Sustainability of continuous wheat sequences in relation to crown rot in the low rainfall Eastern Wheatbelt

GRDC UPDATES

Department of Primary Industries and Regional Development

GOVERNMENT OF WESTERN AUSTRALIA

GRDC GRAINS RESEARCH & DEVELOPMENT CORPORATION

Bob French[A] and Shahajahan Miyan[B]
DPIRD
[A]Merredin and [B]Northam

GRDC UPDATES

Department of Primary Industries and Regional Development
GOVERNMENT OF WESTERN AUSTRALIA

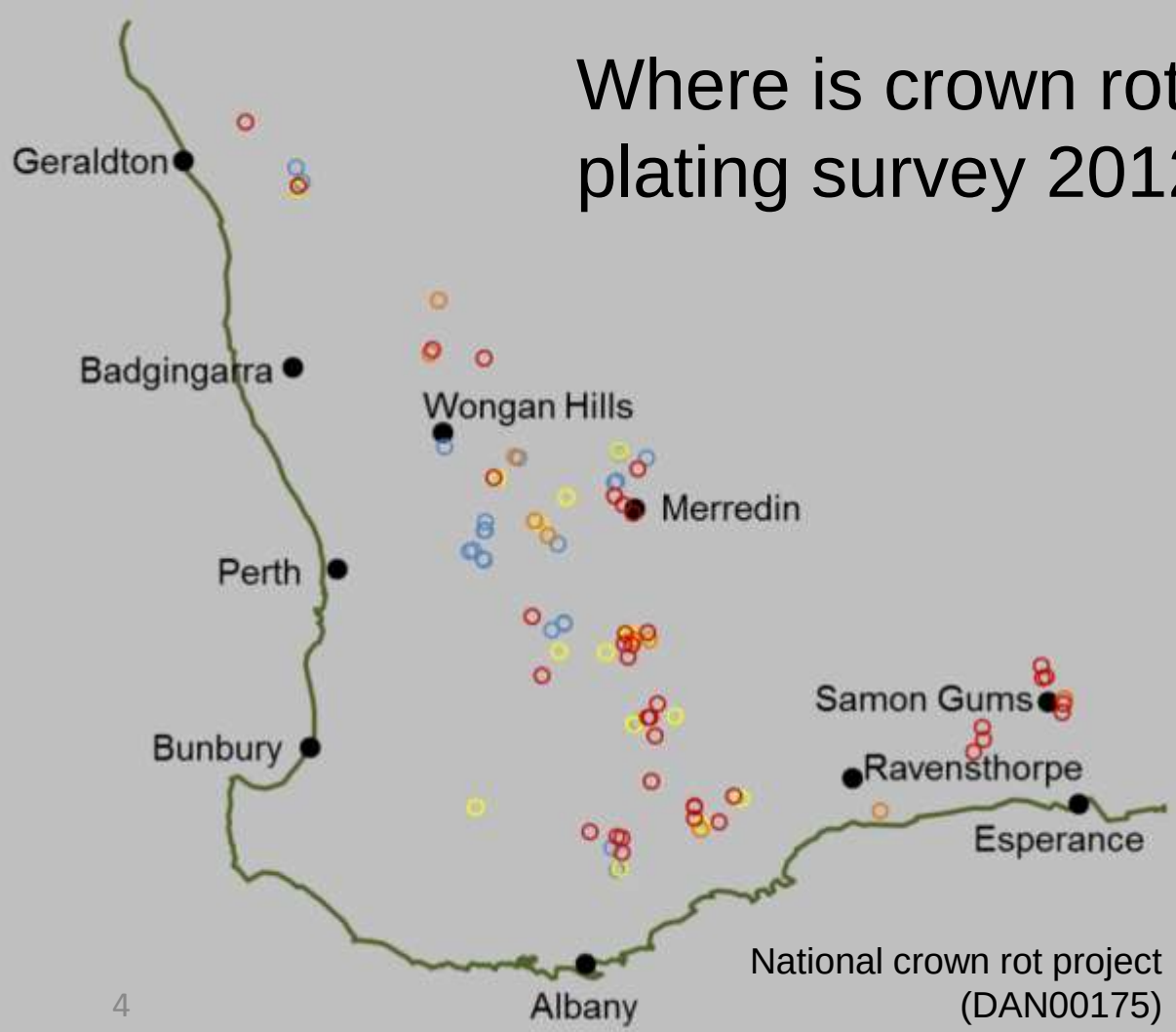
GRDC
GRAINS RESEARCH & DEVELOPMENT CORPORATION

BACKGROUND

- Wheat after wheat is common in WA, especially in low rainfall areas and on loamy soils
- This is despite the well known benefits of break crops for system sustainability
- Can management of continuous wheat prolong system sustainability?

GOVERNMENT OF WESTERN AUSTRALIA
Department of Primary Industries and Regional Development
GRDC UPDATES

Where is crown rot in WA? – Stubble plating survey 2012-2013



Crown rot incidence in paddocks:

- Nil (0-2%)
- Low (3-10%)
- Medium (11-24%)
- High (>25%)

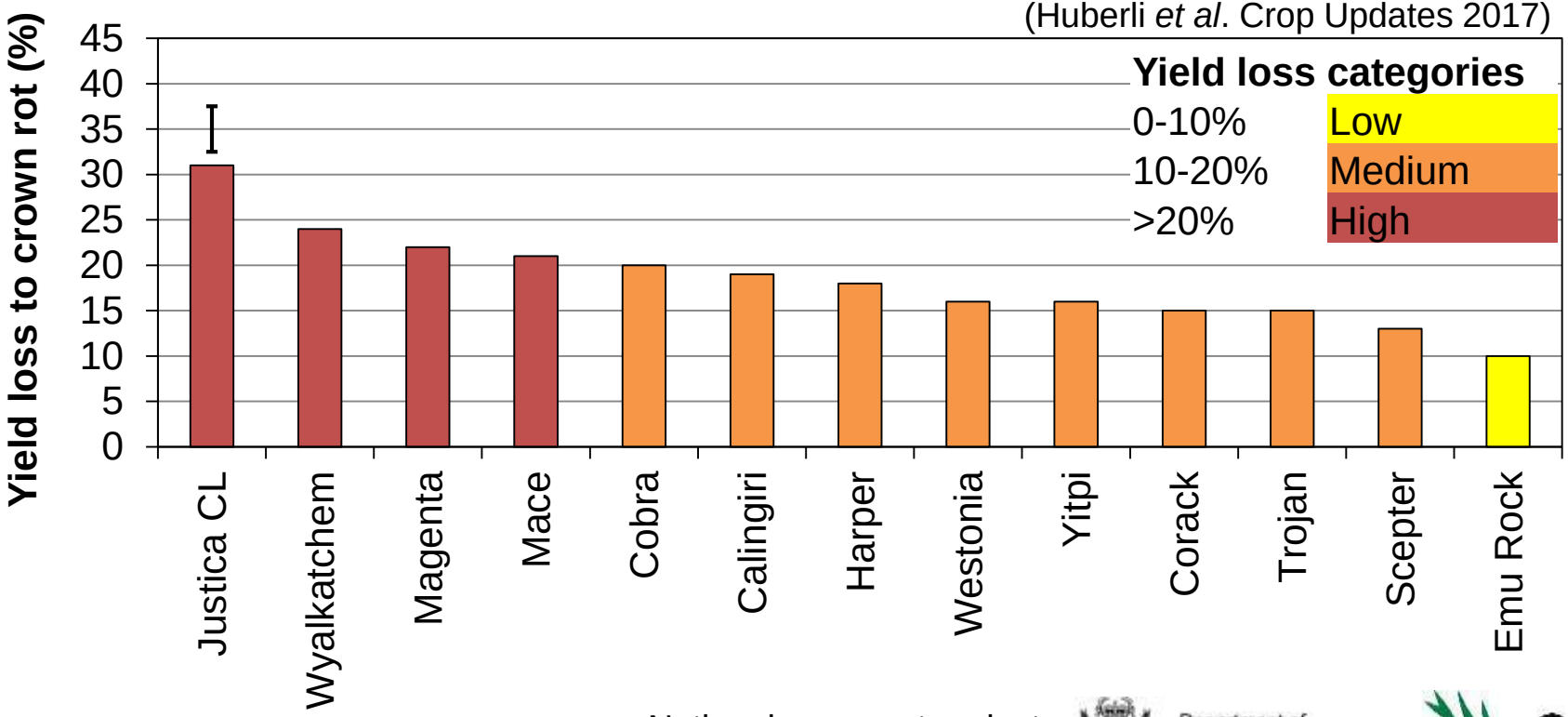
National crown rot project (DAN00175)

Department of Primary Industries and Regional Development
GOVERNMENT OF WESTERN AUSTRALIA

GRDC UPDATES

Wheat yield loss – met-analysis 2014-2016

(Huberli *et al*. Crop Updates 2017)



National crown rot project
(DAN00175)

Department of Primary Industries and Regional Development

GOVERNMENT OF WESTERN AUSTRALIA

GRDC UPDATES

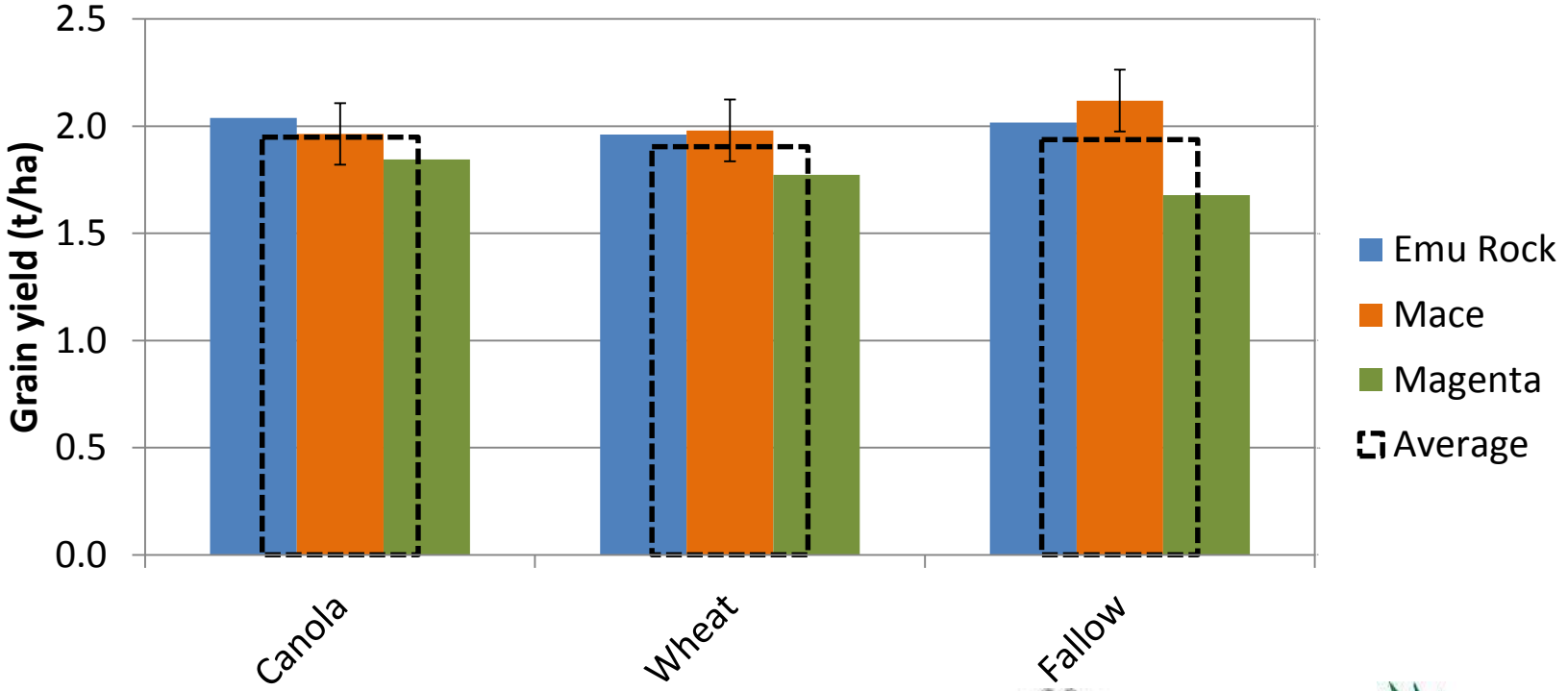
TRIAL DESIGN

Six sequences

2015	2016	2017	2018
Wheat	Wheat	**Wheat**	Wheat
Canola	Wheat	**Wheat**	Wheat
Fallow	Wheat	**Wheat**	Wheat
Fallow	Canola	**Wheat**	Wheat
Canola	Fallow	**Wheat**	Wheat
Wheat	Fallow	Canola	Wheat

Department of Primary Industries and Regional Development
GOVERNMENT OF WESTERN AUSTRALIA
GRDC UPDATES

Previous crop did not affect wheat yield in 2016

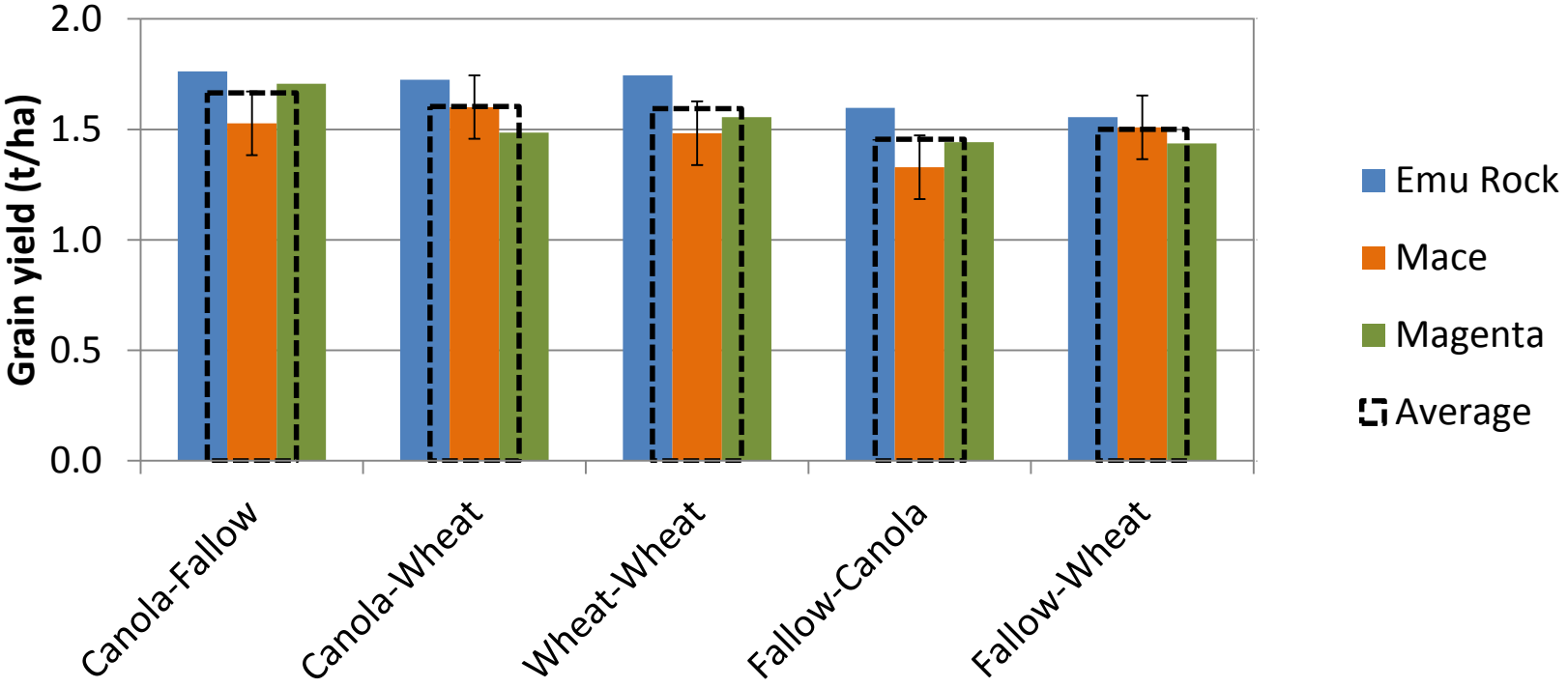


Department of Primary Industries and Regional Development

GOVERNMENT OF WESTERN AUSTRALIA

GRDC UPDATES

Sequence did not affect wheat yield in 2017



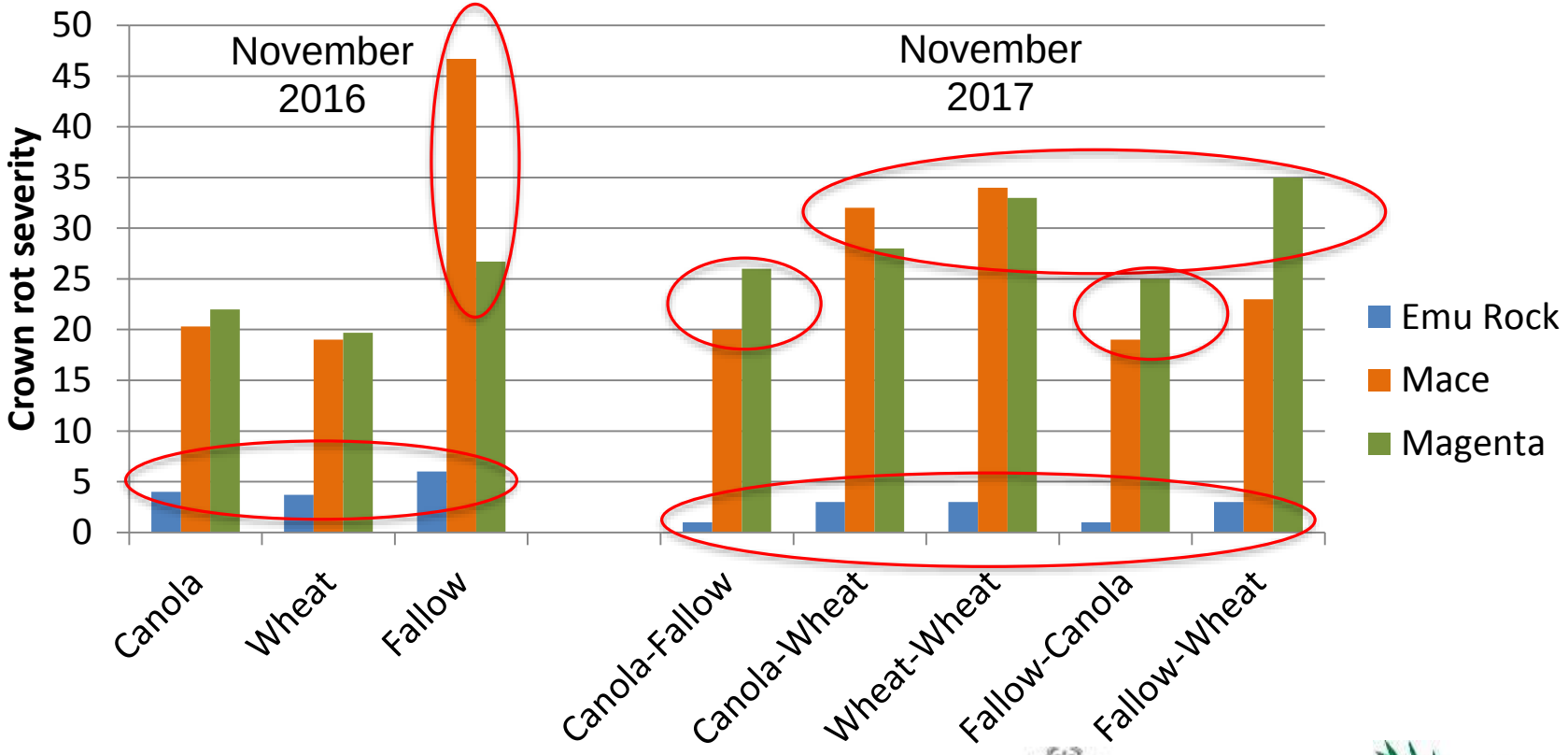
Initial crown rot levels were high

- In 2015 crown rot organism isolated from ~12% of crowns remaining from 2014*
- Predicta B: high levels of crown rot DNA in soil, low or nil levels of other soil borne diseases

* GRDC National Crown Rot Project (DAN00175)

Crown rot expression

Sequence and cultivar both affect crown rot severity

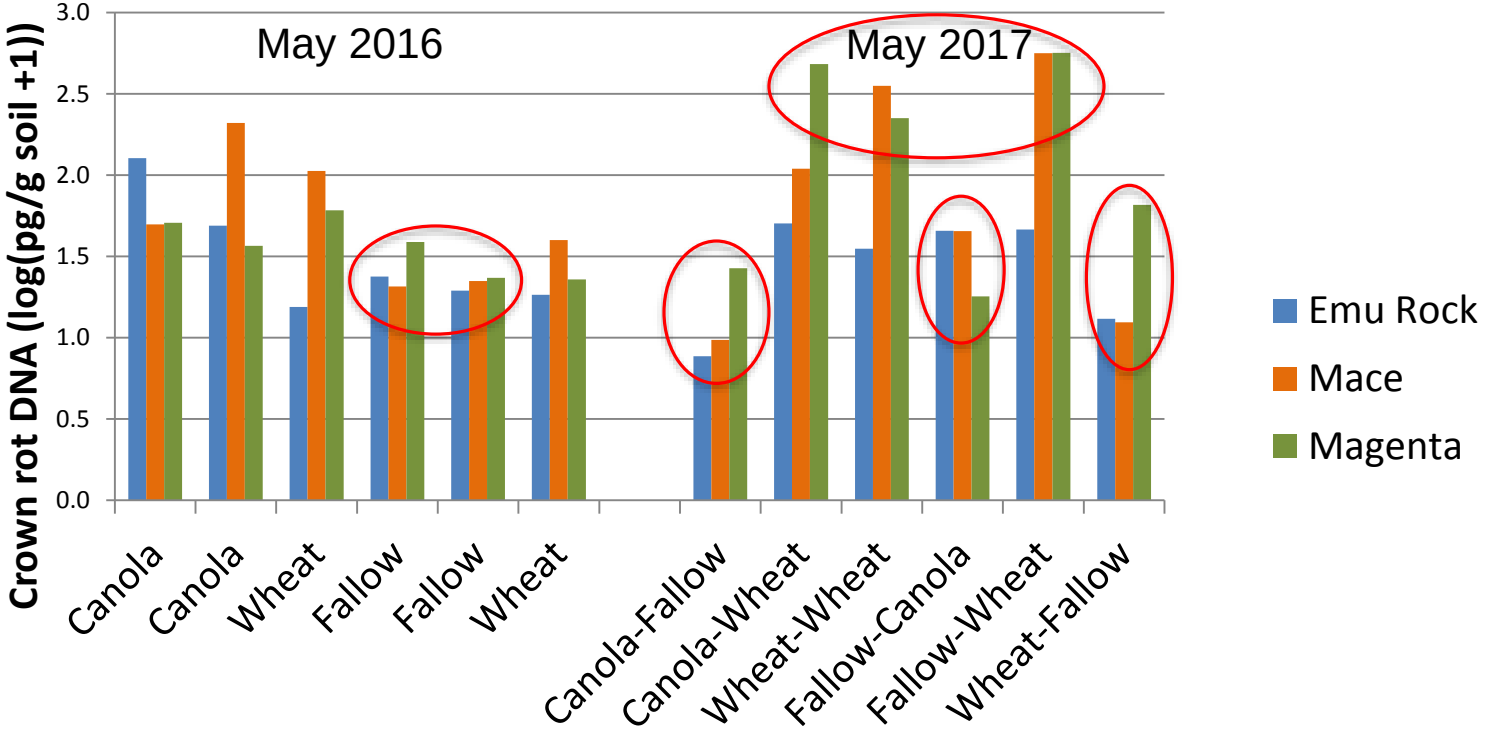


Department of Primary Industries and Regional Development

GOVERNMENT OF WESTERN AUSTRALIA

GRDC UPDATES

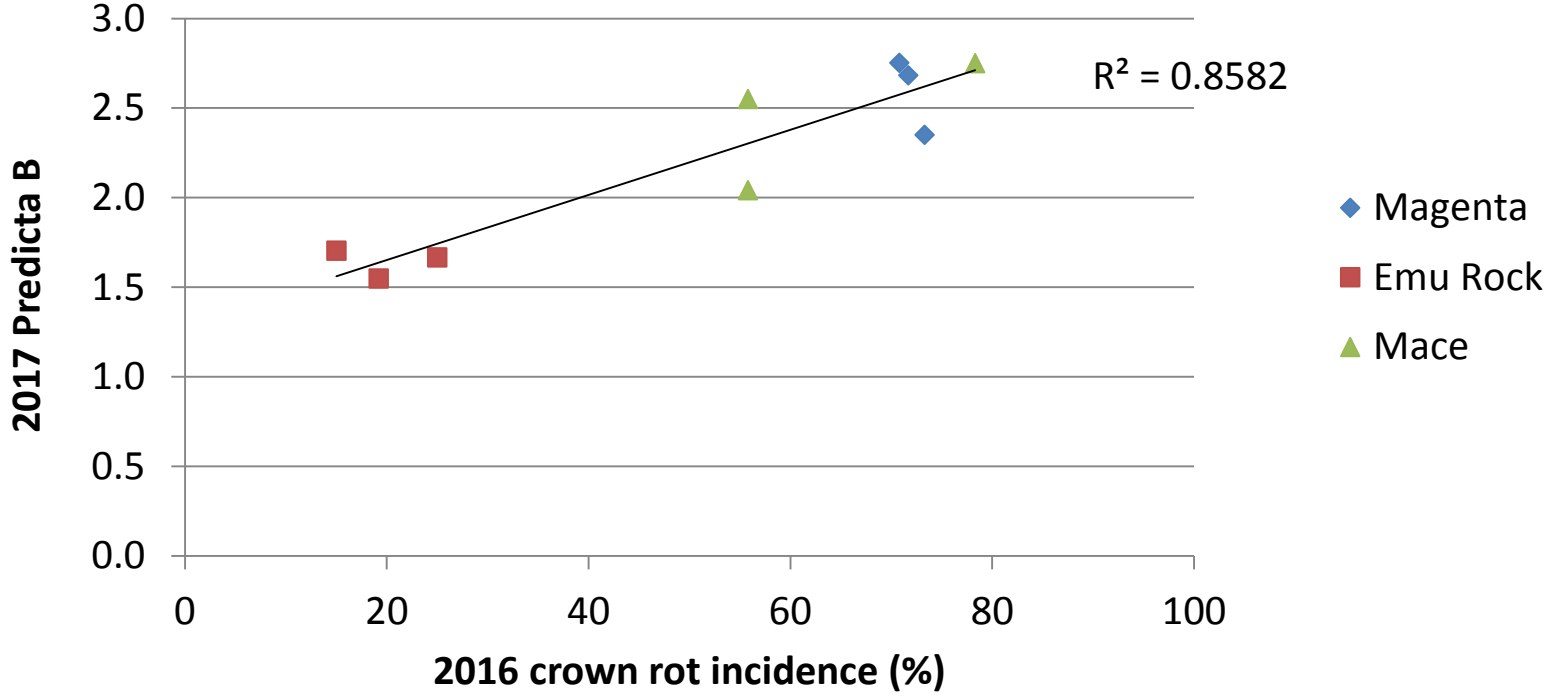
Sequence and cultivar both affect soil crown rot DNA levels



Department of Primary Industries and Regional Development
GOVERNMENT OF WESTERN AUSTRALIA

GRDC UPDATES

Soil DNA levels are related to crown rot severity in previous year



Department of Primary Industries and Regional Development
GOVERNMENT OF WESTERN AUSTRALIA
GRDC UPDATES

Sequence and crop competitiveness affect ryegrass head numbers

Me m² in October

	2015	2016	2017
All cropped plots	18		
Fallow	<1	<1	<1
Canola		14	
Wheat after wheat		2	9
Wheat after canola			20
Emu Rock – cont. wheat			45
Emu Rock – after canola			54

Department of Primary Industries and Regional Development

GOVERNMENT OF WESTERN AUSTRALIA

GRDC UPDATES

CONCLUSIONS

- Continuous wheat can be sustainable for at least 4 years on a loamy soil with a crown rot background

- Emu Rock has lower crown rot expression than Mace or Magenta and lower inoculum carry-over to the following season.

- Competitive crops are crucial in preventing weed blowouts

Thank you

DPIRD Merredin Research Facility staff for managing trial
Shahajahan Miyan
Bruce Haig
Julia Tilli
GRDC co-invested in this work as part of project DAW00249 (Tactical Wheat Agronomy in Western Australia)

Grains Research and Development Corporation (GRDC)
A Level 4, East Building, 4 National Circuit, Barton, ACT 2600 Australia
P PO Box 5367 Kingston, ACT 2604 Australia
T +61 2 6166 4500
F +61 2 6166 4599
www.grdc.com.au

@thegrdc @GRDCWest #GRDCUpdates

Department of Primary Industries and Regional Development
GOVERNMENT OF WESTERN AUSTRALIA

GRDC UPDATES