SECONDARY NUTRIENTS

CALCIUM

THE USE OF FERTILIZERS TO SUPPLY CALCIUM IS RARE

MOST WISCONSIN SOILS CONTAIN ADEQUATE AMOUNTS
OF Ca, SUCH THAT 2-3 x THE NEED IS BROUGHT TO THE
ROOT SURFACE IN MASS FLOW

MOST WISCONSIN SOILS ARE LIMED WHICH RESULTS IN Ca
ADDITIONS

TRIPLE SUPER PHOSPHATE (0-46-0) IS A CALCIUM
PHOSPHATE, WHICH PROVIDES Ca WHEN IT DISSOLVES

POTATO DOES RESPOND TO CALCIUM

GROWN ON ACID SOILS BECAUSE OF CERTAIN DISEASES

TUBER IS A “DEAD END” STRUCTURE SO SAP MOVEMENT IS
LOW

CALCIUM IS IMPORTANT FOR BUILDING STRONG CELL
WALLS

RESEARCH HAS SHOWN BOTH YIELD INCREASES AND
BETTER STORABILITY WITH CALCIUM FERTILIZATION

EFFECT OF CALCIUM ADDITIONS ON POTATO, HANCOCK,
1984

<table>
<thead>
<tr>
<th>TREATMENT</th>
<th>YIELD cwt/a</th>
<th>YIELD (6-13 oz) cwt/a</th>
<th>TUBER PEEL Ca (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>CONTROL</td>
<td>363</td>
<td>87</td>
<td>0.13</td>
</tr>
<tr>
<td>GYPSUM</td>
<td>409</td>
<td>123</td>
<td>0.20</td>
</tr>
<tr>
<td>LIME</td>
<td>389</td>
<td>90</td>
<td>0.15</td>
</tr>
<tr>
<td>0-46-0</td>
<td>416</td>
<td>113</td>
<td>0.19</td>
</tr>
</tbody>
</table>

MAGNESIUM

MAGNESIUM FERTILIZER NEEDS ARE RARE IN WISCONSIN.
MOST LIME IS DOLOMITIC.
MAGNESIUM I PART OF THE CHLOROPHYLL MOLECULE

SITUATIONS WHERE THEY MAY BE EXPECTED ARE:

- SANDY, LOW ORGANIC MATTER SOILS
- LOW pH SOILS
- WHERE LARGE AMOUNTS OF OTHER CATIONS HAVE BEEN APPLIED (K FERTILIZER OR PAPERMILL LIME SLUDGE)

THE LATTER SITURATION CREATES AN “ION ANTAGONISM” WHERE THE HIGH CONCENTRATION OF ONE ION INTERFERES WITH THE PLANT UPTAKE OF ANOTHER

MAGNESIUM FERTILIZERS INCLUDE:

- SULPOMAG
- EPSOM SALTS (MAGNESIUM SULFATE)
- DOLOMITIC LIME

SULFUR

SULFUR IS A COMPONENT OF THREE AMINO ACIDS

REACTIONS IN SOIL IS SIMILAR TO N. A LARGE ORGANIC N POOL, WITH TRANSFORMATIONS CONTROLLED BY BACTERIA. EXISTS AS AN ANION AND LEACHES

FERTILIZER SOURCES INCLUDE

ELEMENTAL S: MINED FROM DEPOSITS IN LA AND TX

GYPSUM: MINED FROM DEPOSITS IN MI, IA, AND WESTERN STATES. ALSO AVAILABLE AS AN INDUSTRIAL BY-PRODUCT

POTASSIUM SULFATE: MINED IN WESTERN US

AMMONIUM SULFATE: DIRECT MANUFACTURE OR BY-PRODUCT

OTHERS: SEE TABLE 9.7
A considerable amount of S is deposited each year in precipitation. Surveys show a relationship to industry/population centers. Southern Wisconsin receives almost enough via precipitation for corn (P. 133)

Manures supply significant S.
Dairy manure = 1-2 lb S/ton

Choosing a sulfur fertilizer

- Associated ion (Mg, K, N, etc)
- Reaction time: Elemental S must first oxidize to become available. May not be available in year of application
- Price

Diagnosing sulfur need

Sulfur soil test is only one component

Wis. recs. for S are based on contributions from

- Organic matter
- Manure
- Precipitation
- Subsoil
- Soil test

These factors are ranked to create a sulfur availability index (SAI) that provides the relative need for S fertilizer

Micronutrients

Before applying micronutrients determine if there really is a need

Diagnose need by

- Soil test
- Plant analysis
- Relative crop need
- Manure application
- Field history
APPLY ONLY THE RECOMMENDED RATE. OVER APPLICATION MAY CAUSE A TOXICITY

MOST MICRONUTRIENTS ARE EXTRACTED FROM MINING OR COME FROM INDUSTRIAL BY-PRODUCTS

MICRONUTRIENTS CAN OFTEN BE SUCCESSFULLY APPLIED FOLIARLY.