Compost's Role in Restoring Vegetation, Managing Hydromodification & Maintaining Water Quality

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The Goal:

To Make This:

Function Like This:

Post Construction Conditions:

- Removed Vegetation
- Removed Topsoil
- Compacted Subsoils

Post Construction Conditions:

- ↑ Soil Density
- ↓ Infiltration
- ↓ Soil Nutrients
- ↓ Biological Activity

Lead to These Problems:

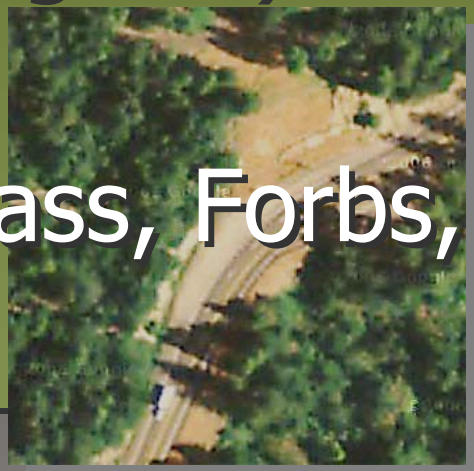
- ↑ Runoff
- ↑ Sediment Loss
- ↓ **Infiltration**
- ↓ **Water Quality**

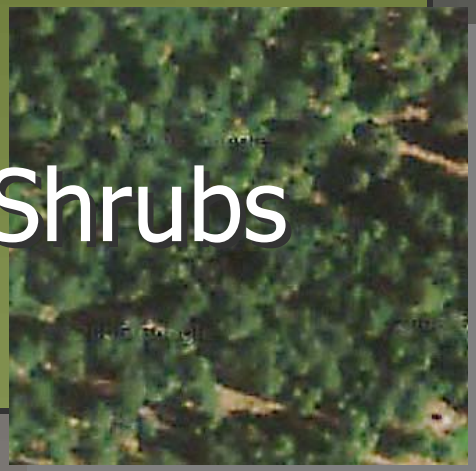
How Do We Restore Original Site Function?

Goal	Action
↓ Soil Density	Organics/Till (Porosity)
↑ Infiltration	Organics/Till (Porosity)
↑ Soil Nutrients	Organics/Slow Rel. Fert
↑ Biological Activity	Organics/Till/Plants
↑ Sustainable Vegetation	Organics/Till/Slow Release Fert

How Do We Restore Original Site Function?

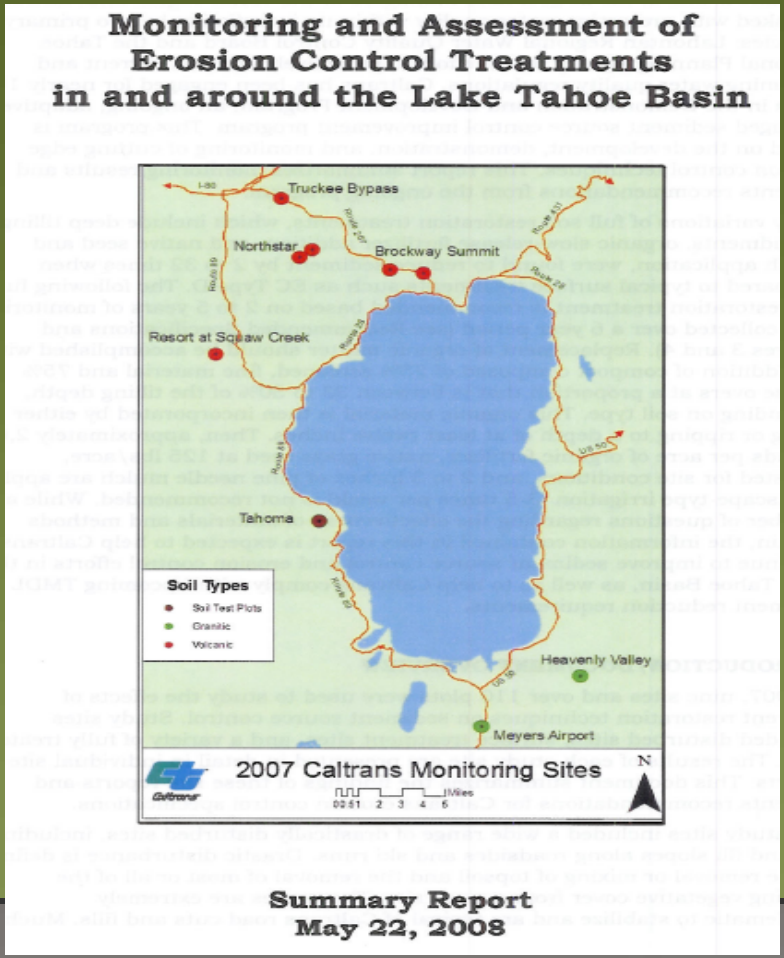
- Compost/Organics
  - 75% Coarse Woody Material/25% Fine
  - Application Rate: 33% - 50%
- Till Compost into Soil 12”–18”
- Slow Release (Organic) Fertilizer
- 2” Mulch Layer
- Seed - Native Grass, Forbs, Shrubs





Case Study: Lake Tahoe Basin Erosion Control Treatments

- Nine Test Sites
- 110 Test Plots
- 2-5 Years of Monitoring Data



Treated Site Compared With Untreated Site

Sediment Loss	1.8x Reduction (= Native Sites for up to 6 yrs.)
Infiltration Rate	1.5-2.0x Increase (≥ Native Sites for up to 6 yrs.)
Soil Density	2.3-5.2x Reduction
Nutrients	Comparable to (or Slightly Less than) Native Sites

Case Study – Buckhorn Summit

- Shasta County Route 299

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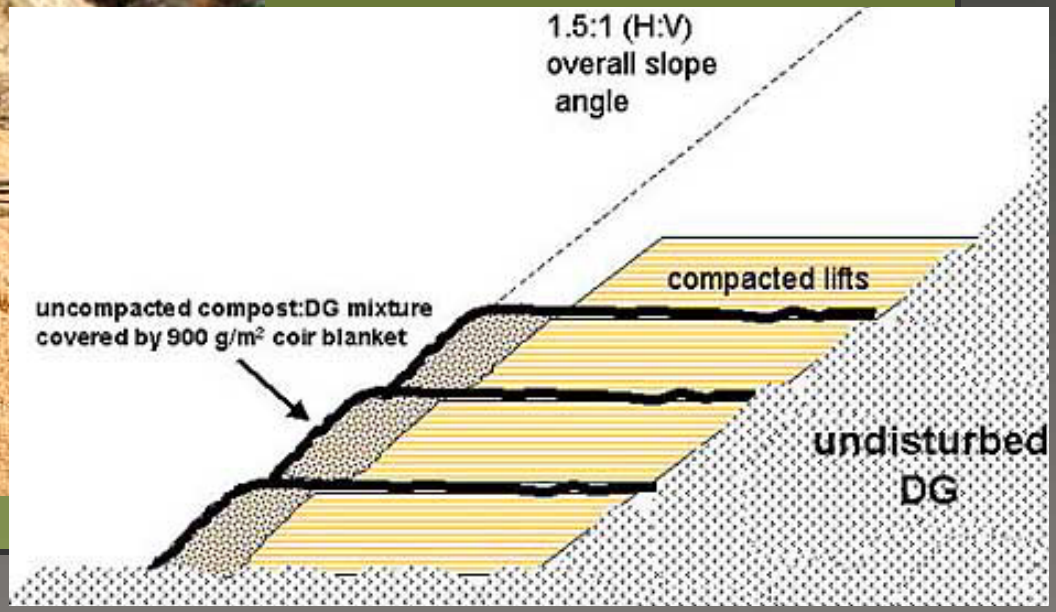
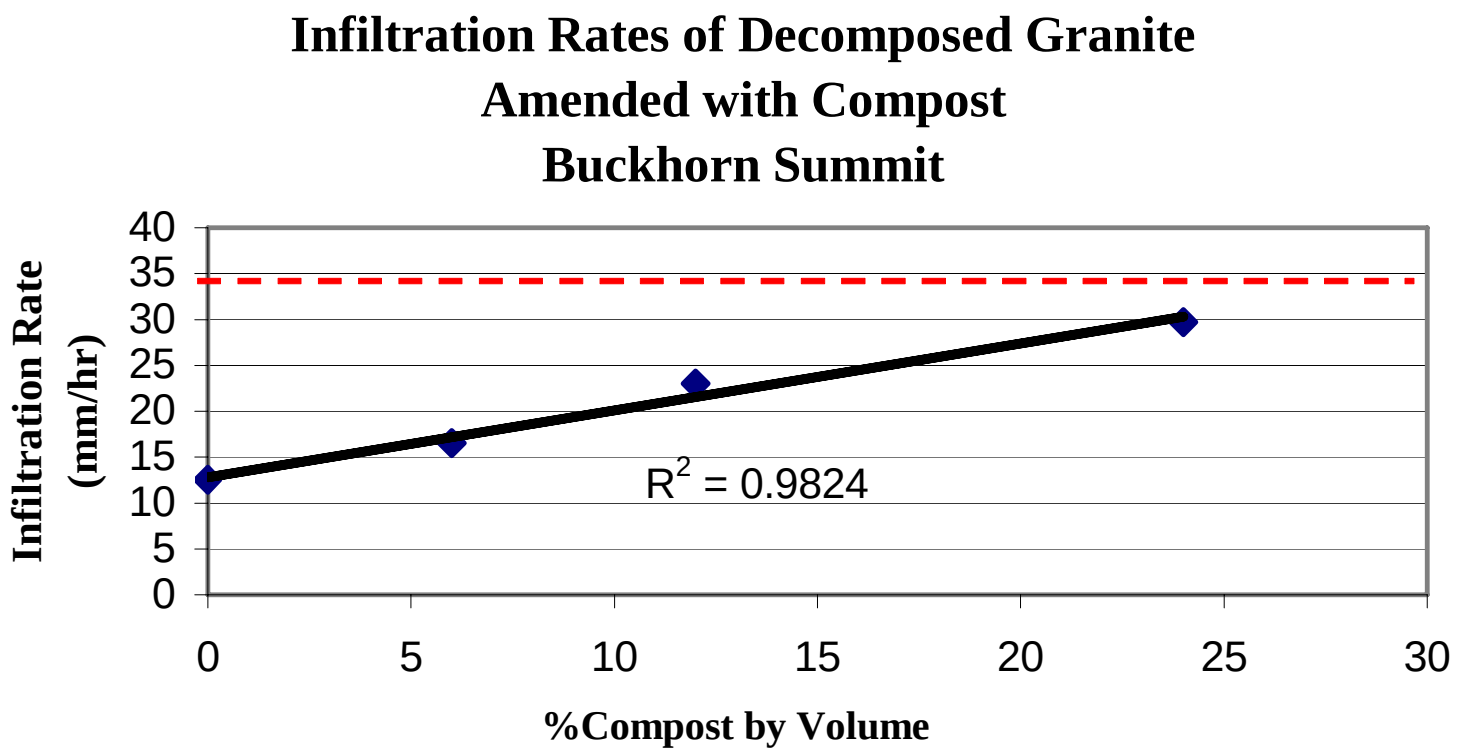
- Shasta County Route 299

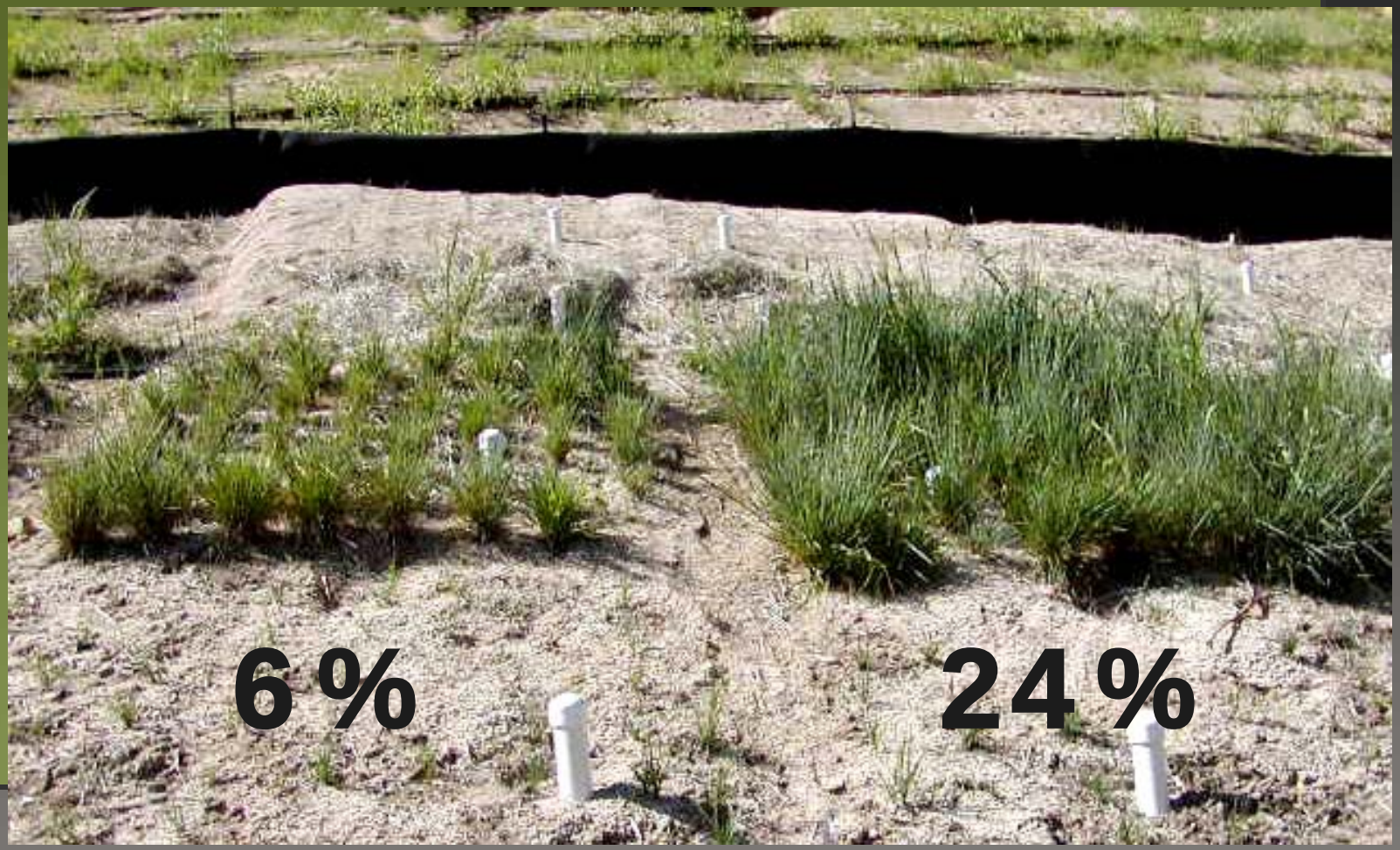


Compost Infiltration Rates – Simulated Rainfall



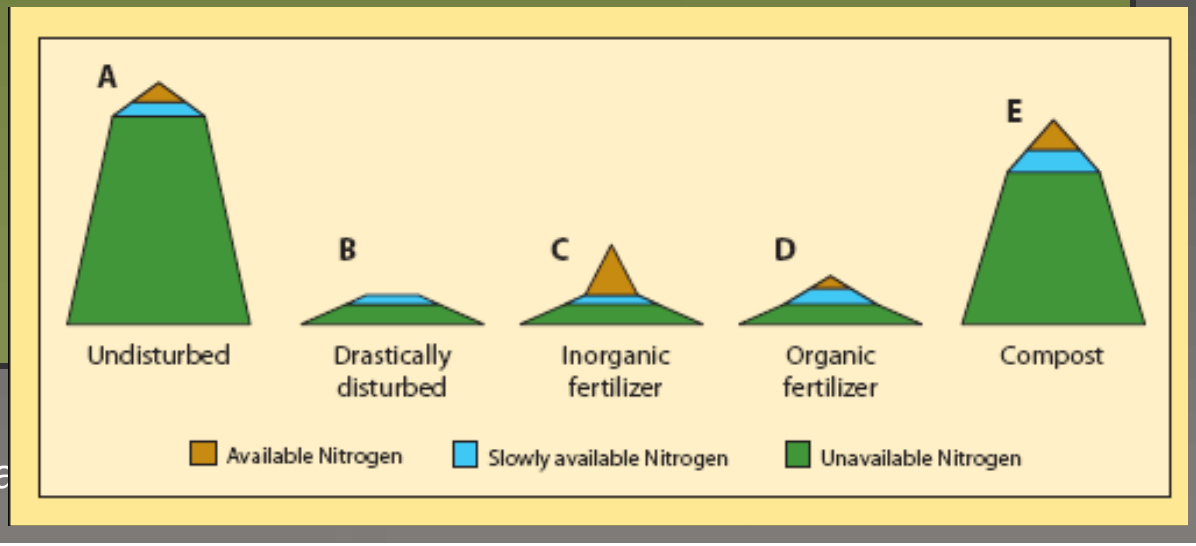
Dotted Line Represents the Vegetated Reference Site Value (34.1 mm/hr)

Compost and Vegetation Establishment



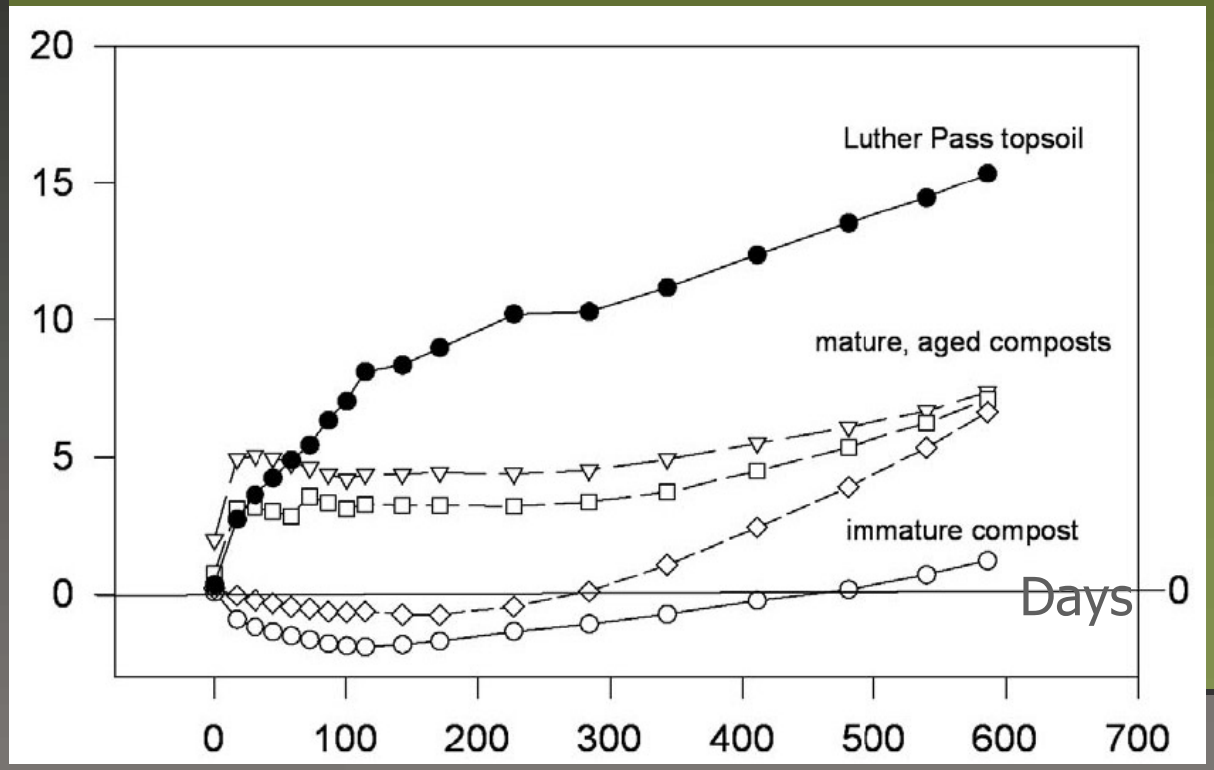
Nitrogen Capital:

- Goal - Replicate Undisturbed Site "N"
- "Fund:"
  - Pocket Cash
  - Savings Account
  - Retirement Account



Nitrogen Capital:

- Some Composts Draw Nitrogen FROM the Soil.



Fertilizer and Compost Nitrogen Release Rates Vary:

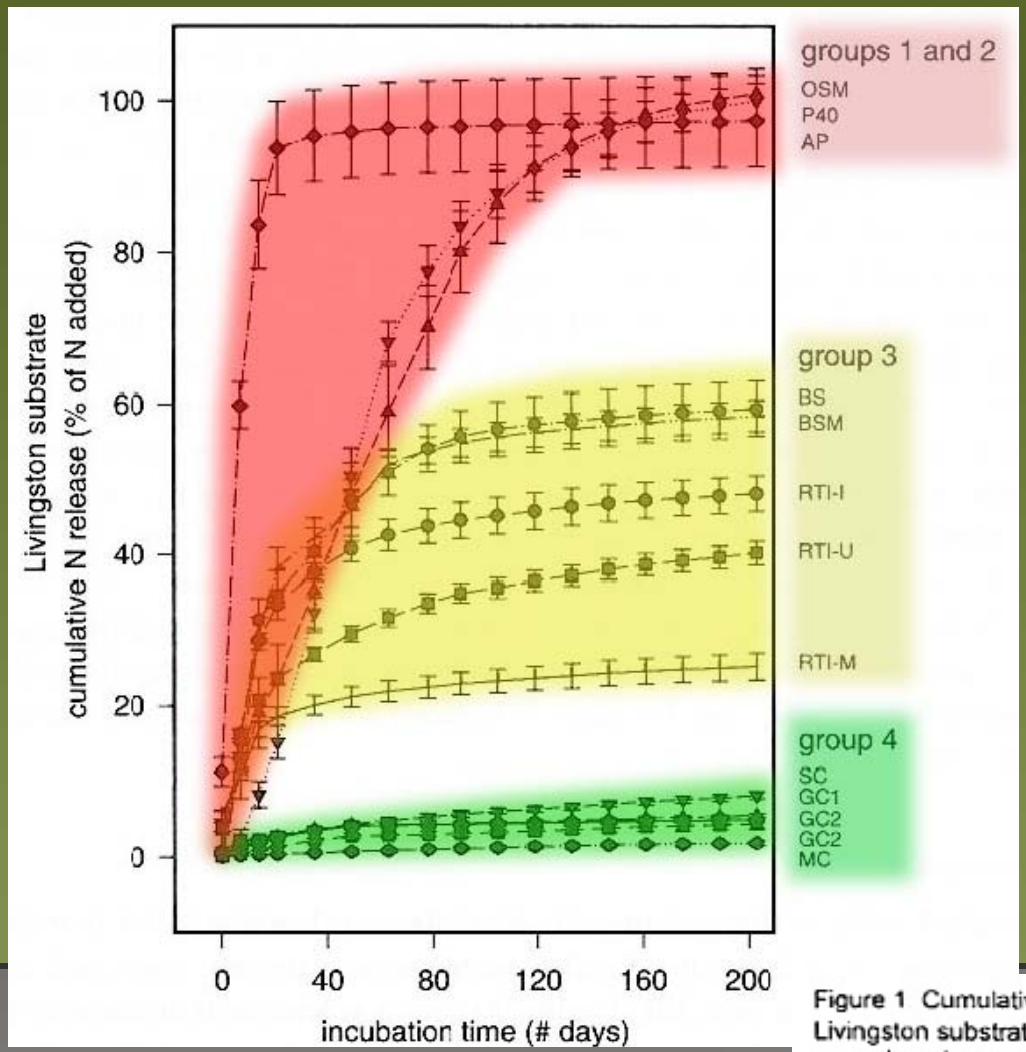


Figure 1 Cumulative N release by extraction from soil amendment materials on Livingston substrates (% of N added) during laboratory incubation at 30 °C. Group 1 amendments are chemical formulations; group 2 are slow release chemical formulations; group 3 are organic based blended materials and group 4 are unblended greenwaste composts.

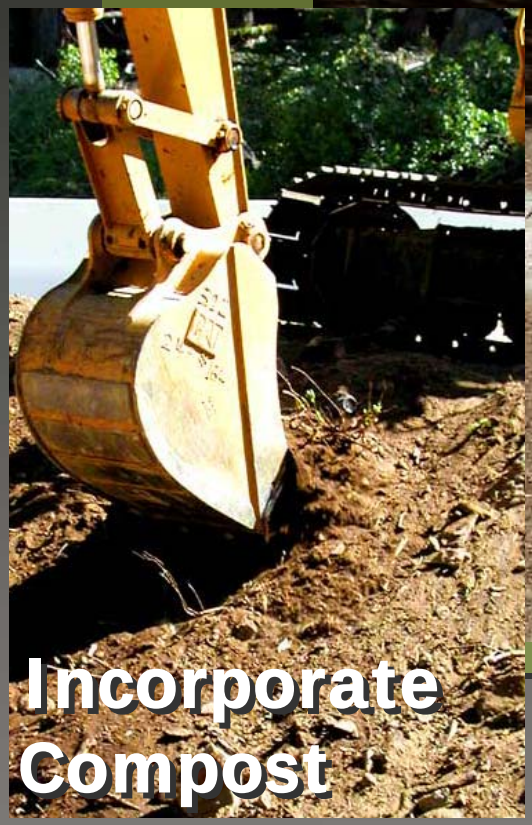
Inorganic Slow Release Fertilizers

Organic Slow Release Fertilizers

Green Material Composts

Specifications

Specifications:



Specifications:

Compost Shall Comply With the Following…

Producer Requirements:

Compost Producer Shall be Fully Permitted Per:

- California Integrated Waste Management Board
- Local Enforcement Agencies
- Any Other State and Local Agencies That Regulate Solid Waste Facilities

Feedstock Neutral:

- Green Material
  - Chipped, Shredded, or Ground Vegetation
  - Clean, Processed, Recycled Wood Products
- Biosolids
- Manure
- Mixed Food Waste

Materials:

Shall be Composted to Reduce Weed Seed and Pathogens in Conformance with CA. Title 14, CCR, Div. 7, Ch. 3.1, Art. 7, Sec. 17868.3

(Similar To US EPA Regulation 40 CFR, Part 503b)

Quality Control:

Spec Requires Test Results For:

- Maturity
- pH
- Soluble Salts
- Stability
- Pathogens
- Stability
- Phytotoxicity
- Particle Size
- Physical Contaminants
- Heavy Metals

Standard Test Methods Ensure Quality & Uniformity

USCC Seal of Testing Assurance (STA) Program:

- Regular Testing of Compost
- Standard Testing Methodologies
- Certified Labs

Field Verification of Compost Quality

"CTDS" Ensures Field Quality

Project Specifications

Physical/Chemical Requirements

Property	Test Method	Requirement
pH	*TMECC 04.11-A, Elastometric pH 1:5 Slurry Method, pH Units	6.0–8.0
Soluble Salts	TMECC 04.10-A, Electrical Conductivity 1:5 Slurry Method dS/m (mmhos/cm)	0-10.0
Moisture Content	TMECC 03.09-A, Total Solids & Moisture at 70+/-5 deg C, % Wet Weight Basis	N/A
Organic Matter Content	TMECC 05.07-A, Loss-On-Ignition Organic Matter Method (LOI), % Dry Weight Basis	30–65
Maturity	TMECC 05.05-A, Germination and Vigor Seed Emergence Seedling Vigor % Relative to Positive Control	 80 or Above 80 or Above
Stability	TMECC 05.08-B, Carbon Dioxide Evolution Rate mg CO_2-C/g OM per day	8 or below
Particle Size	TMECC 02.02-B Sample Sieving for Aggregate Size Classification % Dry Weight Basis	95% Passing 5/8 inch 70% Passing 3/8 inch
Pathogen	TMECC 07.01-B, Fecal Coliform Bacteria < 1000 MPN/gram dry wt.	Pass
Pathogen	TMECC 07.01-B, Salmonella < 3 MPN/4 grams dry wt.	Pass
Physical Contaminants	TMECC 02.02-C, Man Made Inert Removal and Classification: Plastic, Glass and Metal, % > 4mm fraction	Combined Total: < 1.0
Physical Contaminants	TMECC 02.02-C, Man Made Inert Removal and Classification: Sharps (Sewing needles, straight pins and hypodermic needles), % > 4mm fraction	None Detected

*TMECC refers to "Test Methods for the Examination of Composting and Compost," published by the United States Department of Agriculture and the United States Compost Council (USCC).

Compost Technical Data Sheet (CTDS)

US COMPOSTING COUNCIL
Seal of Testing Assurance

Caltrans

Product Identification:

Date Sampled/Received:

COMPOST TECHNICAL DATA SHEET for Caltrans

LABORATORY:

Compost Parameters	*Test Results*	*Reported as (units of measure)*	*TMECC Test Method*
pH		Unitless	04.11-A 1:5 Slurry pH
Soluble Salts (electrical conductivity)		dS/m (mmhos/cm)	04.10-A 1:5 Slurry Method Mass Basis
Moisture content		%, dry weight basis	03.09-A - Total Solids and Moisture
Organic Matter Content		%, dry weight basis	05.07-A Loss-on-Ignition Organic Matter Method (LOI)
Maturity Indicator (bioassay) Percent Emergence Relative Seedling Vigor		 average % of control average % of control	 05.05-A Germination and vigor
Stability Indicator		mg CO2-C/g OM/day	05.08-B Carbon Dioxide Evoultion Rate
Particle Size		%, dry weight passing through 9.5 mm	02.02-B Sample Sieving for Aggregate Size Classification
Pathogens		PASS/FAIL: Per US EPA Class A standard, 40 CFR 503.32(a)	07.01-B Fecal coliforms
Pathogens		PASS/FAIL: Per US EPA Class A standard, 40 CFR 503.32(a)	07.02 Samonella
Physical Contaminants		%, dry weight basis	02.02-C - Man-Made Inerts Total content
Physical Contaminants		%, dry weight basis	02.02-C - Man-Made Inerts Sharps content

The Goal: Sustainable Vegetation

To Make This:

Function Like This:

Vegetated or Non-Vegetated BMPs?

Questions?

Questions?