INNOVATIONS IN FERTILIZER AND FERTILIZER MANAGEMENT

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✓ Not-for-profit organization dedicated to research and education for the responsible management of plant nutrients for the benefit of the human family.

“We train the trainers and influence the influencers”

Dr. Terry Roberts - President IPNI
Are there innovations in fertilizer management? Are such innovations feasible at farm level?

Are there innovations in fertilizer? If so, what are them?

Is the industry in general taking advantage of opportunities created by research?

Is the industry leading forefront research in terms of new fertilizers?
Many Factors Are Contributing to Changes in Nutrient Management and Educational Needs

- Major changes in fertilizer costs or crop prices
- Climate change induced shifts in cropping patterns, yields, soil processes
- Genetic changes that alter crop yields and NUE
- Changes in crop species due to bioenergy
- Changes in plant parts harvested due to bioenergy
- Manure composition changes due to distillers grains
- Application of bioash
- Government policy
- Fertilizer and equipment technology & tools

Many Techniques are available to help the farmers
INNOVATIONS ON FERTILIZER MANAGEMENT

- Good field applied research aiming better nutrient use efficiency.
- Many good tools available to farmers for better nutrient use efficiency (publications, modeling, local research data, etc).
- Several joint initiatives across the globe for FBMPs.
- Great effort from industry on efficient use of nutrients aiming adequate agronomy, environment and social aspects (4R Nutrient Stewardship Program).
- We need to intensify good extension work.

APPLICATION OF THE RIGHT NUTRIENT SOURCE AT THE RIGHT RATE, TIME, AND PLACE
**Phosphate Rock Decision Support System (PRDSS)**

**Source:** U. Singh & S. H. Chien (2008), unpublished data.


**Charts:**

- **Initial (RAE)**: Scatter plot showing the relationship between RAE at field condition (%) and RAE by PRDSS (%).
- **Residual (RAE)**: Scatter plot showing the relationship between RAE at field condition (%) and RAE by PRDSS (%).
INNOVATIONS IN FERTILIZER
New Released Products

✓ Fertilizers with lower potential for N losses to the environment (e.g., urea with NBPT).
✓ Fertilizers specific to certain agronomic conditions (e.g., urea supergranule for flooded rice).
✓ More adequate nutrient composition to different soils and crops (e.g., inclusion of micronutrients).
✓ More efficient form of delivering nutrients (e.g., fluid fertilizers containing P for calcareous soils).

IPNI INTERNATIONAL PLANT NUTRITION INSTITUTE
Premium Grade PR is decreasing worldwide.

Tendency for lower water soluble P in final fertilizers.

Is it really necessary for totally acidulated P sources to always have high water solubility?
Synthesis, characterization and agronomic evaluation of iron phosphate impurities in superphosphates

Research has showed not to be necessary to always have high water-solubility in fully acidulated phosphate fertilizers. Data obtained suggest that the WSP requirement should be related to the soil system, the crop and the chemical composition of the fertilizer.

### Cumulative P Losses

<table>
<thead>
<tr>
<th>Soils</th>
<th>P Sources</th>
<th>Losses of Dissolved Reactive P (kg ha(^{-1}))</th>
<th>Total P Losses (kg ha(^{-1}))</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Control</td>
<td>PR</td>
<td>TSP</td>
</tr>
<tr>
<td>Alvira</td>
<td>0.28</td>
<td>0.52</td>
<td>32.2</td>
</tr>
<tr>
<td>Berks</td>
<td>0.18</td>
<td>0.39</td>
<td>14.5</td>
</tr>
<tr>
<td>Watson</td>
<td>0.23</td>
<td>0.43</td>
<td>16.2</td>
</tr>
<tr>
<td>Média*</td>
<td>0.23 c</td>
<td>0.45 b</td>
<td>20.9 a</td>
</tr>
</tbody>
</table>

*Source: Shigaki et al. (2007).*
Improving P fertiliser use efficiency (PUE)

- Placement/moisture interactions
- Alteration of chemistry in the fertilised zone
- Accurate diagnosis of P deficiency
- Modifying cultivars to improve PUE

Source: Courtesy of Mike McLaughlin.

Modifying cultivars to improve PUE

**Rhamnolipid (RH)**
Produced by bacteria, can diffuse easily across plant root membranes

**New trace element fertilizers**
- Physically protect TE from phosphate
- Chemically protect TE from phosphate
- Change granule chemistry
  - Fluid fertilizers

“New” chelates to improve TE effectiveness

Response of wheat to additions of rhamnolipid

![Image of wheat response to rhamnolipid additions](image-url)
Some good options already in the market (e.g., NBPT use to suppress N volatilization from urea).

Some fertilizer companies working on new possibilities.

Many good opportunities in literature that could translate into new products. Need for final field research.

Advanced techniques applied in fertilizer research.

Good opportunity to adapt plants to soil (genetic studies).

Be careful with “snake oils”. Only agronomic expertise can provide the necessary and adequate direction to follow.
Are there innovations in fertilizer management? Yes.

Are such innovations feasible at farm level? Many are. Crop consultants are essential.

Are there innovations in fertilizer? No recent real breakthroughs to be applied in large scale but some interesting possibilities.

If so, what are them? Products leading to lower N losses, So, etc.

Is the industry in general taking advantage of opportunities created by research? In general more could be done.

Is the industry leading forefront research in terms of new fertilizers? More can be done. Creating experties in terms of forefront research is not an easy task. It is necessary to strongly invest in forming experts in fertilizer development.
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MOST ESPECIALLY TO THOSE RELATED TO PRODUCING FOOD,
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