

The soil fertility debate

**Ideal and alternative fertiliser
recommendation systems
How do they rate?**

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What I hope to cover today

- **Introductory notes on the debate**
- **Features of good soil and tissue testing services**
- **Soil fertility services - how they compare.**

What Debate?

- **Which is best?**
 - Kinsey **or** traditional?
 - Fertilise soil **or** fertilise plant?
 - Long term **or** short term?
- **None of these **or** all of these ?**

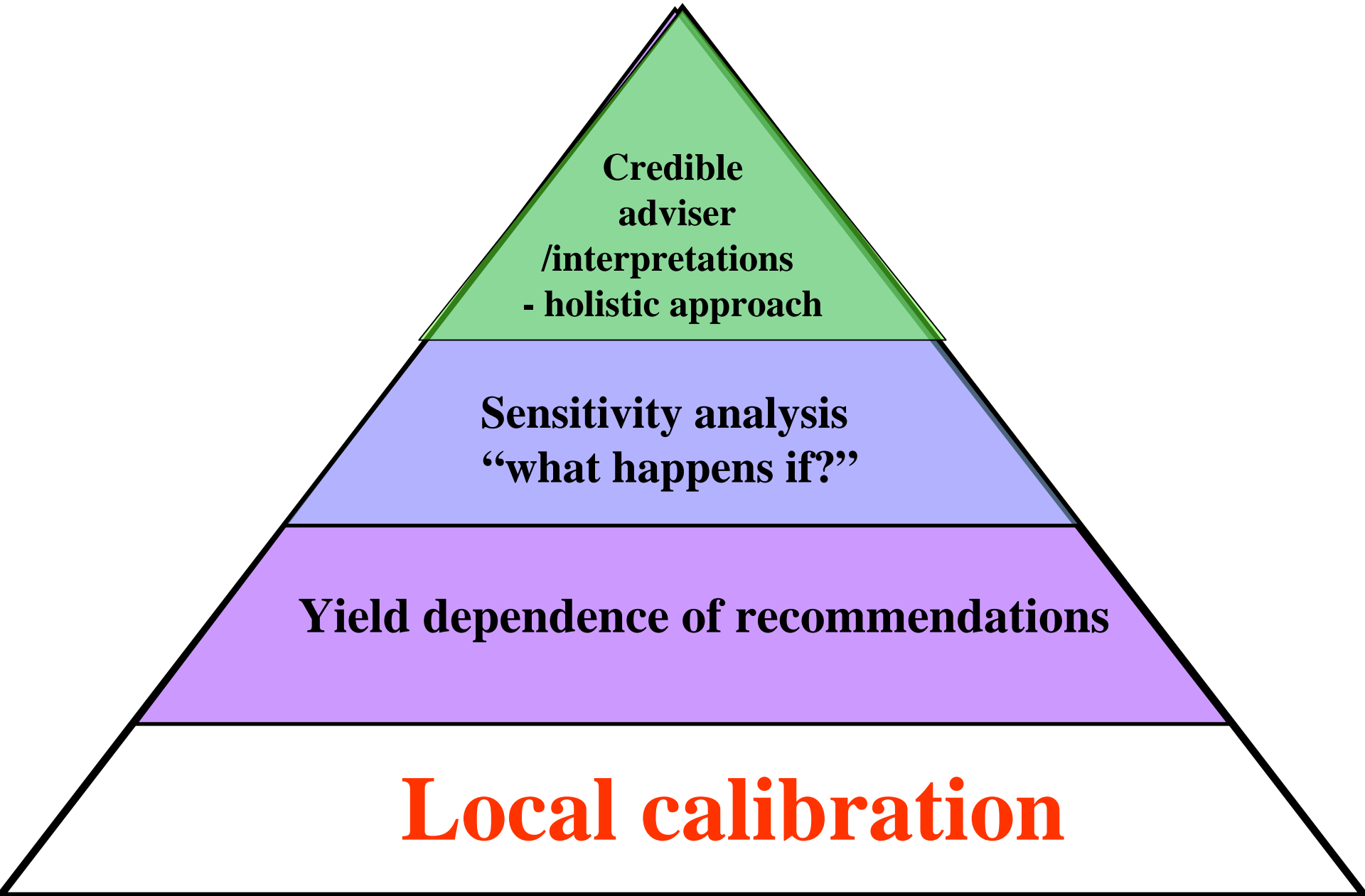
Introduction

- Objectivity, bias and credibility
 - Beware the sales pitch - particularly mine
 - Testimonials are NOT reliable
 - No one system is right all the time.
(but is it 80% or 20%???)
 - Different people require different sorts of advice.
 - The systems are so variable and poorly defined that we in the business can get away with murder..
So local trials are critical

Principles and Practice of Technology Transfer

- The **principles** of plant nutrition and soil fertility are well known and apply any where in the world.
- The **management** of plant nutrition and soil fertility has to be adapted to the local conditions of soil, climate and farming systems.
- Recommendation systems must be **locally calibrated** or the application of the principles can be meaningless

Features of a good recommendation system



The need for local calibration

- Best illustrated with examples of problems if the system is not adjusted for local conditions
- eg any one of the following tells a story:
 - supply and demand dynamic (eg lupin/wheat)
 - copper and phosyn
 - organic carbon dynamics
 - nitrogen and deep sampling
 - potassium and profile distributions
 - solution P fertilisers
 - PR70
 - acid saturation of CEC

Local calibration

What is unique about WA?

The combination of:

- highly weathered, infertile, coarse textured soils

with

- wet winters and dry summers

results in:

- purchased (not God given) fertility
- leaching conditions
- poor buffering
- unique nutrient demand patterns

What is local calibration?

- Determining critical soil nutritional indicators
- Determine the **response of different crops to different levels of the nutrient** for different sources, timing, placements etc
- Determining **critical soil fertility indicators** and how they affect productivity and sustainability

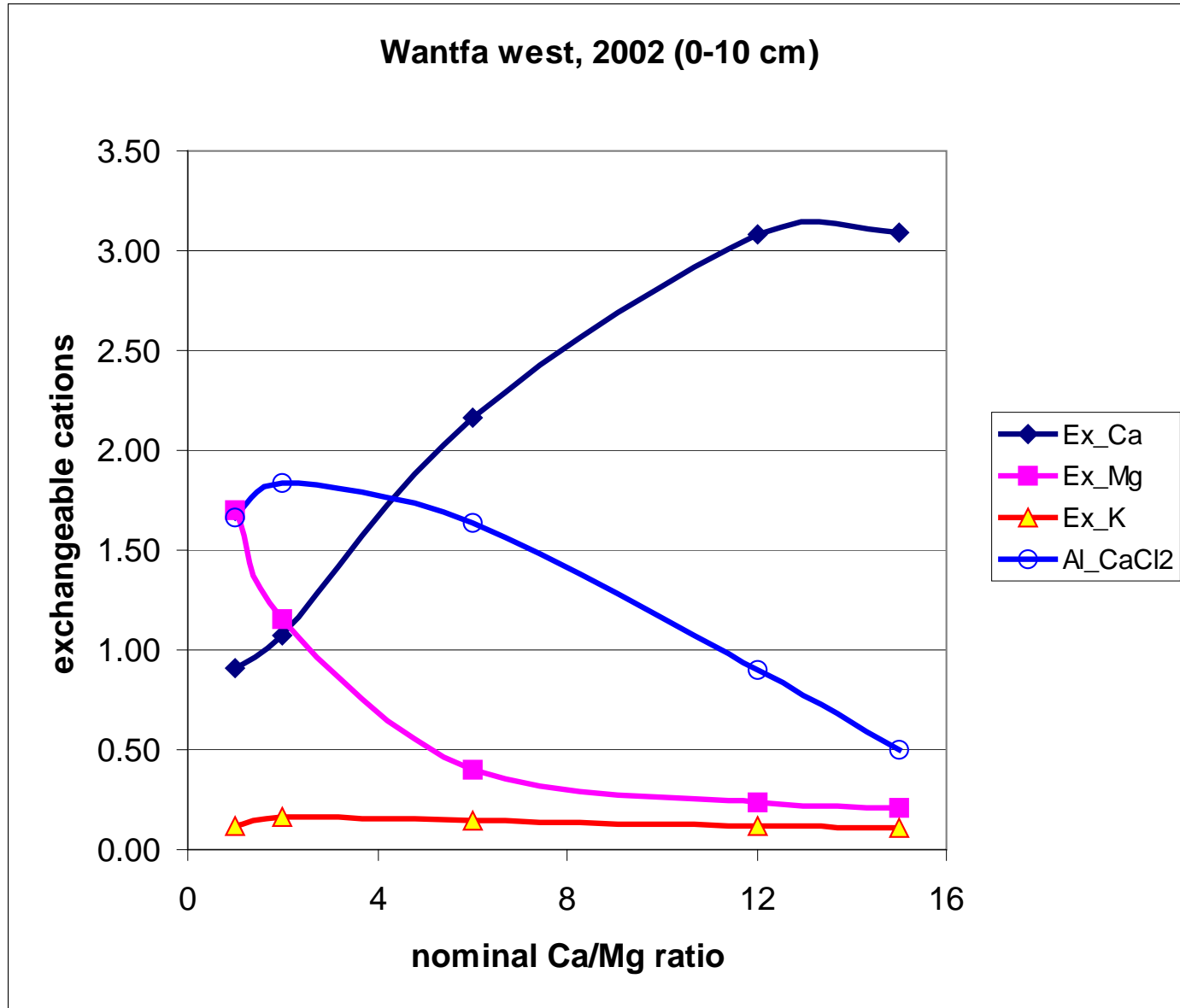
Who uses local calibration?

- Existing WA systems which I know use a lot of local research information
 - CSBP, Summit and their agents
 - Synergy
 - Many AAAC and industry reps who have done our courses and chased up the local information
- Those who to my knowledge, use external systems (but may also use local information?)
 - APAL/Perry/RLF?
 - Schoof/UFC?
 - Kinsey?
 - Optima?

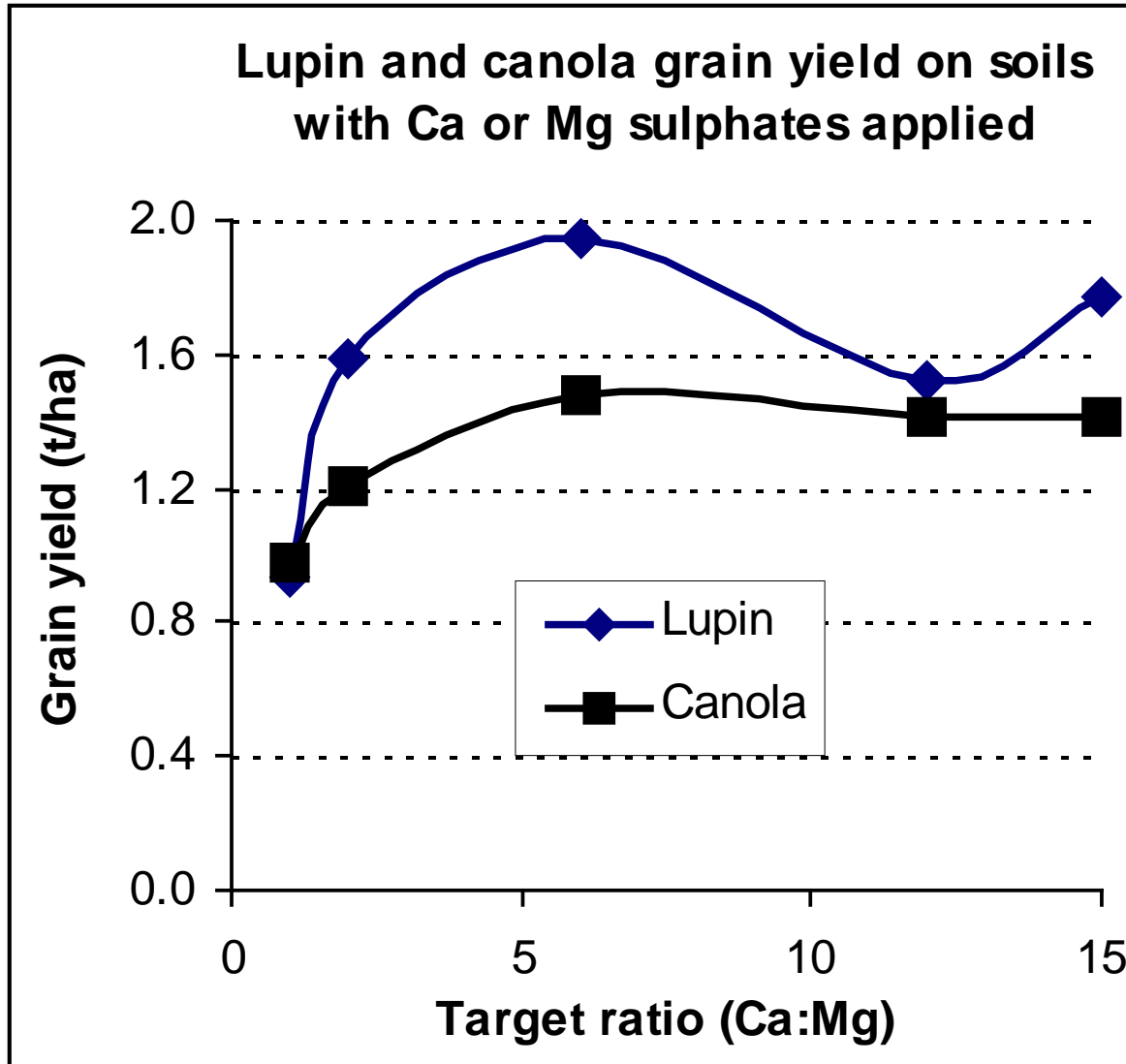
Who needs to do some local calibration?

- Systems which sound OK in principle, but need local evidence - not just testimonials.
 - BCSR/Kinsey school -
 - Ground rock and mineral fertilisers -
 - Worm juice -
 - Coal dust
 - Liquid P and PR70
 - Biological assays

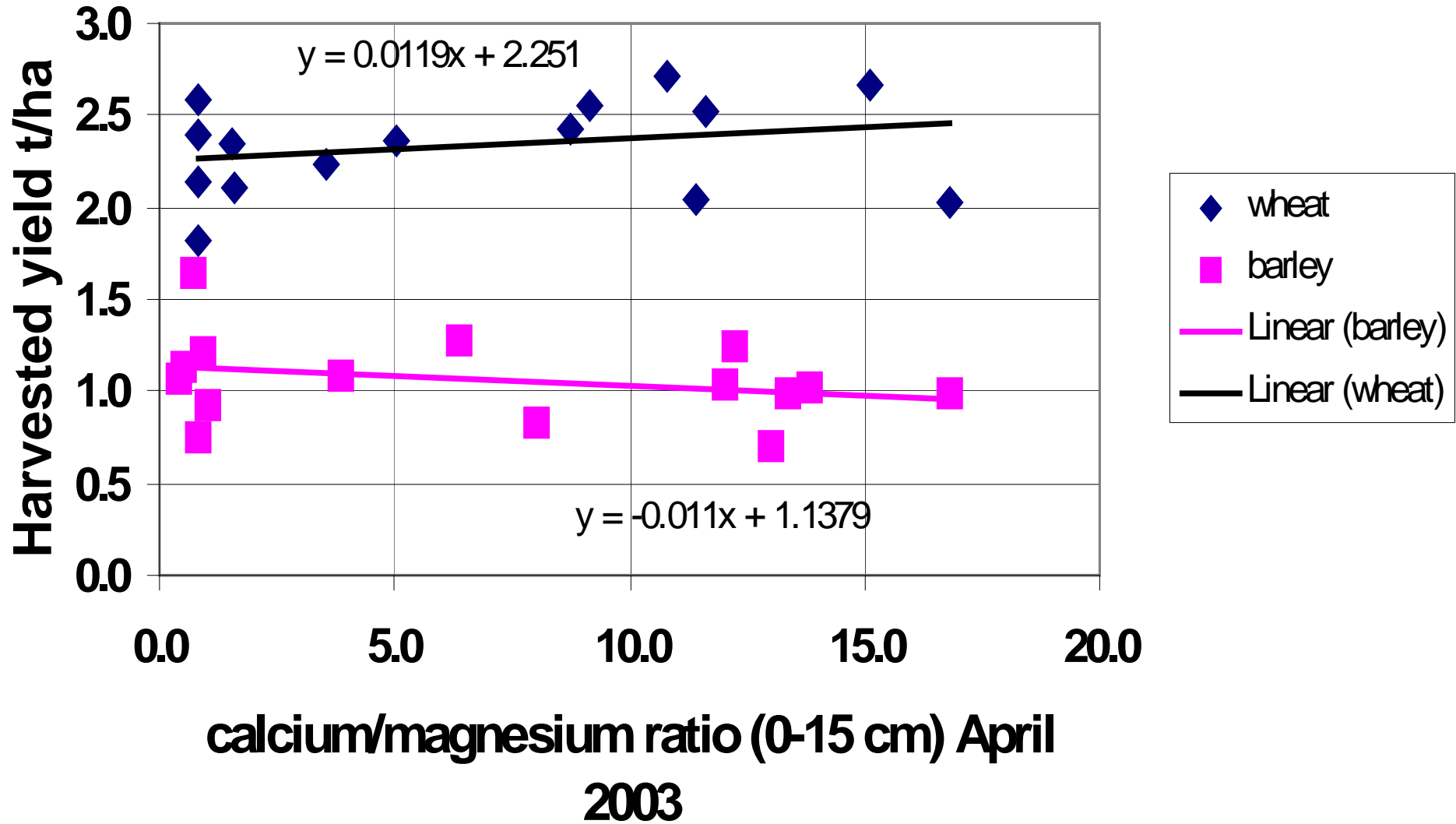
Changing cation chemistry at Meckering



WANTFA Meckering trial - 2001



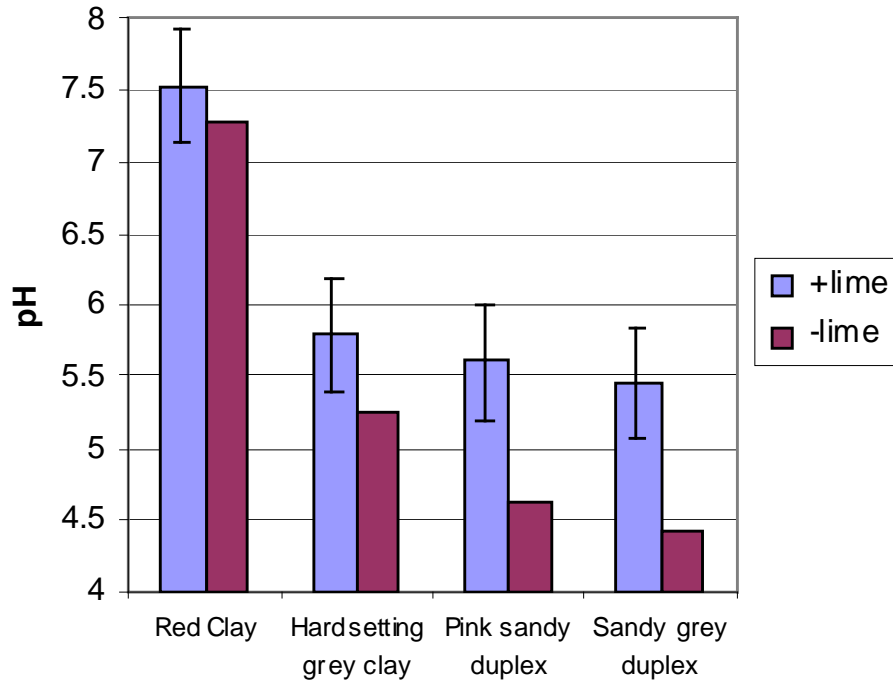
Wantfa Meckering cation ratio trial 2003



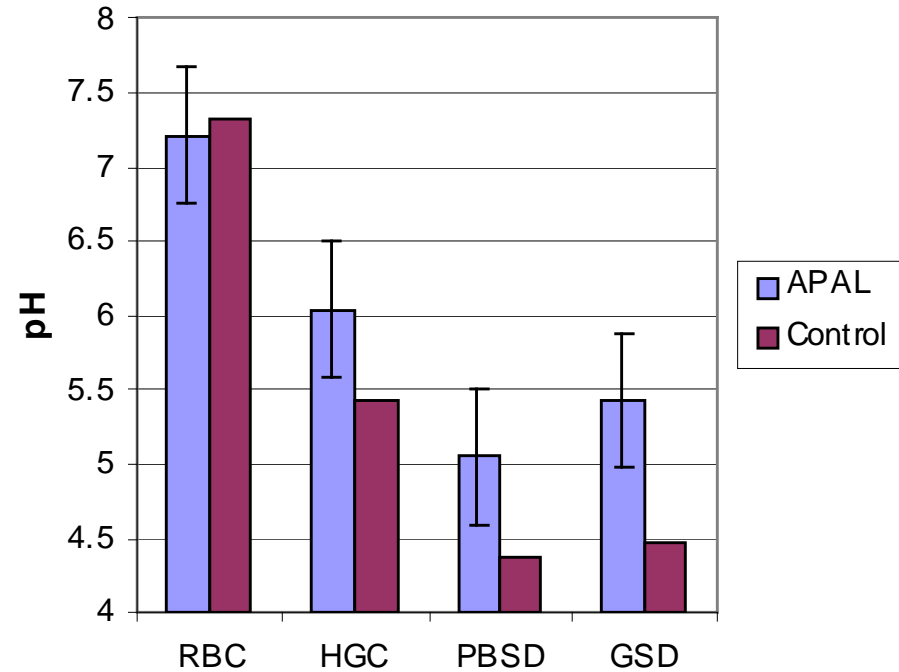
Gnowangerup lime (2.5t/ha/yr?) trial to raise Ca:Mg ratio

Jessica Sheppard and Rod Bowey

pH of 0 - 10 cm soil depth, Sept 2001



pH of 0 - 10 cm soil depth, Sept 2002

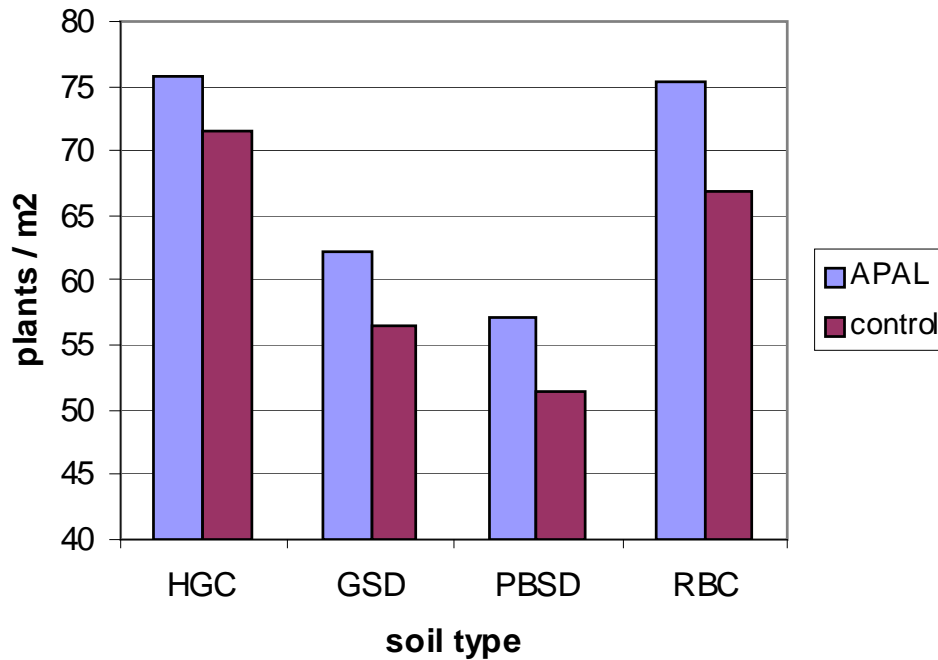


Graph 1a & 1b: topsoil pH for APAL treatments compared to controls in 2001 (lsd 10% = 0.398) and 2002 (lsd 10% = 0.4548)

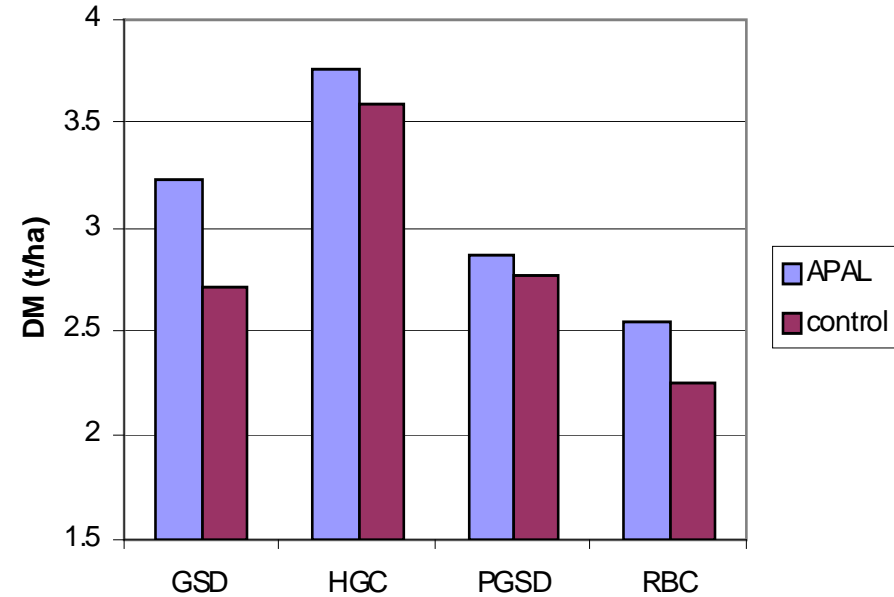
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Crop establishment 2002



Dry matter production for APAL treatment 2002



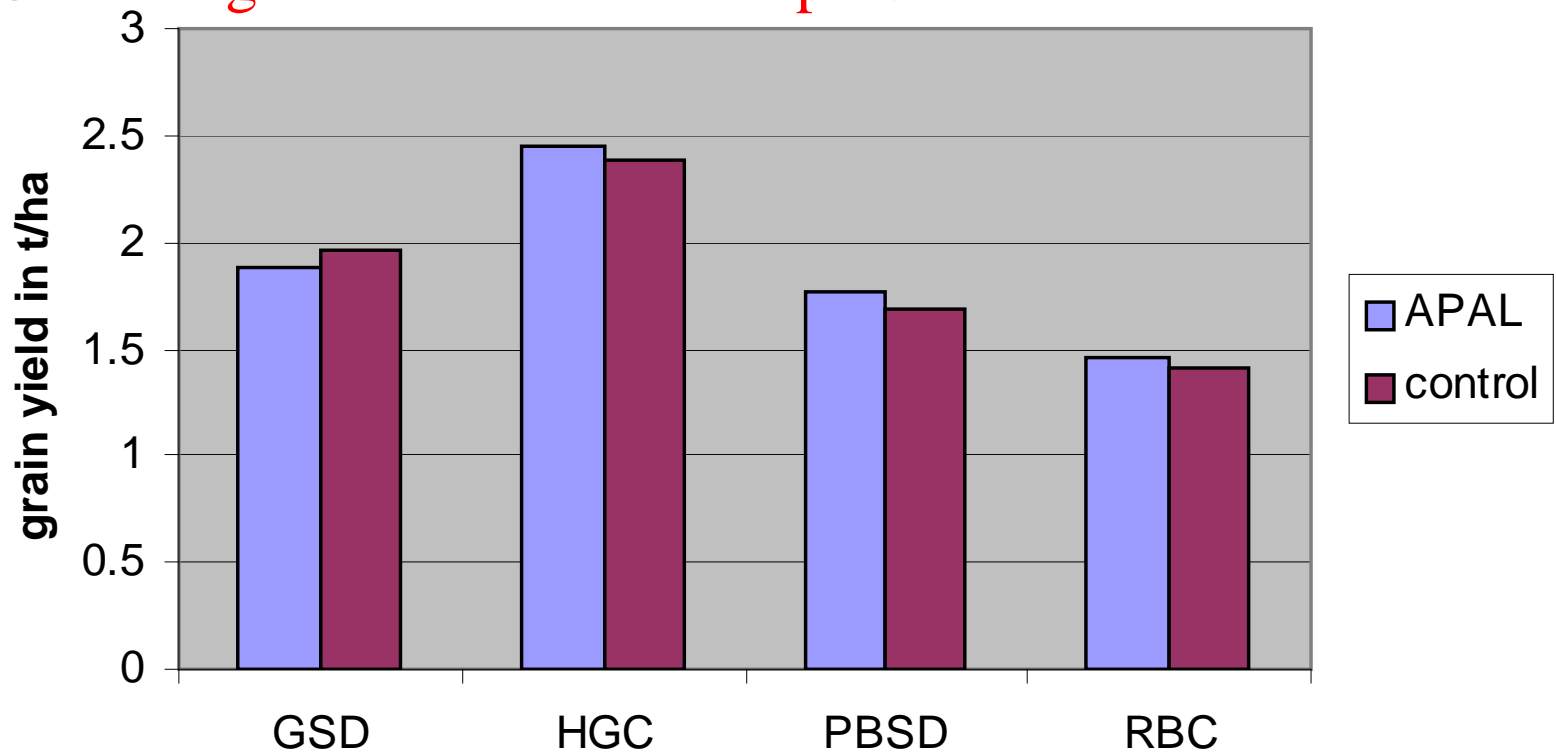
Confusing as different order to previous chart

Gnowangerup lime (2.5t/ha/yr?) trial to raise Ca:Mg ratio

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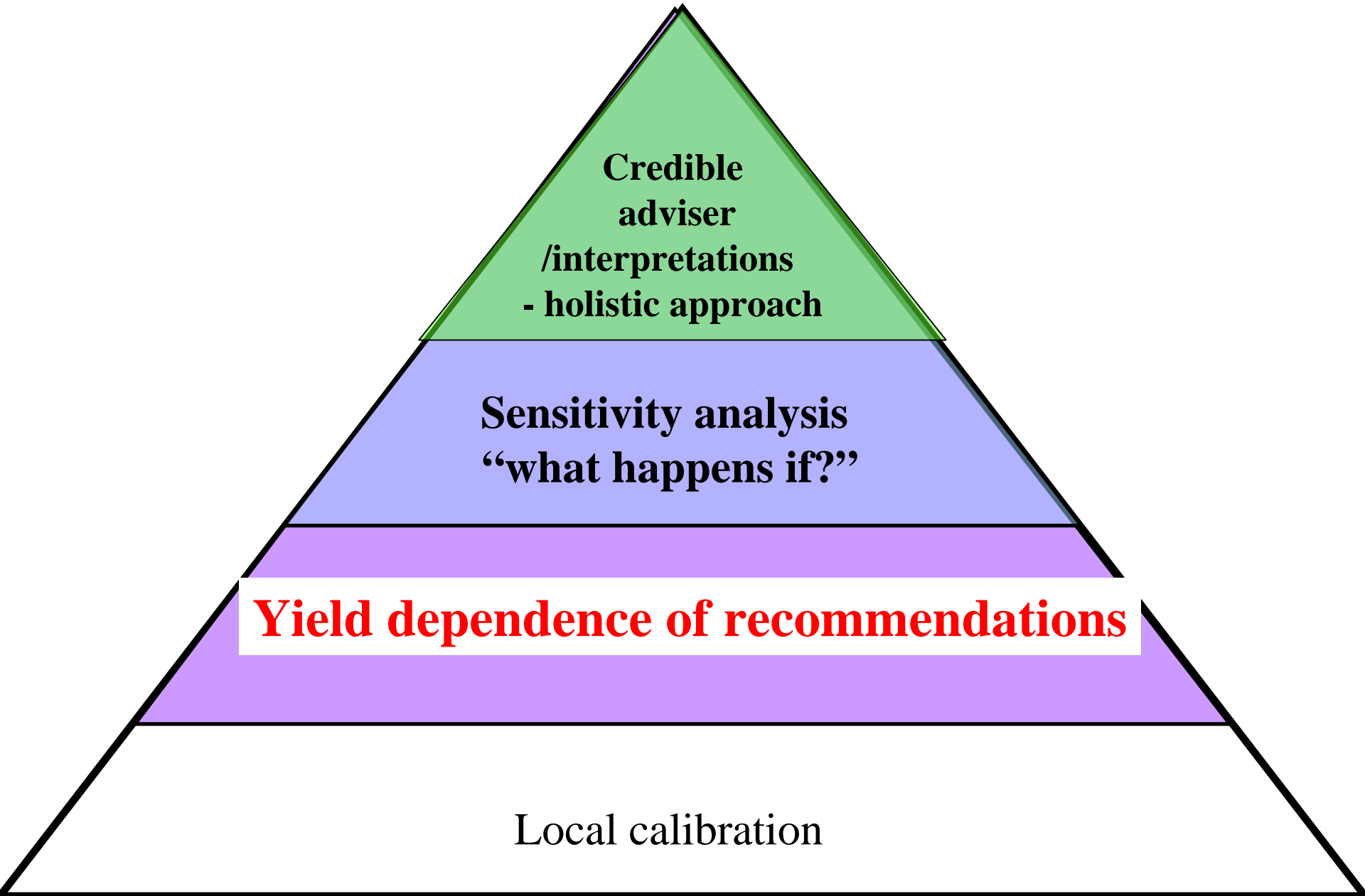
Pea Grain yields 2002

Confusing as different order to previous chart



Lsd 10% between soils = 0.12 t/ha

Features of a good recommendation system



Credible
adviser
/interpretations
- holistic approach

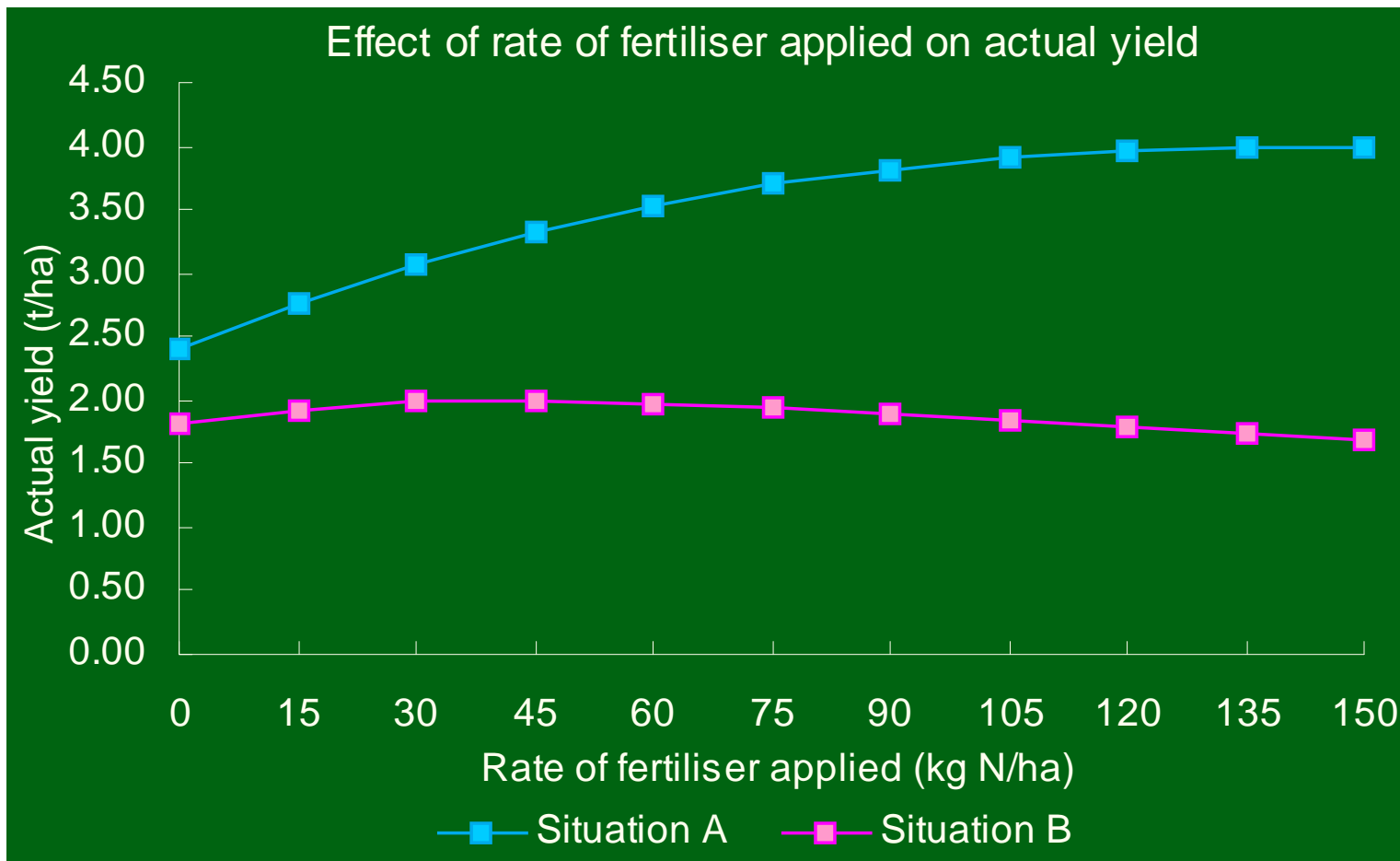
Sensitivity analysis
“what happens if?”

Yield dependence of recommendations

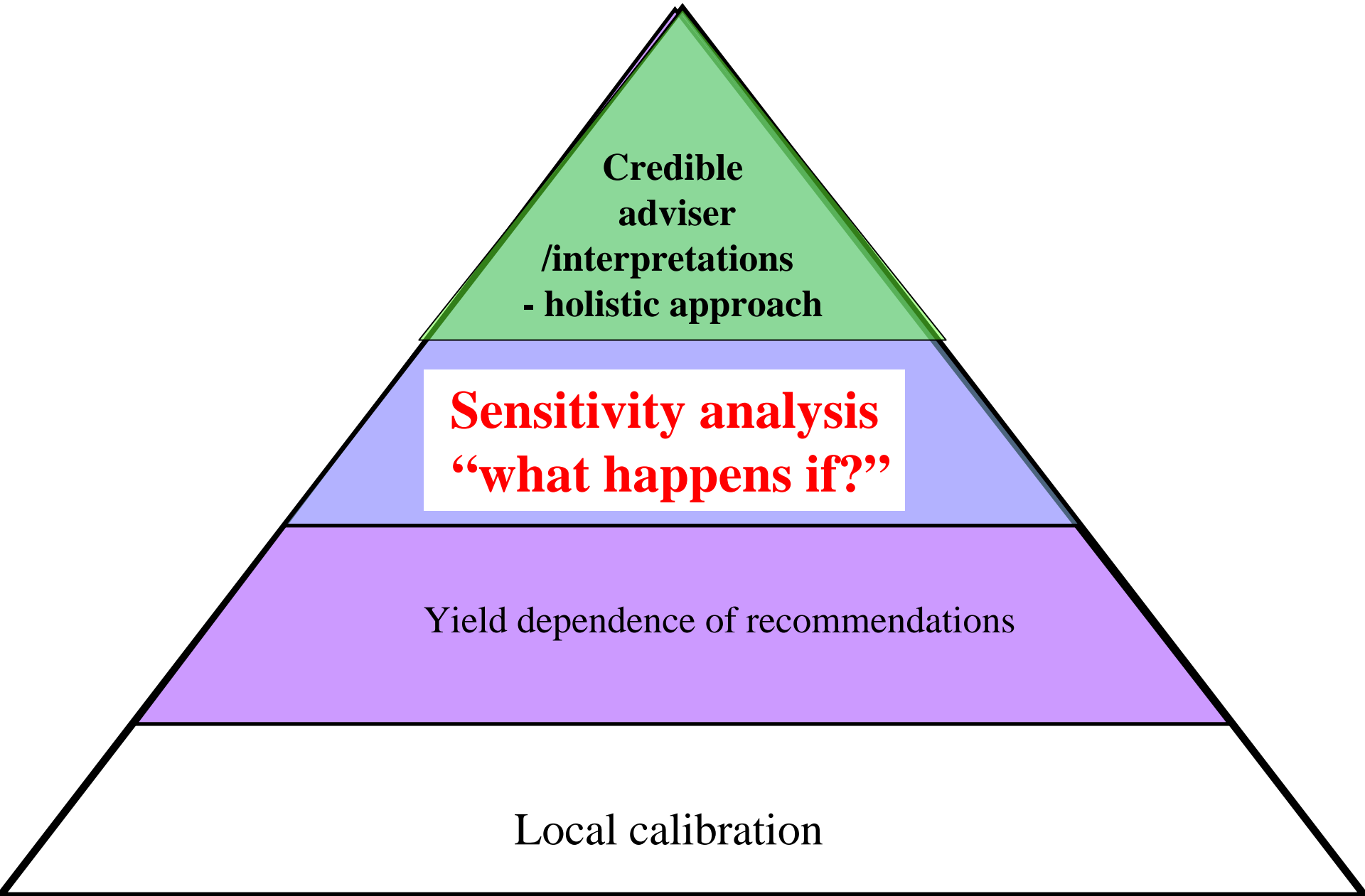
Local calibration

Yield dependence of fertiliser advice

- The bigger the crop, the bigger the demand for nutrients



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Sensitivity analysis
“what happens if?”

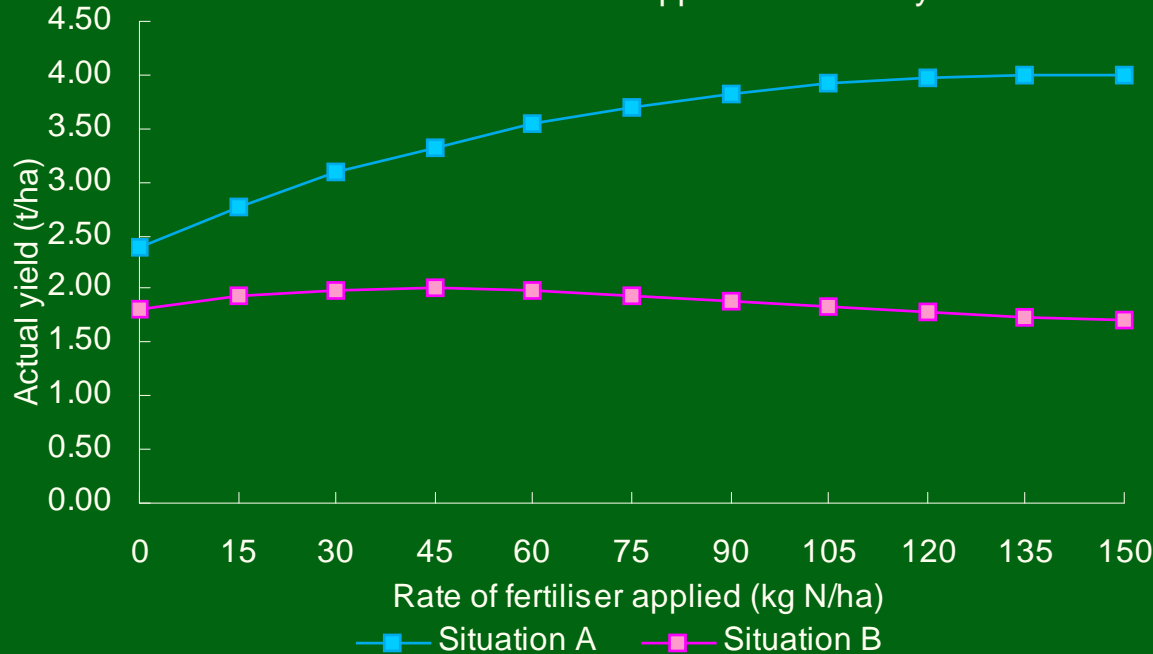
Yield dependence of recommendations

Local calibration

Sensitivity analysis

- Provides yield, quality and dollar responses to different levels of yield which result from different seasons and management choices
 - Allows choice on how much to spend on fertiliser
 - The choices can change with
 - grower
 - stage of life
 - run of seasons/cash flow
 - Not commonly available but can come from individual consultants and some company reps if you push them

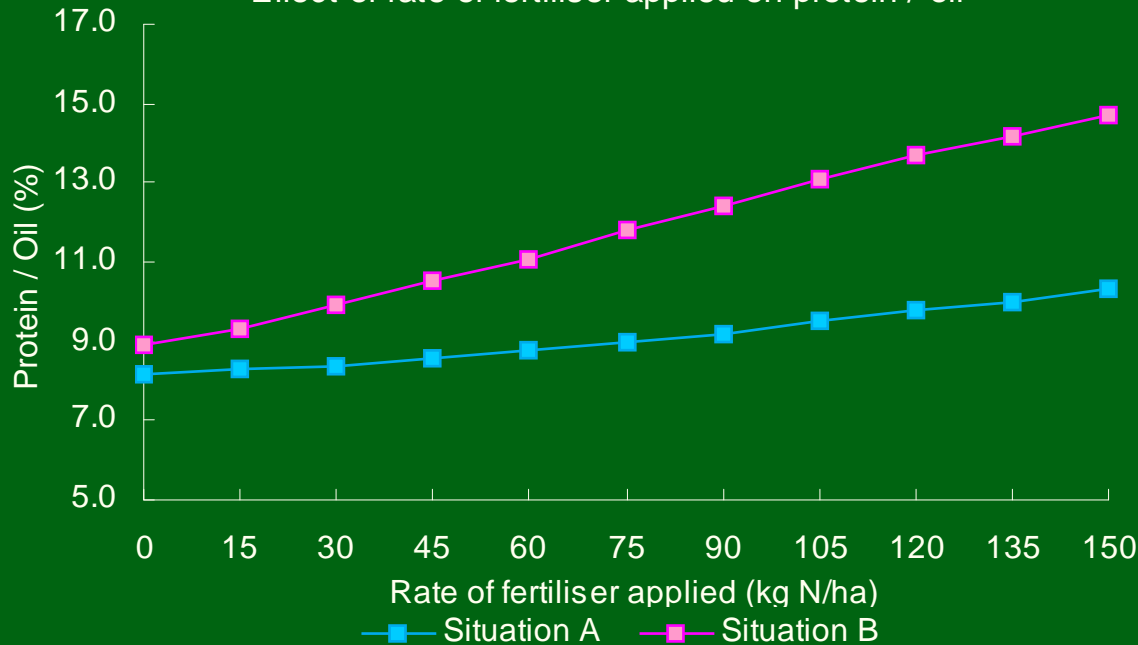
Effect of rate of fertiliser applied on actual yield



Sensitivity analysis

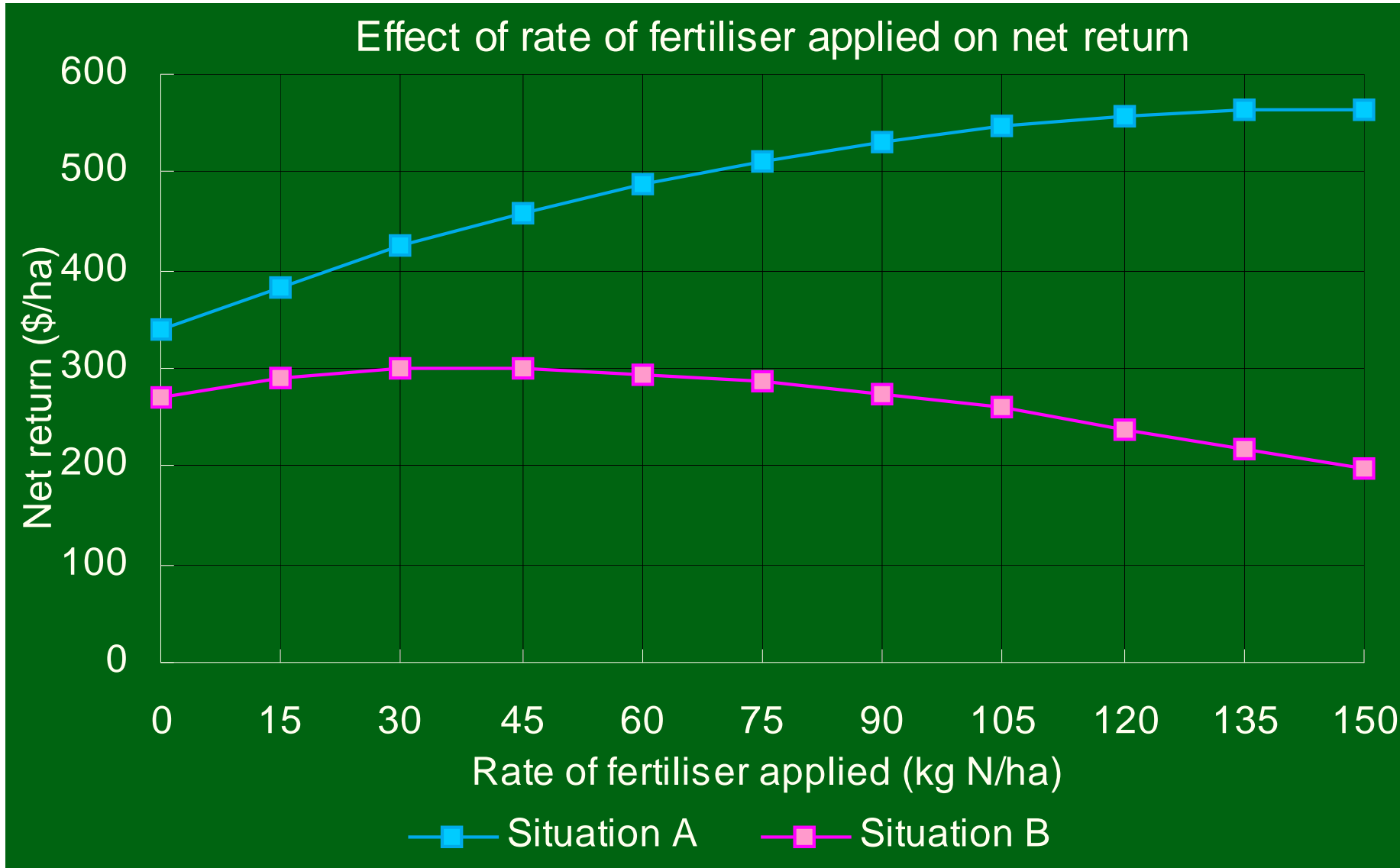
Provides yield, quality and dollar responses to different levels of yield

Effect of rate of fertiliser applied on protein / oil

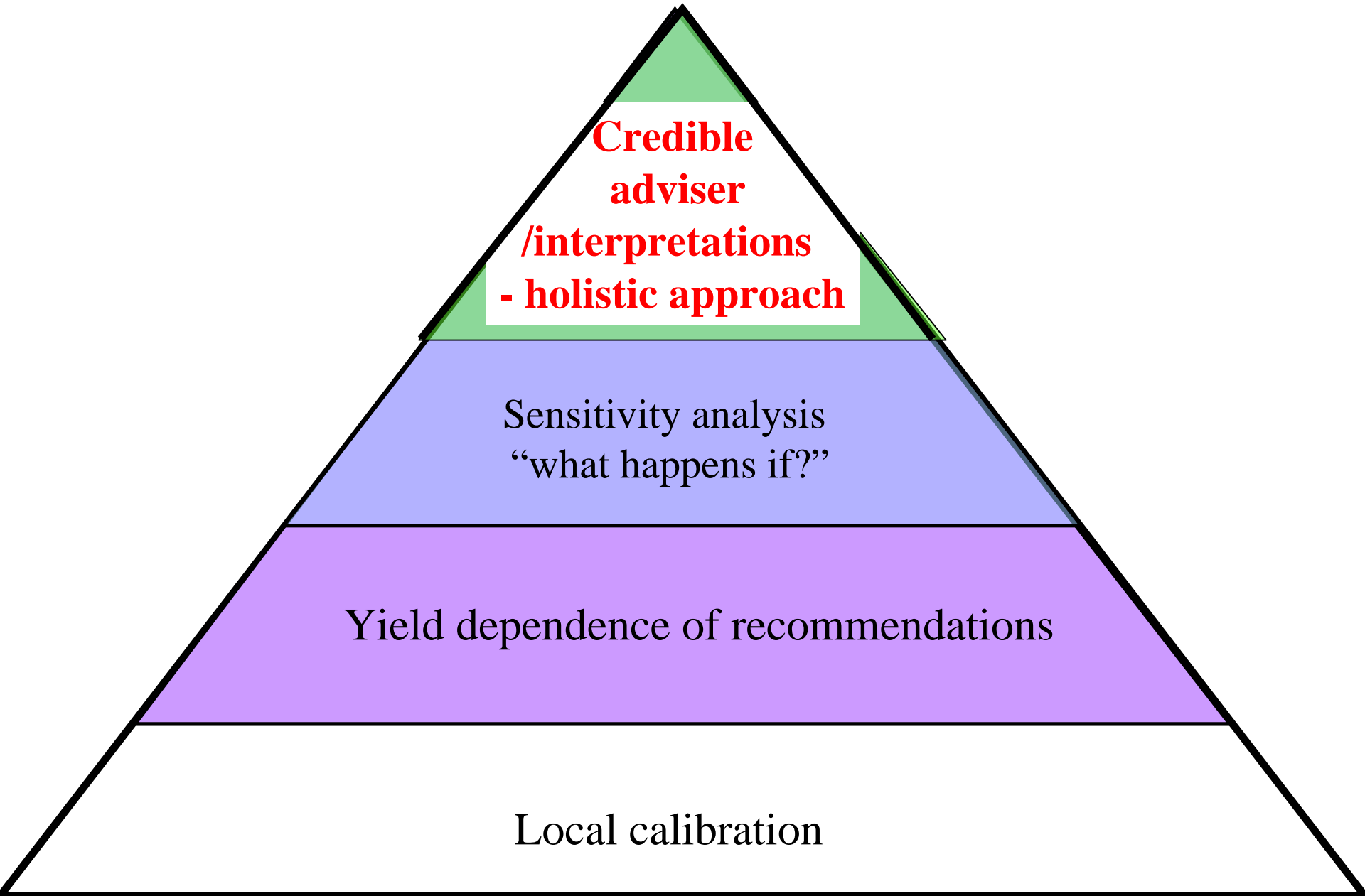


Sensitivity analysis

dollar responses



Features of a good recommendation system



Credible adviser/interpretations - holistic approach

- Advisers with experience and an understanding of farming and soil systems.
- Advice matched to farmers' needs, aspirations and "situations" and this can only be done effectively at a one to one level.
- An adviser who has had access to soil analyses, follow up tissue tests as well as subsequent crop performance
- Meanwhile I will try to summarise this talk in a slide which I hope is not too painful or litigable!

Credible adviser/interpretations - holistic approach

- An adviser who has had access to soil analyses, follow up tissue tests as well as subsequent crop performance
- So you can all go away convincing yourself that you are that experienced and insightful adviser! But before you do, educate yourself using aids such as NPDECIDE, SYN, WOOLMODEL, OPTLIME etc
- Meanwhile I will try to summarise this talk in a slide which I hope is not too painful or litigable!

Concluding summary

These are arguable assessments by jwb and are ever changing

You have to make these assessments for yourselves

	CSBP	Summit	Superfert	APAL	Kinsey	WADA
calibration	+++++	+++	++	no	no	+++++
potential	yes	yes	yes?	no	no	yes
sensitivity	can	can	?	no	no	yes
experience	varies	varies	varies	??	??	varies
extracts	yes	yes	yes	?	?	yes
depth	yes	yes	yes	?	?	yes
units	yes	yes	yes	?	?	yes
individual	agents	agents	synergy	agents	APAL	no

Concluding summary

These are arguable assessments by jwb and are ever changing

You have to make these assessments for yourselves

	BioAgWest	ERA	FCI	Schoof	Arkley	Mason
calibration	no	no	no	+	no	+++
potential	no	no	no	?	no	no
sensitivity	no	no	no	no	no	no
experience	???	??	???	good	good	good
extracts	?	?	?	?	?	yes
depth	?	?	?	?	?	yes
units	?	?	?	?	?	yes
individual	yes	?	?	yes	yes	yes

An aerial photograph of a vast green agricultural field, likely a wheat crop. The field is divided into numerous rectangular plots by thin, dark lines, possibly furrows or small roads. A prominent, winding road or path runs diagonally across the lower-left portion of the image. In the upper-right corner, there is a small, white, rectangular structure, possibly a farm building or shed. The overall scene is a typical agricultural landscape.

Map paddock

Wheat crop, Varley 2000

Showing 1998 frosted wheat crop windrows
a phosphorus or potassium response?

- **A lot of the marketing of ‘alternatives’ can be distinguished by the way it is angled:**
 - discovery so new that most scientists have not heard of it
 - (mis)uses scientific terminology to impress the gullible
 - (mis)quotes non-existent and difficult to source, evidence
 - claims universities and Ag Depts refuse to research it
 - plays down controlled science as not showing the benefits obtained in “practical” agriculture
 - numerous beneficial (but not measurable) side effects
 - you will not see the benefits for several years
 - use according to the label (which may recommend best practice and be of more value than the ingredients themselves)

Dihydrogen Monoxide - The Invisible Killer

- DHMO properties
 - colourless, odourless, tasteless and kills uncounted thousands each year
 - most deaths by accidental inhalation
 - prolonged exposure to solid form causes severe tissue damage
 - symptoms of DHMO ingestion can include excessive sweating and elimination, possibly a bloated feeling, nausea, vomiting and body electrolyte imbalance.
 - For people who are dependent, DHMO withdrawal means certain death

Dihydrogen Monoxide - The Invisible Killer

- DHMO:
 - is a major constituent of acid rain
 - contributes to the greenhouse effect
 - can cause severe burns
 - contributes to the erosion of the natural landscape
 - accelerates rust and corrosion in many metals
 - can cause electrical failures and decrease the effectiveness of automobile brakes
 - has been found in excised tumours of terminal cancer patients

Dihydrogen Monoxide - The Invisible Killer

- DHMO
 - contamination is reaching epidemic proportions
 - non-specific quantities of DHMO now exist in every stream, lake and reservoir in America and even in Antarctic ice.
 - DMHO causes millions of dollars of property damage throughout the world

Dihydrogen Monoxide - The Invisible Killer

- Despite the known dangers, DHMO is regularly used:
 - in nuclear power plants
 - in the production of styrofoam
 - as a fire retardant
 - in animal research
 - in the distribution of pesticides
 - as an ingredient of particular junk foods
- even after being washed thoroughly, fruit and veges remain contaminated
- Companies dump waste DHMO into rivers and oceans and nothing can be done to stop them because this practice is still legal

Dihydrogen Monoxide - The Invisible Killer

- DHMO
 - the impact on wild life is extreme and yet the government will not even consider placing a ban on production, distribution and use of this chemical due to its “importance to the economic health of the nation”
 - the defence forces, military organisations and the navy in particular have a vested interest in conducting ongoing experiments with DHMO and have designed multi-billion dollar devices and programs in order to utilise the substance in warfare situations.

Dihydrogen Monoxide - The Invisible Killer

- DHMO
 - Military research facilities receive DHMO via a highly sophisticated underground distribution network.
 - Many store large quantities for later use.
- TO WHAT EVENTUAL PURPOSE?

Dihydrogen Monoxide - The Invisible Killer

- You guessed it, the chemical DHMO is
- H_2O WATER
- The above is from Australasian Science, Jan/Feb 2001. This edition is devoted to Scepticism and deals with:
 - » psychics
 - » nutrition fads
 - » acupuncture
 - » crystals
 - » creation science
 - » horoscopes
 - » global warming
 - » bent spoons and breatharian

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