Nitrogen

Special because:

• Anion or cation (leeching & availability)
• Huge need = 40-50% of the insides of plant cells (see text: table 26)
• Doesn’t exist in natural mineral form
• ‘Fixed’, mostly by microbial activity
• ‘Fixed’ means add oxygen to make NO3- or add hydrogen to make NH4+
• Fixed N is available to plants
Sources of Nitrogen

- Atmospheric, and left-over-in-the-soil
- Symbiotic and non-symbiotic bacteria
- Release from organic material
- Even with cover crops and compost in high om soil, sometimes need to add N
- Most crops have too much or too little!
Bacteria

- **Non-symbiotic** important in nature, not so much in agriculture
- **Symbiotic**: nitrogen fixing cover crops can provide most (even all) of crop N needs + om + crop rotation+ erosion control + soil drying
- Tables (ATTRA) provide estimates by crop
Release from organic material

1. ENR (Estimated nitrogen release)
   • Use text: (Table 1) or soil test (handout)
   • Do organic farms have ‘better’ NR?

2. Compost
   • Also difficult to count on, even though compost can have a significant amount of N: type, temp, moisture, rain effects
   • Typical compliant compost, made with manure: 0.75 - 1% N. Often, only count half of it. How much N does 10 T/Ac provide?
   • Why not uncomposted manure? (Table 4)
How much N do we need? (See text: Table 20)

Potatoes: 265 lb N/Ac ‘used’ + 15% losses = **305** lb/Ac
(-) ENR (from soil test or Table 1) = **140** lb/Ac
(-) nitrogen in soil (from soil test) = 21 ppm or **42** lb/Ac
(-) 0 lb/Ac from compost (careful!)
(-) amount from cover crop
How do we get it to the crop?

1. **How much have we added so far?**
   - 4lb of 8-5-1 on a 60” bed
   - a) Area: 60” = 5ft. 5’x50’ = 250 sqft
   - Divide by 43,560 = .006 Acres
   - b) Nitrogen from 8-5-1:
     - 4lb x .08 [same as 8%] = .32 lb of N
c) **N so far:** amount added, divided by the area. 
\[ \frac{0.32 \text{ lb}}{0.006 \text{ Ac}} = 53 \text{ lb/Acre} \]

2. **How much more to add?**

- **Need** = amount needed - amount added:
  \[ 123 \text{ lb} - 53 \text{ lb} = 70 \text{ lb} \]
- **How?** One side dress of **70 lb** or two of **35 lb** each
What if…?

• We had planted a N-fixing cover crop?
• We had added 10 tons of compost? (Careful! - usually only count half)
• 2 tons of compost?
• What about lettuce or onions?
• Discussion: Which is better farm management for N addition, compost or cover crops?