Department of Agriculture and Food
GOVERNMENT OF WESTERN AUSTRALIA

GRDC Grains Research & Development Corporation
Your GRDC working with you

BFDC II – the next chapter

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24 February 2014

CROP updates

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Your GRDC working with you

BFDC II

- National collaborative project lead by NSW DPI
- Funded by GRDC and the grains and fertiliser industries
- Part of the More Profit From Crop Nutrition Initiative (1 and 2)
- Phase 2 - 2012 to 2017

CROP updates

REUTER AND ASSOCIATES

BFDC II Summary

What

- To provide independent, consistent soil test calibrations (using the **BFDC Interrogator** tool) in which the associated assumptions are clearly defined.

Why

- Inconsistencies in understanding of critical levels and their modifying factors can lead to confusion, mistrust and ill-informed investments in fertilisers.

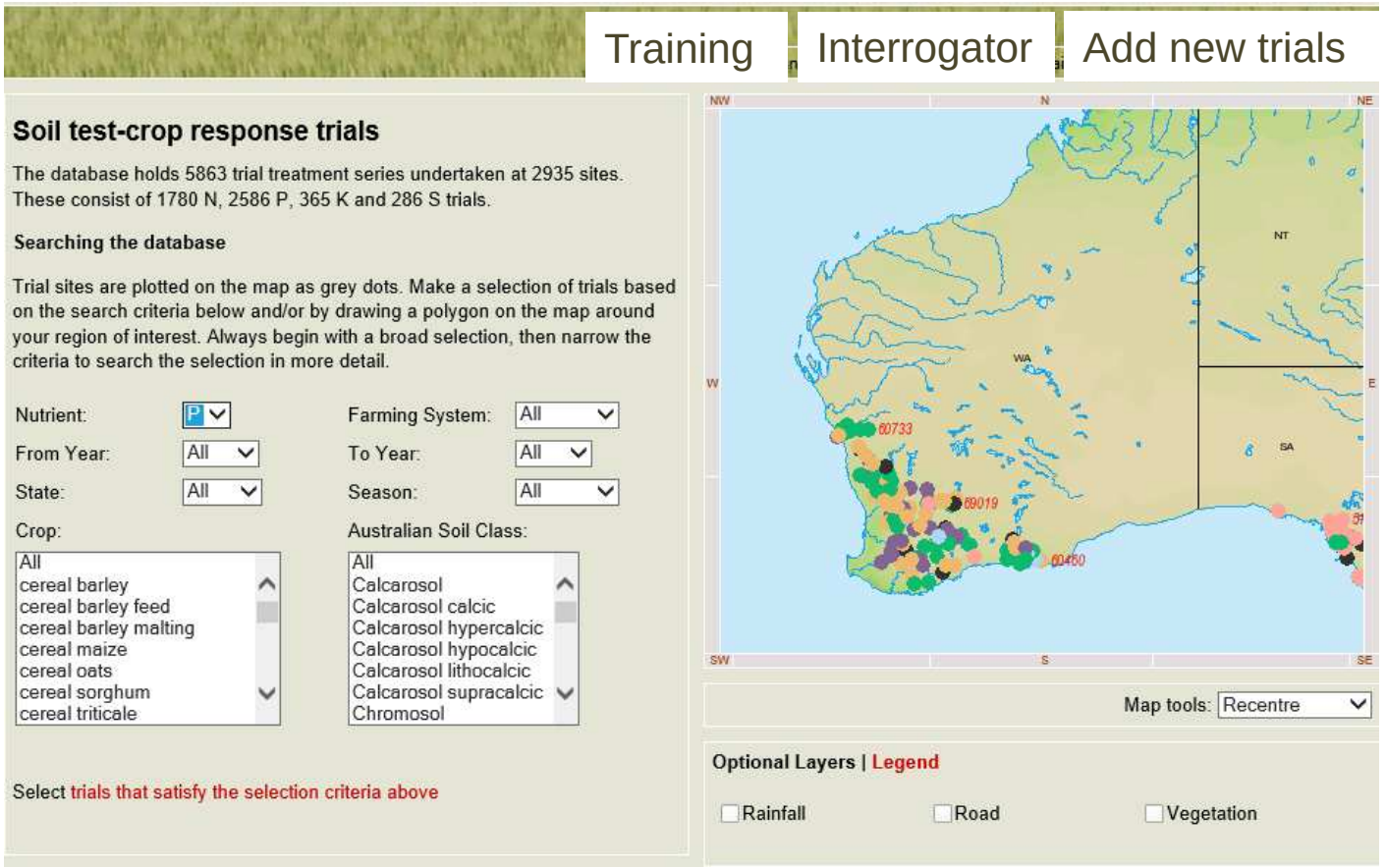
How

- The combination of well-defined and interrelated soil sampling, laboratory analysis methods and critical ranges is at the core of making better fertiliser decisions. This combination provides the rigor that ensures an acceptable level of reliability and repeatability.

What's in it for you?

1. Help explore your own understanding of soil testing, critical levels, soil test calibration and interpretation of response functions
2. To provide some independent standardised soil test critical concentrations and ranges for N, P, K and S
3. Help gain understanding of key components of soil test calibration research
4. Access to an active repository for new research

BFDC Interrogator - full capabilities



What data is available for the West?

WA based experiments

Phosphorus = 606 (24%)

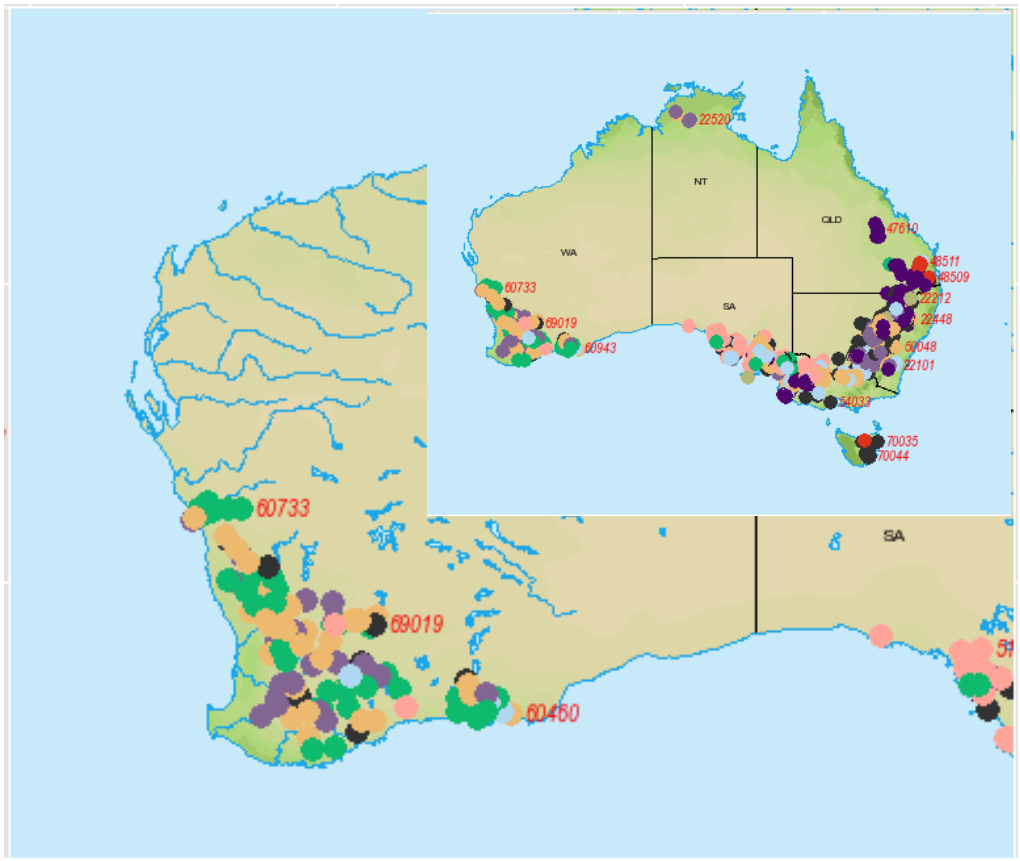
Potassium = 274 (75%)

Sulphur = 196 (69 %)

Nitrogen = 525 (29 %)

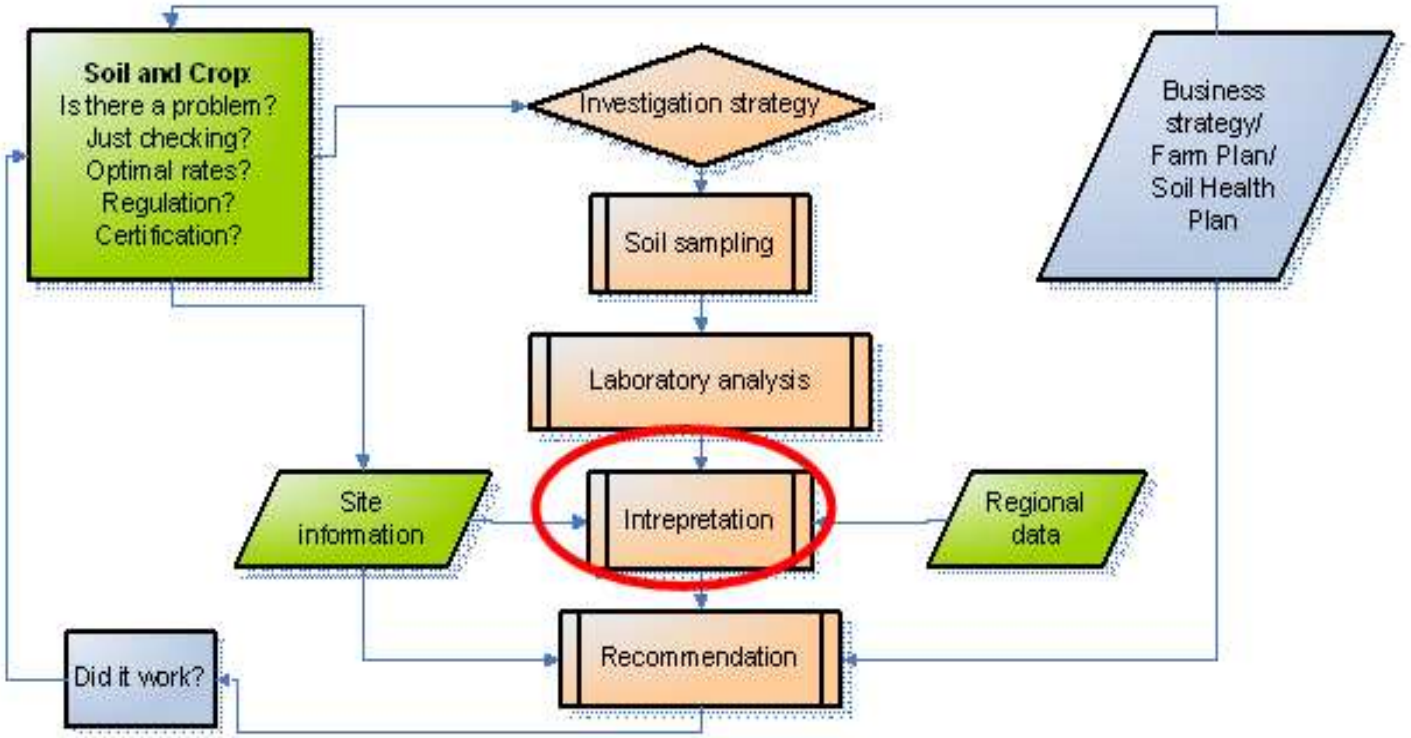
27 % of total experiments

(accessed 28/1/2014)



Putting BFDC Interrogator output into context

THE SOIL TESTING AND NUTRIENT MANAGEMENT PROCESS



Example input

<<back

Soil test-crop response calibrations

31 P trials fit your initial selection criteria. Their locations with Australian Soil Classification(s) are plotted on the map.

You may wish to:

- list selection summary information
- map Australian Soil Classification
- map relative yields
- map maximum yields

To choose a new region draw a polygon and refresh the trial selection.

Graph soil test value by:

(•) Relative Yield ( ) Yield Increase

Choose soil test and sample depth:

P Colwell mg/kg (93)

0-10cm (31)

View data relationship:

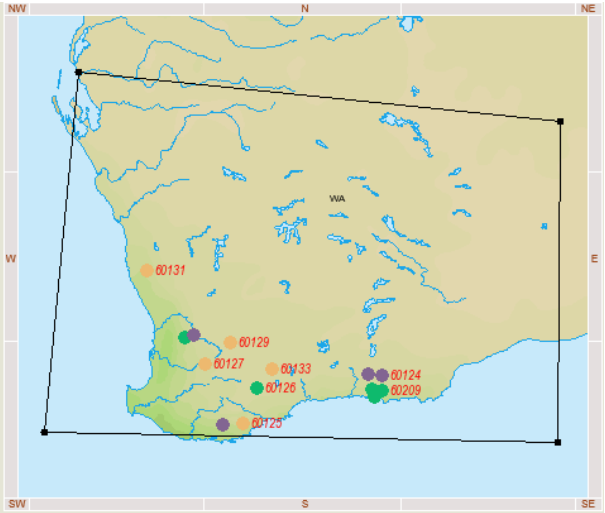
- plot data by crop
- plot data by soil type
- tabulate data

Limit max soil test value: (enter max soil test value for the plot)

Limit plot to most responsive treatment series per trial: ☐

Refine your trial selection for determining a data relationship:

- Filter by rainfall, stored profile water, maximum yield, soil pH and/or soil organic carbon:



[clear] [undo] [complete] Map tools: Draw Polygon

Optional Layers | Legend

☐ Rainfall ☐ Road ☐ Vegetation

A polygon can be drawn on the map when the 'Draw Polygon' tool is selected from the Map tools menu. When doing a trial selection, only those trials falling within the polygon will be selected. To draw the polygon, click on the map to define three or more points that form a boundary around the geographic area of interest. To complete the polygon, always click the '[complete]' text below the map. The polygon boundary must not cross over itself.

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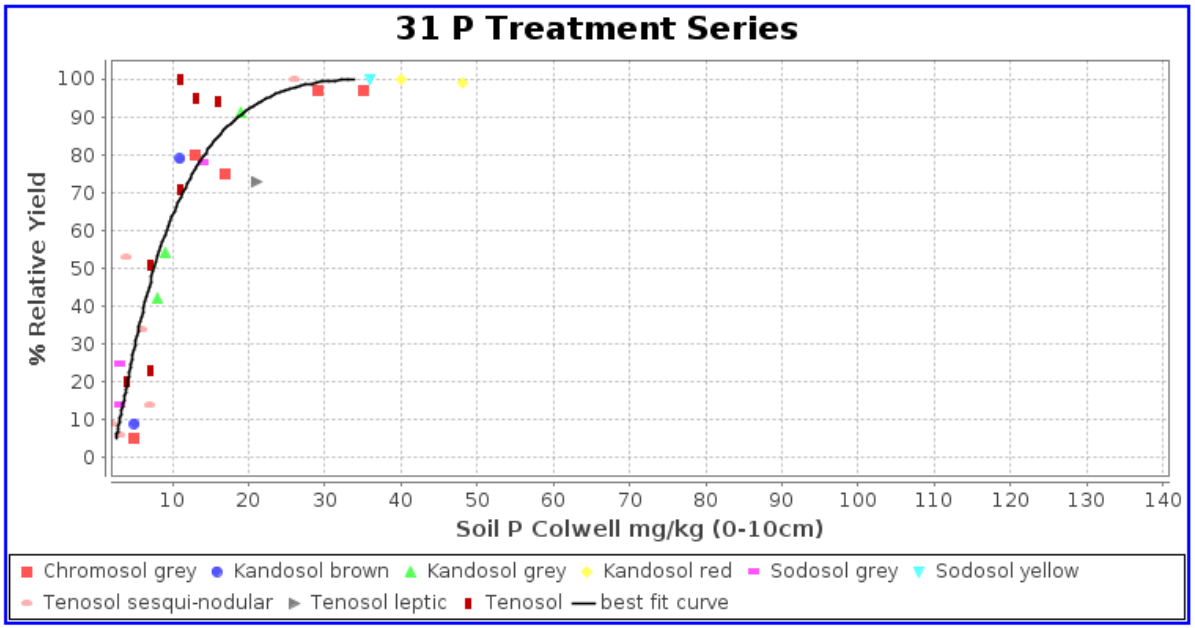
Example of output

Database filters

- WA
- All soils
- Canola
- P(Colwell)
- 0-10 cm

print



Soil test calibration:

80% Relative Yield: 14.0 (12.0 - 17.0)

90% Relative Yield: 19.0 (15.0 - 23.0)

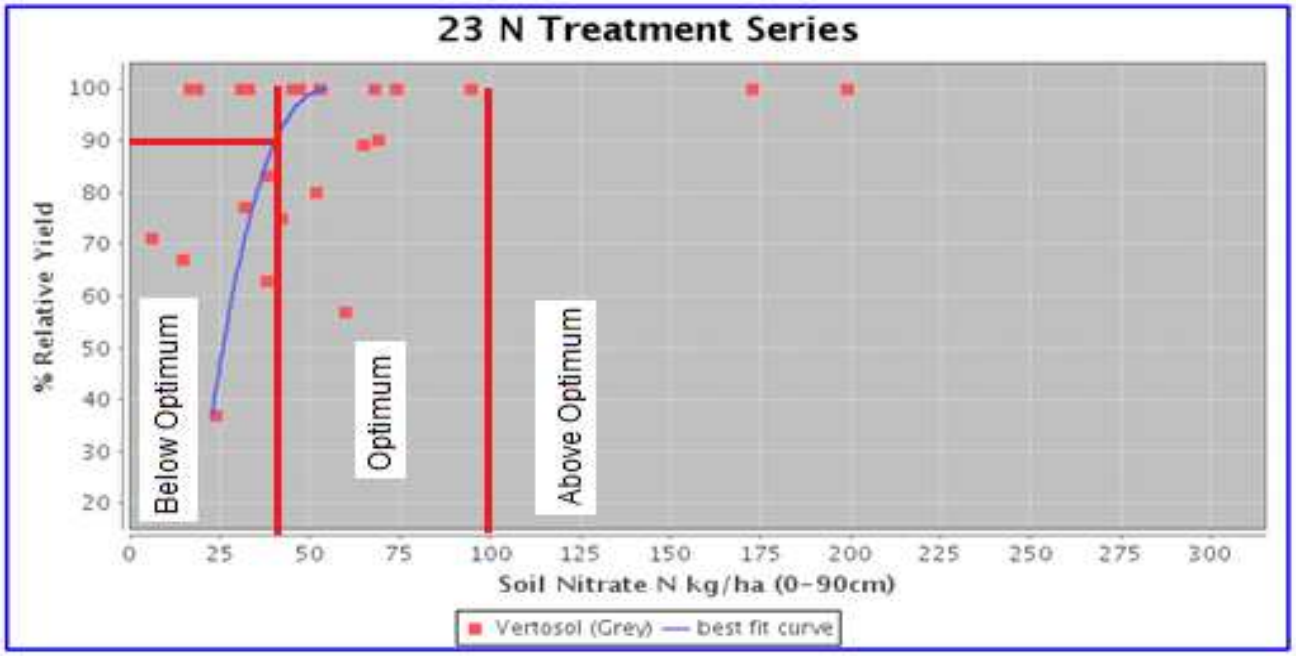
95% Relative Yield: 22.0 (18.0 - 28.0)

Correlation R: 0.89 Slope RY(50-80): 4.7 (3.8 - 5.6)

Regression equation: $x = e^{(1.934(\arcsin(\sqrt{y/100})) + 0.51019)}$

70% confidence limit at 90% Relative Yield: 19.0 (17.0 - 21.0)

Interpretation of output



Soil test calibration:

80% Relative Yield: 35.3 (24.1 - 51.9)
90% Relative Yield: 40.5 (29.3 - 56.0)
95% Relative Yield: 44.5 (32.3 - 61.3)

What data have we got to work with so far?

Data entry scoreboard - October 10th 2011

		Wheat	Barley	Sorghum	Maize	Oats & Triticale	Canola	Sunflower	Safflower	Linseed	Mustard	Linola	Angustifolius	Albus	Chickpeas	Faba Bean	Field Pea	Soybean	Peanut
New South Wales	N	385	16	47		3	62	9	1	3	9	1							
	P	505	10	23		3	16		1		1		17	3	2	2	1		
	K	27														2			
	S	37					38				1								
Queensland	N	300		21	16														
	P	264			20										1			51	2
	K	1		1	2													2	2
	S																		
South Australia	N	291	224			3	42												
	P	439	80				27	10					8			13	52		
	K	36	3					10											
	S	29																	
Tasmania	N																		
	P	24	50																
	K																		
	S																		
Western Australia	N	396	1				138												
	P	373					31						445						
	K	198	2				138						32						
	S	51					131												
Victoria	N	121	11																
	P	128	8				3									1	3		
	K																		
	S																		
TOTAL	N	1493	252	68	16	6	242	9	1	3	9	1							
	P	1733	148	23	20	3	77	10	1		1		470	3	3	16	56	51	2
	K	262	5	1	2		138	10					32			2		2	2
	S	117					169				1								
																			5460

Sampling depths and analytical methods

0-10cm (962)
0-120cm (275)
0-150cm (17)
0-15cm (421)
0-20cm (93)
0-30cm (213)
0-40cm (92)
0-60cm (373)
0-7.5cm (52)
0-7.5cm+0-10cm
0-90cm (198)
10-20cm (87)
10-60cm (89)
15-30cm (413)
20-30cm (69)
30-40cm (53)
30-45cm (347)
30-60cm (64)
40-50cm (53)
50-60cm (53)
60-120cm (32)
60-70cm (56)
60-90cm (68)
70-80cm (53)
80-90cm (53)
90-100cm (53)
90-120cm (48)

% lime (CaCO3) % (23)
C/N ratio (550)
C/S ratio (57)
Ca Exchangeable: alcoholic NH4Cl (pH 8.5) cmol(+)/kg (50)
Ca Exchangeable: alcoholic NH4Cl (pH 8.5) mg/kg (118)
Cl 1:2.5 soil:water mg/kg (50)
K Colwell mg/kg (587)
K Exchangeable (NH4Cl ph7.0) cmol(+)/kg (43)
K Exchangeable (NH4Cl ph7.0) mg/kg (384)
K Exchangeable: alcoholic NH4Cl (pH 8.5) mg/kg (118)
Mg Exchangeable: alcoholic NH4Cl (pH 8.5) cmol(+)/kg (50)
Mg Exchangeable: alcoholic NH4Cl (pH 8.5) mg/kg (118)
N Aerobically 2 wks 30C Keeney and Bremner 1967 mg/kg (202)
N Ammonium N mg/kg (246)
N Anaerobic 2wks 30C Waring and Bremner 1964 mg/kg (202)
N Anaerobically 1 wk 40C mg/kg (202)
N Mineralisable N In-crop (soil incubation) kg/ha (66)
N Nitrate N kg/ha (1559)
N Nitrate N mg/kg (1272)
N Nitrate N+ Ammonium N kg/ha (276)
N Nitrate N+ Ammonium N mg/kg (1070)
N total crop available kg/ha (62)
N Total soil % (585)
N Total soil kg/ha (22)
Na Exchangeable: alcoholic NH4Cl (pH 8.5) mg/kg (161)
Organic C (Walkley-Black) % (1577)
P Bray-1 pH3 mg/kg (79)
P Bray-2 pH1 mg/kg (93)
P BSES mg/kg (418)

P Colwell mg/kg (968)
P DGT Extractable ug/L (23)
P Exchangeable (Holford data: method unknown) mg/kg (37)
P Fluoride mg/kg (43)
P in Soln (Holford data: method unknown) mg/kg (37)
P Lactate Ca mg/kg (46)
P Lactate NH4 mg/kg (9)
P Ln PSI (Bach and Williams(1971) mod Holford ln L/kg (37)
P Mehlich 3 mg/kg (88)
P Olsen mg/kg (58)
P PBI (unadjusted) (92)
P Total (XRF) mg/kg (27)
P Truog mg/kg (62)
pH Soil 0.02M KCl 1:2.5 (202)
pH Soil CaCl2 1:5 (904)
pH Soil water 1:10 (26)
pH Soil water 1:5 (1001)
Reactive iron mg/kg (42)
S KCl40 extractable mg/kg (24)
S Total (XRF) mg/kg (58)
Salinity EC 1:2.5 dS/m (50)
Salinity EC 1:5 dS/m (190)

CROP updates

Why so few trials?

At least half of those made available excluded due to

- No soil test taken (or no depth, method, etc recorded)
- Poor experimental design
  - Y max not defined (rates in the experiment not high enough)
  - Too few rates
  - Lack of replication
  - Unbalanced statistical design
- Use of inappropriate product (nutrient addition not balanced)

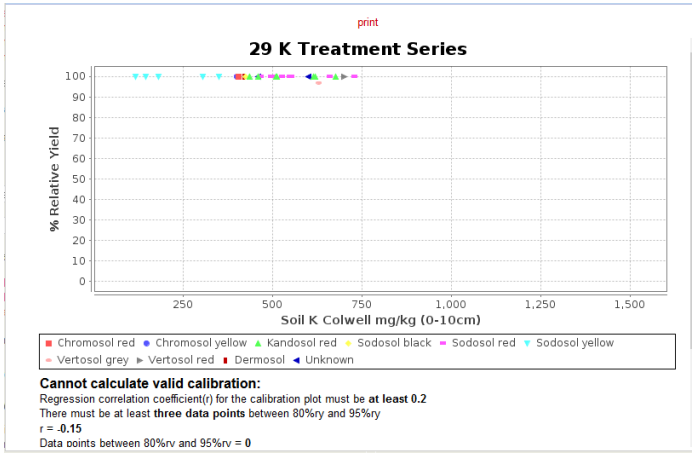
and the rest with time and filing cabinet disposal.

Outcome – simple web interface to add new trials to BFDC database

How do I know outputs are OK?

The BFDC Interrogator has inbuilt statistical rules will **reject** the calibration **that is of low quality e.g.**

- R<0.2
- Where fewer than 3 trials occur in the 85-95 % RY region of the calibration curve



Want to have a closer look at BFDC Interrogator project?

- Go to internet browser and enter ***www.bfdc.com.au***

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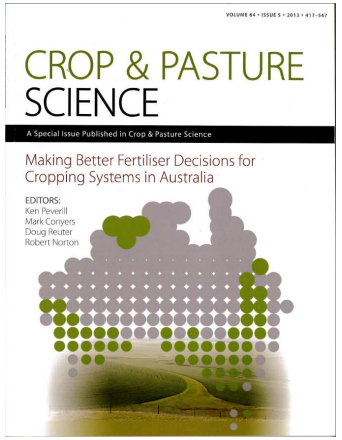
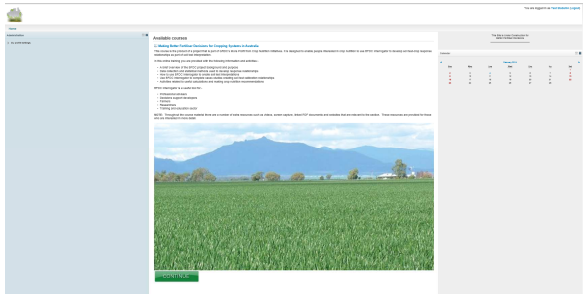
WHAT'S NEW?

- Crop and Pasture Science Special Edition
- On-line training workshop module
- New trials entry portal
- Long term trials

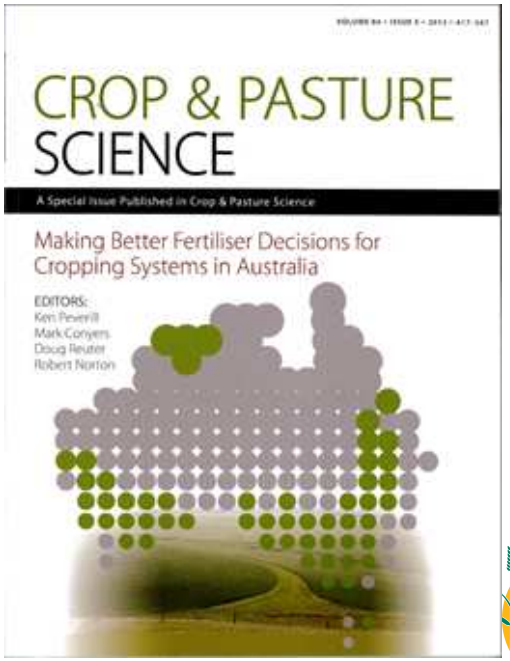




CROP updates

CROP AND PASTURE SCIENCE SPECIAL EDITION

- Concise summaries of what the database is telling us so far
- Papers authored by project technical team



On-line training

- Complete training to gain access to BFDC Interrogator
- Why on-line – easier to do in your own time (minimum 3 hours)
- Process – register and access via website

Administration

My profile settings

Available courses

Making Better Fertiliser Decisions for Cropping Systems in Australia

This course is the product of a project that is part of GRDC's More Profit from Crop Nutrition Initiatives. It is designed to enable people interested in crop nutrition to use BFDC Interrogator to develop soil test-crop response relationships as part of soil test interpretation.

In this online training you are provided with the following information and activities:-

- A brief overview of the BFDC project background and purpose
- Data collection and statistical methods used to develop response relationships
- How to use BFDC Interrogator to create soil test interpretations
- Use BFDC Interrogator to complete cases studies creating soil test calibration relationships
- Activities related to useful calculations and making crop nutrition recommendations

BFDC Interrogator is a useful tool for:-

- Professional advisers
- Decisions support developers
- Farmers
- Researchers
- Training and education sector

NOTE: Throughout the course material there are a number of extra resources such as videos, screen capture, linked PDF documents and websites that are relevant to the section. These resources are provided for those who are interested in more detail.

This Site is Under Construction for Better Fertiliser Decisions

Calendar

February 2014

Sun	Mon	Tue	Wed	Thu	Fri	Sat
						1
2	3	4	5	6	7	8
9	10	11	12	13	14	15
16	17	18	19	20	21	22
23	24	25	26	27	28	

New data entry tool

- What is it?
  - Gateway to input nutrient response data to BFDC Interrogator
- Who can use it?
  - Access protocol being developed for registered users SS2
- How to get access! SS1 SS3
  - contact Dr Simon Speirs (simon.speirs@dpi.nsw.gov.au)

Slide 21

SS1 Maybe better to make the comment that the data entry tool is coming and they'll be an option within the tool to request access for data entry.
Simon Speirs, 4/02/2014

SS2 even then..it will be on request...it wont be an openly available function. Ppl must first be registyered users of the BFDC Interrogator.
Simon Speirs, 4/02/2014

SS3 Realistically we're testing the tool at the moment....and a couple of components wont be ready to roll by the time you speak. e.g. we need to prepare a licence statement that enables us to actually use the IP of those entering data.
Simon Speirs, 4/02/2014

Data input

Treatment Series 1

+ Add Treatment Series

Description (e.g. K Rate)*: N rate

Nutrient*: N

Product: Urea

Nutrient Placement: Other — Prepalnt banded

Tillage System: Zero tillage (disc seeding)

Row Spacing: 100cm

Sowing Rate: 3 kg/ha

Time of Application: Pre-sowing

Fixed Nutrient Rates (kg/ha)

N	P	K	S
	16		20

Nutrient Rate (kg/ha)*	Yield (t/ha)*	DM Harvest (t/ha)	DM Flowering (t/ha)	DM Maximum Weight (t/ha)	% Grain Protein	% Grain Water	% Grain Oil	Grain Nutrient Uptake (kg/ha)
0	2.7				6.5			
30	3.3				6.8			
60	3.8				7.4			
90	4.2				7.8			
120	4.6				8.5			
150	4.7				9.5			

+ Add Rate

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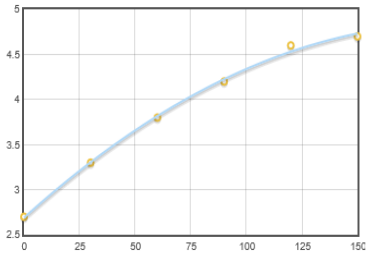
OUTPUT

+ Add Rate

Statistical Models

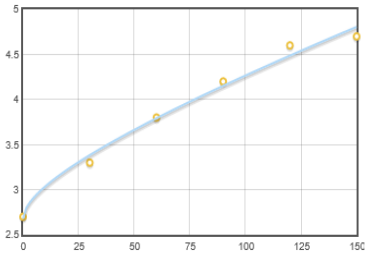
○ **No Model Selected**

○ **Quadratic (Best Fit)**



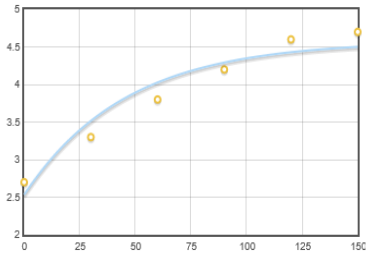
A	2.689
B	0.02225
C	-5.754e-5
R^2	0.9977
Y_0	2.689
Y_{max}	4.84

○ **Square Root**



A	2.679
B	0.09236
C	6.634e-3
R^2	0.9889
Y_0	2.679
Y_{max}	Infinity

◉ **Mitscherlich**



Show linear fit

A	4.578
B	0.4466
C	0.02188
R^2	0.9327
Y_0	2.533
Y_{max}	4.578

Manual Stats Entry

Estimated Y_0	Estimated Y_{max}	F-test	LSD (0.05)

Three key messages

- With the continue decline specialist knowledge in agricultural disciplines, initiatives that can store and easily retrieve accumulated research are increasingly important for future productivity
- The current crop nutrition database may be somewhat dated by the age of available research, but support for this approach to storage and retrieval of research data ensures the availability of an up-to-date independent source of crop nutrient response data for the future.
- A key to longevity of nutrient response data is in ensuring minimum dataset suggestions from this project are recorded.

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Questions?

Dr Chris Dowling

SS5

Online training and workshops

cdowling@ backpaddock.com.au

Dr Simon Speirs

Project Leader

simon.speirs@dpi.nsw.gov.au

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Slide 25

SS5 Run past Craig Scanlan but may be best to have his name here also as leader of the Western region MPCN II extension project.
Simon Speirs, 4/02/2014