Homeowners (and land managers) are forced to establish vegetation, landscapes and crops on problematic sites

Soil management is even more important with climate change (e.g., drought, flood, temp. extremes)

Need to use more sustainable soil management practices - for plants, economics, and environment

“Soil, Compost, and Mulch, Oh My!”

Improve water efficiency in your garden by fixing the soil

Presented by:
Ron Alexander, President
ACWD/BAWSCA Event

5/18/19

Thanks Sponsors

StopWaste

Hosts

BAWSCA

Bay Area Water Supply & Conservation Agency

Various conservation (urban/agricultural) efforts…

Save water and protect the environment! BAWSCA offers a variety of rebates and programs to help Bay Area water users become more water efficient inside the home and outdoors. For water-wise gardening, visit Bay Area Water Wise Gardening.

Alameda County Water District offers a wide variety of rebates, incentives and technical assistance to our residential, commercial, industrial, institutional and large landscape customers.

Compost and mulch use is a great tool!

Topics

• Product Usage Trends
• Composting and Product Specs
• Soil Testing and Soil Mgt Report
• Compost and Mulch Benefits to Plants and Soil
• How to Select / Spec Compost
• Compost and Mulch Applications

Often Planting in Damaged and Depleted Soils

• Most soils have poor structure (fine texture)
  – Drainage, compacted, slow water percolation
  – Less water accepted (storm water management issue)
  – Significant erosion
• Some low in moisture-holding capacity (droughty)
  – Inefficient nutrient uptake, nutrient loss

IMPORTANT TO SOIL TEST
Problem: not often creating landscapes in ‘true’ or higher quality topsoil, and trying to vegetate stressed (and sometimes) over-used land

- Poor structure
- Lacking macro pores (50% concept) and organic matter
- Reduced soil life

COMPOST CAN BE USED TO CREATE ACCEPTABLE LANDSCAPE GRADE SOILS AND IMPROVE OVERALL VEGETATION

Sustainable Landscaping Trends, Green Building and Infrastructure

- Promotes Healthy Soils
- Recreate/mimic ‘natural’ systems
- Provide ‘Water Efficiency Landscapes’ (WELO), gain LEED/SSI credits

Model Water Efficient Landscape Ordinance (WELO) is in Effect

- Applies to all permitted landscape projects with landscape area of:
  - 2,500 sf for landscape renovation
  - 500 sf for new construction
  - “Landscape area” includes pools, but not hardscape
- Projects must meet water budget, based on weather in project location
  - Water budget allows ~25% of area for high water use plants (lawn) or pool
  - Vegetable gardens get higher water budget
- Products
  - Requires 4 CY compost / 1,000 SF
    - Unless already have 6% OM already
  - Requires 3” (9 CY/1,000 SF) of mulch

Same Trends in Agriculture

WHY?... Food and Ag Sustainability

What's critical about soil health now?
1. World population is projected to increase from 7 billion in 2013 to more than 9 billion in 2050. To sustain this level of growth, food production will need to rise by 70 percent.
2. Between 1982-2007, 15 million acres of prime farmland in the U.S. were lost to development.
3. Improving soil health is key to long-term, sustainable agricultural production.

Soil Health Key Points

- Healthy soils are high-performing, productive soils.
- Healthy soils reduce production costs—and improve profits.
- Healthy soils protect natural resources on and off the farm.
- Franklin Roosevelt’s statement, “The nation that destroys its soil destroys itself,” is as true today as it was 75 years ago.
- Healthy soils can reduce nutrient leaching and sediment runoff.
- Increase efficiencies, and sustain wildlife habitat.

Compost / Composting

Various types of composts in California
- 100 Commercial / Permitted sites, some unlicensed sites because of size / feedstock

Many benefits
- Climate change
- Need more resilient soils
- Reduced water usage

Soil health matters because:
1. Healthy soils hold more water (by binding it to organic matter), and loses less water to runoff and evaporation.
2. Organic matter builds up close to the cations and roots cover the soil. Organic matter holds 16-20 times its weight in water and requires nutrients for plants to use.
3. One percent of organic matter in the top six inches of soil would hold approximately 27,000 gallons of water per acre.
4. Most farmers can increase their soil organic matter in three to ten years by adding and maintaining compost to achieve this goal.

[Soil Health Benefits]

[Composting Facts]
**Definition**
Compost is the product manufactured through the controlled aerobic, biological decomposition of biodegradable materials. The product has undergone mesophilic and thermophilic temperatures, which significantly reduces the viability of pathogens and weed seeds, and stabilizes the carbon, such that it is beneficial to plant growth. Compost is typically used as a soil amendment, but may also contribute plant nutrients. *Current AAPFCO definition*

**Use the Right Compost!**

**USE ONLY**
U.S. Composting Council
Seal of Testing Assurance Program

**Important Parameters**

<table>
<thead>
<tr>
<th>Compost Parameters</th>
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<tr>
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<tr>
<td>Soluble salts</td>
<td>dS/m (mmhos/cm)</td>
</tr>
<tr>
<td>Primary plant nutrients</td>
<td>%, as-is (wet) &amp; dry weight basis</td>
</tr>
<tr>
<td>Nitrogen</td>
<td>Total N</td>
</tr>
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<td></td>
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<tr>
<td>Moisture content</td>
<td>%, wet weight basis</td>
</tr>
<tr>
<td>Organic matter content</td>
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</tr>
<tr>
<td>Particle size</td>
<td>Screen size passing through</td>
</tr>
<tr>
<td>Stability (respiratory)</td>
<td>mg CO2-C/g OM per day</td>
</tr>
<tr>
<td>Maturity (biomass)</td>
<td>%, average</td>
</tr>
<tr>
<td>Percent emergence</td>
<td>% (average)</td>
</tr>
<tr>
<td>Relative seedling vigor</td>
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</tr>
<tr>
<td>Select Pathogens</td>
<td></td>
</tr>
<tr>
<td>Trace metals</td>
<td></td>
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</table>

**ReScape Compost Spec**

**Properties**

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<thead>
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</tbody>
</table>

**Example**

Can test to prove the product is a ‘real’ compost, and will work for your application

Many DOTs and other Specifiers (LASs) require STA compost

Can often get more detailed (and historical) data from these composters

**Use Only True Compost**

**PARTICIPATING COMPOSTERS:**

- Complete on-going product testing
- Operate on-going sampling/testing regime, larger facilities test more often
- Using uniform sampling and analytical testing methods (from national testing manual - TMECC)
- Using only STA Program certified labs
- Disclose test data results (lab analyses) on uniform label
- Provide appropriate end use instructions to end users

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ReScape Compost Spec

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</tr>
<tr>
<td>Cr</td>
<td>≤0.5% dry weight basis</td>
</tr>
<tr>
<td>Cd</td>
<td>≤0.05 mg/kg (ppm)</td>
</tr>
<tr>
<td>Hg</td>
<td>≤0.05 mg/kg (ppm)</td>
</tr>
<tr>
<td>Pb</td>
<td>≤0.05 mg/kg (ppm)</td>
</tr>
<tr>
<td>As</td>
<td>≤0.05 mg/kg (ppm)</td>
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Caltrans Compost Specifications

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<tr>
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<th>Test method</th>
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<td>TMECC 05.07</td>
<td>&lt;5-10%</td>
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<td>Pathogens</td>
<td>TMECC 05.05</td>
<td>≤3 MPN per 4 grams, dry weight basis</td>
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<tr>
<td>Physical contaminants</td>
<td>TMECC 04.11</td>
<td>≤5.0 kg per gram, dry weight basis</td>
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</tbody>
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Commercial Composting Facility ‘Walk Through’

19

Various Methods

Technology Levels, Sizes

Feedstock Reception

Microbes:
- Oxygen
- Food (C/N)
- Water

Surface area phenomenon

EXAMPLE
Particle size based on end use
Size Reduction

Feedstock preparation: grinding (and mixing if food waste, etc.)

Site Layout

Organized, materials flow in one direction

Turning Windrows

Forced air instead of turning

Aerobic Process

Oxygen Demand

Monitoring Temperature

High-temperature composting phase

Lower-temperature curing phase
Screening

Typical Compost Feedstocks
- Yard trimmings
- Food residuals
- Manure
- Biosolids*
- Industrial by-products*
- MSW* (no SSO)

*Not OMRI Listable

Feeding differences, pros & cons
(show examples later)

Test to Understand Soil Characteristics

- Physical (structural):
  - Tilth, infiltration, porosity, bulk density, aggregation, texture* (mix of sand, silt and clay)

- Chemical:
  - Nutrient content, salinity, pH, organic matter, mineral content* (parent material)

- Biological:
  - Biomass, biodiversity, biological activity, disease suppressiveness

*Not affected by the addition of OM

Help to prescribe remedies, and in plant selection

Understand Your Soil

- Soil testing is very important and often forgotten
- Soil analysis shall include:
  - Soil texture, infiltration rate, pH, EC, Na, OM  (basics)
  - Often provide recommendations
    - WELC recommends amending soil to get to 6% OM (dw), plus providing organic forms of fertility
  - Testing done by universities and private labs

Make sure that your landscaper tests the soil and Work with labs that provide adequate explanation of soil test data...

Explain “why” and “what to do next”

Ask questions – have them explain data to help in education
Soil Report Tip

- Order organic recommendations, or Welo or “Bay-Friendly”
- Can ask for recommendations to bring SOM to 6%
- Call the soil scientist if you want help interpreting!

Resources:
List of Bay Area soil labs:
http://cesonoma.ucanr.edu/files/27431.pdf

BASICS – SOILS 101:

What is it?

- Topsoil – the surface or upper part of the soil profile, naturally generated medium
  - Consists of sand, silt, clay (mineral fraction)
  - Organic matter – varying types
  - Trace amounts of nutrients
  - Water
  - Living creatures

Soil Texture

- The amounts of each size particle determines the textural property of the soil (grid system)

Functions

Soil provides

- A physically stable medium for plant growth
- Acts as a repository for plant nutrients and water
- Medium for microbial (and other) life

Plus environmental benefits …
- Acts as a biofilter – binding and degrading pollutants
- Absorbs runoff (and reduces erosion)
- Sequesters carbon

We can help soil to properly function if we re-establish the carbon cycle

Soil Components

The 4 Parts of Soil

- Mineral Matter
- Organic Matter
- Soil Air
- Water

About ¼ of the soil volume is solid particles

About ¼ of the soil volume is pore space

NEED POROSITY!!

(OM highly variable, but very low in most regions of California)
Compost and Mulch as a Drought Management Tool

- Amending soil and/or mulching can help reduce the dependency on irrigation (reduce water usage volumes)
- Assist plant survival…. AND

Captures the FREE WATER that falls from the sky as precipitation

Why it’s included in the WELO ordinance, is key to field success

Choosing the Proper Product

- Understand the application (specific end use, details of application)
- Obtain product test results (get help with interpretation)
- Buy certified / Listed products
- Know the Supplier (are they educated?)
- Get samples, test data and end use information from supplier – up-front
- If purchased in bulk, inspect the product before it is dumped

List of composters can be found on USCC website https://compostingcouncil.org/participants/

A Comparison Between Mulch and Soil Amendment Properties

<table>
<thead>
<tr>
<th>Property</th>
<th>Mulch</th>
<th>Amendment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Moisture conservation</td>
<td>Moderate to high</td>
<td>Low to moderate</td>
</tr>
<tr>
<td>Moisture retention</td>
<td>Low (in the mulch)</td>
<td>High (in the soil under mulch)</td>
</tr>
<tr>
<td>Soil temperature</td>
<td>Immediate changes</td>
<td>Slight or unchanged</td>
</tr>
<tr>
<td>Soil structure</td>
<td>Changes with time</td>
<td>Changes immediately</td>
</tr>
<tr>
<td>Phytotoxicity potential</td>
<td>Low to medium</td>
<td>Low to high</td>
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<tr>
<td>Root contact</td>
<td>Low initially</td>
<td>High</td>
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<tr>
<td>Fertility</td>
<td>None to low</td>
<td>Low to moderate</td>
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<tr>
<td>Pathogens</td>
<td>Low to none</td>
<td>None to high</td>
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<tr>
<td>Nitrogen tie up</td>
<td>Low to none</td>
<td>None to high</td>
</tr>
<tr>
<td>Weed control</td>
<td>Moderate to high</td>
<td>Low to none</td>
</tr>
</tbody>
</table>

Source: Creating a Healthy Root Zone, James Downer and Ben Faber, University of California

Not interchangeable products!!

Soil Amending Compost (often 3/8” screened)

Coarser Compost for Mulching

(Chore, Erosion Control / Storm Water Management)

Lots of carbon-based mulches are used...

Bark and recycled wood is common
Benefits of Compost Use to the Landscape World

**Physical:**
- Improves soil structure
- Moisture management

**Chemical:**
- Modifies and stabilizes pH
- Increases cation exchange capacity
- Supplies nutrients

**Biological:**
- Supplies soil biota
- Suppresses plant diseases
- Pollinates plants

**Other:**
- Binds/degrades contaminants
- Binds nutrients

---

Soil Structure: Physical Modification

*Improves*
- Water (oxygen, other) movement
- Rooting — more extensive, faster
- Pore spacing, soil aggregation

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Soil Aggregation

A well aggregated soil has a range of pore sizes. This medium size soil crumb is made up of many smaller ones. Very large pores occur between the medium size aggregates. Occurs physically and biologically.

---

Increased Soil Water Holding Capacity and Moisture Absorption

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Effect of Organic Matter on Available Soil Water

ATTRA — each increase of 1% OM can increase soil WHC by 16,500 gallons H₂O/acre

Reduce irrigation 30-50% by 'fixing' soil first
Soil Type Affects Irrigation Strategies

Organic matter benefits in several ways

Compost Restores Storm Water Infiltration Capacity

So, helps to recharge aquifers...

Influence of Compost on Soil Water Management

<table>
<thead>
<tr>
<th>Western Washington Loamy Sand (% dairy solids compost added)</th>
<th>OM (%)</th>
<th>Saturated Hydraulic Conductivity (in/hr)</th>
<th>Moisture at Field Capacity (weight %)</th>
<th>Moisture at Field Capacity (in/ft)</th>
<th>Bulk Density (g/cm³)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>2.0</td>
<td>4.3</td>
<td>21.5</td>
<td>2.2</td>
<td>1.20</td>
</tr>
<tr>
<td>10</td>
<td>2.0</td>
<td>4.3</td>
<td>26.8</td>
<td>2.7</td>
<td>1.28</td>
</tr>
<tr>
<td>20</td>
<td>2.4</td>
<td>5.4</td>
<td>37.0</td>
<td>3.7</td>
<td>1.09</td>
</tr>
<tr>
<td>30</td>
<td>4.4</td>
<td>7.5</td>
<td>50.9</td>
<td>5.1</td>
<td>0.99</td>
</tr>
</tbody>
</table>

Great tool for water management – too much, too little

Compost Supplies Macro and Micro Nutrients

No compost

Compost

Also increases CEC (nutrients holding ability)

Supplies and Feeds Soil Biology

Responsible for

- Organic matter decomposition and nutrient cycling
- Increased nutrient supply to plant roots
- Formation and stabilization of soil structure
- Breakdown of organic contaminants
- Control of pests and pathogens

Microbial population and diversity are measures of soil quality

Microbes work in symbiosis with plants
**Suppresses Soil-Borne Diseases**

4 Mechanisms of Disease Suppression, via beneficial organisms:
1. Induced systemic resistance (ISR) or systemic acquired resistance (SAR) – turns on plant’s natural disease-fighting mechanisms
2. Antagonism (kills/harms disease organisms)
3. Competition for nutrients (and energy)
4. Competition for root colonization

Preventative, not curative (Malajczuk, 1983)

**Healthy Soils Improve Water Efficiency**

Soil Health
- Nutrient retention and release
- pH
- Energy (C) storage
- Toxicity prevention

**Compost Application**

Soil Incorporant
- Ag crop establishment
- Turf establishment
- Garden bed preparation
- Reclamation/remediation
- Nursery production
- Roadside vegetation

Surface Applied
- Fruit trees
- Garden bed mulch
- Erosion control media
- Turf topdressing

Growing Media Component
- Container/potting substrates
- Landscape (e.g. rooftop, raised planters)
- Backfill mixes (tree and shrub plantings)
- Golf course (e.g. tee, green, divot mixes)
- Manufactured topsoil

Lots of applications, Staple of landscape industry... (future land mgt tool)

**General Landscape Applications**

- Planting Beds
- Tree/Shrub Planting
- Topsoil manufacturing
- Turf Establishment and Maintenance

-Apply 1-2” layer and incorporate to a 6-8” depth (3-6 CY / 1,000 SF)
-Do not over incorporate

-Water plants in well
(can reduce fertilizer, lime, gypsum, humic acid)
**Homes, Parks, Public & Private Land**

**Interior Landscapes and Potting Media Amendment**

- Excavate Planting Hole 2-3 Width of Rootball
- Blend 1 Part Compost to 2-3 Parts Soil

- Place plant
- Backfill hole with soil blend
- Firm occasionally
- Water

**Urban Food Production**

**TREE/SHRUB PLANTING**

- Excavate Planting Hole 2-3 Width of Rootball
- Blend 1 Part Compost to 2-3 Parts Soil

**Pelletized Compost**
Home Lawn Conversion with Sheet Mulching

Done to reduce water consumption

Lawns

Can create and renovate existing lawns with compost

Lawn renovation with sod
To avoid long-term irrigation, manage storm water

Same home, side yard
Lawn renovation with seeding
Site Restoration / Establishment of Natives

- Vic Claassen, UC Davis research – low nutrient needs, Med climate
- Faster, denser vegetation establishment

Caltrans research found....
Deep incorporation of compost improves soil characteristics including:
- Incorporation and porosity
- Water holding capacity
- Texture
- Nutrient levels and cycling
- Microorganism populations
- Rooting depth
- Oxygen exchange and air space
- Vegetation Coverage

Turf Topdressing
- Turf Maintenance
- Partial Renovation

Turf Topdressing
Aerate when soil is moist, but not too wet
Turf Topdressing

...a Beautiful Green Sustainable Lawn

Compost is a great alternative to using chemicals resulting in a true Sustainable Approach!

Before Compost Applied

After Compost Applied

Using an Eco Lawn Applicator is a quick way to spread compost and more efficient spreading wetter product.

Using compost in blower trucks has become a fast application alternative.

TOPSOIL MANUFACTURING

On-site soil blending / improvement

Use in landscaping, (subsoils/sand) reclamation, brownfields, contaminated sites, etc.

Great technique when have adequate volumes of ‘soil’ (mineral substrate) on-site

Financial savings, plus superior soil

Transport 270 CY, instead of 540-810 CY

Can be ½ the cost...

...but must make sure that the process is done properly, may need broadleaf weed control.
Off-site soil blending

Blend ratio depends on initial soil quality and goals

- Typically 20-30% inclusion rate (compost/soil mix by volume)

Many soil blends available to homeowners at garden centers / ldsp. yards

Mulching

- Mulch applied to the soil surface
- Around planted materials and on slopes to both increase water holding capacity and reduce moisture evaporation, and for aesthetic purposes (and much more…)

Really large-scale

How Mulch Works

- Absorbs radiant heat – reduces soil temperature
- Reduces water evaporation from soil
- Helps water absorption
- Reduces weed growth – they use water too
- Breaks down and adds OM to soil

Mulching Provides Many Benefits…Well Documented

- Conserves moisture
  - Reduces irrigation by up to 70%
- Reduces soil temperature (8-10°F) and temperature fluctuations
- Suppresses weed establishment
- Improve soil structure and increase soil fertility over time
- Improves erosion control
Preferences…
Often more related to ‘look’ (and cost) than efficacy

Recycled mulch is required where available
Apply 3” layer
(9 CY / 1,000 SF)

Woody materials

Apply 3” layer
(9 CY / 1,000 SF)

Lots of options…. good and bad

Mulching Volcanos

Why are Stones being used?

<table>
<thead>
<tr>
<th>Material</th>
<th>Uses</th>
<th>Application Depth</th>
</tr>
</thead>
</table>
| Bark           | Contains waxes that shed water moving it into the soil. Great to use in ornamental beds | 2” Small chips/nuggets
                             |                                                                   | 3” Large chips/nuggets |
| Wood Chips     | Compost fresh chips for a couple of months before use. Use in ornamental beds. | 2” Small chips/nuggets
                             |                                                                   | 3” Large chips/nuggets |
| Leaves         | Use dry, aged and shredded leaves. Use either in vegetable garden or ornamental bed. | 4” loose
                             |                                                                   | 1”-2” settled |
| Grass Clippings| Only use grass from an herbicide free lawn. It is best when dried for a few days. A good source of nitrogen. Use in vegetable garden. | 4” loose
                             |                                                                   | 1”-2” compressed |
| Compost        | Inhibits plant disease, builds the soil, and provides plants with nutrients. Use in vegetable or ornamental beds. | 1”-2” |
| Straw          | Inhibits plant disease and is a good insulator. Use in vegetable gardens. | 4” loose |

- Type of mulch not specified in ordinance, so you may have to

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© The Holden Arboretum, 2003
Research Shows Some Mulches Better than Others for WHC

<table>
<thead>
<tr>
<th>Treatment and Depth</th>
<th>WHC (inches water)</th>
<th>WHC (inches water / foot appl. depth)</th>
<th>Std. Dev.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gro-Mulch – 3”</td>
<td>0.91</td>
<td>3.64</td>
<td>0.11</td>
</tr>
<tr>
<td>Yard waste – 5”</td>
<td>1.13</td>
<td>2.72</td>
<td>0.17</td>
</tr>
<tr>
<td>Yard waste – 3”</td>
<td>0.63</td>
<td>2.07</td>
<td>0.17</td>
</tr>
<tr>
<td>Yard waste – 1”</td>
<td>0.20</td>
<td>2.34</td>
<td>0.04</td>
</tr>
<tr>
<td>Composted yard waste – 3”</td>
<td>0.40</td>
<td>1.59</td>
<td>0.16</td>
</tr>
<tr>
<td>Fabric + OGC – 3”</td>
<td>0.35</td>
<td>1.42</td>
<td>0.04</td>
</tr>
<tr>
<td>OGC – 3”</td>
<td>0.31</td>
<td>1.02</td>
<td>0.01</td>
</tr>
<tr>
<td>Bark – 3”</td>
<td>0.28</td>
<td>1.11</td>
<td>0.03</td>
</tr>
<tr>
<td>Bark mulch – 3”</td>
<td>0.02</td>
<td>0.61</td>
<td>0.01</td>
</tr>
<tr>
<td>1” Rock – 3”</td>
<td>0.02</td>
<td>0.09</td>
<td>0.01</td>
</tr>
<tr>
<td>Fabric</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Control</td>
<td>-</td>
<td>-</td>
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</tr>
</tbody>
</table>

Ref: Water retention & evaporative properties of landscape mulches. Univ. of CA (Shaw, Pittenger, McMaster)

Erosion Control and Storm Water Management Applications for Compost

Soil and Water Protection

Erosion Control, Storm Water Mgt, Mulching Applications

Coarser, mulchy composts

Erosion/Sediment Control

- National specs exist
- US EPA supports

Compost blankets (berms and socks)

Coarse compost particles absorb rain energy, fine particles absorb water

Total / 100% contact with soil, Extensive rooting

Can be staked into place, so work on concentrated flows

Act as a 3-dimensional filters, so large sediment capacity
Caltrans uses...

Compost applications, over time, blend in with the natural landscape.

Compost berms – sediment control

Green Infrastructure Applications

Storm water mgt.

Source: IDNR, Erth Products, LLC, Filtrexx

Roof top gardens and bioretention features

Source: SOCCRA, RAA

Stormwater media

Compost / sand mixes similar to bioretention features

Bioretention Mulches

Composted, stringy (heavier) mulches are more non-floating

Rain Gardens

Teach Customers to Invest in Water Efficiency and...

Physical
- Root proliferation
- Aeration
- Water retention
- Water infiltration and transmission
- Erosion prevention

Chemical
- Nutrient retention and release
- pH
- Energy (C) storage
- Toxicity prevention

Biological
- Pest suppression
- N mineralization
- OM decomposition
- Habitat protection

Healthy Soil

Healthy Soils Improves...

- Plant growth and survival rates
  - Ability for ‘plants’ to better handle environmental stresses
  - Microbial life, many live symbiotically with plant life
- Sustainability of landscape / turf / slope
  - Less water, other inputs
  - Lower maintenance costs
- Erosion / sediment control and
- Storm water management

Compost and mulch usage assist in creating healthy and water efficient soils!
QUESTIONS

More information:
- www.compostingcouncil.org
- www.lawntogarden.org/marketplace

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