

Yardstick trial

A grower group's solution to reducing wheat and barley selection risk for their low rainfall farming system



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Primary Industries and
Regional Development



Merredin and Districts Farm Improvement Group



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Merredin and Districts Farm Improvement Group

- Low rainfall
- Low input
- Variable seasons

3 h 44 min

3 h 3 min
260 km



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Background

- Reduce new variety selection risk
- Test newly released wheat and barley varieties
- Four district practice fertiliser regimes



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Background

Year	Summer rain Decile	GSR Decile
2010	9	1
2011	7	7
2012	7	2
2013	10	5
2014	1	6

Source: NVT Online



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Background

Year	Summer rain Decile	GSR Decile	Soil
2010	9	1	Sandy loam
2011	7	7	Sandy loam over loam
2012	7	2	Sandy loam over loam
2013	10	5	Sandy loam
2014	1	6	Loam

Source: NVT Online



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Background

Year	Summer rain Decile	GSR Decile	Soil	N kg/ha	P kg/ha
2010	9	1	Sandy loam	80	11
2011	7	7	Sandy loam over loam	58	12
2012	7	2	Sandy loam over loam	35	12
2013	10	5	Sandy loam	35	12
2014	1	6	Loam	35	12

Source: NVT Online



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Background

Year	Summer rain Decile	GSR Decile	Soil	N kg/ha	P kg/ha	Wheat t/ha	Barley t/ha
2010	9	1	Sandy loam	80	11	0.78	0.77
2011	7	7	Sandy loam over loam	58	12	2.30	-
2012	7	2	Sandy loam over loam	35	12	0.62	-
2013	10	5	Sandy loam	35	12	2.85	2.41
2014	1	6	Loam	35	12	0.57	-

Source: NVT Online



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NVT wheat and barley locations

Wheat



Source: NVT Online

Barley



Background

- Co-locate with NVT to compare NVT fertiliser with treatments in Yardstick trial
- Provide local variety data if NVT unreleased
- Target heavier soil
- This project drove NVT site selection to a different soil important for region but not previously represented by NVT



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Background

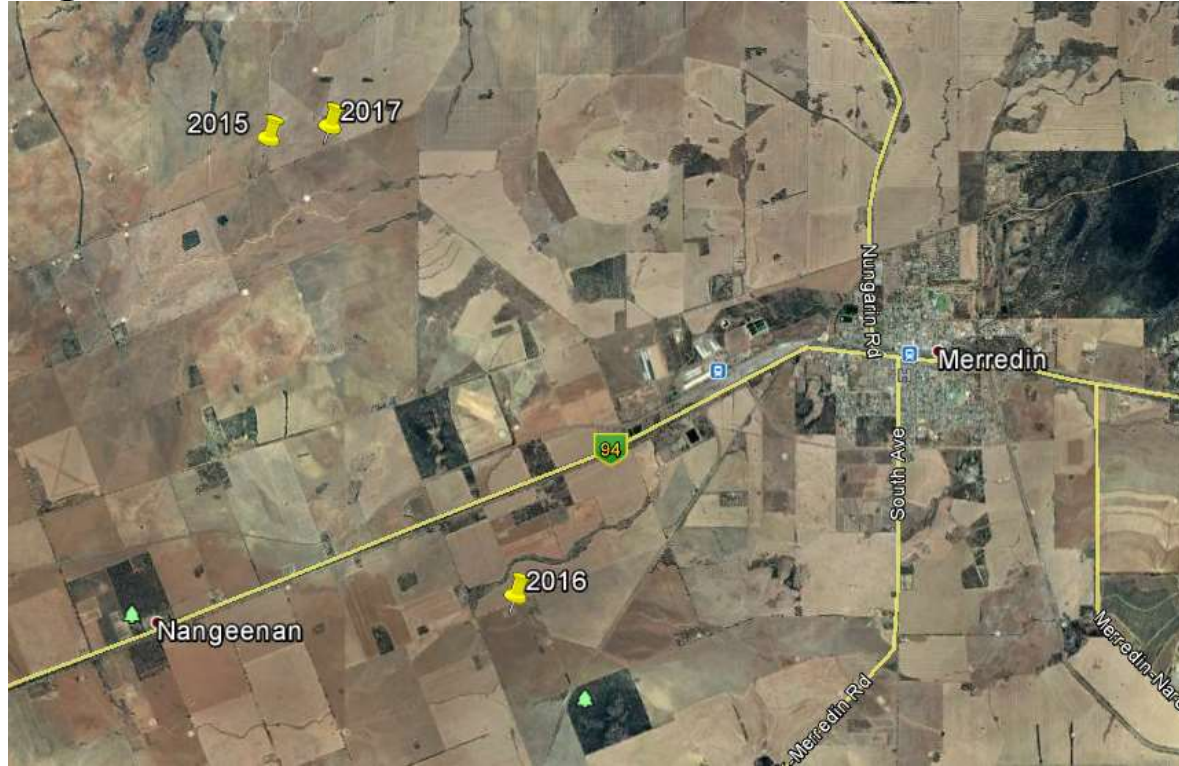
- Co-locate with NVT to compare NVT fertiliser with treatments in Yardstick trial
- Provide local variety data if NVT unreleased
- Target heavier soil
- This project drove NVT site selection to a different soil important for region but not previously represented by NVT
- Small plot demonstration
- Replicated block design with 3 reps
- 3 seasons, 1 site per season
- 'Decile' fertiliser regimes and wheat and barley varieties



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Targeted heavier soils



Targeted heavier soils



'Decile' targeted fertiliser regimes

Treatment	N kg/ha		P kg/ha
	At seeding	Post (3 leaf-early tillering)	At seeding
Decile 1	0	-	0
Decile 4-5	10	-	5
Decile 7-8	30	-	5
Play the season 2015	10	10 (6 WAS)	5

Base NVT	35	-	12
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'Decile' targeted fertiliser regimes

Treatment	N kg/ha		P kg/ha
	At seeding	Post (3 leaf-early tillering)	At seeding
Decile 1	0	-	0
Decile 4-5	10	-	5
Decile 7-8	30	-	5
Play the season 2015	10	10 (6 WAS)	5
Play the season 2016	30	20 (5 WAS)	5
Play the season 2017	30	20 (7 WAS)	5
Base NVT	35	-	12

District grown and new varieties

- Wheat
- 2015 10 varieties Calingiri, Cobra, Corack, Emu Rock, Hydra, Impress, Mace, Magenta, Trojan, Zen
- 2016 12 varieties Calingiri, Cobra, Emu Rock, Hydra, Impress, Mace, Magenta, Ninja, Scepter, Supreme, Trojan, Zen
- 2017 14 varieties Calingiri, Chief, Cobra, Cutlass, Emu Rock, Hydra, Impress, Mace, Magenta, Ninja, Scepter, Supreme, Trojan, Zen



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District grown and new varieties

- Wheat
- 2015 10 varieties Calingiri, Cobra, ~~Corack~~, Emu Rock, Hydra, Impress, Mace, Magenta, Trojan, Zen
- 2016 12 varieties Calingiri, Cobra, Emu Rock, Hydra, Impress, Mace, Magenta, **Ninja**, **Scepter**, **Supreme**, Trojan, Zen
- 2017 14 varieties Calingiri, **Chief**, Cobra, **Cutlass**, Emu Rock, Hydra, Impress, Mace, Magenta, Ninja, Scepter, Supreme, Trojan, Zen



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District grown and new varieties

- Barley
- 2015 5 varieties Compass, Fathom, Hindmarsh, La Trobe, Scope
- 2016 5 varieties Compass, Fathom, La Trobe, Scope, **Spartacus**
- 2017 6 varieties Compass, Fathom, La Trobe, **Rosalind**, Scope, Spartacus



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District grown and new varieties

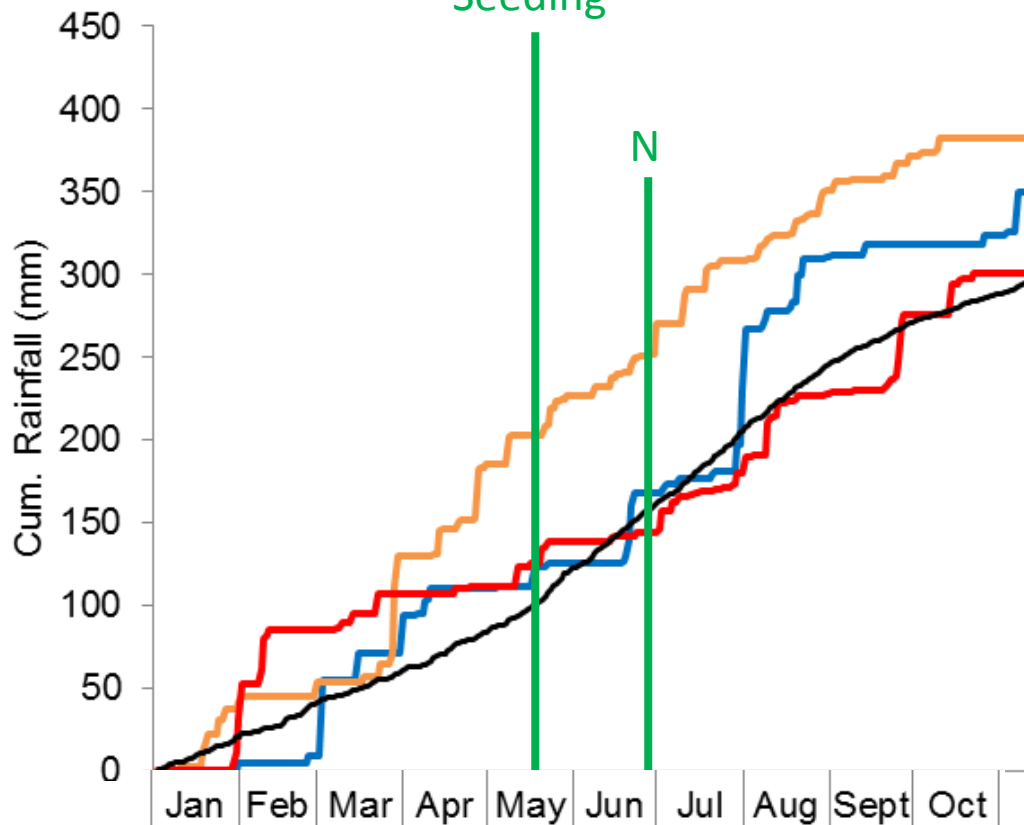
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- 2017 6 varieties Compass, Fathom, La Trobe, **Rosalind**, Scope, Spartacus



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Rainfall



Year	Summer rain	GSR
2015	Decile 8	Decile 6
2016	Decile 10	Decile 8
2017	Decile 8	Decile 3

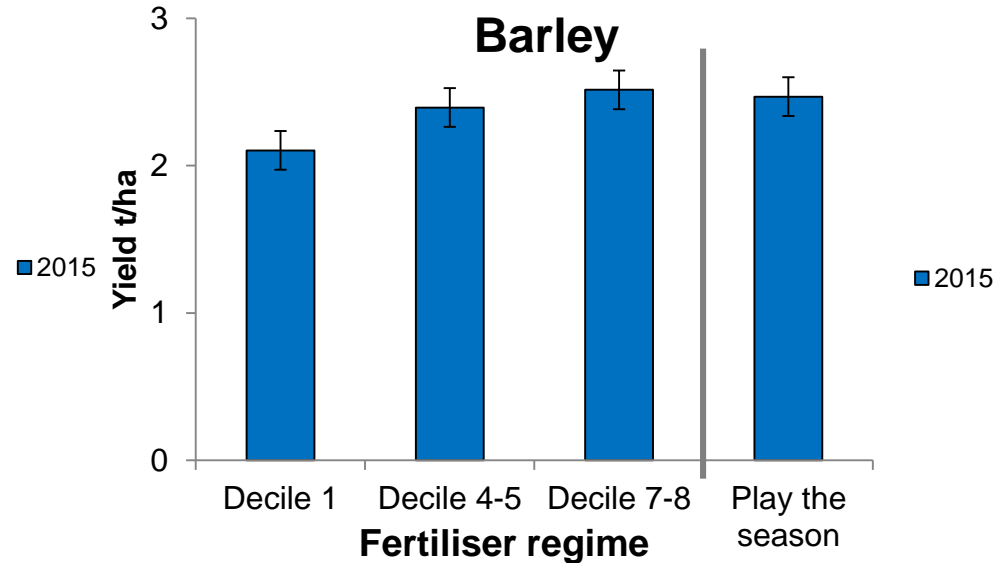
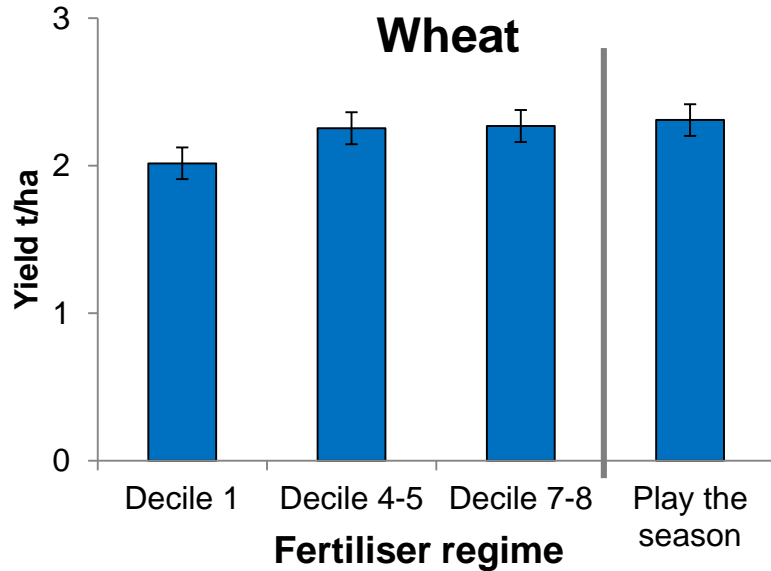
- 2015
- 2016
- 2017
- Avg since 1975



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Optimum nutrition regime varied between seasons



Decile 1: 0P 0N

Decile 4-5: 5P 10N

Decile 7-8: 5P 30N

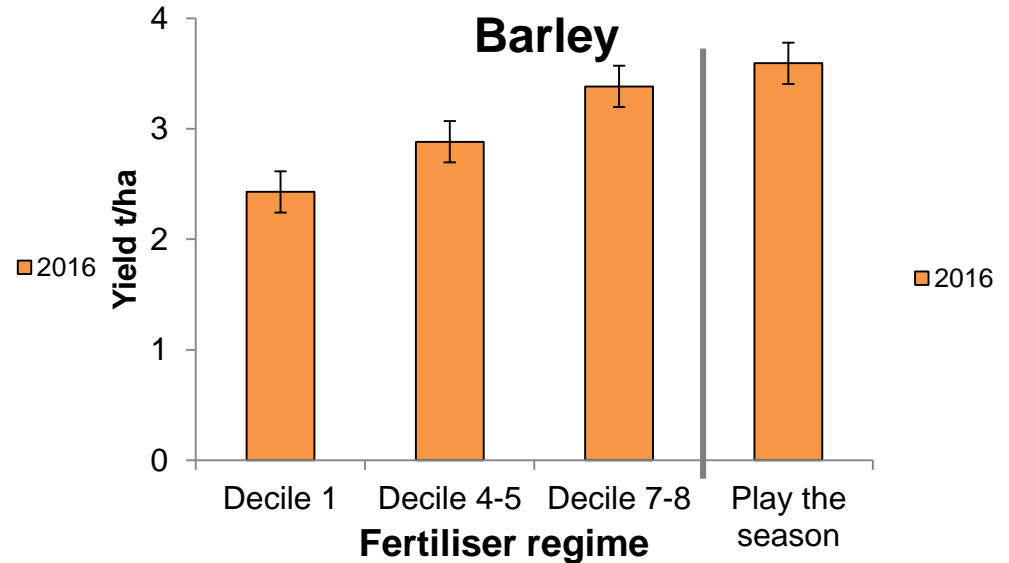
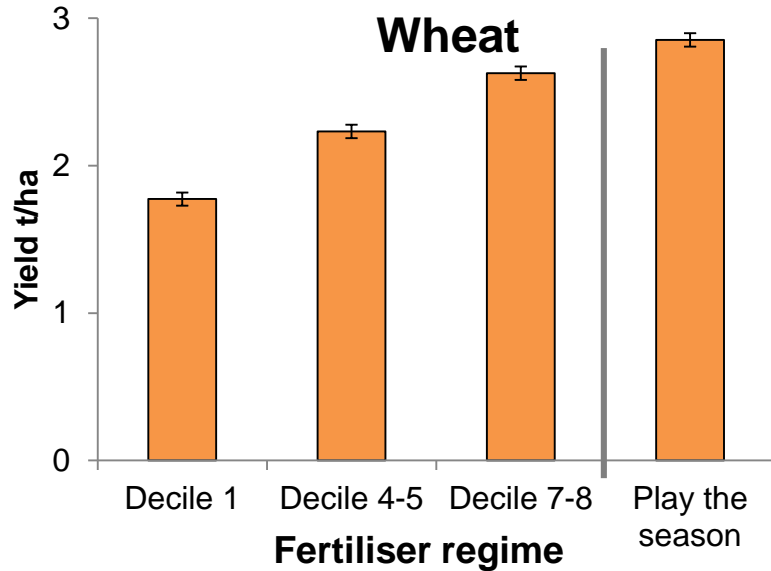
2015 Play the season: 5P 10N + 10N



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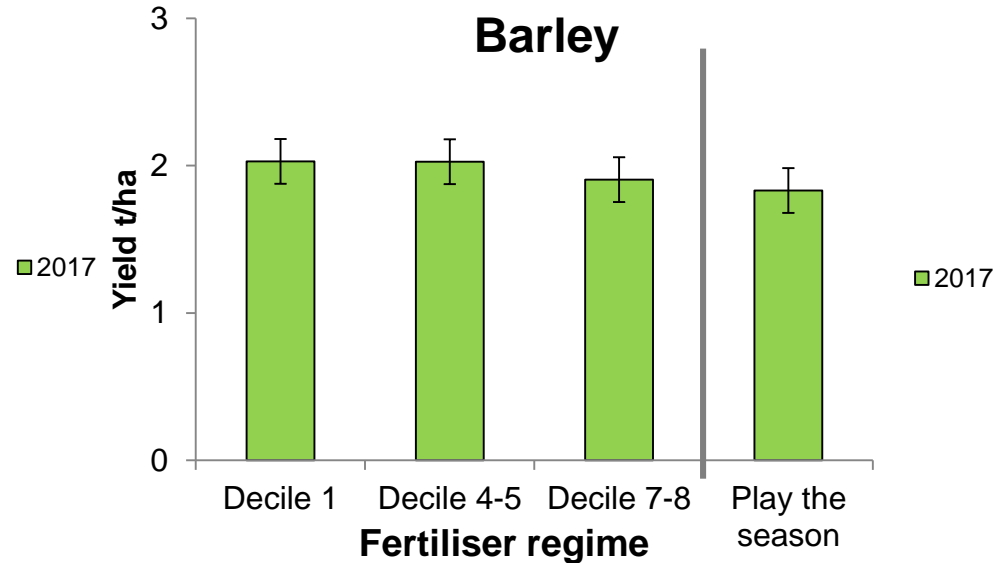
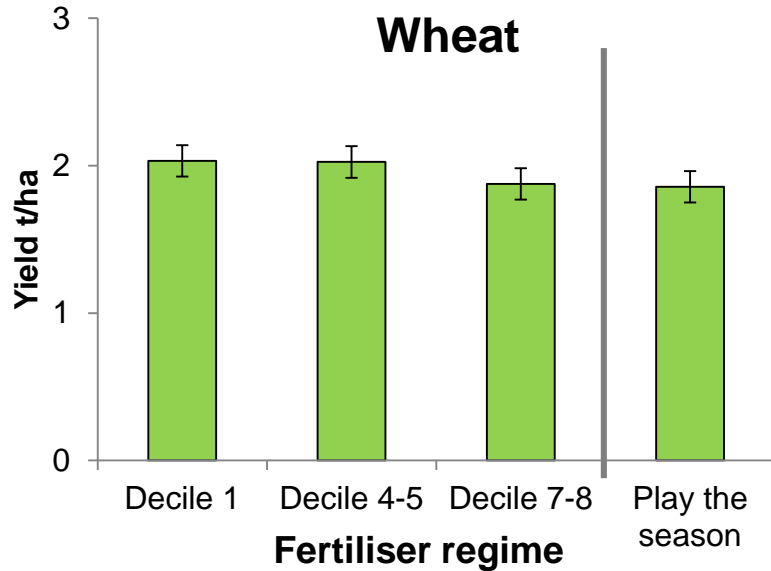
2016 Play the season: 5P 20N + 30N



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Optimum nutrition regime varied between seasons



Decile 1: 0P 0N

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Decile 7-8: 5P 30N

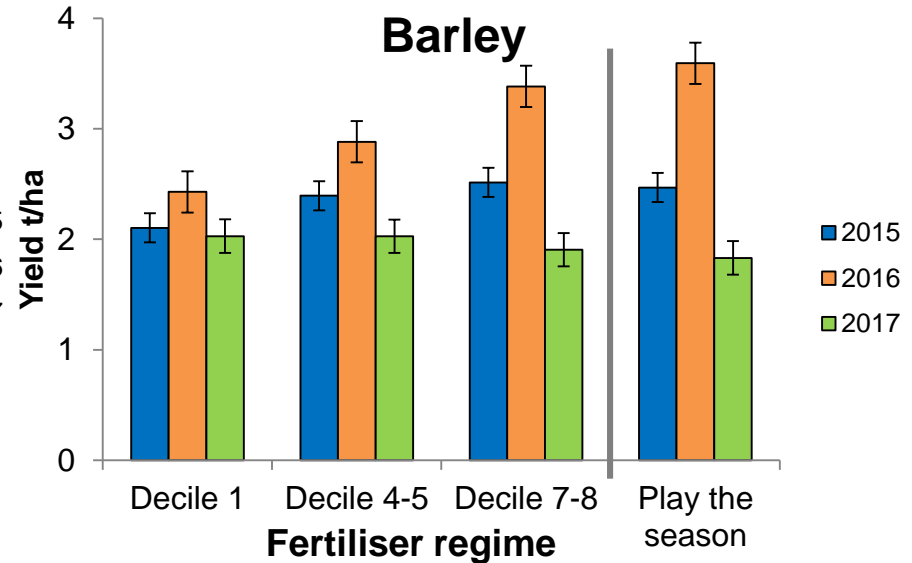
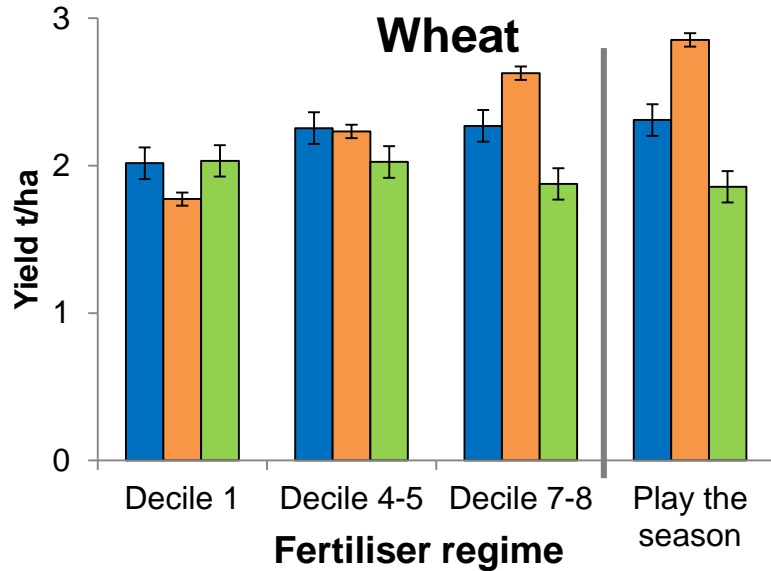
2017 Play the season: 5P 20N + 30N



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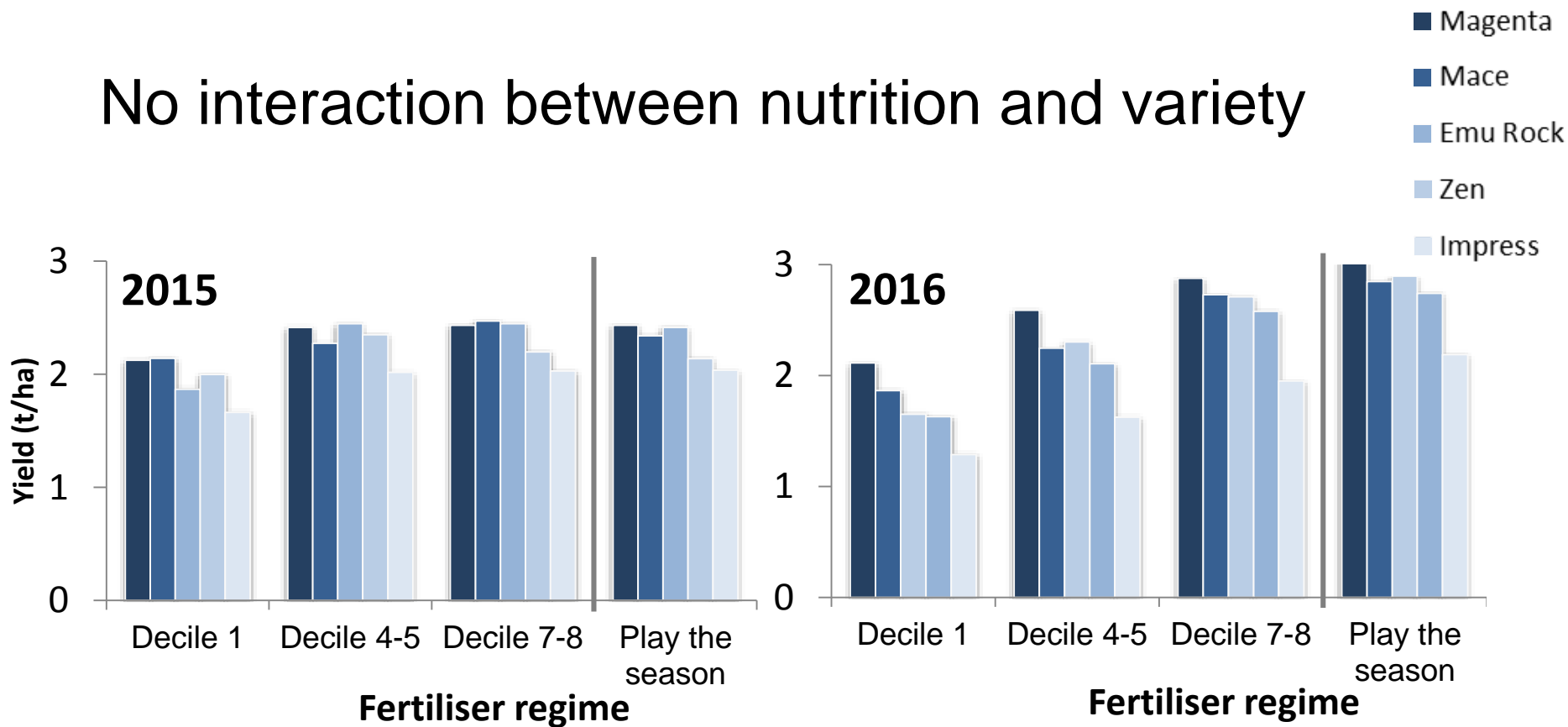


Optimum nutrition regime varied between seasons



10N + 5P at seeding equal or greater yield than nil fertiliser

No interaction between nutrition and variety



Decile 1: 0P 0N Decile 4-5: 5P 10N
 2015 Play the season: 5P 10N + 10N
 2016 Play the season: 5P 20N + 30N

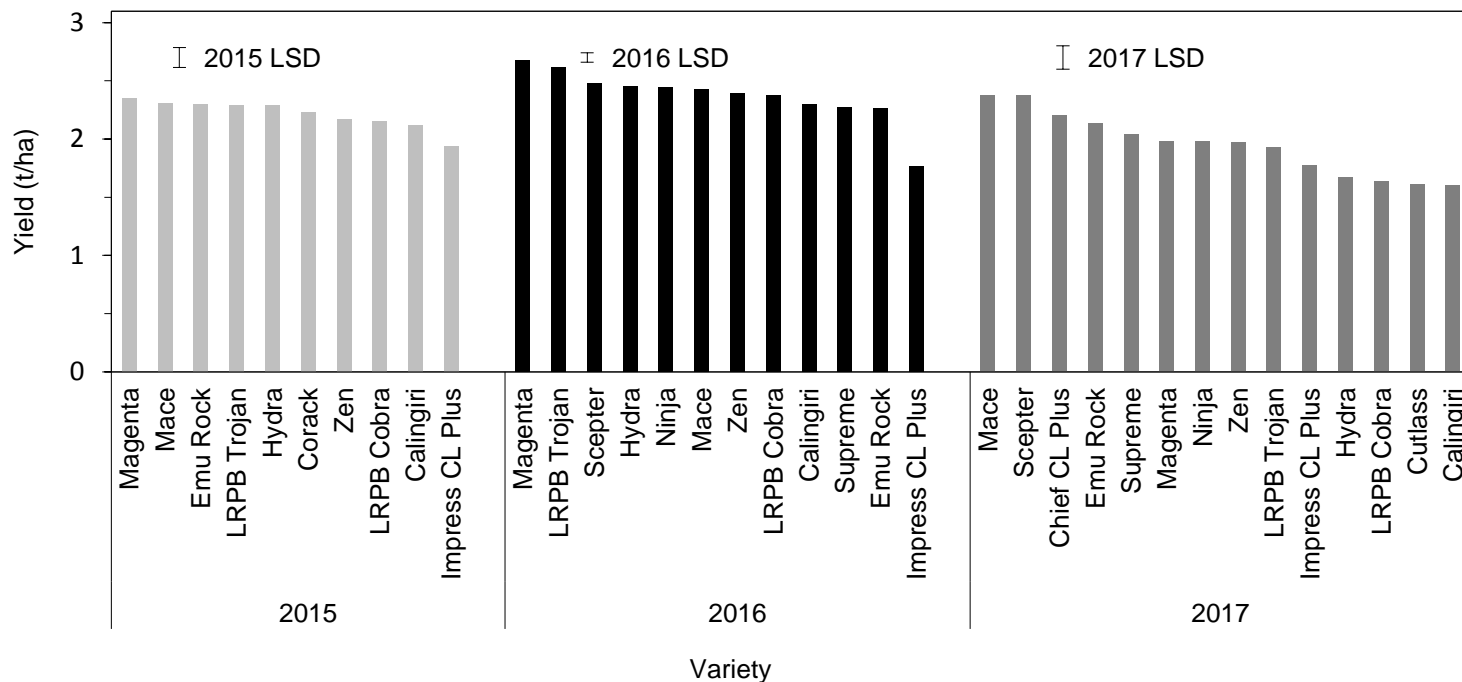
Decile 7-8: 5P 30N



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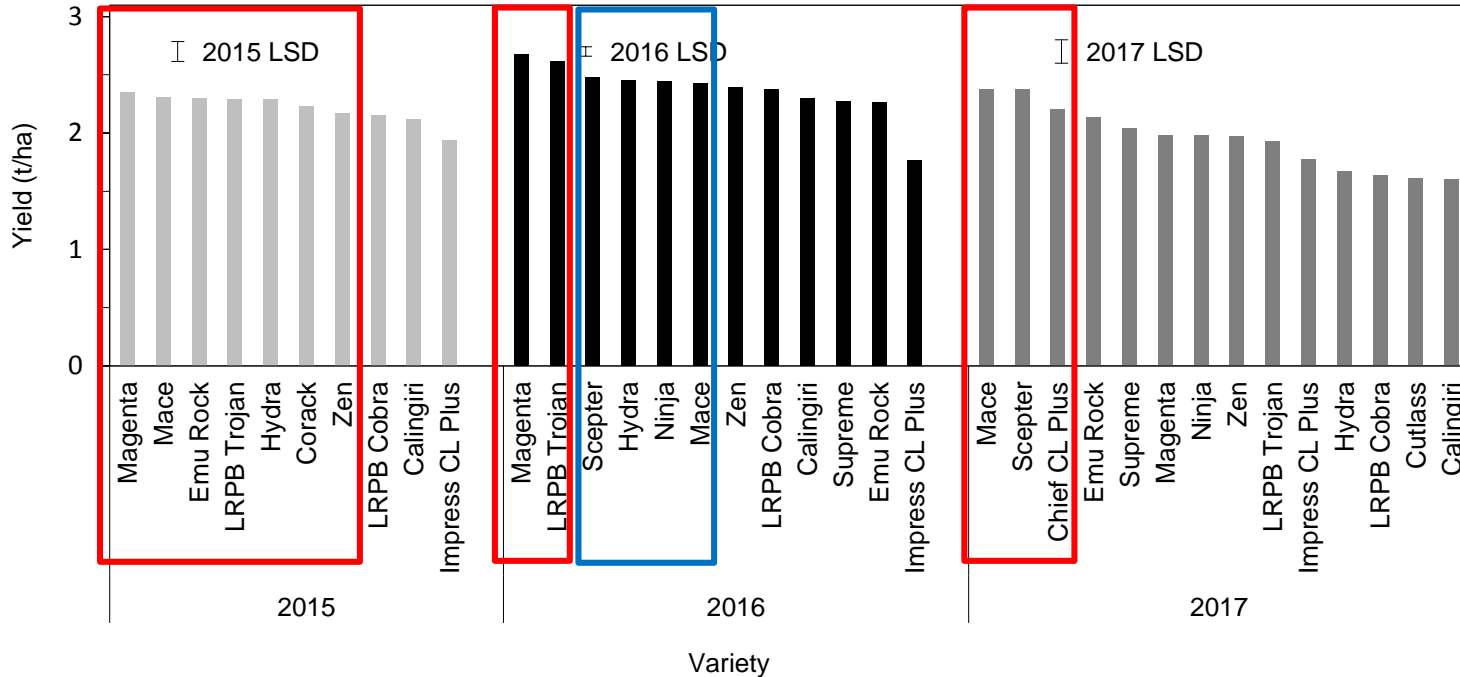
Which wheat variety?



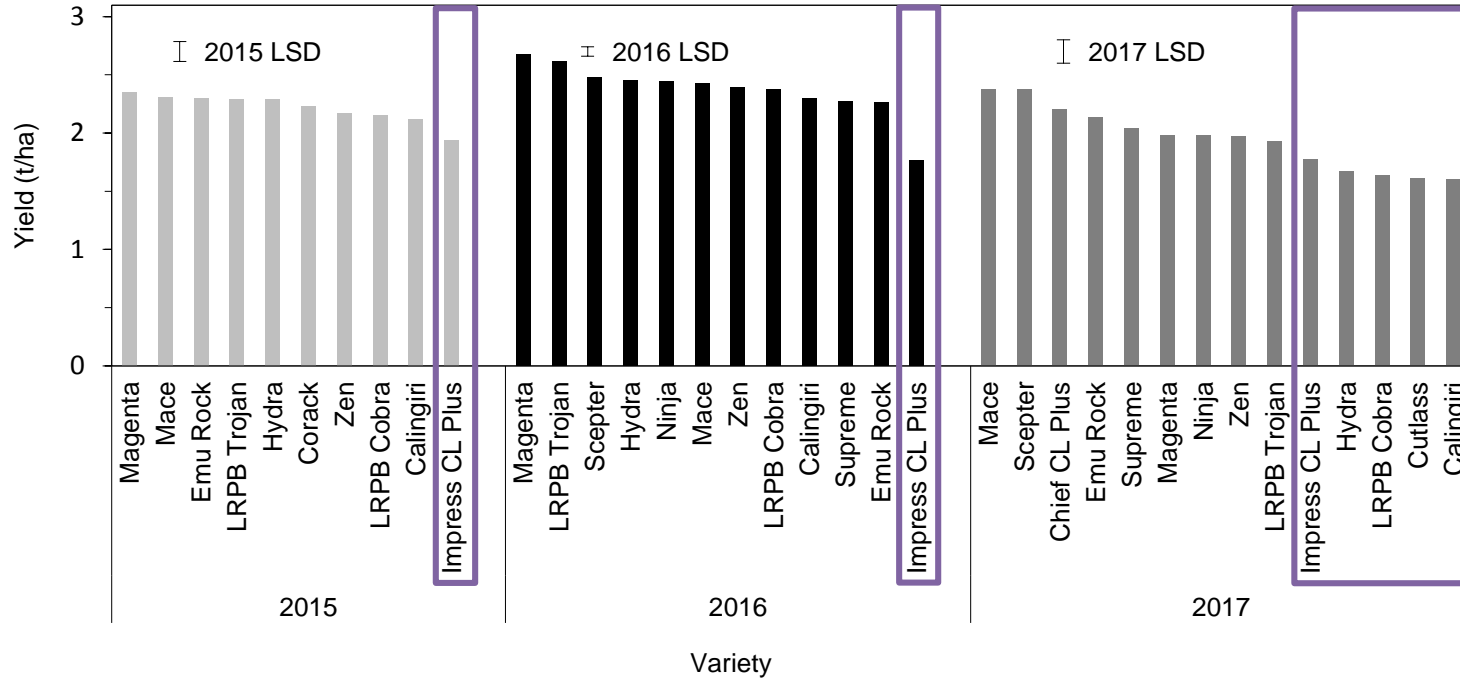
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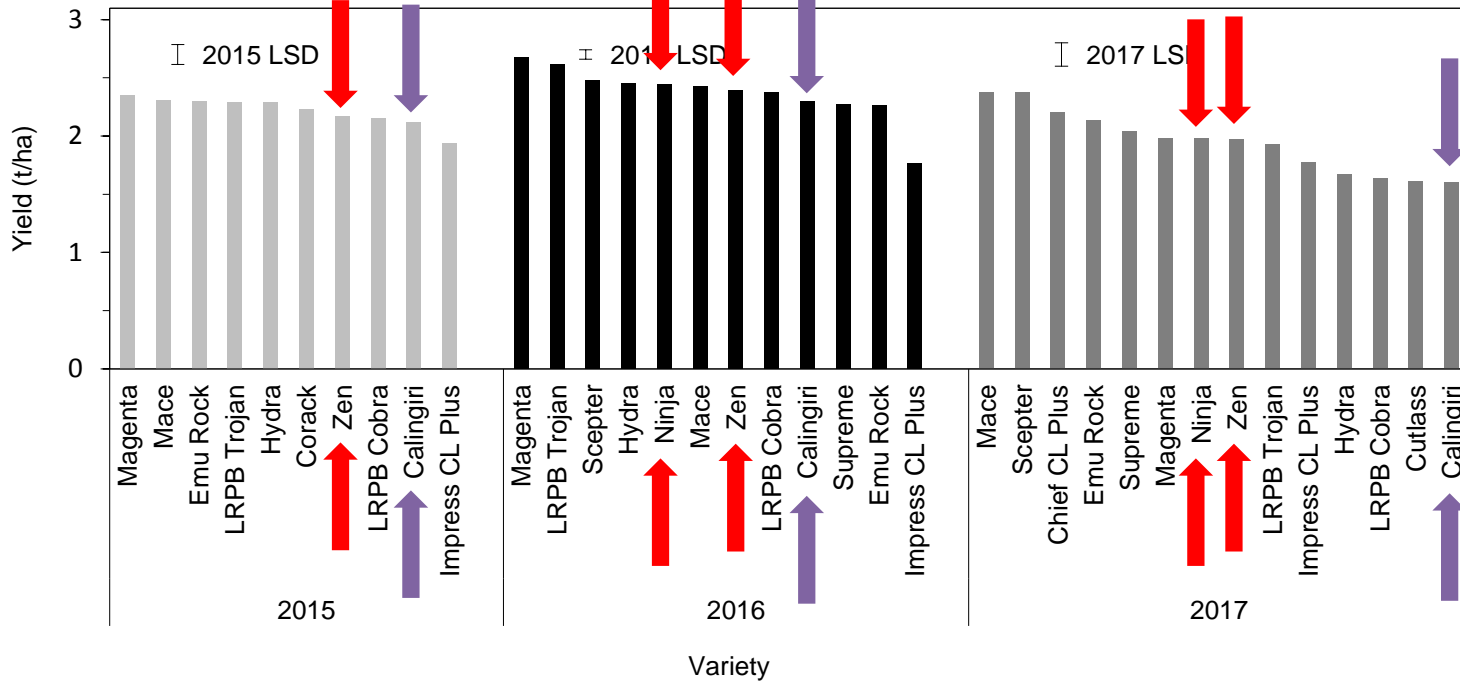
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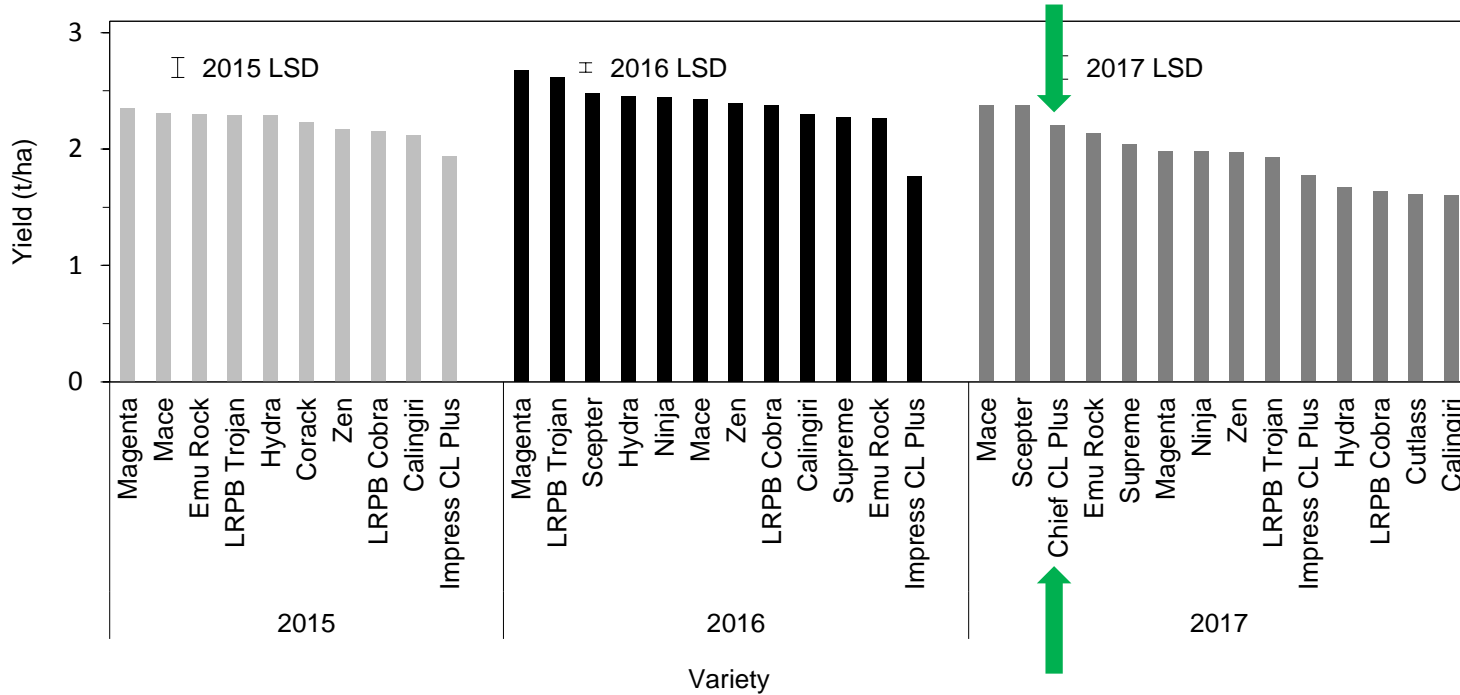
Which wheat variety?



Which wheat variety?



Which wheat variety?



Agzone 4

All zones

Wheat NVT results

35 N	2015	Year	2015	*31 N	2016	2016	54 N	2017	2017
	2.11	Mean yield	2.73		3.05			3.55	
	9	No. sites	44		4	25		9	39

Source: NVT Online



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Wheat NVT results

Total N
Merredin site

- Agzone 4
- All zones

	2015	Year	2015	2016	2016	2017	2017
35 N	2.11	Mean yield	2.73	3.05	3.55	2.15	3.17
	9	No. sites	44	4	25	9	39
*31 N							
54 N							

Source: NVT Online



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Agzone 4

All zones

Wheat NVT results

35 N	2015	Year	2015	*31 N	2016	2016	54 N	2017	2017
	2.11	Mean yield	2.73		3.05	3.55		2.15	3.17
	9	No. sites	44		4	25		9	39
Scepter	108			Scepter	112		Scepter	114	
Ninja	107			Ninja	109		Ninja	109	
Cutlass	106			Hydra	104		Corack	108	
Hydra	105			Mace	104		Mace	107	
Magenta	104			Zen	104		Chief CL Plus	105	
LRPB Cobra	103			Corack	103		Zen	105	
LRPB Trojan	102			Chief CL Plus	101		Hydra	102	
Zen	100			Emu Rock	101		Cutlass	102	
Mace	98			LRPB Cobra	100		LRPB Cobra	100	
Supreme	98			Magenta	100		Emu Rock	100	
Corack	97			Supreme	100		Supreme	99	
Calingiri	96			Cutlass	99		LRPB Trojan	99	
Emu Rock	94			LRPB Trojan	95		Magenta	98	
Impress CL Plus	87			Calingiri	93		Calingiri	97	
Chief CL Plus				Impress CL Plus	86		Impress CL Plus	92	

Source: NVT Online



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□ Agzone 4

▨ All zones

Wheat NVT results

35 N	2015	Year	2015	*31 N	2016	2016	54 N	2017	2017	
	2.11	Mean yield	2.73		3.05	3.55		2.15	3.17	
	9	No. sites	44		4	25		9	39	
Scepter	108	Scepter	110	Scepter	112	Scepter	Scepter	114	Scepter	113
Ninja	107	Ninja	108	Ninja	109	Ninja	Ninja	109	Ninja	110
Cutlass	106	Hydra	105	Hydra	104	Cutlass	Corack	108	Mace	105
Hydra	105	Zen	103	Mace	104	Hydra	Mace	107	Corack	105
Magenta	104	Mace	102	Zen	104	Magenta	Chief CL Plus	105	Zen	105
LRPB Cobra	103	LRPB Cobra	102	Corack	103	Zen	Zen	105	Chief CL Plus	105
LRPB Trojan	102	Corack	101	Chief CL Plus	101	LRPB Cobra	Hydra	102	Hydra	103
Zen	100	Cutlass	101	Emu Rock	101	LRPB Trojan	Cutlass	102	Cutlass	102
Mace	98	Magenta	100	LRPB Cobra	100	Mace	LRPB Cobra	100	LRPB Cobra	101
Supreme	98	LRPB Trojan	99	Magenta	100	Corack	Emu Rock	100	Magenta	100
Corack	97	Supreme	97	Supreme	100	Supreme	Supreme	99	Supreme	99
Calingiri	96	Emu Rock	96	Cutlass	99	Chief CL Plus	LRPB Trojan	99	LRPB Trojan	98
Emu Rock	94	Calingiri	95	LRPB Trojan	95	Emu Rock	Magenta	98	Emu Rock	98
Impress CL Plus	87	Impress CL Plus	93	Calingiri	93	Calingiri	Calingiri	97	Calingiri	97
Chief CL Plus		Chief CL Plus		Impress CL Plus	86	Impress CL Plus	Impress CL Plus	92	Impress CL Plus	91

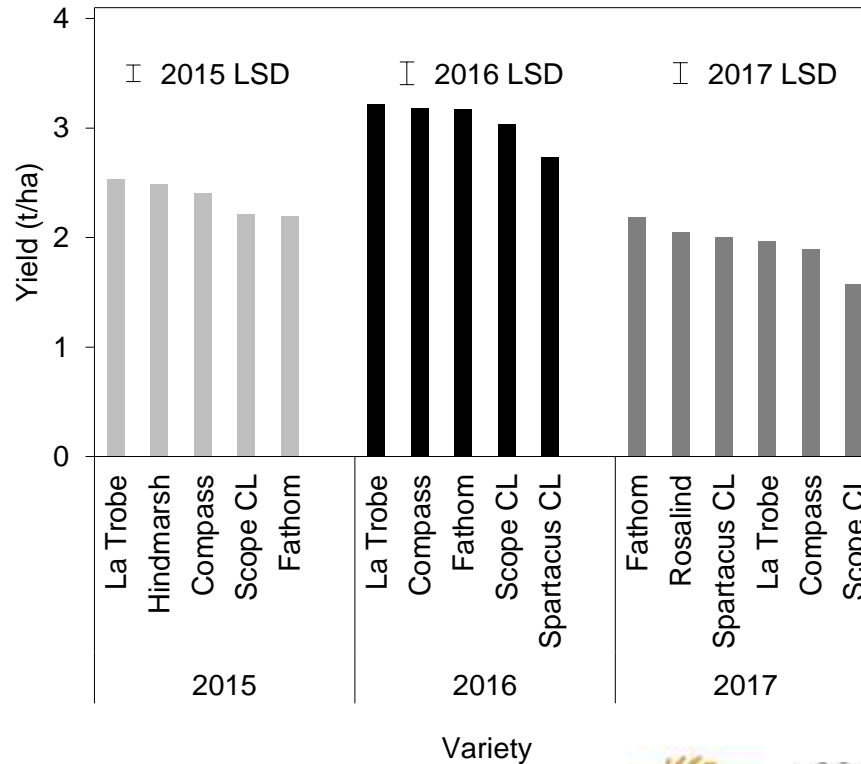
Source: NVT Online



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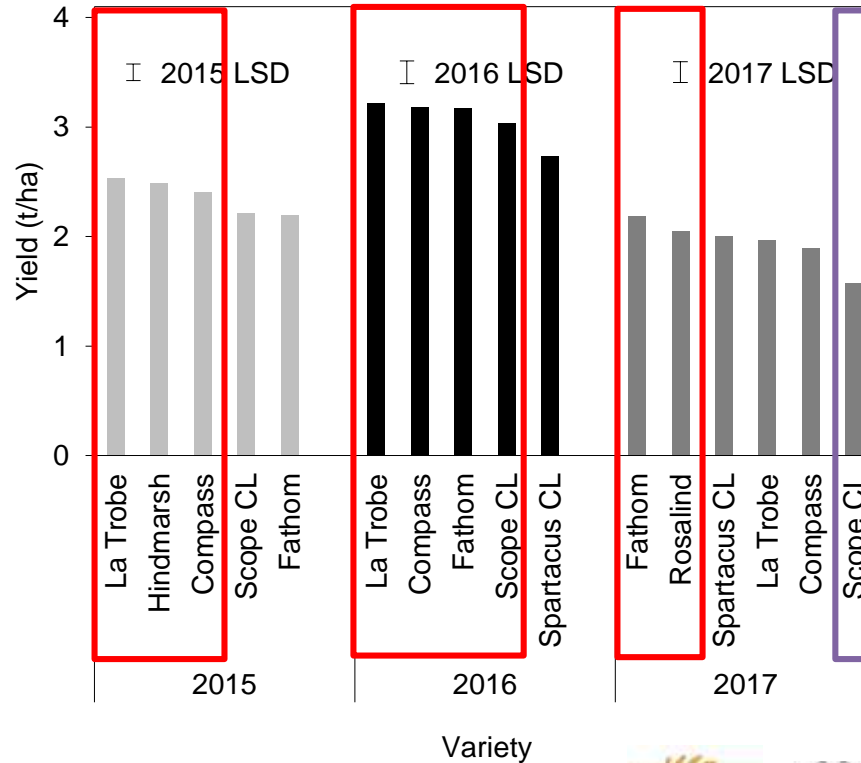
Which barley variety?



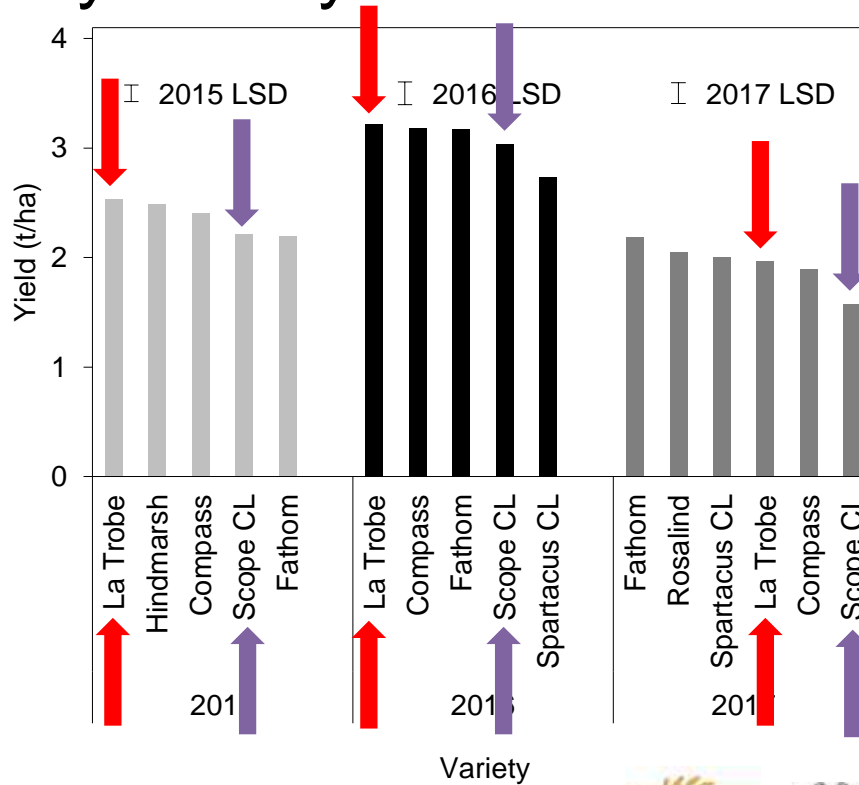
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Which barley variety?



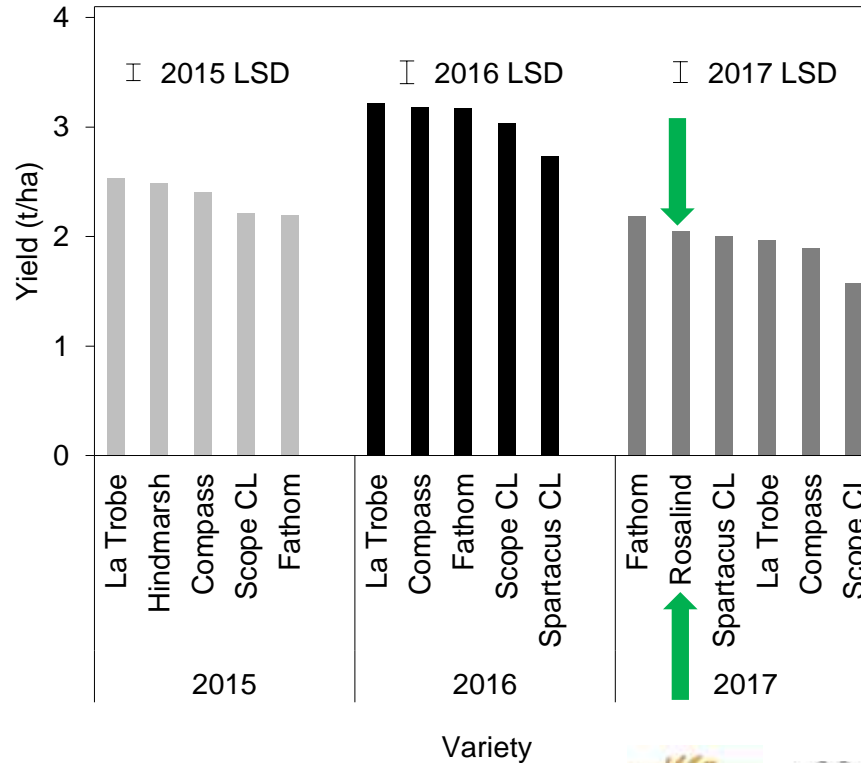
Which barley variety?



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Which barley variety?



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- Agzone 4
- All zones

Barley NVT results

	2015	Year	2015		2016		2016		2017		2017
35 N	2.82	Mean yield	3.1	*12 N			3.87	*63 N	1.45		3.5
	2	No. sites	20				9		1		15
Rosalind	121	Rosalind	119	Rosalind		Rosalind	110	Rosalind	137	Rosalind	111
Spartacus CL	115	Spartacus CL	112	Spartacus CL		Fathom	104	Spartacus CL	131	Compass	106
Hindmarsh	114	Hindmarsh	111	Compass		Compass	103	Compass	130	Fathom	105
Compass	113	La Trobe	109	La Trobe		Hindmarsh	100	La Trobe	123	Spartacus CL	104
La Trobe	110	Compass	108	Fathom		La Trobe	100	Fathom	120	La Trobe	104
Fathom	102	Fathom	101	Scope		Spartacus CL	98	Scope	101	Scope	98
Scope	97	Scope	94	Hindmarsh		Scope	98	Hindmarsh		Hindmarsh	

Source: NVT Online



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Return on fertiliser management

	2015		2016		2017		Accum. \$return 3 years
	t/ha	Net return \$/ha	t/ha	Net return \$/ha	t/ha	Net return \$/ha	
Wheat							
Decile 1	2.02	504	1.77	443	2.03	508	1456
Decile 4-5	2.25	541	2.23	536	2.03	484	1561
Decile 7-8	2.27	527	2.63	616	1.88	428	1572
Play the season	2.31	536	2.85	645	1.86	395	1576
Barley							
Decile 1	2.10	463	2.43	534	2.03	446	1443
Decile 4-5	2.39	504	2.88	612	2.03	424	1540
Decile 7-8	2.51	513	3.38	704	1.91	379	1595
Play the season	2.47	502	3.59	722	1.83	334	1557

Farm gate
Wheat \$250/t
Barley \$220/t
Fertiliser
Urea \$420/t
MAP \$700/t
Spreading
\$10/ha

Net return = farm gate minus fertiliser cost



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Return on fertiliser management

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Best 3 year
management
wheat
\$1694/ha

Best 3 year
management
barley
\$1680/ha

Decile 1: 0P 0N Decile 4-5: 5P 10N Decile 7-8: 5P 30N

2015 Play the season: 5P 10N + 10N

2016 & 2017 Play the season: 5P 20N + 30N



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Opportunity cost t/ha

Wheat

	2015	2016	2017	Avg.	Total
Variety	0.4	0.9	0.8	0.7	2.1
Fertiliser	0.3	1.2	0.2	0.5	1.5

Barley

	2015	2016	2017	Avg.	Total
Variety	0.3	0.5	0.6	0.5	1.4
Fertiliser	0.4	1.2	0.2	0.6	1.8

Opportunity cost t/ha

Wheat

	2015	2016	2017	Avg.	Total
Top	2.3	2.7	2.4	2.5	7.4
Mid	2.2	2.4	2.0	2.2	6.6
Low	1.9	1.8	1.6	1.8	5.3

Barley

	2015	2016	2017	Avg.	Total
Top	2.5	3.2	2.2	2.6	7.9
Mid	2.4	3.2	1.9	2.5	7.5
Low	2.2	2.7	1.6	2.2	6.5

Farm gate
Wheat \$250/t
Barley \$220/t

Opportunity cost \$/ha

Wheat

	2015	2016	2017	Avg.	Total
Top	587	670	595	617	1852
Mid	542	610	495	550	1647
Low	485	440	400	442	1325

Barley

	2015	2016	2017	Avg.	Total
Top	559	708	480	583	1747
Mid	530	702	418	550	1650
Low	484	603	345	477	1432

Key messages

- No interaction between variety and nutrition
- Tactical N important for given season but not overall variety performance
- Important to get variety right – yield, quality, disease etc.
- Maximise profit potential in favourable seasons with sufficient fertiliser



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Acknowledgements

- Andrew van Burgel DPIRD for statistical analysis
- Kalyx and Living Farm for establishing and managing trials
- McGinniss, Gethin and Crook families for hosting trials
- GRDC RCSN for supporting the project concept
- DPIRD staff

GRDC/RCSN MDF00001 Reducing variety selection risk through understanding varietal performance with different management strategies

GRDC/Royalties for Regions/DPIRD DAW00256 Building crop protection and production agronomy R&D capacity in regional Western Australia



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Thank you

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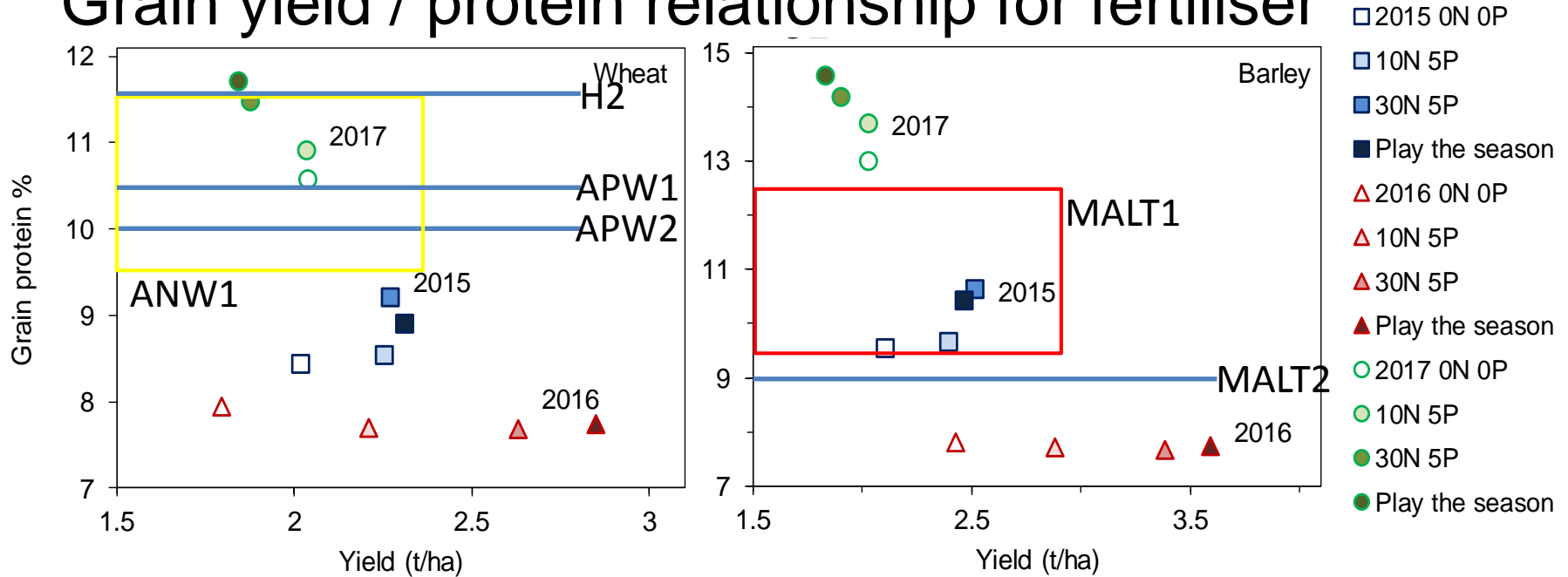
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Does fertiliser regime change grade?

Grain yield / protein relationship for fertiliser



Generally, no...

Site/season bigger influencer

Targeted heavier soils

