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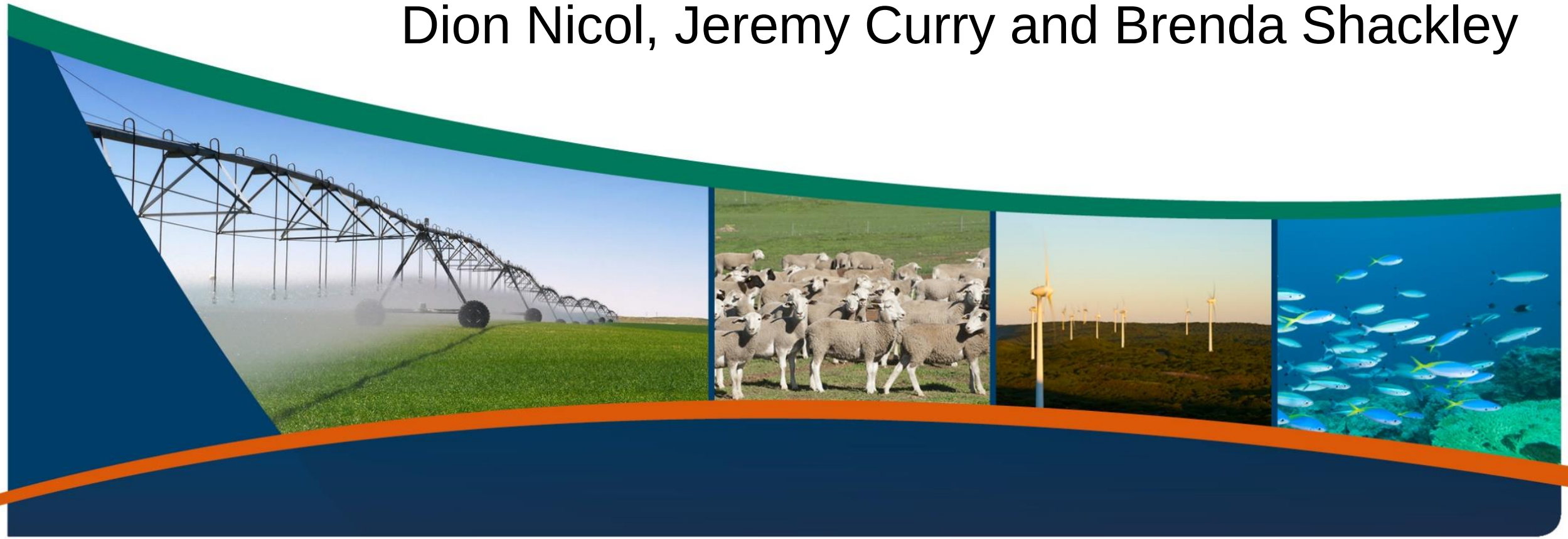
Regional Development

GOVERNMENT OF
WESTERN AUSTRALIA

DPIRD Wheat Agronomy

Dion Nicol, Jeremy Curry and Brenda Shackley



DPIRD Wheat agronomy

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- New varieties
- Wheat sowing time
- Pre-harvest sprouting
- Deep sowing
- Winter wheats in WA

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New varieties released quicker

- Increasingly varieties are released with only 1 year of NVT data
- Some may not have early sown or other data required to test in applicable sowing window
- Hard to guarantee risks are identified in time

- Potential advantage in beneficial varieties to market/scale sooner
- Cost of seed increase not huge but uncertainty should be clear

2021 releases

	Scepter	Calibre	Longreach Avenger	Valiant CL Plus
Yield (%NVT)	110%	114%*	108%	98%*
Maturity	Quick-mid	Quick-mid	Quick	Slow (*p*)
Classification	AH	AH	APWN	AH
Falling no. index	5			
Stem Rust	MRMS	RMR*p*	MS	MR*p*
Stripe Rust	MR*	RMR*p*	MRMS	RMR*p*
Leaf Rust	MSS	S*p*	S	MSS*p*
Powdery mildew	S	S*p*	S*p*	
Yellow spot	MRMS	MS*p*	MS	MRMS*p*
EPR ($/t)	$3.25	$3.50	$4.00	$4.35

Calibre – quick-mid AH from AGT

- 2021 data show up to 4 days quicker than Scepter in main-season sowing
- Outyielded Scepter in 2020 NVT data, need to consider quick maturity comparisons where maturity could contribute
- 2021 data thus far – single site data, in NVT Scepter and Vixen were higher yielding
- Consider fit based on being slightly quicker than Scepter, may not be direct replacement for growers that push Scepter early

2020 NVT data Calibre vs Scepter + Vixen

2021 NVT to date

Averaging single site data from 11 NVT sites in 2021 available to date

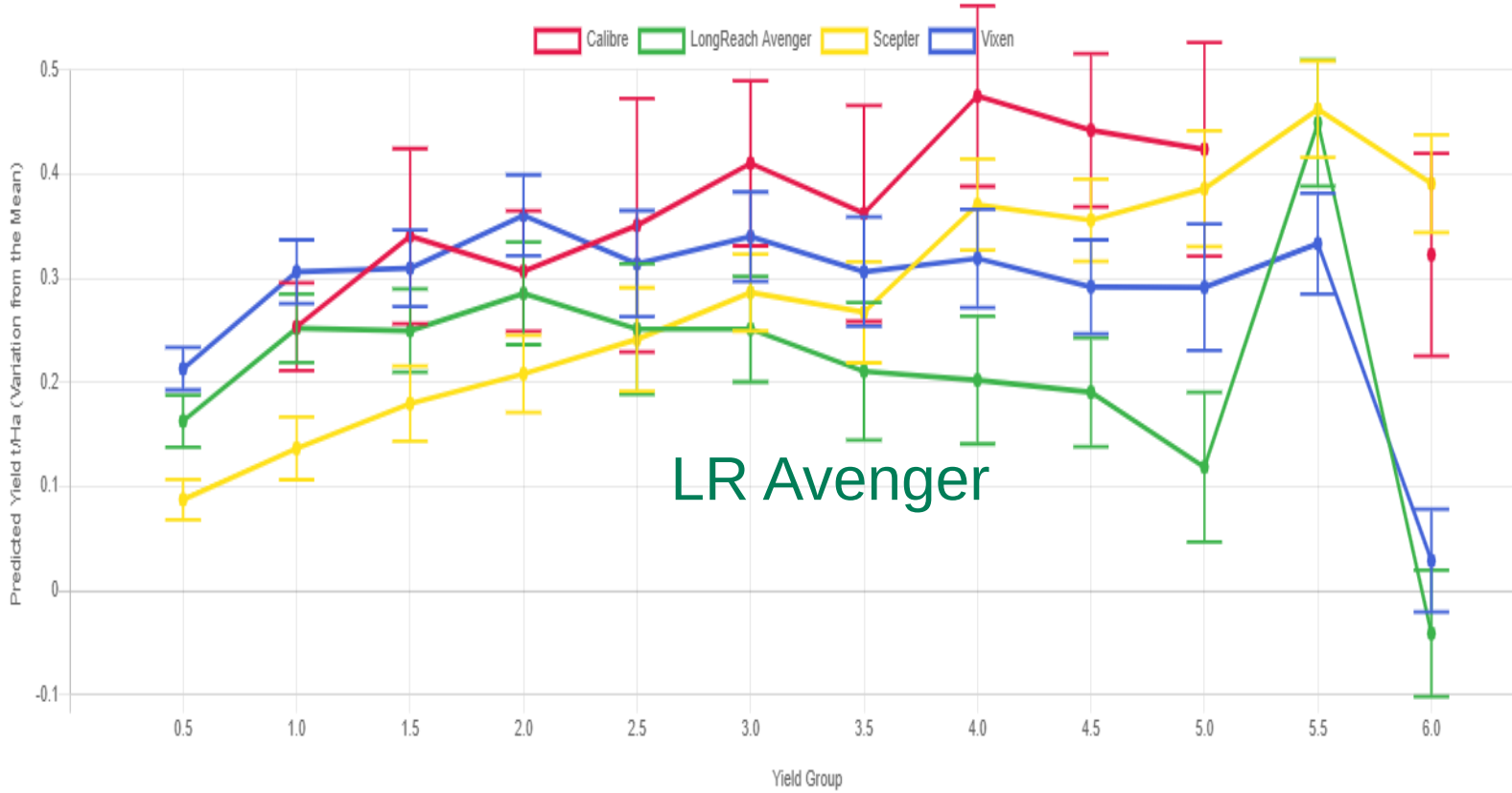
Variety Name	Mean %
Vixen	111.9
LRPB Havoc	111.4
Scepter	110.7
Sting	108.9
Zen	107.1
Calibre	106.2
Razor CL Plus	106.0
Devil	105.2
Boree	104.5
Ballista	104.3
Hammer CL Plus	104.1
RockStar	103.4
Mace	101.9

LRPB Avenger

Quick APWN

No results for 2021 due to seed mix-up

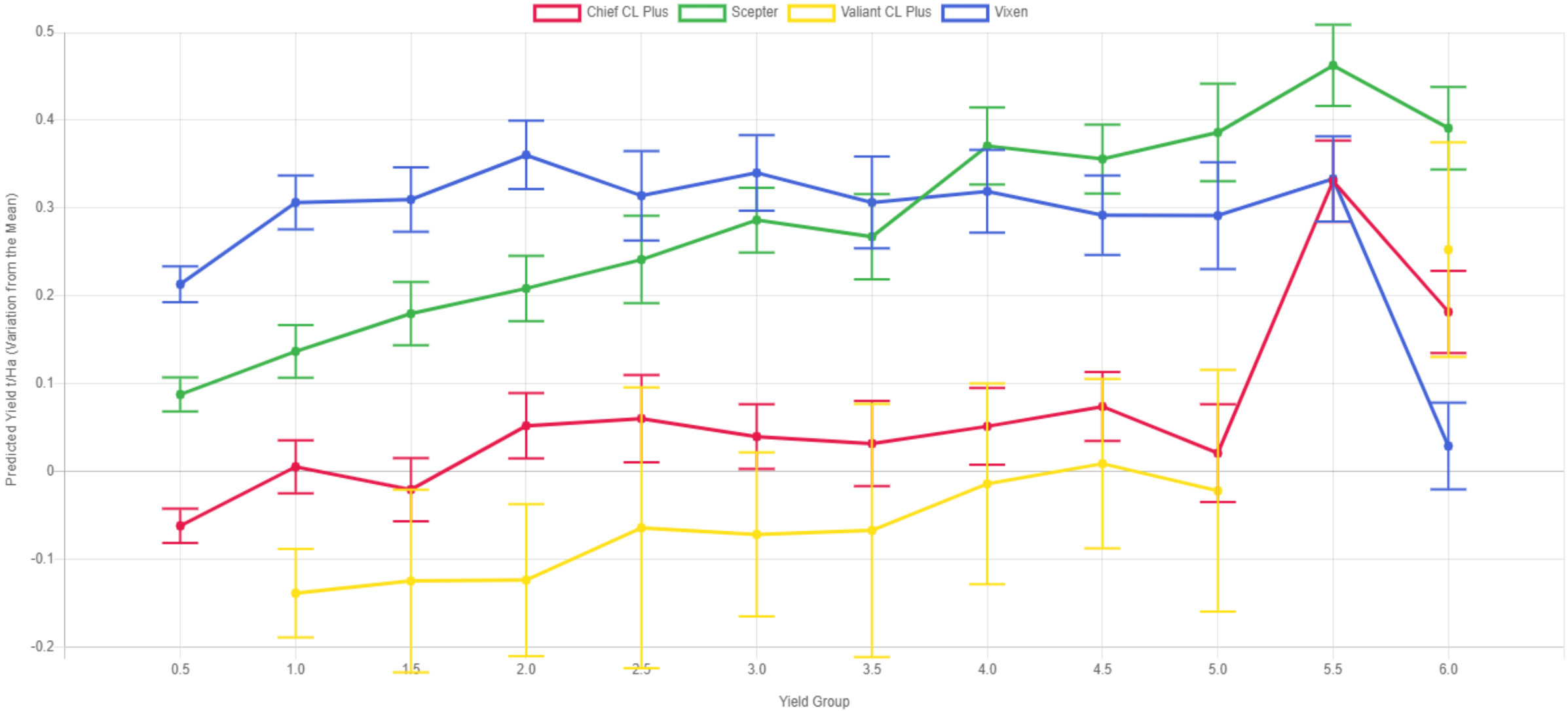
2020 results found generally behind Vixen and Sting (+ Calibre)



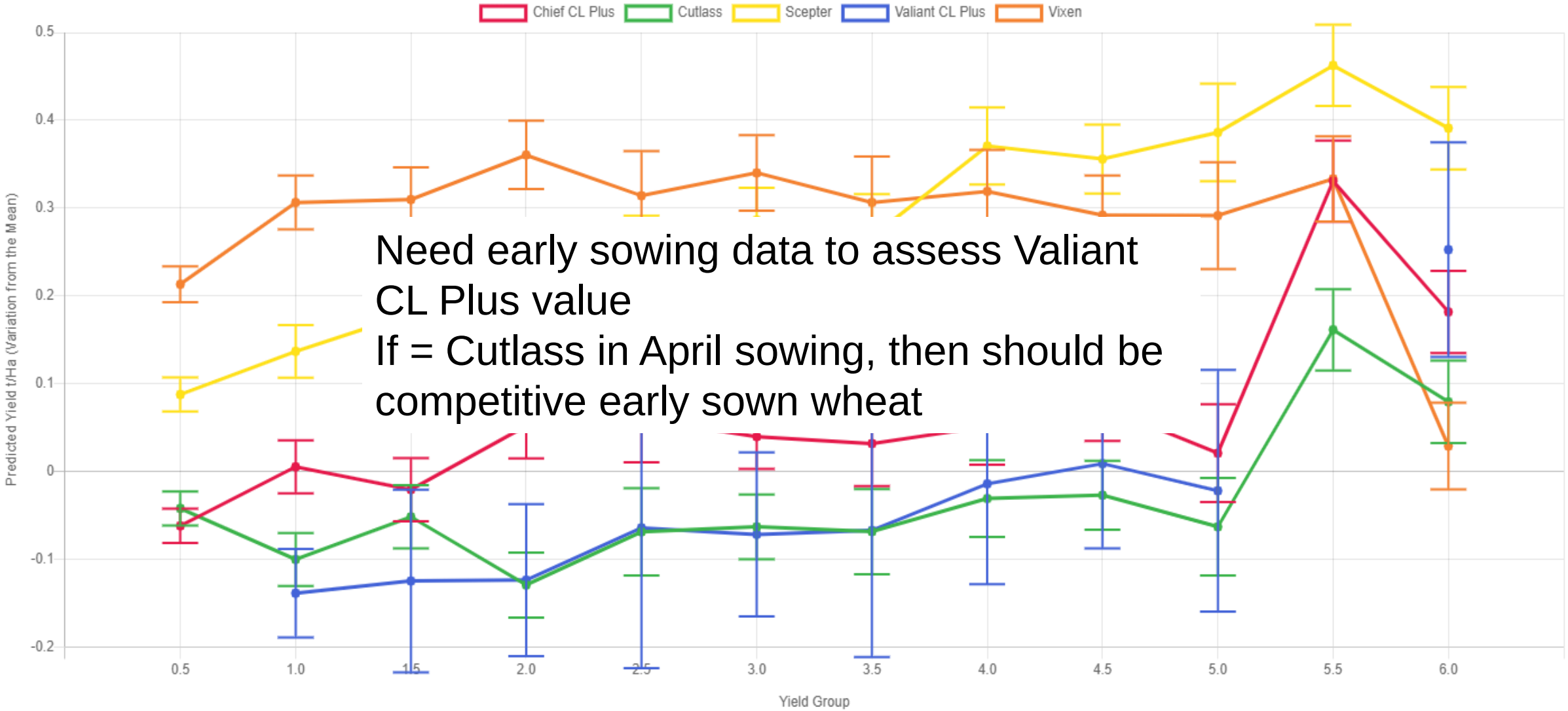
Valiant CL Plus

- Early sowing CL Plus option
  - Early sowing can mean Z31 (Intervix deadline) comes quickly. E.g. Yitpi/Cutlass mid-April sowing = early June
- No regional TOS data (DPIRD), but in 2021 early NVT
- NVT data show for maturity, still managing decent yields

2020 NVT results for Valiant CL Plus



Competitive with Cutlass in main season 2020 NVT



Need early sowing data to assess Valiant CL Plus value

If = Cutlass in April sowing, then should be competitive early sown wheat

New release summary

- **Faster release of varieties, with risks of limited/incorrect information**
  - Fewer seasons to understands relative strengths and weaknesses
- **Calibre – Observations in 2021, not same as Scepter (up to 4 days quicker)**
- **Longreach Avenger – behind Vixen as quick maturity wheat, no 2021 data**
- **Valiant CL Plus – Early sowing imi. option.**
  - Data not yet available for early sowing.
  - Cutlass equiv. in phenology and main-season NVT yield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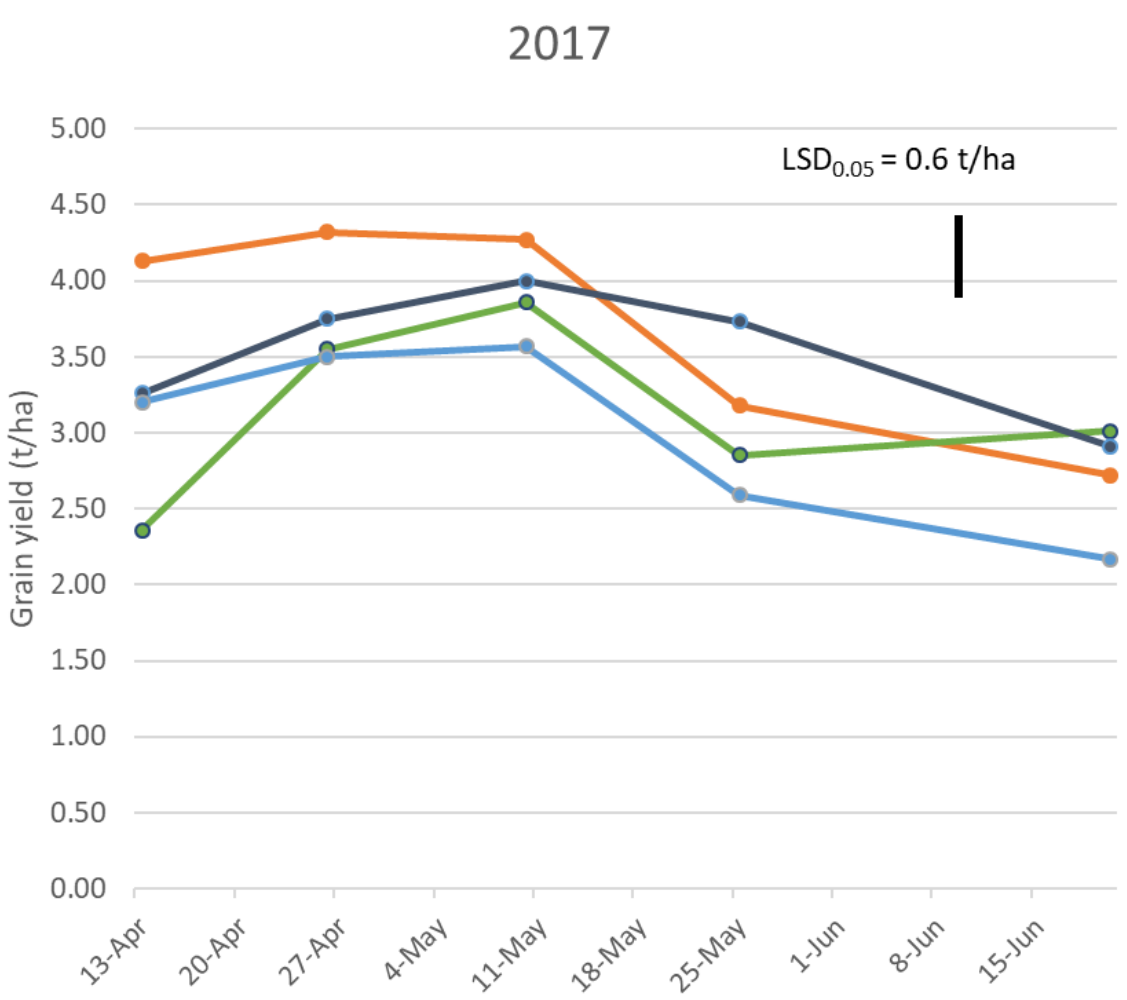
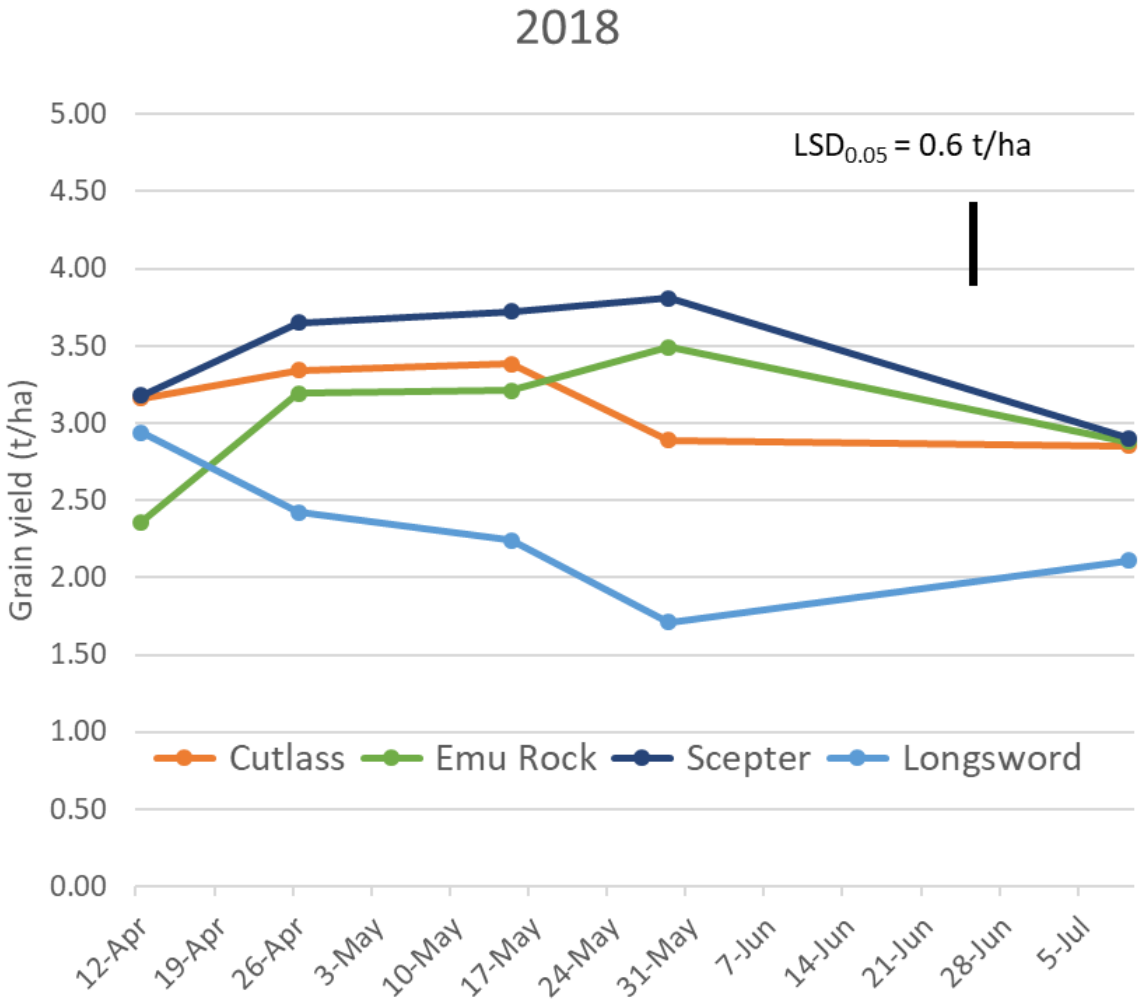
Wheat Agronomy
Capturing the best sowing opportunities for wheat
Dion Nicol
0429 686 316

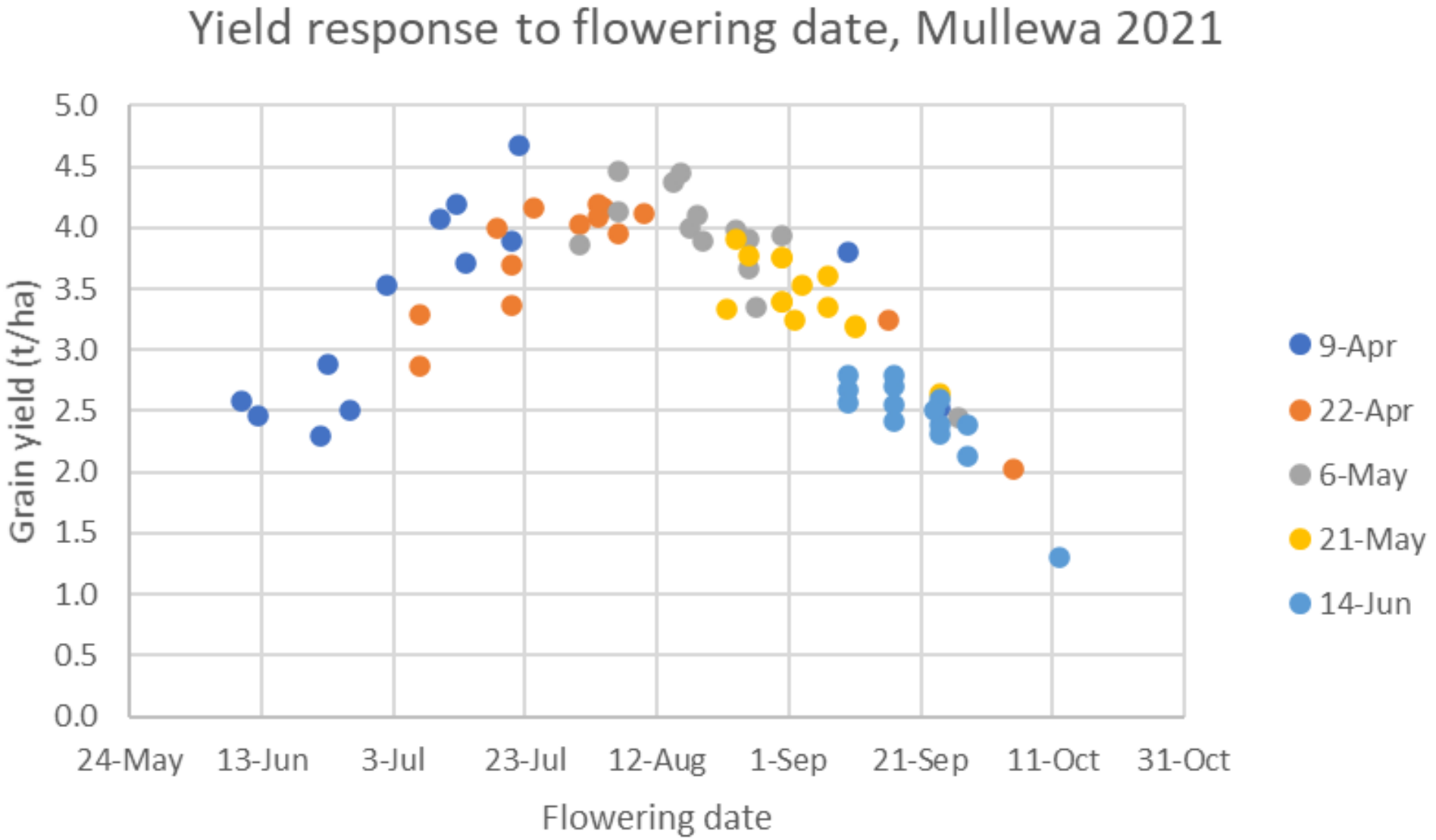
Merredin time of sowing × yield



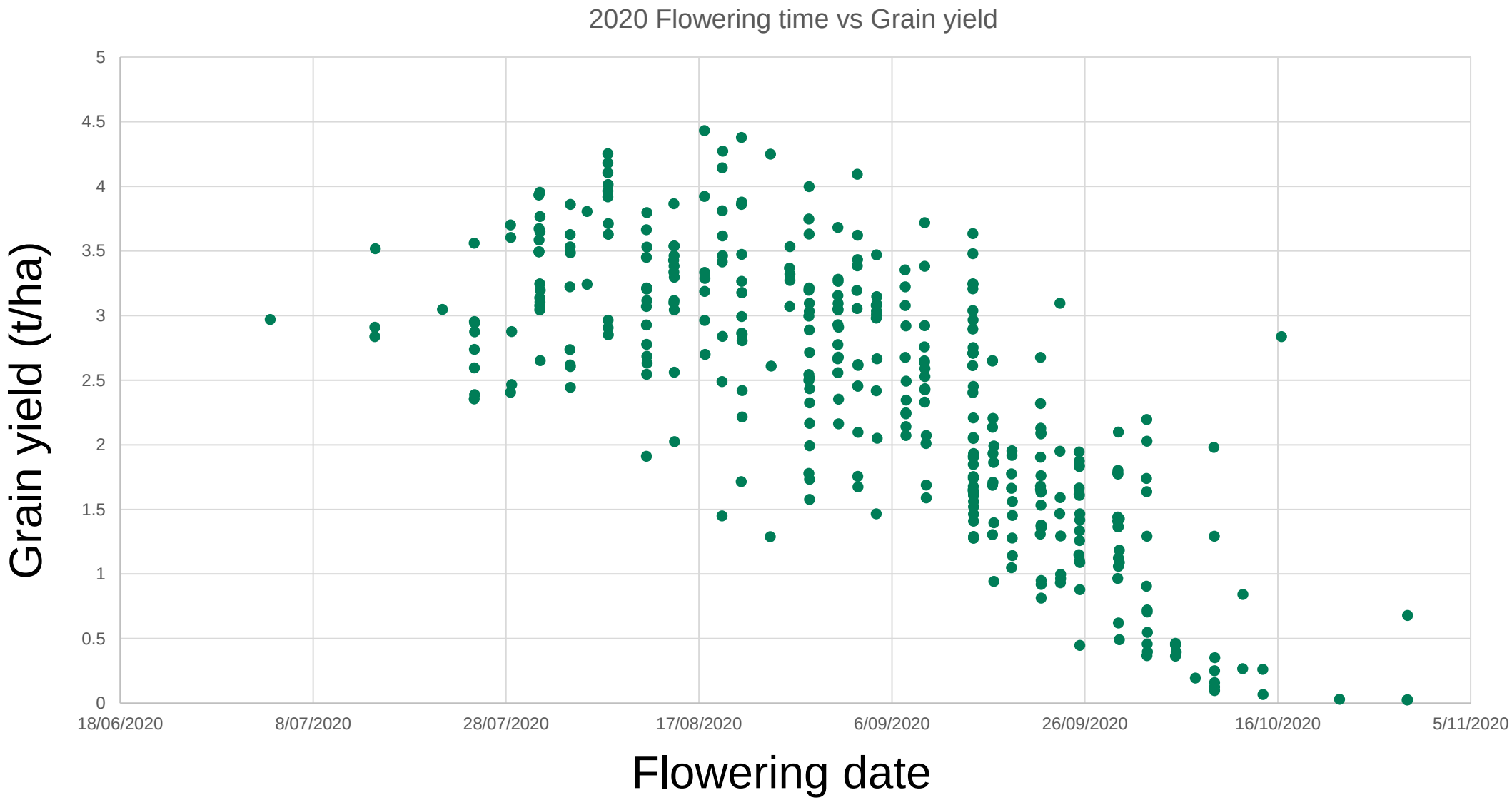


Shackley et al, 2019 GRU

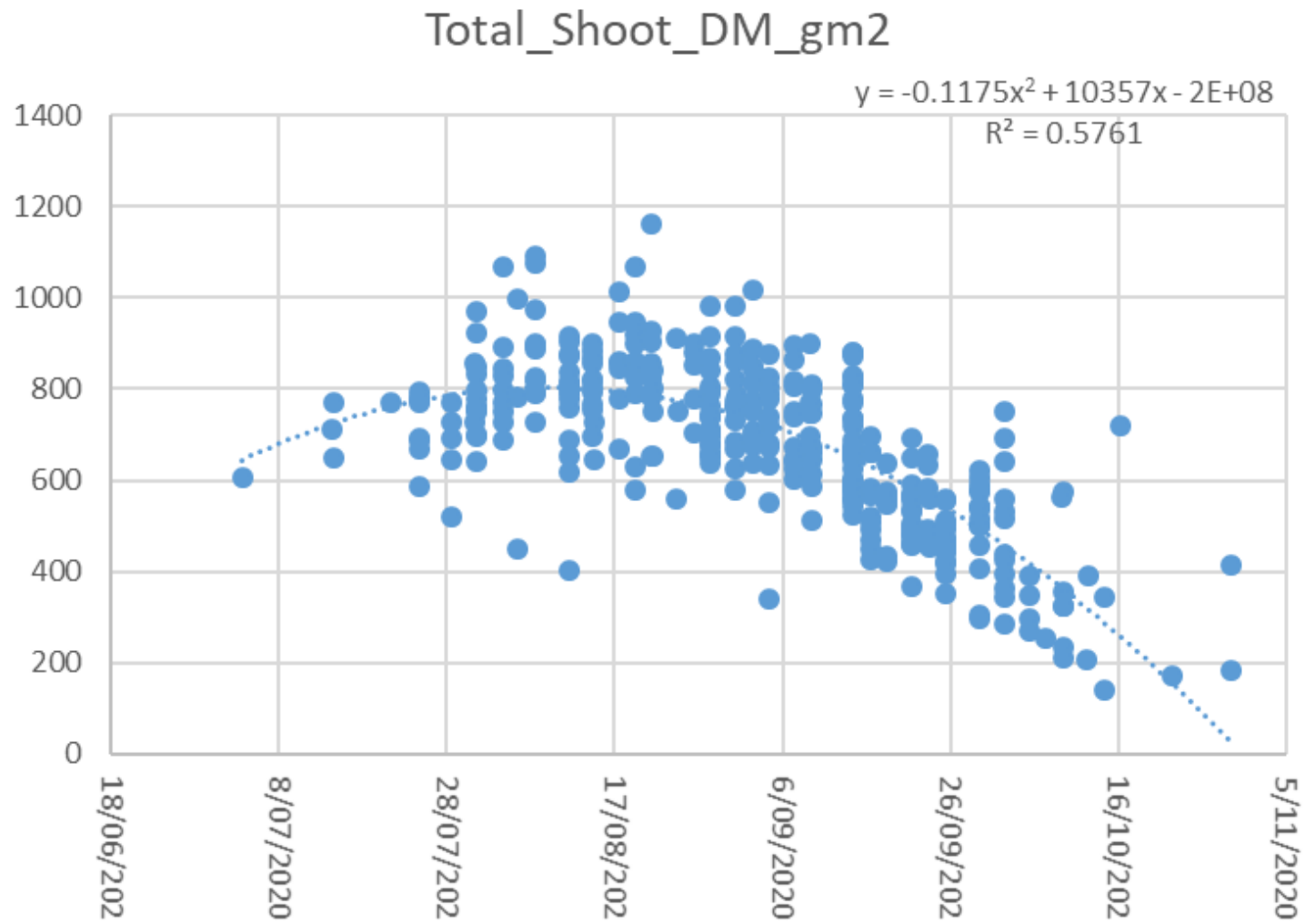
Flowering windows



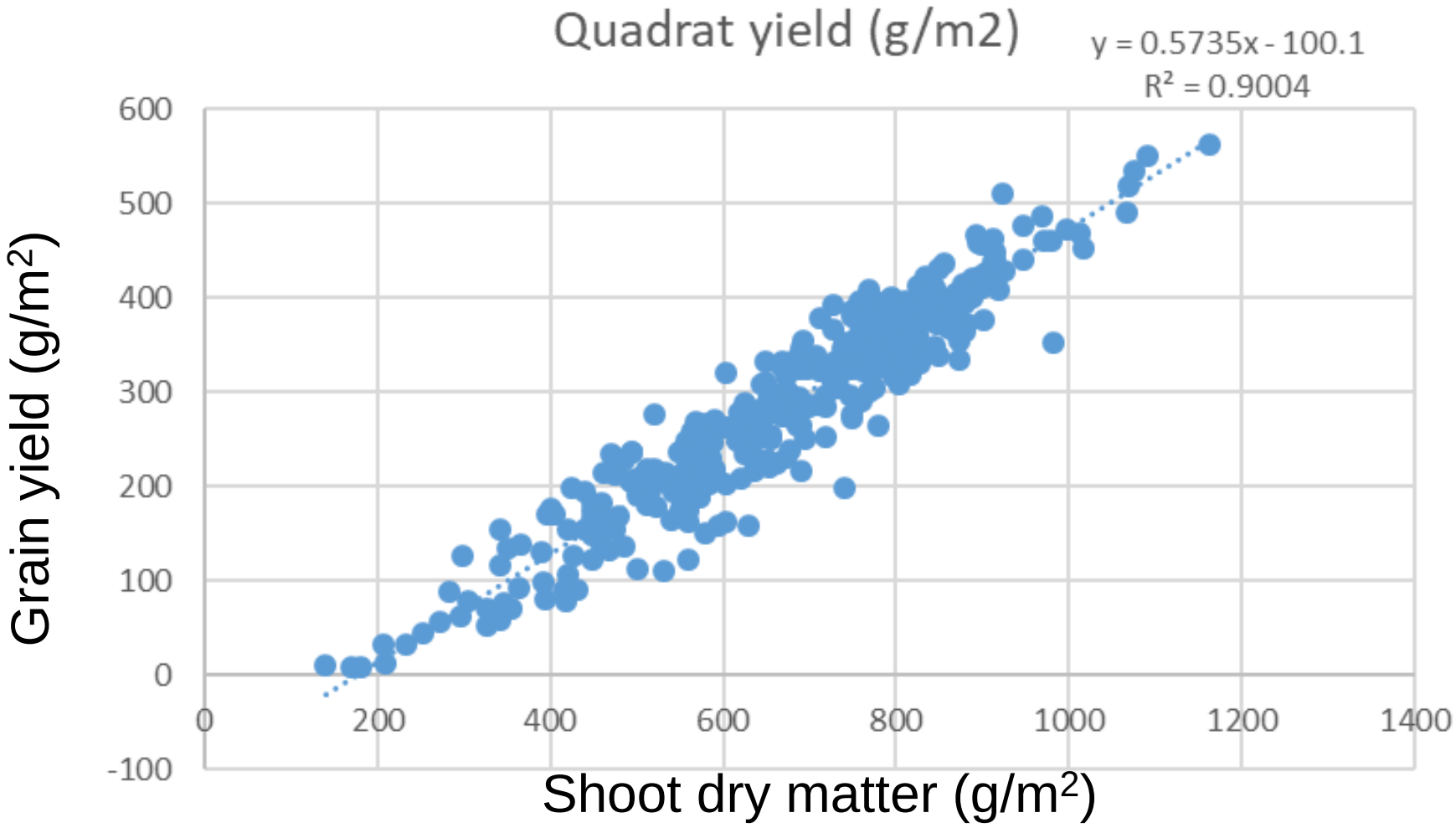
2020 Merredin TOS – Flowering x Yield



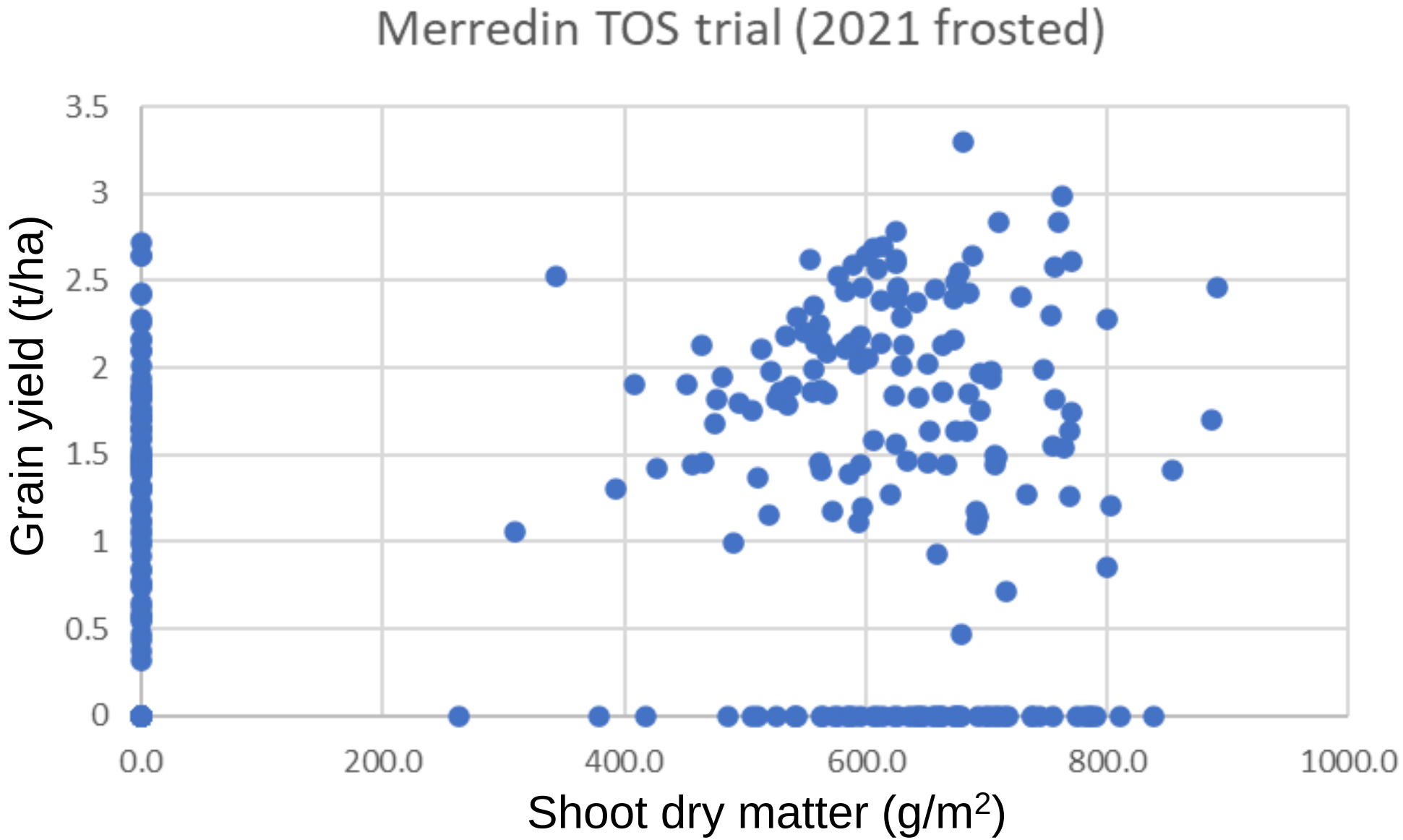
Shoot dry matter vs. flowering time - Merredin 2020



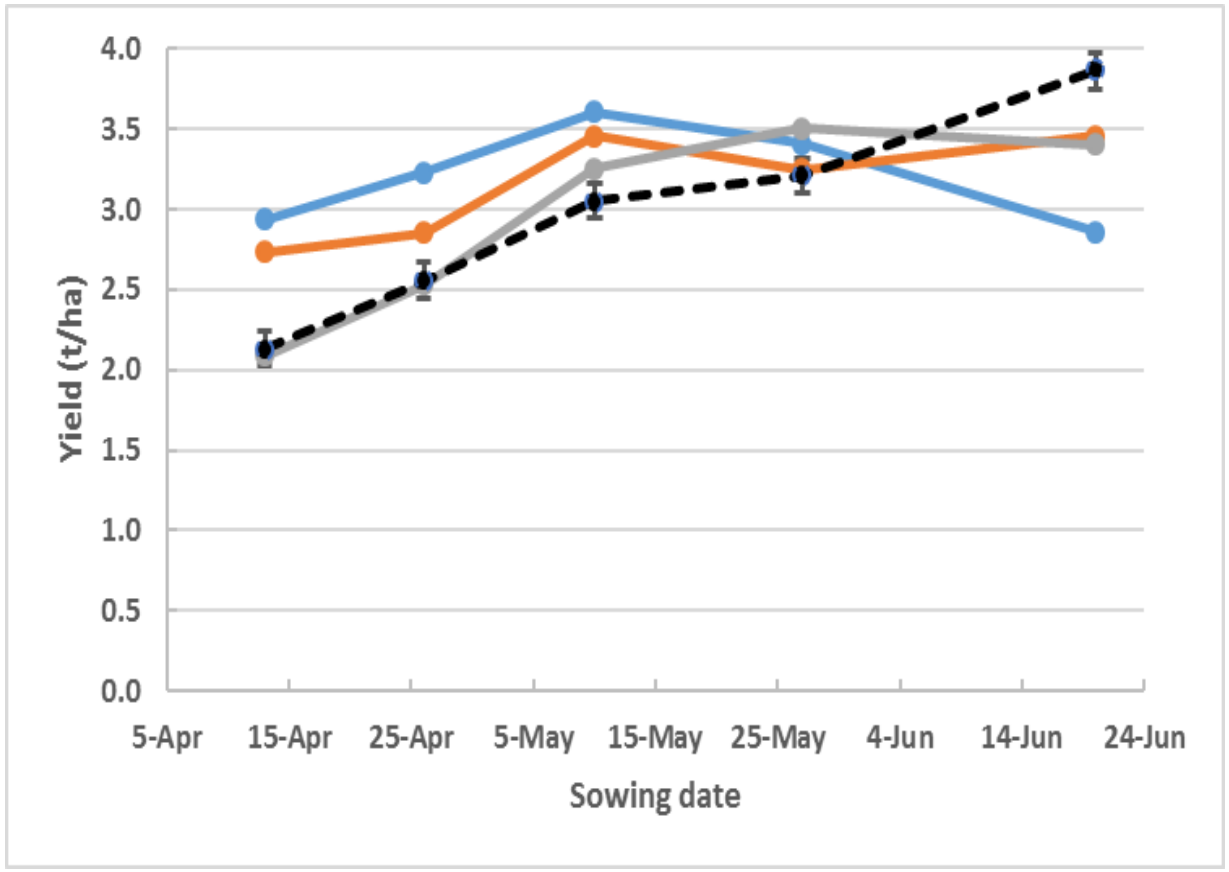
Grain yield vs total shoot dry matter across all sowing times - Merredin 2020

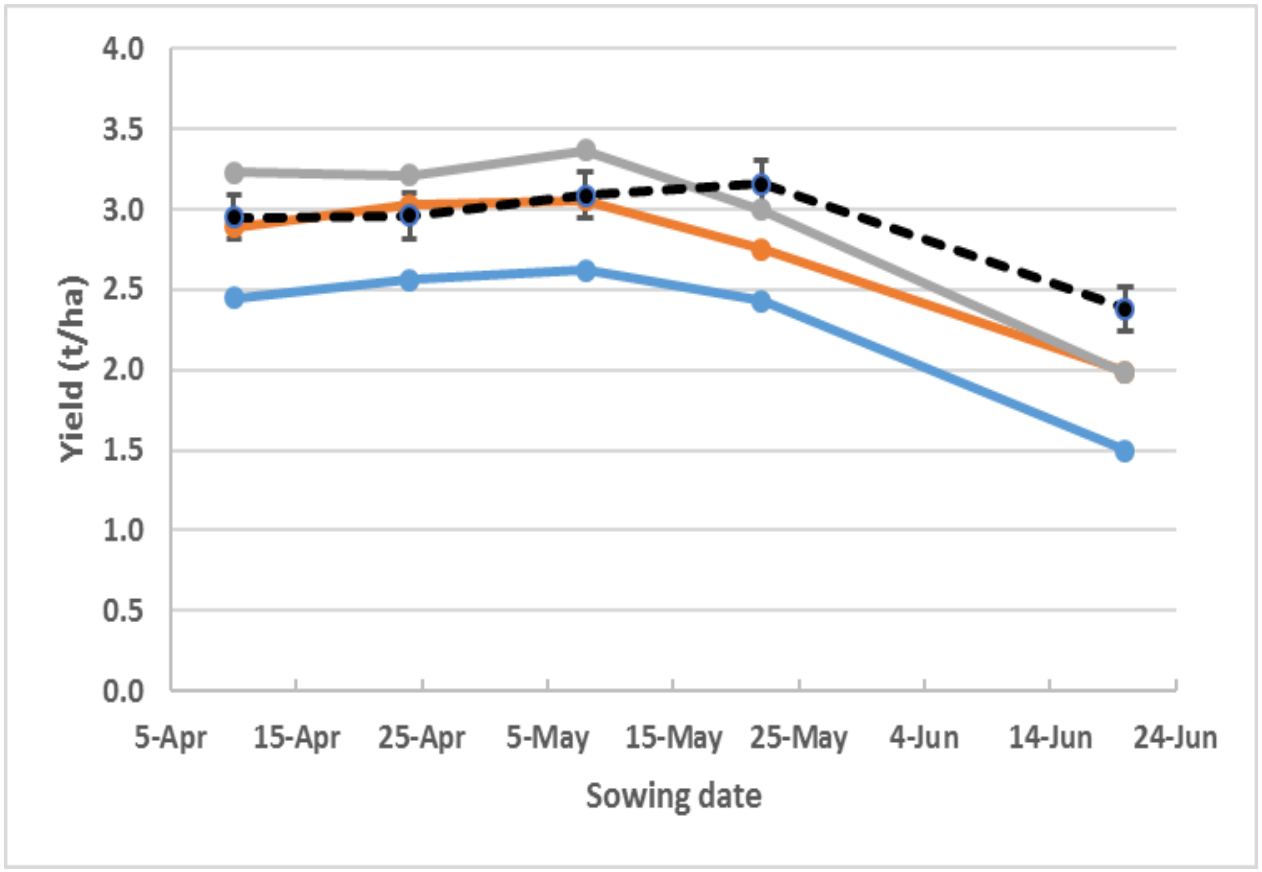


Merredin 2021 – Shoot Dry matter vs grain yield



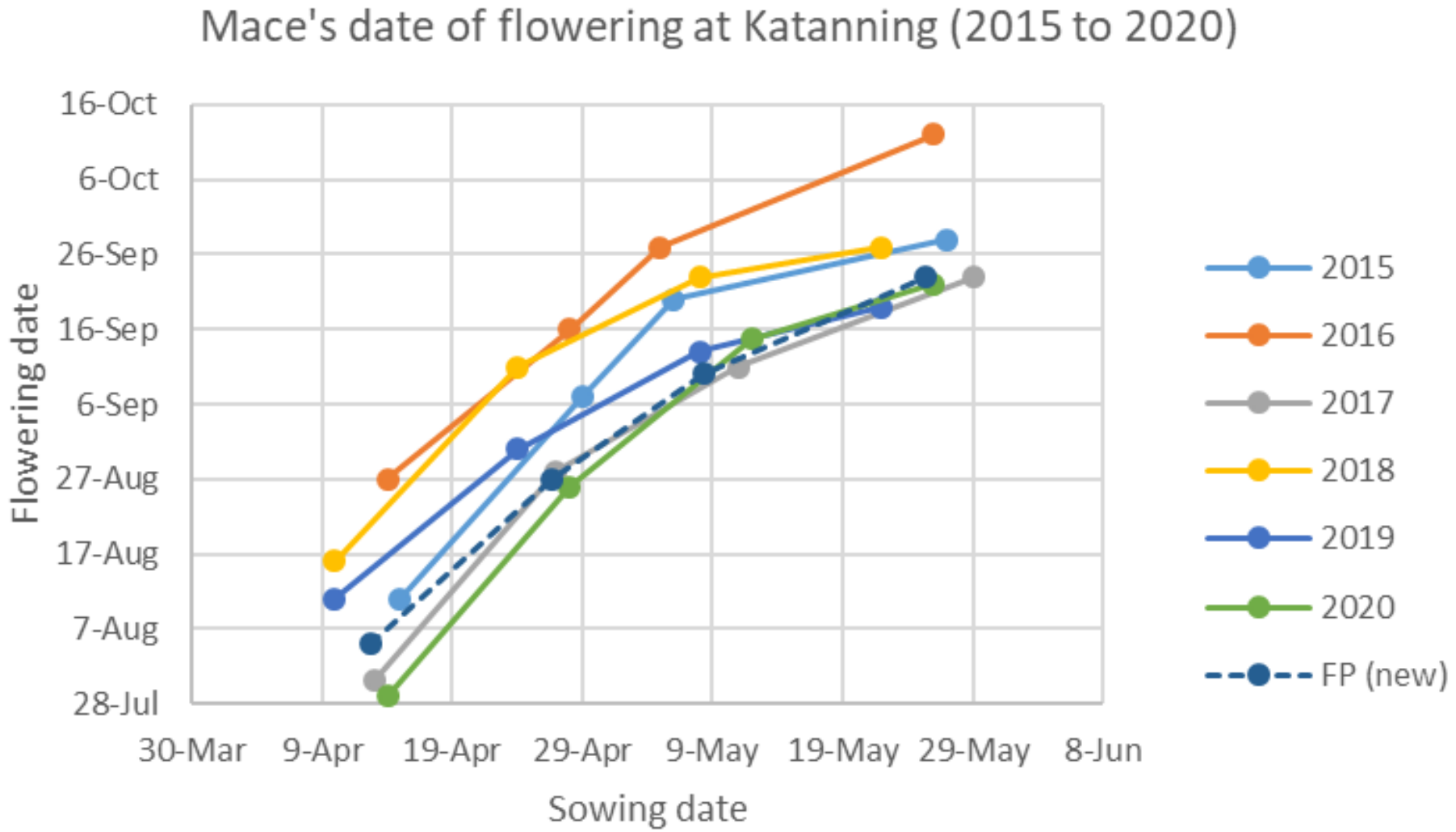
Mullewa





Shackley et al, 2019

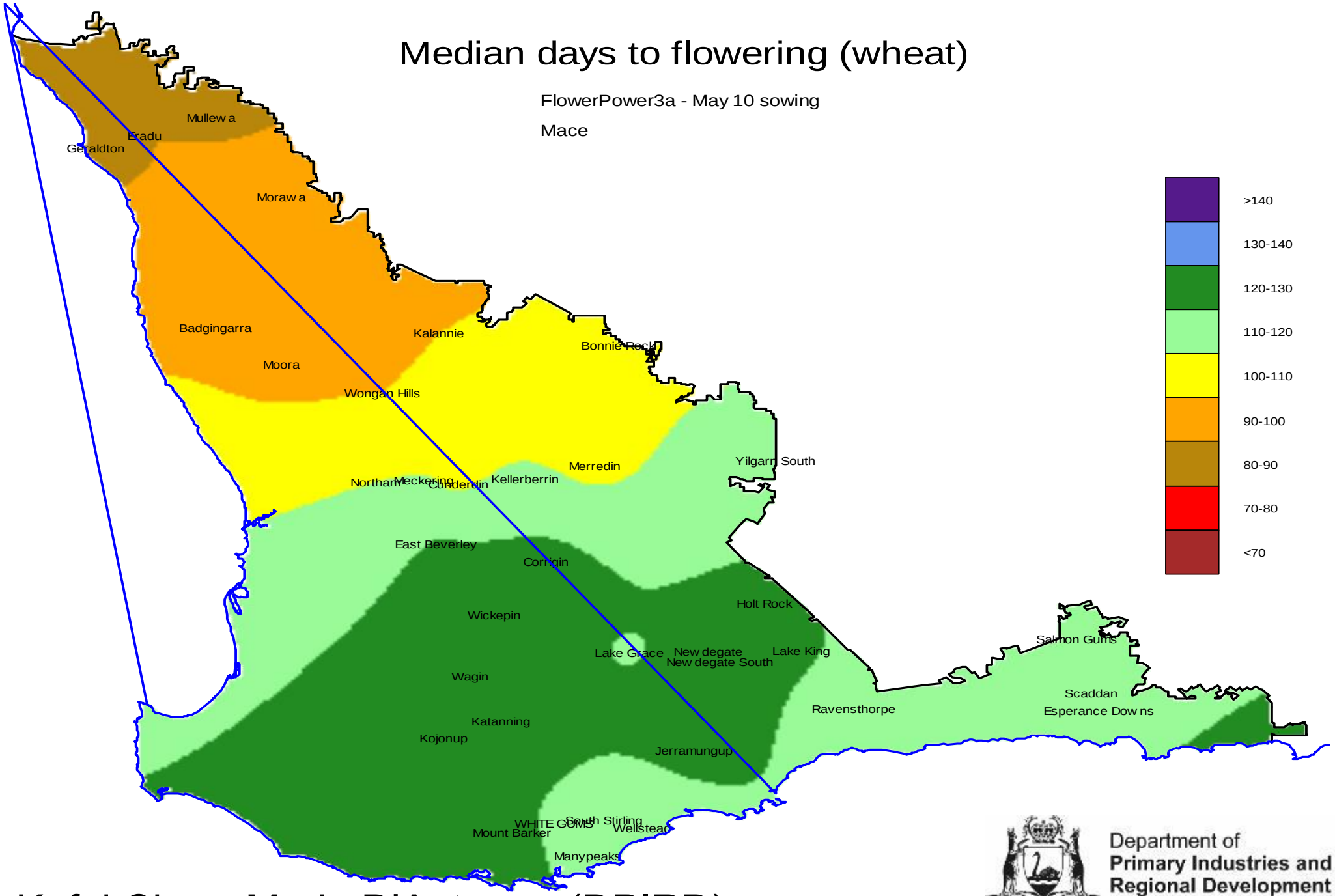
Flowering times can change more each season than the target flowering window duration



Median days to flowering (wheat)

FlowerPower3a - May 10 sowing

Mace



Source: Kefei Chen, Mario D'Antuono (DPIRD)

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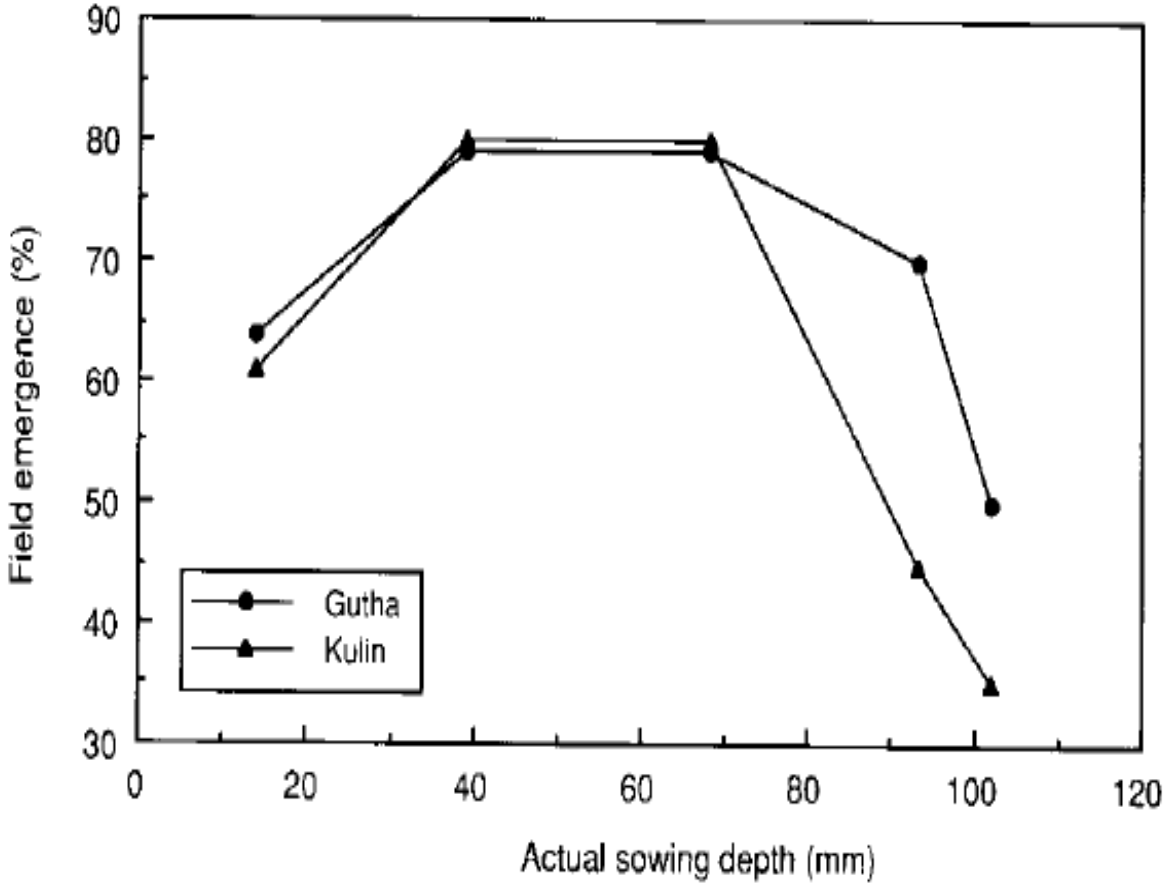
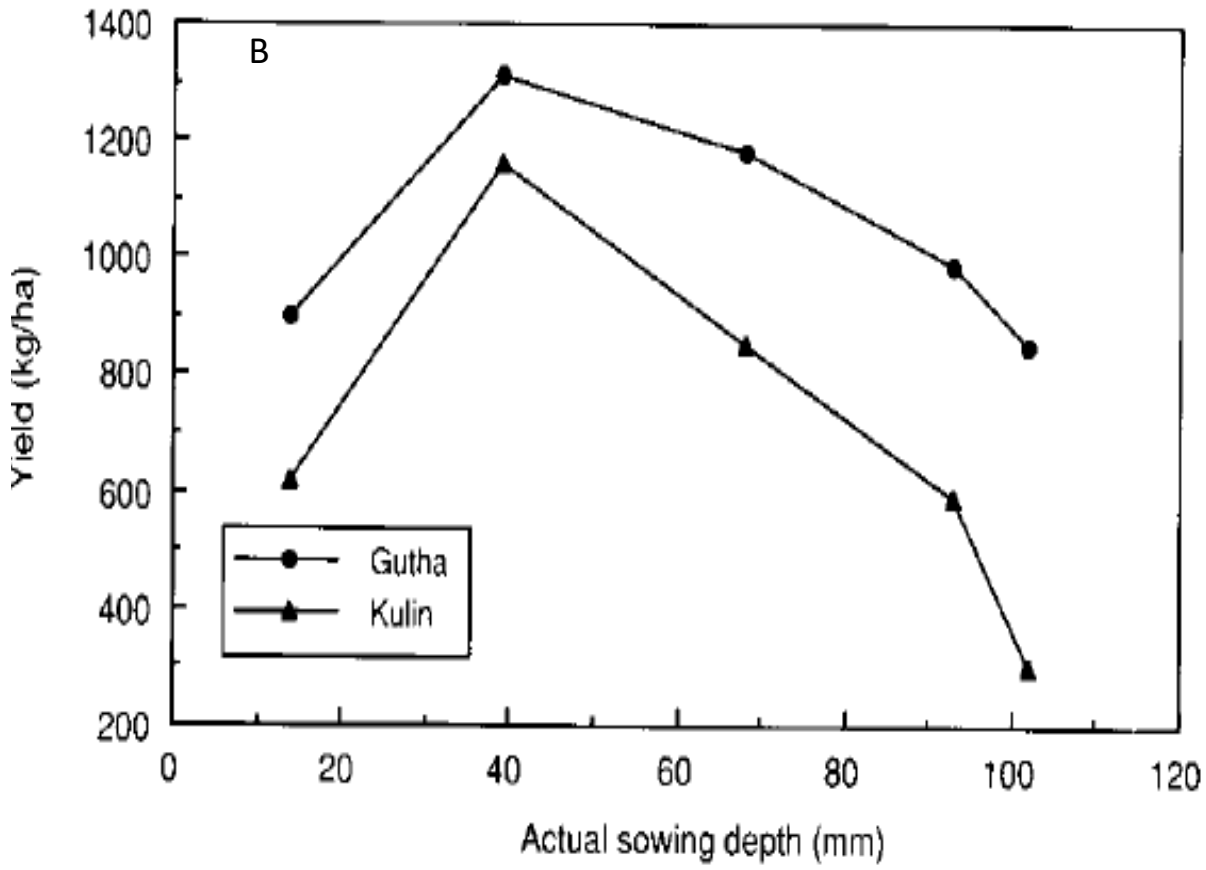
Sowing time responses relatively consistent across WA despite different optimal flowering times

	April				May				June			
	wk 1	wk 2	wk 3	wk 4	wk 1	wk 2	wk 3	wk 4	wk 1	wk 2	wk 3	wk 4
Mid-long: ~~Calingiri,~~ Catapult, Cutlass, Kinsei, ~~LRPB Trojan, Magenta,~~ Rockstar, ~~Yitpi,~~ Zen												
Short-mid: Chief CL Plus, ~~Corack,~~ Devil, ~~LRPB Cobra,~~ LRPB Havoc, ~~Mace,~~ Scepter, ~~Supreme~~												
Short: ~~Emu Rock,~~ Sting, Vixen												

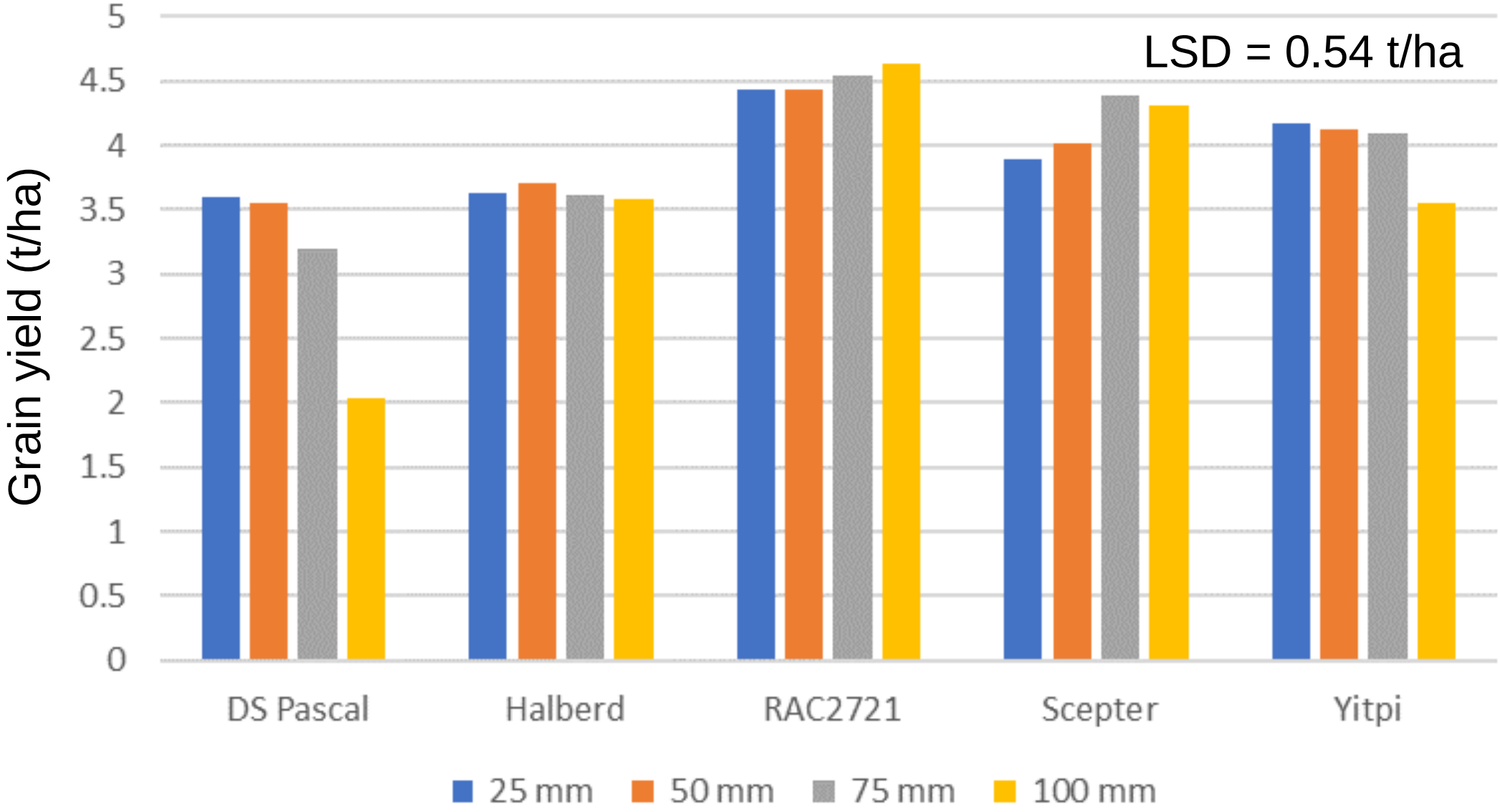
Deep sowing risks/implications





Field emergence (A) and grain yield (B) of Gutha, a long coleoptile, tall wheat variety compared to Kulin, a short coleoptile, semi-dwarf variety with increasing sowing depth sown 25th May 1989 Merredin (source: The wheat book, p 141).

Mullewa variety × depth 2021



Change in phenology From deep sowing Mullewa 2021

Days after sowing (23rd April)

Depending on the relative impacts of flowering time, this factor has often been little considered.

Depth	25 mm	50 mm	75 mm	100 mm	Difference
Variety					
DS Pascal	116	118	123	129	13
Halberd	101	102	104	105	4
Calibre (RAC2721)	88	92	95	103	15
Scepter	84	88	94	103	19
Yitpi	110	111	115	118	8
				LSD 2.5	

Katanning 2021 Deep sowing

Even long coleoptile wheats lose density when deep. Lifting sowing rates likely of importance.

Plant establishment (m²) 21 DAS				
Desired depth	25 mm	60 mm	100 mm	Av
Actual depth	39 mm	58 mm	102 mm	
DS Pascal	183	148	27	119
Scepter	180	172	31	128
Valiant	142	130	42	104
Calibre	162	155	48	122
Yitpi	184	186	58	143
Halberd	166	179	100	148
Av	169	161	51	127
Depth	<.001	10		
Variety	0.001	16		
DepthxVariety	0.074	30 (33)		
CV (%)	16.8			

Change in phenology Katanning 2021

Depending on the relative impacts of flowering time, this factor has often been little considered.

Date of flowering (z65), Katanning 2021				
Variety	Seeding depth (mm)			Days between 25 and 100mm depth
	25	62.5	100	
DS Pascal	22-Sep	24-Sep	28-Sep	6
Scepter	15-Sep	16-Sep	22-Sep	7
Valiant	25-Sep	26-Sep	30-Sep	5
Calibre	13-Sep	14-Sep	16-Sep	3
Yitpi	22-Sep	24-Sep	28-Sep	5
Halberd	20-Sep	20-Sep	22-Sep	3

Deep sowing

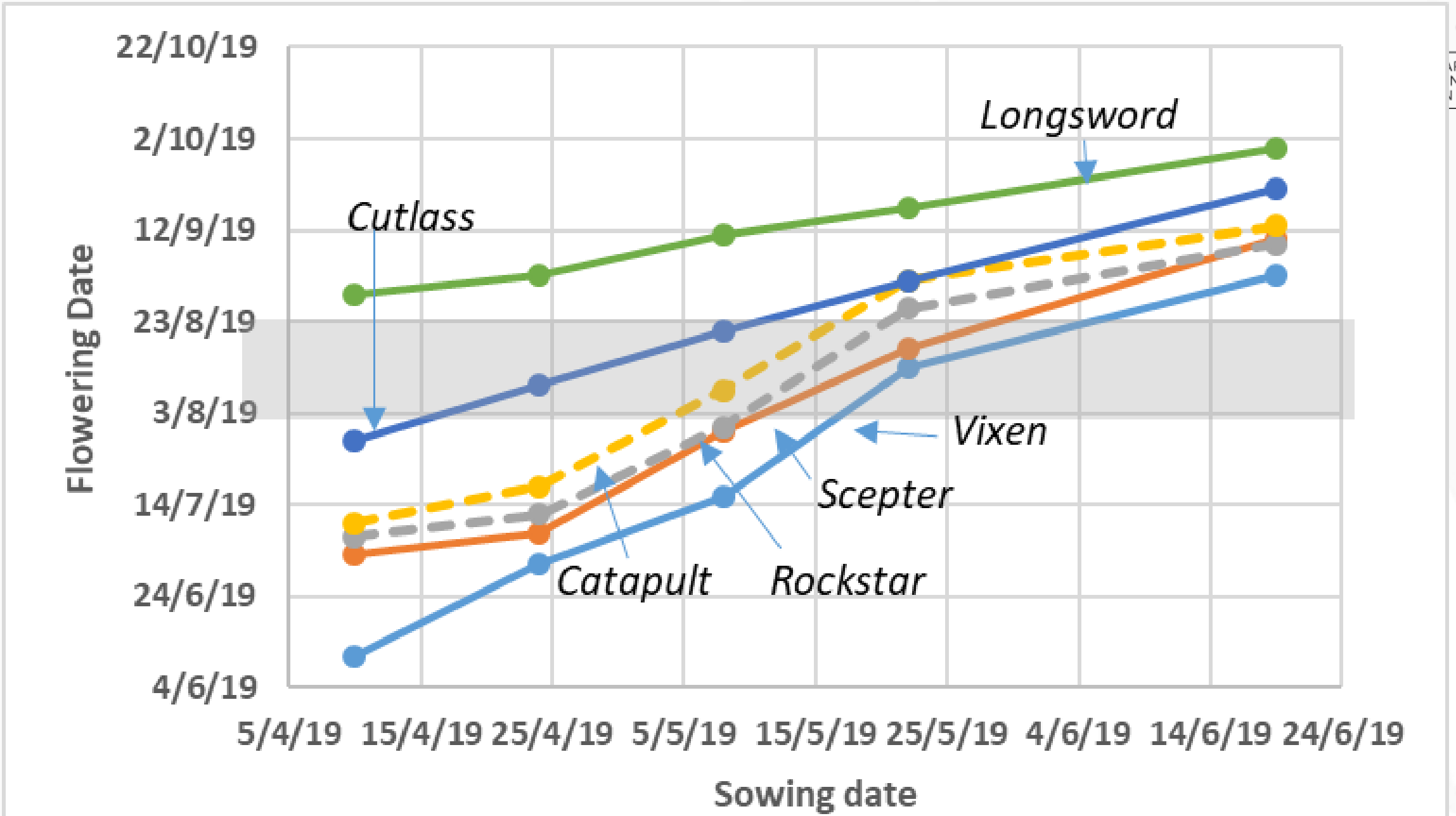
- Phenology could be playing a part in deep sowing response (varies)
  - This could be a benefit when early sowing?
- Seeder setup and changing to soil conditions will be critical (more variation in this than wheat genetics)
- Potential coleoptile length and realised length are environmentally and seed source driven

Take home messages for deep sowing

- Don’t go deep unless warranted
- Choose safer soil types
- Change seeder setup to reduce resistance of seedling emergence and not too stricter depth distribution
- Use ‘good’ seed and consider increasing seed rate

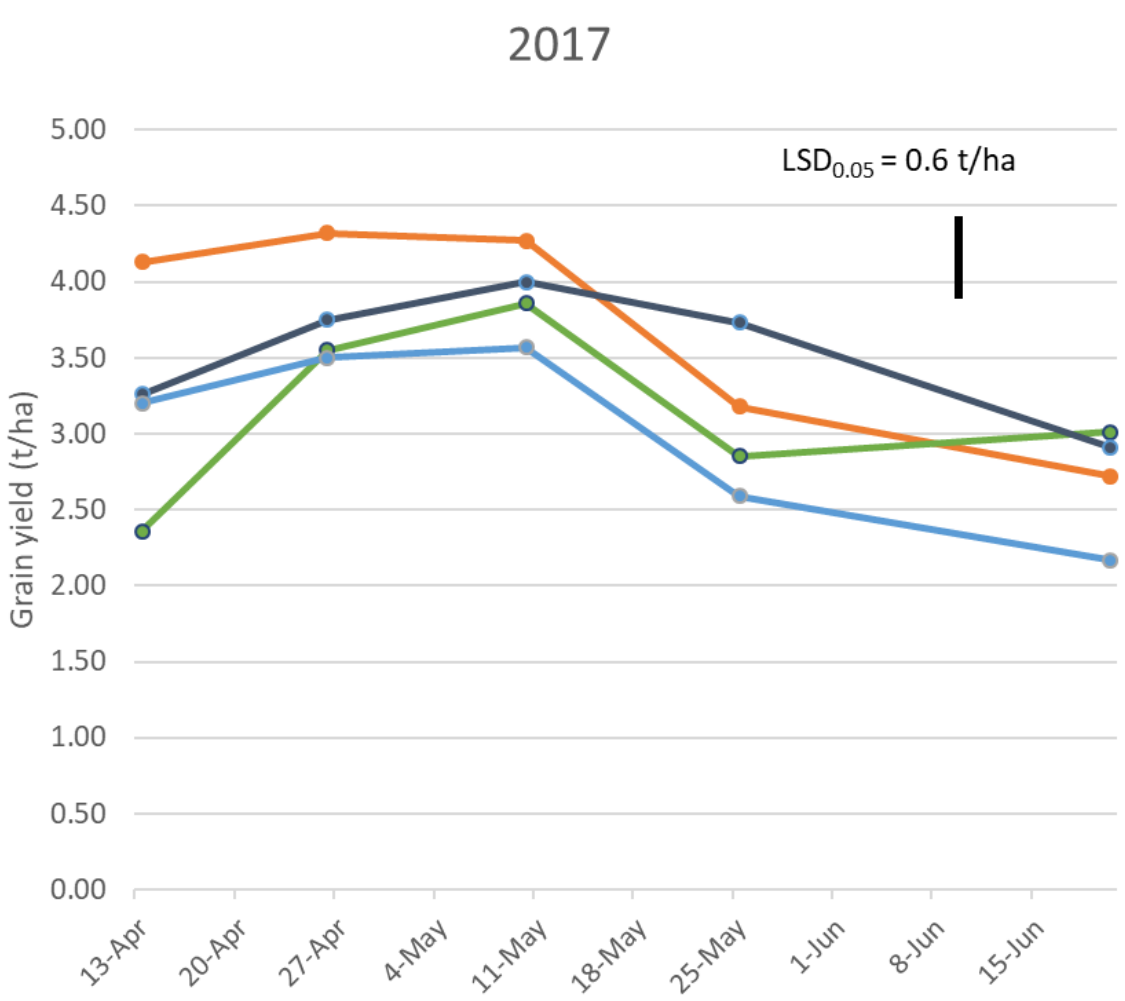
The fit of winter wheats in WA

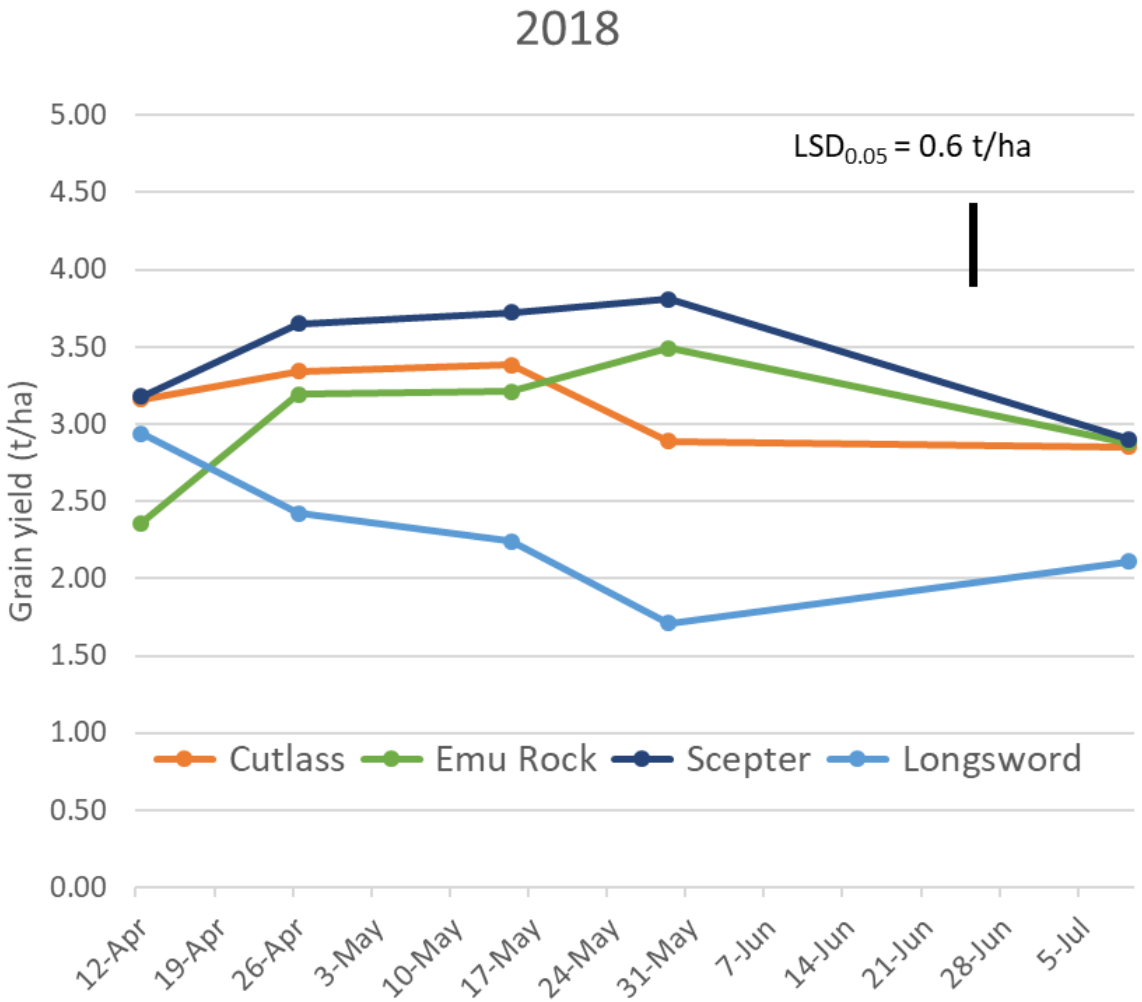
- Sowing time responses
- Yield gap to spring and consideration of varied risk profile
- Phenology and dry matter accumulation
- Chemical options and system
  - Grazing and chemical timing
  - Phenology impacts on spray windows
- Genetic gaps – coleoptile length often very short in winters



Geraldton 2019 – Sowing sequence of varieties

Merredin Research station time of sowing data

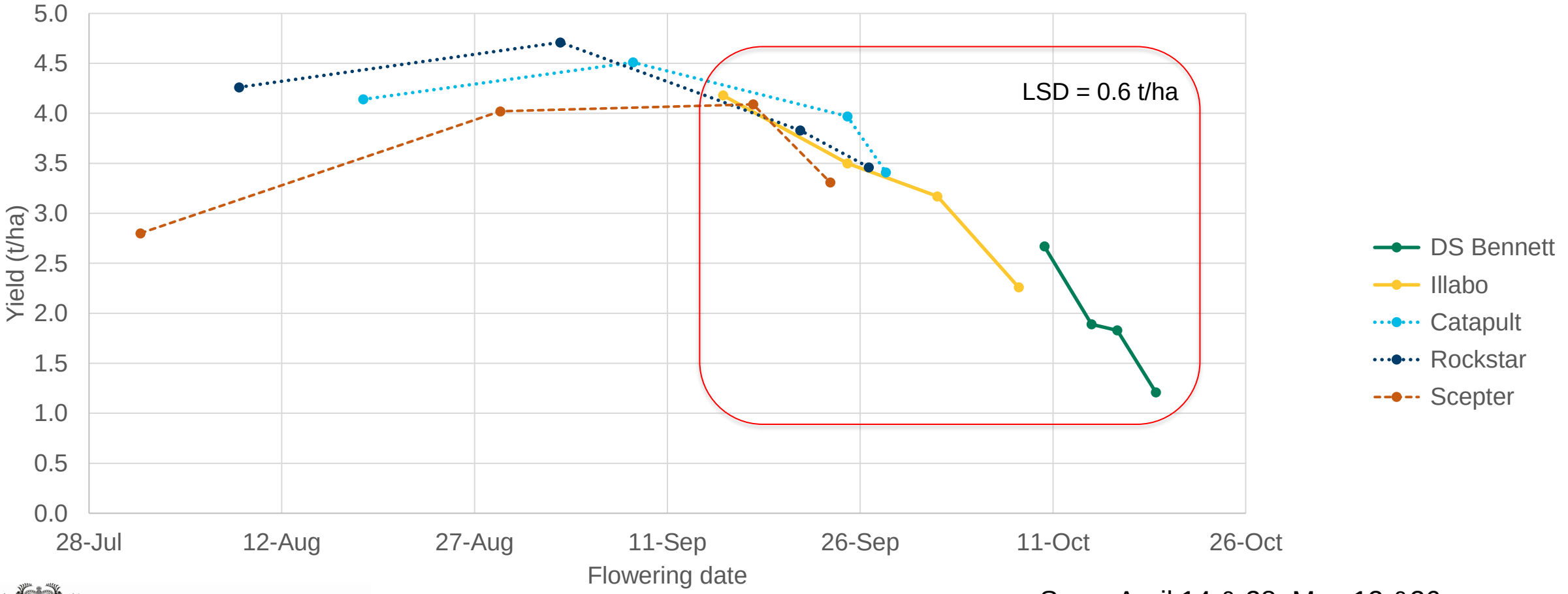




Shackley et al, 2019 GRU

Typical yield pattern of winter wheats

Yield response to flowering date, Katanning 2020



Sown April 14 & 28, May 12 &26

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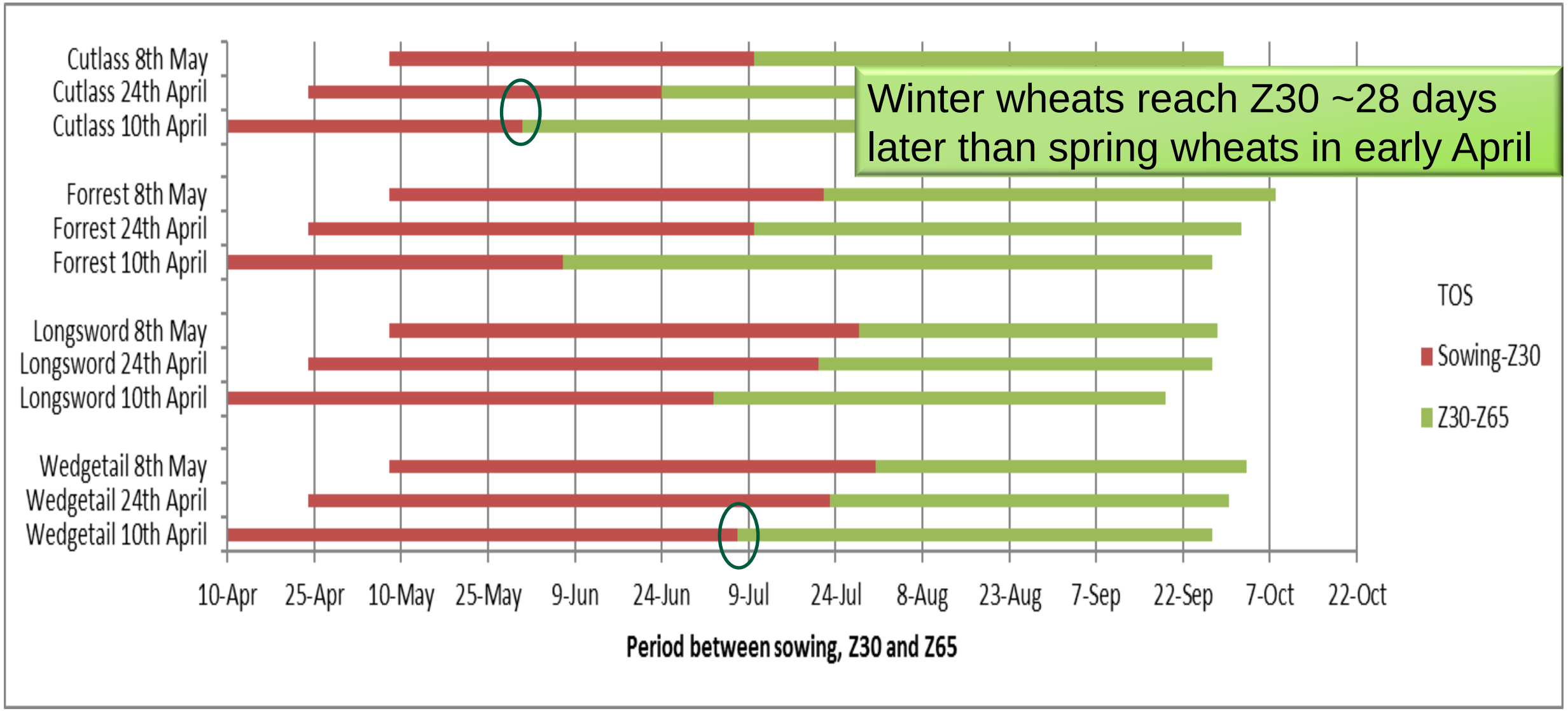
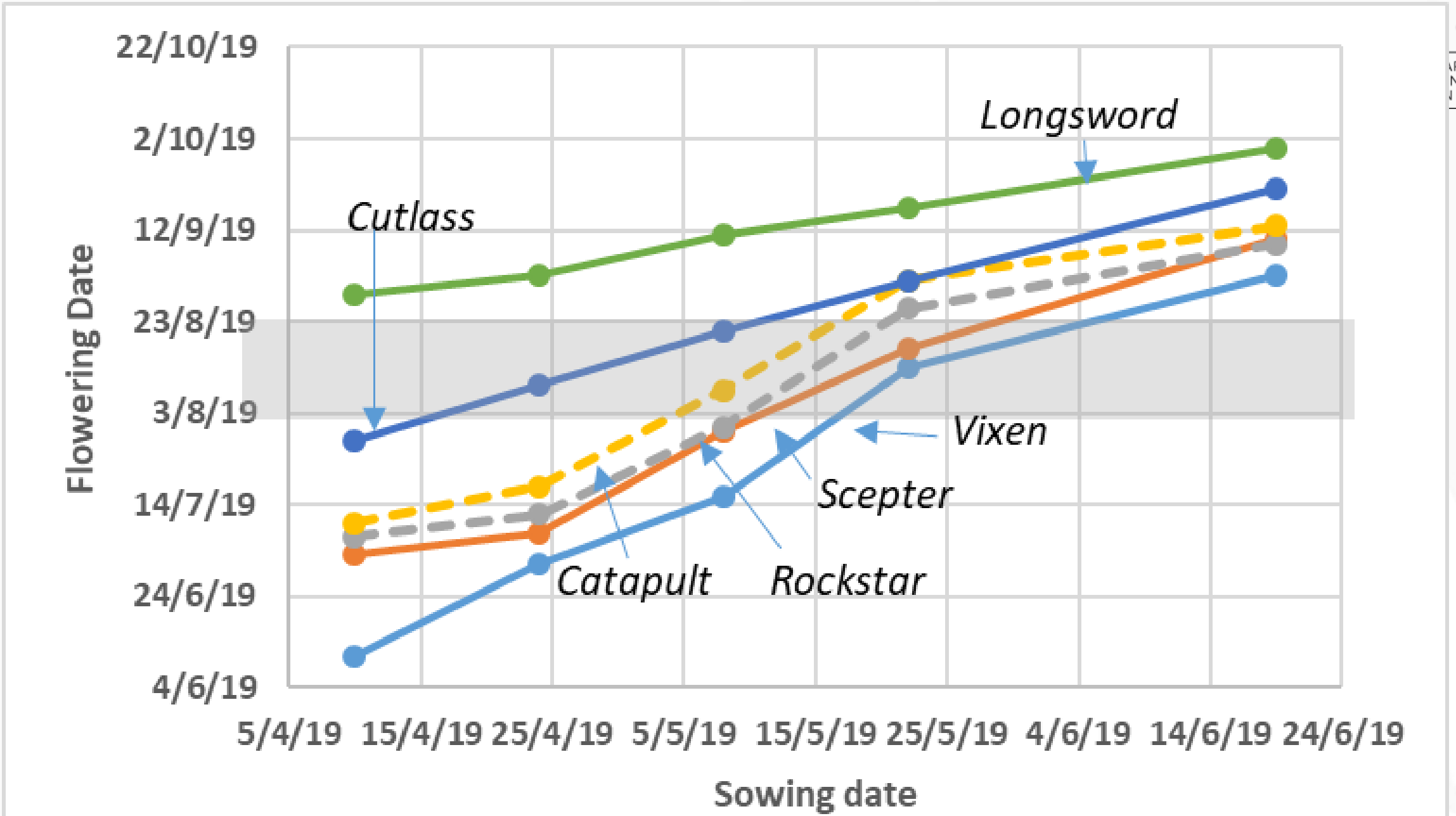
Vegetative phase varies with variety and sowing time

(Katanning 2018)



Shackley et al, 2019



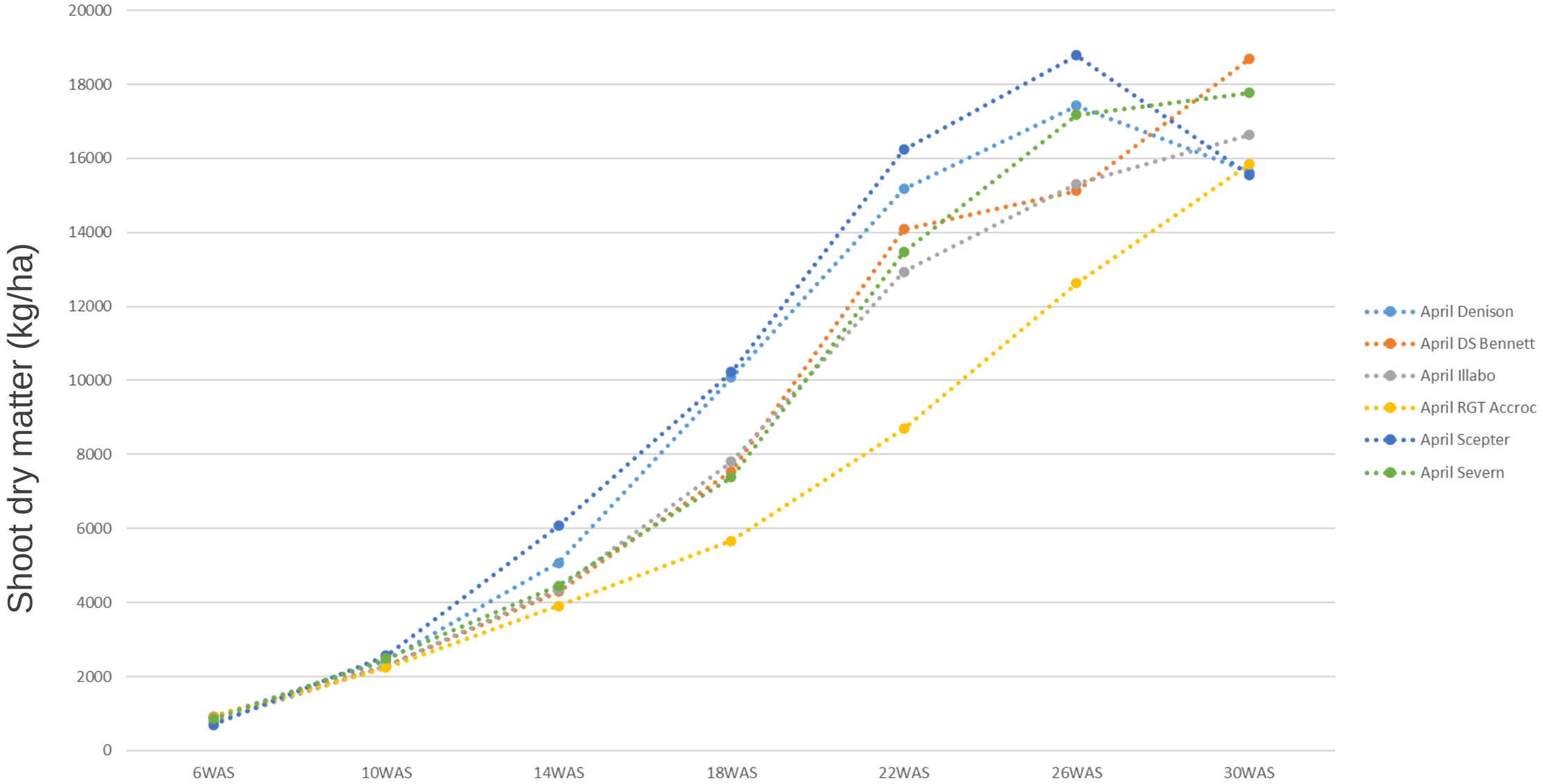
Geraldton 2019 – Sowing sequence of varieties

Where is the fit in WA?

Depends on the season and how much water and what the alternatives are in that window.

- Vernalisation requirement of winter wheats work well for very early sowing. Cancelling out the increased temps by effectively holding the growth back until cold accum.
- What about semi-winters of the past?
  - Bencubbin, Yandilla King
- Terminal drought is a significant issue

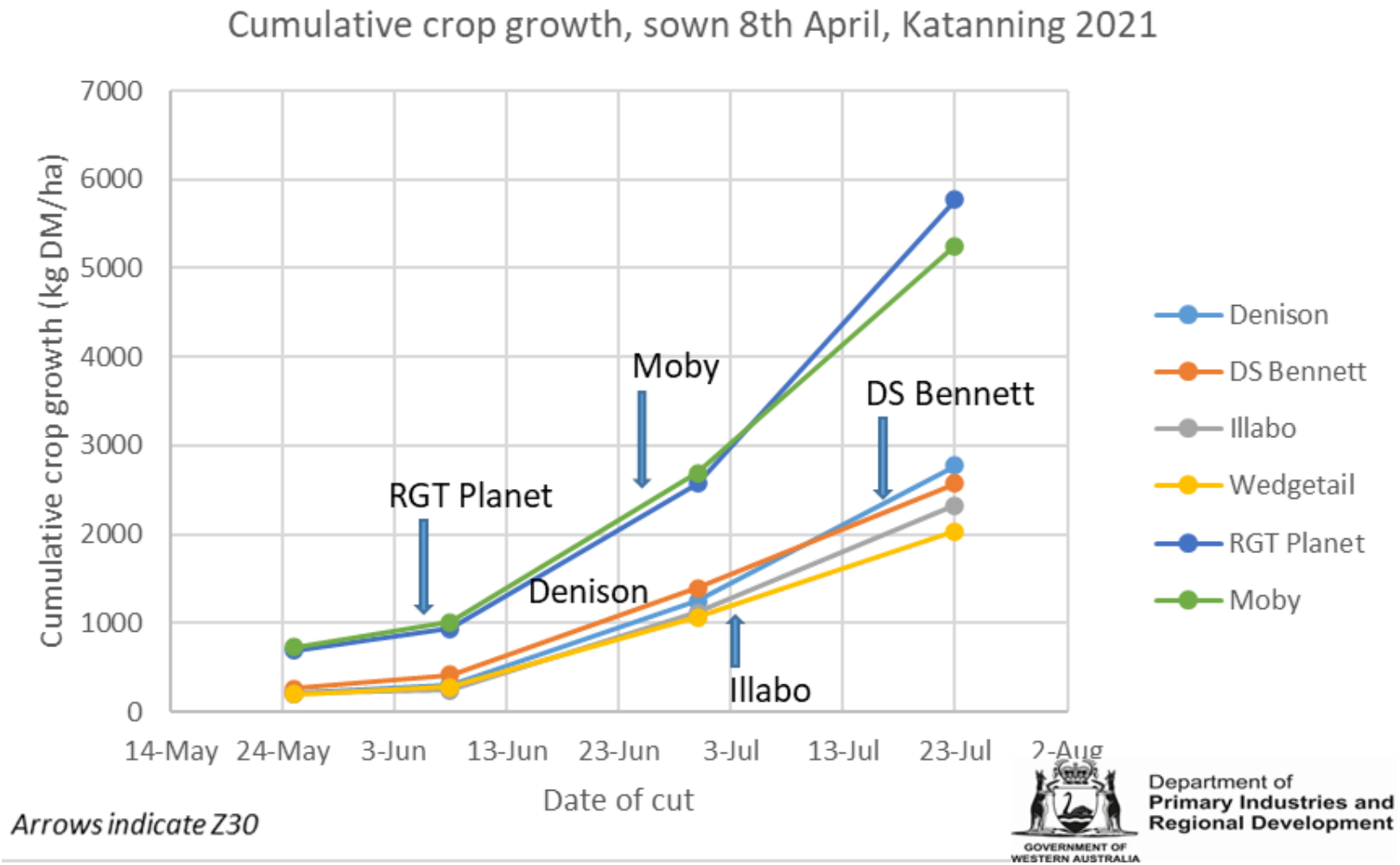
Dry matter accumulation across spring and winter wheats



Jeremy Curry - DPIRD Esperance

Dry matter accumulation in winter wheats

Comparison with oats, barley etc. for grazing required



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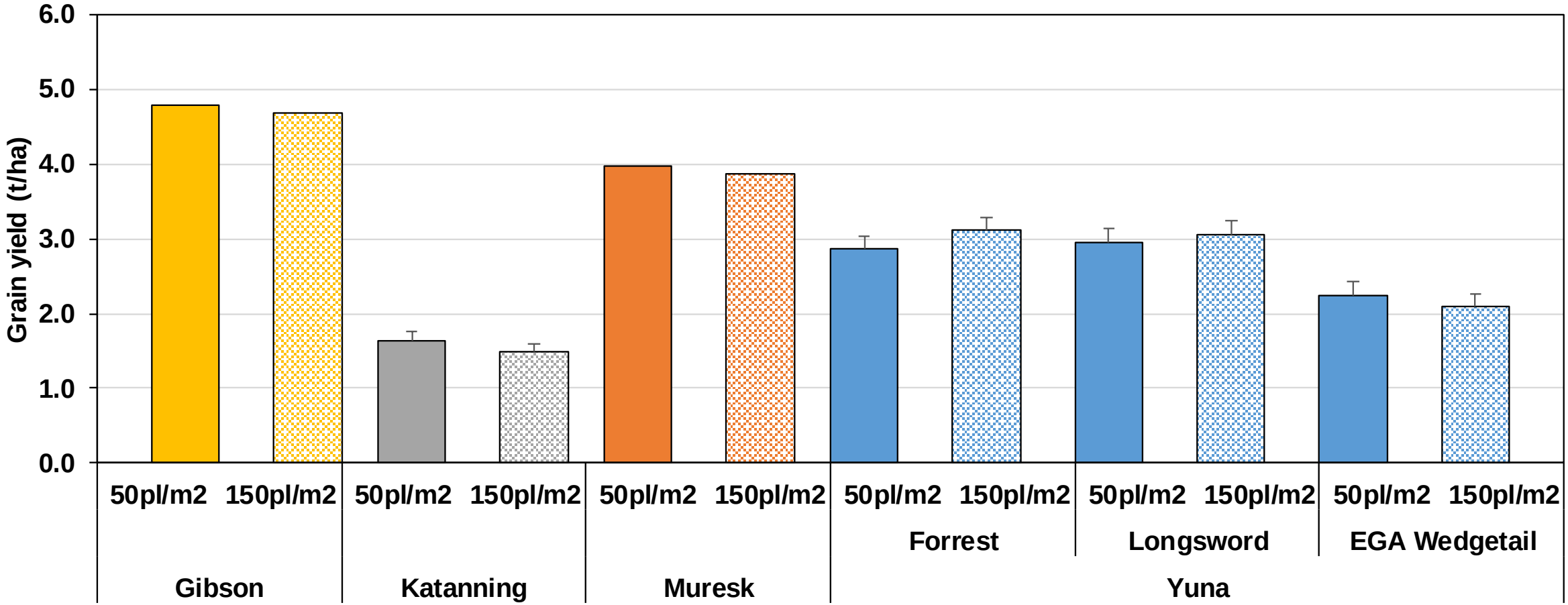
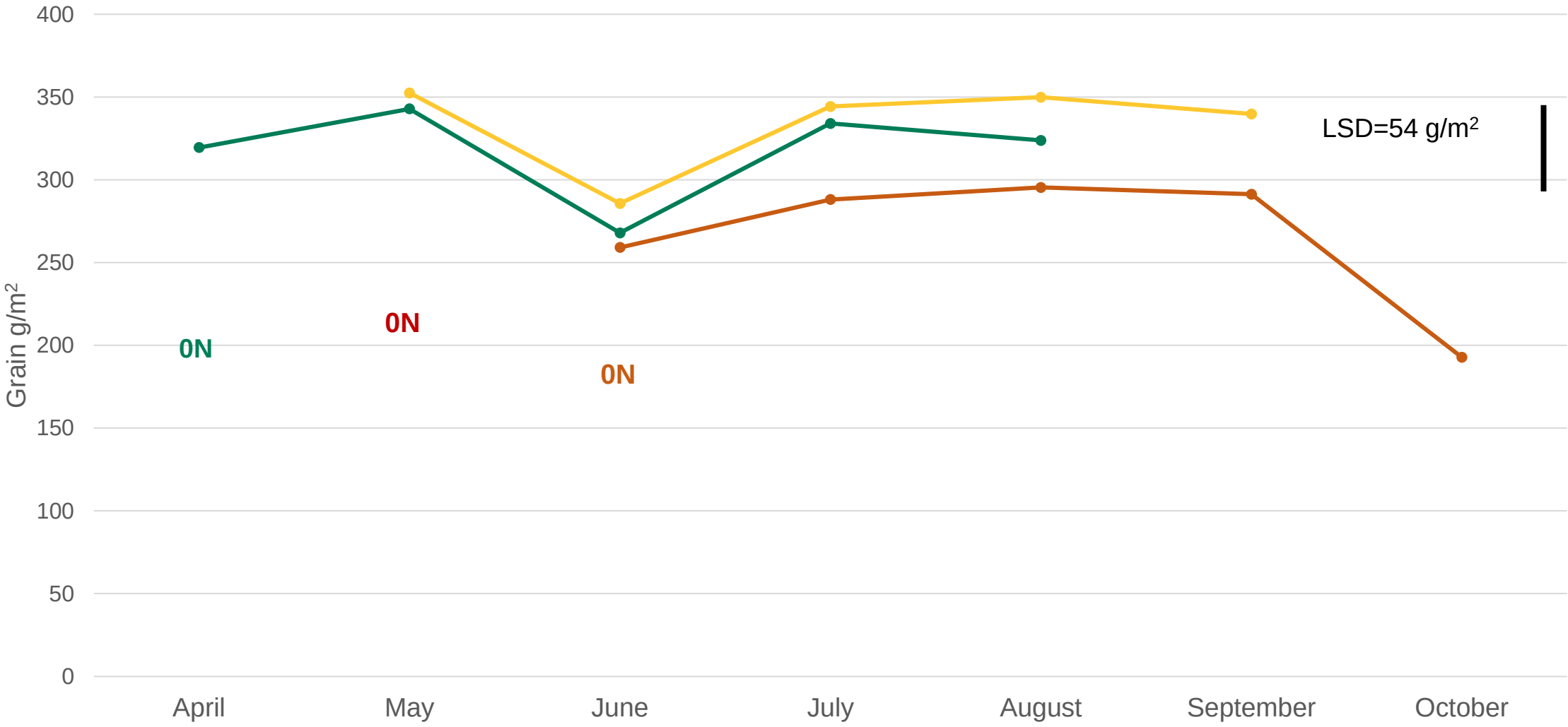
Plant density not a big issue affecting production for early sowing

- Choose target density for grazing or grain-only

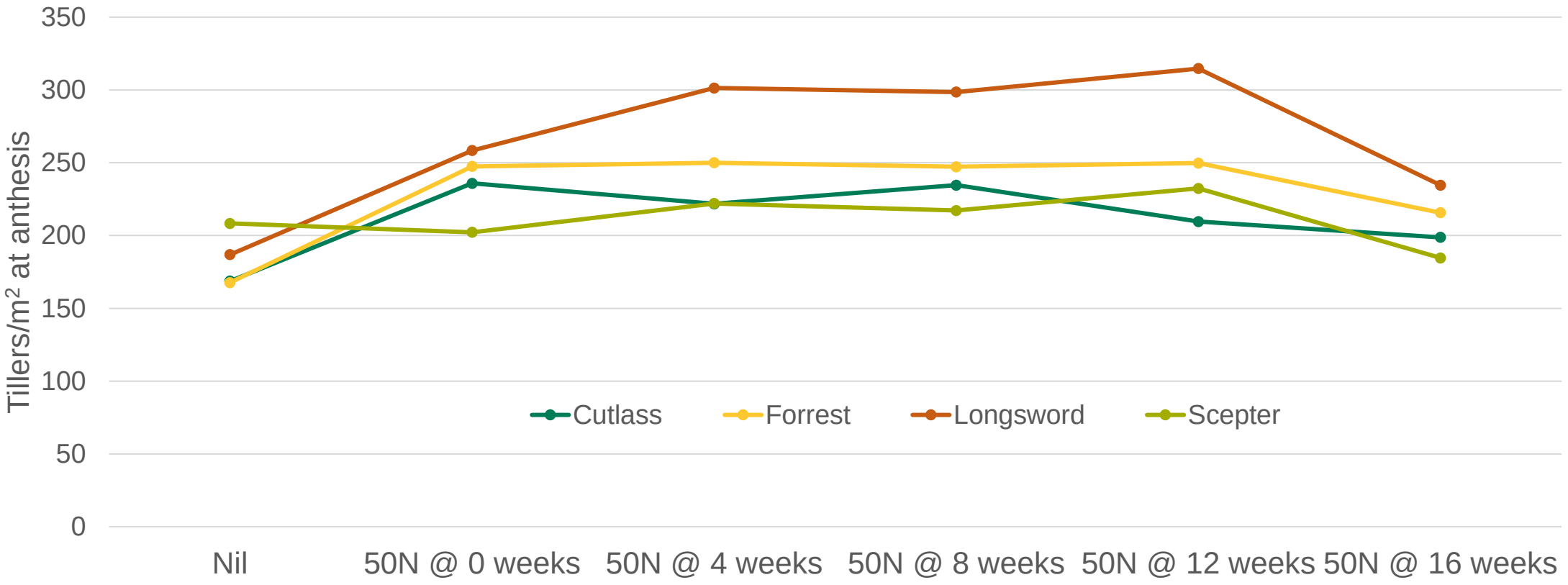


Zaciou-Kunesch et al, 2019

Effect of time of sowing x variety x nitrogen timing on grain yield



Effect of N timing on tillers/m^2 (anthesis) by variety



Key messages on winters

- Winter wheats have risks of lower yields in small plot trials
- Systems benefits still warrant production

  (e.g. Trafficability, frost risk)
- Grazing should be compared for other species such as oats and barley given higher DM
- Canopy management mainly about if grazing or not