IPNI
INTERNATIONAL
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INSTITUTE

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Micronutrients – scoping the issue

More Profit from Crop Nutrition #2

Better Crops, Better Environment … through Science

Advisor Updates, Perth, February 2013.

Why micronutrients & why now?

- Widespread awareness of the issue of micronutrient deficiency
  - Eg 8 Mha of WA was recognised as Zn deficient (Welsh et al.)
  - World leading work in WA and SA on diagnosis and treatment.
- Many paddocks treated with micronutrient supplemented base fertiliser – some every year, some every now and then.
  - Fertilizer – eg 1.6% Cu is $160/t extra over MAP ($8/ha)

- "Cheap" insurance or another unnecessary cost?
- Strategic versus tactical application?
- Treating gross deficiency or are these the "icing on the cake".

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How to identify the scale of the problem

- The problem is
  - Soil tests not that great.
  - Tissue tests OK but need good sampling protocols (esp. timing).
  - Transient deficiencies.

- Risk of micronutrient deficiency is a function of
  - Soil type – pH, texture, subsoil, organic C, subsoil properties
  - Climate – rainfall.
  - Crop – cereals, oilseeds, pulses – (Yield potential?)
  - Management
    - Prior use, P history, liming, clay lifting, S (Mo), N (Cu).

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How to estimate risk of micronutrients for soil types?

- Better define soil type and risk on soil characteristics
  - Mn on highly calcareous soils (SA, lentil in WA)
  - Zn on calcarosols, shelly vertosols, podzolic sands WA, lateritic soils, etc)
  - Cu often with Zn, but with high OM.

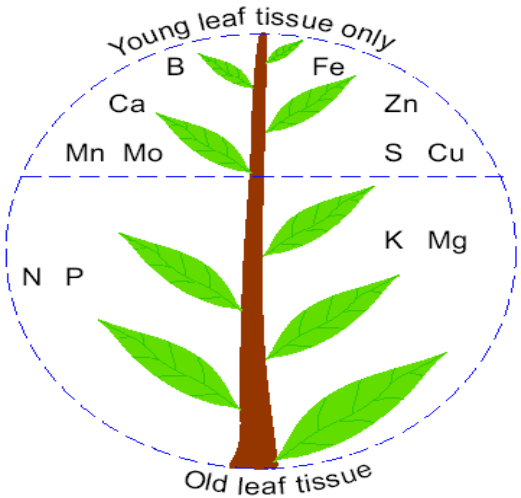
	Cu	Mn	Zn	B	Mo
pH > 7.0	---	--	---	**	++
pH < 5.5	++	+++	+	--	--
water-logged soil	+	+++	+		
drought	---	---	-	---	--
high organic C content	---	++	++	++	-
high P-content	-	-	---	-	+++
sand	---	--	---	--	-
compaction	+	+	+	+	+

Need for evidence versus scepticism

Look for the weight of evidence

Using the weight of evidence to assign risk

- Soil factors (Australian Soil Classification)
  - Texture, pH, colour, etc, are parameters that define these classes.
- Soil test values (NVT site database, against ASC)
- Grain nutrient content (NVT sites 2012)
- Literature – past research on responses.
- Management aspects – liming, etc, & by crop.



Risk by soil type – work in progress

ASC Broad soil type	B (low pH, low WHC)	Cu (high pH, well drained, high OM, low WHC)	Mn (high pH, well drained, low WHC)	Mo (low pH, low WHC)	Zn (high pH, low WHC)
Kandosols	3	3	3	3	3
Kurosols	2	1	1	3	1
Organosols	2	3	1	2	1
Podosols	4	3	3	4	4
Sodosols	2	1	1	2	1
Tenosols	3	3	3	3	3
Vertosols (alkaline)	1	2	2	1	4

BUT HOW DO YOU KNOW THE SOIL TYPE (ASC)?

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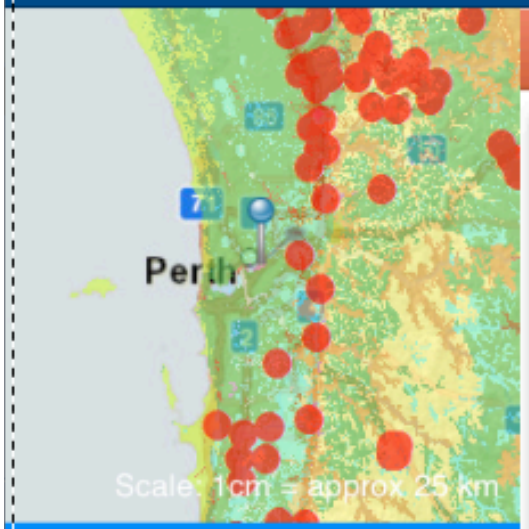
Return to Map

ASRIS Map Discovery



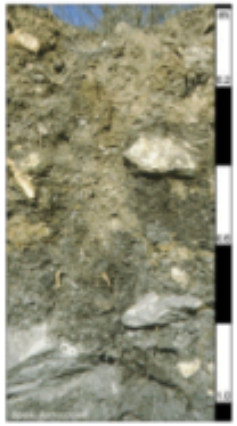
- Spolic Anthroposol — Plain
- Grey Dermosol — Plain
- Spolic Anthroposol — Plain

High Medium Low

Soil Type | Reference Profile | Summary Data

ANTHROPOSOLS: Soils resulting from human activity

- Formed by the modification, mixing, truncation or burial of the original soil or creation of new soil parent materials as a result of human activities.
- Includes soils underlain by manufactured or organic landfill, soils formed by the application of human-made materials such as slurry, and soils formed by earthmoving in construction.
- Identified by the presence of artifacts in the profile or knowledge that the soils or parent materials have been made or altered by human action.
- Excludes soils altered by common agricultural operations and soils that are artificially drained or flooded.



Cu B Mn Zn

MPCN II – Micronutrient Survey – Project 15

- Objective is to assess the extent of potential impact of micronutrient deficiency within each agro-ecological zone (AEZ) based on soil type.
  - Consider Zn, Cu, Mn, B, (Mo), cereals, pulses and canola.
- Soil type represents the primary risk
- Can soil type be better linked to risk?

Use this against the weight of evidence from:

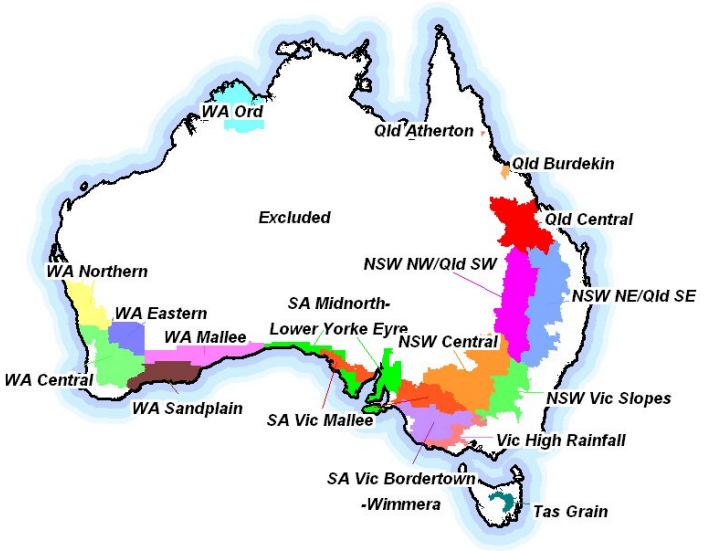
Database of soil test info.

NVT (back to 2006).

Grain nutrient contents

NVT sites 2012.

Literature (refereed and other)



- Outcome – Improved targeting of micrnutrient use by growers.