Biosolids Nutrients and Agronomic Rate Calculation

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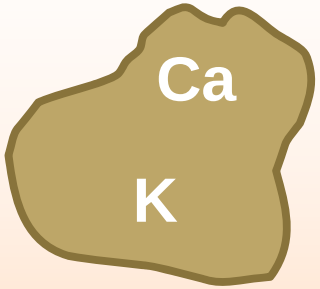
Soil is full of nutrients, but most are not available to plants

Mineral

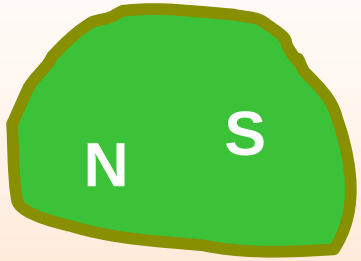


Ca^{++}, K^{+}

Insoluble, unavailable

Soluble, available

Organic



NH_4^{+}, SO_4^{--}

One-Minute Drill

- Describe the difference between total nutrient content and plant-available nutrient content of biosolids.
- What do you need to know to estimate the fertilizer N replacement value of biosolids?

Agronomic Rate Goals

- **Environmental**:
  Balance crop N demand with plant-available N to prevent nitrate leaching.
- **Economic**:
  Provide enough N for near maximum yield and quality of crop.

Agronomic Rate Calculation

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Agronomic Rate Calculation

- Soil and crop information
- Biosolids data
- Other sources of plant-available N
- Estimate plant available N needed from biosolids
- Estimate plant available N per dry ton of biosolids
- Calculate agronomic rate
- Convert to “as-is” basis

Example 1:
Grass Hay, West of Cascades

- **Soil:** *Jory silty clay loam*
- **Crop:** *grass hay*
- **Yield goal:** *2-3 dt/a*
- **Plant-available N needed:** 150 lb/acre
  Guidance from OSU Fertilizer Guide 63
- **Plant available N from other sources:** *none*

Example 1:
Grass Hay, West of Cascades

- **Biosolids form:** *dewatered (21% solids)*
- **Biosolids processing:** *anaerobic*
- **Method of application:** *surface*
- **Days before incorporation:** *never*
- **Expected application season:**
  April-May

Example 1: Biosolids Analysis

Nutrient	Concentration (mg/kg dry weight)
Total N	50,000
Ammonium N	5,000
Total P	22,000
Total K	6,000

Example 2:
Dryland Wheat, Columbia Plateau

- **Soil:** *Walla Walla silt loam*
- **Crop:** *Wheat-fallow*
- **Yield goal:** *60 bushels/acre (soft white wheat)*
- **Plant-available N needed:** 140 lb/acre
  Guidance from WSU EB 1987, Dryland Winter Wheat
- **Plant available N from other sources:**
  Preplant N in root zone - 85 lb/acre
  Previous biosolids application, 3 dt/acre, 2 years ago

Example 2:
Dryland Wheat, Columbia Plateau

- **Biosolids form:** *dewatered (22% solids)*
- **Biosolids processing:** *anaerobic*
- **Method of application:** *incorporated*
- **Days before incorporation:** *1*
- **Expected application season:** *Sept.-Oct.*

Example 2:
Biosolids Analysis

Nutrient	Concentration (% dry weight)
Total N	6
Ammonium N	1.2
Total P	2.8
Total K	0.7

Example 2:
Biosolids Analysis

Nutrient	Concentration (mg/kg dry weight)
Total N	60,000
Ammonium N	12,000
Total P	28,000
Total K	7,000

On The Web

Biosolids publications and links:

http://www.soils1.org "*Biosolids*" page

Soil Testing:

http://www.soils1.org "*Soils and Soil Testing*" page