Department of
Primary Industries and
Regional Development

GOVERNMENT OF
WESTERN AUSTRALIA

Management of pre-harvest sprouting in wheat

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21ST CONFERENCE
AGRONOMY
AUSTRALIA

Key messages

The risk of pre-harvest sprouting changes during the maturation period.

This risk of germination relates to stage of maturation influencing moisture content and dormancy (both under the influence of environment).

At harvest, there is little that can be done to limit PHS besides harvesting as soon as possible, although PHS can occur prior to harvest maturity reducing the effectiveness of these strategies.

Pre-emptive strategies at seeding can help avoid maturation under conducive conditions and mitigate risk.

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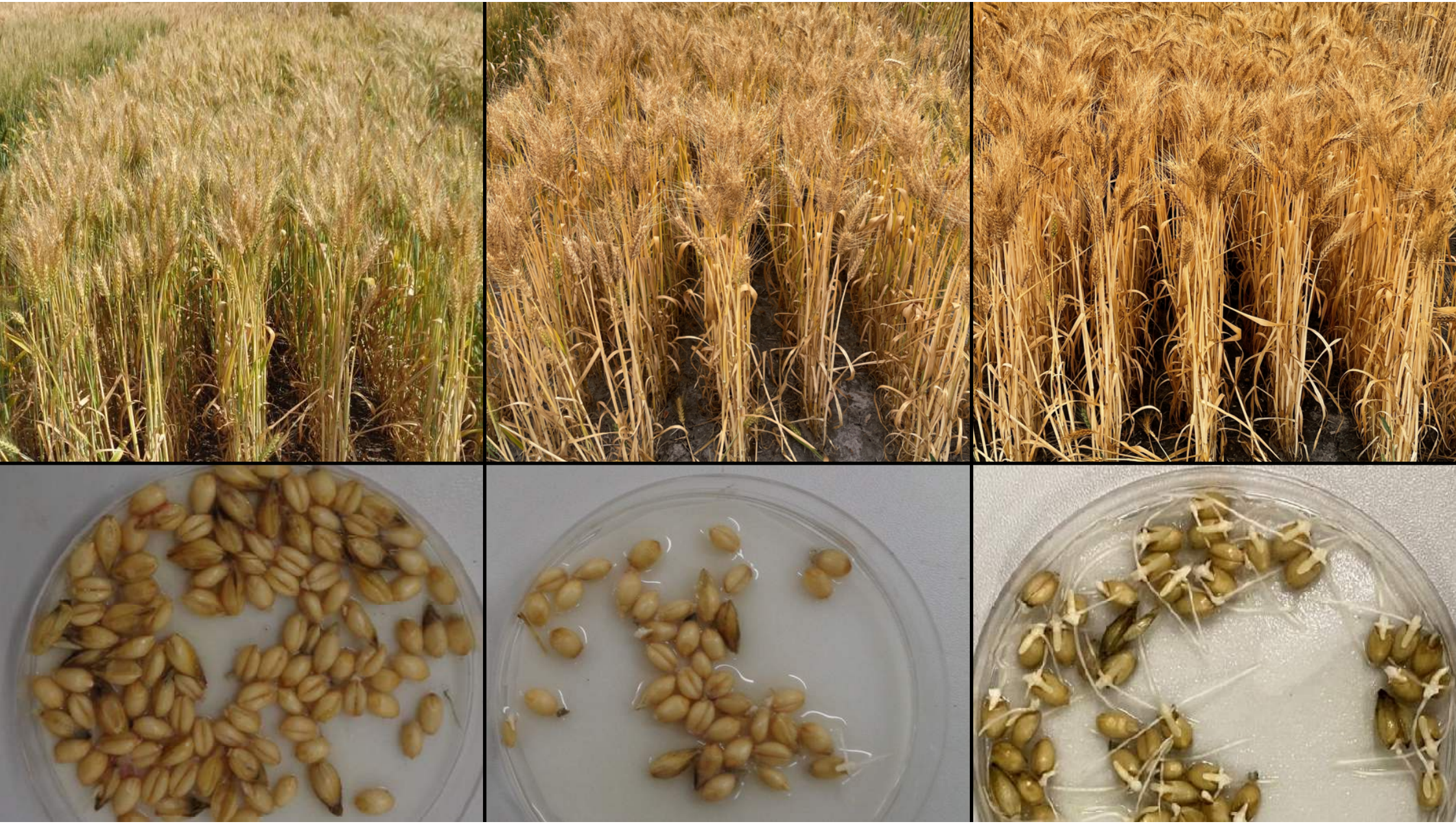
Background

Pre-harvest sprouting – germination prior to harvest.

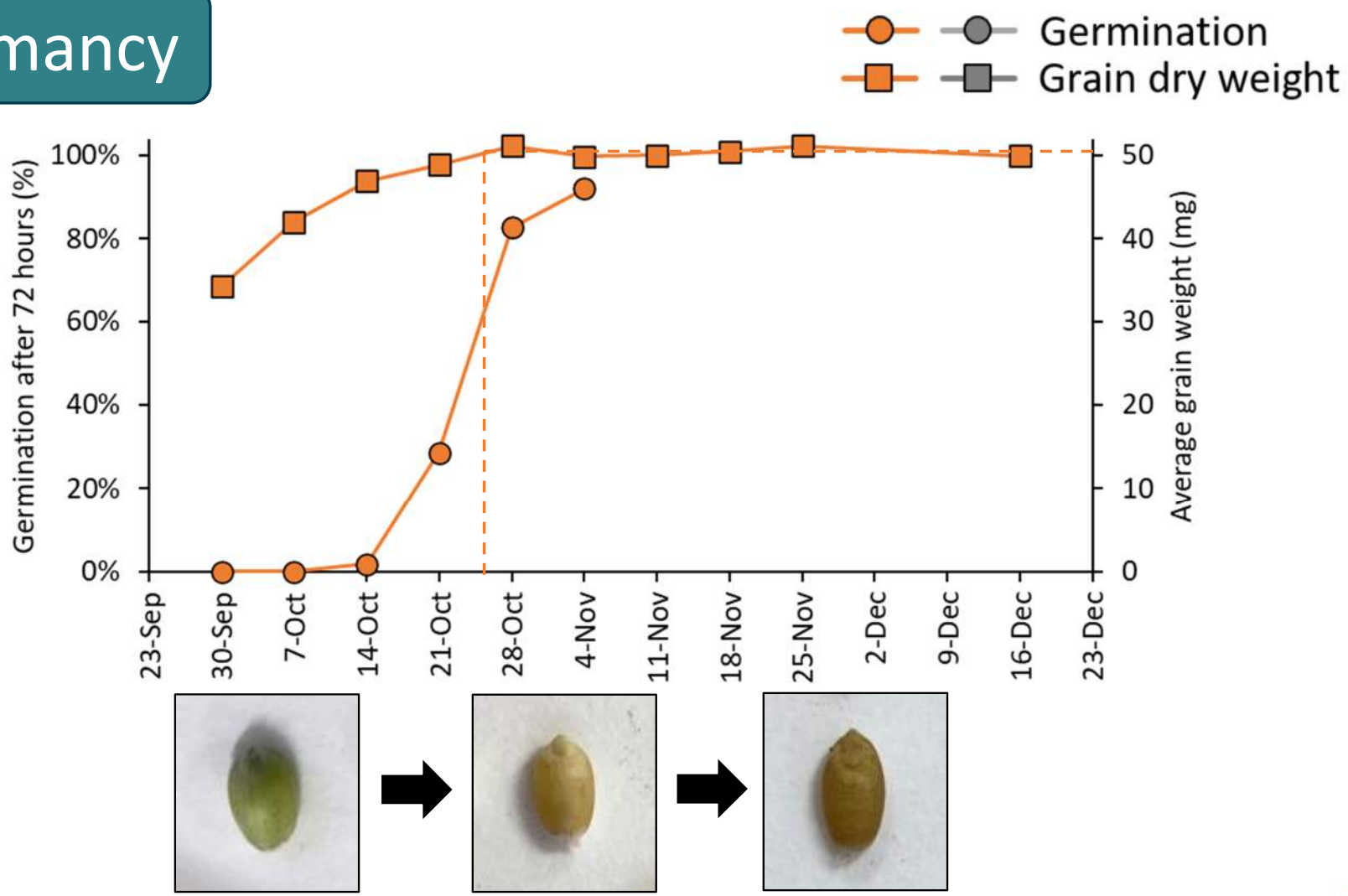
Germination stimulate production of α-amylase, an enzyme that facilitates starch degradation.

The presence of α-amylase reduces the end-use quality of the wheat.

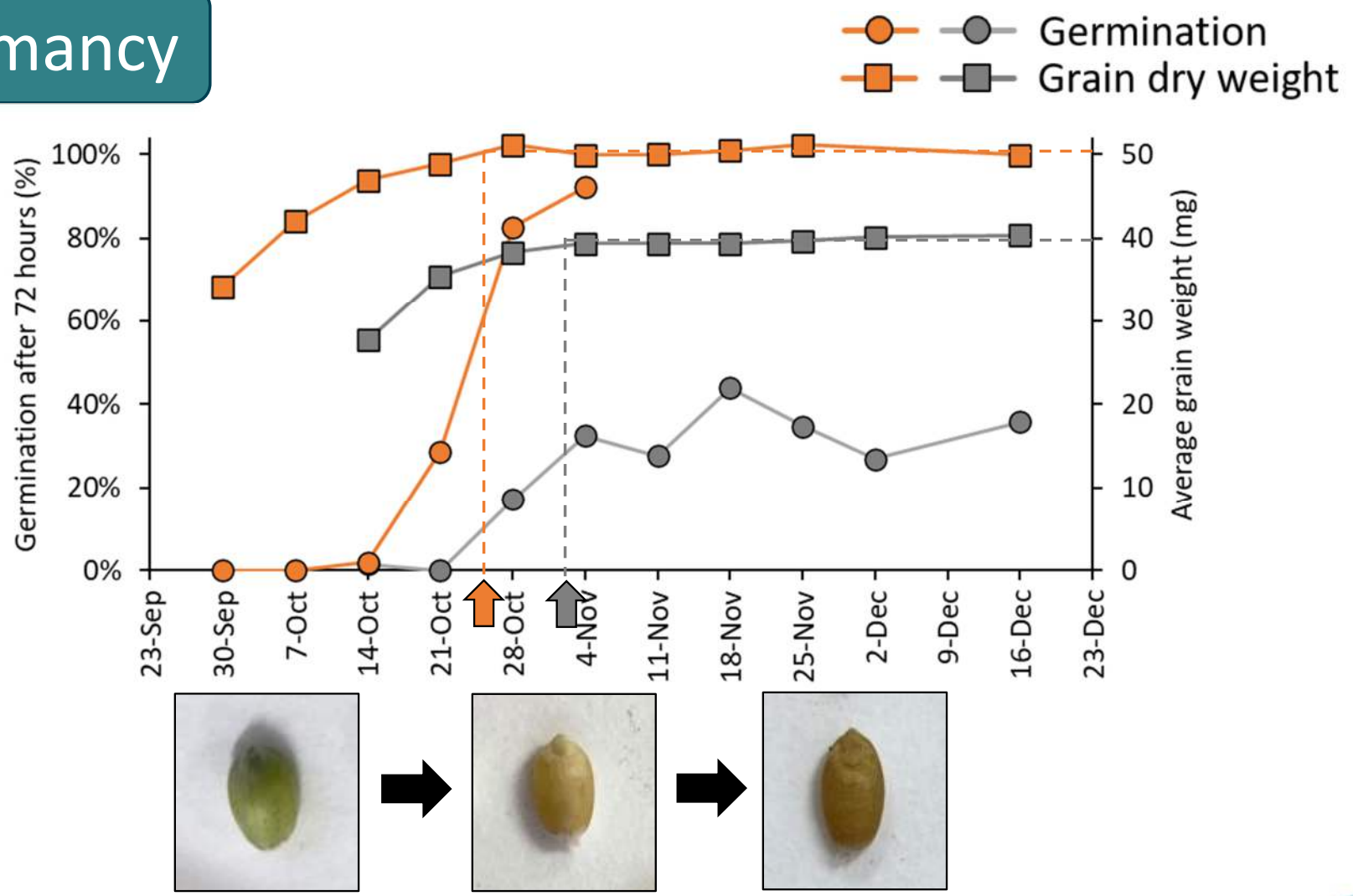
The Falling Number test is used to determine whether the levels of α-amylase are acceptable.



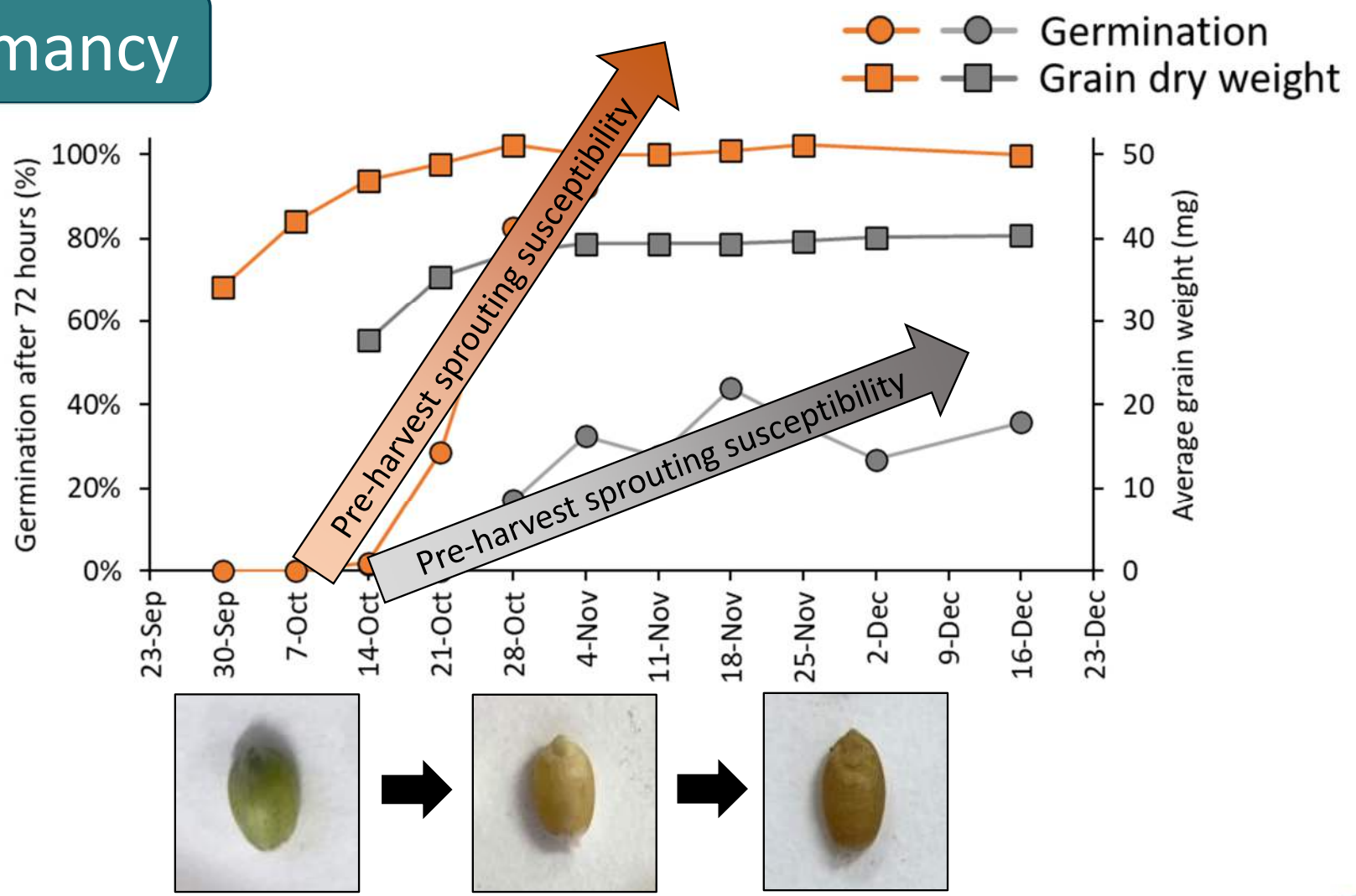
Grain dormancy



Grain dormancy



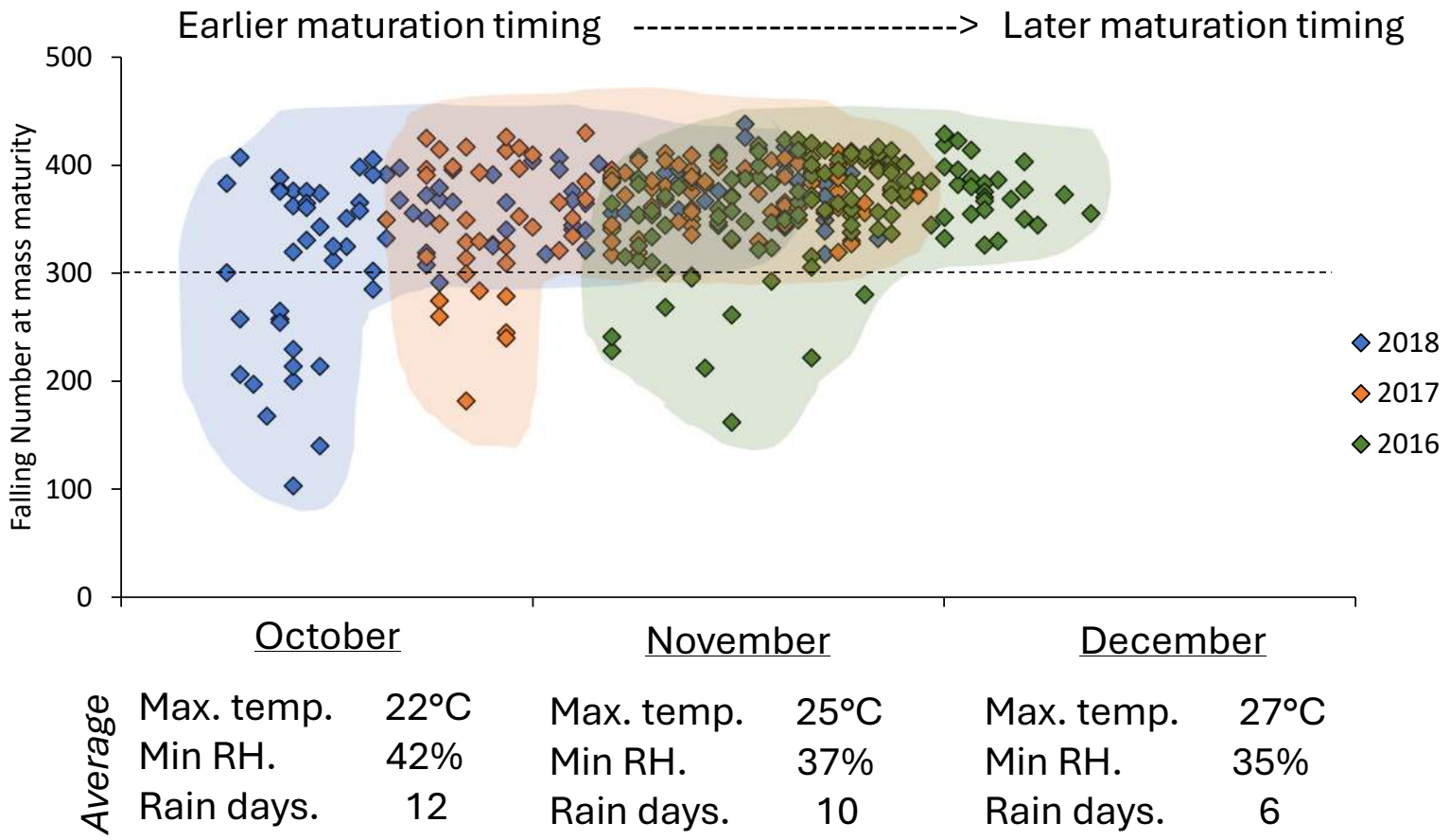
Grain dormancy




Early PHS

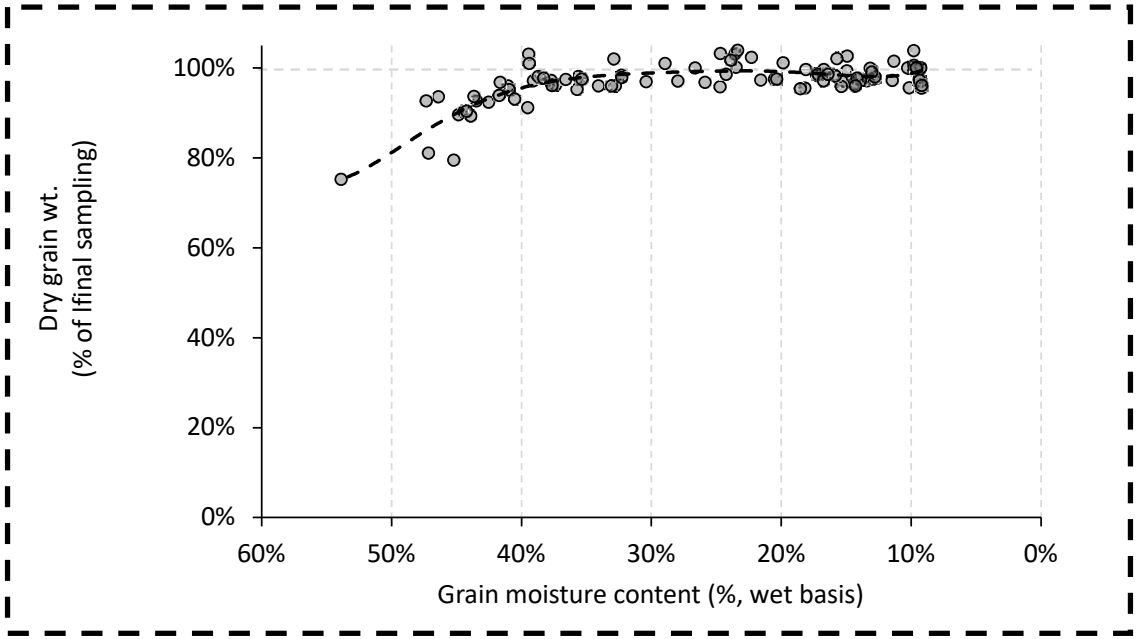
Early pre-harvest sprouting

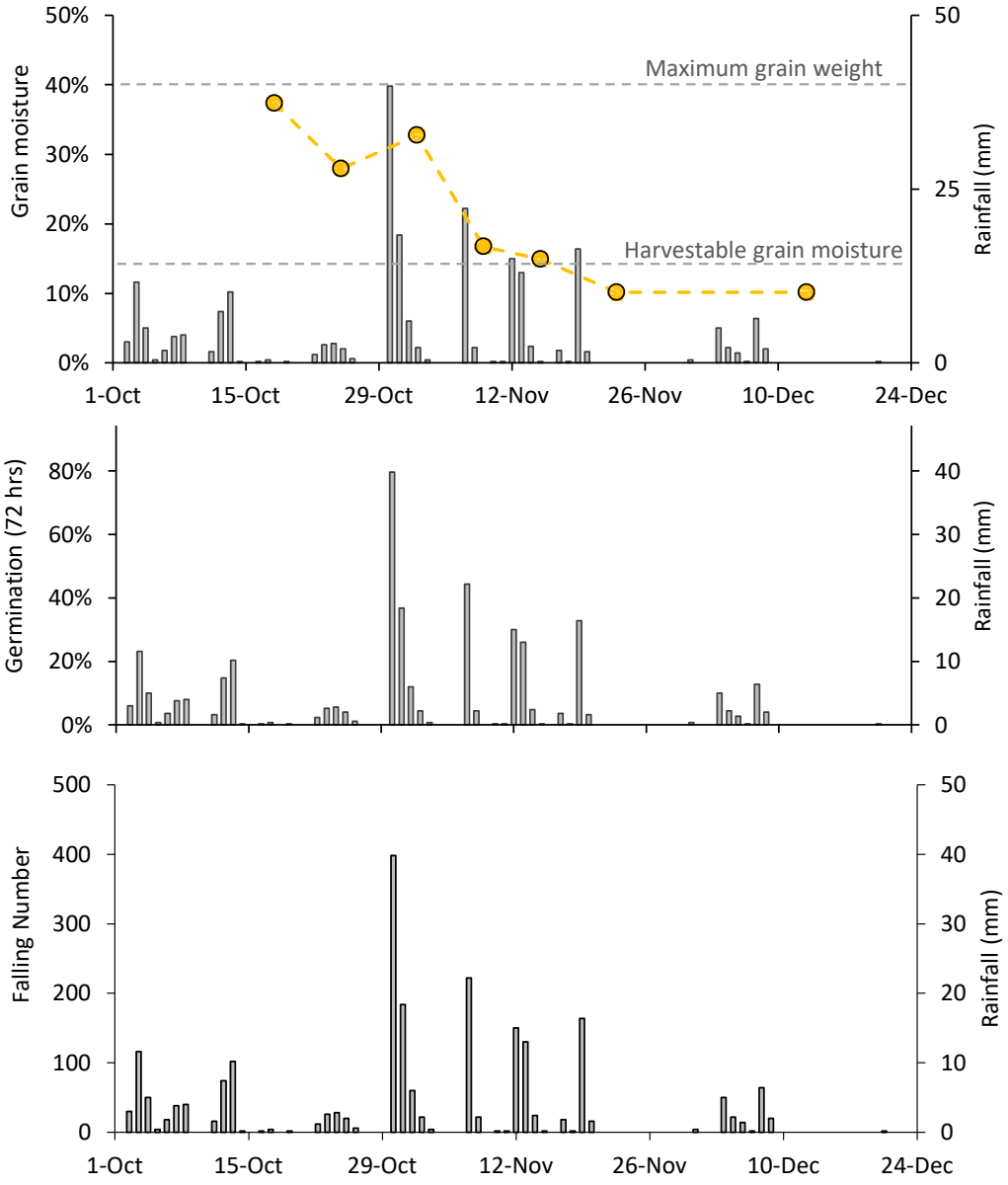
Low FN indicates elevated a-amylase



Average					
Max. temp.	22°C	Max. temp.	25°C	Max. temp.	27°C
Min RH.	42%	Min RH.	37%	Min RH.	35%
Rain days.	12	Rain days.	10	Rain days.	6

Changes during maturation drying





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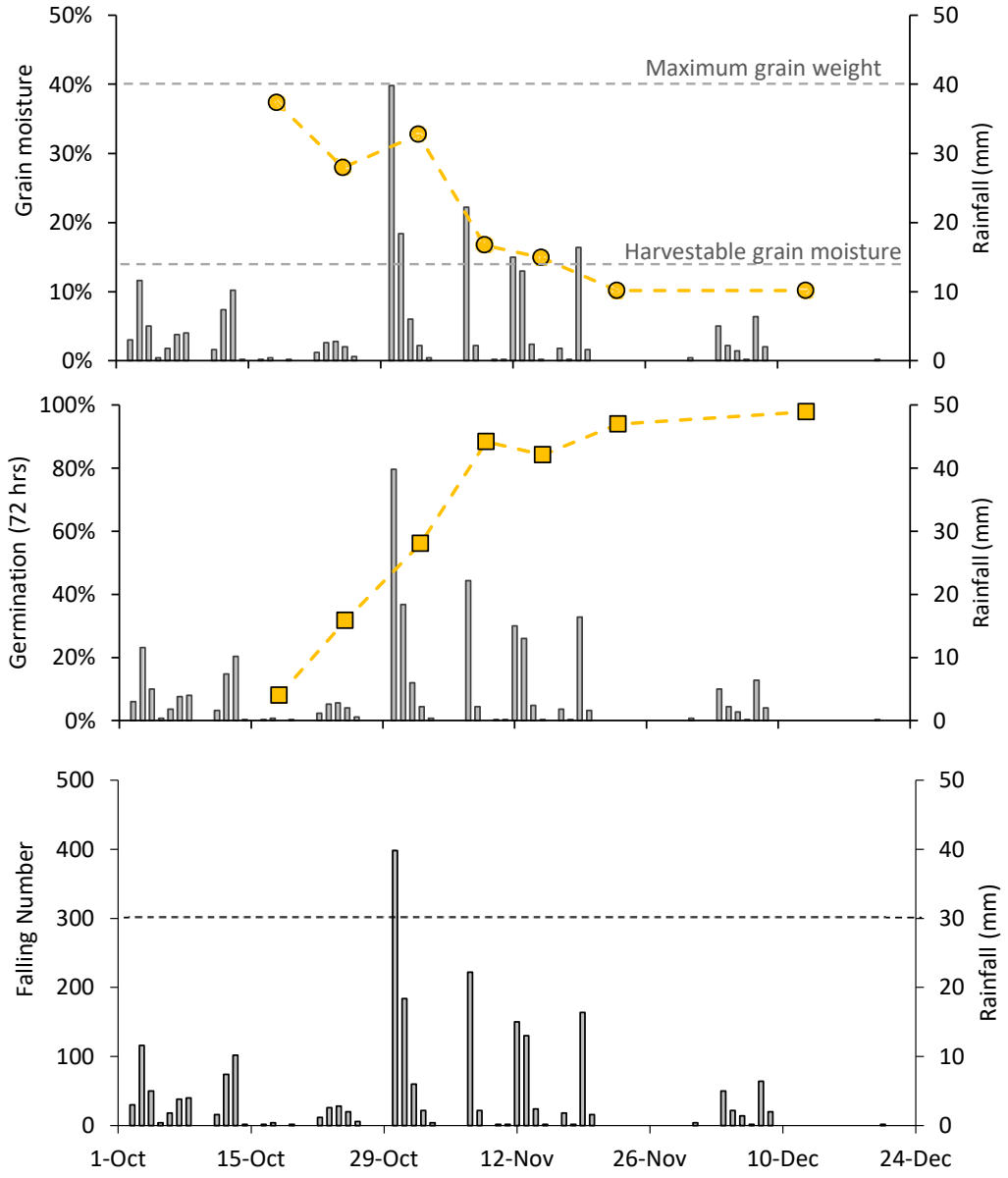

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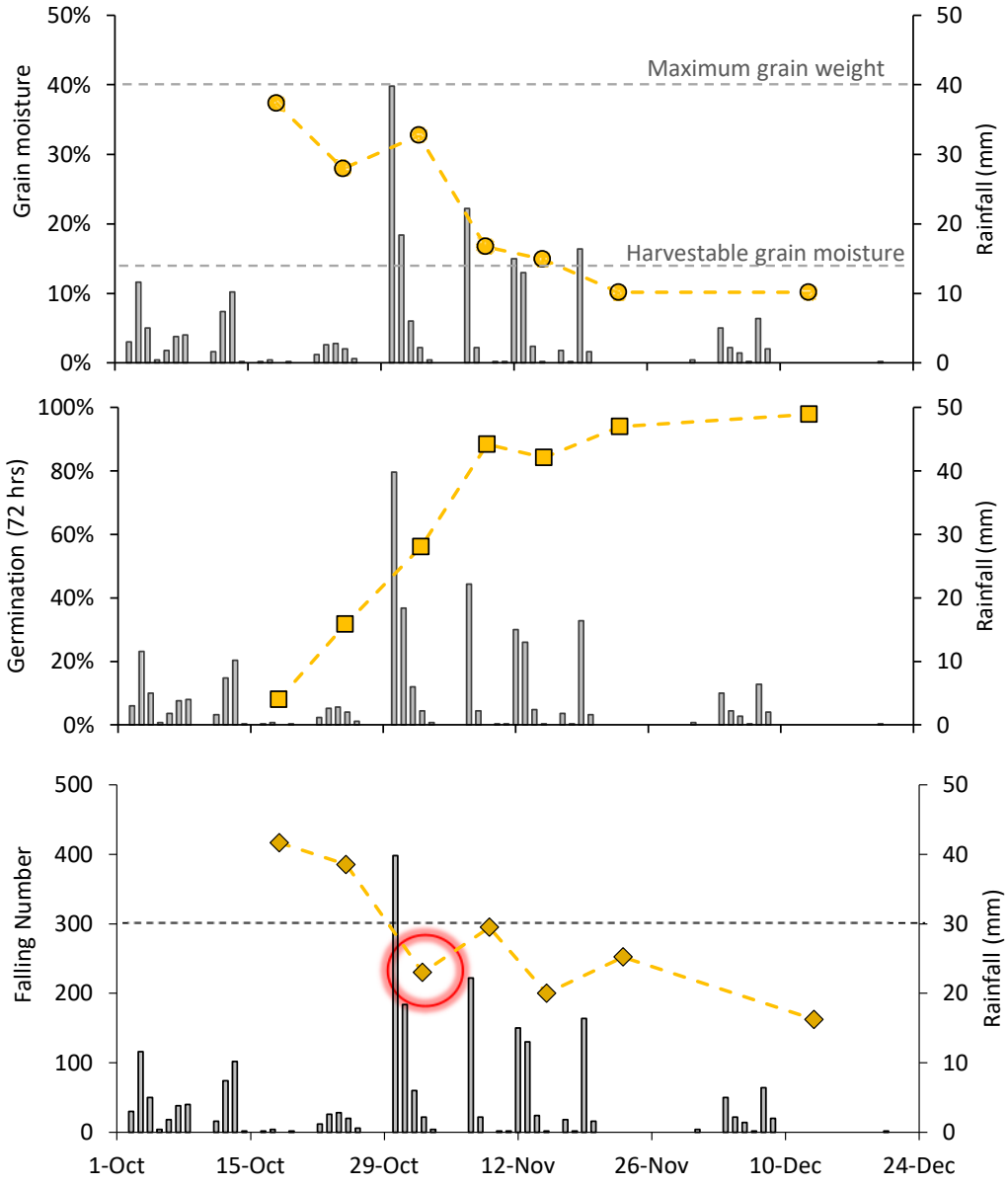

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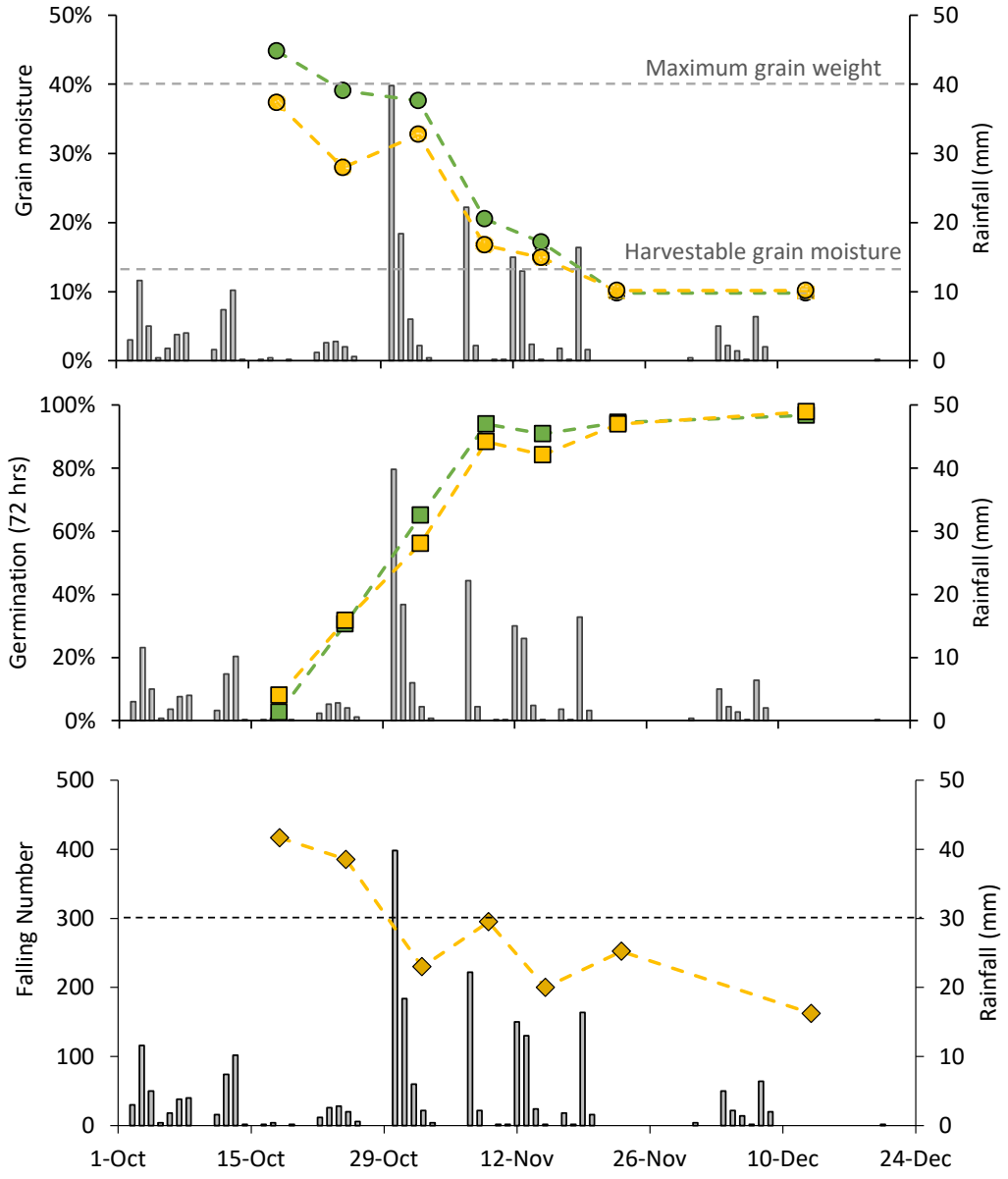

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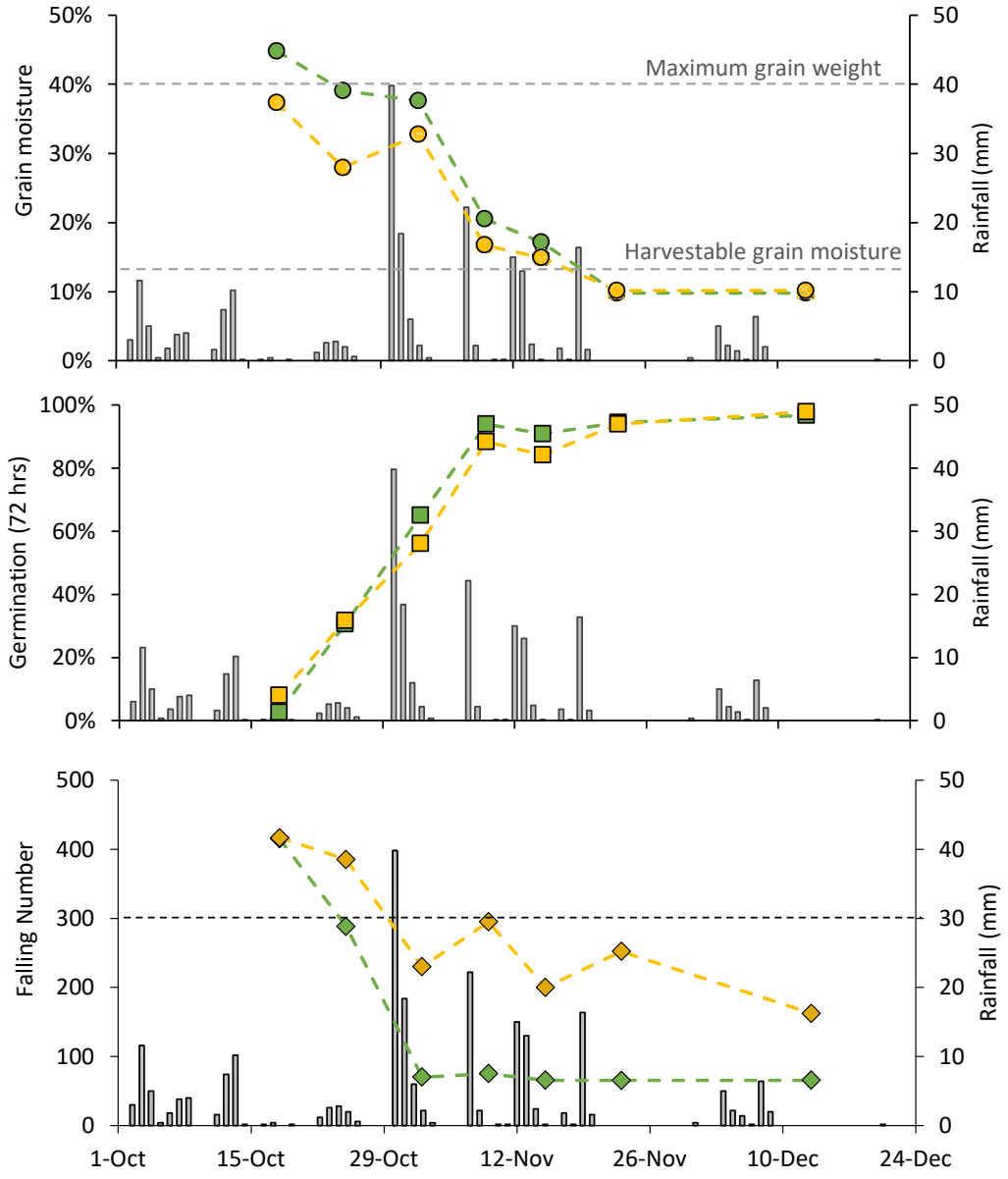

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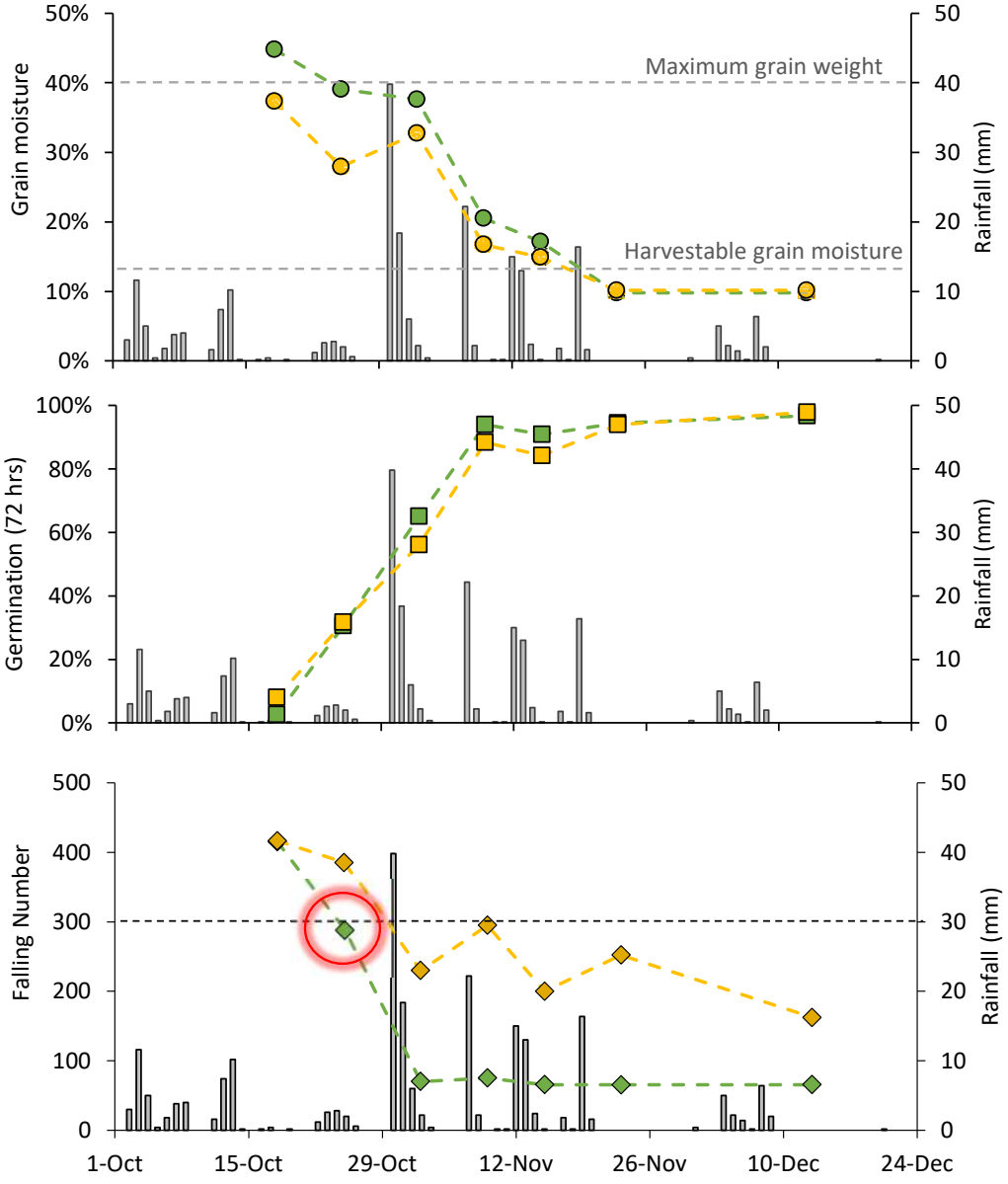

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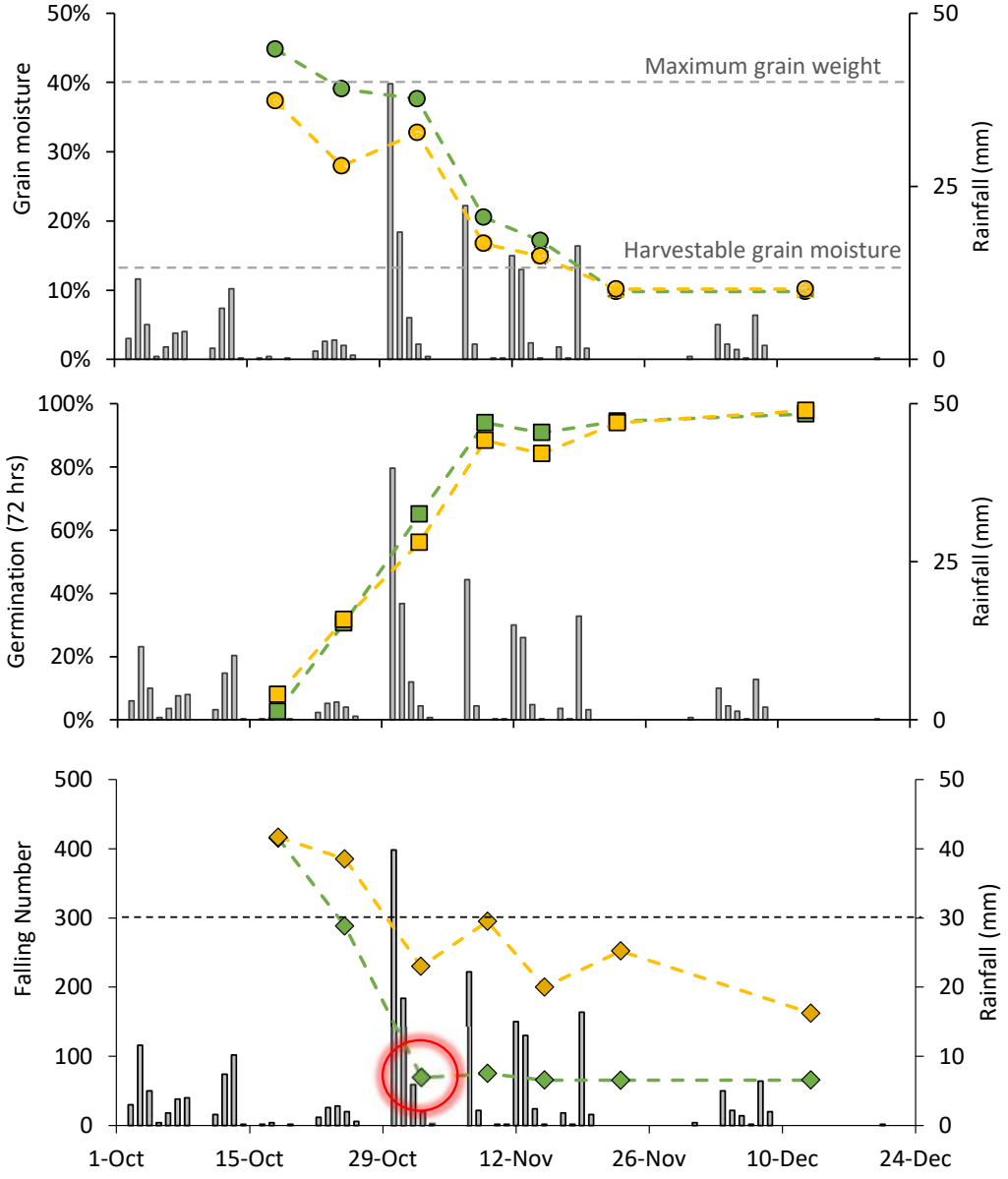

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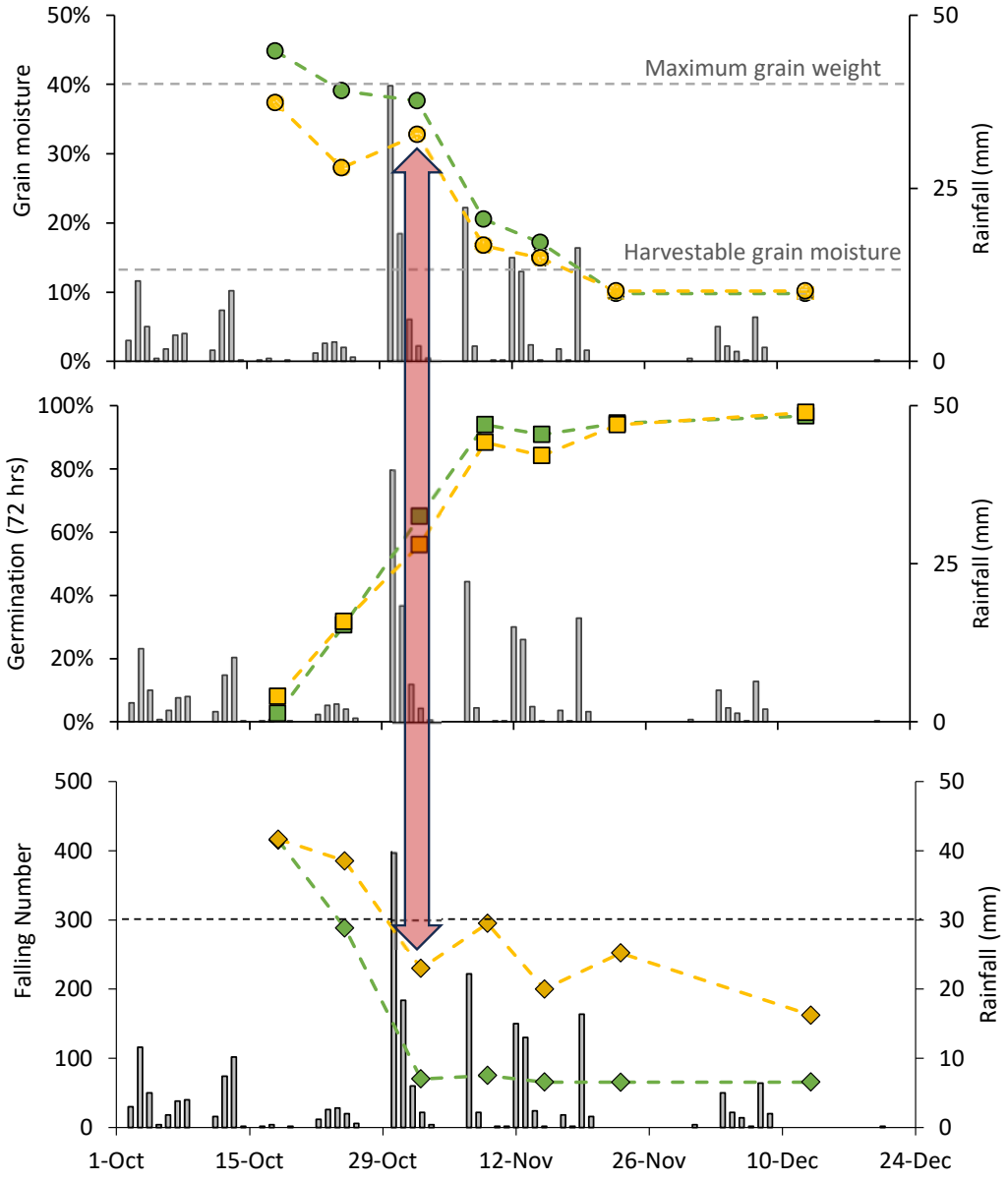

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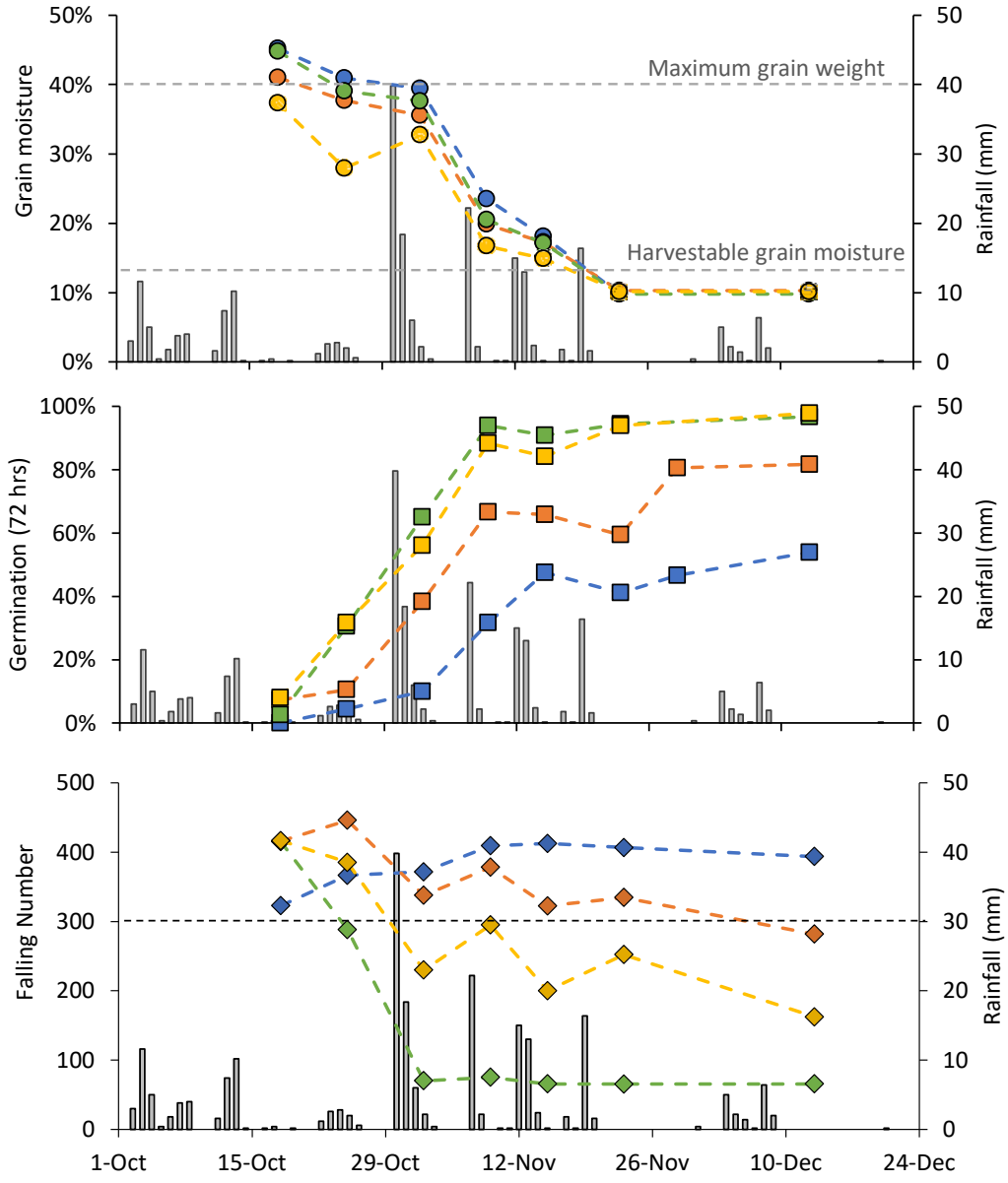

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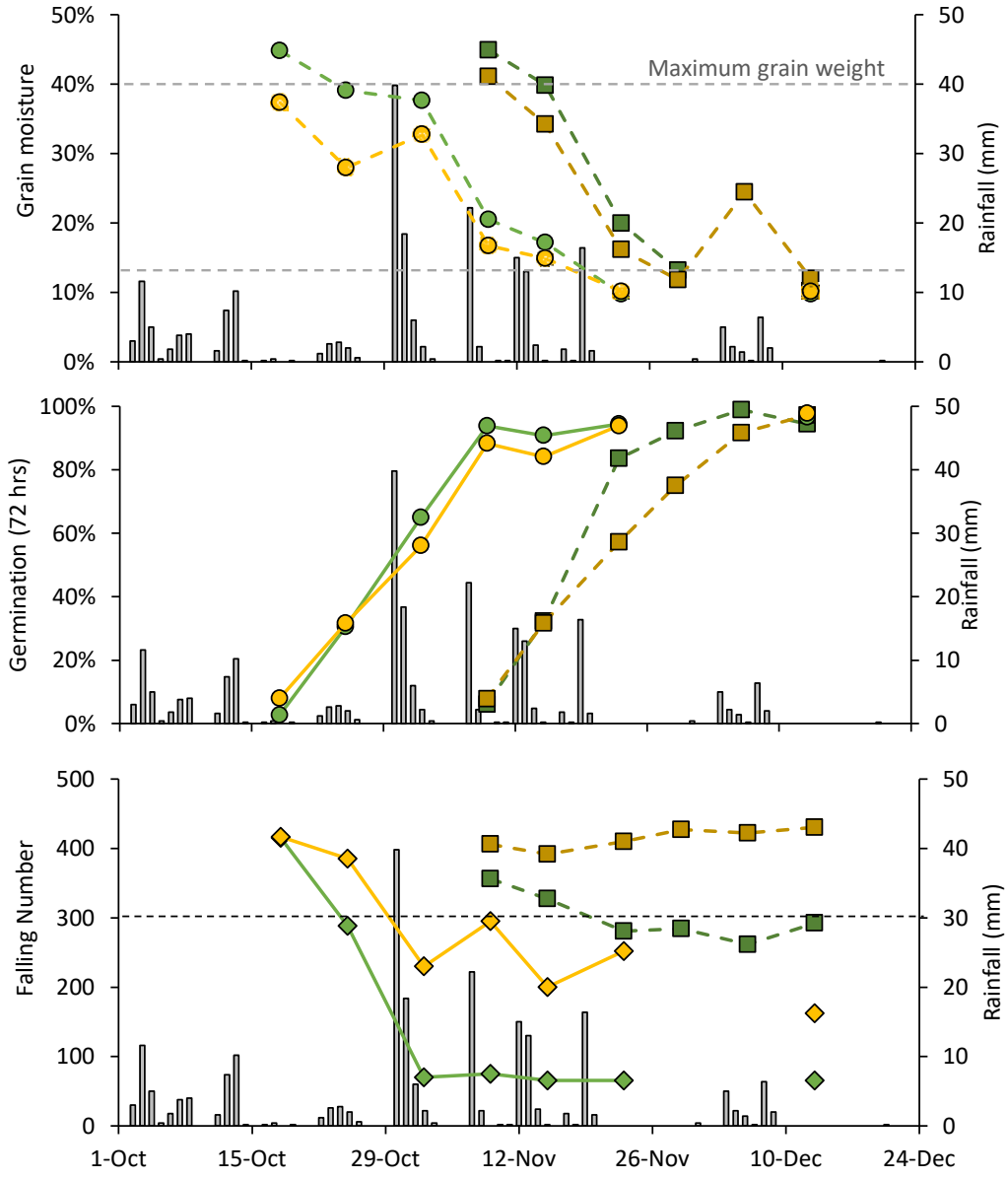
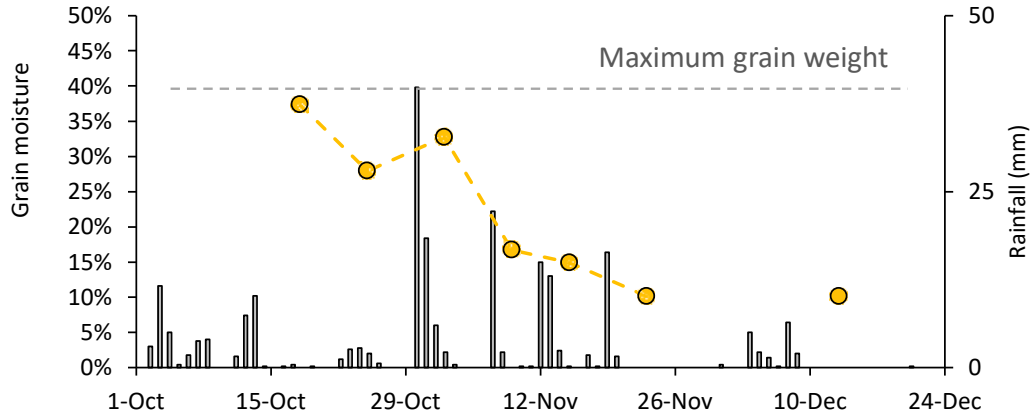
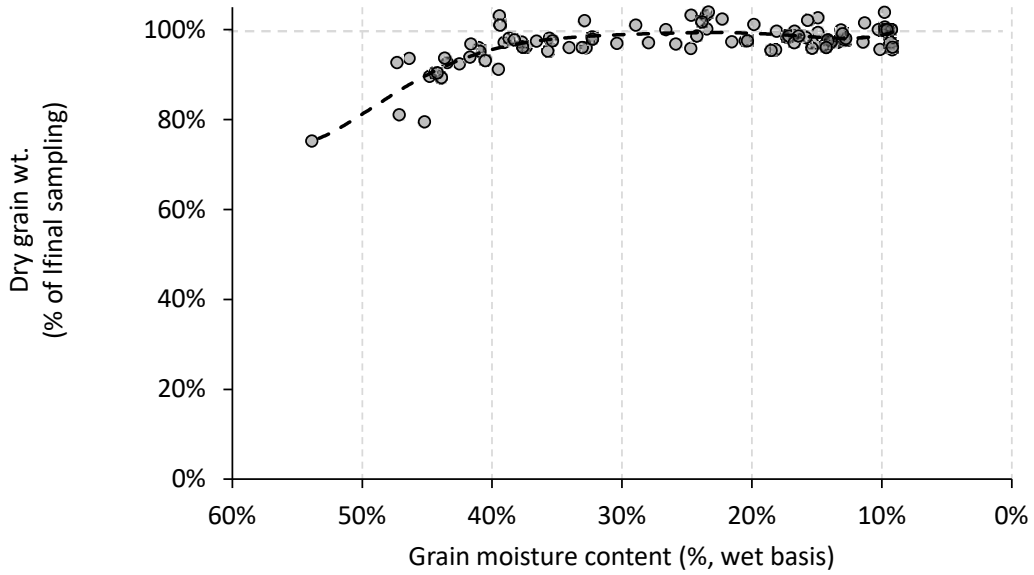


Early pre-harvest sprouting

In 2022 we measured weekly:
- dry grain weight
- grain moisture
- germination (72 hrs in petri dish)





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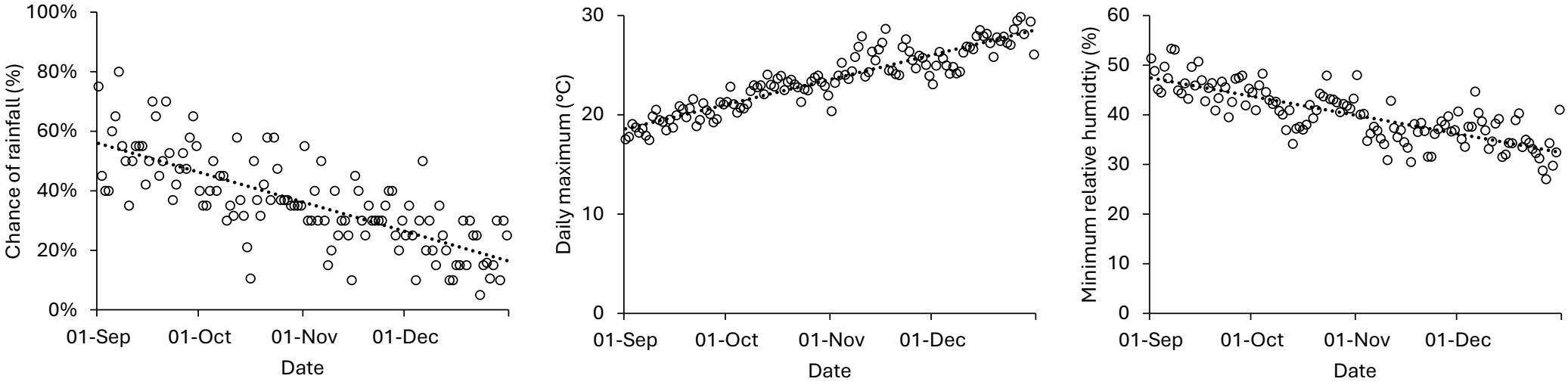
Maturation drying conditions



Average/frequency based on weather station data at Esperance Downs Research Station (2000 to 2020).

Crop development timing

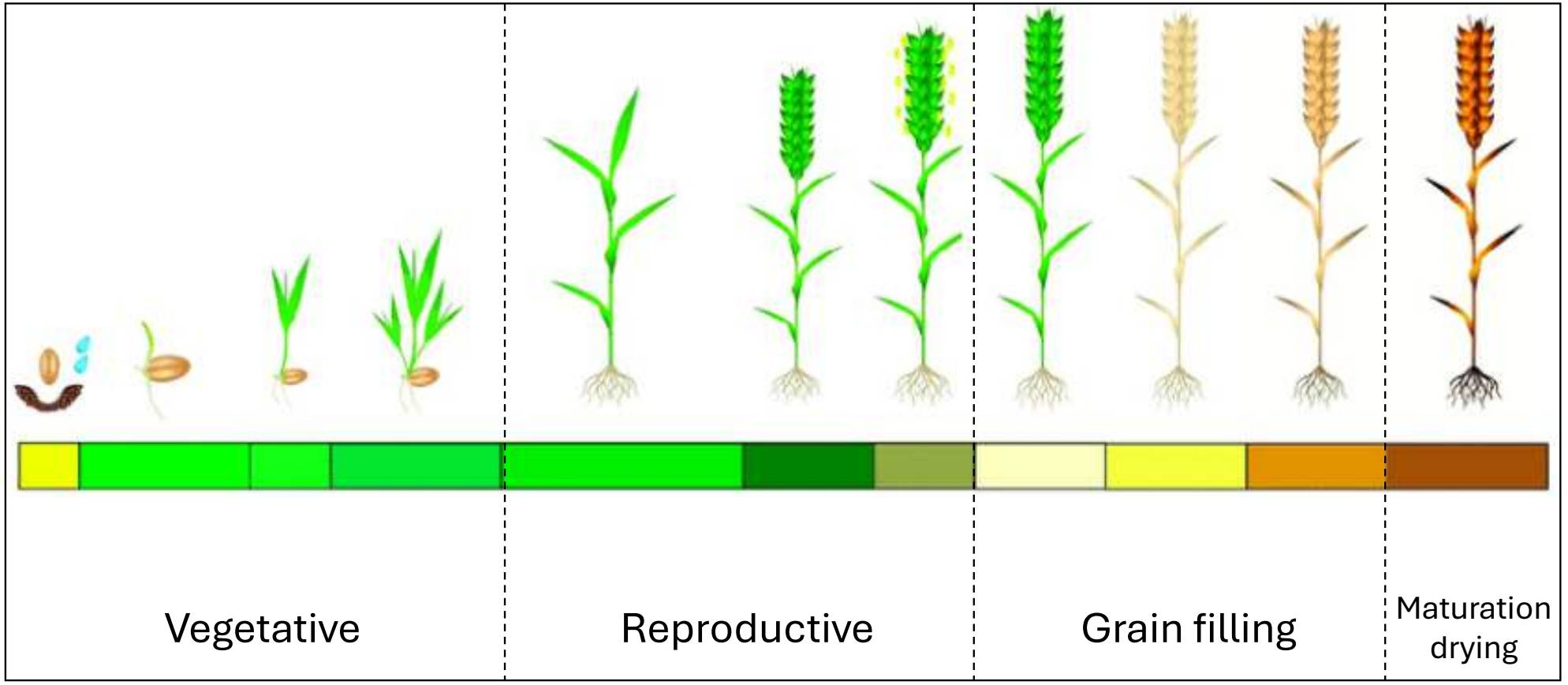
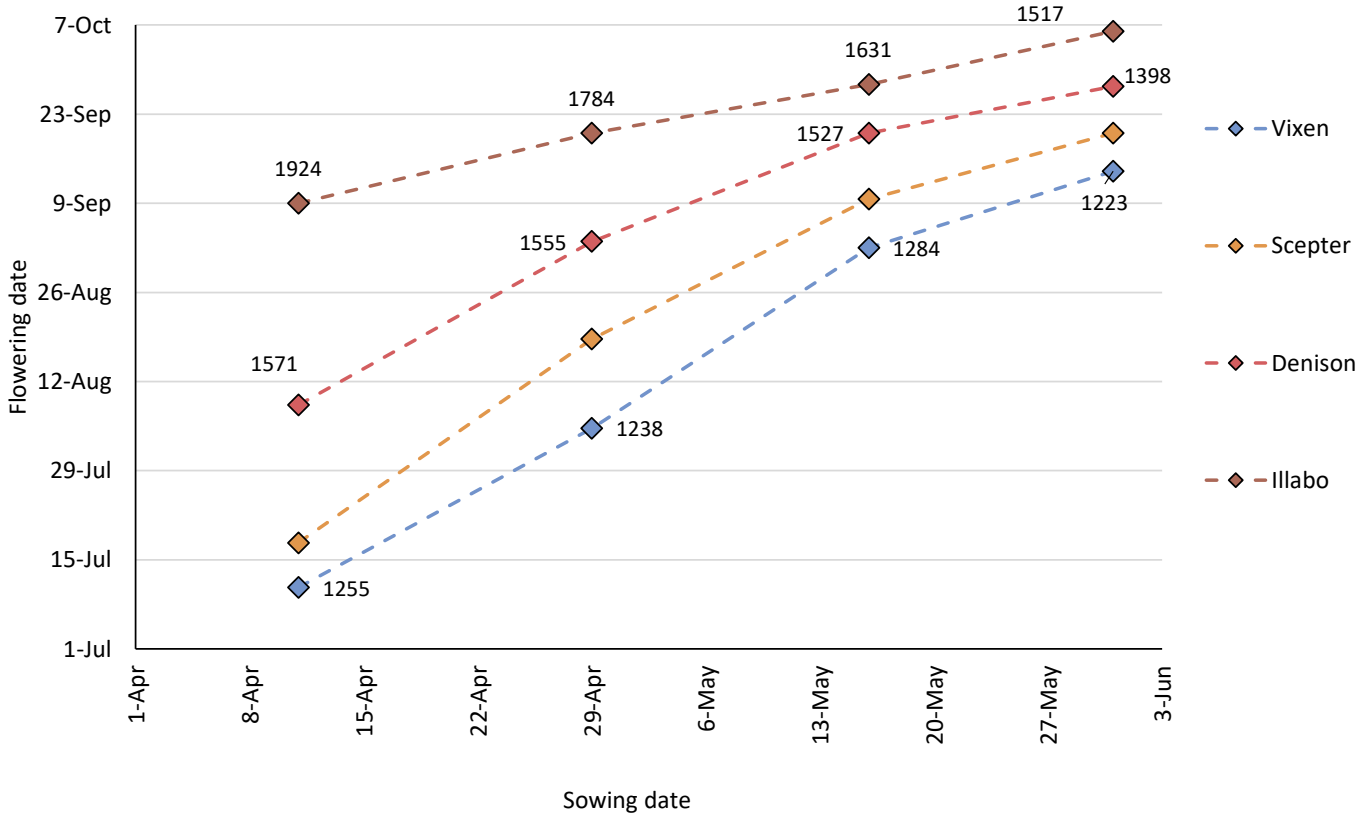


Image adapted from: Sabella, Erika et al. (2020). Impact of Climate Change on Durum Wheat Yield. Agronomy. 10. 10.3390/agronomy10060793.

Development with sowing time



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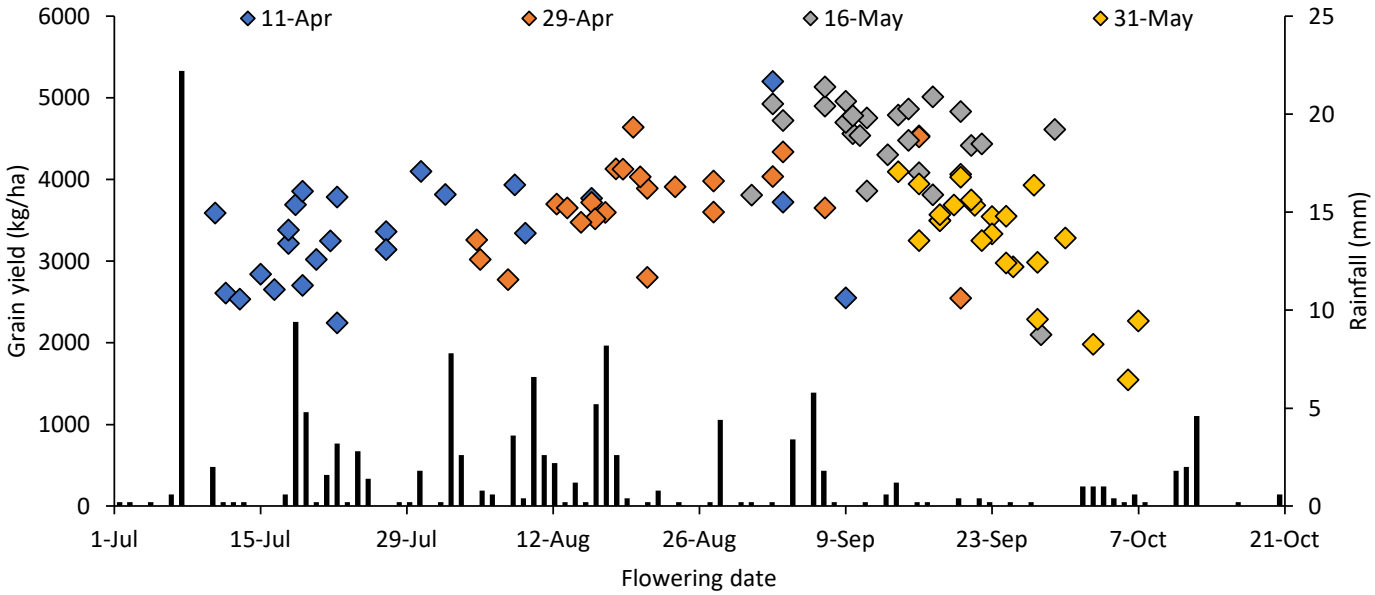
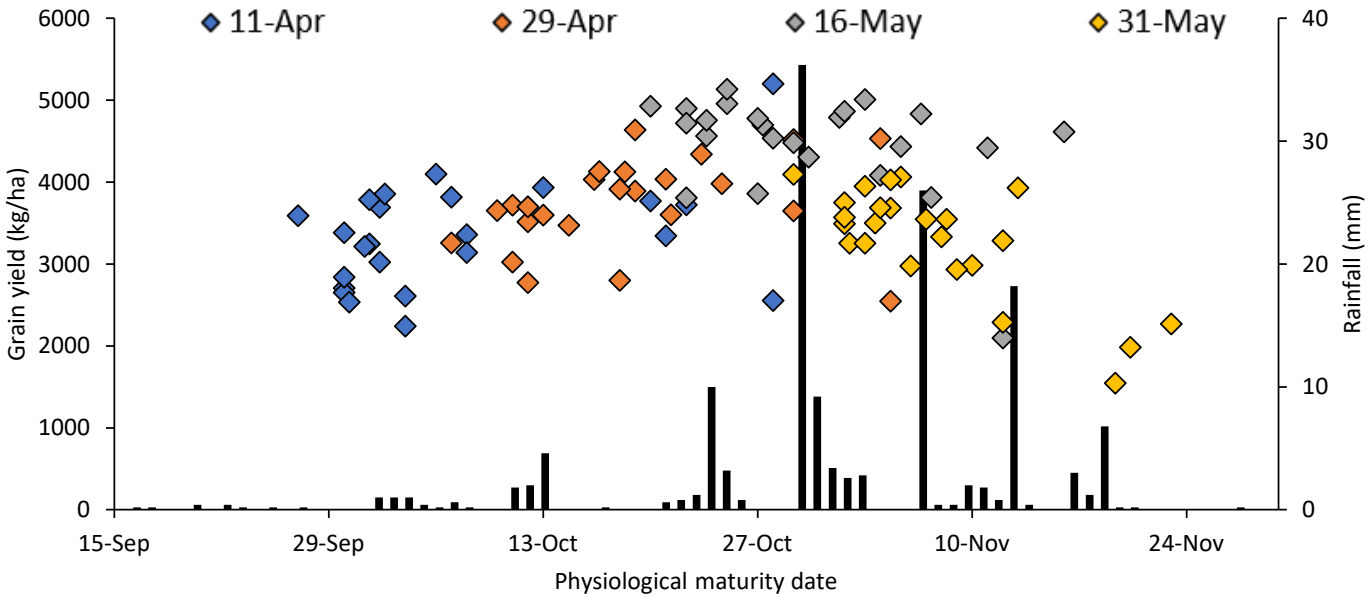
SEPWA

Crop development timing



Crop development timing



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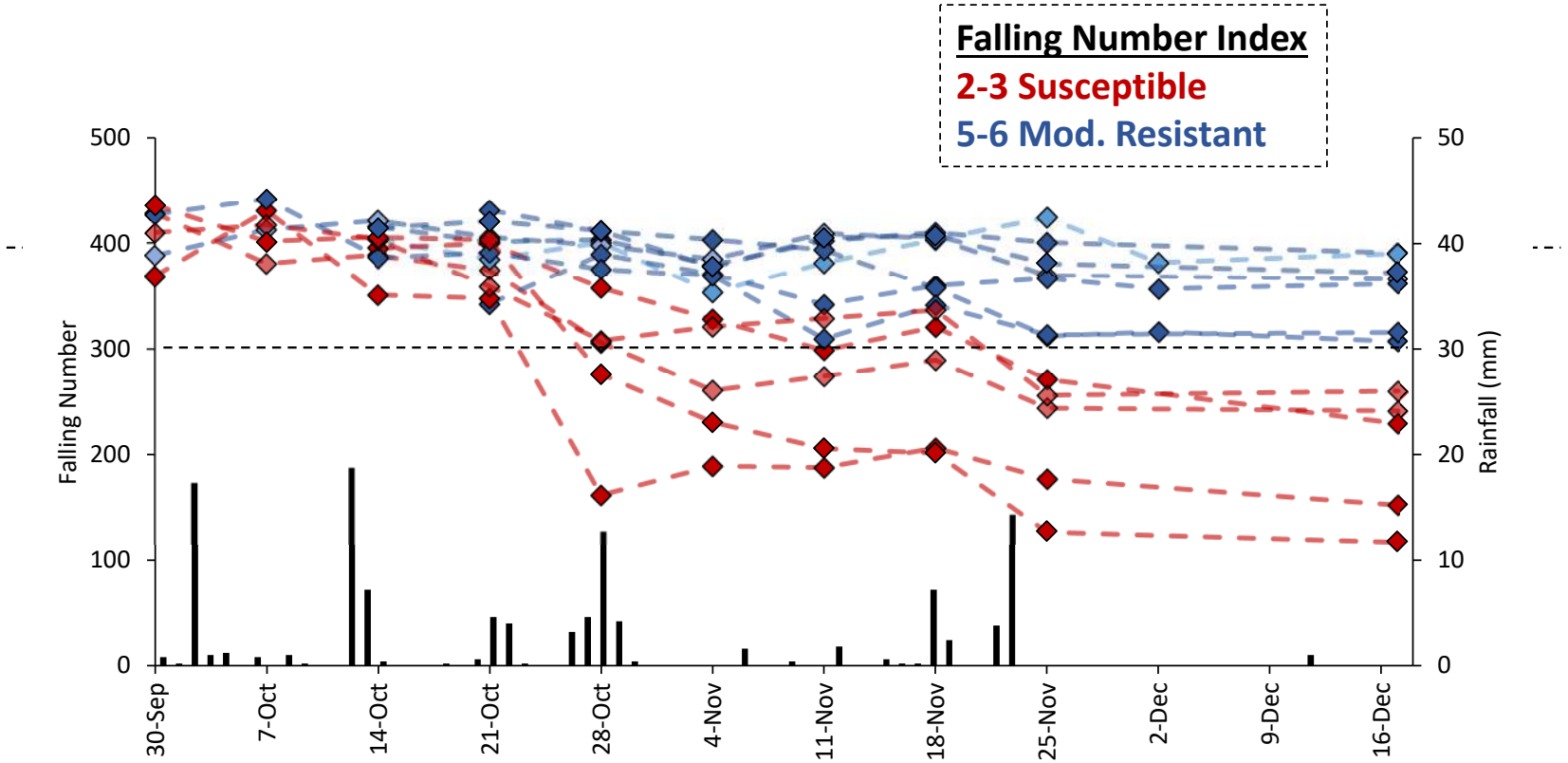
Variety susceptibility and maturation timing



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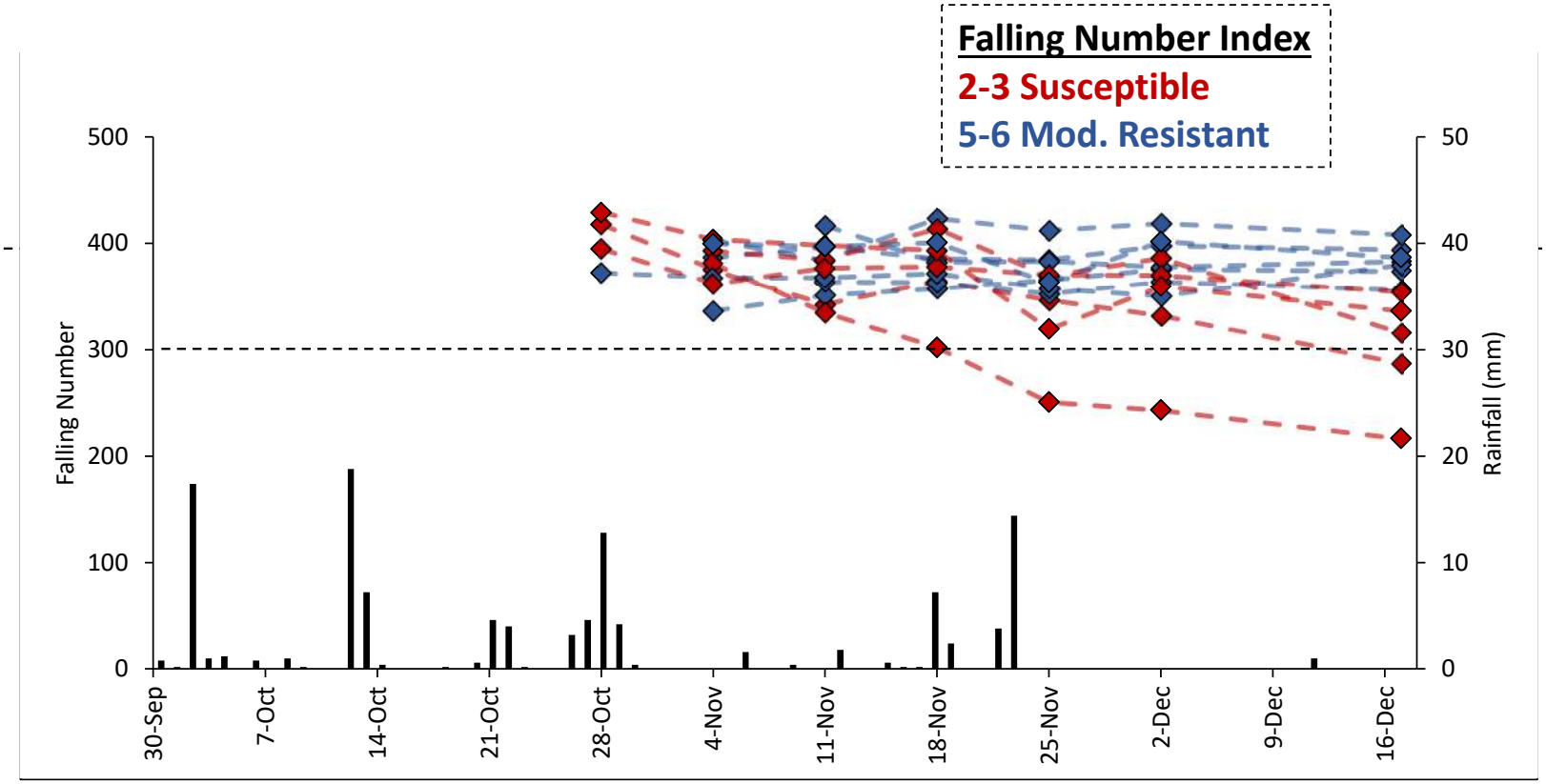

Thank you

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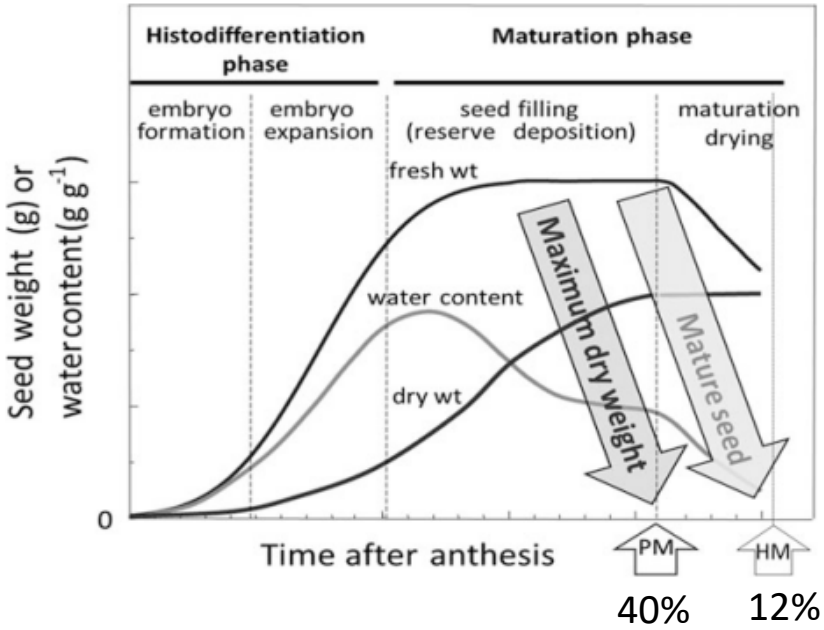
DPIRD Esperance

Maturation drying



Sripathy, K.V., Groot, S.P.C. (2023). Seed Development and Maturation. In: Dadlani, M., Yadava, D.K. (eds) Seed Science and Technology. Springer, Singapore. https://doi.org/10.1007/978-981-19-5888-5_2

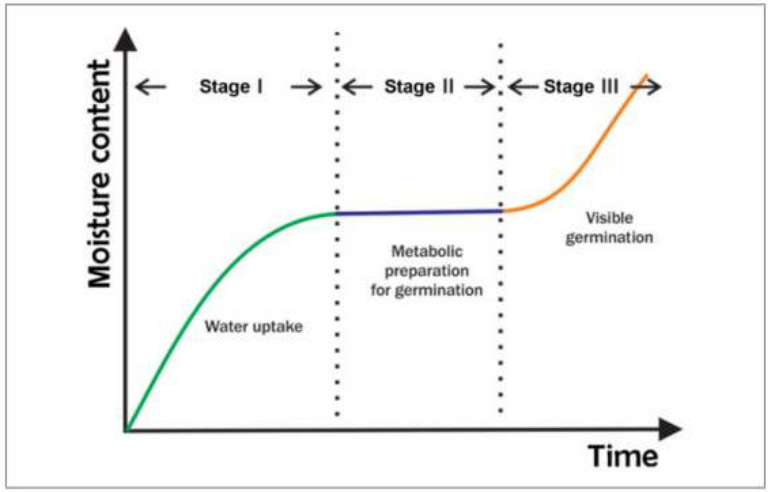
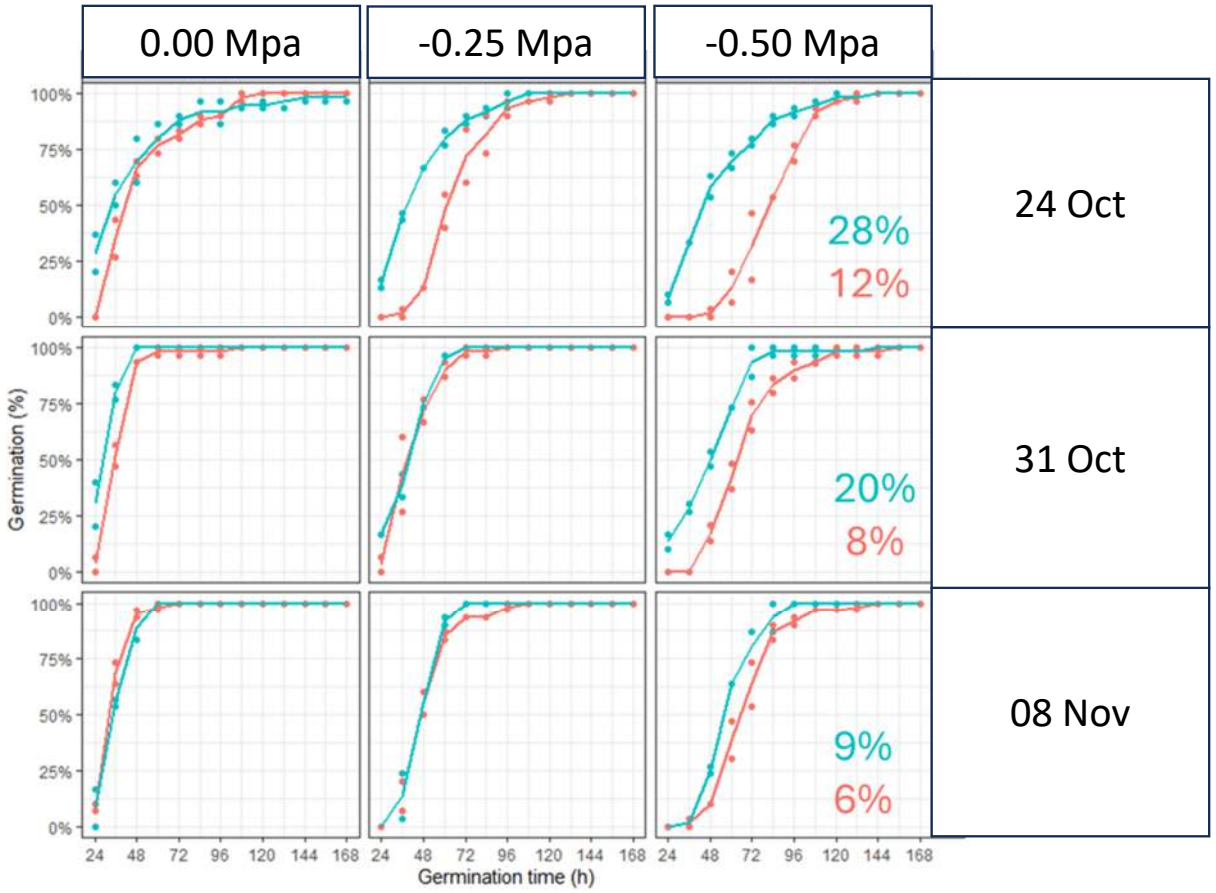


Figure 2–Seed water imbibition during the hydration – germination process. Adapted from Bewley and Black (1978). Stage I can have 2 different patterns, as described in Figure 6 and Section "Water uptake pathways and hydration behavior."

Fresh v. dry grain germination

Fresh

Dry



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