

A pair of hands is shown from a top-down perspective, cupped together and holding a large quantity of dark, rich compost. The compost is piled high in the center of the hands, with some particles falling onto the palms. The background is a soft-focus green lawn. The text "The Soil Sponge: Compost" is overlaid in white, serif font in the center of the image.

The Soil Sponge: Compost

Tidbits, Fun Facts

- Compost can hold 20 times its weight in water.
- Good, well-aged compost contains organic Nitrogen, which does not leach from soil to water.
- Compost reduces TNT-contaminated soils for the US Navy with a destruction and removal efficiency (DRE) of 99.7% through sorption and chelation.
- Normal soil contains bacteria populations of 26 million per gram; compost contains 417 million per gram. Microbial activity in mature compost is 40 times more active than fertile soil.

Drought.

- “For every 1% organic matter content, each cubic foot of soil can hold an additional 1.5 quarts of plant-available water” (Sullivan, 2002).
- “For every 1% of organic matter added, soil can hold an extra 16,500 gallons of plant-available water down to one foot deep per acre” (Scott and Wood, 1986).
- “Increasing the organic matter content from 1 to 2 percent would increase the volume of water to 3 quarts per cubic foot of soil” (Gould, 2012).

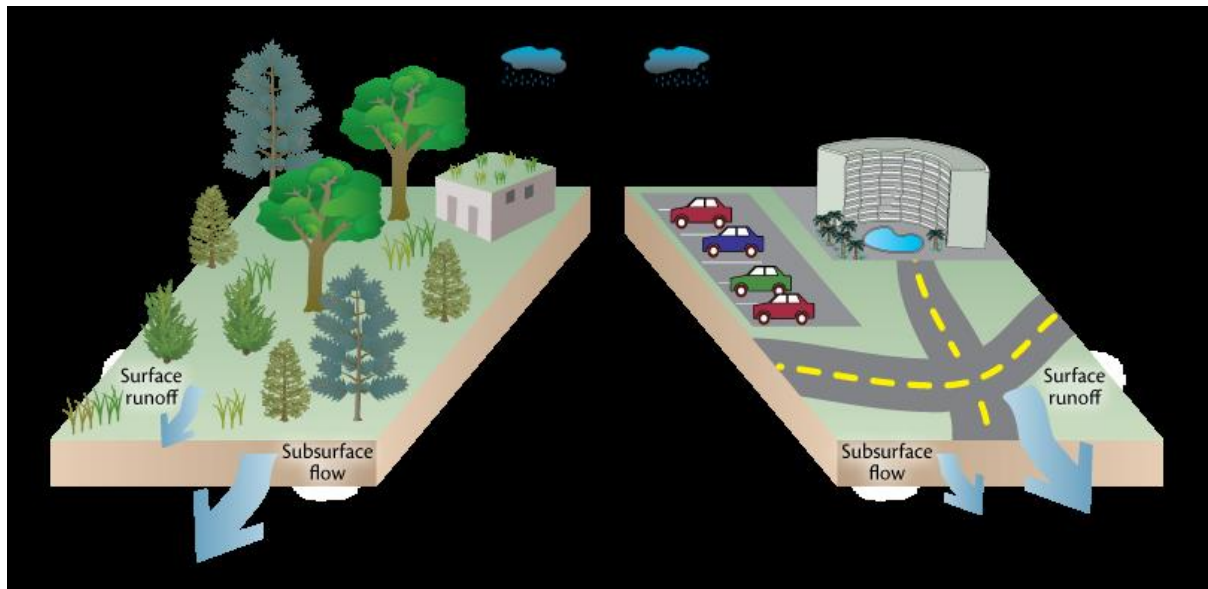


Drought, cont'd

- The average American landscape is overwatered by 20-30%. Automatic sprinkler systems use roughly two times the amount of water used by the same sized yards watered with manually moved and controlled sprinklers.
- Between 2010 and 2060, a 100% population increase is expected in the Highland Lakes region of Texas.
- In the last 100 years, the world's population has increased by a factor of four. The residential water use has increased by a factor of 7.

Stormwater is created when the soil's ability to absorb and retain rainfall is exceeded.

- In natural Watersheds, average runoff is 10% of annual rainfall.
- Urban areas with 35-50% impervious surface area, runoff is 30%; a 300% increase.
- Per unit area, construction sites have soil erosion rates 20 times greater than agricultural lands, and 2,000 times greater than forested lands.



Stormwater

- Infiltration of water to pre-developed land is 7.03” per hour, while non-recreational lawns is .26” per hour. Water that cannot be absorbed becomes **runoff**; in this case, 27 times *more runoff*.
- Adding compost creates a much better environment for rainfall absorption, infiltration, moisture retention (conservation) and plant growth.

*“We know more about the movement of celestial bodies than about the soil underfoot”
-Leonardo daVinci*

Erosion.

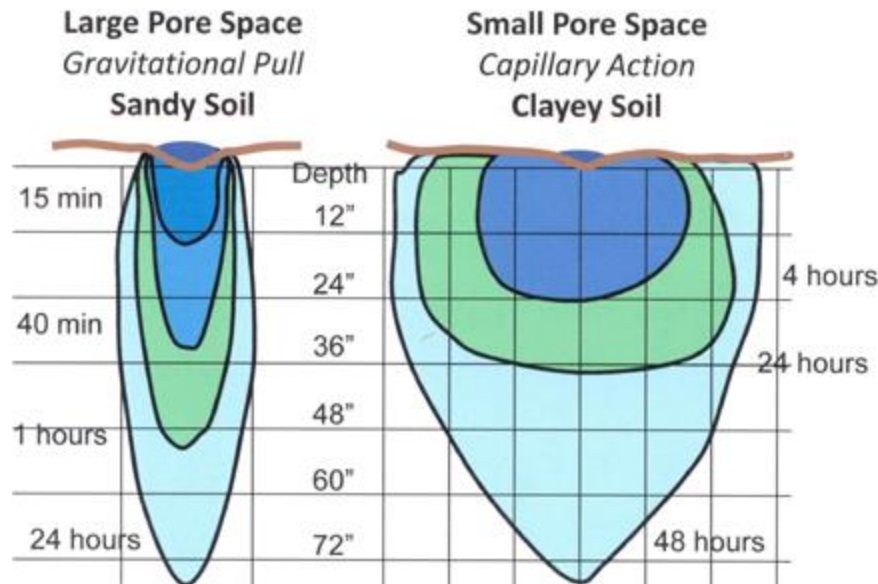
- Each year we lose five billion tons of topsoil in the United States. 80% of that is washed away, 20% is blown away.
- In 200 years, the U.S. has lost 1/3 of its cropland topsoil, at a rate 10 times faster than topsoil is formed.
- With the loss of soil, its ability to buffer against environmental impacts is lost. Nutrients and contaminants are released into waterways.



"A nation that destroys its soils destroys itself."
-Franklin D. Roosevelt

Water infiltration instead of runoff.

- Compost reduces soil crusting (clay), which helps with water absorption and penetration into the soil. Recent research suggests that the addition of compost in sandy soils can facilitate moisture dispersion by allowing water to more readily move laterally from its point of application.



Onion Creek, 10/31/13



To view soil and water as separate is a mistake. Healthy, absorptive (hygroscopic) soil will capture and retain precipitation. Unhealthy soils are water-repelling (hydrophobic), and contribute to runoff.

Common sources of H₂O pollution:

- Nitrogen and Phosphorous from commercial fertilizers
- Bacteria and nutrients from animal manures
- Sediment from Earth-moving activities
- Storm runoff (rooftops, roads, parking lots, industrial sites)
- Emissions from power plants and heavy industries
- Faulty septic systems



Southface Energy Institute, Atlanta GA:

- Captures 100% of storm water generated on site.
- Reduced city-supplied potable water by 84%
- The captured water is absorbed by, and filtered through COMPOST!



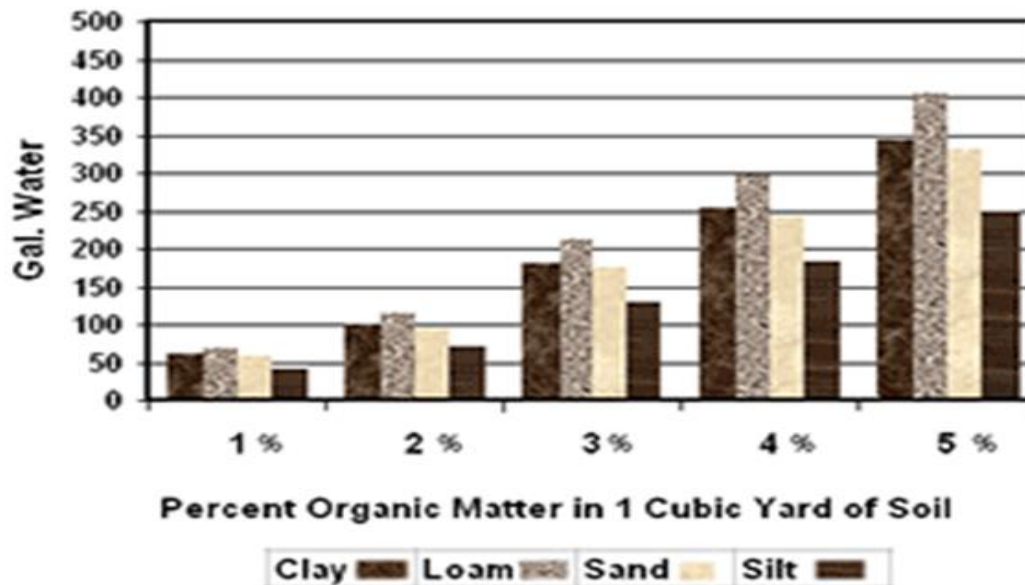
Purification.

- USDA concluded that compost filter socks removed:
 - 65% of clay
 - 66% of silt
 - 74% total coliform
 - 75% E. coli bacteria
 - 37-72% of Cd, Cu, Cr, Ni, Pb, Zn
 - 99% of diesel fuel
 - 84% of motor oil
 - 43% of gasoline
- Soils rich in organic matter store, degrade, and immobilize nitrates, phosphorous, pesticides, and other substances that become pollutants in air and water.



Strive for five!

As the organic material (OM) ratio increases, so does the water-holding capacity.



Compost on the lawn:

- A hypothetical landscape, using Scott and Wood's findings of 1% organic matter adding 16,500 gallons of plant available water for every acre down to one foot deep, would yield the following results:

Under Stage 2 restrictions, an AWU customer can water 1" per week on his 2500 square foot lawn.

He will use **1558** gallons per week.

If the customer had tilled in 1" of aged compost with 60% organic matter (OM), the compost alone would be able to absorb and hold **1134 extra** gallons of water. Infiltration would increase, runoff would decrease, and we'd approach that 7.03" per hour infiltration rate.

Studies show:

- Texas A&M's "Austin Area Fertilizer Impacts" study concluded:
- "grass treated with organic fertilizer was denser and more attractive than those treated with inorganic fertilizer". (Dillo Dirt)
- "Organic fertilizers low in phosphorous and potassium are the best choices for Central Texas"
- "All fertilizers except for the surface application of Dillo Dirt had average leachate concentrations above the drinking water standard... Dillo Dirt is the only fertilizer application with leachate below the aquatic life standard"



Why doesn't Texas A&M recommend topdressing with compost?

“Currently, the view of our turf faculty is that application of compost as a top dressing is not practical from a homeowner/home lawn standpoint because it is labor intensive and many homeowners are wanting a ‘low labor input’ lawn these days. “



Compost wears lots of hats

Compost absorbs water and gives it back to plants

Compost mitigates soil temperature fluctuations, and reduces evaporation—think finely-ground mulch.

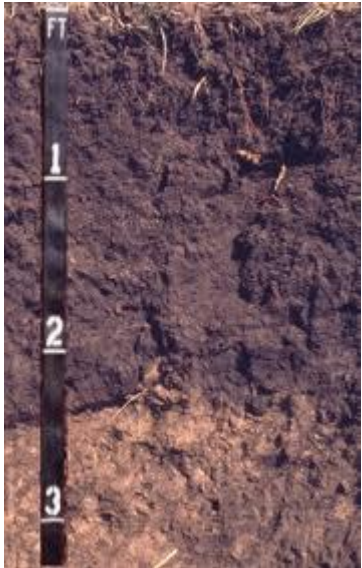
Compost is a *complete* fertilizer, enhancing overall turgor and dehydration avoidance mechanisms like waxy cuticle formation and stomatal closure



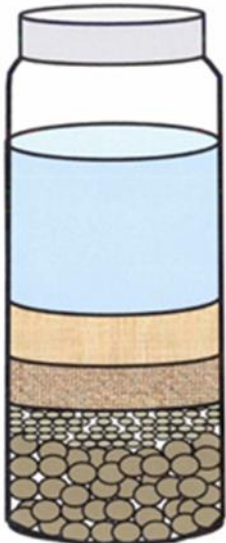
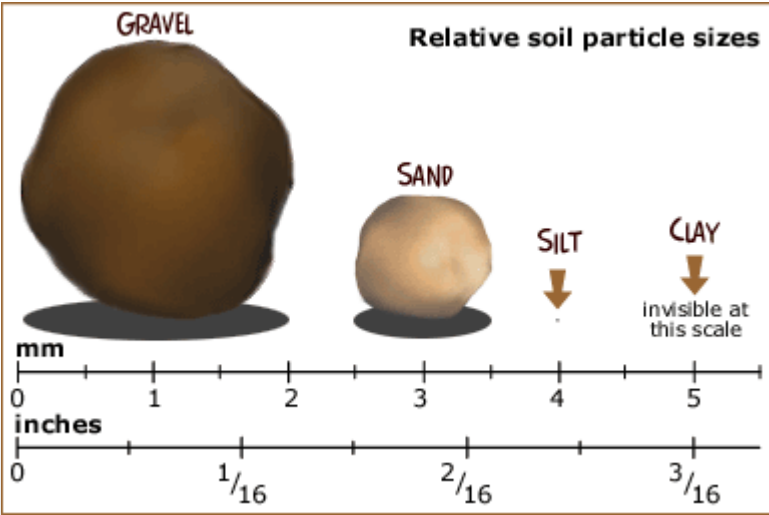
What soil type(s) typify Austin?



West, thin clay, bedrock



East-"gumbo" (mollisols)



"Jar Test"

- Clay layer – water clears
- Silt layer – 2 hours
- Sand layers – 1 minute

Evaluation of 60-Day Drought Survival in San Antonio of Established Turfgrass Species and Cultivars (2006 & 2007).

- “All grasses survived the 60 day drought, in both years, when planted on the native agricultural soil, without restriction to rooting depth.”
- “Shallow soils (less than 4” deep) contribute to an inability of turfgrasses to survive extended drought”
- Dr. David Chalmers says; “If more people could just handle that grass can be a little tan in summer, it takes the pressure off to keep watering. The grass will be fine!”



COA 601S.3 Materials

- The city mandates the use of 6” of quality topsoil for permitted new construction. No products are specified, however, and unless an inspector thinks he or she sees “Red Death,” there is no inspection of topsoil. “A lot of guys get the cheap Red Death, and throw down sod on top before anyone sees it.”

-Environmental Inspector, COA

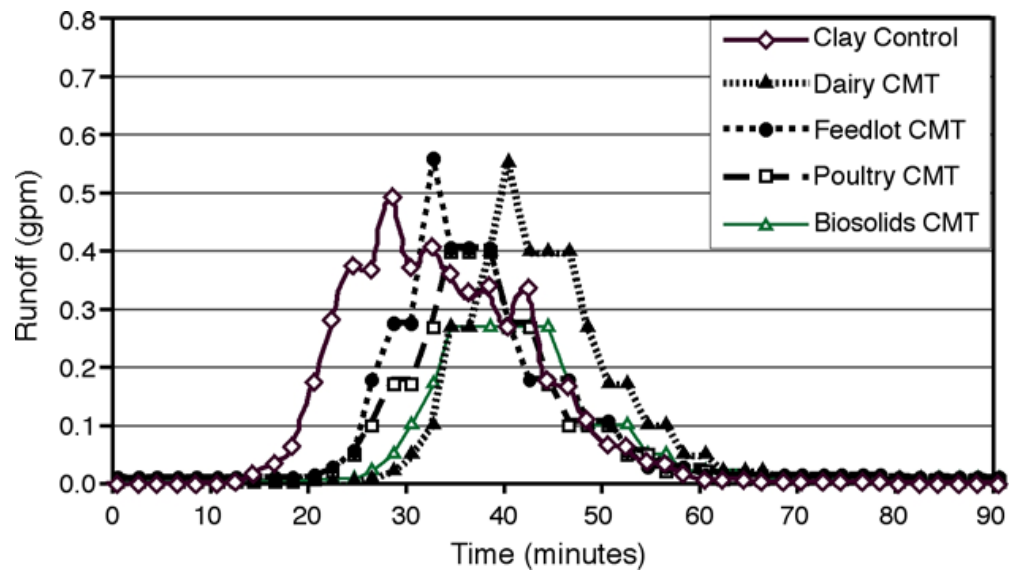
We need to learn about healthy soils—replete with organic matter—which reflect Austin’s water-saving needs, prevent catastrophic flooding, and that don’t pollute our waterways!



To consider...

- Well-founded concerns exist with regard to nitrogen and phosphorous runoff when applying any fertilizer or compost; an effort to ensure proper C:N ratio is important.
- University of Texas's "Characteristics of Compost: Moisture Holding and Water Quality Improvements" study showed that runoff was delayed for **15 minutes** when compost was applied.

"Onion Creek rose 11 feet in **15 minutes** and crested at a record 41 feet, sending walls of water into surrounding neighborhoods. The previous record for Onion Creek, set in 1869 and again in 1921, was 38 feet"
-USA Today, Nov 7th, 2013





**US Composting
Council**

***Seal of Testing
Assurance***[®]

Garden-Ville

Rejuvenator

Invigorator

Eco-Thrive

Coastal-Gro

Superior Soil

Lawn & Garden Soil

*Whittlesey Landscape Supplies

*LETCO

*Austin Water Utility (Dillo Dirt)

*New Earth

Healthy, breathing soil.

Secrets of the successful Central Texas Gardener!

- Generous amounts of compost
- Haydite (Expanded Shale)
- Scoria Lava Rock
- Texas Greensand
- Decomposed Granite
- Basalt
- Hydretain®
- Mycorrhizal fungi
- Liquid Seaweed

Unlock the soil.
Save water.
Enjoy your garden.



Thank You!

References:

- 1) Scott, H.D., L.S. Wood, and W.M. Miley.1986. *Long-term effects of tillage on the retention and transport of soil water*. Arkansas Water Resources Research Center. Publication Number 125. 39 p.24.
- 2) Sullivan, P. 2002. *Drought Resistant Soil*. National Sustainable Agriculture Information Service
- 3) Faucette et al., 2006. *Vegatation and Soil Quailty Effects from Hydroseed and Compost Blankets*, Journal of Soil and Water Conservation, 61:6: 355-362
- 4) Gould, M.C. 2012. *Compost Increases the Water Holding Capacity of Droughty Soils*. Michigan State University Extension, Drought Resources.
- 5) Mullarkey, Nora. Presentation *Landscape Professionals Day*, City of Austin, 2012
- 6) TXDOT. *Use of Compost and Shredded Wood on Rights of Way*, 2003
- 5) Heilman, J.L., McInnes, K.J., Kjelgaard, J.B., Owens, M.K., Schwinning, S. 2009. *Energy Balance and Water Use in a Subtropical Karst Woodland on the Edwards Plateau, Texas*. Journal of Hydrology, 426-435
- 7) Turner, M. 2003. *Austin Area Fertilizer Impacts*. City of Austin Watershed Protection and Development Review Department, Environmental Resource Management Division, Water Resources Evaluation Section,. http://www.ci.austin.tx.us/watershed/publications/files/sr0307_fertilizerimpact.pdf
- 8) Shay, K. *Texas A&M Recommends Dramatic Changes in Lawn Fertilization Practices*. 2003. Water Lines, Vol. 3, Number 1
- 9) Sherman, R. 2003, *Texas Transportation Dept. Accelerates Highway Use of Compost*. BioCycle, July, p.25.

Interviews:

- Russell Lewis, Environmental Inspections Program Coordinator
- Joan Balogh, Senior Scientist at Watershed Protection, October 2012
- Alexander Duncan, Environmental Scientist at Watershed Protection, October 2012
- Jody Slagle, Senior Engineer at AWU-Hornsby Bend, October 2012
- Jaqui Peterson, Professor of Soil and Crop Sciences, Texas A&M University
- Al Rattie, Marketing Director U.S. Composting Council
- Kevin Anderson-Env. Program Coordinator, Hornsby Bend, September, 2012
- Dean Minchillo, Conservation Program Manager, Tarrant Co. Water, November, 2012
- Brandy Honeycutt, Soil Program Director, Denver Water
- Ron Alexander, Alexander and Associates