Micronutrients

- What form makes sense or cents?
- Oxides
- Sulfates
- Citrates
- EDTA
COMMON MICRONUTRIENTS

- Zinc
- Manganese
- Copper
- Iron
- Magnesium (Mg)
- Boron
Oxides, Sulfates, and Chelates

- Zinc Oxide, Zn Sulfate, Zinc Citrate, and Zinc EDTA
- Manganese Dioxide, Manganese Sulfate, and Manganese EDTA
- Copper Sulfate, Copper Citrate, and Copper EDTA
- Ferrous Sulfate, and Iron EDTA
- Manganese EDTA
- Boric Acid
Protecting Zinc from Phosphate Costs Money!

COMPATABILITY

$  $$  $$$  $$$$  $$%

STABILITY

20% Ammoniated Zinc
10% Citric Complex Zinc
10% Citric/EDTA Complex Zinc
9% Pure EDTA Zinc
30% ORTHO

70% POLY
JAR TEST

There Is A Good Reason For This....
EDTA
Ethylenediaminetetraacetic Acid
\((\text{HO}_2\text{CCH}_2)\text{2NCH}_2\text{CH}_2\text{N(CH}_2\text{CO}_2\text{H)}\text{2}\)
Protecting Zinc from Phosphate Costs Money!

- **COMPATABILITY**
  - $20% Ammoniated Zinc
  - $10% Citric Complex Zinc
  - $10% Citric/EDTA Complex Zinc
  - $9% Pure EDTA Zinc

- **STABILITY**
THE FACTS ABOUT ZINC IN LIQUID STARTER FERTILIZER
ZINC IN STARTERS

RULE # 1 - PHOSPHATE + ZINC = "ZINC PHOSCRETE"

Most Starter Fertilizers Are High In Phosphate And The Zinc Must Be Protected From It
Figure 1. Common Starter Fertilizer Configurations.
ZINC Deficiency

• Activates Enzymes
• Needed for normal cell growth and development
• Taken up by root interception
• Somewhat mobile in plants
<table>
<thead>
<tr>
<th></th>
<th>$ 20% Ammoniated</th>
<th>$ 10% Citric Complex</th>
<th>$ 10% Citric/EDTA Complex</th>
<th>$ 9% Pure EDTA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Analysis</td>
<td>16-0-0-20Zn</td>
<td>8-0-0-10Zn</td>
<td>9-0-0-10Zn-4S</td>
<td>6-0-0-9Zn</td>
</tr>
<tr>
<td>Lbs/Gallon</td>
<td>11.1 ppg</td>
<td>9.6 ppg</td>
<td>11 ppg</td>
<td>10.9 ppg</td>
</tr>
<tr>
<td>Lbs of Elemental Zinc per Gallon</td>
<td>2.22 ppg</td>
<td>.96 ppg</td>
<td>1.1 ppg</td>
<td>1 ppg</td>
</tr>
<tr>
<td>Salt Out/Freeze</td>
<td>-40 F</td>
<td>+20 F</td>
<td>-40 F</td>
<td>+20 F</td>
</tr>
<tr>
<td>Complexing/Chelating Agent</td>
<td>Ammonia</td>
<td>Citric Acid</td>
<td>Citric Acid/EDTA</td>
<td>Pure EDTA</td>
</tr>
<tr>
<td>Zinc Source</td>
<td>Zinc Chloride</td>
<td>Zinc Chloride</td>
<td>Zinc Sulfate</td>
<td>Pure Zinc Oxide</td>
</tr>
<tr>
<td>Mixes with 10-34-0</td>
<td>YES Major Agitation</td>
<td>YES Minimal Agitation</td>
<td>YES Splash Mix</td>
<td>YES Splash Mix</td>
</tr>
<tr>
<td>Mixes with Orthophosphate</td>
<td>NO</td>
<td>NO</td>
<td>NO</td>
<td>YES</td>
</tr>
<tr>
<td>Foliar Application</td>
<td>NO</td>
<td>NO</td>
<td>YES</td>
<td>YES</td>
</tr>
<tr>
<td>Irrigation/Fertigation</td>
<td>NO</td>
<td>NO</td>
<td>YES</td>
<td>YES</td>
</tr>
</tbody>
</table>
ZINC SOURCES

*Choose a Zinc Source Based On:

1. Type Of Starter Fertilizer
   - RiseR with Micros!
   - 10-34-0 Based?
   - ORTHO (NACHURS,W.E.)?

2. Temperature/Storage

3. Price/Cost Should Equal Performance
EDTA OVERKILL

9% EDTA Zinc is only necessary to mix with ortho phosphates, like 3-18-18 or 9-18-9 etc.
Manganese
MANGANESE Deficiency

• Important for energy transfer, photosynthesis reactions

• Deficiency symptoms: greenish-grey spots or flecks on lower leaves; chlorosis
Copper
COPPER Deficiency

- Important for energy transfer, photosynthesis, and resistance to certain diseases.

- Deficiency symptoms: “White Tip” is a common disorder in cereal grains.
Iron

3-18-18
0.5 Fe EDTA

3-18-18
0.5 Fe SO4
IRON Chlorosis

- Central role in chlorophyll production, photosynthesis, energy transfer within plant

- Deficiency symptoms: general yellowing or interveinal chlorosis (green veins, yellow between veins) on younger leaves
Thank You

- Comments?
- Question I might have a chance of answering?
MADE IN THE USA!
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