Soils and Soil Preparation

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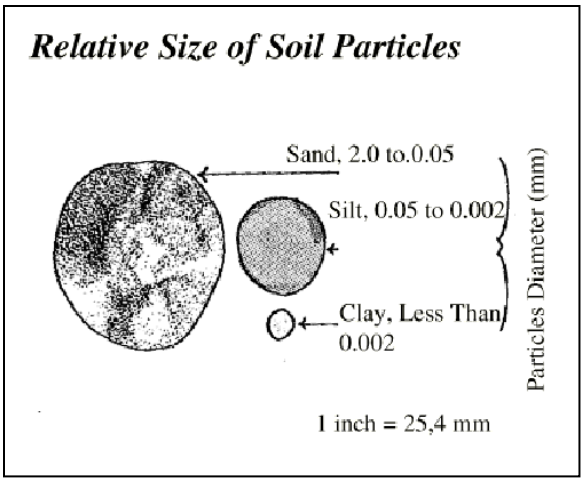
What is Soil?

- Mineral Portion (45%): Sand, Silt , and Clay
- Organic portion (5%): organic matter and humus
- Air (25%): Oxygen, carbon dioxide, other gases
- Water (25%)
- Living Organisms: Macro/Micro



Soil Formation Factors

- Parent Materials
- Time
- Topography
- Climate
- Organisms

Soil Texture

- Relative percentages of sand silt and clay
- Texture largely determines water holding capacity hence irrigation frequency
- Clay particles have a tremendous surface area
- Not easy to manipulate soil texture by adding another soil type
- Texture by feel – do this at home to determine your soil texture

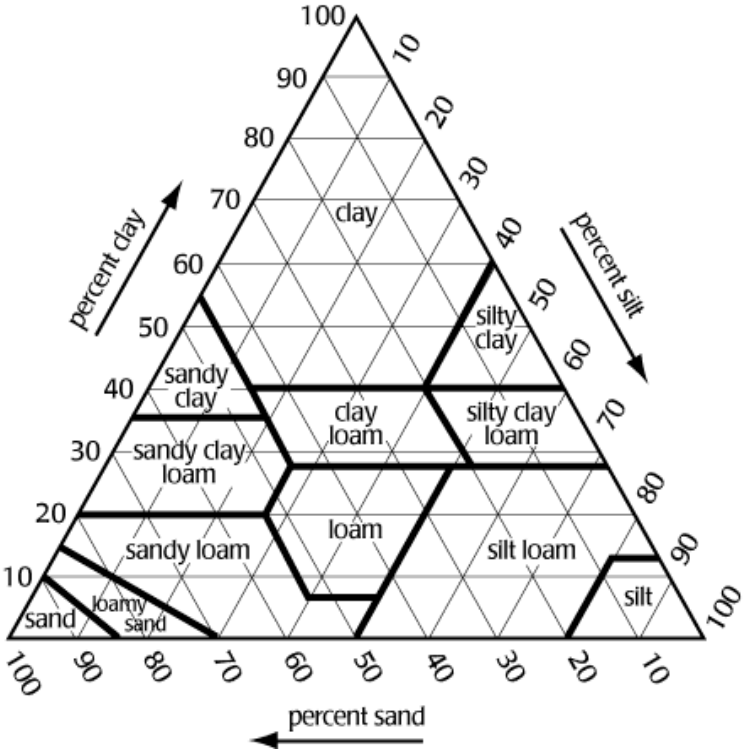
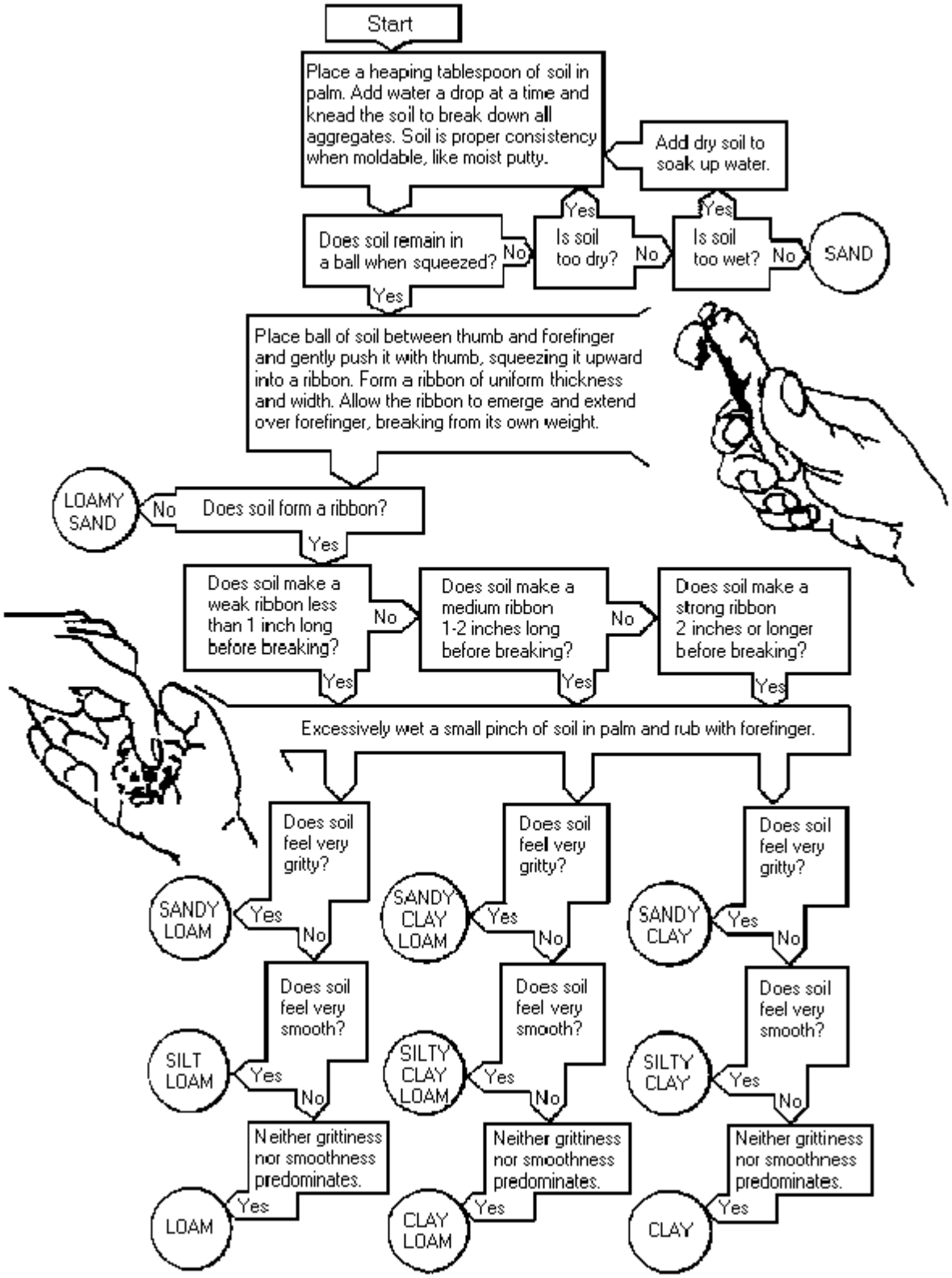


Figure 1. Soil textural triangle used to determine soil textural class.

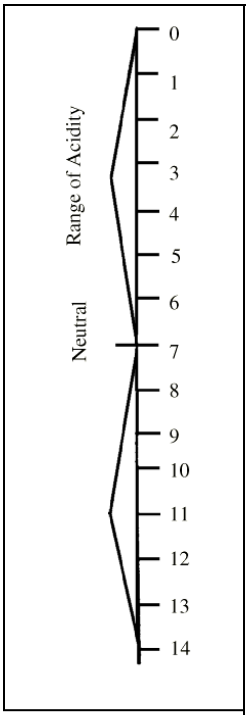
Soil Texture By Feel

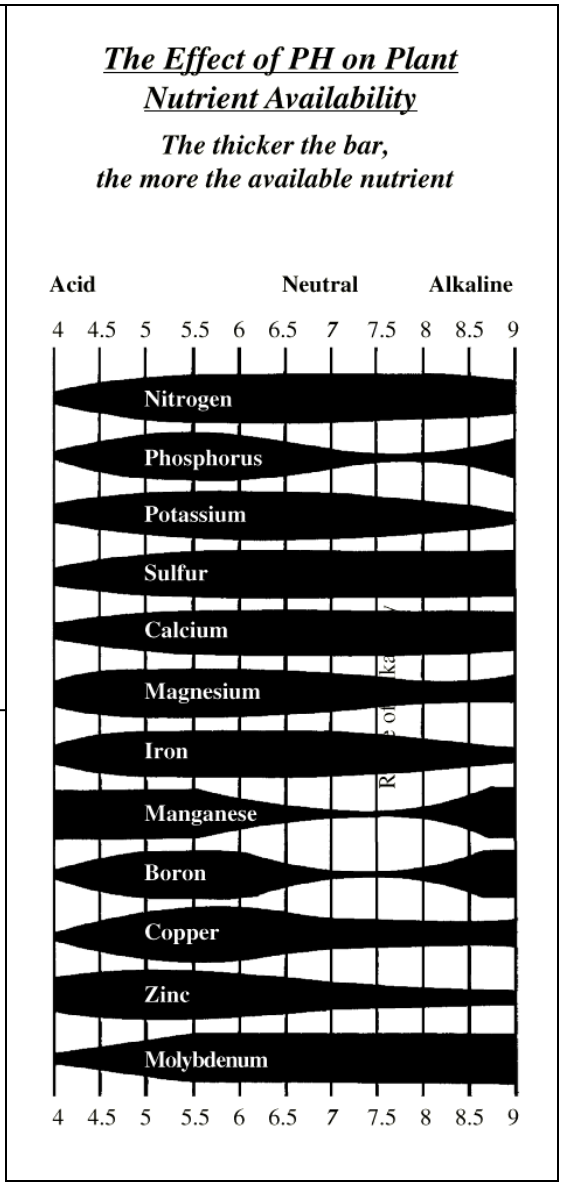
Follow the simple instructions on this page to estimate soil texture by feel. Once experienced, this method gives accurate and repeatable results. It is best to pass soil through a 2 mm sieve prior to starting the procedure. (Adapted with permission; originally published in Thien, Steve, "A flow diagram for teaching texture-by-feel analysis," *Journal of Agronomic Education*, 1979, vol. 8, pp. 54-55.)



Soil Alkalinity (pH)

- pH scale goes from 0-14
- pH 7 is neutral
- 0 to below 7 is acidic
- above 7 to 14 is alkaline
- pH affects nutrient availability
- Additions of organic matter and/or sulfur can lower pH to a small extent





Essential Plant Nutrients

- Macronutrients
  - Carbon
  - Oxygen
  - Hydrogen
  - Nitrogen
  - Phosphorus
  - Potassium
  - Calcium
  - Magnesium
  - Sulfur
- Micronutrients
  - Iron
  - Copper
  - Zinc
  - Manganese
  - Boron
  - Molybdenum
  - Chlorine
  - Nickel
  - Cobalt

Fertilizers

- Nitrogen is usually the most limiting nutrient for plant growth
- Phosphorus is usually the second most limiting nutrient for plant growth
- Iron is often deficient in alkaline soils
- Zinc can be limiting in some soils for some crops (fruit and nuts)
- Guaranteed Analysis (N-P-K)
- Organic fertilizers are not as readily available to plants, especially in cool weather

Soil Amendments

- Organic matter is usually all that is needed
- Composting is an excellent way to recycle organic wastes

Web Resources for Gardening and Landscaping

Arizona Master Gardener Manual (ag.arizona.edu/pubs/garden/mg/)
Yavapai County Cooperative Extension (ag.arizona.edu/yavapai/)
Backyard Gardener Newspaper Column (ag.arizona.edu/yavapai/anr/hort/byg/)