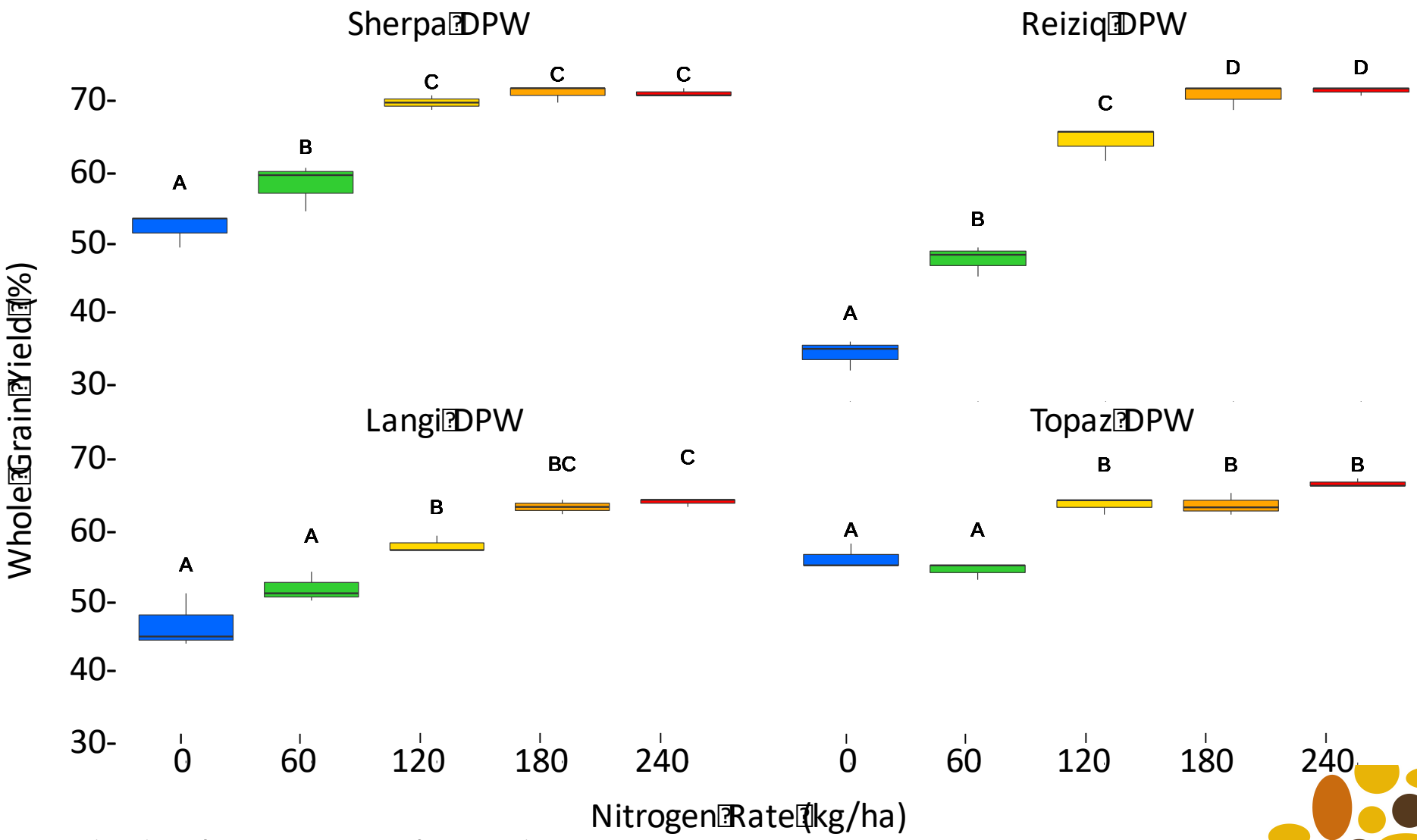
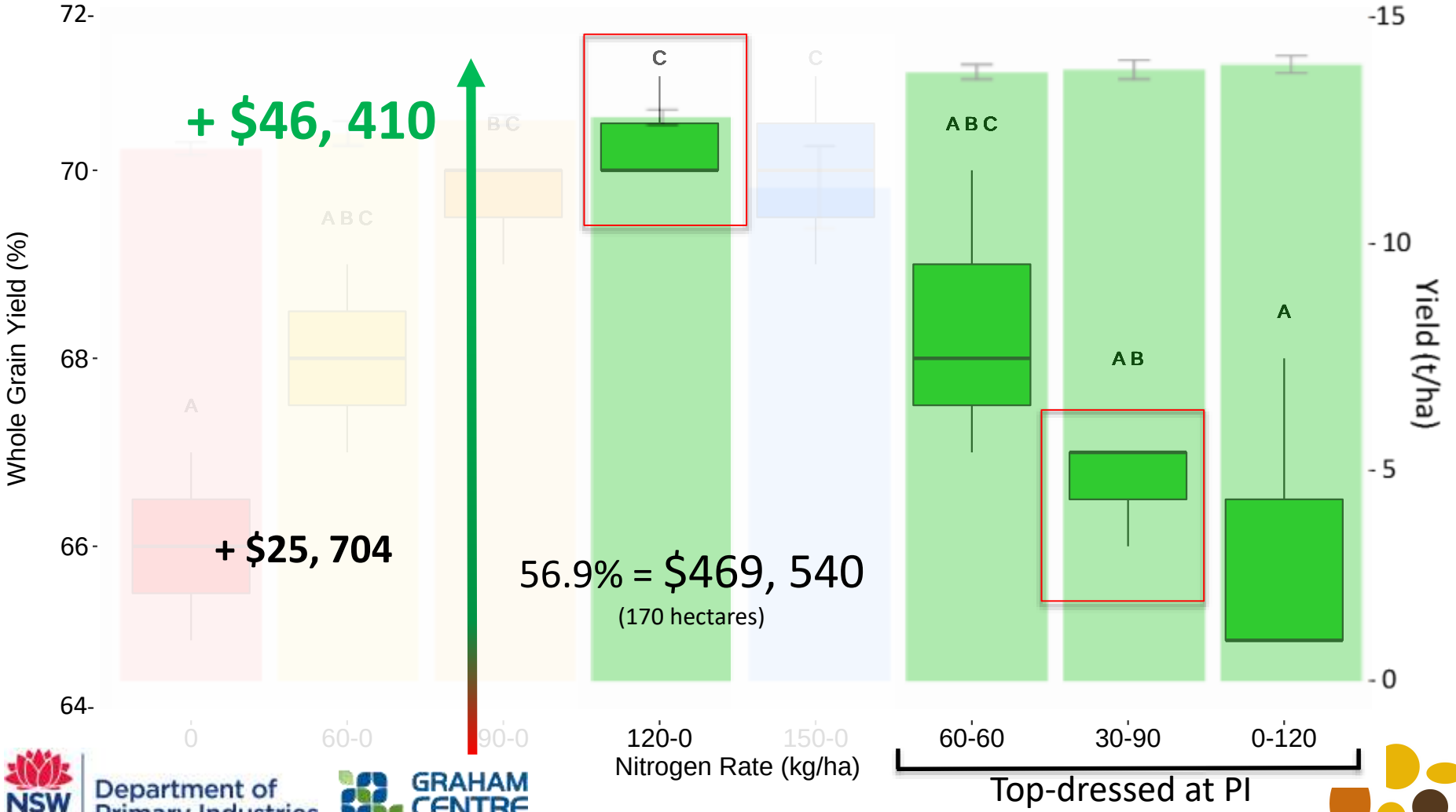


Milling: YRM70 x N rate x Timing



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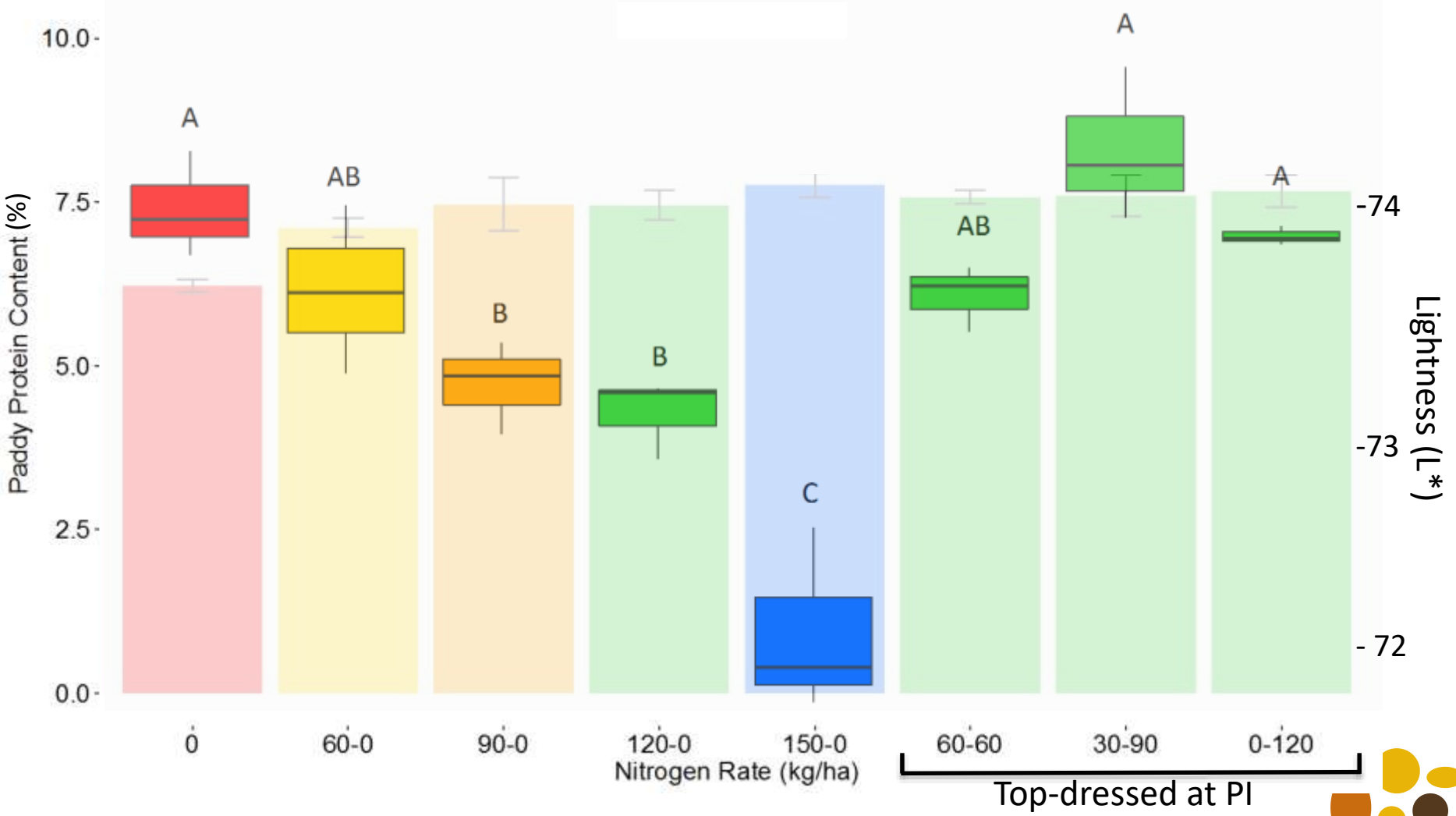

Summary – Preliminary Results

- Response to N differs between varieties
- DPW has a higher WGY under high N
- WGY decreased when N was split
- No change in protein between N rates
- Split N produced lighter grain

Future work

- Measure grain dimensions and colour
- Analyse physicochemical properties:
  - Amylose content
  - Protein content – milled rice
  - Mineral analysis
  - Gelatinisation behaviour
  - Pasting properties
  - Cooked rice texture


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