INJEKTA™
Row Support Research

Soil Carbon and Nitrogen

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INJEKTA FIELD SYSTEMS 2013

Australian Grain Industry Conference – Melbourne 2013

Terrain Productivity Assessment

Soil Condition

All Soil Types

Field Evaluation

“The evidence is always there”

Climate Shift is on !

ADAPTION TO VARIATION (SEASONAL AND LONG TERM)

GREATER FOCUS ON SOIL CONDITION

USE CARBON AND NITROGEN AS BASE TEMPLATE TO GOVERN ADAPTIVE PROCESSES

Carbon and Nitrogen Outcomes

1. MORE GRAIN
2. BETTER QUALITY GRAIN
3. MORE CROP RESILIENCE TO STRESS (FROST, DISEASE)
4. WIDER RANGE OF SUCCESSFUL CULTIVARS USED
5. SOIL STRUCTURAL STABILITY = WUE (S3A = WUE)

Management Decisions

The Decision Agriculture Platform

1. TERRAIN PRODUCTIVITY ASSESSMENT
2. SOIL STRUCTURAL STABILITY ASSESSMENT
3. LIQUID DELIVERY SYSTEMS
4. CROP PRODUCTIVITY ASSESSMENT
5. YIELD AND QUALITY DATA (CORRELATED)
6. SCARE MAPPING : (SOIL CONDITION ANALYSIS REGRESSION EVALUATION)

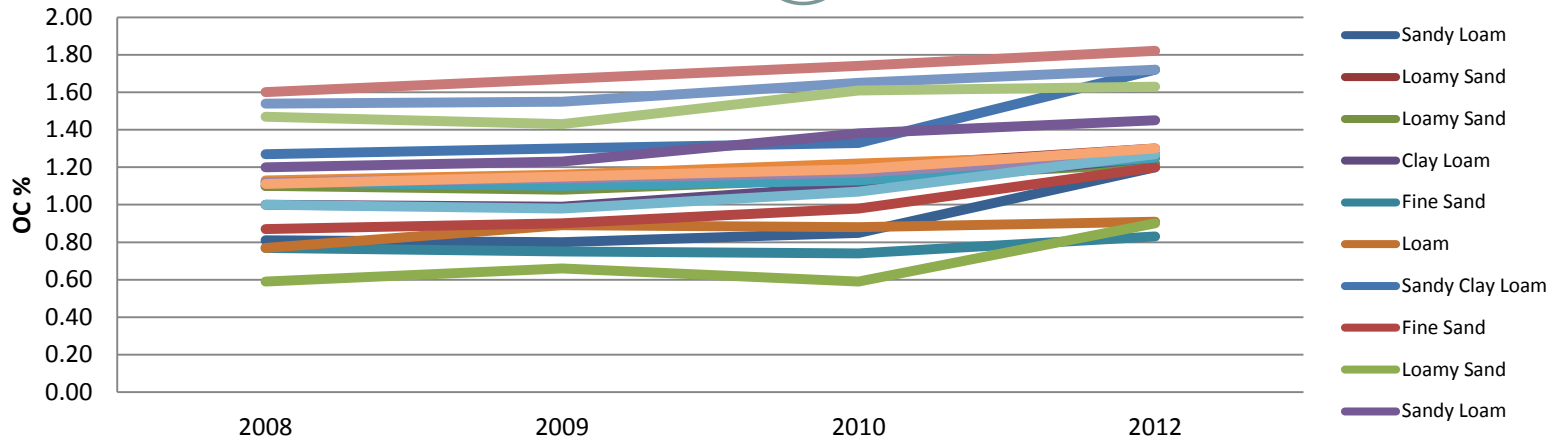
Tools at Disposal

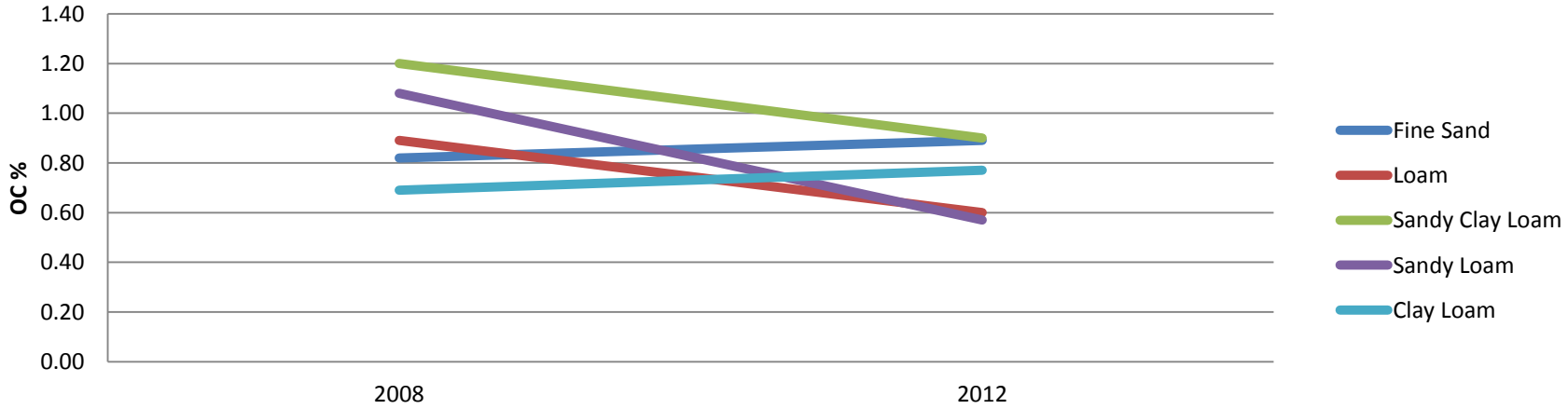
1. FARMER CONCERN AND INTEREST !!
2. CONSERVATION TILLAGE EQUIPMENT (GPS)
3. SOIL & PLANT SCIENCE RESOURCES
4. SCALE & CAPACITY OF AGRICULTURE
5. LIQUID DELIVERY SYSTEMS
6. EVALUATION – SCARE MAPPING & S3A
7. ASSESSMENT – YIELD MAPPING, GIS, EM38

The Factors

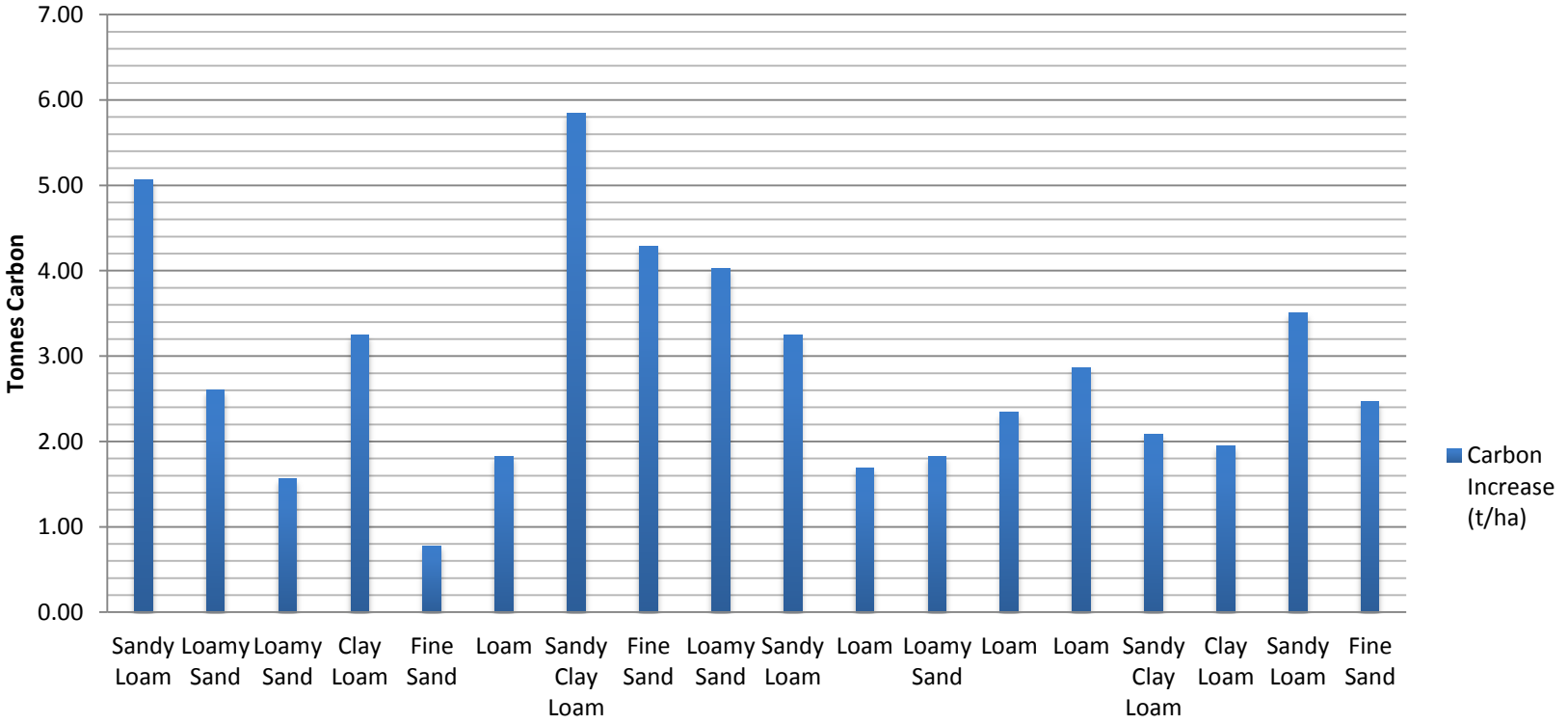
1. NON – JUDICIOUS USE OF N AND P
2. SECONDARY NUTRIENT LIMITS (K, S, MG, CA)
3. MICRONUTRIENT DEFICIENCY & EFFICIENCY
4. HERBICIDE BURDENS (SHORT AND LONG TERM)
5. SOIL DEGRADATION (SOIL STRUCTURAL STABILITY)

10 Years of Data (WA)

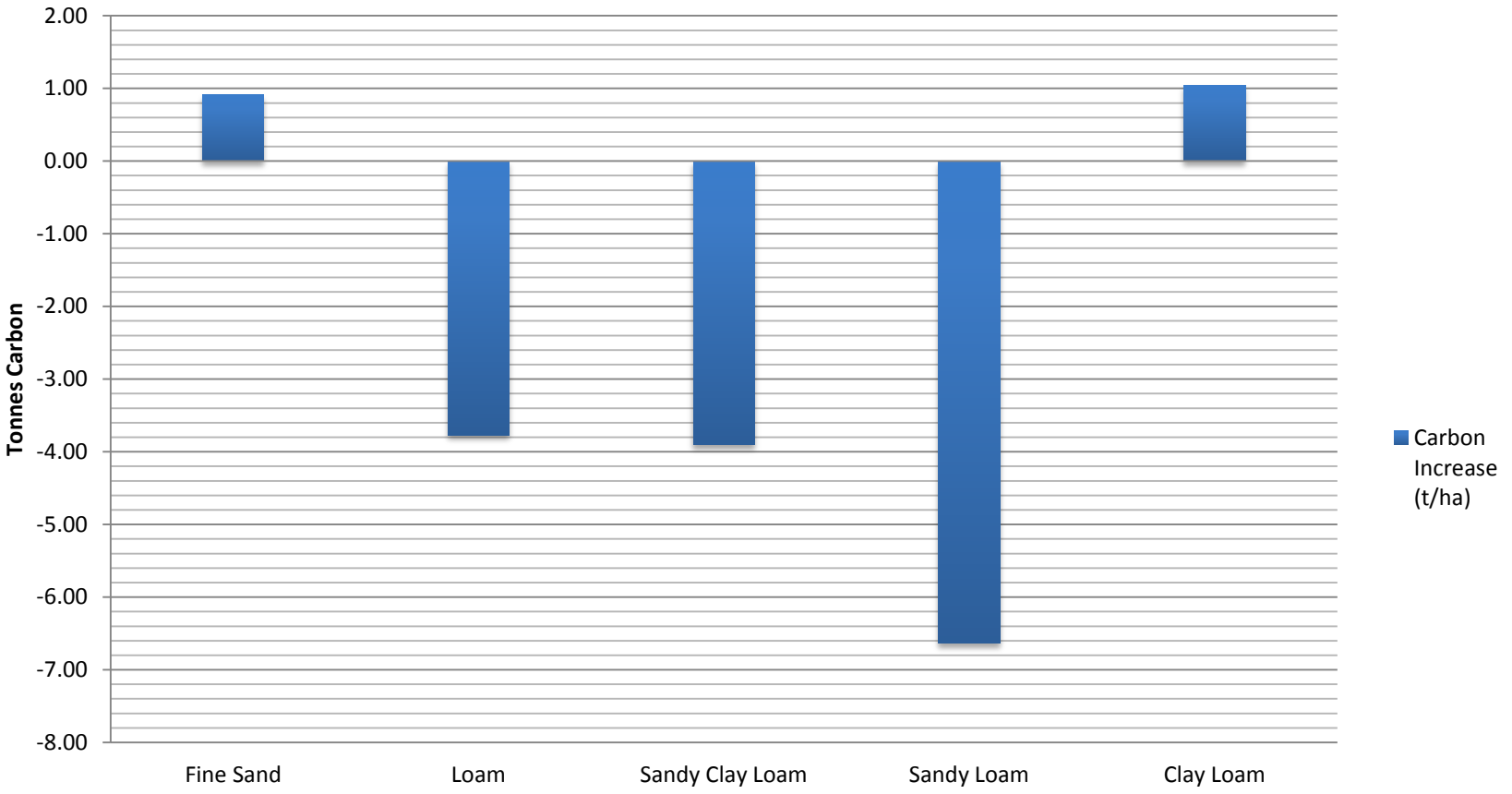




Management Change Sites

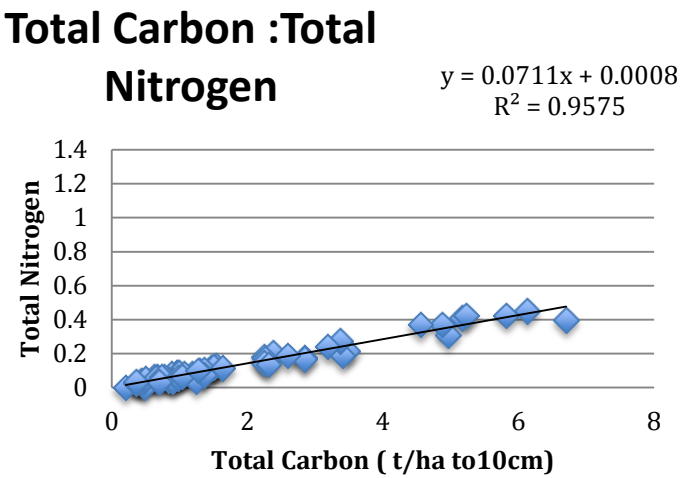


Control Sites – Standard Practice

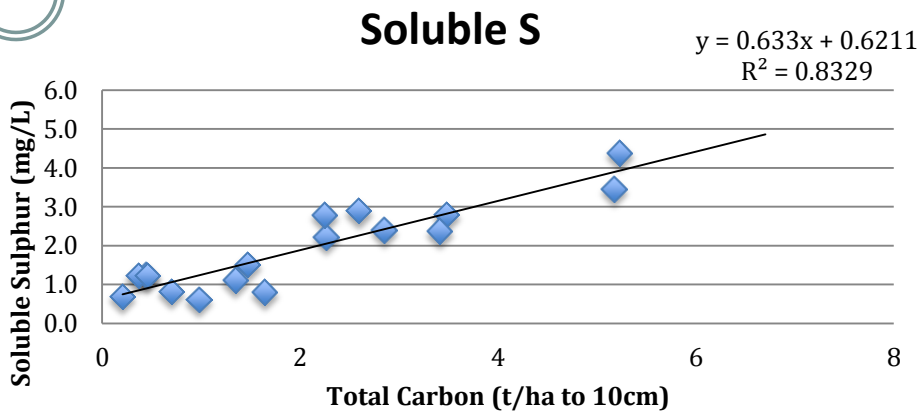


Soil Structural Stability Data

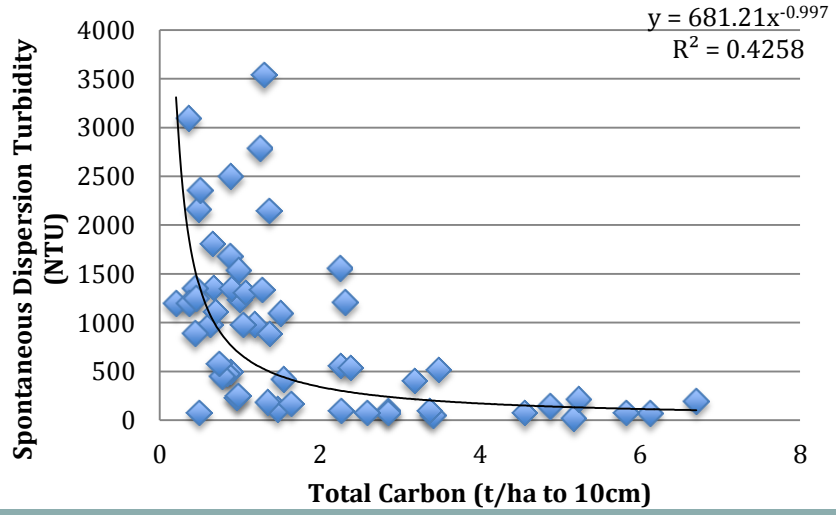
Total Carbon :Total Nitrogen



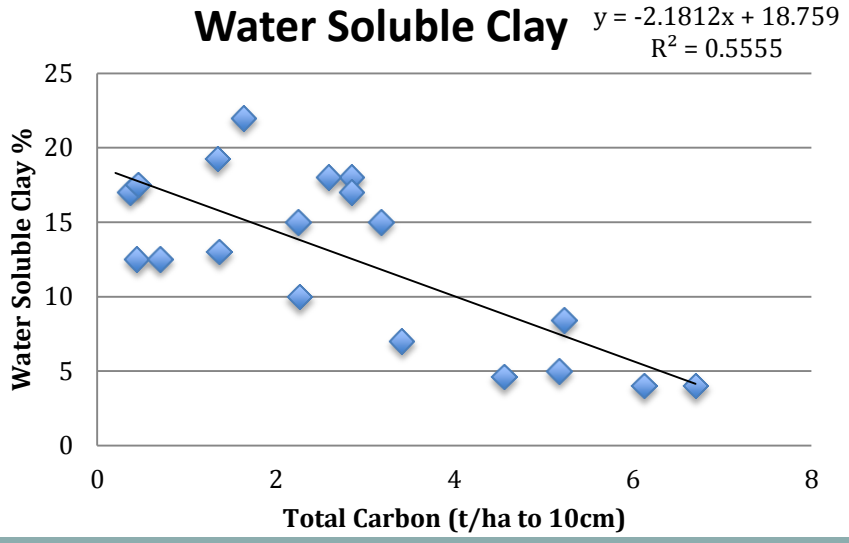
Soluble S



Turbidity - Spontaneous (NTU)



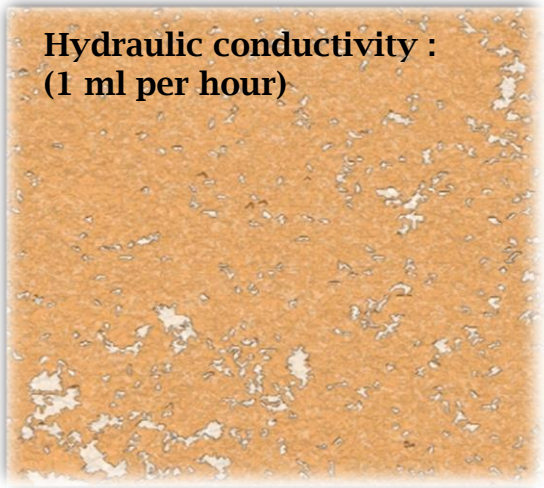
Water Soluble Clay

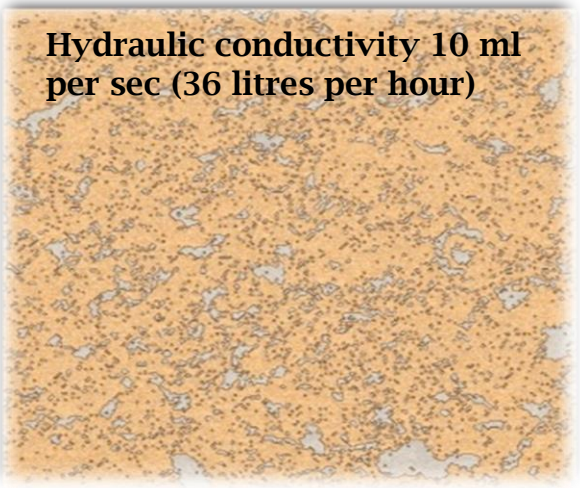


Case Studies - 2013

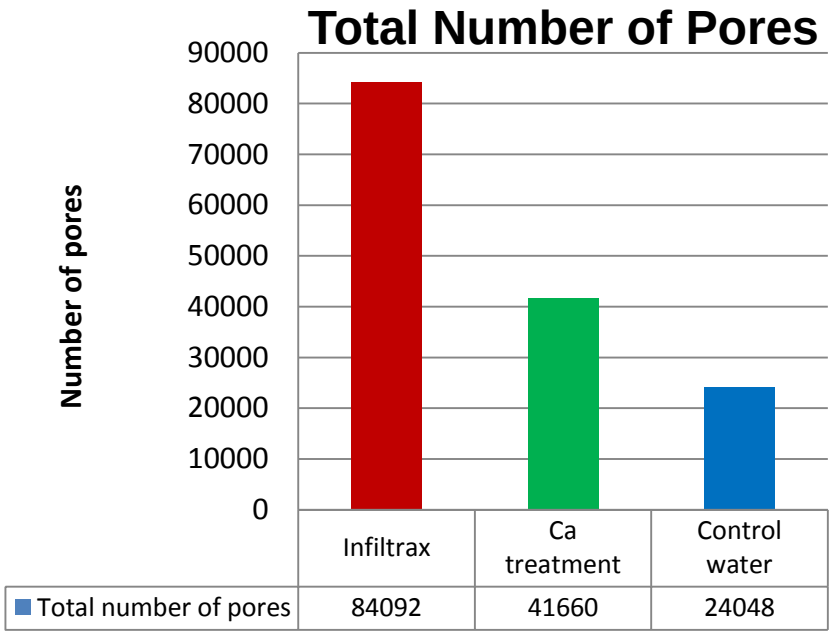
Porosity – Water Movement & Oxygen (CT)

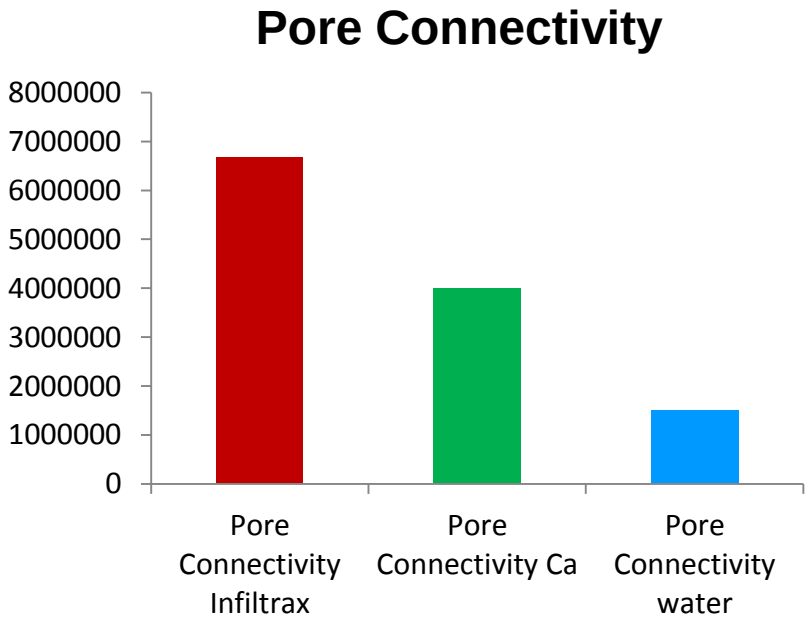
Cross section treated with **Water Only**



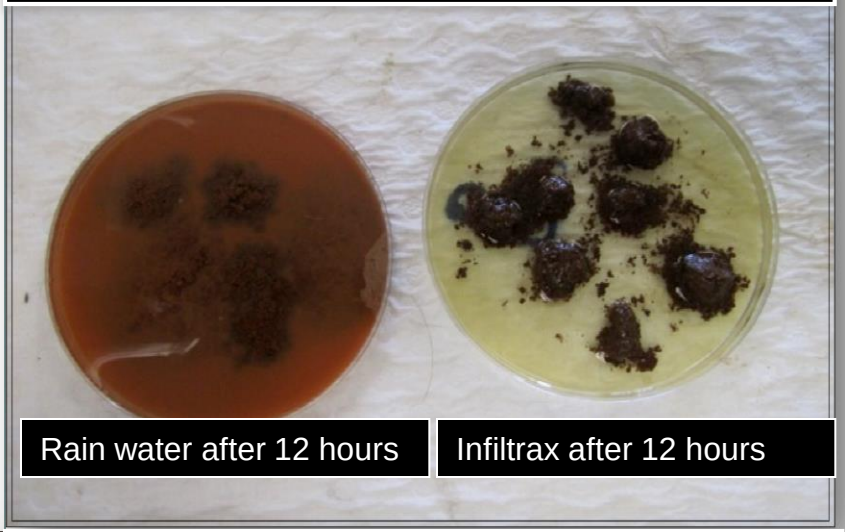


Cross section treated with **Infiltrax™**





Mid North South Australia - A2 Soil Aggregates



Rain water after 12 hours | Infiltrax after 12 hours

Forbes, Australia - A2 Soil Aggregates

Emerson Dispersion

Water

Aggregates immersed in water without disturbance

Infiltrax

Aggregates immersed in Infiltrax solution

Capture & store every rainfall event
-Water Use Efficency (**WUE**)

Soil Use Efficiency (**SUE**)

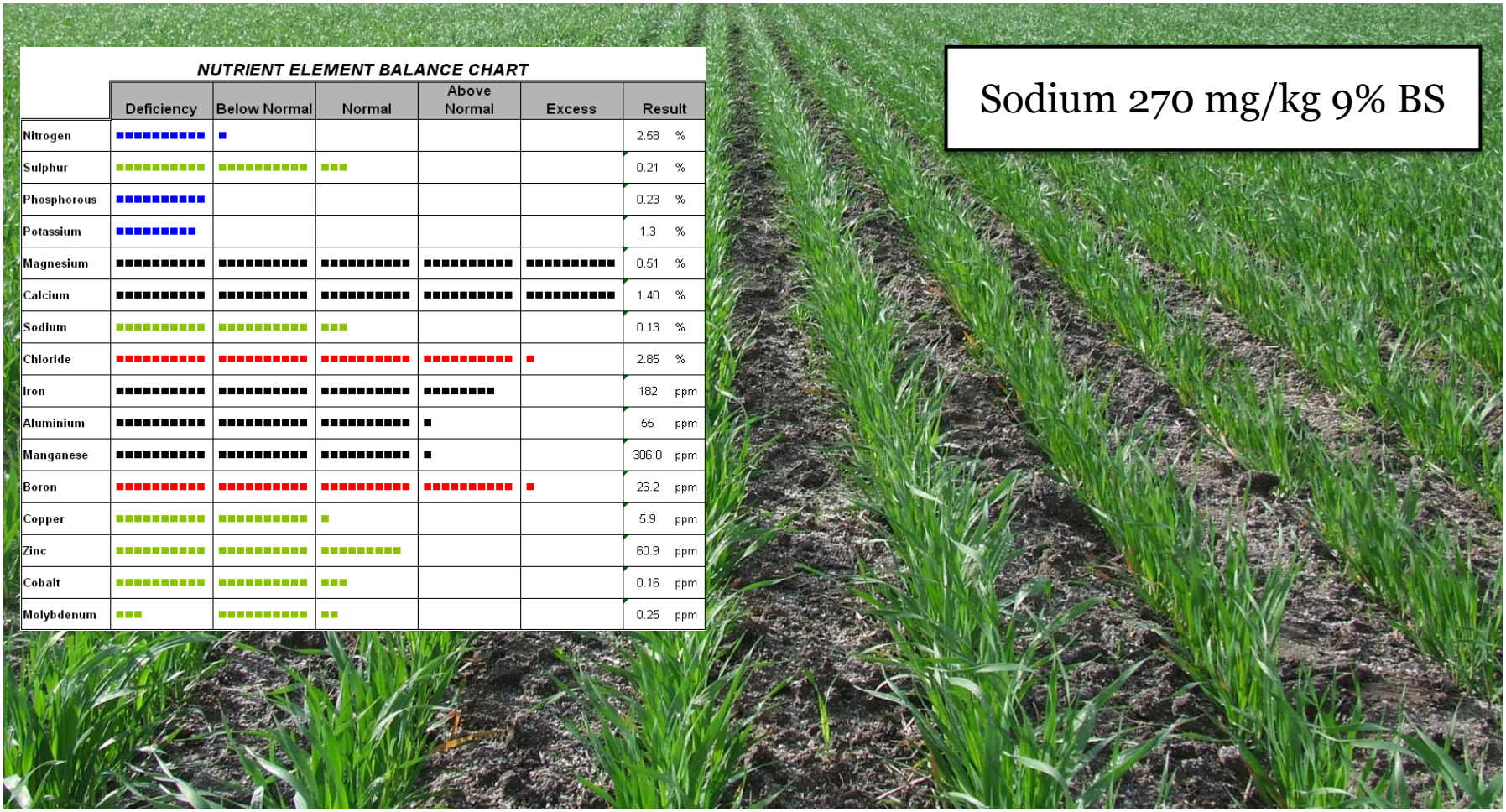
Increased Root Development
-Increased Carbon

Nitrogen Stabilisation – N_2O
- Nutrient Use Efficiency (**NUE**)

Reduce Erosional loss of Carbon

Trial Areas Sown – Yield and Quality

The Tools Available

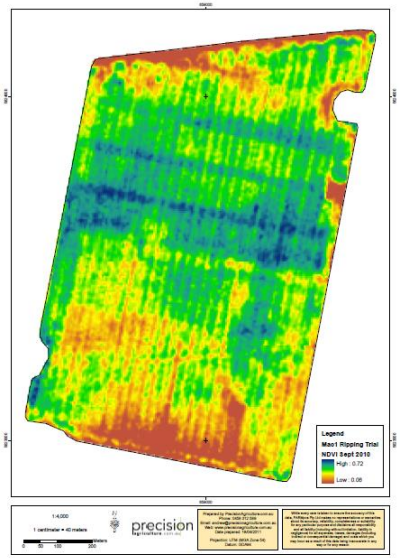


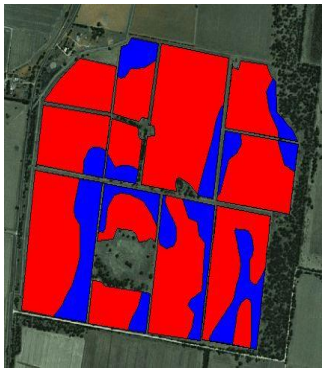
NUTRIENT ELEMENT BALANCE CHART

	Deficiency	Below Normal	Normal	Above Normal	Excess	Result	
Nitrogen	■■■■■■■■■■	■				2.58	%
Sulphur	■■■■■■■■■■	■■■■■■■■■■	■■■			0.21	%
Phosphorous	■■■■■■■■■■					0.23	%
Potassium	■■■■■■■■■					1.3	%
Magnesium	■■■■■■■■■■	■■■■■■■■■■	■■■■■■■■■■	■■■■■■■■■■	■■■■■■■■■■	0.51	%
Calcium	■■■■■■■■■■	■■■■■■■■■■	■■■■■■■■■■	■■■■■■■■■■	■■■■■■■■■■	1.40	%
Sodium	■■■■■■■■■■	■■■■■■■■■■	■■■			0.13	%
Chloride	■■■■■■■■■■	■■■■■■■■■■	■■■■■■■■■■	■■■■■■■■■■	■	2.85	%
Iron	■■■■■■■■■■	■■■■■■■■■■	■■■■■■■■■■	■■■■■■■■		182	ppm
Aluminium	■■■■■■■■■■	■■■■■■■■■■	■■■■■■■■■■	■		55	ppm
Manganese	■■■■■■■■■■	■■■■■■■■■■	■■■■■■■■■■	■		306.0	ppm
Boron	■■■■■■■■■■	■■■■■■■■■■	■■■■■■■■■■	■■■■■■■■■■	■	26.2	ppm
Copper	■■■■■■■■■■	■■■■■■■■■■	■			5.9	ppm
Zinc	■■■■■■■■■■	■■■■■■■■■■	■■■■■■■■■■			60.9	ppm
Cobalt	■■■■■■■■■■	■■■■■■■■■■	■■■			0.16	ppm
Molybdenum	■■■	■■■■■■■■■■	■■			0.25	ppm

Sodium 270 mg/kg 9% BS

The Technology Exists





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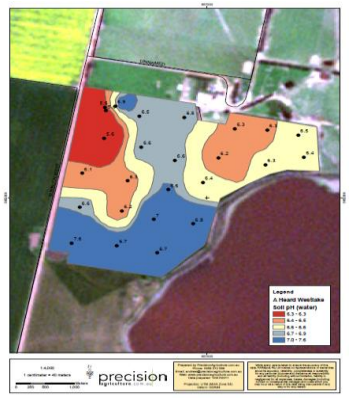
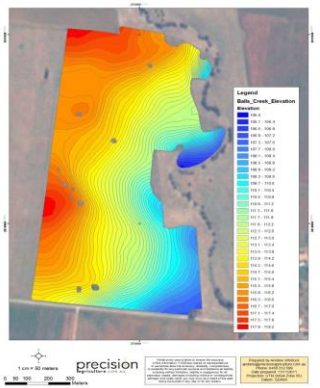
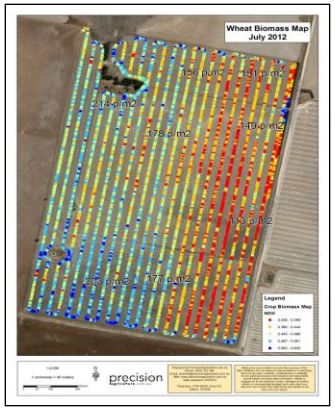


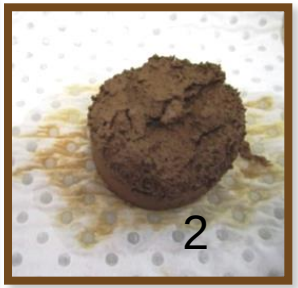




The Equipment Exists

The Science Exists

Urrbrae Soil, South Australia, Waite Institute



CROSS	2.9	3.7	2.5	5.2	6.5
pH	6.9	6.9	6.8	7.1	6.9
EC (dS/m)	0.017	0.013	0.023	0.017	0.013
Zeta	-49.4	-49.6	-50.5	-54	-55.9
Turbid	450	500	650	1000	1363

Spontaneous dispersion

•Clay particles with high adsorbed monovalent cations are separated from the aggregates

The Accuracy Exists

Row by Row

The Placement Exists

Second by Second

Single Stream
Convergent Flow
Dual Delivery
Variable Direct Inject (MP)

The Endeavour Exists

Will the Grains Industry Exist

YES ….IF IT ADAPTS TO CLIMATE SHIFT

YES…..IF WE LOOK MORE CLOSELY AT SOIL CONDITION

YES ….IF WE UNDERSTAND SOIL BEHAVIOUR

YES….IF WE USE AND UNDERSTAND THE TOOLS WE HAVE

YES….IF WE MATCH SOIL AND PLANT DATA

YES….SLOW DOWN ON “FRENETIC GENETICS” !!

INJEKTA™
Row Support Research

Summary

1. THE TECHNOLOGY EXISTS
2. THE EQUIPMENT EXISTS
3. THE SCIENCE EXISTS
4. THE ACCURACY EXISTS
5. THE PLACEMENT EXISTS
6. THE ENDEAVOUR EXISTS
7. WILL THE GRAINS INDUSTRY EXIST?