More Profit from Crop Nutrition Project

Mike McLaughlin
Chair, MPCN Program Advisory Committee
Deputy Chair, GRDC Southern Panel

MPCN

National project since 2008 - North, South and West regions

Focuses on Crop Nutrition and extension with specific aims

To improve the return on investment from fertiliser inputs by
• Improving the nutrient efficiency of crops
• Improving the capacity of soils to supply nutrients
• Reducing the soil’s propensity to lose or lock up nutrients
• Develop improved fertiliser product formulation and design
• Looking at the use of potentially valuable low cost and waste inputs

Coordinated by NSW DPI – Tony Cox
MPCN program goals

- Increased adoption of nutrition knowledge across Australia.
- Improved coordination of communication and extension across the grains and fertiliser industries.
- Improved tools that are used by grain growers and advisers to improve nutrient use efficiency.
- Documentation of emerging ideas and capacity challenges.

Themes

1. Make nutrient use efficiency traits available to plant breeders in adapted backgrounds
2. Better match N, P, K and S inputs to meet crop demand and minimise losses and tie-up
3. Make better use of micro-nutrients to correct deficiencies and enhance crop yield
4. Develop and test new fertiliser products and adjuvants
5. Provide information to growers to make effective fertiliser decisions
6. Coordination of a program with a lasting legacy of analysed, reported and published information
Theme 1 - Make nutrient use efficiency traits available to plant breeders in adapted backgrounds

- Understanding P efficiency traits in crops
- Understanding varietal traits in root architecture for nutrient capture

Root CAT scans – Dr Chris Guppy, UNE

Theme 2 – Better match N, P, K and S inputs to meet crop demand and minimise losses and tie up

Deep P placement – Dr Mike Bell, UQ/QAAFI

- a P band ~ 20 cm deep;
- Roughly <50 cm apart
- Rate to last 3-5 years
- Applied early in the fallow
- Low PBI (< 200) soil
Theme 2 – Better match N, P, K and S inputs to meet crop demand and minimise losses and tie up

Deep P placement – Dr Mike Bell, UQ/QAAFI

![Sorghum grain yield graph](image1)

<table>
<thead>
<tr>
<th></th>
<th>Dysart 13/14</th>
<th>Dysart 14/15</th>
<th>Ginde 13/14</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 kg P/ha</td>
<td>+36%</td>
<td>+25%</td>
<td>+24%</td>
</tr>
<tr>
<td>10 kg P/ha</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>20 kg P/ha</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>40 kg P/ha</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Claying of sands – Dr Richard Bell, Murdoch Uni  
Dr David Hall, DAFWA
Claying of sands – Dr Richard Bell, Murdoch Uni
Dr David Hall, DAFWA

Dalyup Claying Experiment

- Subsoil rate x 2 depths of clay incorporation (1999)
  - 0, 50, 100, 200, 300 t/ha
  - ± Rip 40 cm
- Randomised block design with 3 replicates

![Graph showing yield increase](image)

Claying of sands – Dr Richard Bell, Murdoch Uni
Dr David Hall, DAFWA

![Graph showing yield increase](image)
Theme 2 – Better match N, P, K and S inputs to meet crop demand and minimise losses and tie up Nitrogen use efficiency and gaseous losses of N

Roger Armstrong, Mike Bell, Peter Grace, Louise Barton

Theme 2 – Better match N, P, K and S inputs to meet crop demand and minimise losses and tie up

Nitrogen use efficiency and gaseous losses of N (Mike Bell)

- On Vertosols, 20-40% of applied N, or an average of 24 kg N/ha/year
- Losses typically a lot lower on better drained Ferrosols

Theme 3 – Making better use of micro-nutrients to correct deficiencies and enhance crop yield

- Deficiencies of TEs now rare in Australian soils
- Often misdiagnosis of deficiencies – crop stress
- Value of soil testing for TEs doubtful
- No challenges to ancient management guidelines in modern systems
- Fluid delivery becoming popular
Theme 3 – Making better use of micro-nutrients to correct deficiencies and enhance crop yield

Responses to Cu fertilizers – N. Wilhelm, SARDI

2015 Wheat, Cummins, SA

Yield (t/ha)

- Control
- Seed dressing
- Fertiliser, dry blend
- Fluid at seeding
- Late foliar
- Two foliars

Theme 4 – Develop and test new fertiliser products and adjuvants

- Evaluating foliar P – Univ. Adel.
- Developing fertilizers from wastes (struvite) – Batstone and Mehta, Univ. Qld
Sewage water

Nutrient recovery

Struvite

Damien Batstone and Chirag Mehta, UQ
Theme 5 – Provide information to growers to make effective fertiliser decisions

- Database - Making Better Fertiliser Decisions for Cropping Systems in Australia
- Extension and Training North, South and West
- Decision support tools
- Web-based extension tools – ExtensionAUS Crop Nutrition

Since January 2013:

GROWERS
- 21 workshops = 382 farmers (target 420)

ADVISORS
- 12 workshops = 142 advisors (target 120)

22 grower workshops in 2015/2016 = 374 growers
12 advisor workshops = 111 advisors (+94)
16 in 2016/2017
• Extension and Training North, South and West

In 2015/16
77 events run by
MPCN researchers

• predominantly
field days and
Updates

• 4050 growers
and 870 advisors

>darkness>number
of growers and
advisors attending

• Decision support (economic) tools

1. Deep-P Economic Calculator (North)
2. Profit-Risk Decile Calculator (South)
3. LEAP2MPCN & Optlime (West)
Theme 5 – Provide information to growers to make effective fertiliser decisions

46 articles published 2015

CROP NUTRITION

N-rich strips show if your crop needs a boost this season

What’s the minimum Phosphorus rate if you are following a poor crop?

Older soil test methods hold ground

Many growers will be wondering about what to do with Phosphorus (P) fertiliser for their next winter crop. Soil tests are the best indicator of...

Current widely used soil test methods have come out on top as a reliable soil testing procedure to see which procedures best compare with...

Twitter

1561 followers 1823 tweets
MPCN Annual Workshop

- Research presented to peers and GRDC panel members and GRDC managers
New Projects

- Soil spectroscopy
- Nitrogen and water interactions
- Nutrient performance indicators
- Phosphorus requirements to accompany high N fertiliser levels
- Nutrient stratification and sub-surface soil testing
- Evaluating testing methods for P and K soil reserves
- Deep placement of nutrients
- Organic matter and nutrient availability
- Subsoil manuring
- Management of sandy soils

Summary

- GRDC’s MPCN program has been very successful in
  - Creating a national focus for crop nutrition research in Australia with the aim to increase grower profits
  - Providing a platform for collaboration of researchers across states and institutions
  - Coordinating collation and extension of crop nutrition knowledge to growers via multiple modes
  - Identifying emerging crop nutrition issues that could limit profits
  - Providing valuable training and capacity development for young researchers