Rhizoctonia solani (AG8):
Surviving the summer after various winter crops

Introduction
Rhizoctonia bare-patch (R. solani AG-8) is a major impediment to cereal growers in Western Australia (WA) costing the wheat and barley industry an estimated $27M annually (Murray and Brennan, 2009, 2010). Current management practices recommended to minimise the impacts of this disease are combinations of, cultivation with a fungicide seed-dressing and adequate nutrition.

In South Australia (SA) it has been shown that canola and other non-grasses can reduce the inoculum level of R. solani following cereals and thus, are effective break crops (Gupta et al., 2012). Additionally, they found that summer and autumn rainfall events, in the absence of weeds, can also reduce the inoculum from high to a lower disease risk level. These effects on inoculum levels have yet to be demonstrated in WA. The aim was to test the effect of crop rotation on survival of R. solani inoculum in a 2-year trial. The effect of summer and autumn rainfall on inoculum under various crops was also tested.

Methods
In the first year (2011), plots of 40m x 1.5m were barley, wheat, canola and chemical fallow, and in the second year (2012), all plots were barley with treatments of in-furrow fungicide injection, Dividend® seed dressing, or cultivation 10 cm below the seed. Dates of sowing and harvest in 2011 were 27 June and 16 Dec., and in 2012, 14 June and 23 Nov., respectively. The DNA present in the soil using PreDicta-B was determined in soil samples collected from all plots prior to sowing, at anthesis, and periodically during the summer and autumn months during both years. No crops were sown on the plots over summer. In 2011 summer, weeds were sprayed out, while in 2012, weeds were not sprayed.

Results
Both cereal crops significantly increased the inoculum level of R. solani between the pre-sow and the anthesis soil sample in 2011 (Fig. 1). Inoculum levels in cereals continued to be significantly higher over summer 2012 compared with those for the canola and fallow plots. In January 2012, all inoculum levels began to decline and a significant (P < 0.0001) decline was associated with 13 mm rain 10 days prior to sampling on 13 February of canola plots, and 11 mm rain 7 days prior to sampling on 5 June 2012 for barley and wheat plots. At the pre-sow, sampling, in early June 2012, barley plots were still significantly higher compared to canola, fallow and wheat plots.

In 2012, none of the treatments (in-furrow fungicide injection, Dividend® seed dressing, or cultivation 10 cm below the seed) had a significant impact on soil DNA levels although they did effect disease expression (not presented here), and so data was combined for analysis of the effect of the 2011 crops. But the 2011 treatments continued to significantly influence the inoculum (DNA) levels until early autumn 2013 (12 March), with 2011 barley plots, and in some cases wheat plots, having significantly higher inoculum levels than 2011 canola or fallow plots (Fig. 1).

Conclusion
• A break crop of canola or a chemical fallow may reduce R. solani inoculum levels and reduce disease in the following cereal crop.
• In fields with high levels of R. solani inoculum it is recommended that a crop other than barley or wheat is sown.
• Summer or autumn rainfall events (>11 mm), in the absence of weeds, can reduce the R. solani inoculum levels.
• Weeds in autumn can increase R. solani inoculum levels.

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References
• Gupta V. et al. (2012), Rhizoctonia Fact Sheet. GRDC, ACT, Australia.

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