



GOVERNMENT OF
WESTERN AUSTRALIA

Department of
Primary Industries and
Regional Development

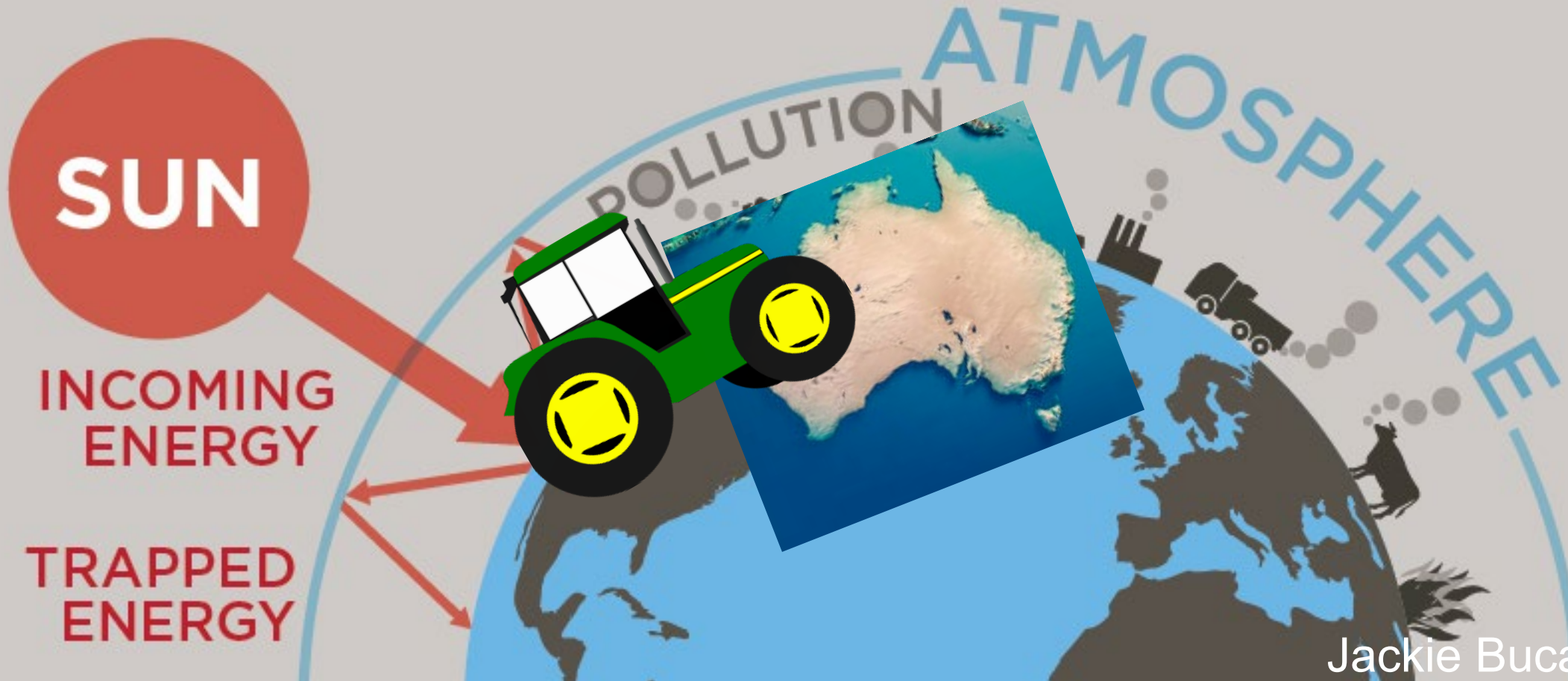
Identifying critical temperature and moisture limits to increase certainty of canola establishment

Jackie Bucat, DPIRD



Climate change

- Less rainfall events in autumn
- Less growing season rainfall
- Higher temperatures
- Hot spells: more, longer, hotter





+ Mullewa

+ Wongan Hills

+ Dale

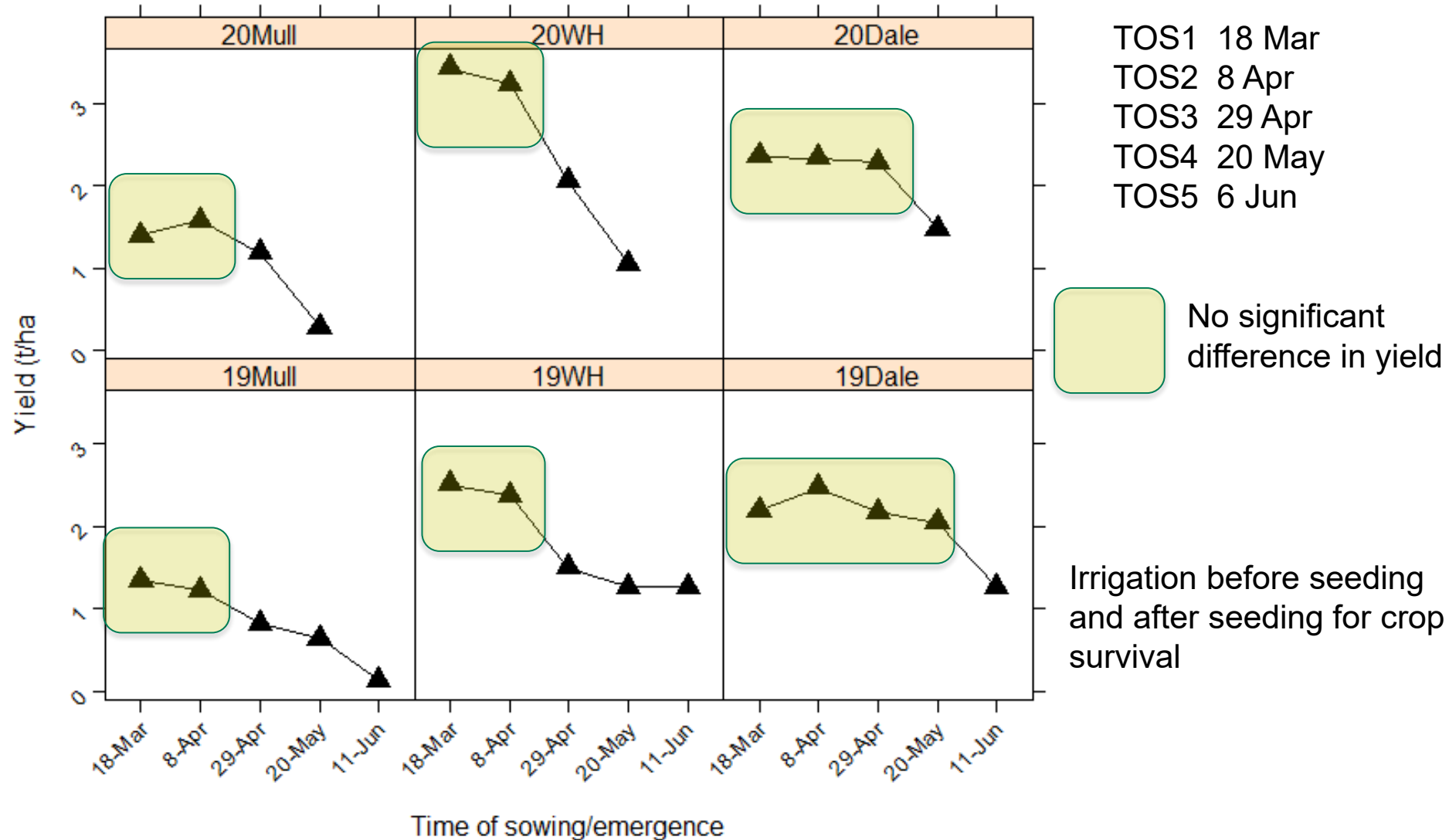
Grass Patch



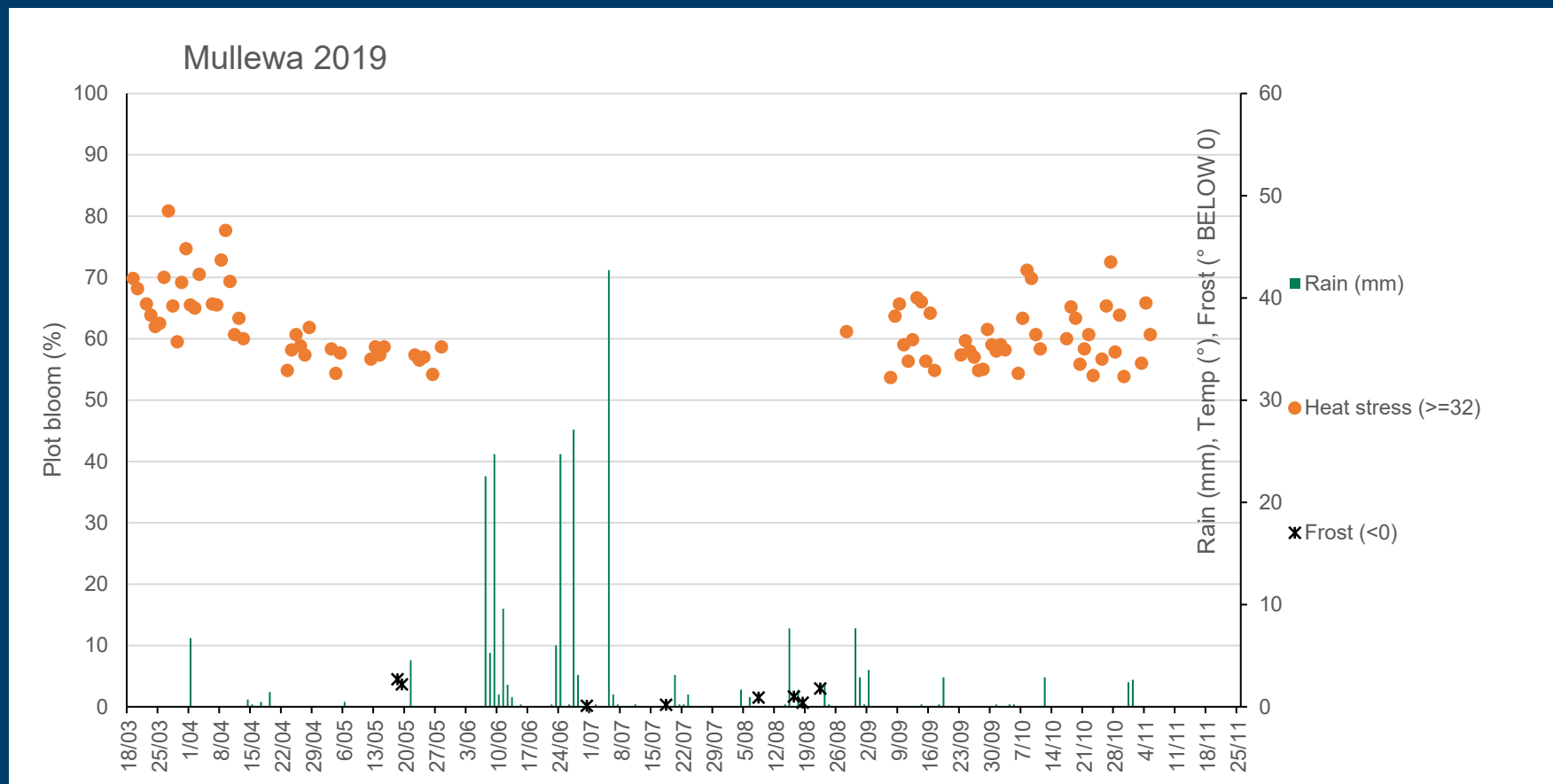
+ Early sowing trials
2019 and 2020

Early sowing research 2019-2020

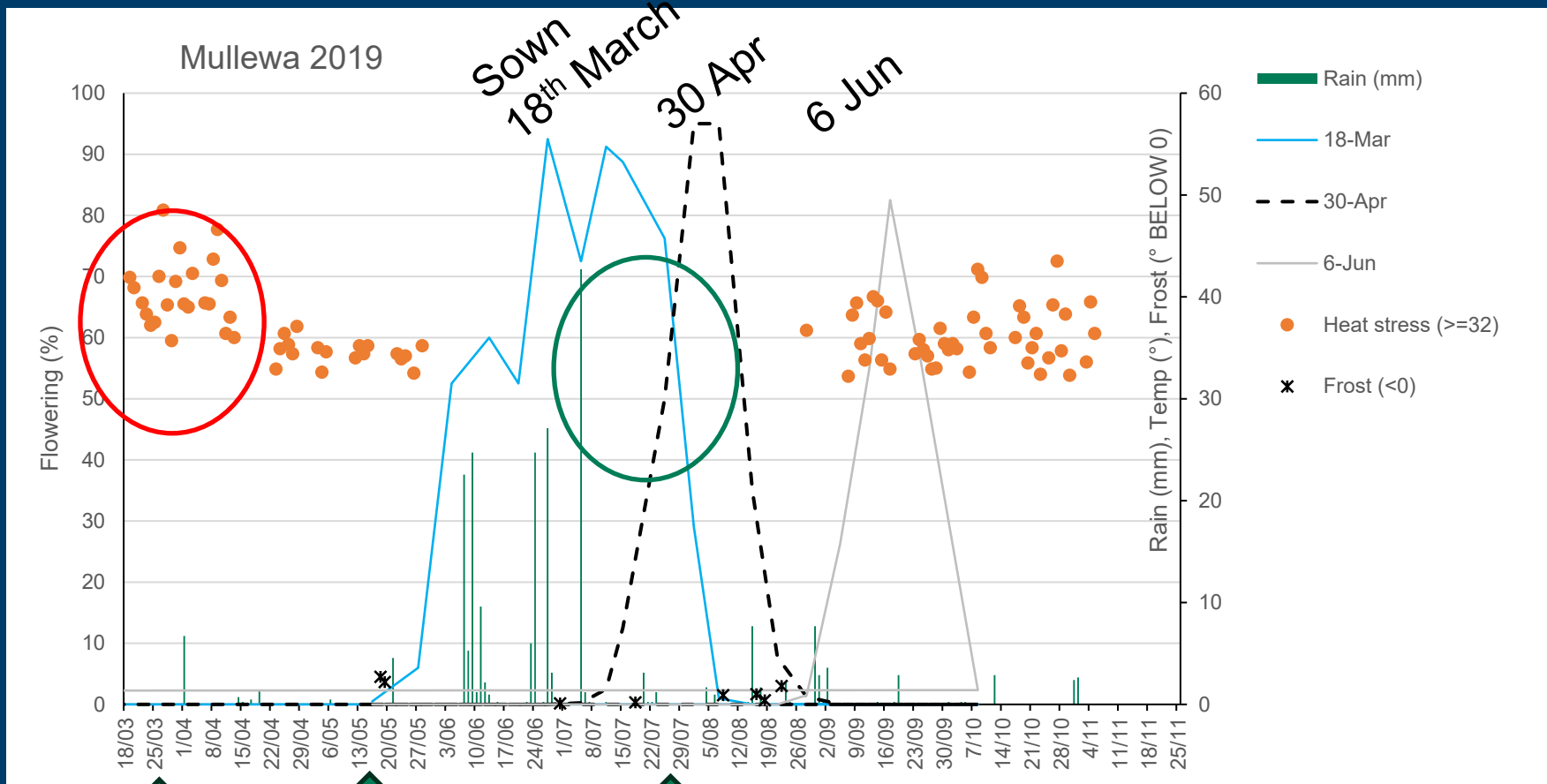
Key result- **Highest yields with sowing 18 March OR 8 April**



Rain, heat stress and frost at Mullewa



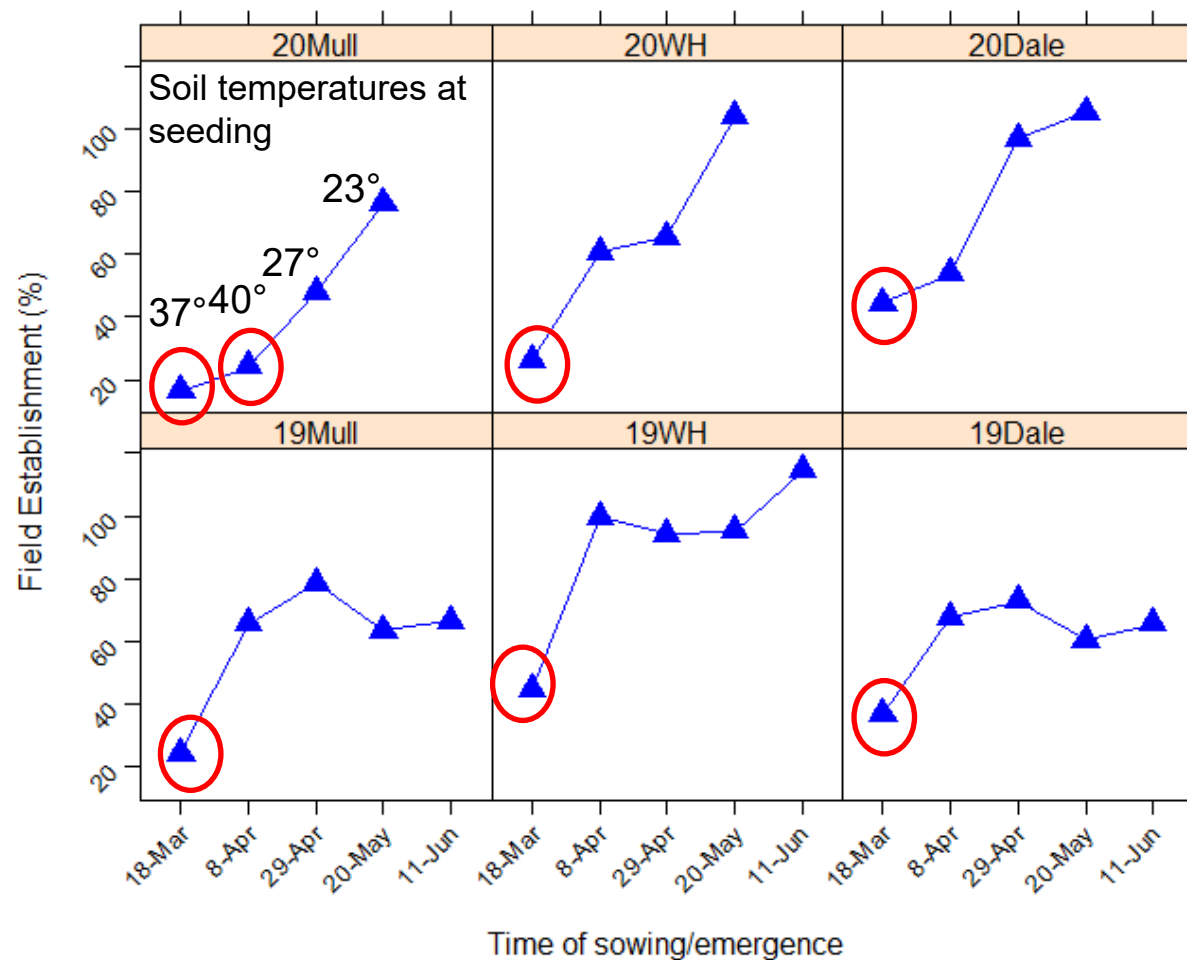
ATR Bonito flowering with different sowing times



TOS1 18 Mar
TOS2 8 Apr
TOS3 29 Apr
TOS4 20 May
TOS5 6 Jun

Similar flowering
patterns at Wongan
Hills, Dale and
Grass Patch

Reduced field establishment with early sowing



Acknowledgements

DPIRD and GRDC

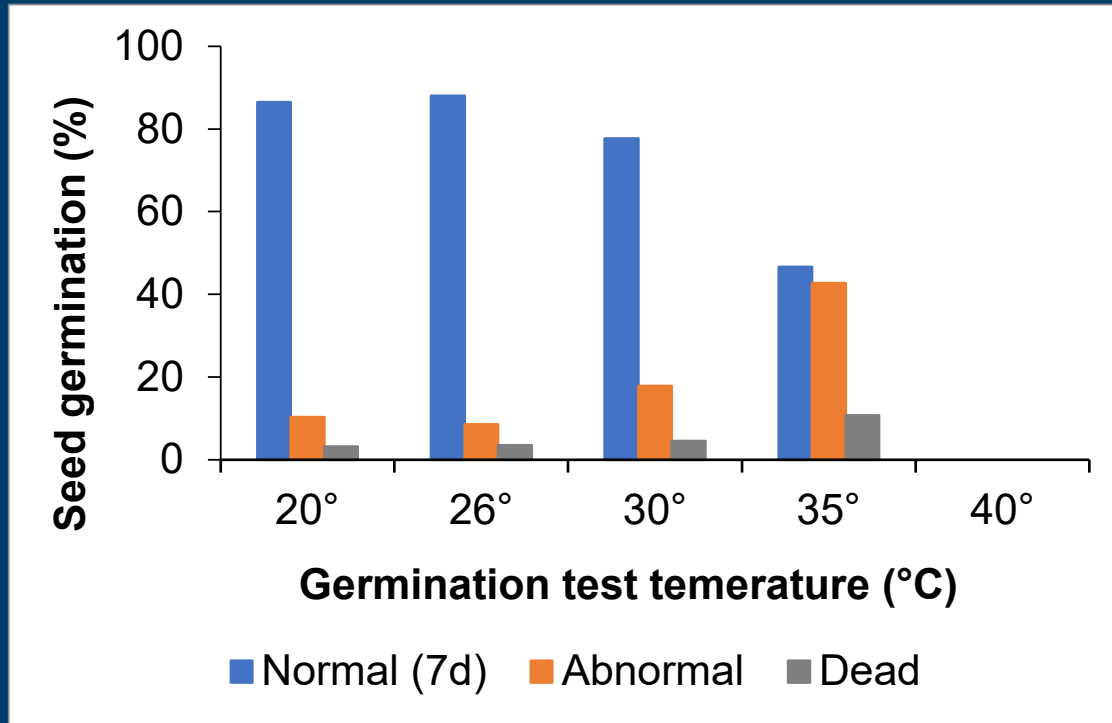
DPIRD staff-Stacey Power, Andrew Blake,
Martin Harries, Imma Farre,
Salzar Rahman and Stephanie Boyce



Towards identifying conditions for successful canola establishment

- Laboratory germination tests
- Hand sown plots at South Perth 2021
- Field trial at Geraldton 2021
- Field trial at Merredin 2022

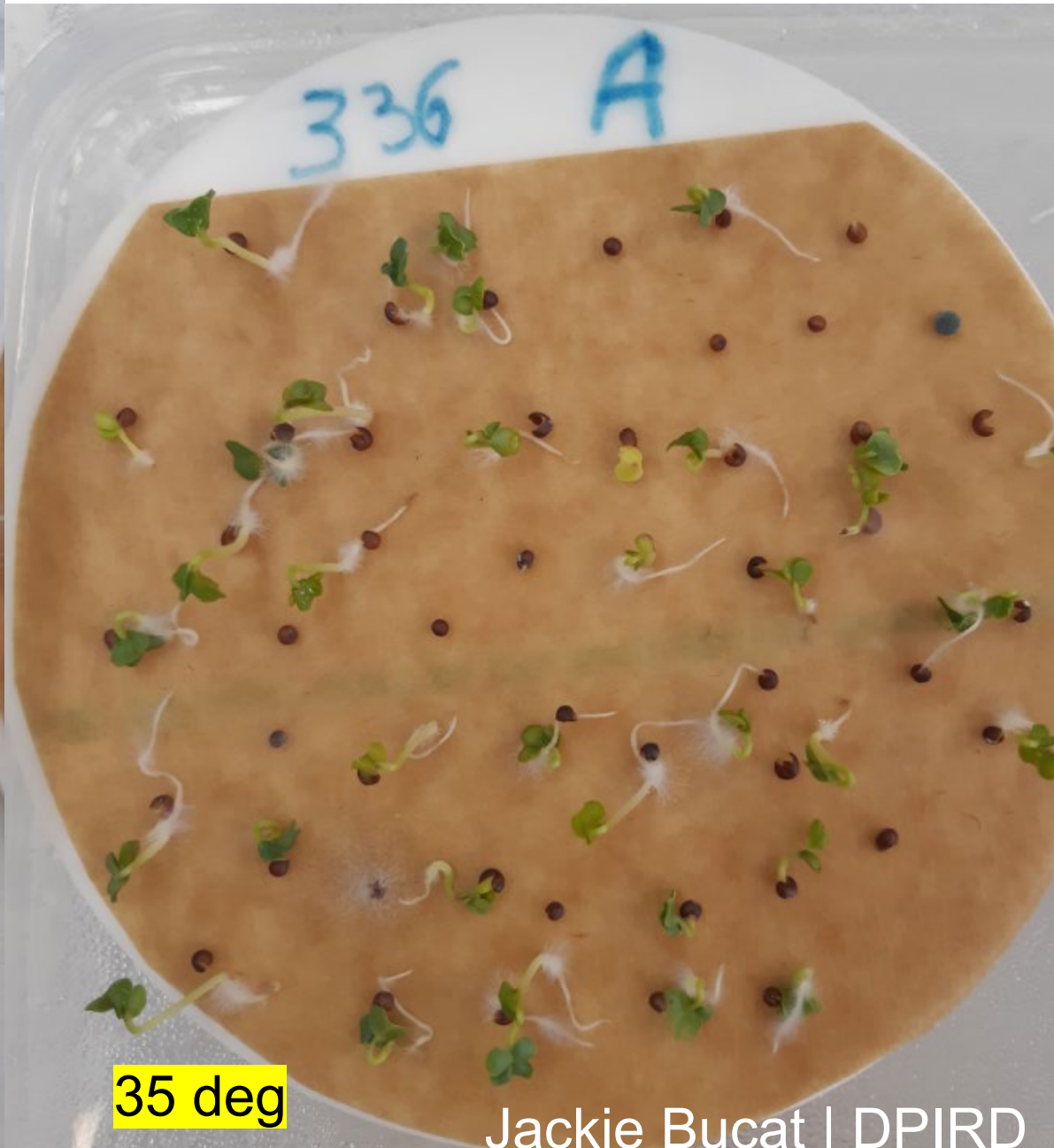
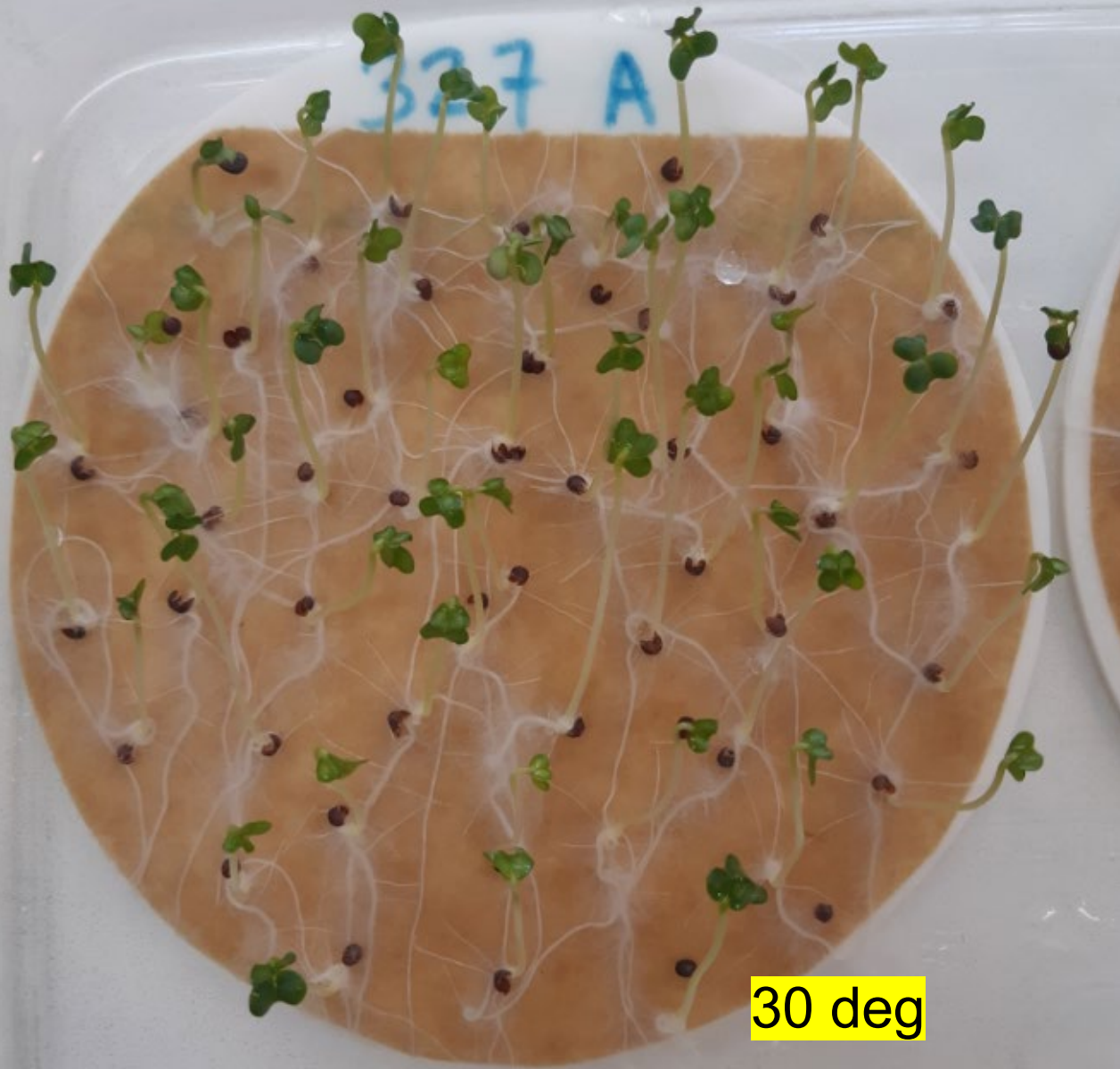
Laboratory germination tests at 20°, 26°, 30°, 35° and 40°C



Increasing temperature of germination

- ↓ normal seedlings
- ↑ abnormal seedlings
- ↓ speed of germination
- ↓ hypocotyl length

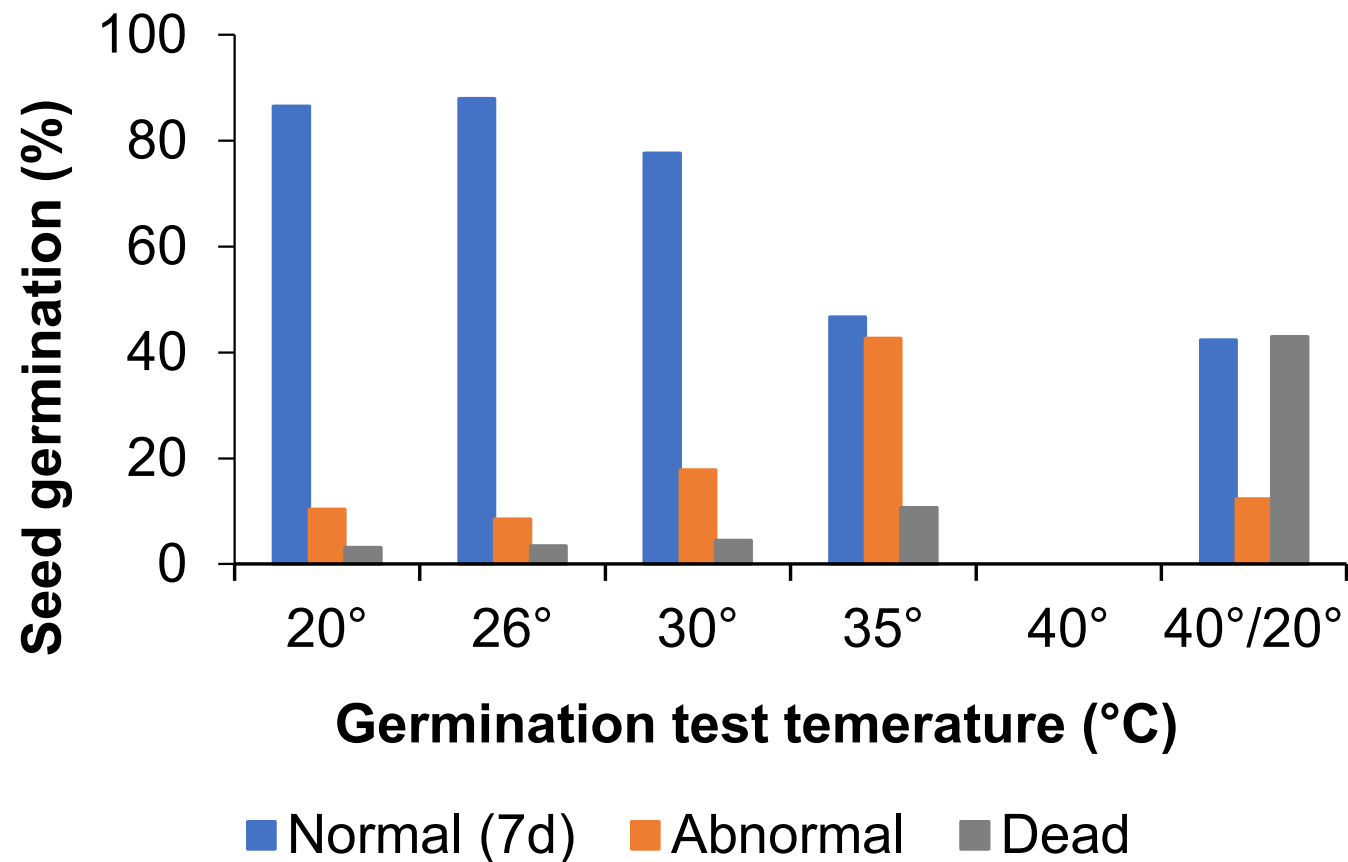
Laboratory germination test



Lab germination test



Laboratory germination tests at 20°, 26°, 30°, 35° and 40°C- then 20° again



40°C in the lab for 7 days
caused

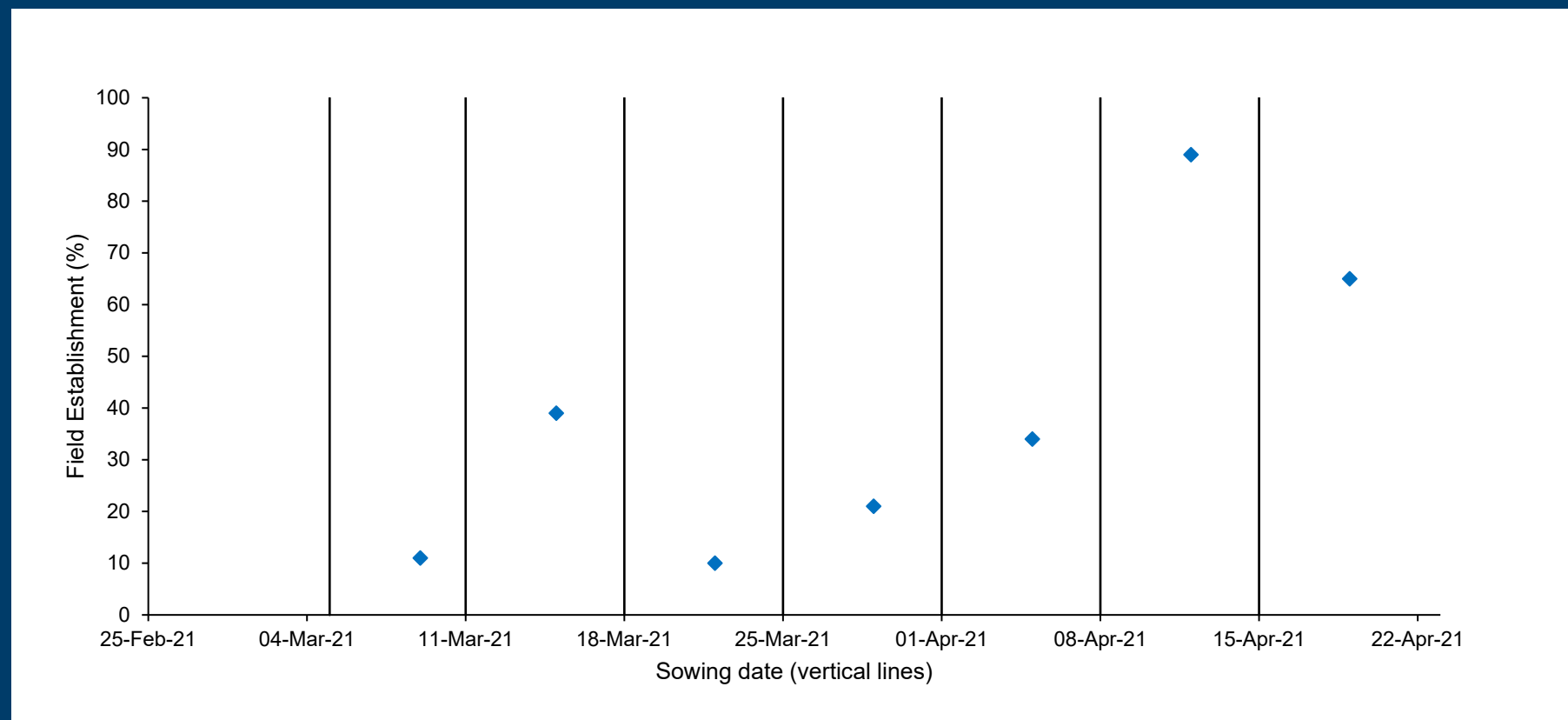
- Thermo inhibition
- Seed death

Precision seeding- Perth plots



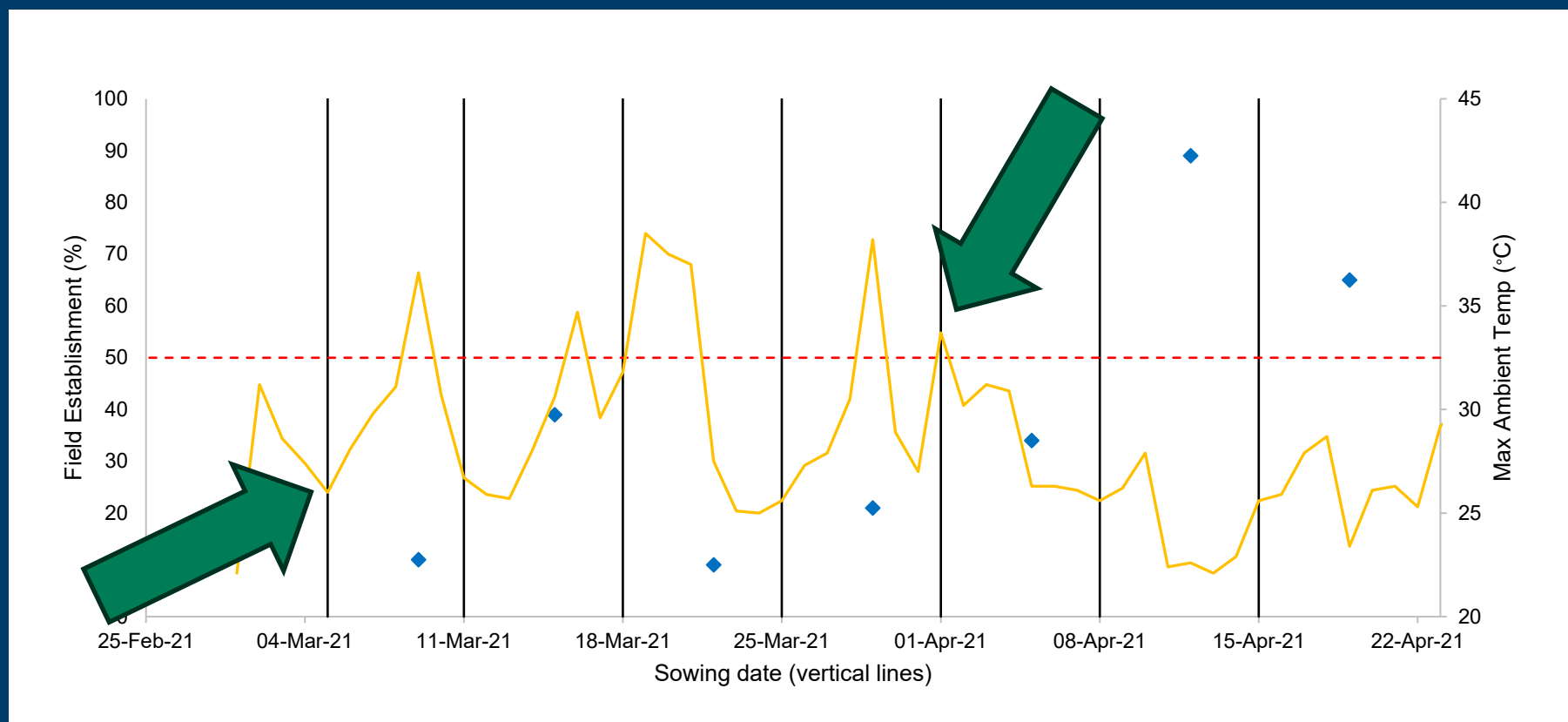


Perth 2021- hand sown plots



TOS1	5-Mar
TOS2	11-Mar
TOS3	18-Mar
TOS4	25-Mar
TOS5	1-Apr
TOS6	8-Apr
TOS7	15-Apr

Perth 2021- hand sown plots





Field establishment below 50% when max ambient temp over 32°
at any stage during germination and emergence

seeding 5 March
photos 10 March

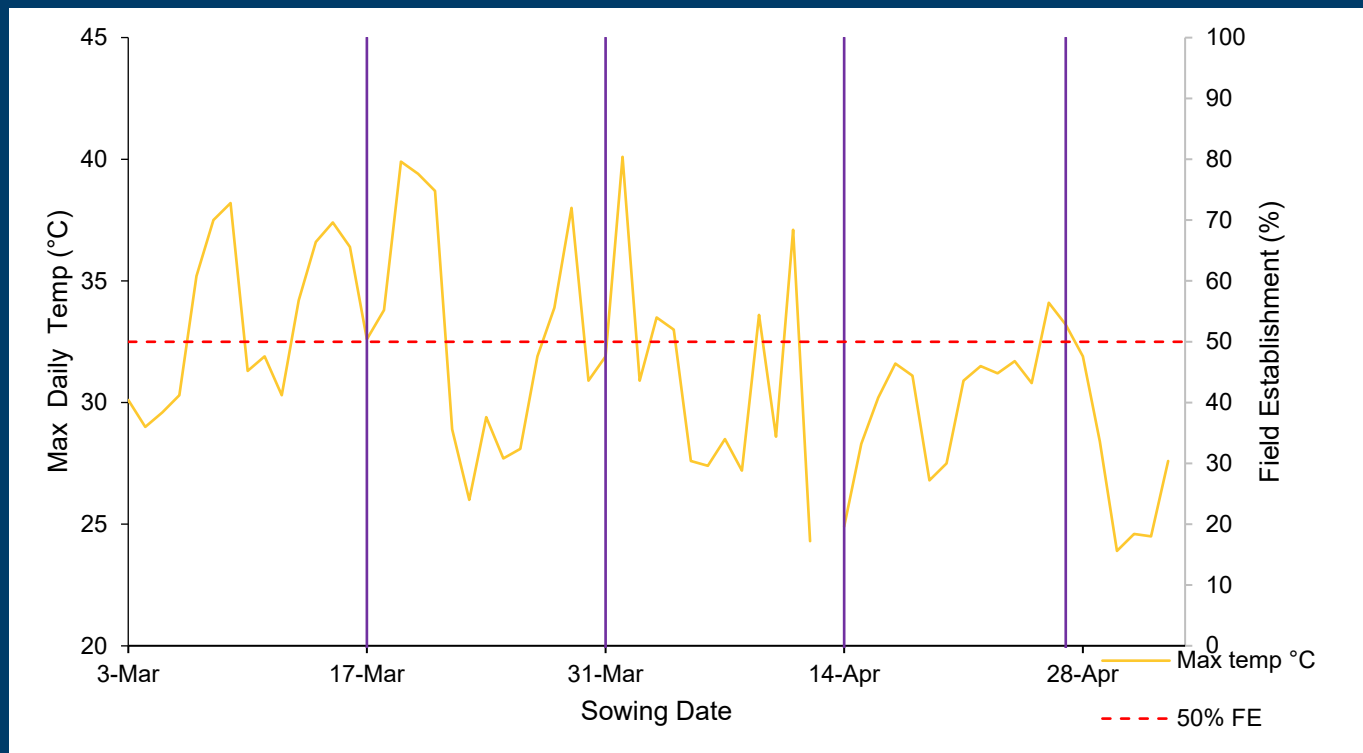


Seeding 25 March
Photo 4 April (10 days)



-  Establishment trials
-  Early sowing trials

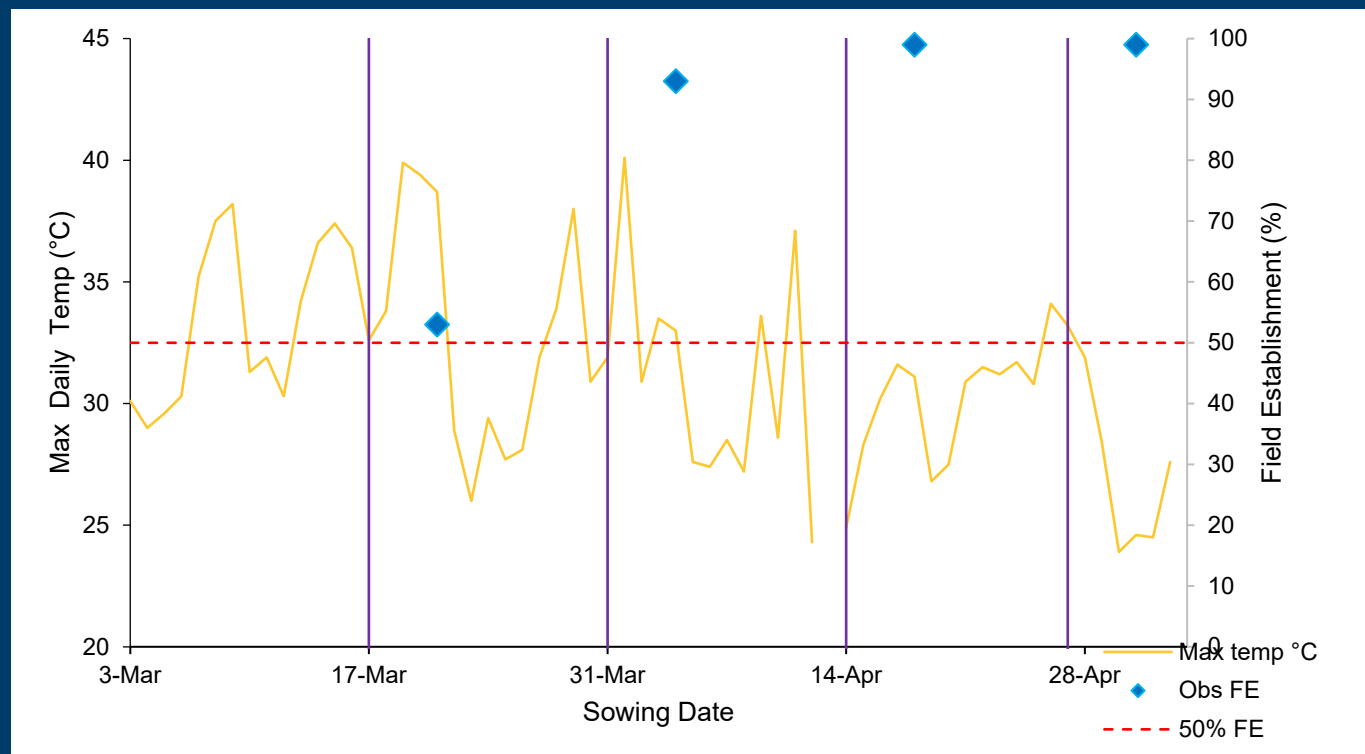
Geraldton 2021



TOS
17 Mar
31 Mar
14 Apr
27 Apr

Sown with pre-seeding irrigation:
high 30ml
low 15ml
Also rainfall earlier in the season

Geraldton 2021- field establishment



TOS	FE (%)
17 Mar	53
31 Mar	93
14 Apr	100
27 Apr	120

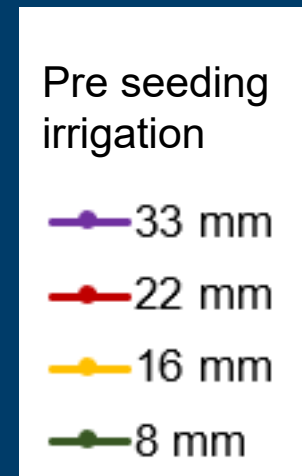
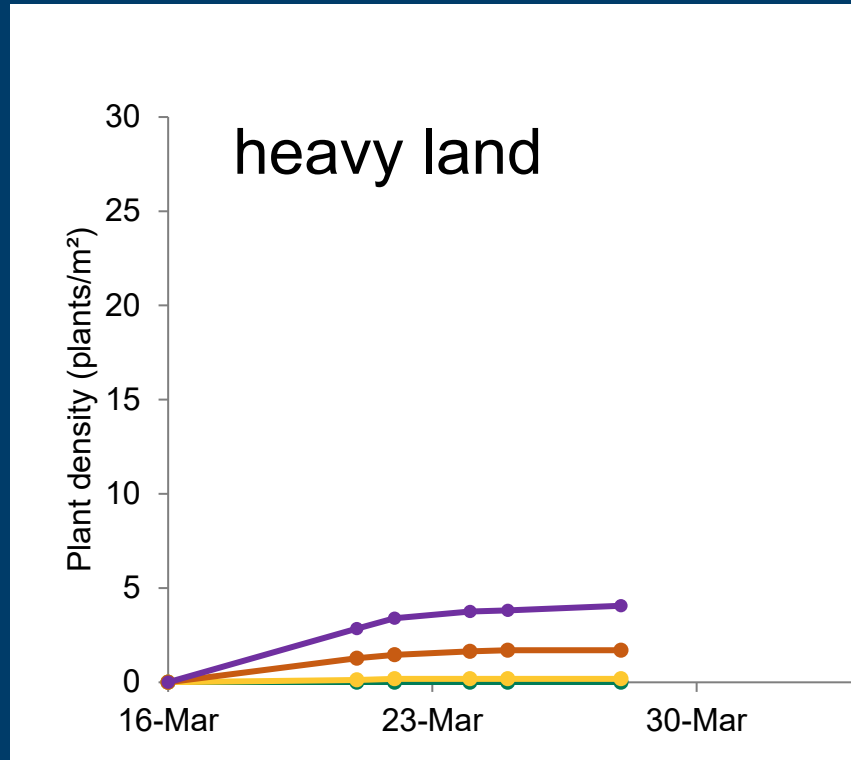
Successful (>50% establishment) at all sowing times, even when temperatures above 35°C

No difference in FE between high or low irrigation treatments

There were soil moisture differences in top 10cm, similar subsoil moisture

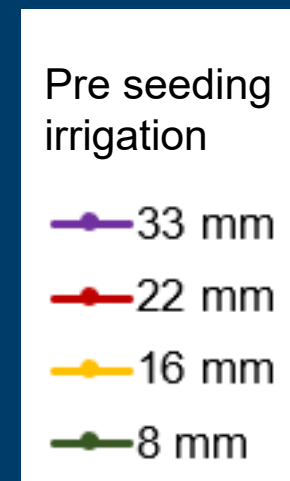
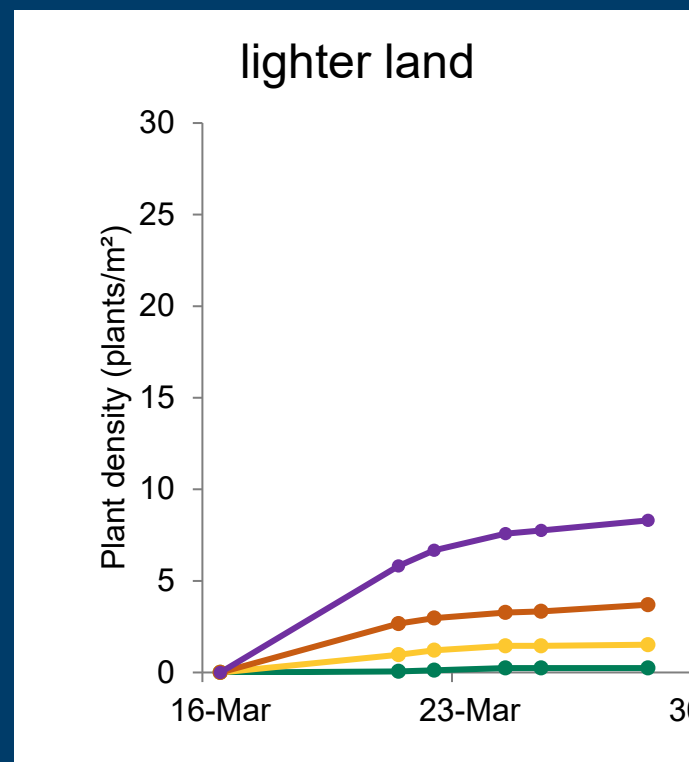
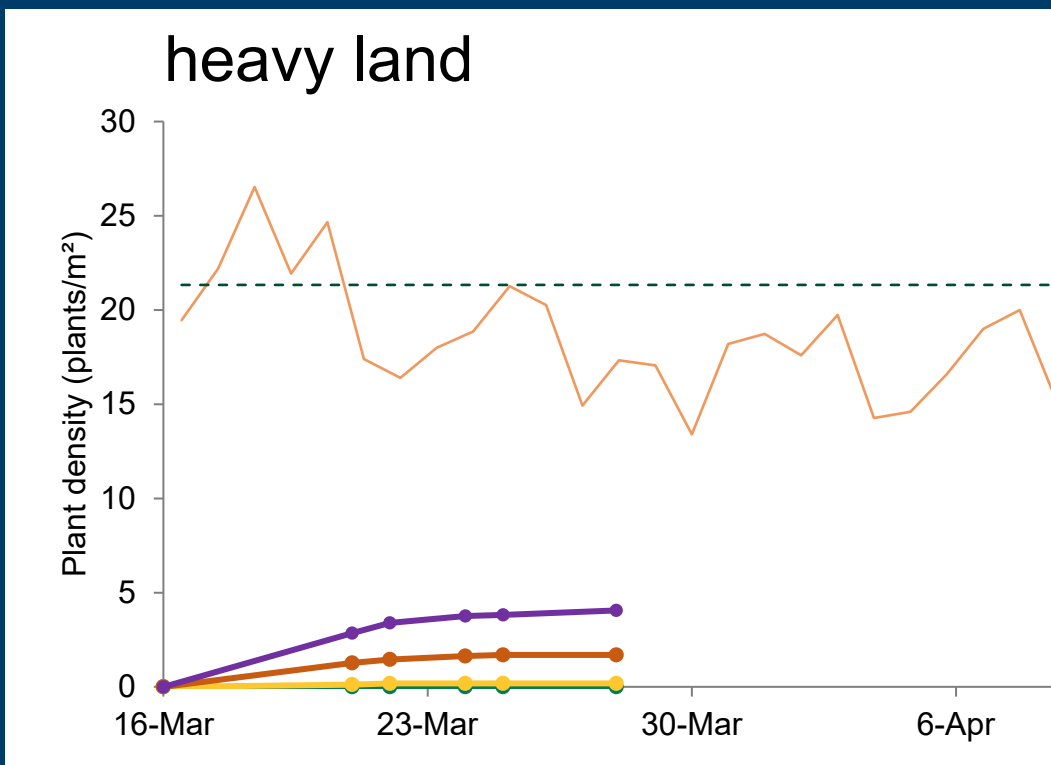
Until Cyclone Seroja April 11th

Merredin 2022



Highest emergence with highest irrigation

Merredin 2022- Plant emergence



Low emergence due to temperature

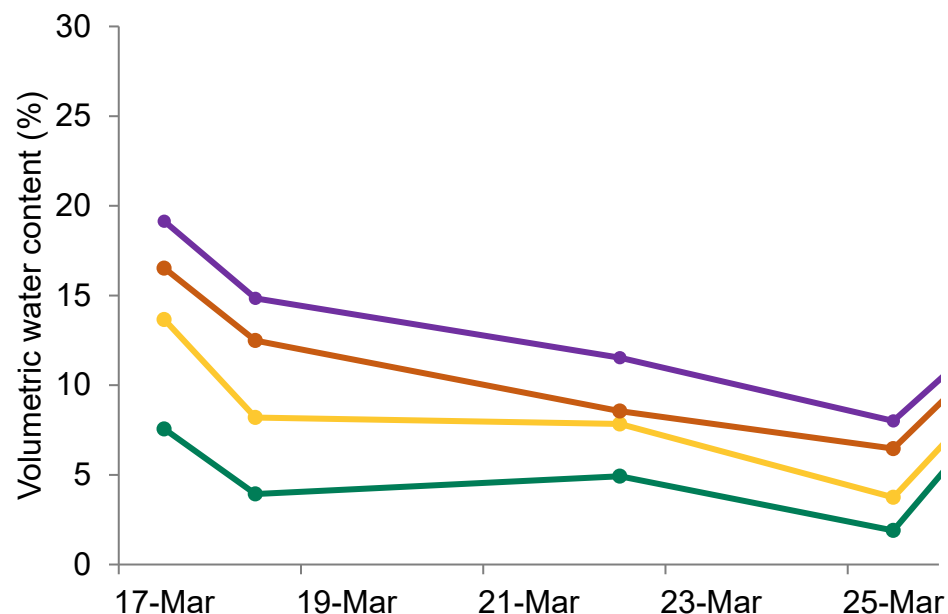
But higher emergence on lighter soil=more moisture availability



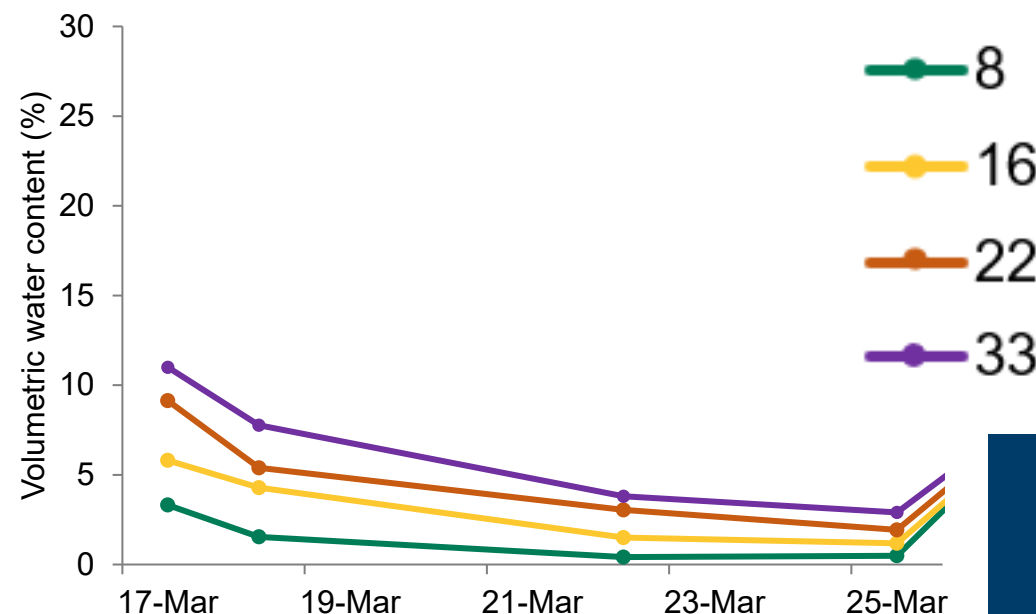
Merredin 2022- Soil water content

Mobile moisture probe

TOS 1 -Heavy soil



TOS 1 -Lighter soil

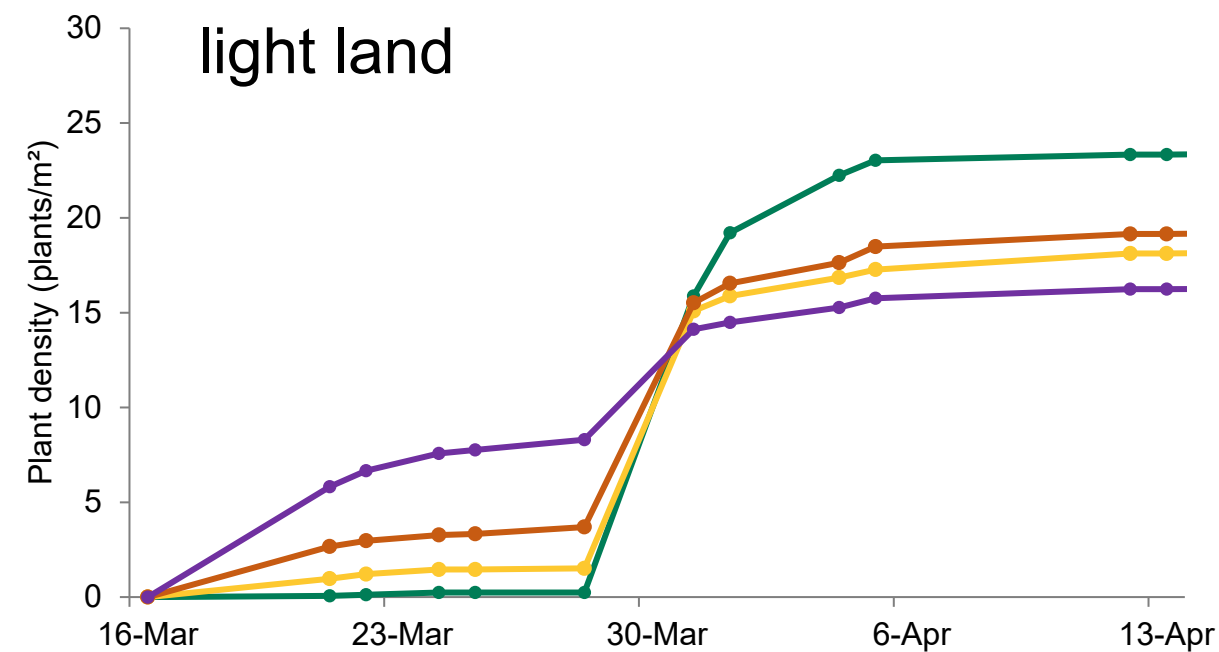
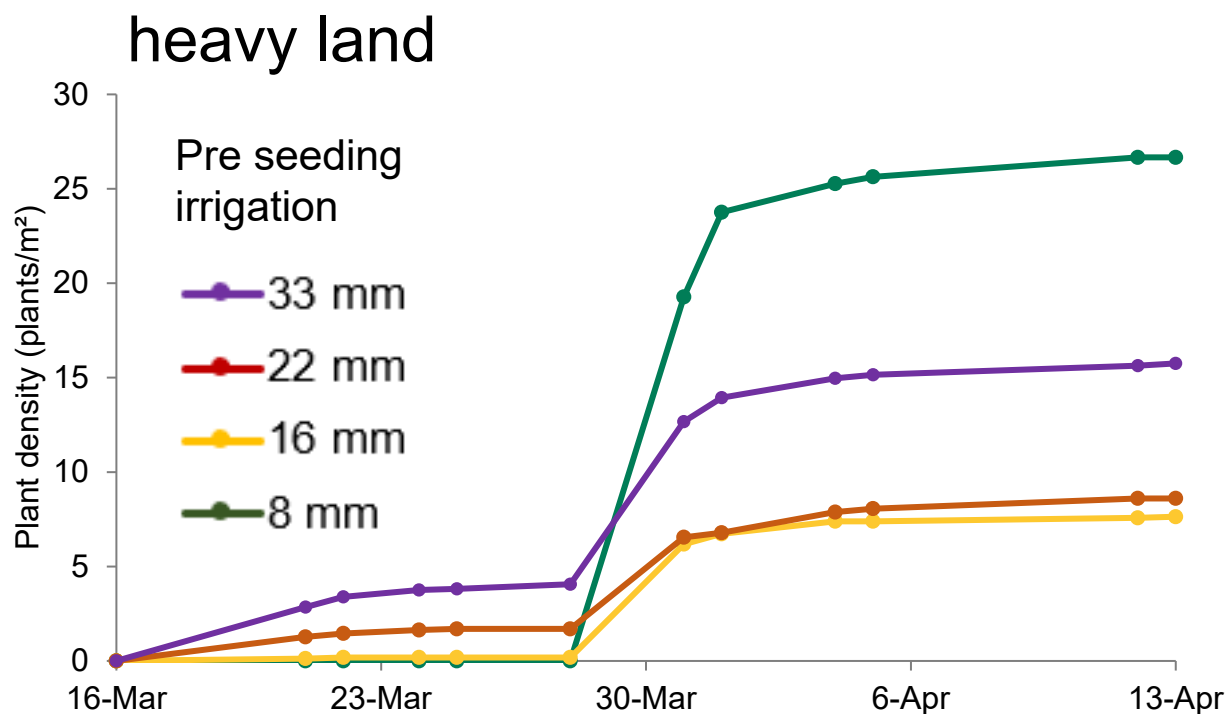


More water content in heavy land
More available in light land

Good agreement with buried Campbell Scientific probe
Poor agreement with soil samples collected at seeding



Merredin 2022



Then it rained- cyclone Charlotte 26 March

Highest final density with lowest irrigation treatment

Summary

Early sown crops are more prone to reduced emergence due to hot temperatures, and this can be compounded by marginal moisture

Germination or **emergence** of canola can be reduced from 32 ° C

Seeding in marginal moisture and drying profile can cause irreversible seed damage

Soil/moisture limitations not yet clear

Thank you

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