
1970


1970


2020

Ambling in Arable – 50 years

Nick Pyke

Agronomy Conference

31st August 2022


1960


2020

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AGRONOMY SOCIETY NZ

1st publication - 1971 Journal Papers

26 papers

- *Grain yields of four barley cultivars in field trials 1965-71*

  ***K. Cattier, L.W. Blackmore, J.A. Douglas, C.C. McLeod, G.W. Nixon and R.C. Stephen* pp. 9-15**

- *The effects of plant populations and row spacings on the grain yield of maize (Zea mays L.)*

  ***J.A. Douglas, K. Cottier and G.L.B. Cumberland* pp. 31-39**

- *The potential of direct drilled maize (Zea mays L.) for greenfeed and silage production*

  ***P.P. Williams, I.C. Logan and J.G. Whittles* pp. 67-75**

- *The effects of plant spacings and irrigation on the yields of green peas (Pisum sativum hortense L.)*

  ***J.G.H. White and J.A.D. Anderson* pp. 121-128**

- *Spring-sown field experiments with wheat selections in Canterbury*

  ***R.C. Stephen and C.C. McLeod* pp. 165-172**

- *Seasonal variations in the levels of mineral nitrogen in two soils under different management systems*

  ***T.E. Ludecke and K.C. Tham* pp. 203-214**

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Dr Harvey Smith –Presidential Address 1971

Greater emphasis will have to be placed on the following topics:

1. Breeding hybrid crop varieties
2. Breeding high quality processing crops
3. Husbandry of new crops e.g., peppermint, edible dry beans and drug crops
4. Irrigation and fertiliser requirements for crops
5. Development of intensive cropping and pasture systems.

1996 - Arable farming and research - into the next century

- The arable industry has good practices – environmental.
- New technology and products will provide effective solutions.
- New information rapidly implemented into farm operations.
- These, plus predicted world shortages of grain, place the industry in a very sound position to meet the demands of the future.

What the future will involve

Molecular techniques, remote sensing, crop modelling, biopesticides, integrated management practices, targeted and variable rate application of inputs, disease & pest prediction, technology yield maps.

1996 Proceedings Agronomy Society of New Zealand 26: 9-12

NZ cropping 1970 to today

Crop	Tonnes produced 000		Estimated area 000 ha		Export value $mill (2021)	Domestic value $mill
	1970	*2021*	*1970*	*2021*		
Wheat	384	460	107	45	$170*	$180
Barley	260	290	81	44	0	$115
Maize	101	200	15	18	$1.4	$296 sil, 93 grn
Seeds		81		43**	$260	$84
Forage Brassicas			210	240(20)	-	
Potatoes	494(99)	533	14(99)	10.5(19)	$100	$942
Processed peas	78(99)	66	9.5(99)	4(20)	$108	$25
Onion		208		5.3(20)	$145	$23

Source: BERL report 2021, Fresh Facts 1999, 2020 and Indexmundi

* Baked products - Not all NZ wheat

** Certified seed only

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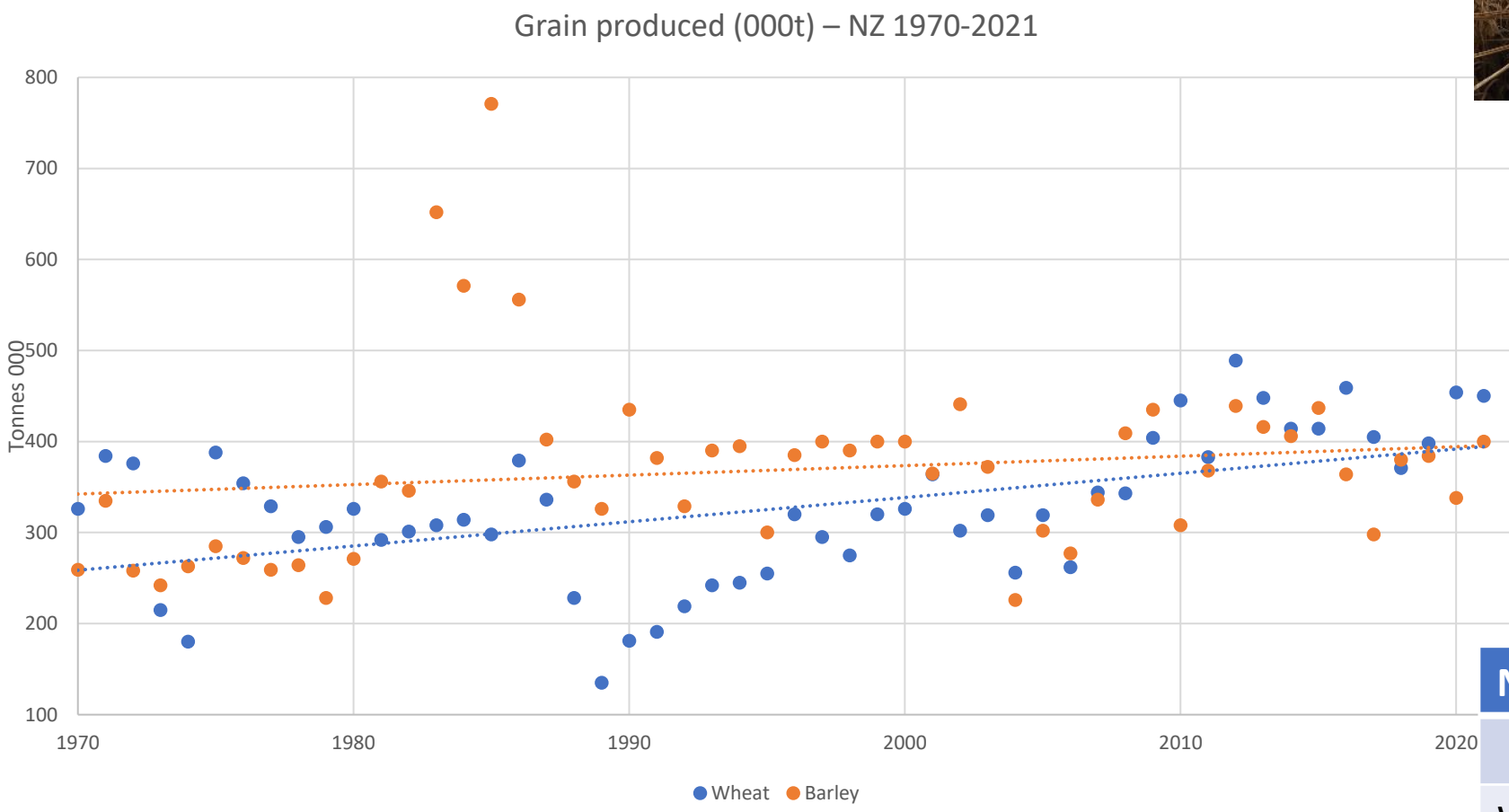
50 years of grain production in NZ



NZ Consumption (tonnes)		
	1970	2021
Wheat	400,000	960,000
Barley	282,000	350,000

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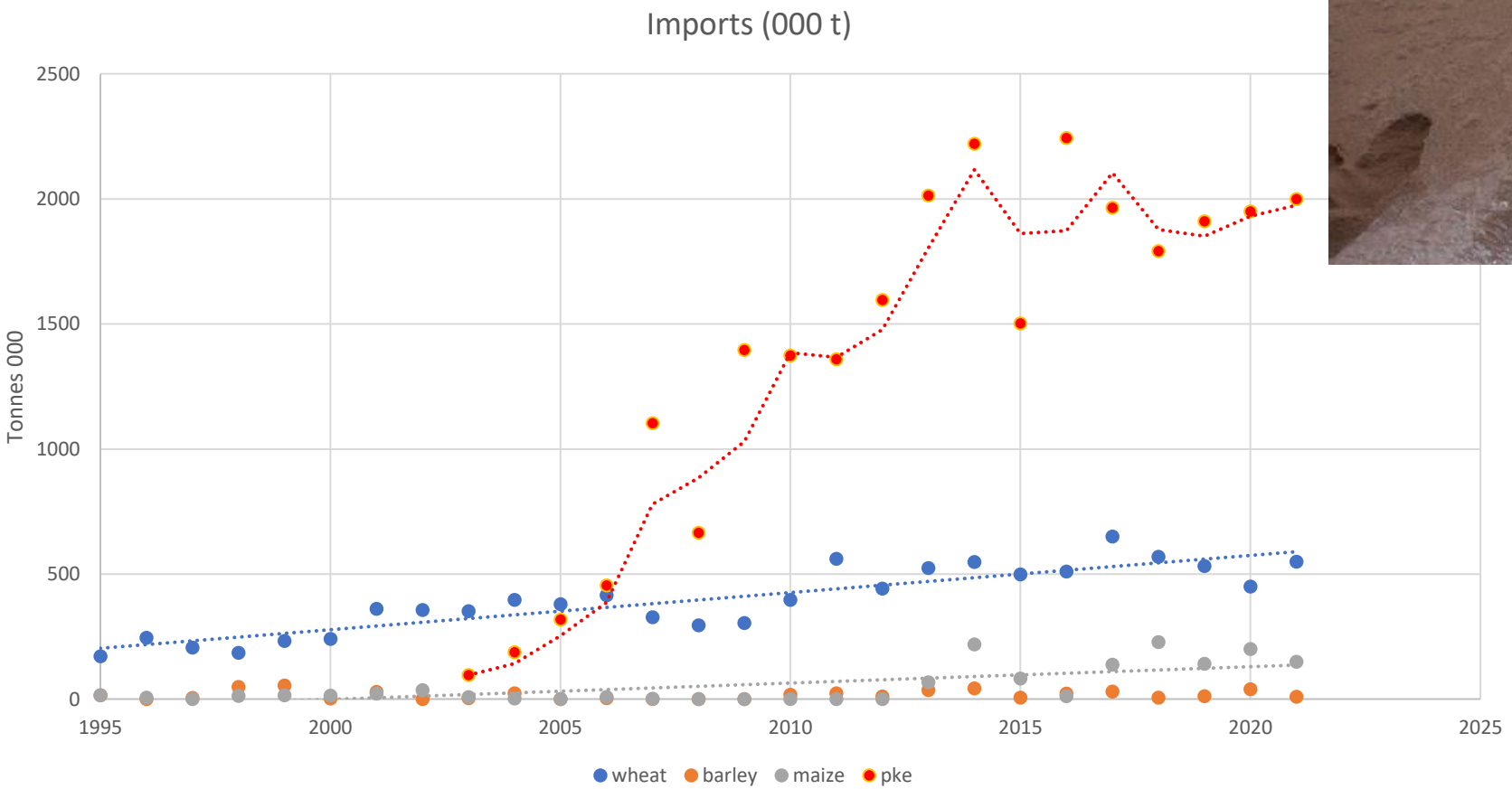
Increased Imports – Grain and PKE



Imports baked products $270 mill in 2019 Source: Indexmundi

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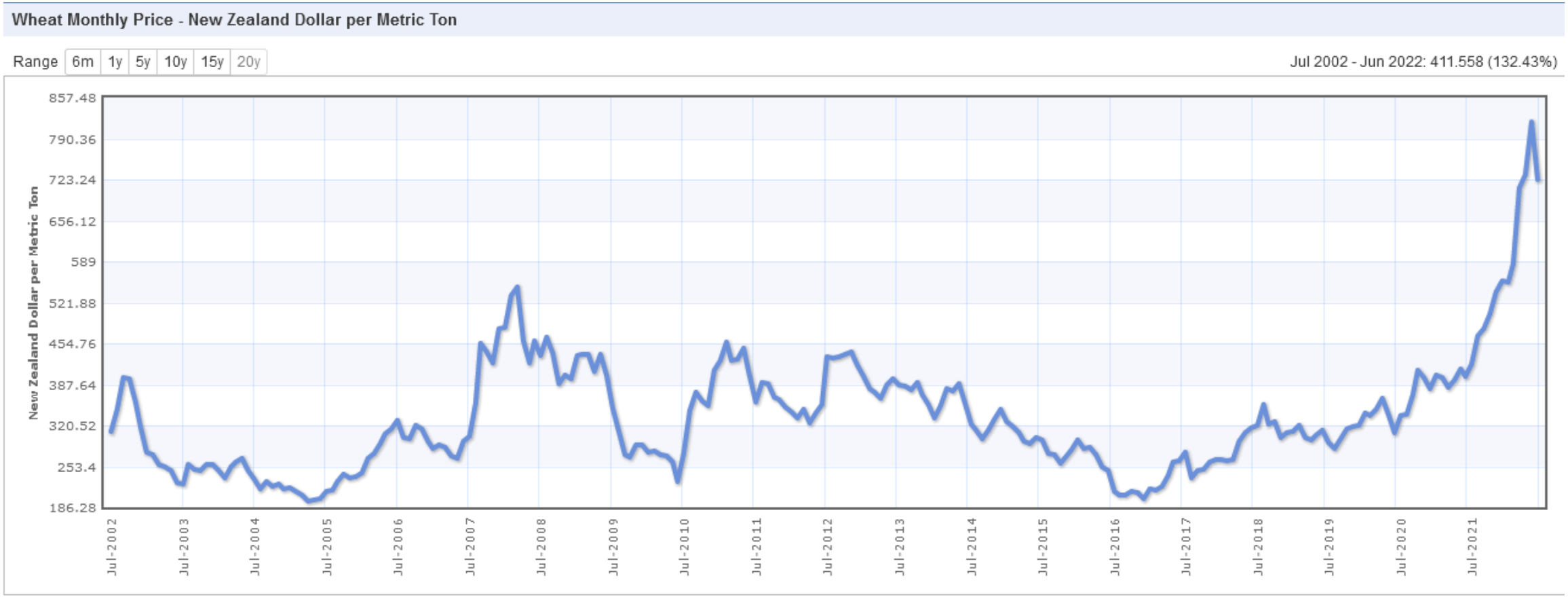
Volatile Commodity Prices - NZD – Gulf port



Description: Wheat (U.S.), no. 2 hard red winter Gulf export price; June 2020 backwards, no. 1, hard red winter, ordinary protein, export price delivered at the US Gulf port for prompt or 30 days shipment

Unit: New Zealand Dollar per Metric Ton

NZ Grain yields 1870 - 1970

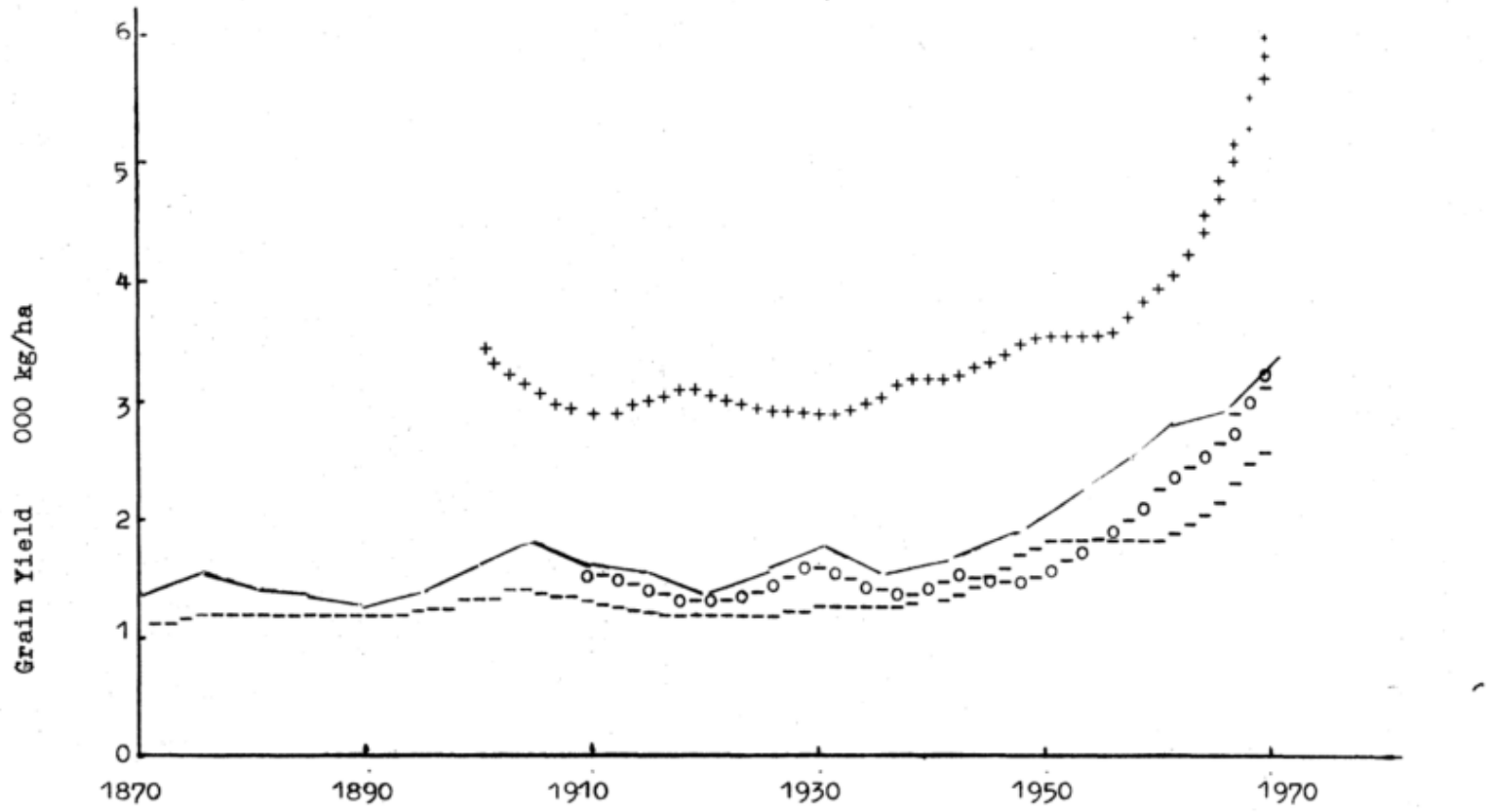
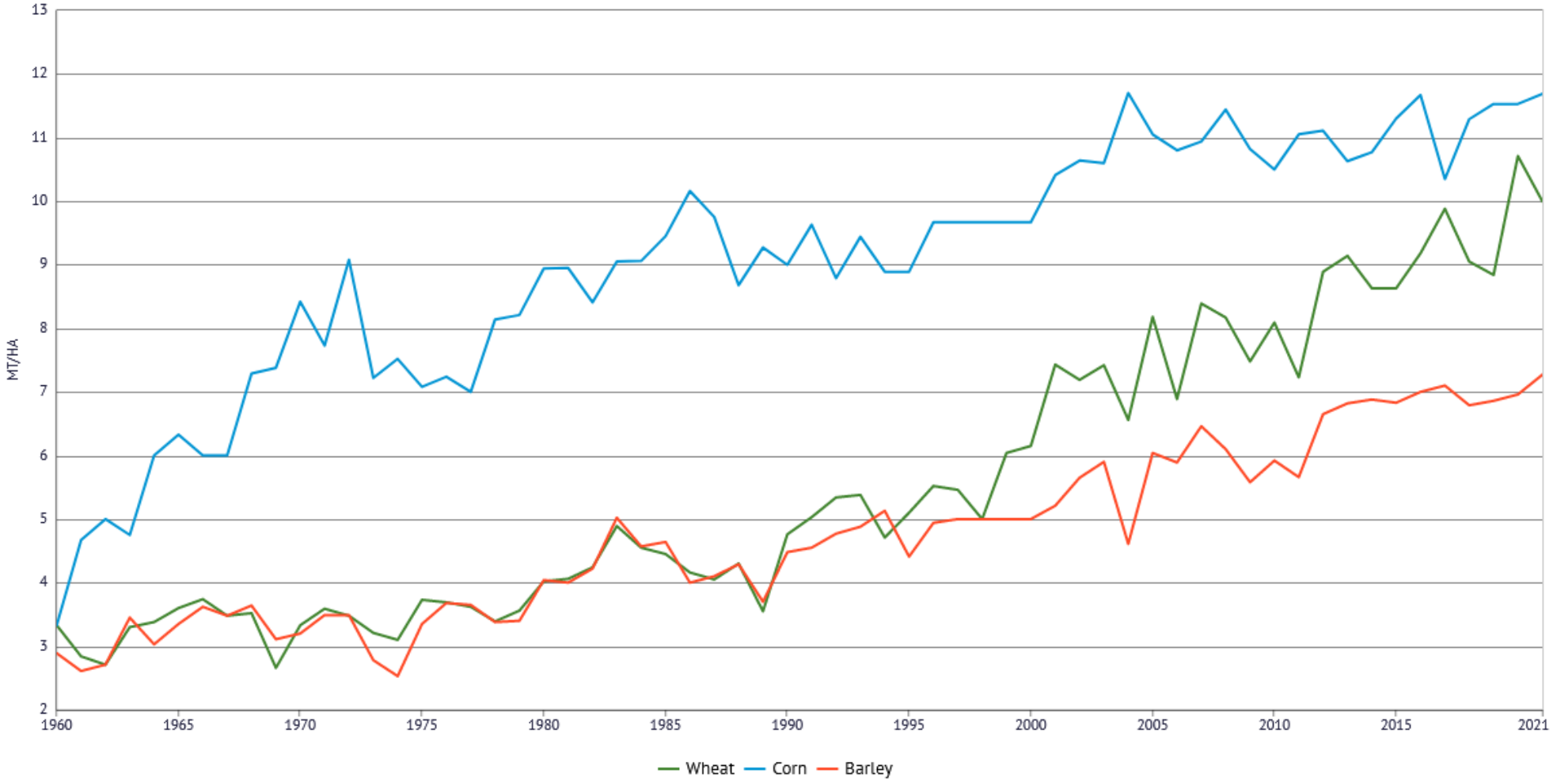


Fig. 1. Five year average grain yields of wheat—— ; oats ---; barley 0-0-0 and maize + + + in New Zealand 1870-1970.

Smith H 1971: Developments in Agronomy. Agronomy Journal NZ: 1, 1-8

NZ grain Yield increase 1960-2021



https://knoema.com/USDAPSD2021May25/production-supply-and-distribution-of-agricultural-commodities-by-market-year-25-may-2021

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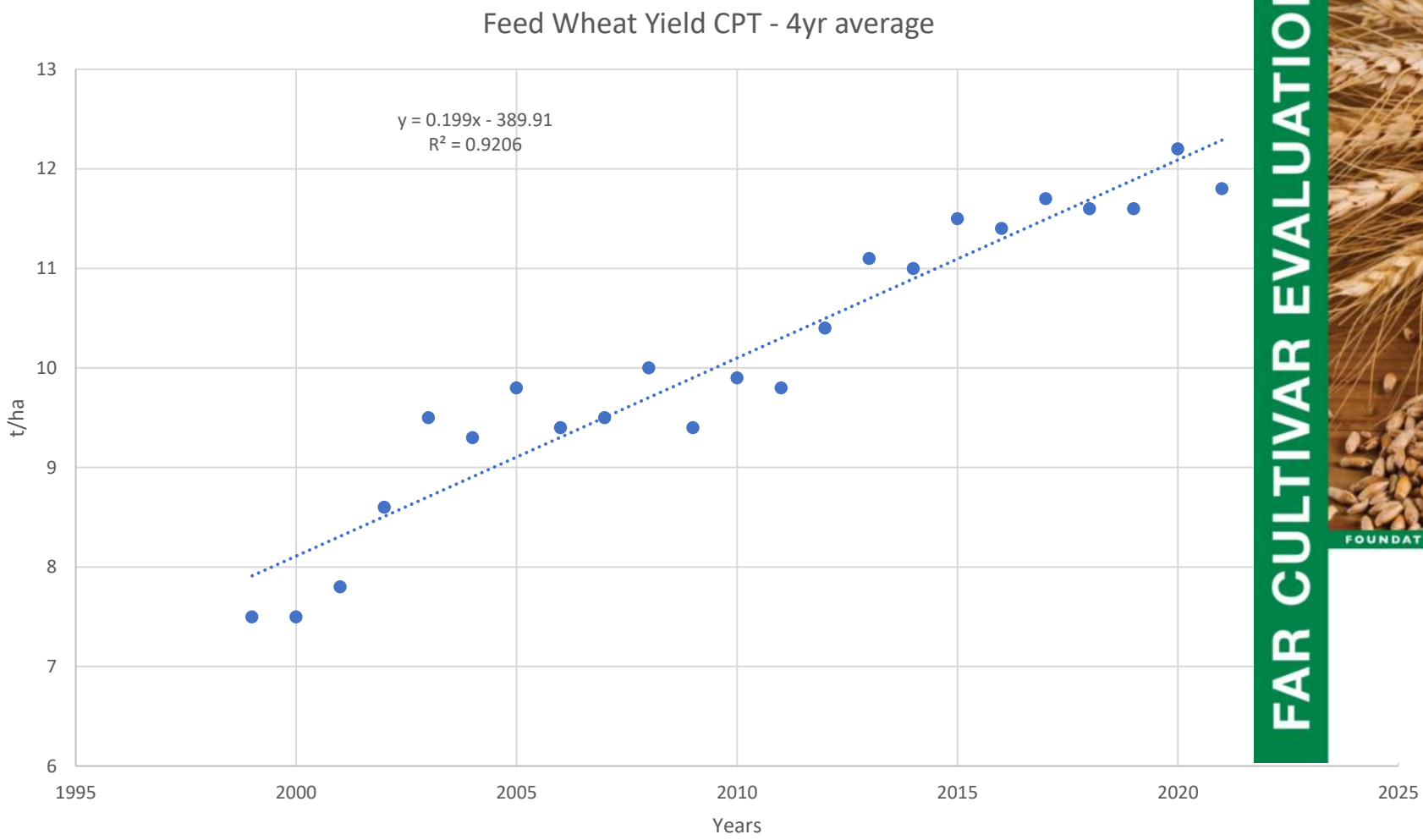
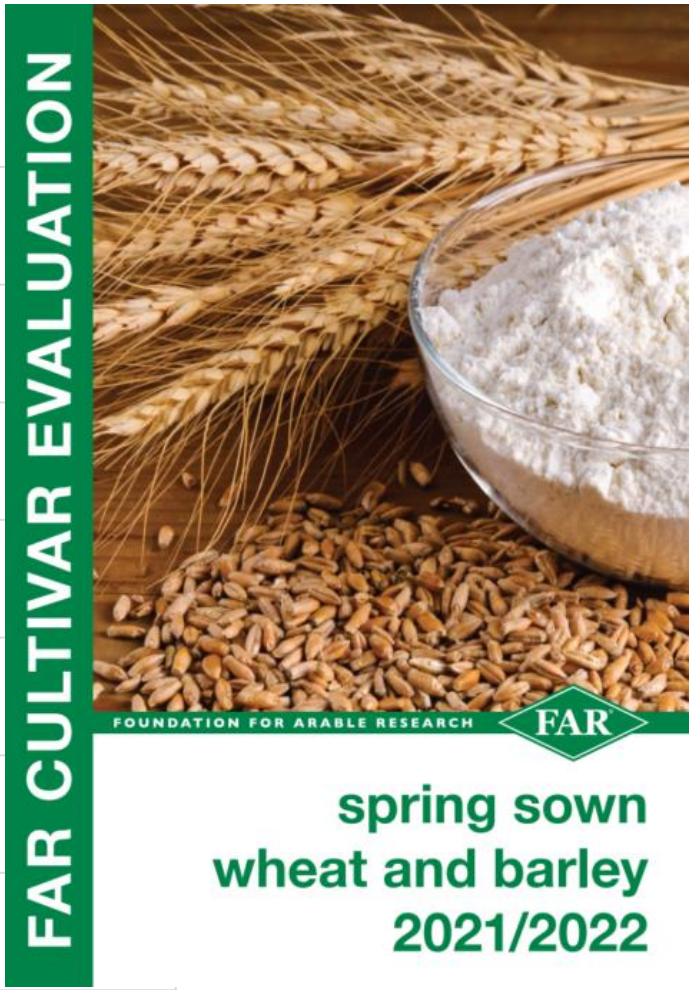
Yield increase wheat – CPT 4yr average





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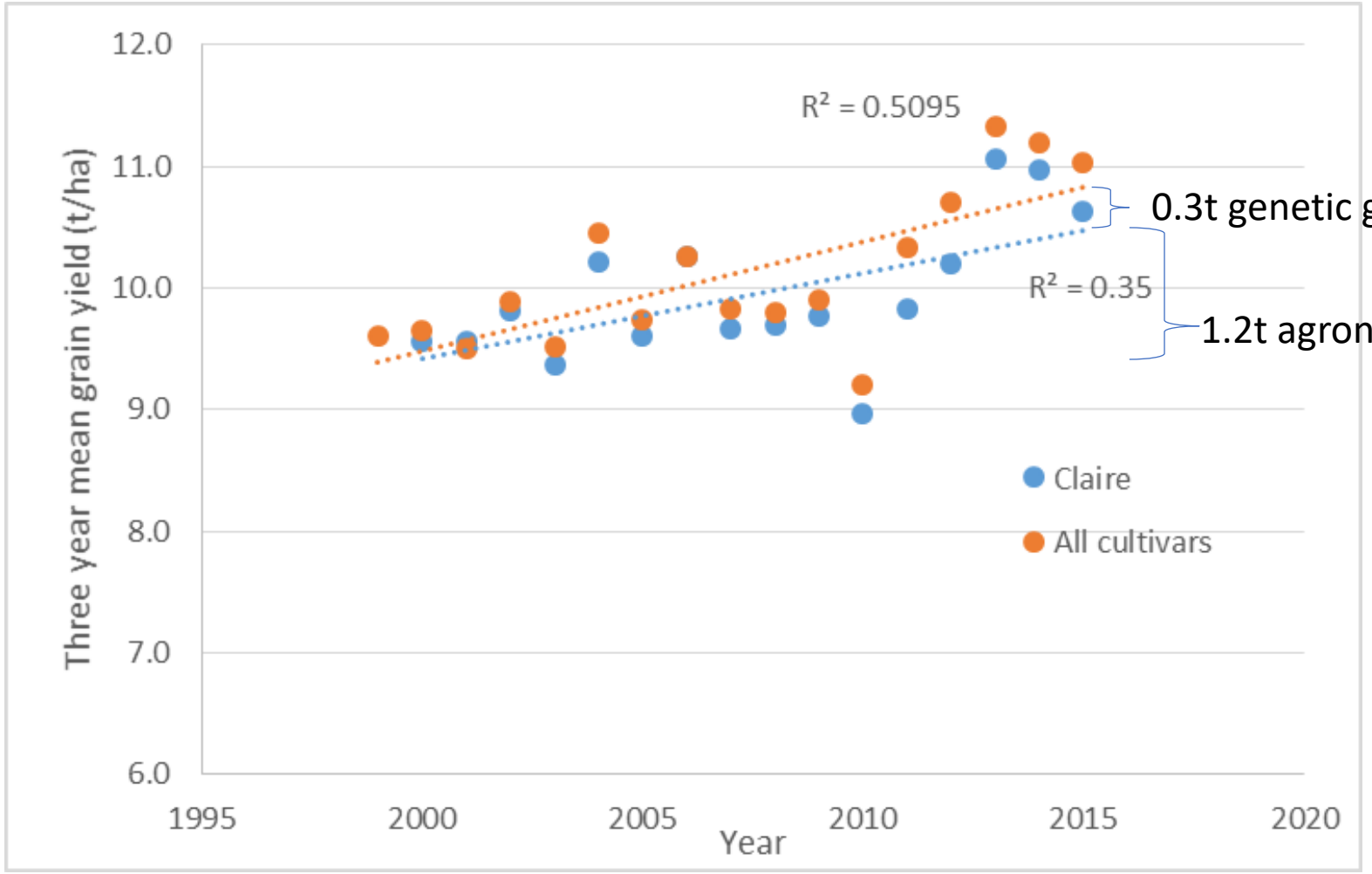
Genetic and Agronomic Yield Gain - CPT



0.3t genetic gain = 17.6kg/year

1.2t agronomic gain = 70.6kg/year

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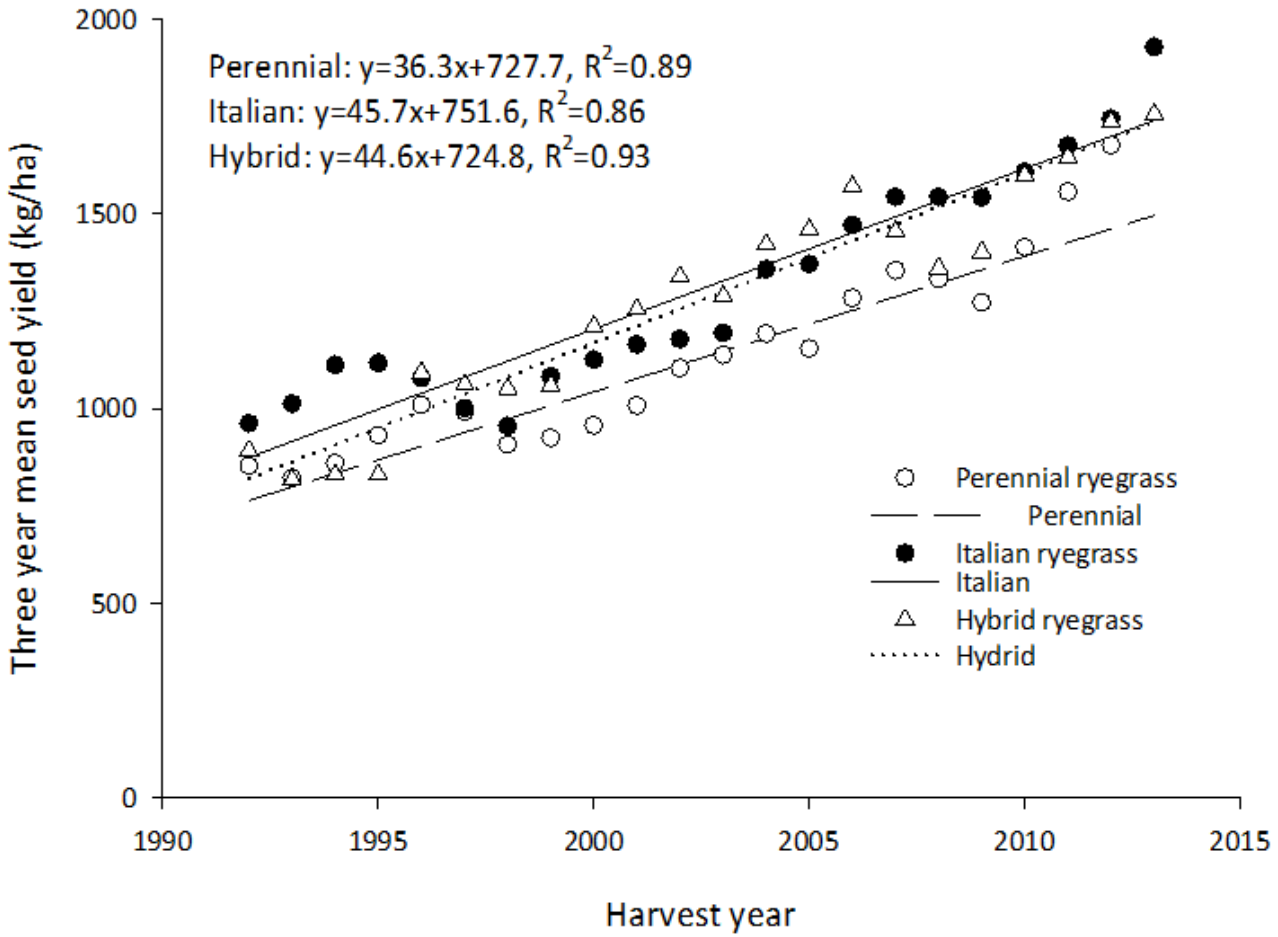
Ryegrass seed yield increase



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Benefits of irrigation

- Grow a wider range of crops – vegetables, seed (over 75%).
- Increase yields.
- Improve soil quality.
- Reduces environmental impacts.

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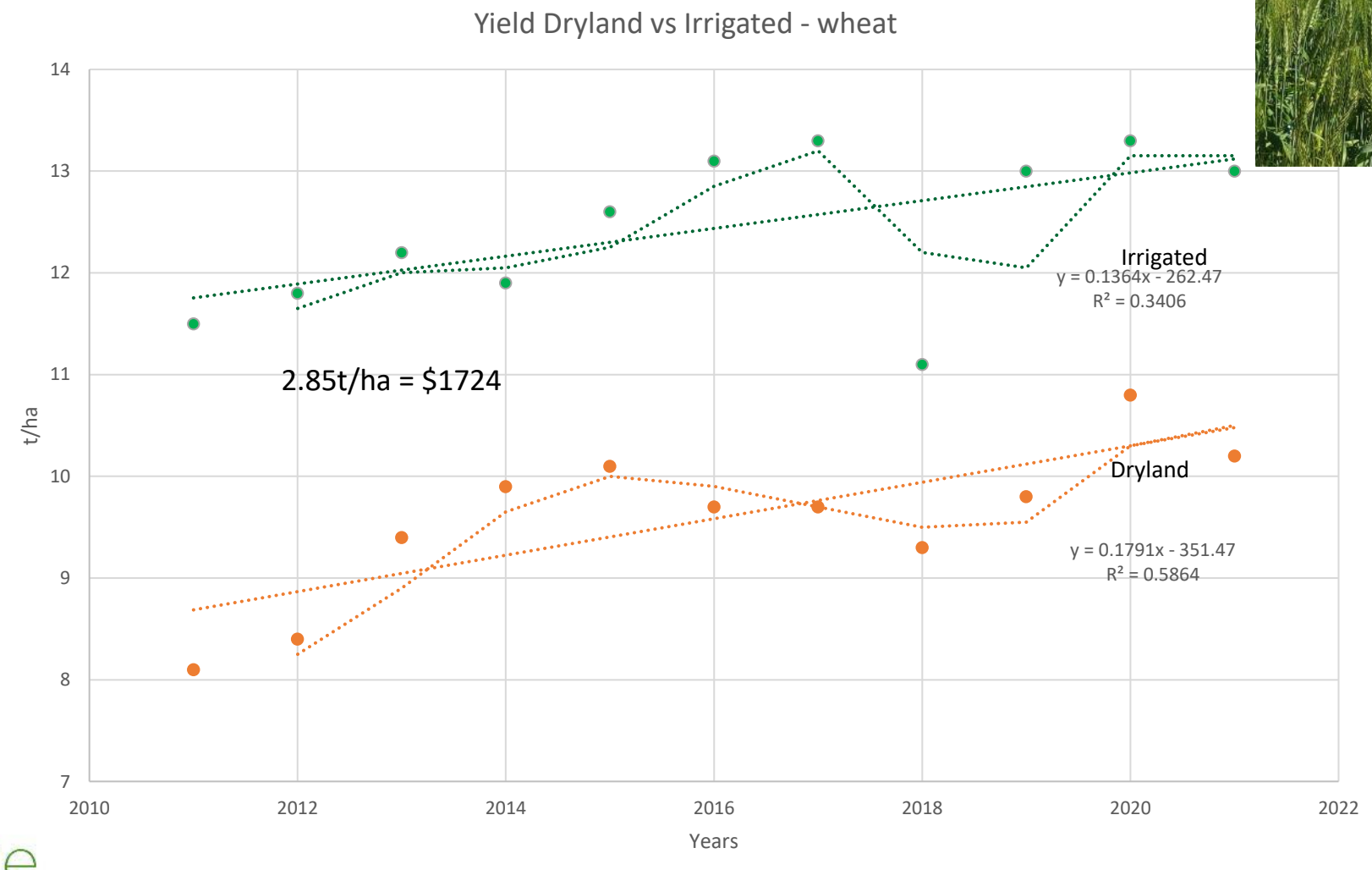
Irrigation benefit – wheat (CPT data)



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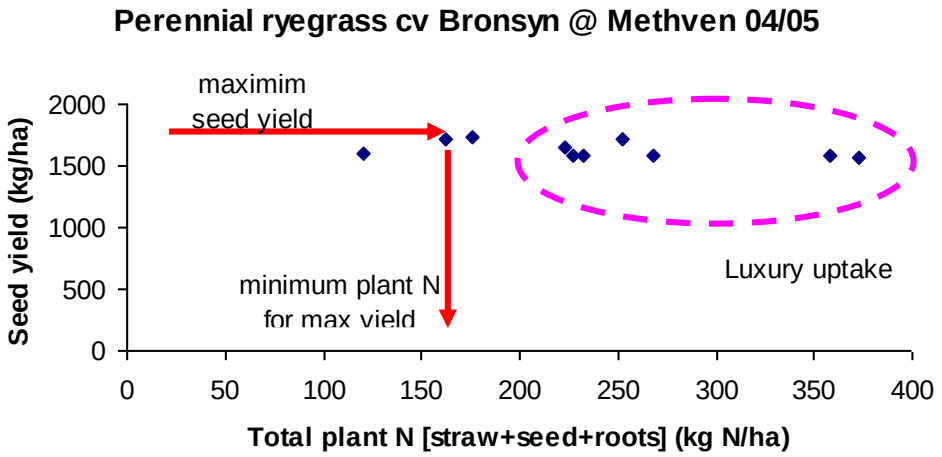
$ benefit of irrigation – grass & peas

PEAS	Increase yield over nil	Extra seed value $	Water applied	Return over cost of water ($2.50/mm)
Early 3 appl	0.58	580	108	310
Late 3 appl	0.51	510	84	300
Mid-late 9 appl	0.93	930	216	390
Full 12 appl	1.18	1180	379	232

	Dryland yield kg/ha	Irrigated yield kg/ha	Extra seed value $
Perennial	980	1900	2024
Italian	670	1880	2300

Nitrogen use - ryegrass

Early 1990s -
increase 80kg to 120kg/ha
Late 1990s –
increase 120kg to 300kg/ha
2000ish –
decrease to 200kg/ha
2010 –
decrease 185kg = soil N + applied N



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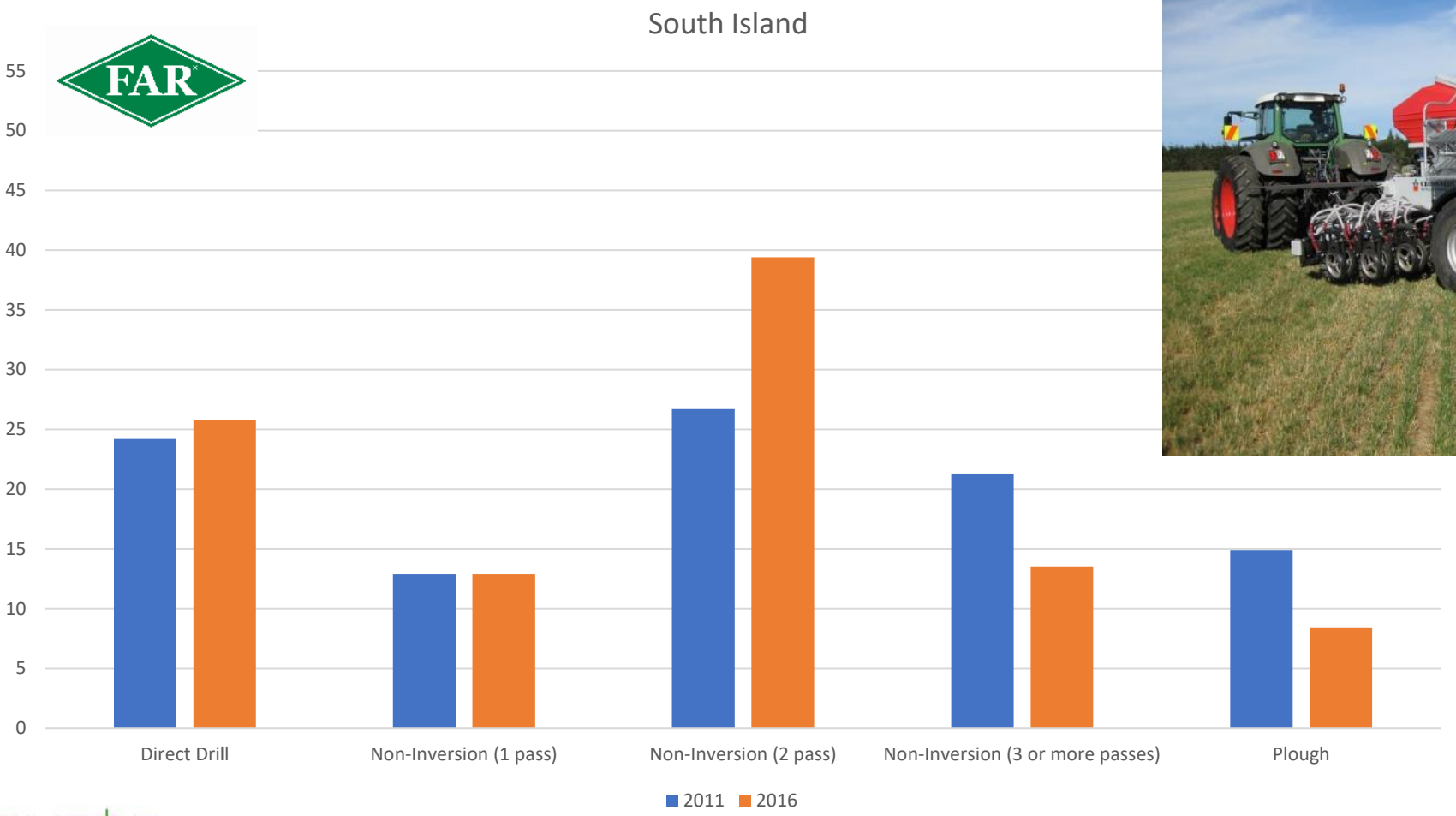
Increase in reduced tillage following cereals



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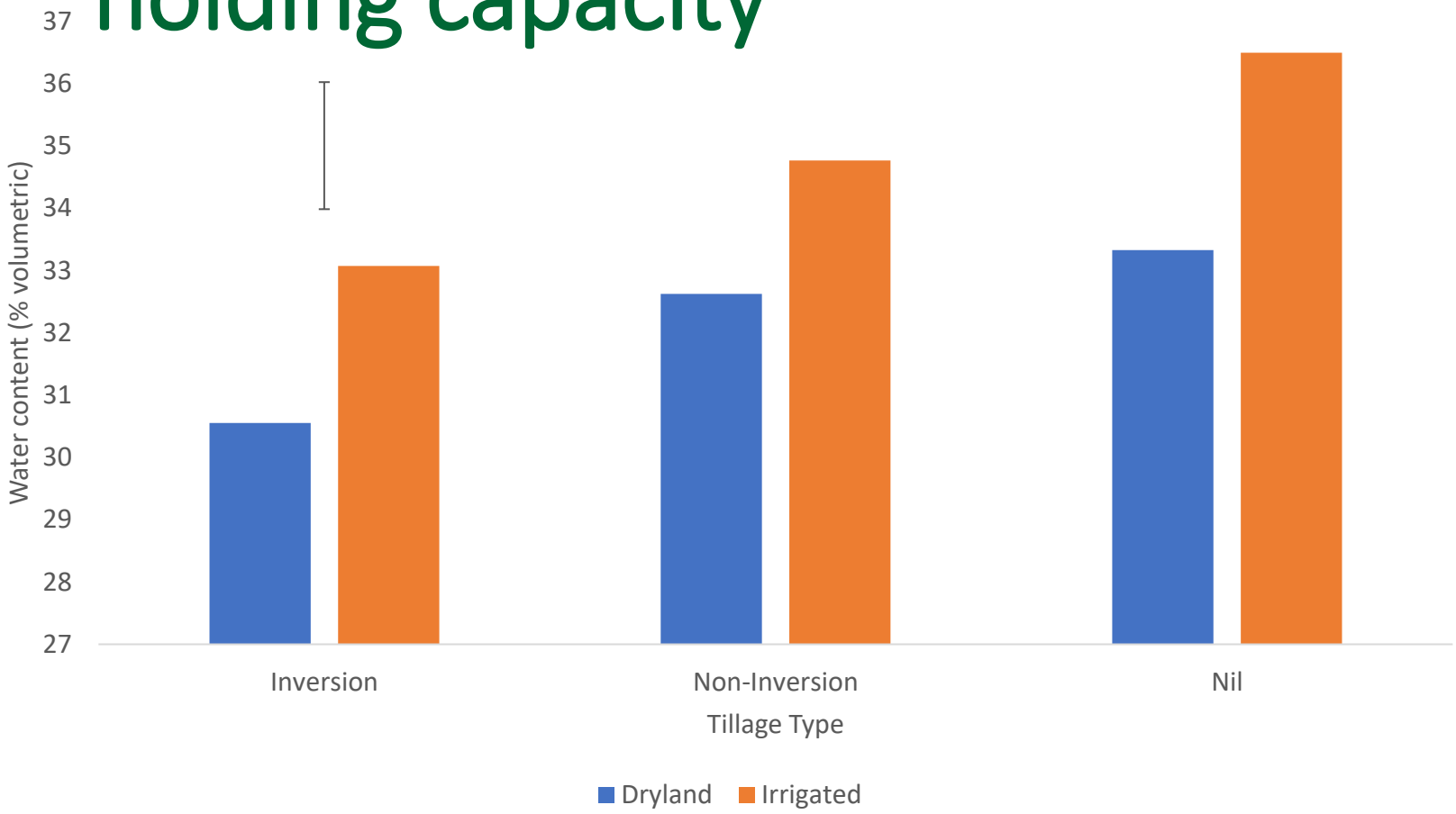
Reduced tillage increases water holding capacity



Mean volumetric water content (%) at field capacity from 2015 for the three cultivation types and two irrigation treatments

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Tillage and Soil quality

Cultivated No - till

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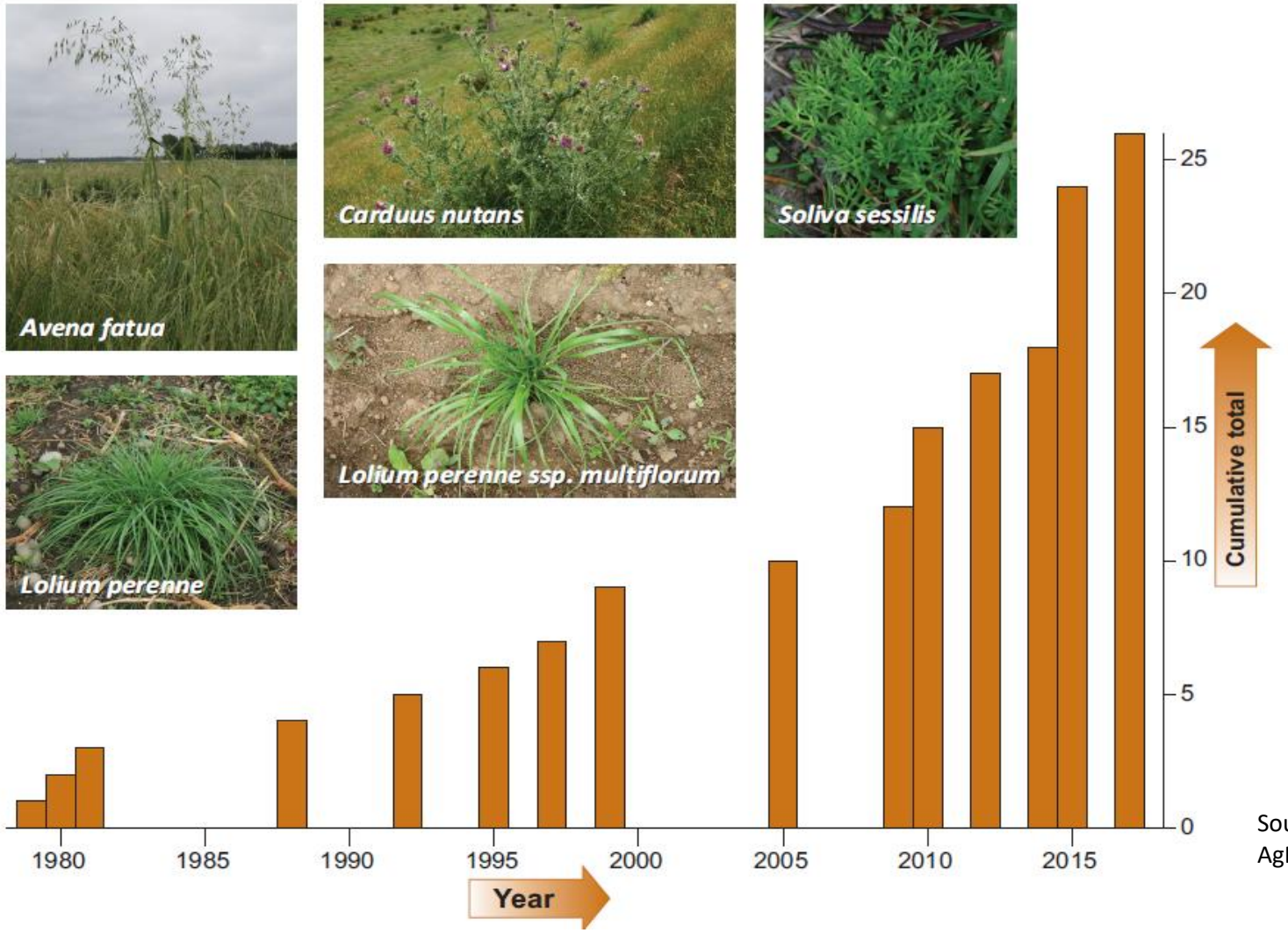
Pest & disease – what is changing?

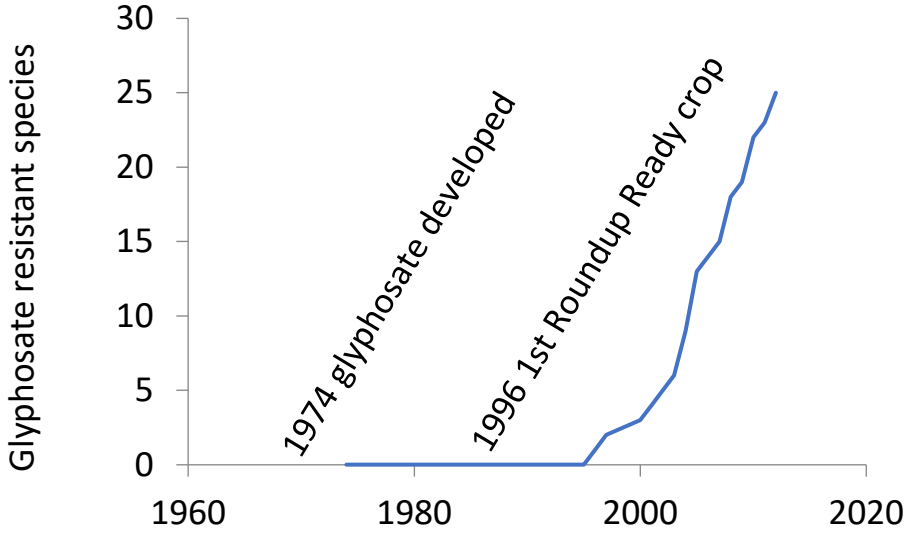
- Glyphosate – resistance, bans, cancer, reduced till
- Neonicotinoids – bans, beneficial insects
- Resistance – herbicides, insecticides, fungicides
- New registrations – new chemistry
- Biopesticides, Endophyte, IPM– R&D, efficacy, targeted, beneficials, soft chemistry
- Biodiversity – ecosystem services, markets
- Consumer – spray free, organics

Increased Herbicide Resistance in NZ

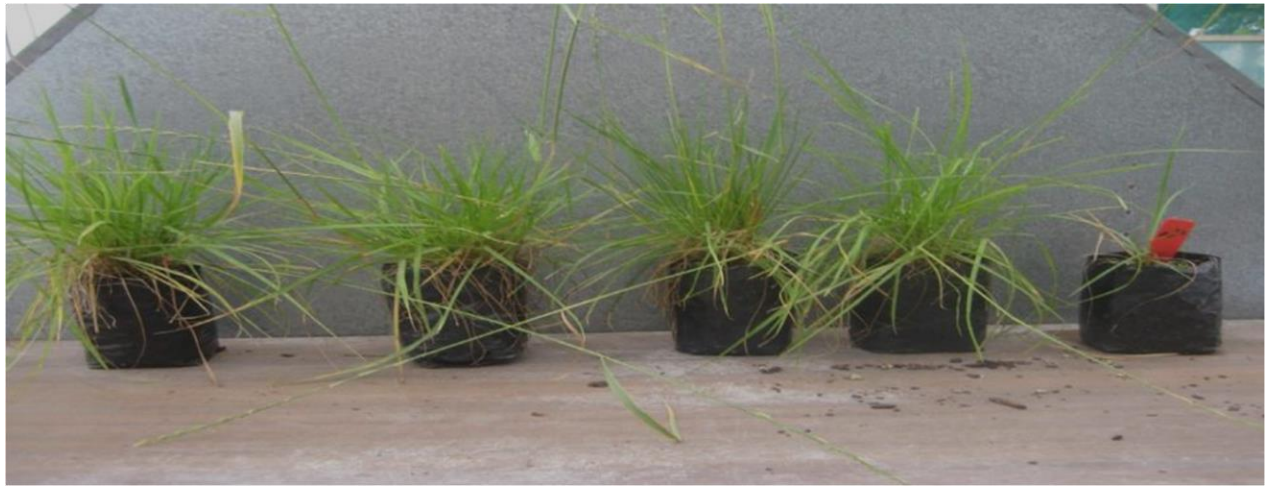


Source: Trevor James AgResearch

Glyphosate resistance – a concern



World



Glyphosate (360) at 0, 1, 2, 4 and 8l/ha

NZ - Reduced tillage, Direct drill, shorter rotations, less animals, usage patterns, cost.

Solutions - Cover crops / IPM/ prediction

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Seeds – NZ is a world leader

- Vegetable seeds – climate, genetics
- Grass seeds – endophyte, forage genetics, climate
- Cereal seeds – quality, out of season

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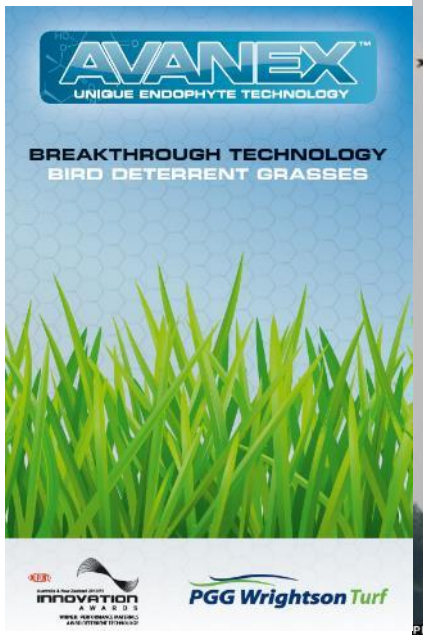
Innovative products

Bird Strike 1.5 billion $US/yr



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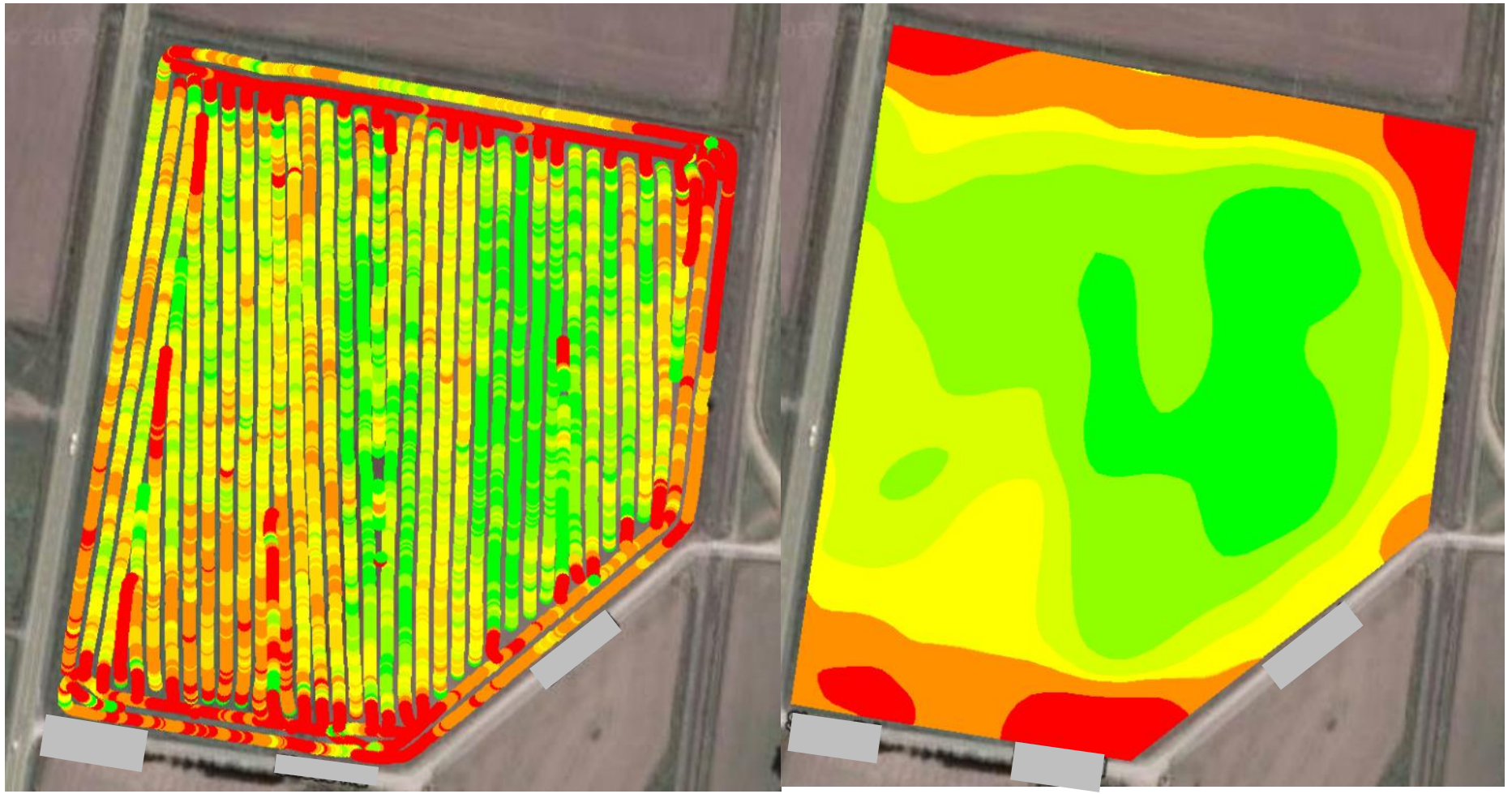
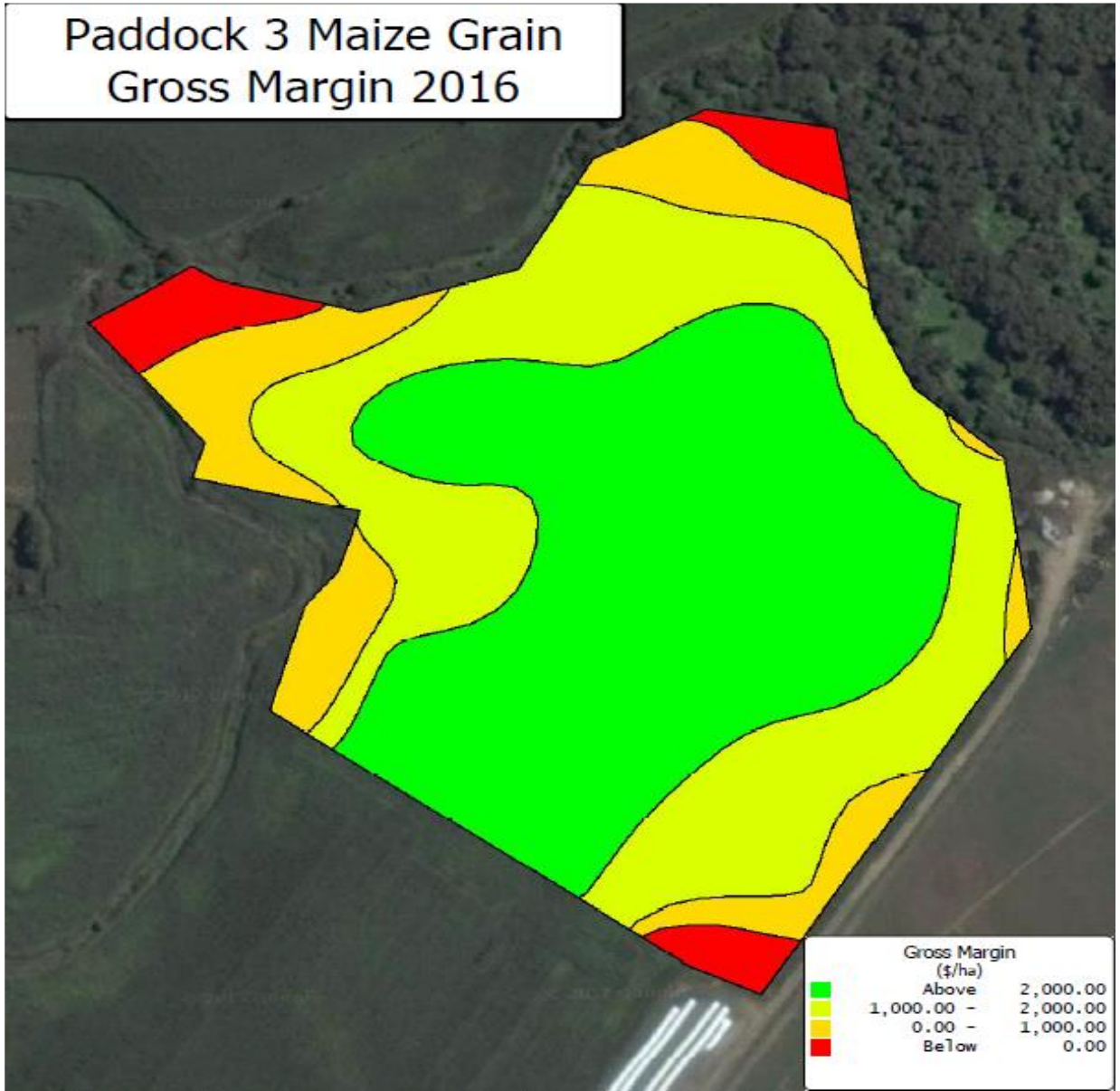
Precision Agriculture – Yield Maps



Making money - Profit Maps



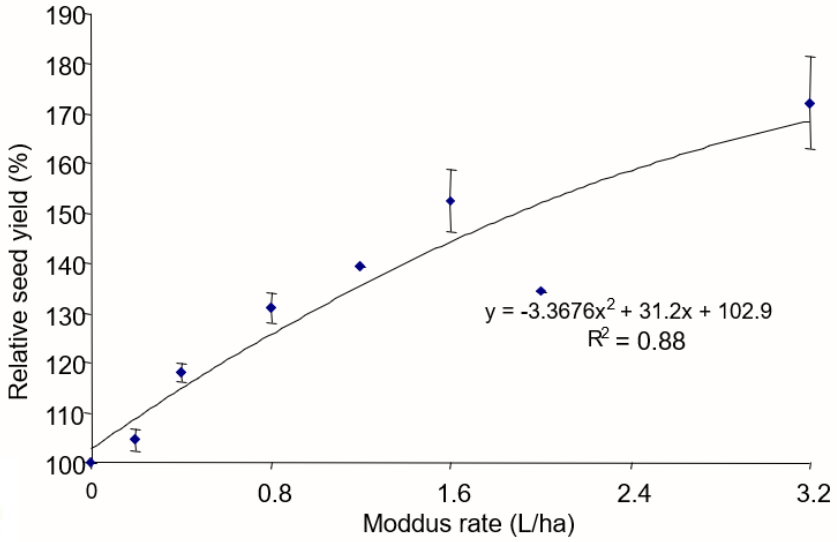
Knowledge exchange – Adding something to what you already do?

Moddus in ryegrass –

- Simple, immediate - Large yield increase
- No enduring effects
- Small downside of getting it wrong

MOCC $1000/ha = $8 mill/yr

80% uptake over two years



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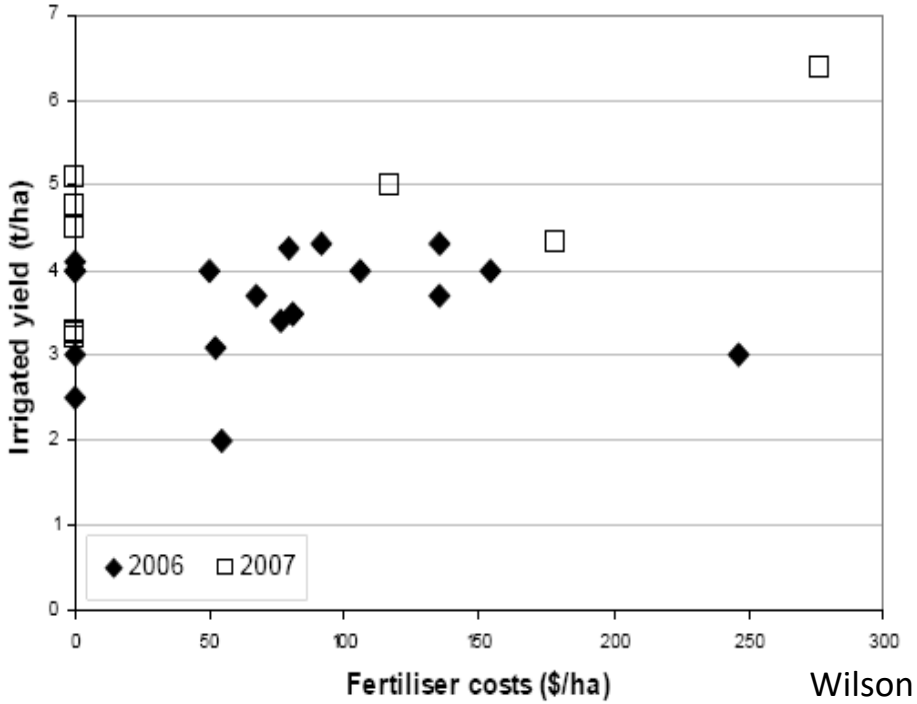
Stop doing something you have always done?

Pea fertiliser – over 15 years research

- Yield reduction from fertiliser (6%) = $168.00 loss
- Extra cost of seed not emerged (11%)= $35.75 wasted
- Cost of fertiliser = $51.30 wasted - **TOTAL = $255.05/ha**

Slow uptake



Wilson et al.

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Measuring value – Gross Margins/day

	Cereal silage Spring Canterbury Irrigated	Feed Barley Spring Canterbury Irrigated	Pea Seed Canty Irrigated
GM/ha @ achieved yield ($)	2226	1456	2182
Days in Land Use (cult. to harvest)	133	162	120
GM/ha/day ($)	16.7	9.0	18.1

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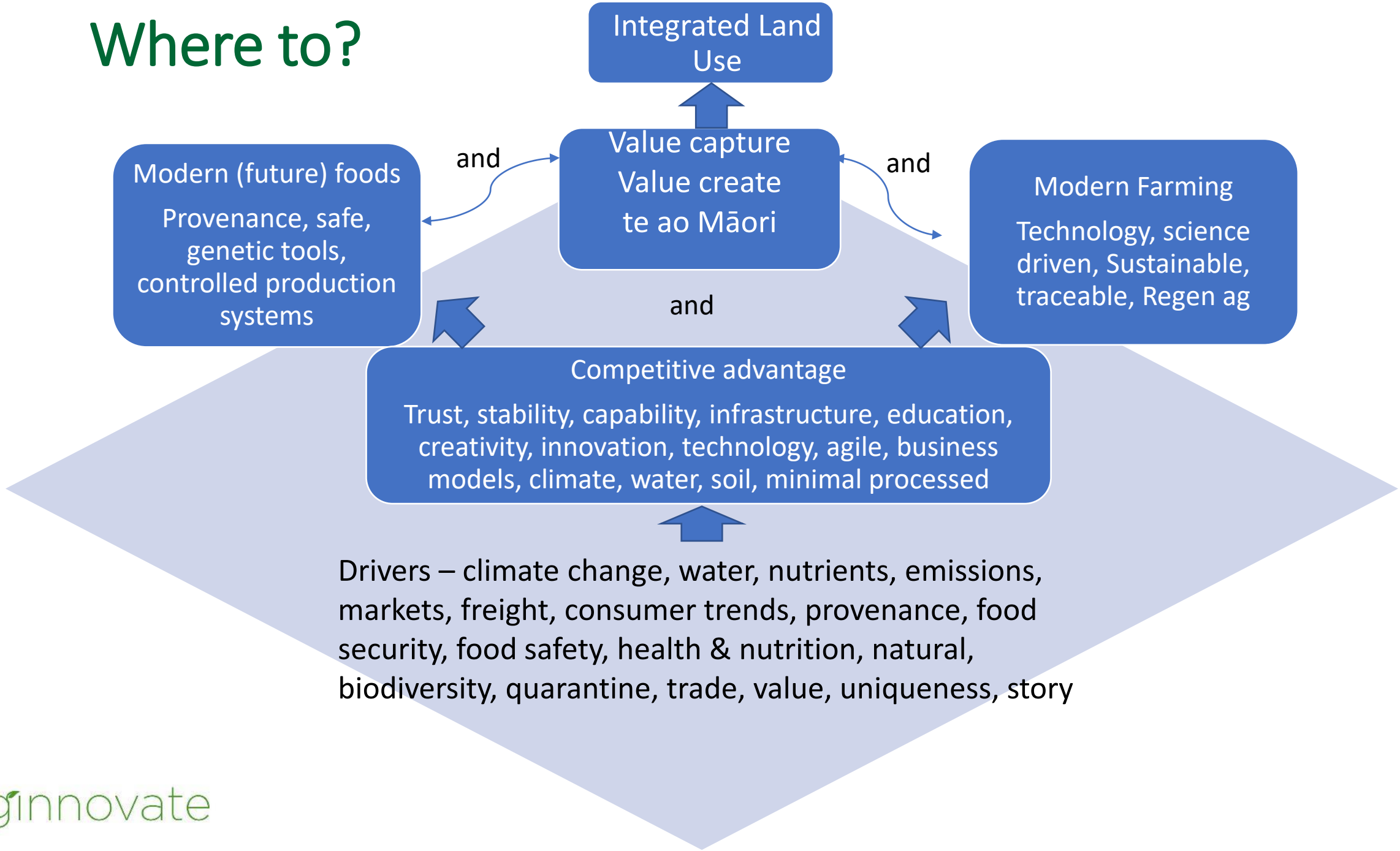
Where to?



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