

SOIL AND WATER

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Common Misconceptions

- Soils in the Puget Sound region are mostly clay.
- It's raining today. Therefore I don't need to irrigate.
- We don't need to irrigate drought tolerant plants.
- There's standing water here. I must be over-watering.
- It rains a lot in Seattle. We don't need to worry about irrigation.
- I need better drainage in my clay so I think I will add sand to help it drain.
- The more organic matter we incorporate into soil the better.

Soils

The foundation of plant growth

Soils provide plants with :

- Water
- Nutrients
- Root anchorage



Soils are probably the single most important reason for poor plant performance of landscape plants and given the least attention.

"Soil is a complex physical, chemical, and biological system"

Soil Water

One of the most important functions of soil is to catch water during periods of rainfall and store it.

Three types of soil water:

1. Gravitational
2. Capillary
3. Hygroscopic

Soil water

1. Gravitational water- moves down through the soil due to gravity. Plants do not use this water as it rapidly moves out of the soil
2. Capillary water- water that is in the soil pore spaces or held loosely around soil particles. This is the **most available** form of water for plants to utilize.
3. Hygroscopic water- this water forms a very thin film around the soil particles and is usually not available to plants. It is held too tightly around the particles of soil (think of potters clay)

Soils in the Puget Sound region

Our landscapes are created on "disturbed soils" They are often area specific and combinations of:

- Sands
- Silts
- Clays
- Glacial Till- gravel with lots of round rocks of all sizes!
- Mixtures- various soil combinations and organic matter 6" ,12"-24" in depth over hardpan clay

On slopes, over time, this leads to slips and slides. This is a natural process all over the Puget Sound basin

Soil Texture and Structure

Texture:

- The percent of sand, silt and clay



Structure:

- The arrangement of soil particles (sand, silt, and clay) into aggregates or clumps
- Organic matter also plays a role as the microbes help bind the particles.
- Structure can change with human activity/ seasonal changes or natural break down of O.M.

Ways to Increase Water Holding Capacity

Improve soil structure:

- Avoid soil compaction, stay off the soil if it is water saturated
- Add organic matter in many forms, work it into the native soil
- Feed the microbes, they hold the key to improved soil structure
- Avoid unnecessary tilling

Feed the microbes!

- Beneficial effects of high microbial activity in soils:
 - Improved soil structure
 - Improved water holding capacity
 - Increase air/water relationship
 - Better soil permeability
 - Increases root penetration and growth
 - Nutrient availability
 - Healthier plants
 - Improved ability to survive drought and stress
 - Less summer watering required

First things first: Plant selection

- What type of soil are these plants being planted in?
- Present and future watering strategies
- Visual priority of new site
- Future maintenance for this planting



Root establishment, a function of:

- Plant selection for site
- Soil structure
- Planting practices
- Watering practices initially and over time
- Maintenance over time



Plant establishment: years 1-3 plus

- Watering practices the first plus summers is key to establishment
- Shallow watering causes stress and possibly death slowly
- Late summer (Sept, Oct) watering is often ignored



A plant under drought stress (or is this overwatering?)

- Stomata close
- Leaves curl in an effort to conserve
- Root hairs dehydrate
- Older leaves turn yellow and shed
- Photosynthesis shuts down due to a lack of water as a raw material
- Growth slows way down
- Continuance may cause death



Poor irrigation practices (under and over watering)



- Harmful Effects:
 - Shallow rooting
 - Run off
 - Stressed plants & increase disease susceptibility
 - Powdery mildew
 - Phytophthora
 - Nutrient deficiency
 - Dead root hairs=lack of nutrient uptake

Establishment of plants on a slope:a story

- Know the soil texture
- Plant selection for site
- Plant in late fall?
- Build wells on downside of slope, incorporate woody material
- Mulch for the winter
- Supplement water first few summers late in season



The hillside

Before: blackberry and brush



After: Bare soil



Beauty is in the eyes of the client

- Education of the client
- Unclear communication to a client
- Understanding of soils and how to wisely use our water resources.
- Sound soil, planting, and maintenance practices
- Charging fairly for soil preparation

Then:

Reveling in plant growth and establishment over time

