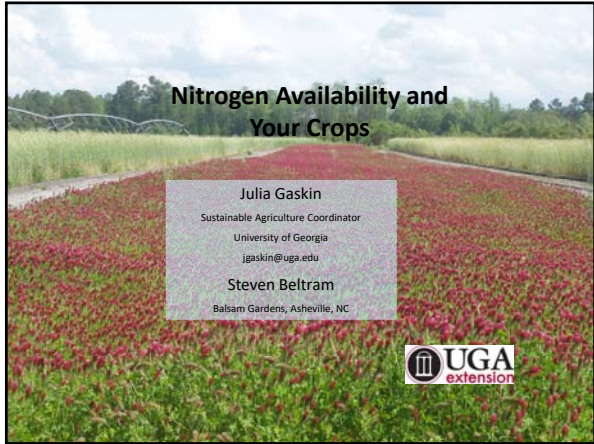



Nitrogen Availability and Your Crops



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Key Factors for Healthy Soils

- pH
- Soil organic matter
- Management effects on soil tilth and nutrient release



pH and Nutrient Availability


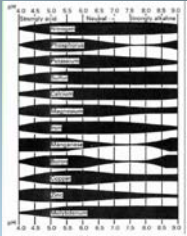
Target is usually 6.0 to 6.5 (near neutral)

At these pHs phosphorus and micronutrients most available

Low pH (<5.5) – aluminum toxicity


At high pH also decreased availability

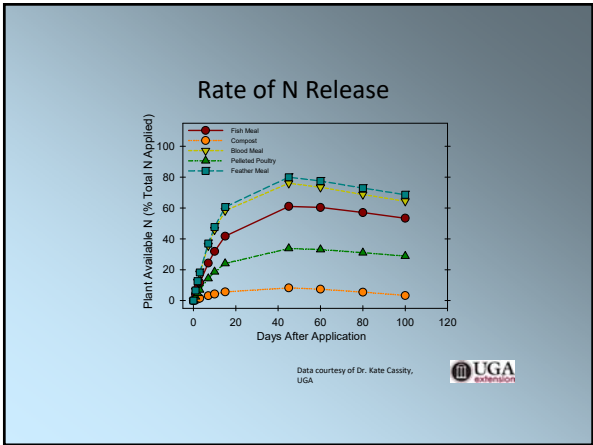
Exception molybdenum – important for legumes



Effect of Fertilizer Quality



- C to N ratio - N mineralization or immobilization by soil microbes
 - < 25 net mineralization
 - > 25 net immobilization
- Feedstock
 - Bloodmeal – undigested cells
- Processing
 - Compost – decomposed or digested organic matter
 - Raw





Putting it Together

- Compost
 - Already stabilized, does not contribute much N
 - Useful to build stable soil organic matter and add microbial life



Putting It Together

- Blood meal
 - Mineralizes very quickly and has large amount of inorganic N
 - Useful in cooler soils and high N demanding plants
 - Fall broccoli transplants
 - Might not want to use with slow growing direct seeded crops



Putting It All Together

- Feather meal
 - Mineralizes quickly under good conditions but doesn't have inorganic N
 - Useful in spring and summer when soil temperatures are high
 - Most useful for transplants



Putting It Together - Manures

- Similar approach to fertilizers
- Remember waiting periods before harvest
 - 90 days if crop doesn't touch soil
 - 120 days if it does
- Maybe best use with cover crops
- Watch phosphorus overload

Nitrogen in Cover Crop Residues

Winter Legumes	Lbs Total N / Acre
Alfalfa	100-250
Crimson Clover	50-160
Austrian Winter Pea	40-175
White Clover	75-140
Hairy Vetch	45-200
Summer Legumes	
Cowpeas	40-100
Soybean	35-80
Sunn Hemp	20-280

Reeves, 1994; Mansoor et al, 1997; Schomberg et al, 2007; Gaslin unpublished data



Effect of Cover Crop Quality

- C:N ratio
 - < 25 net mineralization
 - > 25 net immobilization
- Carbohydrates increase rate of decomposition
- Lignin, tannins and polyphenols slow the rate of decomposition
- On surface or incorporated



Grain/Legume Mixtures



Growing conditions influence which species dominate.

High N favor grains
Low N favors legumes



Grain is tall; legume spreads underneath for weed suppression
Slows N release

Recommended rates
2/3 legume to 1/3 grain
1/2 legume to 1/2 grain





Putting It Together – Cover Crops

- If using cover crops for N source
 - Legumes fix N
 - Most N released within a month of termination
 - Transplant can take better advantage of this




Putting It Together – Cover Crops

- If using cover crops for N source
 - Grains and brassicas good N scavengers
 - Note: Winterkilled radishes release N very rapidly
 - Brassicas - Think about crop rotation and disease bridges
 - Grain legume mixtures slow N release



Putting It Together – Cover Crops

- For maximum N,
 - Maximize legume biomass
 - Timely planting (Asheville probably 1st of Sept)
 - Fresh, correct inoculant
 - Legume kill mid-bloom
 - Grains before boot
- Don't incorporate too deeply (top 6 inches)



Take Home Messages

- MANY factors affect N
- Mineralization much slower at low soil temperatures or very dry soils
 - N may be in soil but not plant available
- Rely more on manure based fertilizers when building soil, move to cover crops when maintaining
- Think about synchronizing N mineralization with plant need
- Use a variety of N sources



A Couple of References

- Building Soils for Better Crops – free pdf at SARE Learning Center
- Sustainable Ag Webpage at UGA – www.sustainagga.org
- NCSU Extension