Department of Primary Industries and Regional Development

GOVERNMENT OF WESTERN AUSTRALIA

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Deep sowing and coleoptile length in wheat

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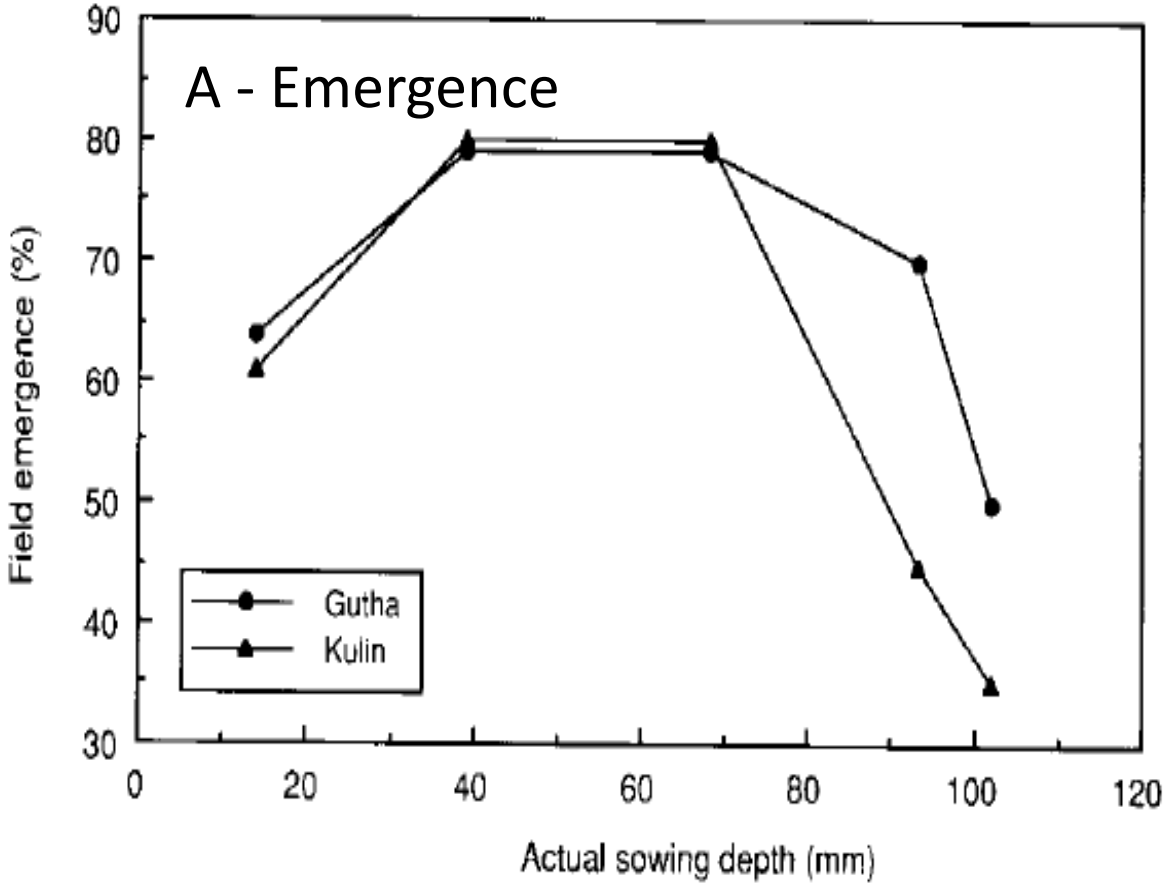
Intro

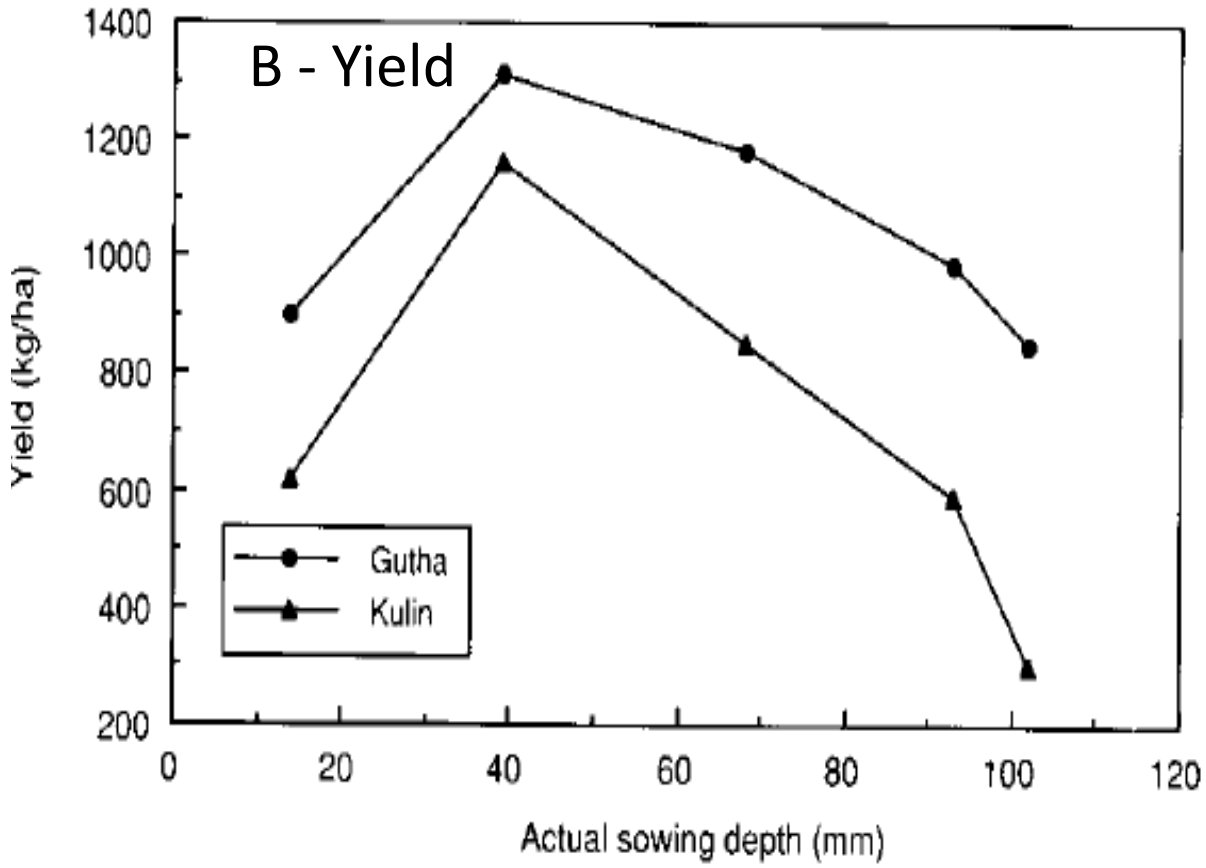
- Definition of ‘long’ coleoptile wheat
  - Long coleoptile, tall wheat is the ‘wild type’
  - Major dwarfing genes reduce coleoptile length
  - Longer coleoptile traits in semi-dwarf – 1A chromosome
  - Novel dwarfing genes such as *Rht18* (work by Rebetzke et al.) maintain coleoptile length

Aspects of deep sowing often less discussed

- Pacific Northwest USA – International deep sowing capital
  - Light, sandy soils with dry sowing conditions
  - Deep furrows with wide rows
  - Peak emergence with cultivars of 90 mm (longer could lose strength)
  - Long first leaf (more common in old, tall wheat varieties)
  - More moisture required for seedling strength/turgor to allow emergence from greater depth

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).

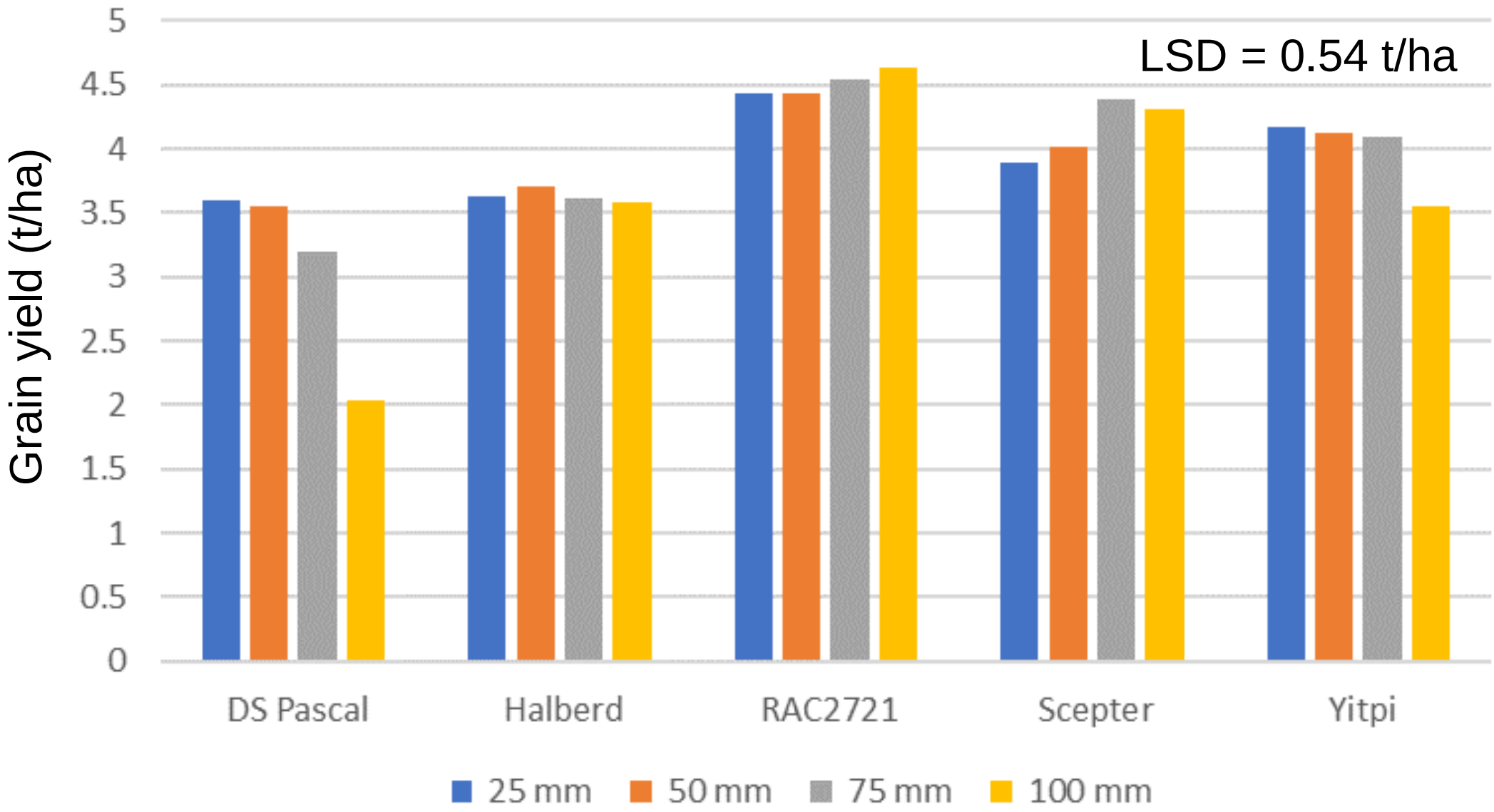
Coleoptile lengths and deep sowing

Table 19. Coleoptile length (cm) and plant establishment of a range of varieties germinated on filter paper 'cigars' or sown at 10cm at Katanning in 2021

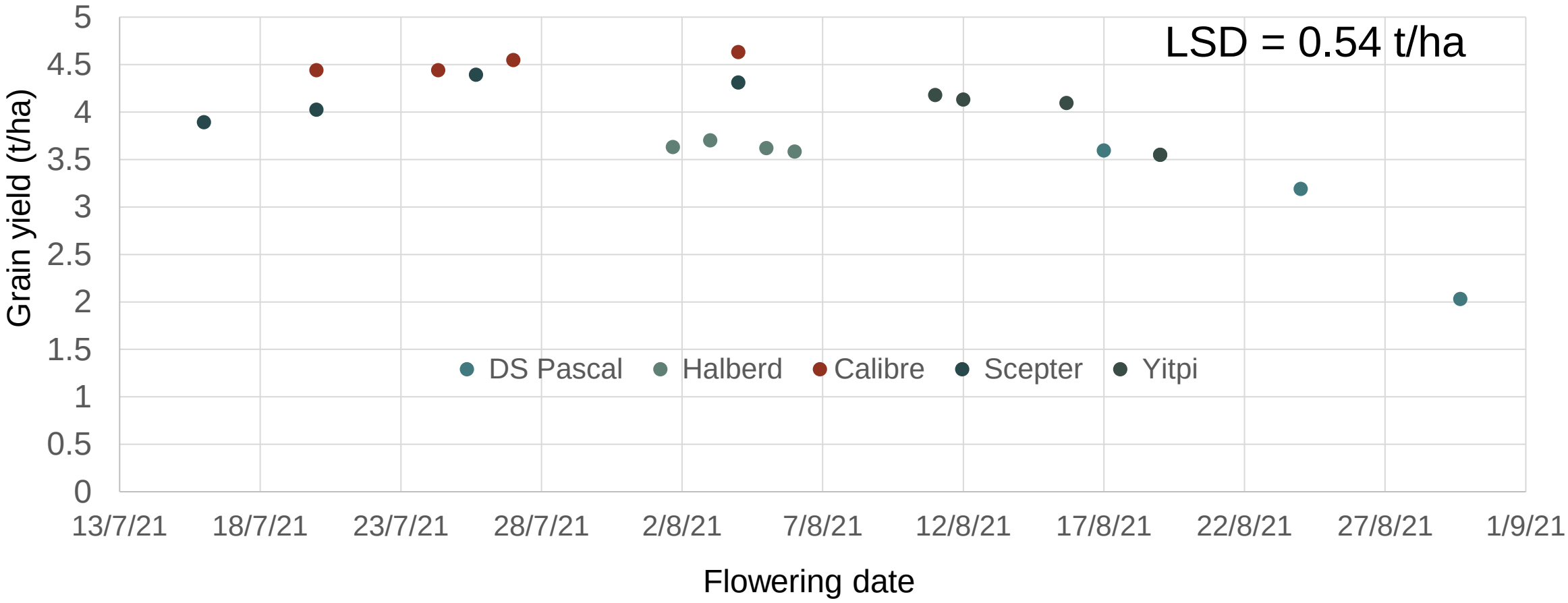
Variety (Coleoptile group)	Coleoptile length (cm)		Establishment (m^2) at 10cm deep	Grain yield (t/ha)	
	Filter paper	Sown at 10cm		at 10cm deep	at 4cm deep
DS Pascal (S)	6.3	4.9	27	2.3	4.4
Scepter (S/M)	7.5	5.5	31	2.5	5.0
Calibre (L)	8.5	6.7	48	3.0	4.9
Yitpi (L)	9.4	6.8	58	2.7	4.6
Halberd (VL)	12.3	7.8	100	3.3	4.2
lsd			30 (m^2)	0.5 (t/ha)	0.5 (t/ha)

From page 34 of DPIRD Crop Sowing guide
Work by Brenda Shackley & Rod Bowey - Katanning

Mullewa variety × depth 2021



Deep sowing impact on grain yield + flowering date

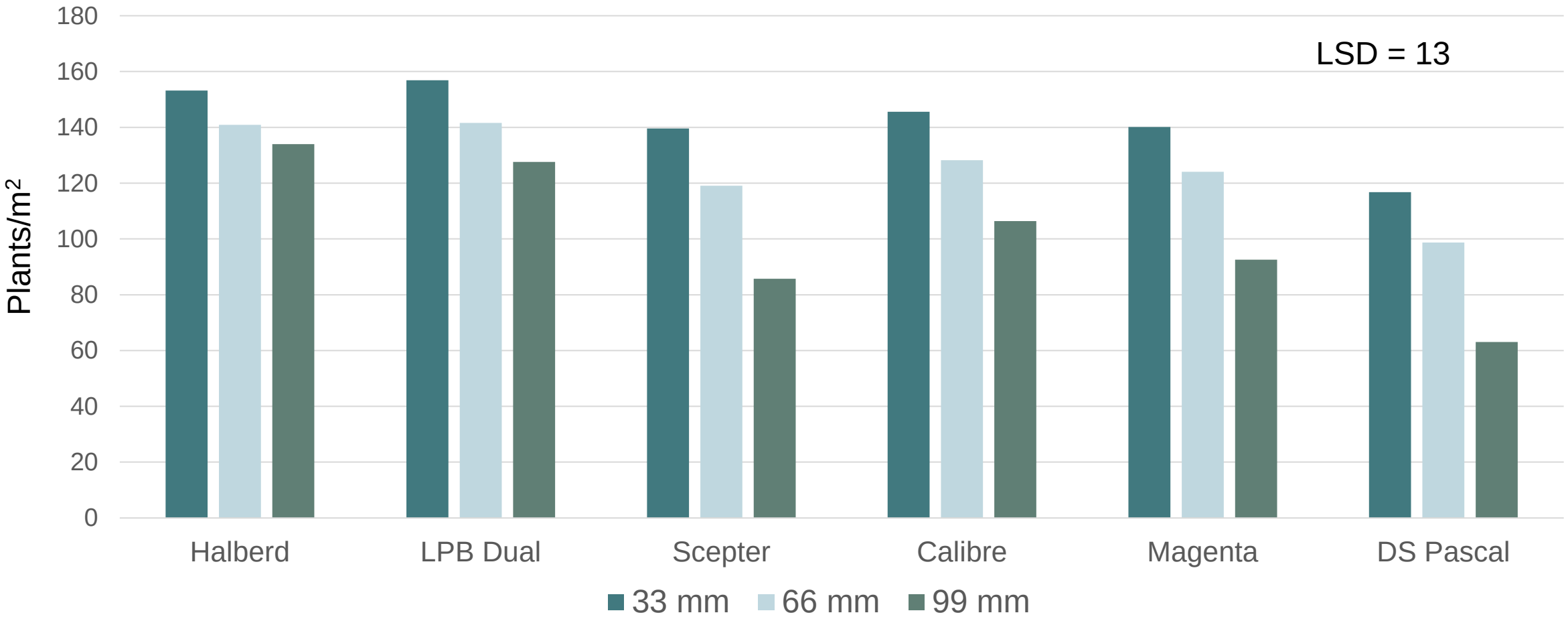


Merredin 2022 – TOS x Var x Depth x Density

Hypothesis: Delay in flowering due to lower plant density and delays in emergence

- TOS - 29th April vs 20th May
- 6 varieties - Halberd, LRPB Dual, Scepter, Calibre, Magenta, DS Pascal
- Seed rates (75, 150, 300 seeds/m^2)
- Seeding depths targeted (33, 66, 99 mm)

Merredin 2022 – Plant establishment



Merredin 2022 – TOS x Var x Depth x Density

Impact of depth on flowering time

- Average only 4 days delay in flowering from 33 to 100 mm depth
- Main interaction that didn’t occur was variety by depth
- Possible that intermittent stress impacted phenology
- Not a reliable response

Merredin 2022 – Grain yield

- No significant variety x seed depth for grain yield
- Many other interactions, but not what hypothesized

Results are variable,

when it works, most things do,

when it goes pear-shaped, most things do

Seeder setup is critical when going deeper

Risks in research techniques vs on-farm

- Perpendicular working impacts seed depth control and consistency
  - Increased chatter
- Ability on-farm to specifically target furrow
- Specific seed depth targeted vs. spreading risk
  - Many seeders can target std. and deep sowing depth simultaneously