TEN YEARS OF DIFFERENT CROP ROTATIONS –
WHAT HAPPENED TO PLANT DISEASES AND NEMATODE PESTS?

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ACKNOWLEDGEMENTS

- GRDC Project number UWA00174
- SARDI for the PREDICTA®B

AIM

Understand the effects of crop rotation and residue management on the soil, crop production and **disease/nematodes** under a no-till system

METHODS

- Cunderdin College of Agriculture
- Red sandy clay loam
- Plots 36 m x 80 m
- 5 rotations (3-crop phases)
- 3 replications

ROTATIONS

Year	Cereal	Diverse	Farmer	Monoculture	Pasture
1	Cereal	Wheat	Wheat	Wheat	Pasture
2	Cereal	Legume	Barley	Wheat	Pasture
3	Cereal	Canola	Legume or fallow	Wheat	Pasture

Year	Cereal
2007	Oat CC
2008	Barley
2009	Barley
2010	Wheat
2011	Wheat
2012	Barley
2013	Wheat
2014	Wheat
2015	Barley
2016	Wheat
2017	Wheat
2018	Barley

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Year	Cereal	Diverse
2007	Oat CC	Wheat
2008	Barley	Vetch CC
2009	Barley	Canola
2010	Wheat	Wheat
2011	Wheat	Field pea
2012	Barley	Canola
2013	Wheat	Wheat
2014	Wheat	Chickpea
2015	Barley	Canola
2016	Wheat	Wheat
2017	Wheat	Lupin (albus)
2018	Barley	Canola

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Year	Cereal	Diverse	Farmer
2007	Oat CC	Wheat	Wheat
2008	Barley	Vetch CC	Barley
2009	Barley	Canola	Lupin
2010	Wheat	Wheat	Wheat
2011	Wheat	Field pea	Barley
2012	Barley	Canola	Field pea
2013	Wheat	Wheat	Wheat
2014	Wheat	Chickpea	Barley
2015	Barley	Canola	Fallow
2016	Wheat	Wheat	Wheat
2017	Wheat	Lupin (albus)	Barley
2018	Barley	Canola	Fallow

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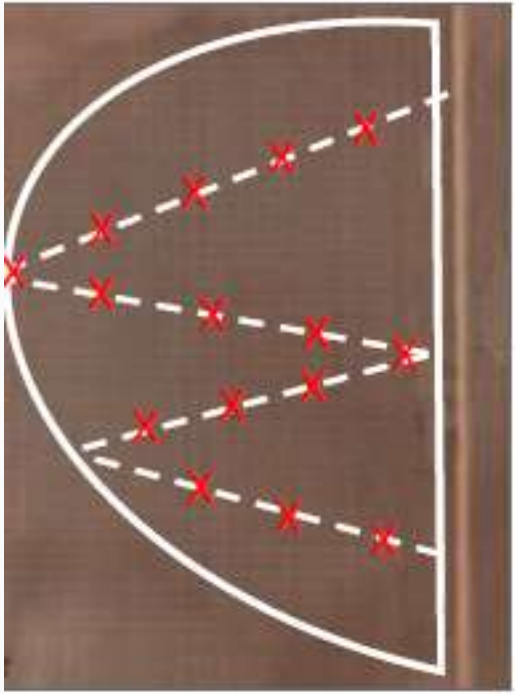
Year	Cereal	Diverse	Farmer	Monoculture	Pasture
2007	Oat CC	Wheat	Wheat	Wheat	Pasture
2008	Barley	Vetch CC	Barley	Wheat	Pasture
2009	Barley	Canola	Lupin	Wheat	Pasture
2010	Wheat	Wheat	Wheat	Wheat	Pasture
2011	Wheat	Field pea	Barley	Wheat	Pasture
2012	Barley	Canola	Field pea	Wheat	Pasture
2013	Wheat	Wheat	Wheat	Wheat	Pasture
2014	Wheat	Chickpea	Barley	Wheat	Pasture
2015	Barley	Canola	Fallow	Wheat	Pasture
2016	Wheat	Wheat	Wheat	Wheat	Pasture
2017	Wheat	Lupin (albus)	Barley	Wheat	Pasture
2018	Barley	Canola	Fallow	Wheat	Pasture

PLOTS SPLIT FOR RESIDUE MANAGEMENT IN 2010

RESEARCH HYPOTHESIS

Disease and nematode levels would be increased by cereal rotation and wheat monoculture compared with the diverse and farmer rotations

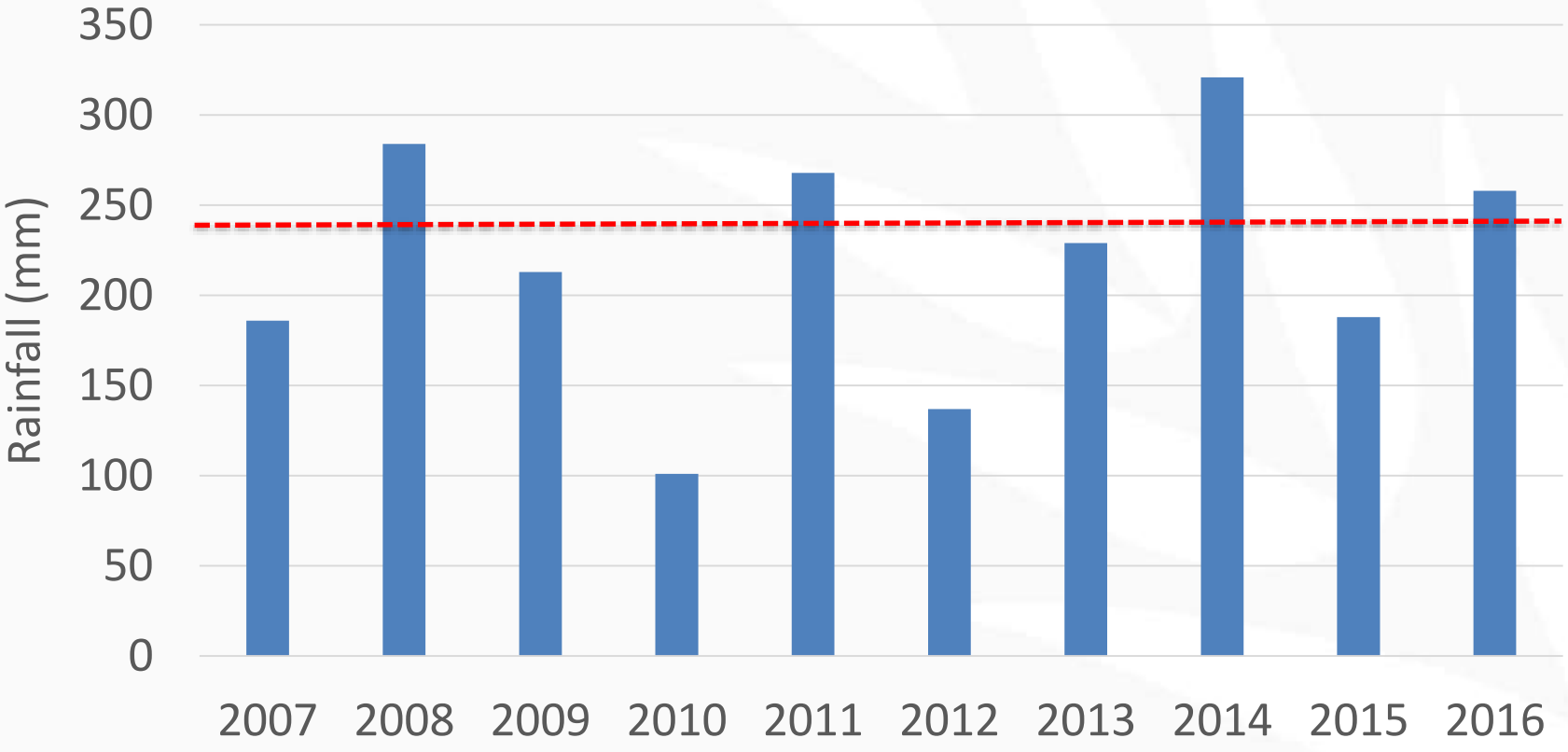
METHODS - PREDICTA®B



METHODS - 2016

- Pre-seeding soil cores to 10 cm (soil)
- In-crop samples at stem elongation (soil/rhizosphere and root samples)

GROWING SEASON RAINFALL



RESULTS

- Windrow burning had little effect on leaf, root or soil cereal disease levels

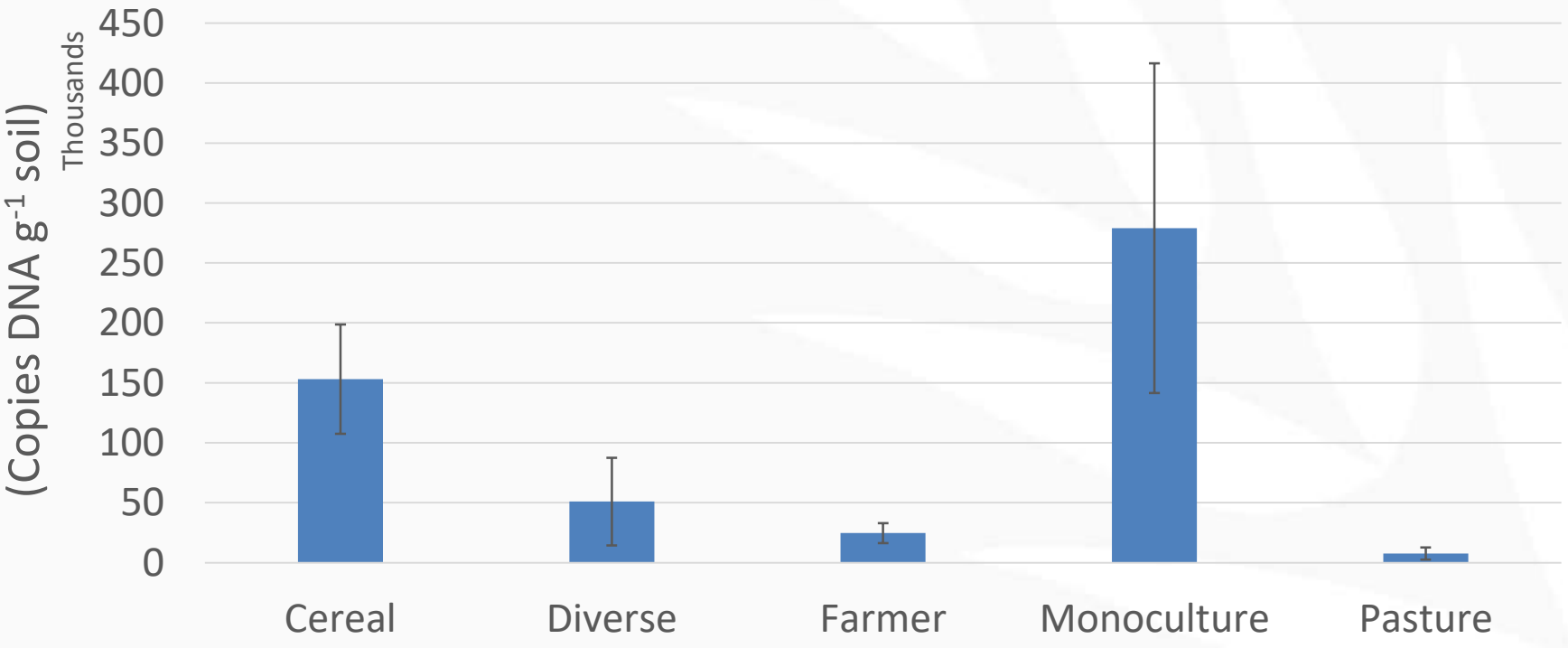
RESULTS

Effect of overall rotation treatments

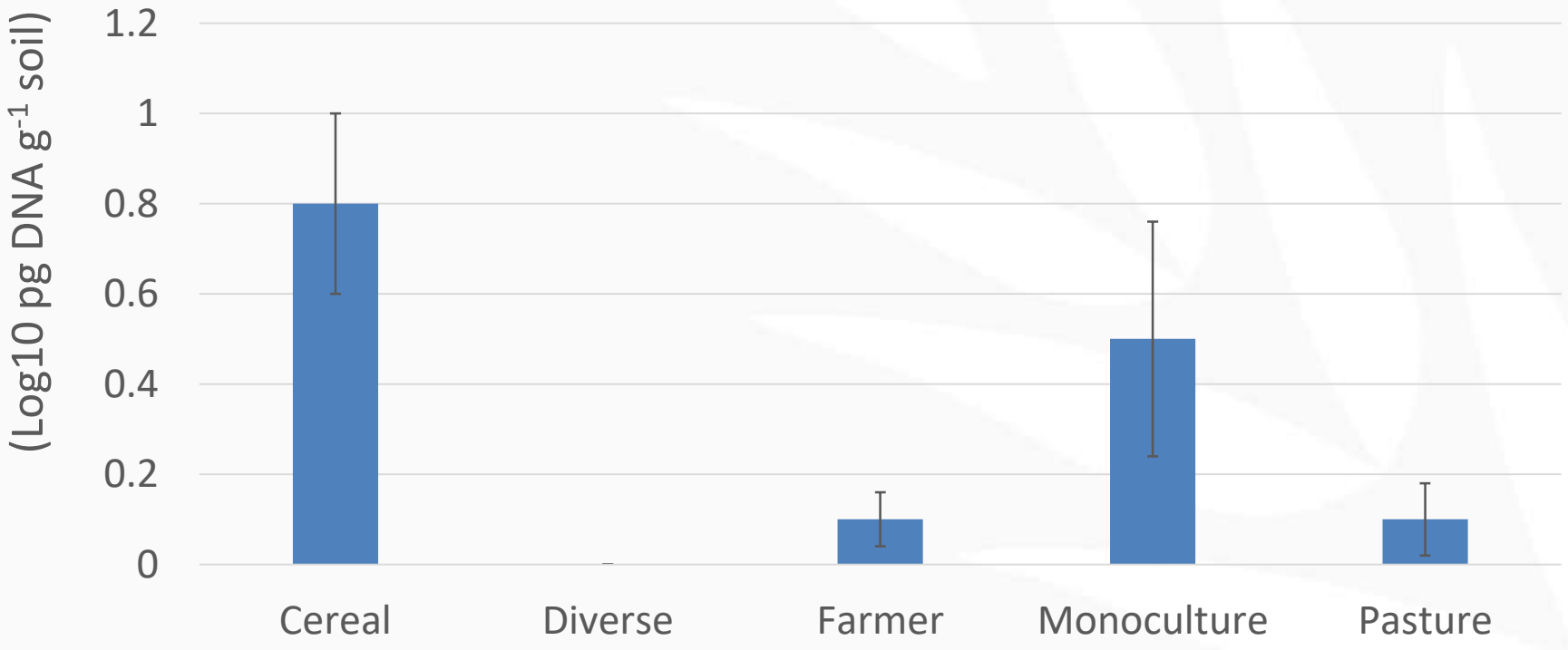
Year	Cereal	Diverse	Farmer	Monoculture	Pasture
1	Cereal	Wheat	Wheat	Wheat	Pasture
2	Cereal	Legume	Barley	Wheat	Pasture
3	Cereal	Canola	Legume or fallow	Wheat	Pasture

PREDICTA®B RESULTS - PRE-SEEDING 2016

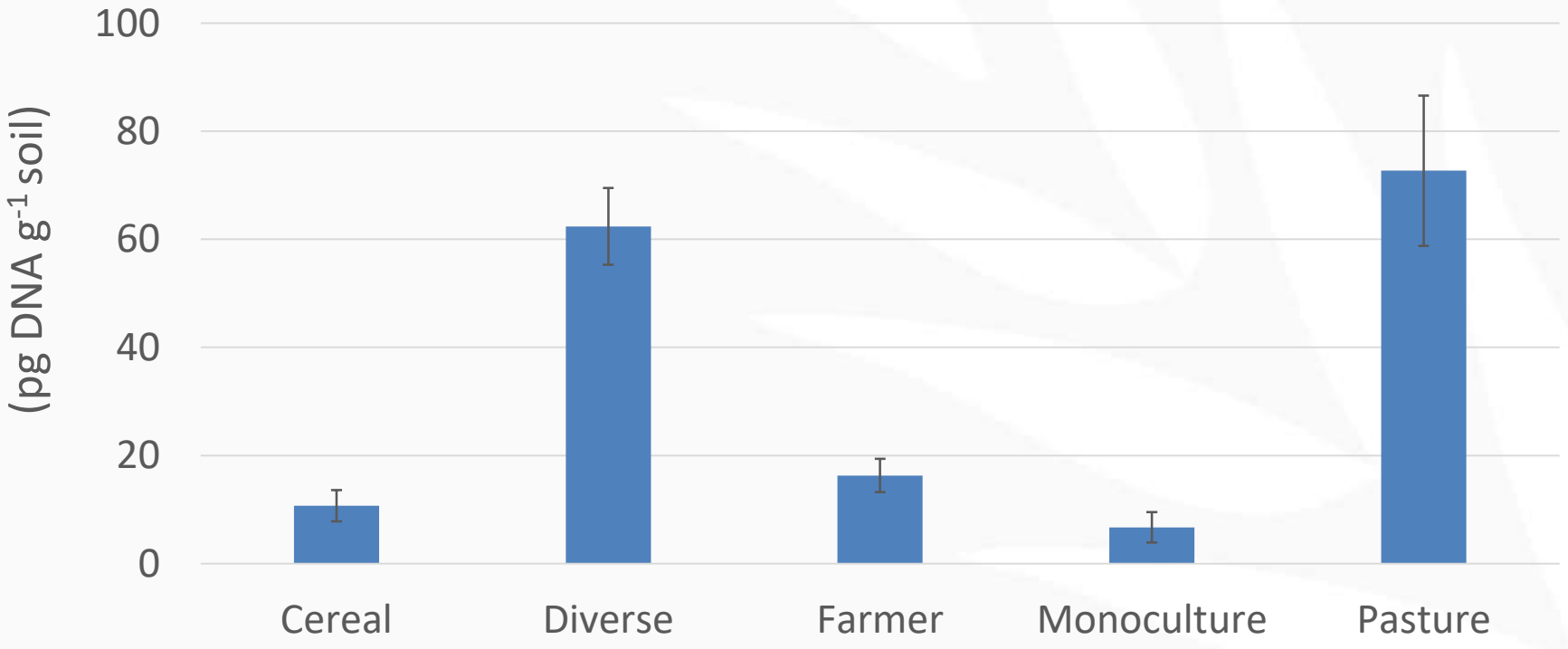
WHEAT YELLOW SPOT (*P. tritici-repentis* DNA, *IN SOIL*)



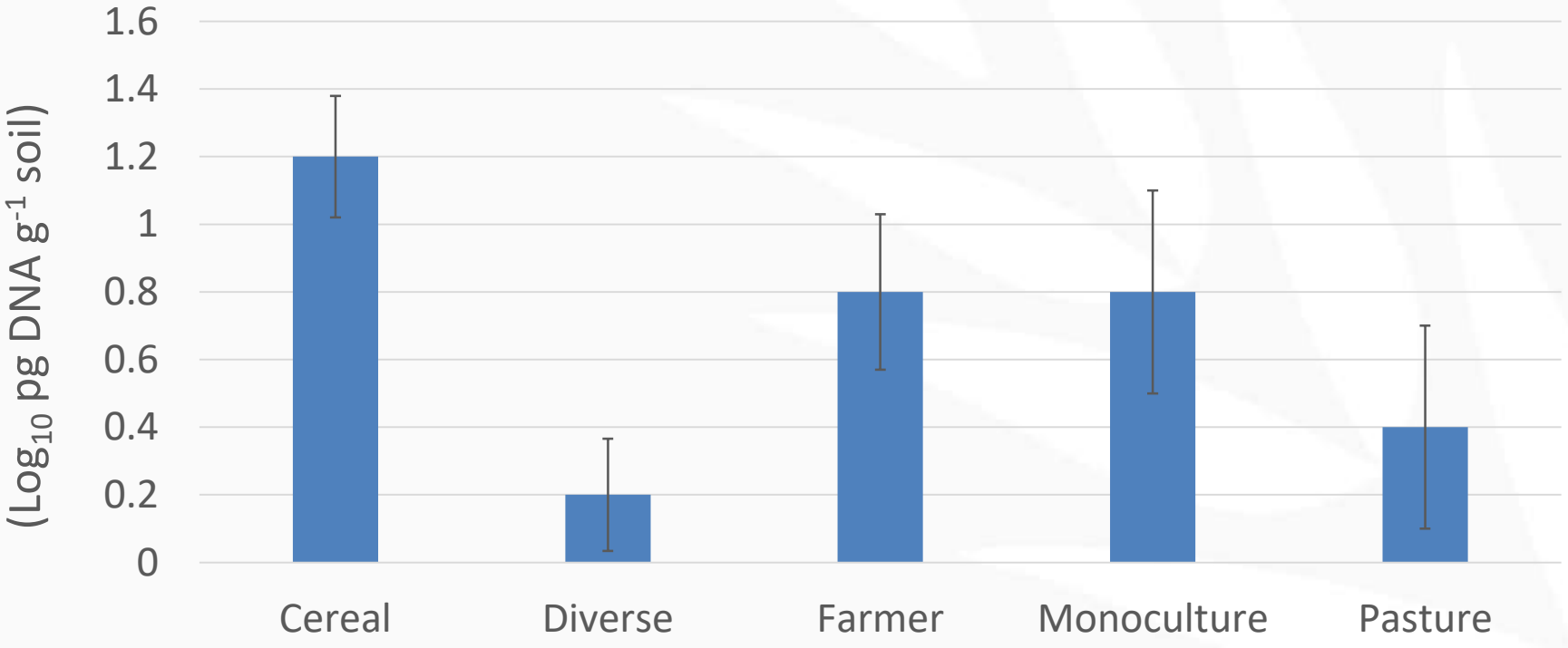
CROWN ROT (*Fusarium* SPP. DNA, *IN SOIL*)



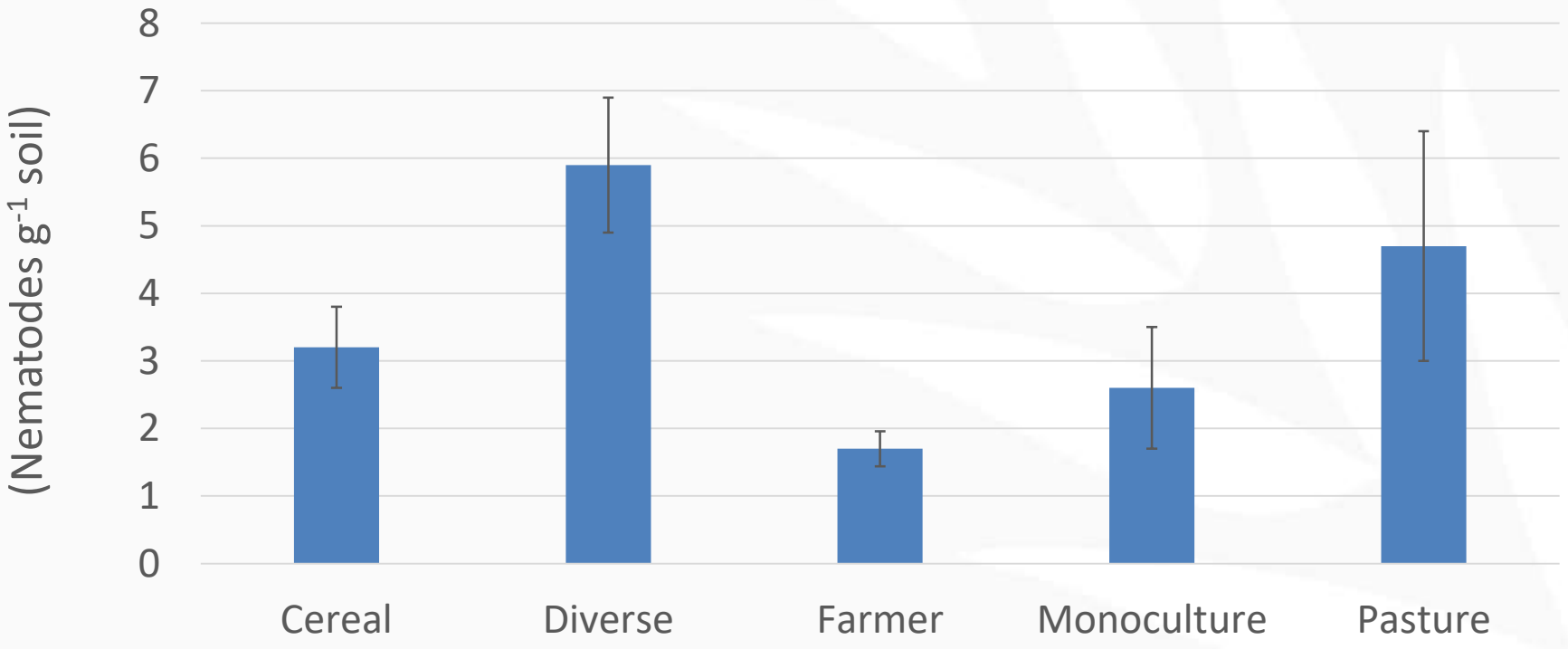
Pythium SPP. DNA, *IN SOIL*



Rhizoctonia solani AG8 DNA, *IN SOIL*



Pratylenchus neglectus IN SOIL

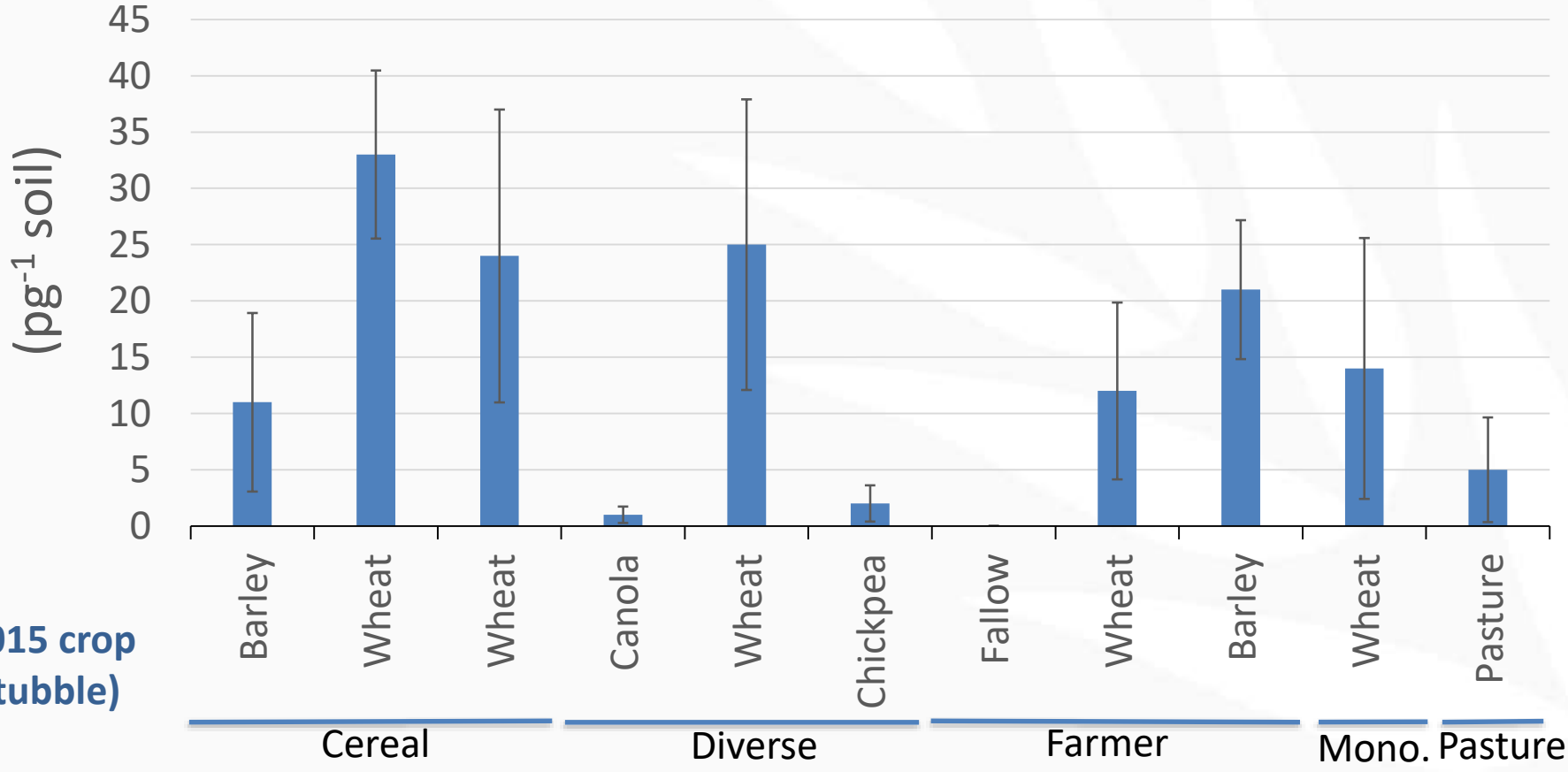


RESULTS

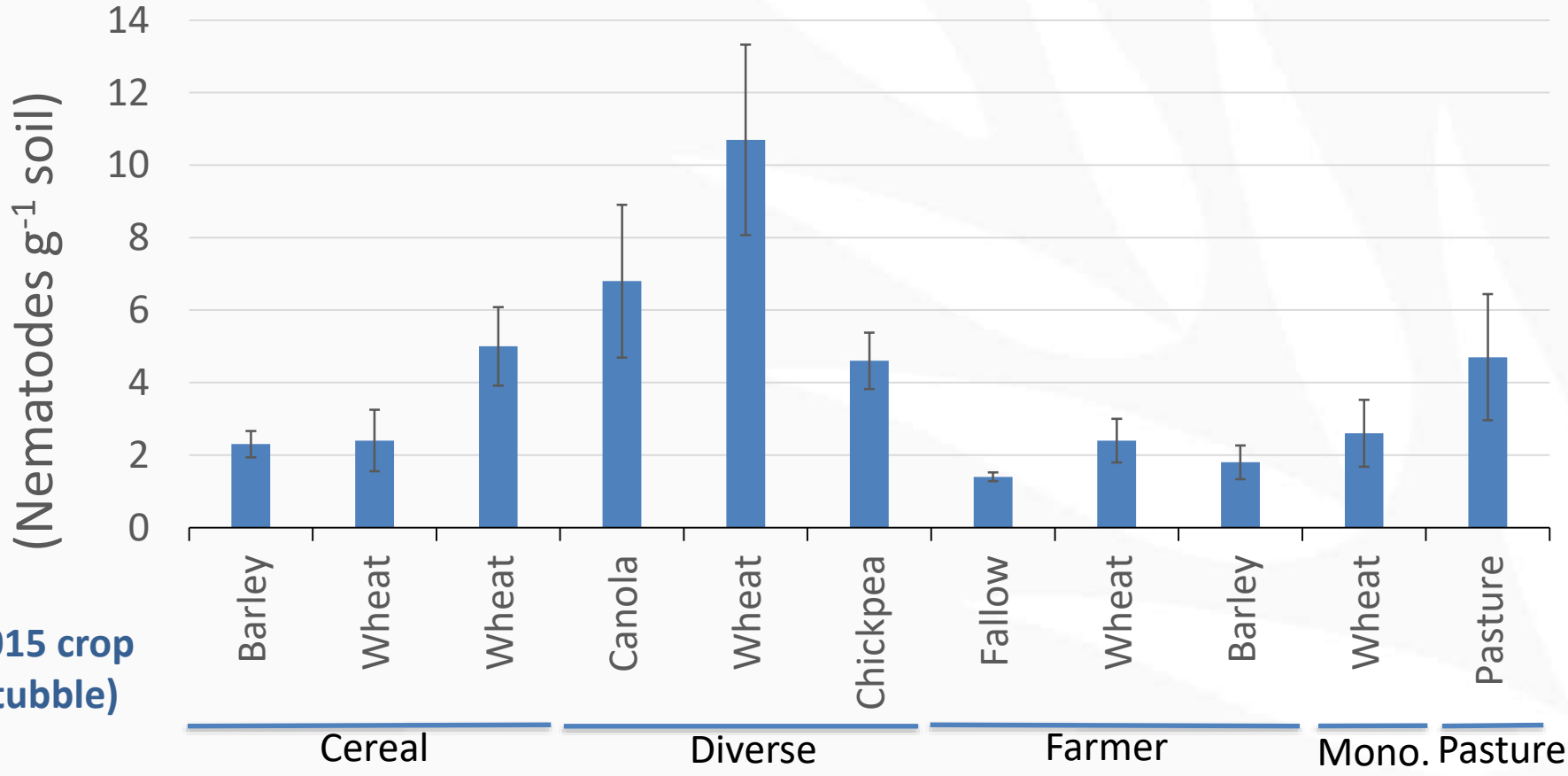
Effect of crop types within rotations

PREDICTA®B RESULTS - PRE-SEEDING 2016

PRE-SEED – *Rhizoctonia solani* DNA, IN SOIL



PRE-SEED – *Pratylenchus neglectus*, IN SOIL



PREDICTA®B RESULTS – IN-CROP 2016

IN-CROP – Rhizoctonia solani DNA, IN ROOTS

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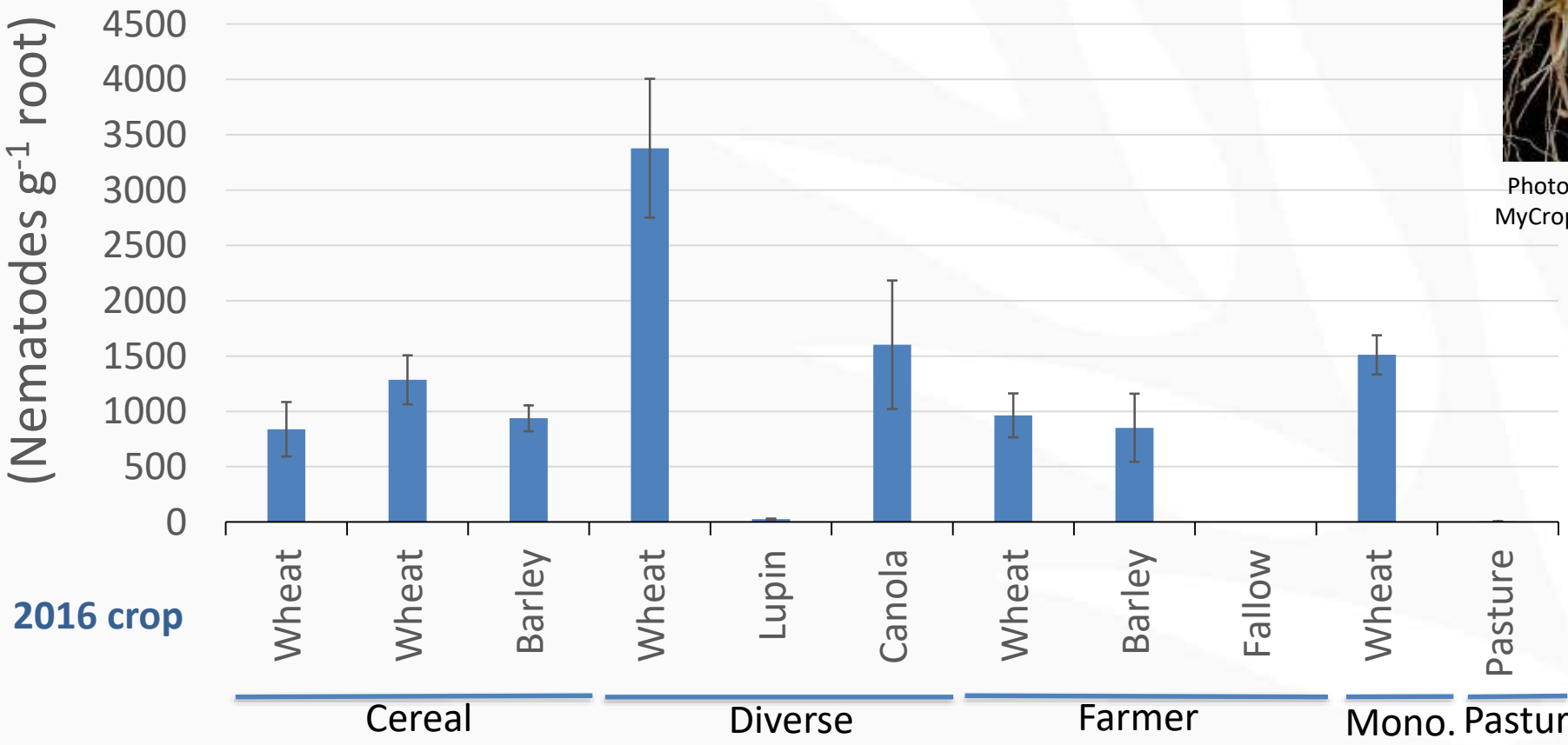
Photo DRIPD
MyCrop Wheat

IN-CROP – Pratylenchus neglectus, IN ROOTS

Photo DRIPD
MyCrop Wheat



SUMMARY

- Fusarium crown rot and Rhizoctonia increased in the cereal dominated rotations
- RLN and *Pythium* spp. were more prevalent in the pasture and diverse rotations
- Windrow burning is not effective as a long-term control option for the stubble-borne diseases.

MESSAGE

- Differences in disease and nematode susceptibility between crop types and even varieties means that farmers require up-to-date information on the host status if rotation is going to be an effective broad-based control measure.

Thank you

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