2015 SUMMARY
Highlights of Farming Systems Research

"To promote and develop economic and environmentally sustainable agriculture through research, planning, monitoring and demonstrating best practice."
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WHY DO THE TRIAL?

• Evaluate crown rot inoculum levels following different rotations (wheat or lupin or chemical fallow) and the effect of these inoculum levels on crown rot infection and grain yield of the following wheat crop (2015).

• Evaluate the effect of inter-row sowing on crown rot infection and grain yield.

KEY MESSAGES:

• Rotation with non-host crops such as lupin or chemical fallow can reduce soilborne crown rot inoculum compared to host crops such as wheat (Figure 1).

• Wheat sown on row had significantly greater incidence of crown rot following wheat than lupin (Table 1).

• Significantly lower levels of crown rot inoculum are present between rows than within rows (Figure 1).

• Environment plays a key part in the impact of the disease on yield.

Figure 1. Inoculum levels of crown rot (Fusarium pseudograminearum log (pg DNA/ g soil)) in soil samples collected in March 2015 from on and off the crop rows of 2014 wheat (varieties Mace and Emu Rock), lupin (variety Mandelup) and a chemical fallow (sown without seed). The inoculum level of soil collected in May 2014 from each plot is indicated by the horizontal line. Lines on bars are ± standard errors of the mean.
Table 1. Crown rot incidence and grain yield of wheat (Mace; 2015 crop) sown on and off the previous year’s row of wheat (Mace or Emu Rock), lupin (Mandelup) and a chemical fallow (sown without seed).

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</thead>
<tbody>
<tr>
<td>Wheat (Mace)</td>
<td>On-row</td>
<td>53 c</td>
<td>2.8 b</td>
<td>0.05</td>
<td>&lt;0.001</td>
<td>0.04</td>
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<tr>
<td></td>
<td>Off-row</td>
<td>52 c</td>
<td>2.9</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Wheat (Emu Rock)</td>
<td>On-row</td>
<td>58 c</td>
<td>2.9 b</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Off-row</td>
<td>31 ab</td>
<td>2.8</td>
<td></td>
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<tr>
<td>Lupin (Mandelup)</td>
<td>On-row</td>
<td>27 a</td>
<td>2.8 b</td>
<td></td>
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<tr>
<td></td>
<td>Off-row</td>
<td>39 abc</td>
<td>2.6</td>
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<tr>
<td>Chemical fallow</td>
<td>On-row</td>
<td>45 abc</td>
<td>2.3 a</td>
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<tr>
<td></td>
<td>Off-row</td>
<td>46 bc</td>
<td>2.4</td>
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1. Treatments that do not share a common letter are significantly different according to the protected Fisher’s Least Significant Difference Test at P = 0.05.
2. Since only the 2014 treatment was significant and not the interaction, Fisher’s Least Significant Different Test is presented only for this treatment.

COMMENTS:
Both wheat varieties significantly increased the inoculum level of crown rot from the DNA level in 2014 compared to lupin and the chemical fallow (Figure 1). The 2014 pre-sow level is considered a low risk level (0.6 - 2.0 F. pseudograminearum log (pg DNA/ g soil)), but by seasons end both Mace and Emu Rock had increased inoculum levels to high risk (≥2.5 F. pseudograminearum log (pg DNA/ g soil)).

Incidence of crown rot infection in 2015 ranged from 27 to 58% with plots following both wheat varieties having a significant two-fold increase in infection compared to plots following lupin sown on the row (Table 1). The effect of chemical fallow was not significantly different when compared to wheat. The trial did have a small amount of grass weeds present in 2014 and this may have contributed to the increased crown rot infection in the fallow plots. Sowing off the row appeared to be variable in impact on disease incidence and this may have been due to the row spacing being too close for consistent inter-row sowing.

Overall, the severity of infection, how far the disease grew up the stem, was low ranging from 0.3 to 0.8 on a scale of 0 to 3 with 3 as the most severe level of disease. The low severity is reflected in the grain yields which do not show any response to the high levels of inoculum present at the start of 2015 or the relatively high incidence of crown rot infection. Only the fallow treatment had significantly lower yield, which is likely a response to changes in the moisture/nutrition components compared to the cropped areas of the trial.

Environment plays a key part in the infection, expression and impact of crown rot. Limiting soil moisture during flowering and into grain fill can exacerbate the severity of the disease and expression of white heads. These conditions were not experienced at the field trial in 2015.

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