## F2. Field Pea Forage Production, Yorke Peninsula (Arthurton) and Mid North (Piney), South Australia

**Aim**

To compare grain yield and biomass potential of current and potential field pea varieties.

**Treatments**

Varieties: Table 1
Sowing dates: see Table 2
Biomass cut timings: see Table 2
Fertiliser: MAP + Zn @ 90kg/ha

Table 1: characteristics of lines in forage trials, Arthurton and Pinery 2012

| Variety | Growth Habit | Seed type | Early season vigour | Flowering time | Maturity time |
|---|---|---|---|---|---|
| Kaspa | Semi-dwarf, semi-leafless | "Kaspa type" Dun | High | Late | Mid |
| Morgan | Tall, semi-leafless | Dun | High | Late | Late |
| PBA Hayman | Conventional | White | Moderate | Very Late | Very Late |
| OZP1103 | Conventional | Dun | High | Mid-Late | Mid |

Table 2: sowing dates and biomass cut timings of forage trials, Arthurton and Pinery 2012

| Site | Sowing Date | Cut 1 | Cut 2 | Cut 3 | Cut 4 | Cut 5 |
|---|---|---|---|---|---|---|
| Arthurton | 7-Jun | 7-Aug | 2-Oct | 17-Oct | 26-Oct | 4-Nov |
| Pinery | 27-May | 14-Aug | 20-Sep | 17-Oct | 1-Nov | - |

**Background**

Two breeding lines have been identified for release for suitability to forage (hay/silage) or green/brown manuring. PBA Hayman was released in February 2013 as a late maturing, forage pea, with very high biomass potential but low grain yields. OZP1103 is as a dual purpose forage/grain field pea offering the flexibility of a forage option if grain yield is affected by seasonal stresses such as frost.

This trial aims to compare biomass accumulation and grain yield of these genotypes with current standards, Kaspa (predominant grain yield variety in SA) and Morgan (a dual purpose field pea variety).

**Results and Interpretation**

- Trials were sown late May and early June at the earliest available sowing window as predicted by "Blackspot Manager" to reduced blackspot risk while still maximising biomass production and grain yield potential. Seed was treated with P-Pickel T (active ingredients thiram and thiabendazole) and Apron XL (a.i. metalaxyl) to reduce blackspot and downy mildew infections.
- Flowering is likely to be the ideal time for hay cutting in field pea due to the difficulty of drying down pods, particularly those which have begun filling. No cut was done at this timing, however start flower dates have been marked on Figure 1 and Figure 3 (red checkpoints) which may enable for some extrapolation of data at this timing.

**Arthurton:**

- OZP1103 showed the highest early biomass at Arthurton (measured on August 7th), while there was no difference between the other three varieties at this timing (Figure 1). By early October (Oct 2) OZP1103 still showed greater biomass than all other varieties except Morgan, while Kaspa, Morgan and PBA Hayman performed similarly.
- PBA Hayman was much later to commence flowering than the other varieties (Table 3). Biomass of PBA Hayman at commencement flowering was plotted to be approximately 5.5t/ha,

compared with approximately 1.5-2t/ha in other varieties at this timing (Figure 1, red checkpoints).

- Kaspa was the earliest variety to reach physiological maturity (Table 3), and produced less total biomass than the other four varieties at physiological maturity (Figure 2). Morgan and OZP1103 reached physiological maturity approximately 7 days after Kaspa and had approximately 20% greater biomass than Kaspa.
- PBA Hayman was the last variety to reach physiological maturity, approximately 15 days after Kaspa (Table 3). It produced 36% greater biomass than Kaspa and 13% greater than Morgan/OZP1103 (Figure 2).
- Grain yield of Kaspa and OZP1103 at Arthurton was higher than Morgan and PBA Hayman (Figure 2). PBA Hayman had the lowest grain yield, yielding 45% lower than Kaspa.
- PBA Hayman had the highest total biomass (9.1t/ha) and lowest grain yield, giving it the lowest harvest index at only 20%. Kaspa had the highest grain yield and lowest total biomass, producing a 50% harvest index.

**Pinery:**

- PBA Hayman showed some transient chlorosis (suspected to be iron deficiency) early in the season at this site. Plants recovered and grew away from these symptoms, however early season biomass production of PBA Hayman is likely to have been limited by this factor. This effect was also noted at other sites in SA in 2012 and 2013 where PBA Hayman was grown and work is in progress to identify the exact reason for this effect.
- Kaspa showed significantly greater early biomass (measured August 14th) than the other three lines (Figure 3), which all performed similarly. By late September (September 20) Kaspa and OZP1103 both showed significantly higher biomass than Morgan and PBA Hayman.
- There was less biomass at start of flowering at Pinery (Figure 3, red checkpoints) than at Arthurton, and extrapolated growth curves also show less difference in biomass between the four varieties at this timing.
- PBA Hayman was again later to commence flowering (Table 3) than the other varieties, and yielded approximately 2t/ha compared to approximately 1-1.5t/ha in other varieties (Figure 3).
- Physiological maturity (Table 3) of Kaspa, Morgan and OZP1103 occurred at a similar timing at Pinery, and all showed similar levels of biomass production at this timing. PBA Hayman showed significantly less biomass than the other three varieties at their physiological maturity dates, but it showed greater total biomass than the other three varieties at its physiological maturity date (15 days later than the other varieties).
- Similarly to the findings at Arthurton, grain yield of Kaspa and OZP1103 were higher than Morgan (Figure 4). PBA Hayman was the lowest, yielding line 26% lower than Kaspa.
- PBA Hayman again produced the highest total biomass (Figure 4), yielding over 10t/ha, 40% greater than Kaspa and 70% greater than Morgan. It also had the lowest harvest index (13%).
- Kaspa, Morgan and OZP1103 showed no difference in total biomass accumulation at Pinery.

Table 3: start flower and physiological maturity dates, Arthurton and Pinery forage field pea trials, 2012

| Variety | Arthurton (6 June) | | Pinery (27 May) | |
|---|---|---|---|---|
| | Start Flower | Physiological Maturity | Start Flower | Physiological Maturity |
| Kaspa | 19-Sep | 18-Oct | 9-Sep | 12-Oct |
| Morgan | 20-Sep | 25-Oct | 8-Sep | 15-Oct |
| PBA Hayman | 20-Oct | 2-Nov | 1-Oct | 1-Nov |
| OZP1103 | 20-Sep | 26-Oct | 8-Sep | 17-Oct |

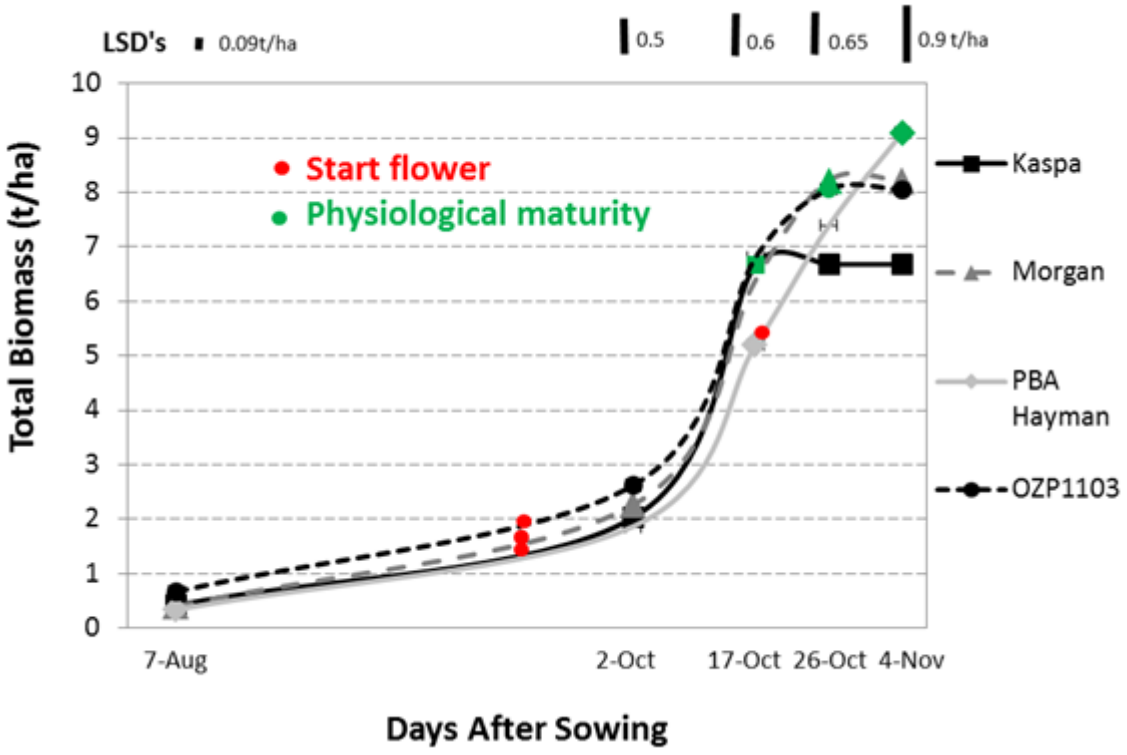



Figure 1: Biomass accumulation of four field pea varieties, showing mid flower and physiological maturity checkpoints, at Arthurton 2012. LSD's are shown as bars above the graph.

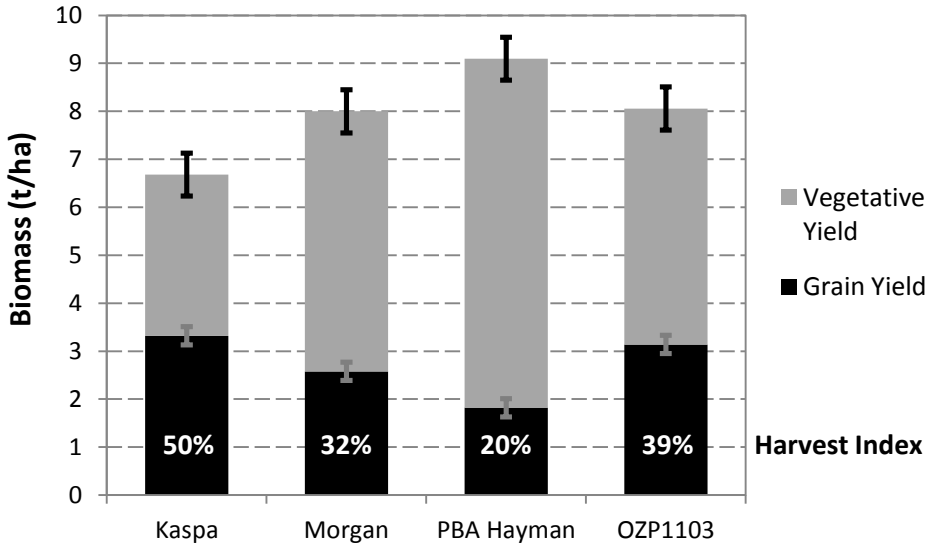
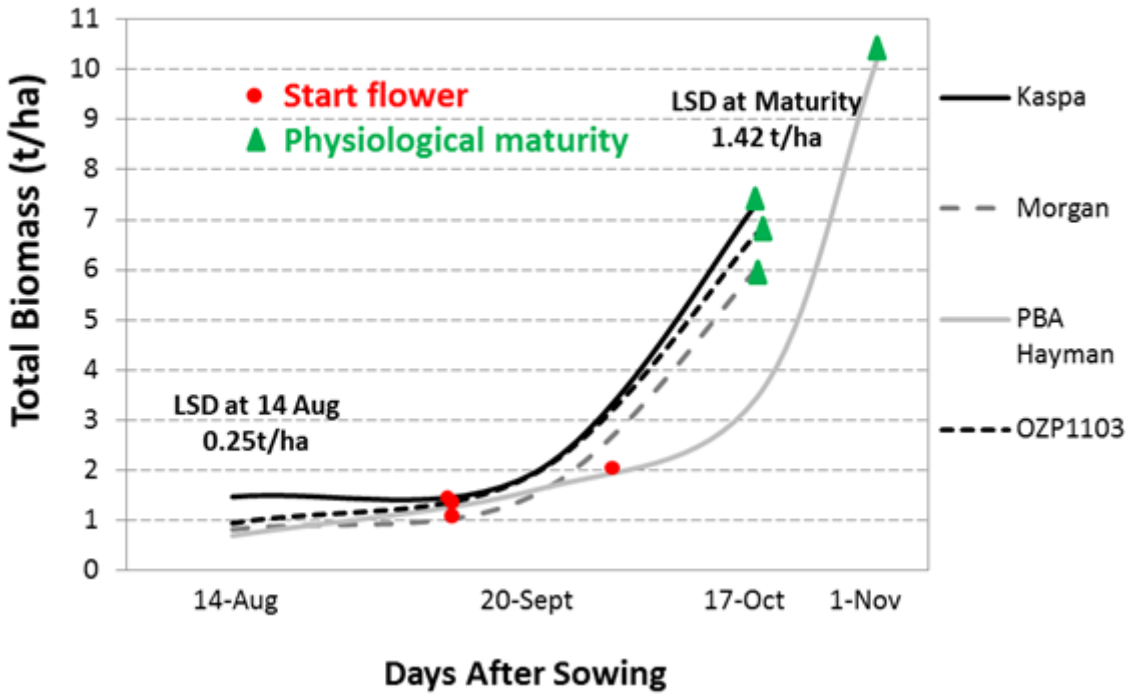



Figure 2: Biomass partitioning (vegetative and grain yield) of four field pea varieties at Arthurton, Yorke Peninsula, 2012.

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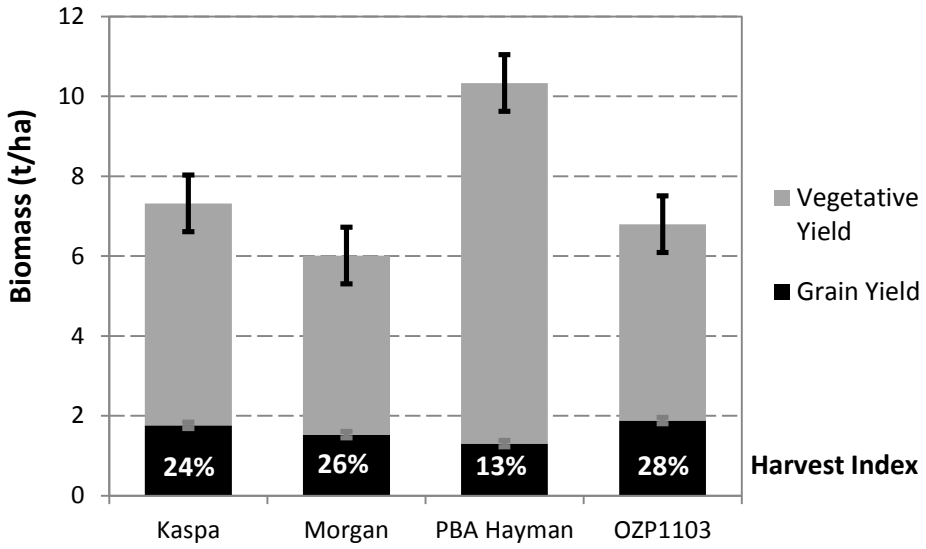


Figure 4: Biomass partitioning (vegetative and grain yield) of four field pea varieties at Pinery, Mid North, 2012.

**Key Findings and Comments**

- The optimum hay cut timing for both maximum biomass production and ease of drying (i.e. before pod set) is likely to be approximately 7-14 days after commencement of flowering.
- Varieties with later flowering and pod set are likely to be better suited to hay production as this allows maximum vegetative growth prior to cutting, and extends hay cut timing into more favourable (warmer and quicker) drying conditions.
- PBA Hayman produced slower early growth than other varieties, but later flowering and maturity timings led to it producing the most biomass at flowering and physiological maturity at both sites. Early growth may have been retarded by transient chlorosis at Pinery.
- Kaspa produced similar biomass to the two dual purpose forage/grain field pea lines (Morgan and OZP1103) at Pinery, but less biomass at Arthurton.

- Kaspa and OZP1103 produced the equal highest grain yield at both sites, while PBA Hayman produced the least at both sites and had the lowest harvest index. These results indicate grain retrieval of PBA Hayman may be difficult in low rainfall areas. In low rainfall environments new seasons seed for sowing may need to be sourced from elsewhere.
- PBA Hayman and OZP1103 offer improvements in biomass potential and biomass/grain yield stability (i.e. risk management), respectively.
- These trials have enabled the development of appropriate management strategies for further forage field pea studies.
- Work funded by SAGIT in 2013 and 2014 will aim to identify optimum management strategies for maximising biomass production of new varieties of forage field peas (eg sowing date, sowing density, disease management). Future work will focus more specifically on flowering/early pod development as an important timing for hay production in field pea.