Rhizoctonia and Crown Rot status of Western Australian paddocks can be managed with crop rotation

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Why worry about Crown rot and Rhizoctonia?

- 60% of paddocks cropped are wheat (Harries et al 2015)
- 12% are Canola and Pasture
- 6% are Lupins and Barley

- Wheat Wheat Wheat was the rotation in 23% in the Northern Agricultural Region!

- Wheat Wheat was the rotation in 61% of paddocks in the NAR!
Distribution of Rhizoctonia (DNA and Visual Score) in wheat
Visual Score vs DNA - Rhizoctonia

![Graph showing the relationship between Visual Score and Log DNA Rhizoctonia]
Trends in Rhizoctonia (all paddocks)

Rhizoctonia Ratings

Visual Score

2010 2011 2012 2013

Rhizoctonia DNA (log)

log DNA

2010 2011 2012 2013
Predicting Rhizoctonia DNA at anthesis (wheat)

Sowing log DNA < 0.35

Facey, Liebe Mig, Wantfa, WMG, Yuna

FBG, NSPG

0.45 (DNA)
102 paddocks

Sowing log DNA > 0.35

Holt Rock, Liebe, Mig, NSPG, Wantfa

Facey, FBG, WMG, Yuna

1.2
51 paddocks

1.7 (DNA)
6 paddocks

2.2
22 paddocks
What causes increase in Rhizoctonia from 1 year to the next (2013 to 2012)

Barley, Oats and Wheat grown in 2012 Rhizoctonia declined by 0.37 units in 2013, when break crops grown.

All other crops and pastures in 2012 resulted in an increase 0.36 units of Rhizoctonia in 2013 when cereals were grown.

One interpretation is that break crops are lowering the Rhizoctonia in season by anthesis (or indeterminate crops version of anthesis)

Implication - break crops bring about a decline in Rhizoc (~ 0.7 units) relative to cereals.

Summary correlations with soil type and nutrients, implying soil processes and biology do matter.
Distribution of Crown Rot DNA (log) and Visual Score in wheat

- **Log Crown Rot DNA**
  - Frequency
  - **0.0**  0.5  1.0  1.5  2.0  2.5  3.0
  - 0 50 100 150 200 250

- **Visual Crown Rot Score**
  - Frequency
  - 0 20 40 60 80
  - 0 50 100 150 200 250 300
Trends in Crown Rot (all paddocks)

Crown Rot Ratings

Crown Rot DNA (log)

Visual Score

0 2 4 6 8 10 14

2010 2011 2012 2013

log DNA

0.0 0.2 0.4 0.6 0.8 1.0

2010 2011 2012 2013
Predicting Crown Rot DNA at anthesis

Sowing Cr DNA < 0.4

- 0.06
- 120 paddocks

Sowing Cr DNA > 0.4

- N < 15 kg/ha
  - 2.3
  - 6 paddocks

- N > 15 kg/ha
  - 0.67
  - Facey, Liebe, Mig Wantfa
    - 23 paddocks
  - 1.65
  - FBG, NSPG
    - 10 paddocks
Cause of Crown Rot increase from 1 year to the next.

• 2012 landuse = canola, lupin, pasture decrease of 0.15 in 2013

• 2012 landuse = wheat and barley, increase of 0.22 in 2013

• Opposite signal to Rhizoctonia.

• Differences may not materialise as quickly as Rhizoctonia, ie a breakdown of crown rot does not happen by anthesis.

• Sampling regimes need work.

• Similar correlations with nutrients and soil type.

• Very few data to work with
Double break crop effect on wheat yield in low rainfall environments
Conclusions

• Diseases are an emerging problem in systems dominated by wheat.

• This mimics problems emerging in SA and Victoria

• Result of an over reliance on wheat, corrected by rotation

• Survey data need to be augmented with experiments located on disease affected paddocks, to evaluate practical management strategies.

• Sampling strategies of surveys and of crown rot need refining