

Soil Savvy: A Key to Successful Western Gardens and Landscapes

*Foothills Rotary Club
February 27, 2018*

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Front Range Soil Savvy

8 Major *Soil Savvy* Points in 20 minutes

A pdf handout of my slides is available

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Front Range Soil Savvy -- 8 points

1. The most common inciting factor to unhealthy plants in Colorado landscapes is the condition of the soil

>80% of all plant problems are related to soil conditions

And yet the soil is the resource we usually know the least about

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Soil: The fundamental component of any landscape

- Crucial to plant health:
 - Supplies the 14 necessary nutrients (C, H, O from the air and water)
 - Supplies water
 - Supplies O₂ needed for root metabolic processes

Roots need oxygen as much as they need water

Plant health is fundamentally dependent on soil health....

If the soil isn't healthy, the plants won't be either!



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Soil: The fundamental component of any landscape

- Crucial to plant health:

We need to know as much about our soils as we do about our plants!

Manage for a healthy soil and then healthy plants will follow

If the soil isn't healthy, the plants won't be either!



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Front Range Soil Savvy

1. The most common inciting factor to unhealthy plants in Colorado landscapes is the condition of the soil
2. **We live in a semi-arid climate, and our soils are different than soils in a wetter climate.**
Much of what you learned in Iowa won't help you here!

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Soils in dry climates are different:
we have to manage them differently

- Soils formed in semi-arid and arid climates:
 - Usually high pH (alkaline, pH>7)
Makes some nutrients in the soil less plant-available (Fe, P, Zn, Mn, B)
 - Often calcareous (contains free lime, CaCO₃)
keeps the pH high
 - Naturally low organic matter
 - Often high clay content along the Front Range

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Soils in Semi-arid climates:
we have to manage them differently

Add in our highly variable climate, and we have some real challenges trying to grow plants!

This can happen in the spring too!

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3. **Urban/landscape soils aren't "real" soils**

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Undisturbed Native Grassland Soil

- ✓ Takes thousands of years to form (*co-evolves with the plant community*)
- ✓ Develop horizons (layers)
- ✓ Well aggregated, aerated
- ✓ Full of life: plant roots, microbes, etc.
- ✓ A living, self-sustaining ecosystem (*no need to fertilize, irrigate or mow the prairie!*)

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<p>Undisturbed Native Soil</p> <p>A living, self-sustaining system, thousands of years to develop</p>	<p>Compacted, Unamended Urban "soil"</p> <p>"Dead dirt", needs help we expect our plants to live in this!</p>
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- ✓ Mixed horizons
- ✓ Loss of OM
- ✓ **Compaction**/loss of structure & porosity
- ✓ Poor aeration & water infiltration
- ✓ Few active organisms

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<p>Undisturbed Native Soil</p>	<p>Compacted, Unamended Urban "soil"</p>
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Compaction is the #1 problem in urban/landscape soils

- Poor aeration
- Poor water infiltration into the soil
- Poor water percolation through the soil
- **Stunted** rooting volumes/shallower rooting depth

Roots won't go into compacted soil (low O₂) even when moisture is good

Learn how to deal with compaction

- recognize it
- reduce existing compaction
- avoid making it worse

See GardenNote #215 "Soil Compaction" for ideas on reducing soil compaction at www.cmg.colostate.edu

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4. **Too much of a good thing ceases to be a good thing.**

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Over-fertilizing

A common problem in landscapes

- Adding fertilizer when none was needed
- Adding lots of fertilizer when a little was needed
 - Plants won't use more than they need
 - Just adding excess salt to the soil—salinity issues
 - Nutrient imbalances (ex. excess plant-available P can interfere with iron uptake and induce iron chlorosis)
 - Pollution issues
 - nitrate leaching into the ground water
 - phosphorus in surface runoff contributes to algal blooms in surface waters (eutrophication)





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Over-amending (with compost)

A common problem, especially in veg. gardens


- Adding **WAY** too much compost or other organic amendment
 - salinity buildup
 - excessive plant-available nutrients
 - nutrient imbalances
 - pollution





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Soil Test: Organic Matter Content

Do I need to add any compost?

5% = High *Vegetables, fruits, many flowers* 

3% = Moderate *Adequate for most landscape plants* 

<2% = LOW* *Many natives/xerics prefer* 

*Native soils: <2%

**Match type of plant you want to grow...
With the soil O.M. content the plant prefers**

Do some research on plant preferences

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Soil Test: Organic Matter Content

5% = High *Vegetables, fruits, many flowers*

3% = Moderate *Adequate for most landscape plants*

<2% = LOW* *Many natives/xerics prefer*

*Native soils: <2%

You don't ever need to raise soil O.M. higher than ~5%
 To build up soil OM content, add small amounts of OM each year (1-2" depth), tilled 6-8" into the soil, rather than large amounts all at once.
 CSU Extension

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5. **Use soil testing as a landscape management tool.**

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Why Have Your Soil Tested?

- It's the best way to check the growing potential of your garden/landscape.
 - Takes the guess-work out of decision making
 - **Add fertilizer?** (are each of the necessary plant-available nutrients deficient, sufficient, or excessive)
 - **Add compost?** (is soil OM deficient, sufficient or excessive for the plants you want to grow)
 - **How do I irrigate properly?**
 - soil texture and OM content drive irrigation strategy



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Why Have Your Soil Tested?

- Other soil properties
 - Salinity problems?
 - Soil pH acceptable for the plants you want to grow?
- CSU Soil Testing Lab sample bottles are available today (instructions and submission form are inside)

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Soil Testing: A Tool for Making Management Decisions

- **Before** you purchase plants, install irrigation system, develop irrigation strategy, or add amendments & fertilizers....
- Get a soil test to determine basic soil properties
- Know what you're working with before making decisions on plant type, irrigation, adding amendments or fertilizers, etc.

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6. **Improper irrigation is a major cause of Colorado landscape plant problems.**

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Front Range Soil Savvy

6. **Improper irrigation is a major cause of Colorado landscape plant problems.**



Tony Koski, CSU Turf Expert: "Improper irrigation is the major underlying cause of weed, insect and disease problems in turfgrass"



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Irrigation design and strategy

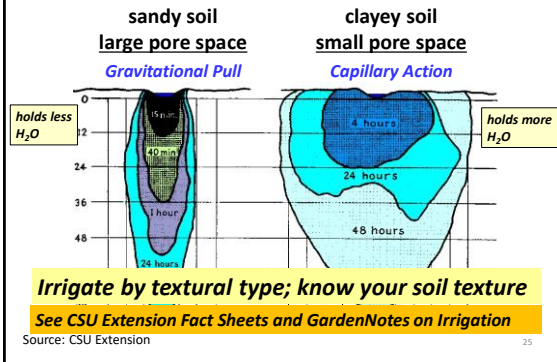
How you irrigate HUGELY influences soil/plant health

Goals:

- Keep the primary root zone well hydrated and well aerated
- Water as infrequently as possible (need time for gravity to move water out of pores and air recharge)
- Take into account the moisture preferences of your plants (xeric vs water hog)

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Soil texture influences water movement



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 5. Use soil testing as a landscape management tool.
 6. Improper irrigation is the major cause of Colorado landscape plant problems.
 7. Plant natives/xeric plants whenever possible
 - Better adapted to high pH/high lime, low OM soils, and the dry & variable climate
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Landscape plants with high susceptibility to iron chlorosis due to high soil pH

- Trees
 - Amur, silver & red maples, Aspen, Beech, Birch, Crabapple, Douglas fir, Honeylocust, Horse chestnut, Juniper, Linden, Magnolia, Mountain Ash, N. Red Oak, Pin Oak, Pine, Spruce
- Shrubs
 - Azaleas, Cotoneaster, Rhododendron, Spirea,
- Fruits
 - Apple, Cherry, Peach, Pear, Raspberry, Grapes
- Ornamentals that evolved in wetter climates

source: CSU GardenNotes 223 Iron Chlorosis

Soils with high pH and Lime Content

Alternative: Select plants that are less susceptible to iron chlorosis & better adapted to our soil properties:

- Fact sheet #7.229 "Xeriscaping: Trees & Shrubs"
- Fact sheet #7.230 "Xeriscaping: Ground Cover Plants"
- Fact sheet #7.231 "Xeriscaping: Garden Flowers"
- Fact sheet #7.233 "Wildflowers in Colorado"
- Fact sheet #7.242 "Native Herbaceous Perennials for Colorado Landscapes"
- Fact sheet #7.421 "Native Trees for Colorado Landscapes"
- Fact sheet #7.422 "Native Shrubs for Colorado Landscapes"

Also Plant Select and High Country Gardens websites

8. Check out CSU Extension Fact Sheets and Garden Notes for info on plants, soil, irrigation, etc.

CSU Extension GardenNotes and Fact Sheets

www.cmg.colostate.edu

- Soil, Soil Amendments, Fertilizers, Mulches
- Irrigation
- Vegetable/Fruit Gardening
- Container Gardening
- Trees, shrubs, ornamentals
- Natives, xeric plants
- Diseases, weeds, insects

Fact Sheet 7.244 Colorado Mountain Gardening Basics

Fact Sheet 7.220 Colorado Gardening: Challenge to Newcomers