



Intro to Organic Soil Amendments

Soil Amendments



Synthetic Fertilizers

- Plant available, "simple" form
- 100% N released immediately
- Ex. Urea, ammonium sulfate

Organic Fertilizers

High Nitrogen (>8% N)

- "Complex" organic form
- 80% N released in first 3 months
- Ex. Feather meal, fish-blood meal

Organic Fertilizers

Low Nitrogen (<5% N)

- "Complex" organic form
- 10% N released in first year
- Ex. Compost

Fast Release
Volatile



Slow Release
Soil Building, Reserves

Soil Health & Fertility of Organic Fertilizers



- Improves soil
- Water holding capacity
 - Nutrient availability
 - Aeration, tilth
 - Microbial diversity, competition

Food Safety Practices For Organic Amendments

Storage

- Separate treated materials from raw materials
- Protect from runoff, pests (e.g., chickens, dogs, CRB)

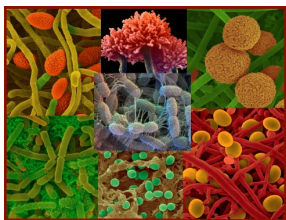
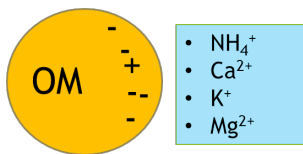


Need to add higher quantities...

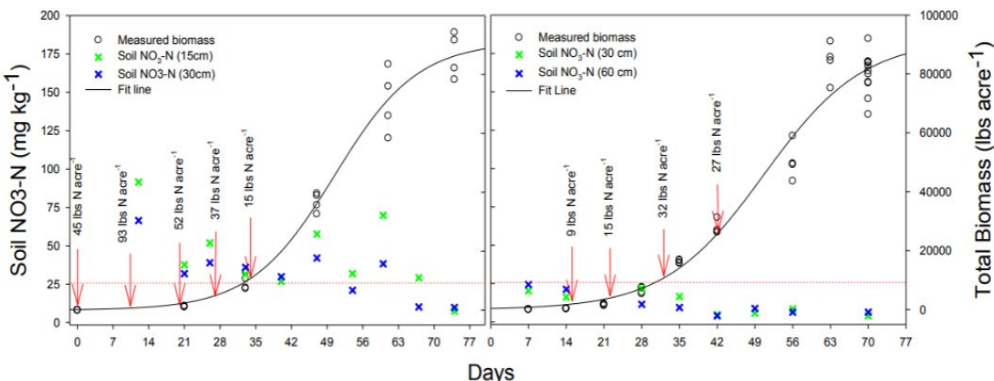
To account for the slower release (aka "mineralization")

Ex. If crop needs 200 lbs N/acre, feather meal has 10% N, and releases about 80% N in three months

$$(200 \text{ lbs N/acre}) \times (100 \text{ lbs feather}/10 \text{ lbs N}) \div (0.8) = \mathbf{2,500 \text{ lbs feather meal/acre needed}}$$



Data: M. Loo 2018



RIGHT RATE, RIGHT TIME

- Synchronization= add fertilizer to match crop growth pattern
- Feed majority of crop need during "growth spurt" (e.g., 70% of Total N)
- Farmer Practice= 525 lbs urea
- Research= 182 lbs urea
- Fertilizer savings= \$165 per acre!



Types of Organic Amendments (NPK; N Released 1st year)

Compost, Vermicompost

(2-1-1)
10% Nr



Biochar, Biosolids

(varies)
10-40% Nr



Manures (Animal)

(5-2-3)
50% Nr



Meals (Fish/Meat, Bone, Feather)

(Fish/Meat: 10-3-1
Bone: 3-20-0
Blood/Feather: 12-0-0)
90% Nr

Meals (Crustacean, Shrimp)

(4-0-0)
40% Nr



Minerals
(varies)



Benefits

Carbon rich
Microbially active but safely treated
Improves soil "tilth"

Carbon rich
Increases soil pH slightly
(v/v; <0.5 pH units)
Source of base cations (Ca, K)

Moderate source of N, P
Little to no processing needed

Rich source of N
Bone meal source of P, Ca
Moderate N mineralization,
release (fish, blood, feather)
Multiple forms available (e.g.,
granular, pellet, powder)

Moderate source of N, Ca
Chitin for IPM of plant
diseases, pests, nematodes

Variety of products (K= 0-0-52;
P= liquid 0-20-0; calcium
chelate)
Some fast releasing forms (0-0-52)

Constraints

Can initially "steal" N
Not nutrient rich

Can initially "steal" N (biochar)
Human biosolids have
potential uncertainties (e.g.
pharmaceuticals)

Food safety restrictions,
microbial pathogens
Potential for high salt and
ammonia levels

Potential N loss if not
incorporated, injected
Potential plant burn if apply
excessive amounts

Potential N loss if not
incorporated, injected
Potential allergens

Some slow releasing forms (green
sand, rock phosphate)
Sodium containing forms have
potential issues