Composting and Possibilities of Unharvested Crop Material

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“*We Build Healthy Soil*”
www.healthysoil.org
Topic Outline

- Association of Compost Producers
- **Compost Production**
- Benefits of compost
  - Soil Health $\rightarrow$ Watershed Health
  - Water and Nutrient Management
- **Issues and Trends**
  - Short Lived Climate Pollution (SB 1383)
  - Plastic & Glass Contamination
  - Healthy Soil Initiative
- **Composting vegetative ag material**
  - Considerations - Agronomic & Environmental
  - Next Steps – Agronomic and Economic
Association of Compost Producers

A Public/Private Association - 501(C)6 – Calif. State Chapter of US Composting Council

- Public and Private Organics Residual Generators
  - Green Waste, Manure (into and out of animals)
  - Food Waste, Biosolids (into and out of people)
- Public and Private Compost Producers
- Public and Private Compost Marketer/Distributors

Our Vision:

- Support beneficial reuse of organics in California, compost playing a central role to
- Build and maintain sustainable healthy soils,
- Keeping our state’s lands productive, green and biologically diverse for generations to come.

Our Mission:

Increase the quality, value and amount of compost being used in California.

- Burrtec
- CalPoly SLO
- CR&R
- Engel and Gray
- Filtrexx
- Inland Empire Utilities Agency
- Kellogg Garden Products
- Liberty Compost
- Los Angeles County Sanitation Districts
- P.F. Ryan and Associates
- Republic Services
- Serrano Creek Soil Amendments
- Scott Brothers Dairy
- Soiland
- Synagro
- University of California, Cooperative Extension
- Vision Recycling
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The Organics Value Cycle

Generate:
- Landscape trimmings
- Food/Ag waste
- Biosolids
- Manure

Use:
- Landscape
- Agriculture
- Environmental
- Bioenergy

Process:
- Compost
- Chip and Grind
- Anaerobic Digestion
- Biofertilizer
- Energy (biofuel, electricity)

Market:
- Compost
- Fertilizer
- Energy

Haul, Pre-process:

Gov. Agencies
- EPA: air, water, solids
- LEA, Planning, CDF
- CEC/PUC, etc., etc.

Stakeholders
- Env. Eng. & Tech.
- Env. Activists

Communicate
- Sell!
- Report

Communicate
- Agency
- Report
The Organics Value Cycle

- **Organics Residuals** = carbon (C) & nitrogen (N) compounds

- **Organics Recycling** = renewable carbon (& nitrogen) management
Feedstocks to Bioproducts

Feedstock(s) (organic residuals)

Process train

Bioproduct(s)
Thermophilic, On-farm Composting

Industrial Composting
Options - Compost Technology Advancements

Current Windrow Technology

Solar Powered, Control Irrigated Aerated Static Pile
Largest Indoor Compost Facility in North America, IERCA.org
If it isn’t STA Compost…… What is it?
**COMPOST TECHNICAL DATA SHEET**

<table>
<thead>
<tr>
<th>Compost Parameters</th>
<th>Reported as (units of measure)</th>
<th>Test Results</th>
<th>Test Results</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Plant Nutrients:</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nitrogen</td>
<td>%, weight basis</td>
<td>.72</td>
<td>1.12</td>
</tr>
<tr>
<td>Phosphorus</td>
<td>P₂O₅</td>
<td>.13</td>
<td>.21</td>
</tr>
<tr>
<td>Potassium</td>
<td>K₂O</td>
<td>.32</td>
<td>.50</td>
</tr>
<tr>
<td>Calcium</td>
<td>Ca</td>
<td>2.34</td>
<td>3.64</td>
</tr>
<tr>
<td>Magnesium</td>
<td>Mg</td>
<td>.57</td>
<td>.89</td>
</tr>
<tr>
<td><strong>Moisture Content</strong></td>
<td>%, wet weight basis</td>
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<td></td>
</tr>
<tr>
<td><strong>Organic Matter Content</strong></td>
<td>%, dry weight basis</td>
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<td></td>
</tr>
<tr>
<td><strong>pH</strong></td>
<td>unitless</td>
<td>7.4</td>
<td></td>
</tr>
<tr>
<td><strong>Soluble Salts</strong></td>
<td>Electrical conductivity</td>
<td>3.49</td>
<td></td>
</tr>
<tr>
<td><strong>Particle Size</strong></td>
<td>screen size passing through</td>
<td>1/8</td>
<td></td>
</tr>
<tr>
<td><strong>Stability Indicator</strong></td>
<td>CO₂ Evolution</td>
<td>.14</td>
<td></td>
</tr>
<tr>
<td><strong>Maturity Indicator</strong></td>
<td>Percent Emergence, AND</td>
<td>92</td>
<td></td>
</tr>
<tr>
<td><strong>Relative Seedling Vigor</strong></td>
<td></td>
<td>86</td>
<td></td>
</tr>
<tr>
<td><strong>Select Pathogens</strong></td>
<td>PASS/FAIL: per US EPA Class A standard, 40 CFR § 503.32(a)</td>
<td>Pass</td>
<td></td>
</tr>
<tr>
<td><strong>Trace Metals</strong></td>
<td>PASS/FAIL: per US EPA Class A standard, 40 CFR § 503.13, Tables 1 and 2</td>
<td>Pass</td>
<td></td>
</tr>
</tbody>
</table>

**Participants in the US Composting Council’s Seal of Testing Assurance Program have shown the commitment to test their compost products on a prescribed basis and provide this data, along with compost end use instructions, as a means to better serve the needs of their compost customers.**

**Directions for Product Use:**

**New Lawns:** Apply a 1-2” layer to soil and incorporate to a depth of 5-7”, apply seed, then rake and water.

**Flower Beds:** Apply a 1-2” layer to soil and incorporate to a depth of 6-8”. Condition soil this way every year to 2 years. Plant flowers and water.

**Trees & Shrubs:** Dig a hole 2/3 the depth of the root ball and at least twice as wide. Mix 1 part compost with 2 parts soil obtained from the planting hole. Place the tree or shrub in the planting hole and apply amended soil around the root ball. Firm soil occasionally and water.

**Topsoil Manufacturing/Upgrading:** Mix 1 part compost with 2 parts existing or purchased soil and blend uniformly.

**Growing Mixes:** Planter box or raised bed mixes can be produced by mixing 1 part compost to 1 part pine bark and 1 part soil, sand or expanded shale. Potting mixes should contain 1 part compost, 1 part peat moss or pine bark, and 1 part perlite, vermiculite, styrofoam, or other aggregate.

**Mulching:** Spread a 2-3” layer around trees, shrubs, and flowers. Always avoid placing mulches against plant trunks and stems.

**Garden Beds (food crops):** Apply a 1-2” layer to soil and till to a 6-8” depth. Reapply each year, or as per soil test recommendations.

**NOTE:** The USCC does not assume whether or not, or to what extent, these directions are sound, sufficient or otherwise appropriate. It is the participant’s responsibility alone to ensure that they are.

**Compost Ingredients:**

Yard trimming, food by-products

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This compost product has been sampled and tested as required by the Seal of Testing Assurance Program of the United States Composting Council (USCC), using certain methods from the “Test Methods for the Examination of Compost and Composting” manual. Test results are available upon request by calling Barnes Nursery at 800-421-8722. The USCC makes no warranties regarding this product or its contents, quality, or suitability for any particular use.

For additional information pertaining to compost use, the specific compost parameters tested for within the Seal of Testing Assurance Program, or the program in general, log on to the US Composting Council’s TMECC web-site at http://www.tmecc.org.
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Compost = Organic Carbon & Nitrogen, & Soil Organisms

- Pathogens killed, quick carbon (sugars and starches) metabolized and turned into “humus”

- Compost Contains ~50% Organic Matter by Weight

- Organic Matter is made of Carbon Compounds so it:
  - Provides food (energy) to the soil organisms
  - Provides tilth for water infiltration, holding and oxygen penetration
  - Sequesters carbon

- Must keep adding to the soil as it is eaten (degraded) by the soil organisms

- Also it provides Organic Nutrients (“NPK”, i.e. nitrogen, phosphorous and potassium)
Native Soil Environment
Storm Water 201

Low Impact Development (LID) approach - new hydrologic pattern mimics predevelopment patterns
Promise of Healthy Soil

- Infiltrates & retains water
- Holds nutrients in microorganisms and root bits
- Stores Carbon
- Can jump start with compost

90% of our states managed water, used on soil first!
COMPOST Turns Dead Dirt... to Living Soil

Main Applications
- Landscape
- Erosion Control and Restoration
- Agriculture

Specifications are Key
- User Driven Specifications
- Landscape Specifications (Manual)
- Agronomic Rates
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Plastic & Glass Contamination

Biggest issue with municipal food scrap compost

- Disposal Education
  - Enforcement
  - Market-based?!?

- Packaging Industry

- Onsite Monitoring

- Human/Mechanical Separation

- Regulatory Limits
  (0.5% by weight)
Market Drivers - Env. Regulations

“Regs driving more municipal compost production”

- **AB 876** – (2015) Organics Management Infrastructure Planning
  - www.calrecycle.ca.gov/LGCentral/AnnualReport/OrganicInfrastructure.htm

- **AB 901** – (2015) Recycling and Disposal Facility Reporting
  - www.calrecycle.ca.gov/Laws/Rulemaking/Reporting/default.htm

  - www.calrecycle.ca.gov/Climate/SLCP/
Several actions have been identified to:

- Protect and restore soil organic matter
- Identify sustainable and integrated financing
- Provide for research, education and technical support to facilitate healthy soils
- Increase governmental efficiencies to enhance soil health on public and private lands
- Ensure interagency coordination and collaboration
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Broccoli Harvest
Post Harvest, ready to disk in
Romaine Lettuce Harvest
Pros & Cons of Composting Ag waste

**Pros - Why do it?**
- Clean the field
- Nutrient management
  - Capture
  - Control
- Decrease fertilizer use
- Sustainable land use practices

**Cons - Why not?**
- Two more field passes
  - Collection
  - Compost application
- Composting is expensive ($30-60/ton)
- Best management practices not widely known
  - Need field trials
  - Need analytical framework
Ag Compost Is Feasible ... but

Needs the following:

- **Nutrient fate**
  - Which Nutrients?
  - Quick release (chemical)
  - Slow release (composted/biological)
  - What about biochar?

- **Economic Analysis**
  - Composting & Chemical Fertilizers
  - Biofertilizers & biochar

- **Best Management Practices**
  - Post harvest collection
  - On farm composting
  - Timing & Compost Analysis
  - Spreading & Nutrient analysis

- **Outreach**
Summary

**Compost Provides Benefits**

- Healthy Living Soil
- Nutrient control
- Water Quantity and Quality Management

**Issues:**

- Analytics
- Contamination
- Cost

**Composting Ag Material**

- Feasible
- More organic nutrient control
- Regenerative
Questions?
Comments?
Discussion...

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Bioprodut Development

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