



# GRAYWATER CURRICULUM

CLASS SIX

Plants, Products and Graywater

# Objectives

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- 1. Plants and graywater**
- 2. Drought tolerant landscapes**
- 3. Product consideration**

# Plants and Graywater

## **Consider the characteristics of the graywater that is being delivered to the plant material:**

- Likely to be alkaline
  - Washing machine detergents may produce highly alkaline graywater
  - Shower water pH dependent on shampoo, may be acidic or neutral
- May contain a relatively high amount of salts
- Relatively constant supply
  - Periods of drought, e.g. vacation
  - Periods of excess moisture, e.g. family visits, lower evapotranspiration

# Plants and Graywater

## **Unfiltered graywater delivered through mulch basins is best for:**

- Larger ornamental trees, bushes, shrubs
- Fruit trees and brambles

## **Why?**

- They have a large root area
- Likely to be more tolerant of irregular irrigation
- If there is abnormally high graywater production and roots get temporarily soggy, the plant has many other dry roots to keep it healthy
- Practical consideration of delivery through mulch basins

# Plants and Graywater

## **Plant specific factors:**

- Acid loving plants may be more difficult to keep happy with graywater
- Evergreen plants may be able to make better use of the available water year round
- If a plant is established and hasn't been previously irrigated do not begin irrigating it with graywater
- Plants with higher transpiration rates can be used for treatment/disposal, e.g. if available landscape space is limited

# Ornamental Trees and Shrubs

- Chinese Pistache
- Japanese Maple
- Redwood
- Horsechestnut
- Cedar
- Redbud
- Escallonia
- Trumpet flower
- Heavenly bamboo
- Hibiscus



# Fruit Trees

- Apricot
- Nectarines
- Peaches
- Plums
- Pineapple guava
- Pomegranate
- Figs
- Persimmon



- Apples
- Pears
- Quinces
- Almond
- Hazelnut/Filbert
- Citrus

# Edible Brambles, Berries & Vines

- Raspberries
- Blackberries
- Weeping mulberry or tree
- Elderberries
- Passion Fruit
- Kiwi
- Squash
- Grapes





# Vegetables

**Vegetables when the edible portion is above ground and/or protected with mulch barrier:**

- Squash
- Tree collards
- Malibar spinach
- Ground cherry
- Artichokes
- Staked tomatoes
- Corn



# California Native Plants

## Riparian and Wetland Species

### Trees

- Bigleaf maple
- White alder
- Western sycamore

### Shrubs

- Creek dogwood
- California rose
- Red willow

### Perennials

- Dwarf sedge
- Horsetail
- Rush
- Scarlet Monkeyflower
- Creek parsley

# Drought Tolerant Landscapes

## Options:

- Create separate hydrozone(s) for drought tolerant species
- Mound drought tolerant plants or plant on berms so that root crowns remain dry
- Spread graywater out so drought tolerant plants don't receive too much water

# Best and Worst Plants to Water

## **Best:**

- **Trees**
- **Shrubs / bushes**
- **Vines**
- **Perennials**
- **Large annuals**

## **Worst:**

- **Root crops**
- **Lawns**
- **Drought established**
- **Small plants**
- **Raised beds**
- **Sensitive plants (e.g. ferns)**

# Activity 1: Rank that Plant

**Thumbs up** = easy to water with L2L system

**Thumbs to side** = may be tricky or require some extra involvement (e.g. more frequent irrigation than you do laundry)

**Thumbs down** = bad idea. Plant won't be happy, it is against code, or the location is difficult to reach with L2L system

- Potted plants
- Raised beds
- Bean starts
- Mature beans
- Apple tree
- Ornamental grasses
- Carrots
- Ornamental trees
- Tomatoes on a trellis
- Lawns

# Activity 2: What Plants Would you Irrigate Here?



# Product Considerations

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**Salt**

**Boron**

**pH**

# Salt

## **Salt is harmful to plants because it**

- Degrades the soil structure
- Inhibits nutrient uptake
- Burns leaves

## **Salt is found in products as:**

- Salt
- Sodium \_\_\_\_\_ (sodium lauryl sulfate, etc.)
- Water softeners (sodium-based)

## **Avoid all salts in products and / or create healthy soils by:**

- Adding compost
- Using mulch
- Flushing salts from soil with rainwater (possible to plumb rainwater downspouts through graywater plumbing)

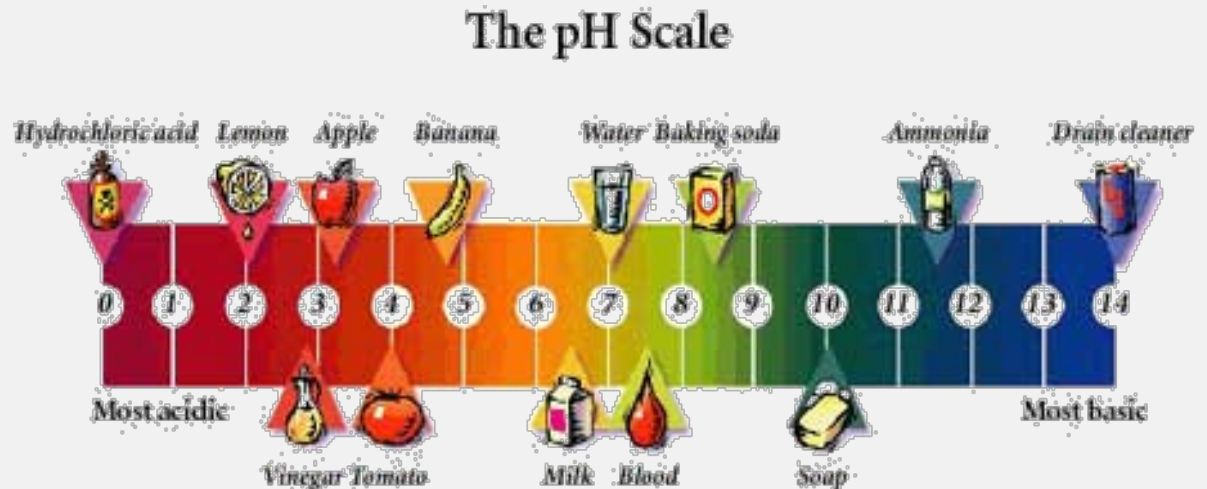
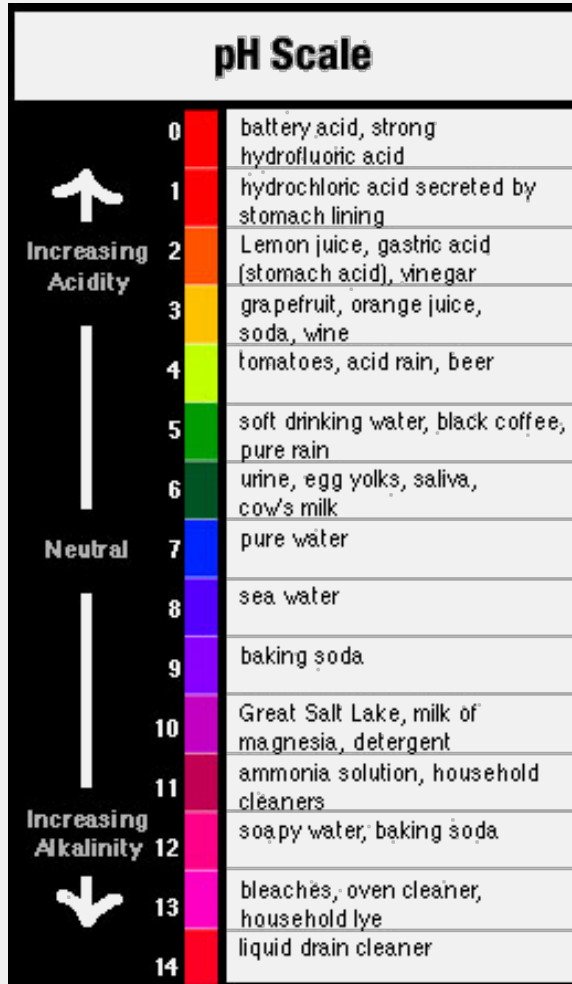


# Boron

- Boron is a plant micro-nutrient AND
- Boron is a plant toxin
- Elevated levels of boron in the soil will damage plants
- Boron is found in many products, its non-toxic to people
- Don't use borax cleaners or products with boron / borax
- Don't use detergents “with bleach” containing sodium perborate

# pH

- pH "potential hydrogen" measures the acidity or basicity of the soil
- It influences the solubility of nutrients and affects soil microorganisms- thus affecting the availability of plant nutrients



# Soil pH

## **Soil pH affected by**

- Natural soil conditions (mineralogy, climate, weathering)
- pH of irrigation water
- Addition of fertilizers/soil conditioners

## **Test soil pH with a soil test kit or send sample to a soil lab**

- Test kits available from garden stores, usually test for Nitrogen/Phosphorus/Potassium/pH

# pH

**"Generic Graywater" tends to be basic because most soaps and detergents are basic**

- Acid loving plants are generally not suited for graywater

**Many liquid detergents do not change pH**

- Oasis, Ecos, Biopac don't change pH

**Acidic mulch can mitigate slightly basic water**

- Redwood bark, pine needles

**Most plants prefer soils with a pH of 6-7, including**

- Most fruit trees
- Most vegetables

**Acid loving plants prefer soils with a pH of 4.5-5.5**

- Azalea, camelia, rhododendron, magnolia, blueberries

**Some plants prefer slightly basic soils with a pH of 6.75-7.5**

- Artichoke, grapes

# Other Considerations

## **Bleach**

- No chlorine
- Hydrogen peroxide okay

## **Water softeners**

- No sodium based softeners
- Potassium based softeners are better for graywater systems
- Backwash water is always too salty
- No softener is best!

# Activity 3: Graywater Friendly?

- Review the ingredient lists in your activities handouts for laundry detergents, shampoos, soaps and cleaners.
- Which ingredient lists would you recommend to be compatible with a graywater system?
- Which ingredients are not plant-friendly?