Nutrient Management Issues for Soybean Production

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Lime use to amend acid soils

1. Site specific application
   a. Variability in lime need
   b. Sampling
      • grid sampling
      • Veris pH +EC
      • Management Zone

Returns include 6% yr coming on positive net return.

The agronomics and economics of variable rate liming

Nance County
4 treatments
2 reps
Other trials planned for Clay, Saunders, and Wayne Counties.
**Soybean N need**

- **Inoculation?**
- **Starter N?**
  1. 50 lb in ND and RRV of MN
  2. 5% yield increase with 15 lb in Brookings, 2x2
  3. Ogallala
  4. No yield advantage further south, e.g. MN, MO
  5. What about no-till irrigated C-C-SB?

**N application at beginning podfill, e.g. 25-30 lb through fertigation**

- IA, MN, SD, MO: little or no response when yield <60 bu/A
- MO: >60 bu/A; pH < 7.5; soil nitrate <75 lb/A in 0-24” depth (9-10 ppm)
- KS: hay gain if >60 bu/A in KS
- Nebr 2009: ~2 bu gain with 25 lb N at R3 in NE and SC but no gain in SE

**Improving fertilizer P recovery**

- Critical levels: Bray-1 or Mehlich 3 < 13 ppm; Olsen < 8 ppm. Is high STP needed to maximize yield?
- P use efficiency improved with band application; apply >1 inch from seed
- Additives to improve fertilizer P recovery, e.g. by reducing P fixation in soil
  - Are they effective? Will more P need to be applied eventually?
  - Poly vs ortho-phosphate

**Chlorosis Management**

- **Variety selection.** Choose varieties based on chlorosis rankings from seed companies.
- **Plant density.** Goal of 12 viable seeds/foot, independent of row spacing.
- **Fe chelate starter.** Apply 2-4 lb product/acre in 20-25 gal water with the seed.
- **Foliar fertilization.** Use either iron sulfate or iron chelate, though results are often inconsistent.

**Site-Specific Management Options**

- Plant tolerant cultivars to areas which are chlorosis-prone.
- Use Fe chelate starter fertilizer in chlorosis-prone areas.
- Identify field areas which are not profitable and plant these to another crop.
Round-up Ready Soybean and Manganese

1. Some RR varieties more likely to be Mn deficient; some are responsive to Mn application.
2. Glyphosate (GL) application often results in yellow flash symptom in new leaves, mimics Mn deficiency but often not Mn deficiency
3. GL probably does not affect soil Mn availability but does affect Mn applied Mn.

Nelson et al (KSU): non-RR and RR sister lines. Mean yield increase with Mn application.
Bernards, UNL: Compared 4 RR with 4 non-RR. Mn foliar applied at V4, V8, R2. No Mn effect.

Yield increase, bu/acre

<table>
<thead>
<tr>
<th></th>
<th>Non-RR</th>
<th>RR</th>
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<tbody>
<tr>
<td>Foliar</td>
<td>0.6</td>
<td>3.2</td>
</tr>
<tr>
<td>Soil</td>
<td>0.9</td>
<td>3.3</td>
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Practical exercises

- Look at a spade-full of roots and soil
- Probe for soil hardness
- The plots: 10-34-0 starter, AVAIL, sugar at R1, Mn at R1-2, Fe chelate