Department of Primary Industries and Regional Development

GOVERNMENT OF WESTERN AUSTRALIA

GRDC GRAINS RESEARCH & DEVELOPMENT CORPORATION

Soil Amelioration in WA

Benefits, adoption and value

Dr Stephen Davies - Principal Research Scientist DPIRD

‘Sandplain’ soils of south-west WA

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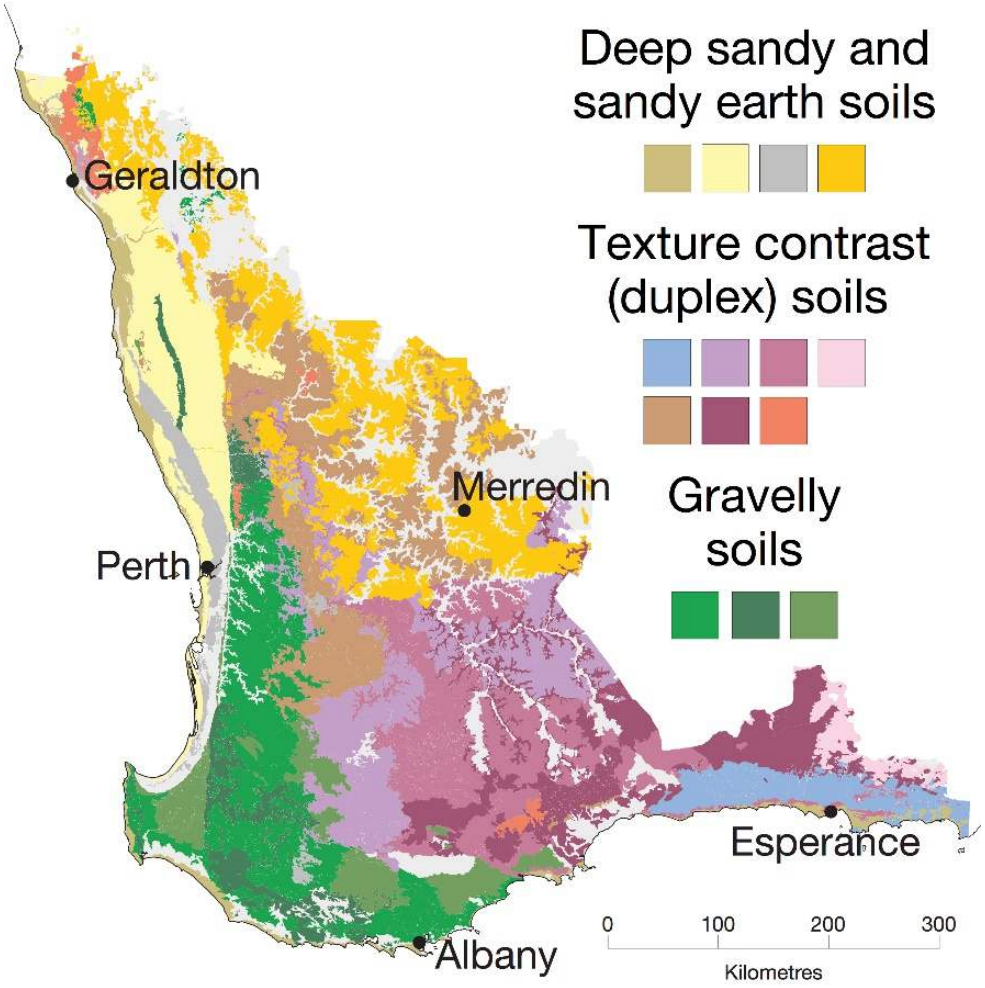

1. ~13M ha ‘sandplain’ cropping soils
2. Soil constraints:
   - Acidity
   - Compaction
   - Soil Water Repellence
   - Sodicity
   - Poor Water Holding
   - Salinity
3. >$2B value in lost grain production

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Strategic Deep Tillage WA

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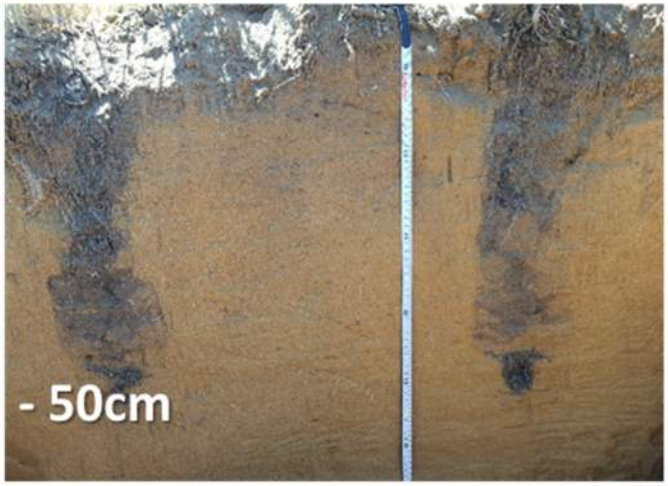
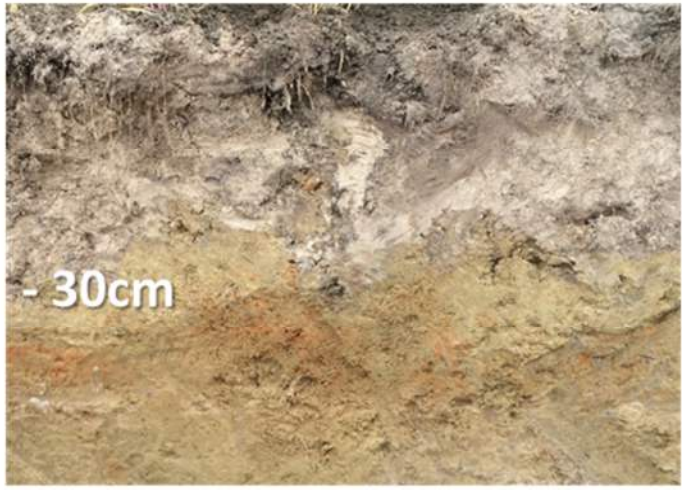
Deep Ripping

Topsoil Inclusion



Delving



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Rotary Spading

Modified One-way Plough

Mouldboard Plough

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Strategic Deep Tillage Crop Responses

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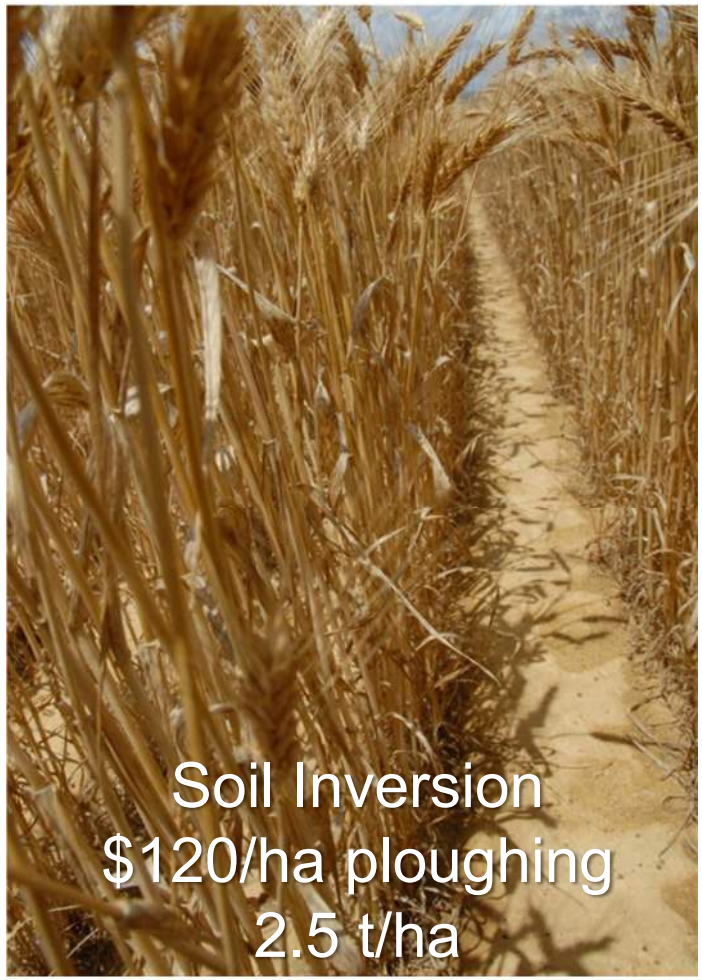

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Summary Crop Yield Response to Strategic Deep Tillage

Crop Type	Grain yield response t/ha		Grain yield response %		% sig. positive comparisons	
	1-2 years	3+ years	1-2 years	3+ years	1-2 years	3+ years
Soil Inversion						
Cereal	0.66	0.65	41	30	77	81
Canola	0.43	0.49	27	43	57	83
Lupin	0.54	0.39	58	60	67	55
Deep Soil Mixing						
Cereal	0.72	0.53	49	29	82	85
Canola	0.36	0.21	33	37	67	55
Lupin	0.19	0.48	7	30	33	71

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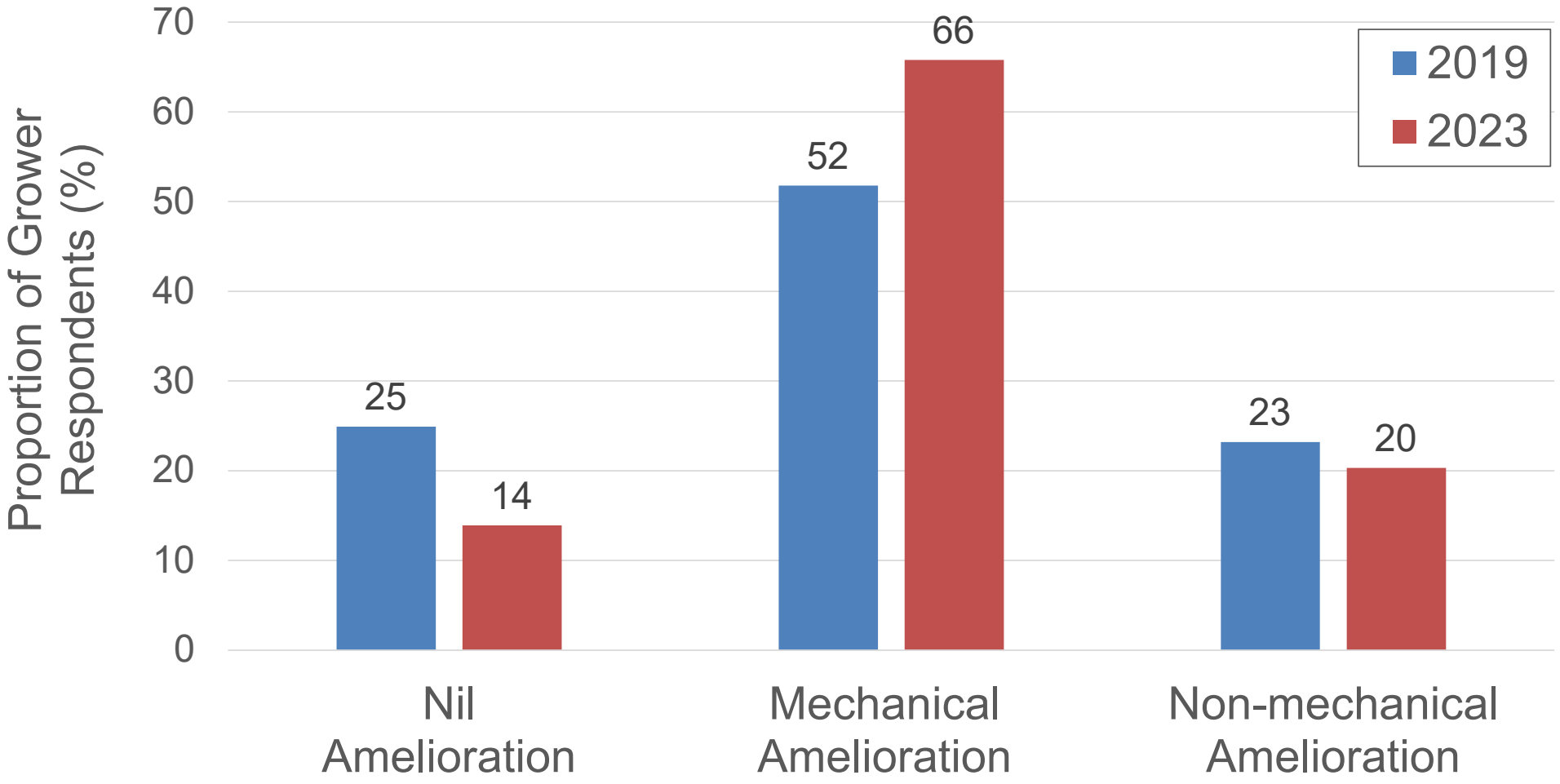
Grower Adoption



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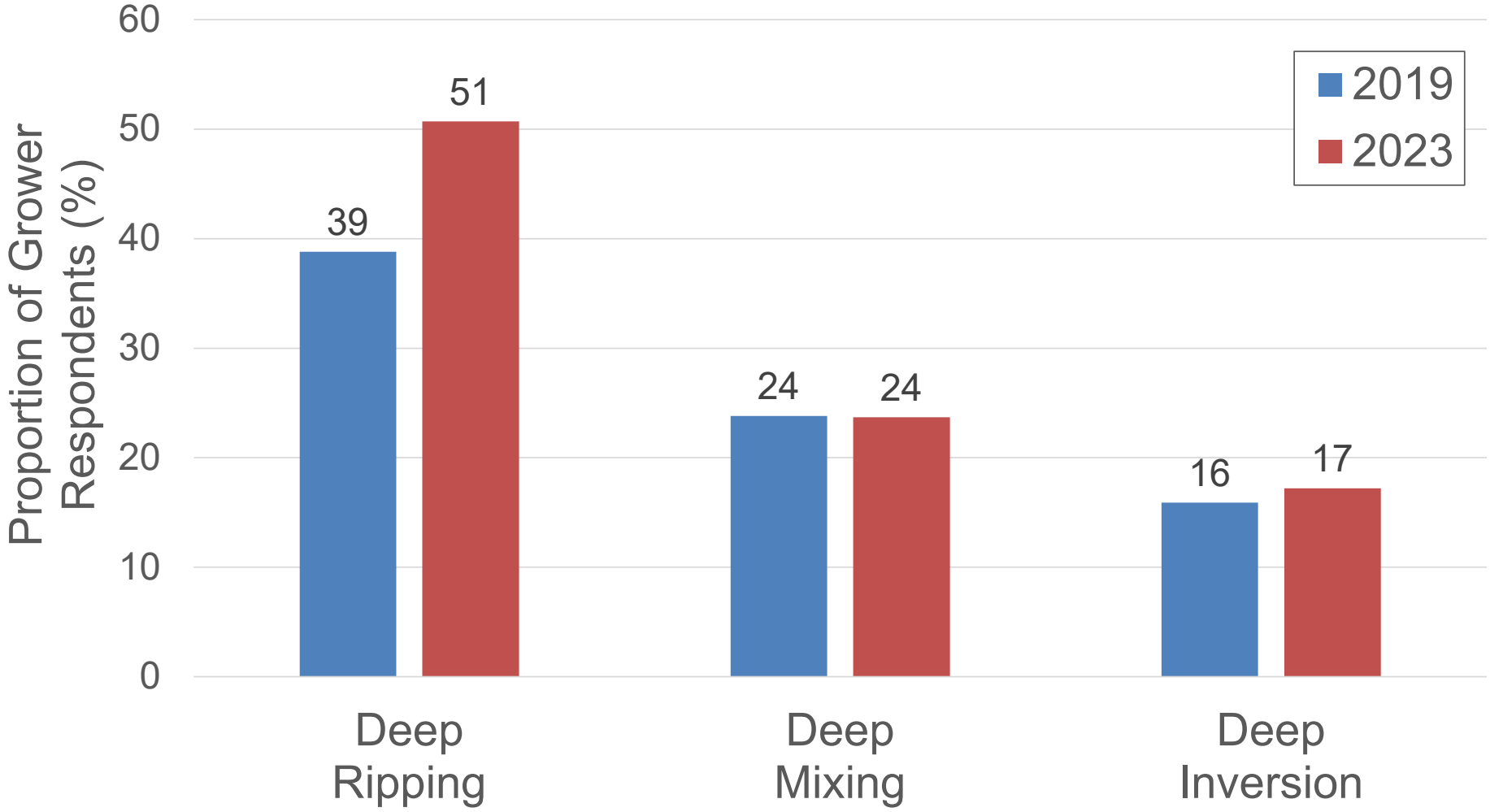
Grower Adoption



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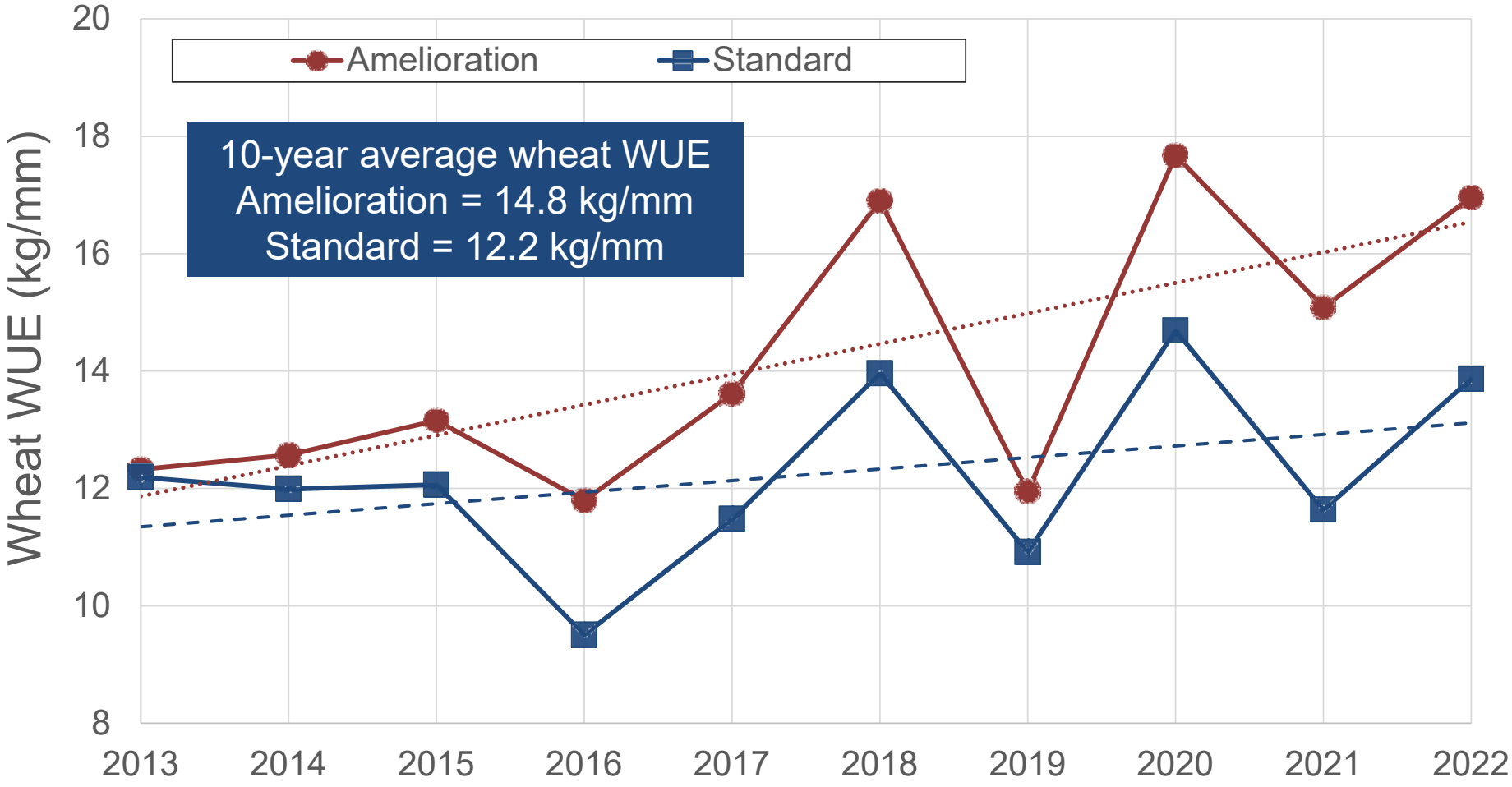

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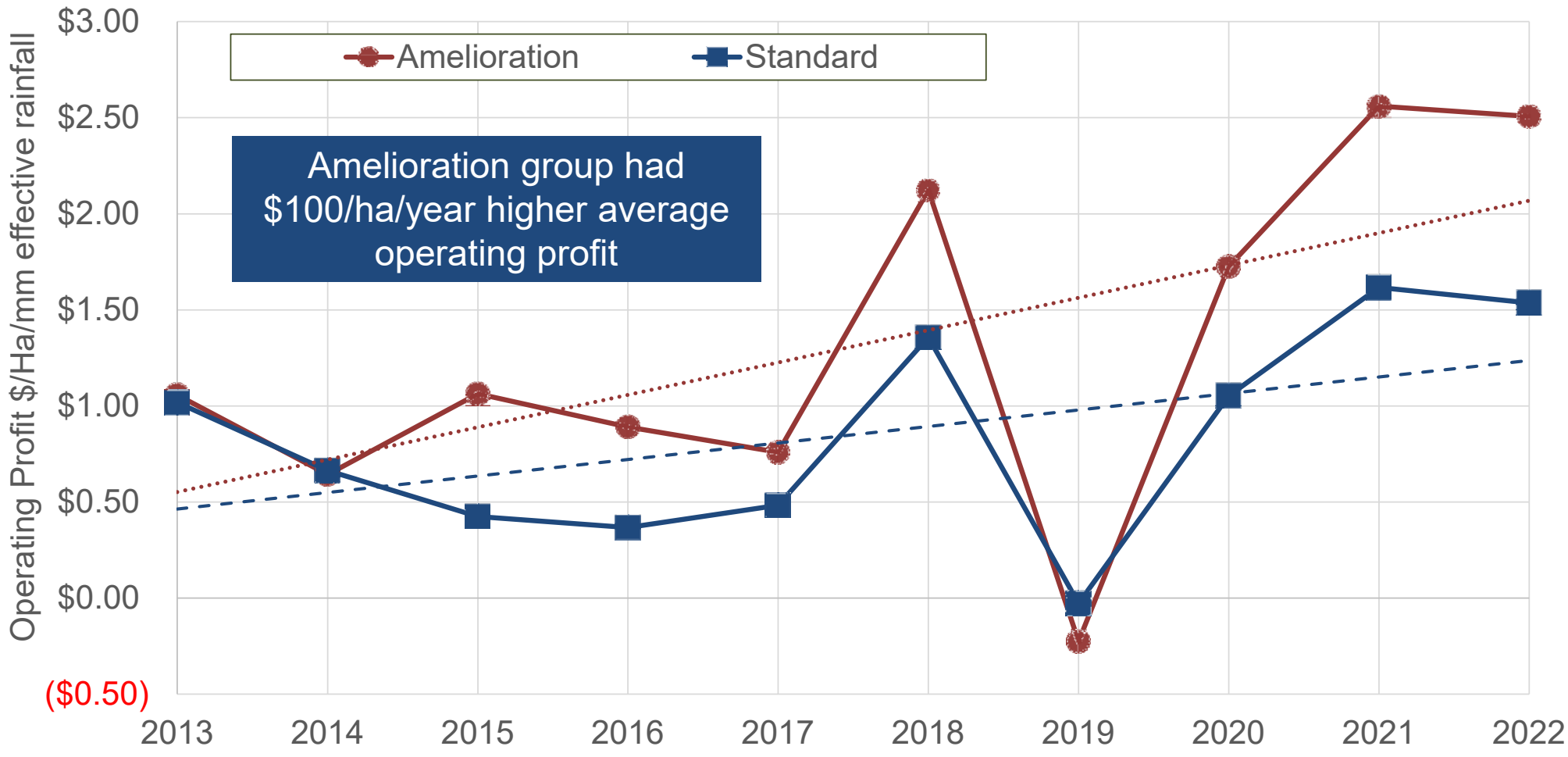

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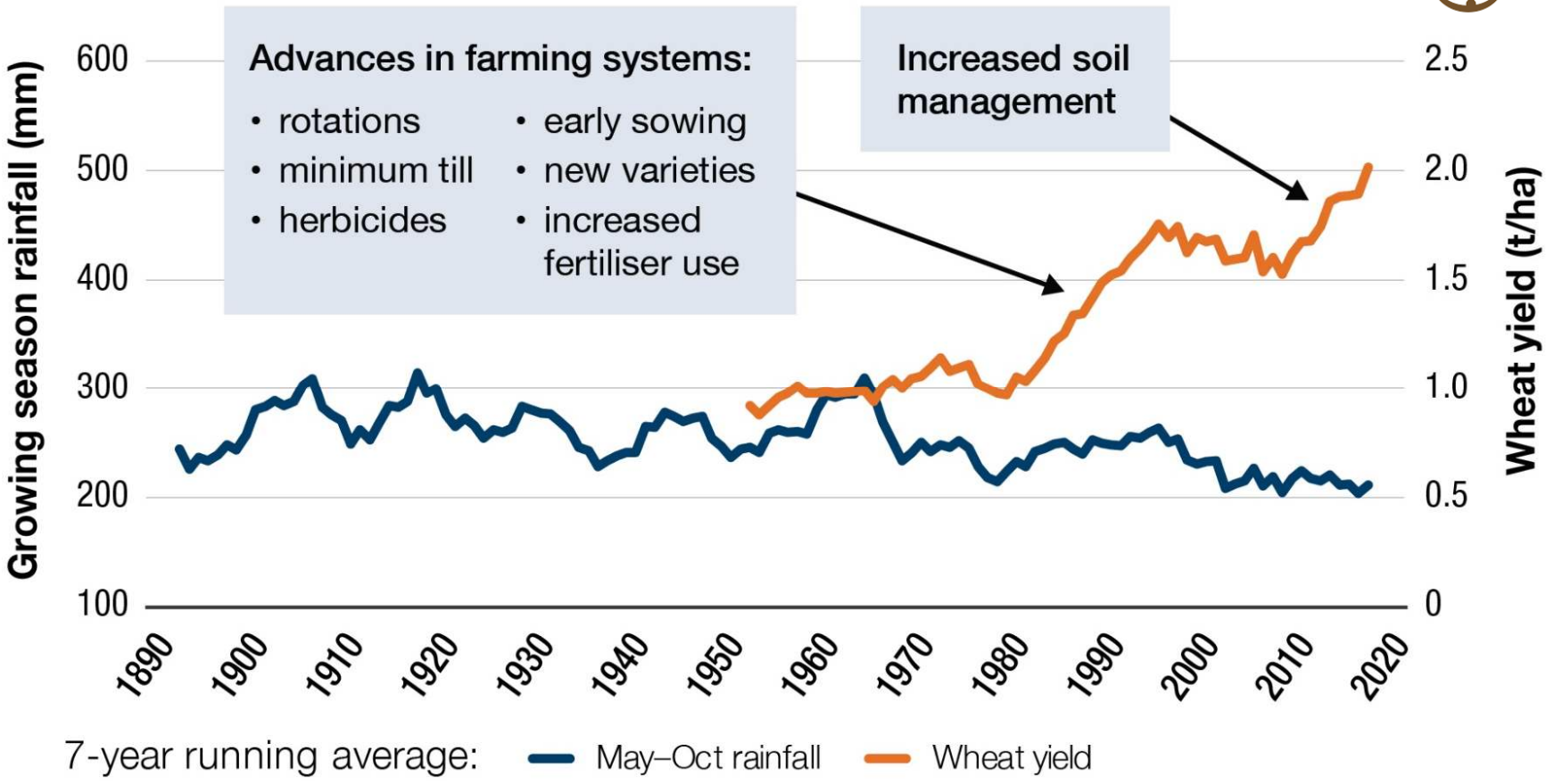
Long-term changes in wheat yield and rainfall in the WA grainbelt



Data source: ABARES and BOM

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Future opportunities

- Spatially diverse application of soil amelioration
- Grower-adoptable soil profile re-engineering
- Integrated nutrient management for new benchmark yield potentials
- System, agronomic and crop genetic integration of soil amelioration and profile re-engineering
- More solutions for heavy-textured soils
- Emissions and soil carbon costs and opportunities

Deep spading.
Photo R. Groocock

Gravel mulch strips on sodic soil.
Photo D. Hall DPIRD

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Soil Profile Reengineering 2019-24

Project Leader – Dr Gaus Azam, Principal Research Scientist


Photo G. Azam DPIRD


Photo G. Azam DPIRD

Cereal yield and WUE (9 cropping years)

Comparisons	Yield (t/ha)	WUE (kg/mm)
Water limited yield potential	3.3	22?
Paddock control	2.0	14
Best bet soil re-engineering	3.9	30

Canola yield and WUE (4 cropping years)

Comparisons	Yield (t/ha)	WUE (kg/mm)
Water limited yield potential	1.8	13?
Paddock control	1.8	15
Best bet soil re-engineering	3.2	26

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Future Opportunities - GRDC Investments 2024

DAW2407-001SPX SWAN Transforming water and nutrient use efficiency in WA grain production 2024-29 – Strategic Collaboration.

Led by Dr Steve Davies, Dr Gaus Azam, Dr Craig Scanlan and Mr Wayne Parker, DPIRD WA

CSP2403-017RTX Sandy Soils II: Management to sustain production potential in the low to medium rainfall environments of the Southern cropping region, 2024-28.

Led by Dr Therese McBeath, CSIRO

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Thanks GRDC, DPIRD Research Team, Growers & Consultants