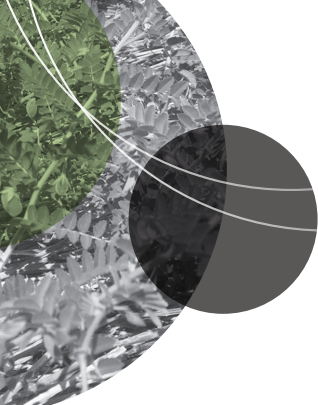




Agronomy

Yield response of 32 bread wheat entries across three sowing dates – Trangie 2016

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Key findings

- The quicker maturing varieties LRPB Dart[®], Hatchet[®] Livingston[®], Mace[®], Sceptre[®], Mitch[®] and Suntop[®] were generally lower yielding than other entries at SD1, but were more yield competitive with other entries at SD2 and SD3.
- The longer season varieties EGA Wedgetail[®] (6.08 t/ha) and EGA Eaglehawk[®] (5.88 t/ha) were the highest yielding varieties at SD1, followed by Cutlass[®] (5.51 t/ha) and LRPB Flanker[®] (5.36 t/ha).
- The mean yield at SD1 (4.89 t/ha) was not significantly different from SD2 (4.63 t/ha), but SD3 (3.56 t/ha) was significantly lower yielding than either SD1 or SD2.
- All varieties yielded their lowest from SD3.
- Protein percentages were low to moderate (mean of 9.8% for SD2 and 10.3% for SD1) with no significant difference from SD for any of the entries.

Introduction

Sowing date is a key driver of yield and variety performance. The optimum sowing time for an individual variety is a balance between having the variety flower too early and being subjected to frost damage, and conversely having it flower too late and experience prolonged heat stress. Both of these factors can have significant negative impacts on yield.

Site details

Location Trangie Agricultural Research Centre

Soil nutrition

Table 1. Soil chemical characteristics for 0–10 cm depth – Trangie 2016.

Characteristic	mg/kg
Ammonium nitrogen	11
Nitrate nitrogen	40
Phosphorus Colwell	42
Potassium Colwell	376
Sulfur	8.8
Organic carbon	1.07 (%)
pH _{Ca}	5.0

Starting nitrogen Total soil nitrogen level to 120 cm at sowing was 170 kg N/ha.

Rainfall The growing season rainfall was 545 mm (April to November).

Experiment design The experiment was a randomised block design that was blocked for the three sowing dates with varieties randomised within blocks. There were three replicates of each treatment.

Fertiliser	70 kg/ha Granulock® Z Extra treated with 400 mL/ha of flutriafol at sowing. 100 L/ha Easy N applied in-crop at early tillering and again after GS32, supplying a total of 85 kg N/ha.
Plant population	Target 100 plants/m ²
Weed management	Roundup CT® 1.5 L/ha + Boxer Gold® 2.5 L/ha + Logran® 30 g/ha applied before sowing. Axial® 100EC 200 mL/ha + Velocity® 1 L/ha applied in-crop.
Insect management	Fastac® Dua 125 mL/ha (alpha cypermethrin 100 g/L) applied in-crop to control aphids.
Disease management	Radial® 1.6 L/ha (azoxystrobin + epoxiconazole) applied at GS32 and Prosaro® (prothioconazole + tebuconazole) applied at GS39 to control rust.
Harvest date	25 November 2016

Treatments

Entries (32)

Twenty-eight released varieties and four advanced breeding lines as outlined in Table 1 and Figure 1.

Sowing date (SD)

SD1: 28 April 2016 (dry sown with rain on 30 April)

SD2: 17 May 2016

SD3: 30 May 2016

Results

Anthesis date

For SD1, Hatchet[®] was the first entry to reach anthesis (24 September) (Figure 1). After this date the coldest temperatures recorded for the rest of the growing season were 3.9 °C on 26 September; 3.3 °C on 28 September; 2.8 °C on 12 October and 3.7 °C on 23 October.

The new variety Coolah[®] followed very similar anthesis dates to EGA Gregory[®] for all three SDs.

The long-season, prime hard variety Suntime[®] was significantly earlier to reach anthesis than EGA Wedgetail[®] or EGA Eaglehawk[®] at each SD (Figure 1).

Grain yield and protein

At Trangie, which has a typically low rainfall and hot growing environment, the longer season varieties EGA Wedgetail[®] and EGA Eaglehawk[®] will normally only perform well from early and mid April sowing dates as they are too slow to flower when sown after these dates. However, in 2016 EGA Wedgetail[®] was the highest yielding variety in this experiment at SD1 (28 April) with 6.08 t/ha (Table 1) despite not flowering until 2 November (Figure 1). The yield performance of EGA Wedgetail[®] declined rapidly after SD1, producing 4.63 t/ha from SD2 (24% yield loss) and 3.64 t/ha from SD3 (41% yield loss; Table 1). EGA Eaglehawk[®] has also yielded well in other seasons from a mid April sowing and has been better than benchmark varieties such as the quicker maturing EGA Gregory[®] from that sowing date. However, similar to EGA Wedgetail[®], EGA Eaglehawk[®] yield rapidly declined after SD1 (Table 1).

LRPB Flanker[®] yielded 11% higher than EGA Gregory[®], the widely grown variety it is aiming to replace, at SD1. However, their yields were not significantly different for the two later sowing dates (Table 1).

Mitch[Ⓛ] and Beckom[Ⓛ] were generally higher yielding than many entries at SD3 and the only ones to yield above 4.0 t/ha with this later SD (Table 1).

Corack[Ⓛ], LRPB Dart[Ⓛ], Hatchet Plus[Ⓛ], LRPB Lancer[Ⓛ], Livingston[Ⓛ], LRPB Spitfire[Ⓛ] and UQ01553 exceeded mean grain protein levels for all three sowing dates (Table 1).

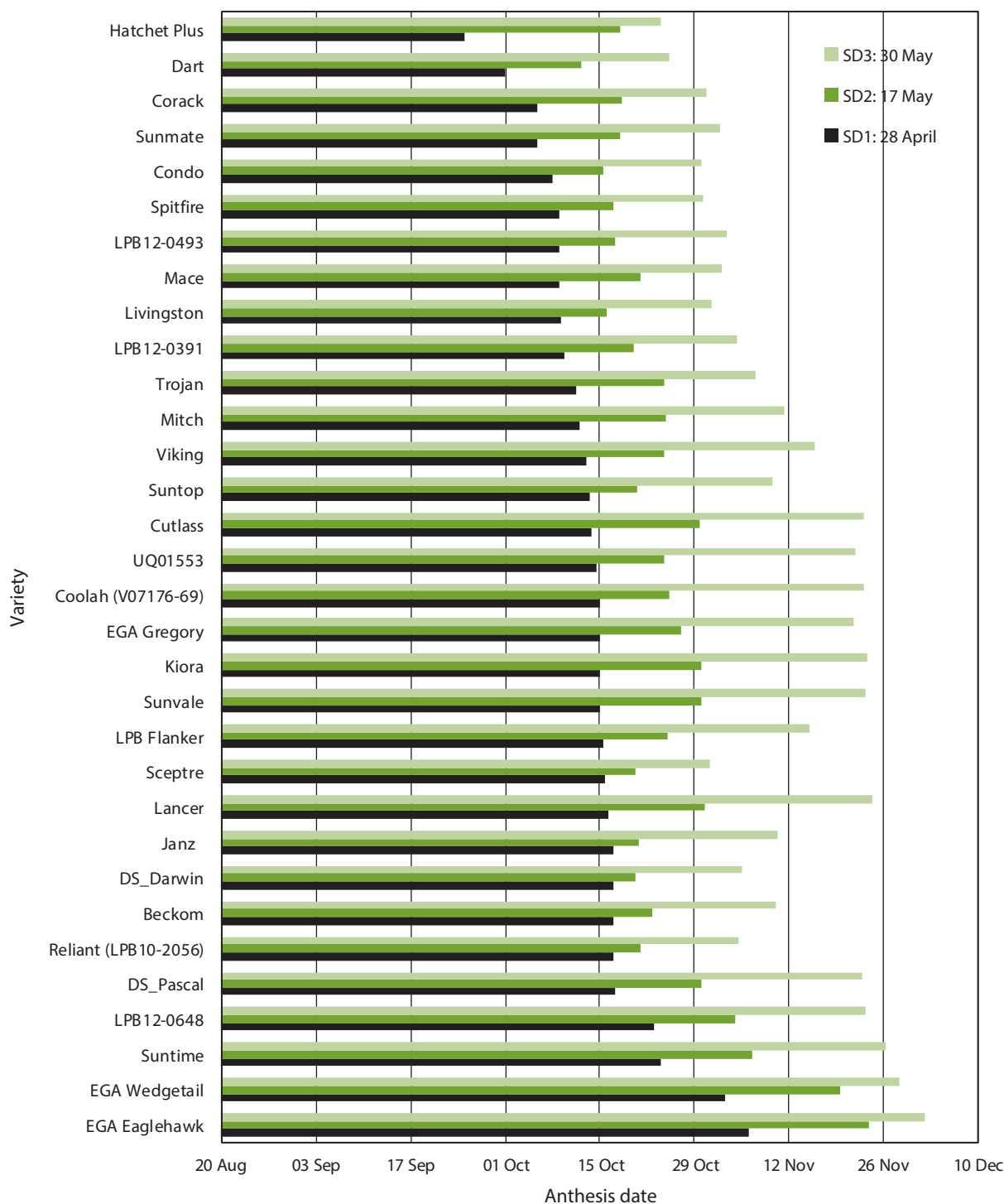


Figure 1. Anthesis (flowering) date of 32 wheat entries from three sowing dates – Trangie 2016
l.s.d ($P < 0.001$) = 1.6 days.

Table 1. Grain yield and protein levels of 32 wheat entries sown on three sowing dates – Trangie 2016
l.s.d. ($P < 0.05$) = 680 kg/ha).

Variety	Yield (t/ha)			Protein (%)		
	SD1 28 Apr	SD2 17 May	SD3 30 Apr	SD1 28 Apr	SD2 17 May	SD3 30 Apr
Beckom	5.54	4.83	4.01	9.4	9.8	9.2
Condo	4.91	4.55	3.38	10.2	10.1	10.5
Coolah	5.21	4.80	3.91	10.1	9.6	10.0
Corack	4.60	4.22	3.59	10.9	11.1	10.5
Cutlass	5.51	4.83	3.96	9.6	9.3	9.6
LRPB Dart	4.15	4.41	3.08	11.4	10.9	10.6
DS Darwin	4.84	4.37	3.17	10.8	10.2	9.9
DS Pascal	4.96	4.48	3.67	9.9	9.0	9.3
EGA Eaglehawk	5.88	4.93	3.78	9.4	9.6	10.1
EGA Gregory	4.83	4.44	3.17	10.2	9.9	10.1
EGA Wedgetail	6.08	4.63	3.54	9.7	9.4	10.4
Hatchet Plus	3.81	4.29	3.15	12.3	10.3	10.9
Janz	4.75	4.32	3.21	10.7	10.3	10.1
Kiora	4.96	4.87	3.51	10.0	9.2	10.0
LRPB Lancer	5.01	4.69	3.43	10.6	10.5	11.2
Livingston	4.22	4.35	2.98	11.2	10.4	10.4
LRPB Flanker	5.36	4.77	3.39	9.9	9.4	9.7
LPB12-0391	4.35	4.36	3.82	10.4	10.0	10.2
LPB12-0493	4.85	4.73	3.56	10.7	9.9	10.1
LPB12-0648	5.43	4.88	3.83	9.7	9.7	10.3
Mace	4.34	4.65	3.73	10.5	10.1	9.8
Mitch	5.03	5.17	4.02	9.0	8.5	8.9
LRPB Reliant	4.69	4.69	3.75	9.9	9.5	9.7
Sceptre	4.80	5.15	3.93	9.5	9.6	9.5
LRPB Spitfire	4.82	4.52	3.52	11.2	10.7	10.9
Sunmate	4.72	4.63	3.81	10.6	9.8	10.1
Suntime	4.94	4.56	3.52	9.5	9.7	10.3
Suntop	4.48	4.53	3.20	10.1	10.0	10.5
Sunvale	4.61	4.53	3.37	10.2	9.7	10.6
Trojan	5.31	5.20	3.68	9.5	9.2	9.7
UQ01553	4.81	4.09	3.39	10.6	10.1	10.6
LRPB Viking	4.83	4.47	3.70	10.6	9.7	9.9
Mean of SD	4.89	4.63	3.56	10.3	9.8	10.1
l.s.d	0.523			1.291		
c.v. (%)	11.6			0.92		

Conclusions

This experiment highlights the potential value of earlier sowing dates in this environment. Averaged across entries, there was a 27% yield decline when sowing was delayed until the end of May (SD3) compared with planting at the end of April (SD1). There was still an average yield decline of 23% when sowing was delayed from mid May (SD2) to the end of May (SD3).

Although the average yield of entries was not significantly different between SD1 and SD2 there were still some large differences for individual entries. EGA Wedgetail[‡] (by 1.45 t/ha), EGA Eaglehawk[‡] (by 0.95 t/ha), UQ01553 (by 0.72 t/ha), Beckom[‡] (by 0.71 t/ha), Cutlass[‡] (by 0.68 t/ha), LRPB Flanker[‡] (by 0.59 t/ha) and LPB12-0648 (by 0.55 t/ha) were all significantly higher yielding at SD1 than at SD2 (Table 1). These are all mid–long season entries, which further highlights the potential value of matching maturity type to planned sowing date to maximise yield potential.

However, results from this sowing date experiment at Trangie in 2016 should be used with caution, as the season was atypically mild, wet and cool during the grain-filling period with few frosts. These conditions produced abnormal yield responses in some longer season varieties such as EGA Wedgetail^o, but still highlights the extra yield potential (generally >1.0 t/ha) of these entries in favourable seasons.

Acknowledgements

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