

### **M3. Brown Manuring- Evaluation of new pulse varieties in a brown manure system and their role in a crop sequence- Wagga Wagga NSW**

#### **Aim**

To compare three time of sowing dates across five newly released and commercial varieties of Field peas, Lupins and Vetch and evaluate their contribution to soil nitrogen and the benefits to the following wheat crop.

#### **Treatments**

Varieties: Field peas - Morgan, PBA Percy and PBA Hayman (OZP902); Vetch – Morava; White Lupin - Rosetta, Narrow leafed lupin - Mandelup.

Sowing Dates: 20 April, 9 May and 2 June 2012

#### **Other Details**

Sowing date: 20 April, 9 May and 2 June

Row Spacings: 30 cm row spacing

Fertiliser: Grain Legume @ 30 kg/ha at sowing.

Plant Density: 50 plants/m<sup>2</sup> for field peas and lupins and 40 plants/m<sup>2</sup> for vetch

Soil Type Red Chromosol (pH<sub>H2O</sub> (0-10cm): 5.2)

#### **Results and interpretation**

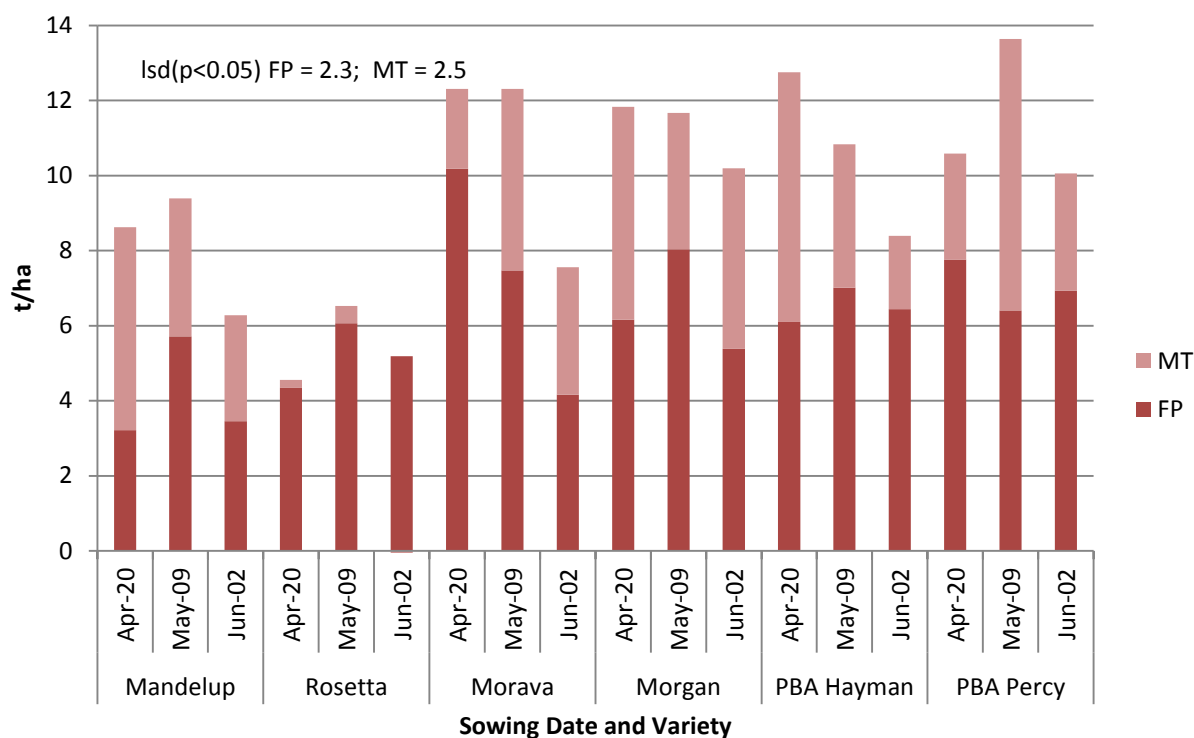
##### *Climate and crop growth*

The 2012 season at Wagga started with high levels of soil moisture after heavy rains in March. This was followed by below average growing season rainfall, average winter temperatures and dry but mild finish during grain fill. Ascochyta and bacterial blight observed particularly in the April 20 sowing of field pea. The plant were able to grow away from the bacterial blight throughout the season.

##### *Biomass*

Biomass cuts were taken at two timings; flat pod stage and physiological maturity. The first timing, at flat pod stage, reflects typical grower practice for brown manuring to control Black oats, while the second measures the total dry matter biomass for each treatment. Biomass cuts were carried out according to each treatment's phenology.

At flat pod, there was a significant interaction between varieties and sowing date. Morava vetch sown early produced 20-70% more biomass than other sowing date and crop treatments (Fig 2.1). However, also showed the greatest reduction in biomass across the three sowing dates. Generally field peas and lupins did not show any trends across the three sowing dates. However, Morgan field pea and Mandelup lupin at the second sowing (9 May) produced greater biomass than the first and third sowing dates. The lower lupin biomass from the first sowing was attributed to grazing by hares.



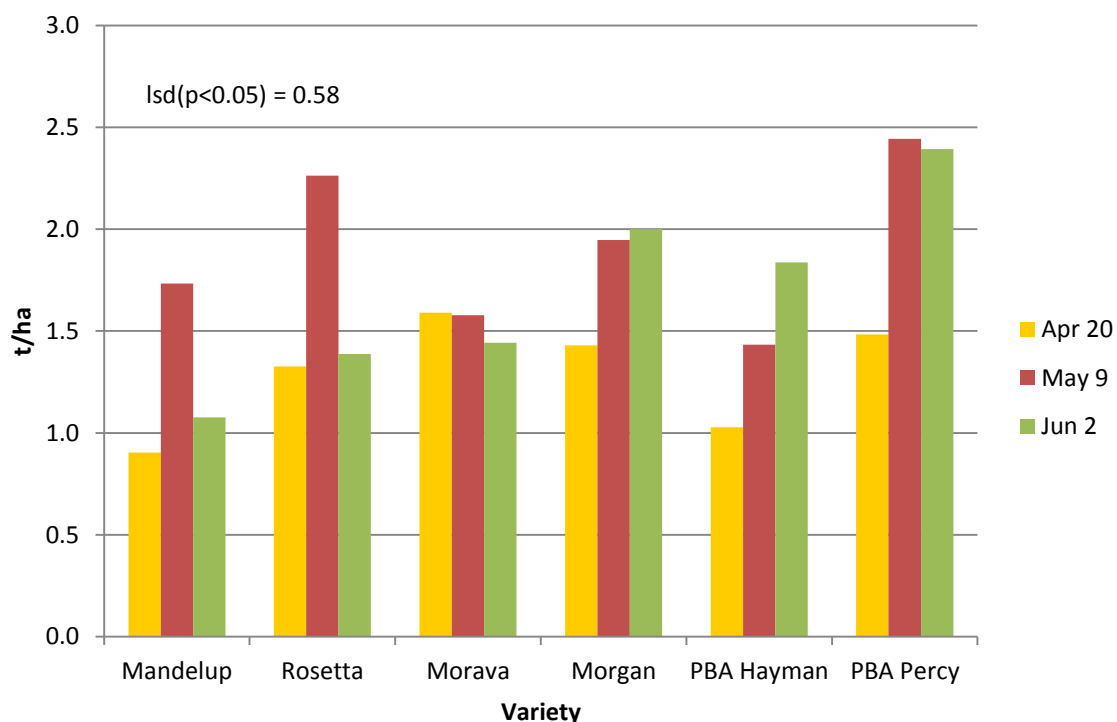
**Figure 2.1. Biomass production at flat pod (fp) and maturity (Mat) of vetch, field pea and lupin varieties sown April 20, May 9 and June 2 at Wagga Wagga, 2012. (\*\*\*)Still working on this – will include lsds and change colours to make it look better)**

At physiological maturity, the main effects of variety, sowing time and the interaction of variety x sowing time were all found to be significant. Typically, later sowing of all species resulted in reduced biomass (Fig 2.1). The highest biomass was achieved by Morava vetch and all field peas sown April 20 and May 9 (except PBA Percy sown April 20). Rosetta white lupins generally had the lowest maturity biomass.

Biomass production between flat pod and physiological maturity varied significantly between the treatments. Rosetta white lupin produced almost no increase in biomass, while all other crops and varieties produced between 2 and 7 t/ha increase in biomass. Generally the earlier April and May sowing dates displayed a greater increase than the June sowing date.

#### *Grain Yield*

PBA Percy, PBA Hayman and Morgan field peas displayed reduced grain yield when sown April 20. This was probably due to the increased disease infection that was observed. Grain yields were very similar for May and June sowing. With both lupins, May sowing had significantly higher yield. At the first sowing, lupin plots were severely grazed by hares, from which they never fully recovered as indicated by the biomass figures. Morava vetch yielded similarly across all sowing dates.



**Figure 2.3. Grain yield of vetch, field pea and lupin varieties sown April 20, May 9 and June 2 at Wagga Wagga, 2012. lsd = 0.29 \*\* (will draw something on graph)**

#### *Key Findings and Comments*

- If early sowing, Morava vetch is the best choice for brown manuring, particularly if brown manuring for early weed control is the objective since early desiccation will preclude any persistence of hard-seeded vetch into subsequent crops. Field peas are the preferred option for later (mid May) sowing for either brown manuring or crop topping
- TOS 1 field peas had disease problems in early winter reducing biomass.
- Lupins produced the least biomass of all crops in this experiment, even when hare damage was not a factor. The poor competitive ability of lupins during early growth would further restrict their biomass production in the presence of weeds.
- At maturity, the best treatments in this trial potentially fixed over 300 kg/ha of N (based on 25kg nitrogen fixed per tonne dry matter). The highest grain yields of 2.5 t/ha of grain represents the export of approximately 80kg of N, leaving a residual of over 200kg of N.