Steam, Solarization and Tons of Prevention

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Hetch Hetchy Regional Water System

Delivering drinking water every day to 2.6 million residents and businesses in Southern Alameda, Northern Santa Clara, San Mateo and San Francisco counties.
Some parts of the system are older than 100 years old.

System crosses three major earthquake faults.
Water System Improvement Projects
35 Local projects
46 Regional projects
7 counties
$4.8 Billion
Large Infrastructure Projects
Calaveras Dam Replacement Project
Large Restorations of SFPUC Watershed Lands
Stewards of SFPUC Watershed Lands
San Andreas Wetlands
Goldfish Pond
San Antonio Creek Planting Basins
Pathogen Risk Minimization Measures

• Sanitary Requirements For:
  • Equipment – cleaned or brand new equipment
  • Imported Materials – sterilized
  • Nurseries – protocols and physical separation

• Limit Imported Materials
  • Direct Seeding into basins
  • Avoid high risk host species

• Inspections and Enforcement
Sensitive Restoration Area
Decontaminate all equipment!
WOOD MULCHES

The many benefits of groundcover mulches on soils have long been recognized throughout the horticultural industry. In addition to providing an aesthetically pleasing finish to the landscape, mulches also aid in conserving soil moisture, moderating soil temperatures, inhibiting weed seed germination, resisting surface erosion on slopes, and ultimately break down to provide organic matter to the soil.

**Wood Mulches** are produced from recycled lumber, using unpainted, non pressure treated wood such as old redwood fences and decks. These mulches are reddish tan in color.

**Garden Wood Mulch**
This product is made from non-painted, non-pressure treated dimensional lumber and redwood fencing which have been ground and screened to produce a midsize mulch with particle sizes from 1 to 3″. It is reddish tan in color and excellent for use in shrub beds and slopes. It is most effective when placed 2-3″ thick.

**Pathway Wood Mulch**
This material is from the same source material as Garden Wood Mulch, but is screened to produce particle sizes 1″ minus. It is excellent for pathways or in areas of heavy foot traffic, but may also be utilized as general garden mulch. We recommend placing this material 2-3″ thick for best results.

**Combo Wood Mulch**
Combo Mulch contains both Garden and Pathway Wood Mulches, providing the full range of particle sizes in one mulch. It should be placed 2-3″ thick.
Safe Procurement and Production Manual

A Systems Approach for the Production of Healthy Nursery Stock

By John A. Griesbach, Jennifer L. Parke, Gary A. Chastagner, Niklaus J. Grünwald and John Aguirre

(July 2011)

No puddles, plants on pallets, no weeds.
Boots sanitized before entering plant area.
Organized by species, inspected regularly.
### Pre-delivery Inspections

<table>
<thead>
<tr>
<th>Heteromeles arb utifolia Toyon</th>
<th>100%</th>
<th>Ready for planting, but should be cut back first.</th>
</tr>
</thead>
</table>

Heteromeles arb utifolia Toyon

Plants shown in photo have been cut back to encourage lower side branches (bushiness).
Pathogen Treatments

• Detection by destructive sampling
• Detection by Canine
• Solarization – prolonged dry heat
• In-situ Steam Treatment – quick steam treatment
• Manual removal and steam
Thermal Anti-Condensate Greenhouse Film, 6mil

- 6 Mil
- UV Stabilized
- Superior Drip Control
- Increased Night Time Temperatures
- Guaranteed Longer Life -- 4 years
- Bee compatibility feature allows more of the UV spectrum to pass through the film, making it easier for bees to achieve pollination
- Energy Absorption in the 7,000nm to 14,000nm Range
- Light transmission is 91% per layer
- Excellent Infrared Retention While Maintaining High Light Transmission in the Visible and PAR Energy Ranges
- Higher Overnight Temperatures Maintained Compared to Non-IR Films

Condensation droplets have been shown to reduce light transmission by as much as 50%.
Solarization of Infected Planting Basins
Temperatures necessary to kill various groups of soil organisms – 30 min. aerated steam

- Few resistant weed seeds: 212°F (100°C)
- Most weed seeds: 190°F (88°C)
- Soil insects: 170°F (77°C)
- Worms, slugs and centipedes: 150°F (66°C)
- Most nematodes: 130°F (54°C)
- Most saprophytic fungi and bacteria: 90°F (32°C)
- Most plant pathogenic fungi, bacteria and viruses: 70°F (21°C)
- Pythium, Phytophthora: 40°F (4°C)
- Few resistant plant viruses: 100°F (38°C)
Homestead Pond and Adobe Gulch Grasslands Sticky Monkeyflower (*Mimulus aurantiacus*) Solarization Soil Temperature Data (08/25/15 – 09/14/15)
Siebinger Manufacturing produces the Tow 'N Dump Aeration Cart specifically with the options requested by the customer to use in their specific application.

The Tow 'N Dump Aeration Cart has the option of a folding rear gate and hydraulic lift or fold down sides and no hydraulic lift. Both carts have a perforated floor and hookups for steam and air equipment.

**RUNNING GEAR FEATURES**
- Running gear weight tested at 6400 lbs. (dropped 6’ abuse)
- 18 x 8.5” wheels (10 mph - non-highway)
- Wheel spindles w/roller bearings

**CART SPECIFICATIONS**
- Cart capacity of 2 cubic yards
- Aeration cart with 40% aerator floor 4” wide x 8’ long w/24” sdes
- Dump cart with smooth dump floor 4” wide x 8’ long w/24” sdes
- Canvas cover for aeration carts

**CART OPTIONS**
- Aeration cart with fold down sides for work bench / flat filling
- Aeration cart with fold up rear gate and battery powered hydraulic lift with safety locks
- 10 amp - 12 volt battery charger for battery powered hydraulics
- Custom aerator and steam fittings available

The cart with hydraulic lift features an easily operated lift control shown here.

Looking down into the cart shows the specially designed screen panel that supports the soil while allowing the air to pass through.

Locking support arms allow for safe maintenance of the cart.
What We Know Now

• Restoration design needs to change to reduce the risk of exposure to native habitats and make in-situ treatment more feasible – when necessary
• Specifications outline the prevention measures – only as good as the commitment to inspection and enforcement
• Treatment effectiveness unknown, difficult and destructive
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