Iron Fertilizer in High pH Soils

- Iron Chlorosis
  - (Lime induced chlorosis)
- Soil Conditions
- Iron Fertilizers

Iron Chlorosis

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Iron Chlorosis

- Occurs at top of plant – iron is immobile in the plant
- Veins remain green while rest of tissue is yellow (chlorotic)
- Soybeans more sensitive to iron chlorosis than corn
- Sorghums are more sensitive to iron chlorosis than soybeans
- Small grains not much problem
- Dry edible beans maybe more tolerant
- Other

Solubility of Excess Lime

- High excess lime
  - Fine calcium carbonate ($CaCO_3$) crystals

$$CO_2 + H_2O + CaCO_3 \leftrightarrow Ca^{++} 2HCO_3^-$$

The problem with HCO_3

- Bicarbonate in soil solution is taken up by the plant
- Bicarbonate precipitates iron in the plant tissue
- Iron chlorotic plants have more iron in them than green plants
- It is a bicarbonate problem
- Sulfate seems to reduce the amount of bicarbonate that is taken up by the plant

Soil Conditions that Increase HCO_3

- Cold, wet soil
  - Cold water holds more CO_2 and more water means less O_2 in the root zone
  - CO_2 dissolves carbonate making HCO_3
  - HCO_3 mass flows into the plant precipitating iron in the plant
- High Nitrate
  - High nitrate can create more HCO_3
  - Manage the cropping system to keep residual low

Soil Conditions

- Other Soil Tests
  - Low iron soil tests
  - Less than 4.5 ppm Fe by DTPA
  - High EC (soluble salts)
  - Minnesota
    - I = 0.77 – 0.023EC – 0.057CCE + 0.062Fe soil test
    - I = IDC index number from 1-5 (no problem to severe)

Iron Fertilizers

- FeEDDHA and ortho-ortho EDDHA (Soygreen)
  - 1 to 2 lbs in the furrow at planting
  - Seed coating
- FeSO4
  - Foliar, may have to apply 3 times
  - Soil applied??

Other Management Ideas

- Starter fertilizer containing 5 to 10 gallons 12-0-0-26
- Apply gypsum from the corn plant at Blair, Nebraska
- Plant chlorosis tolerant soybeans in 30 inch rows
- Planting rate should be 20 % greater than normal
- Apply 300 to 500 lbs of elemental sulfur (90 % Agri-sul) per acre
- Companion crop of oats

Oats and Soybeans