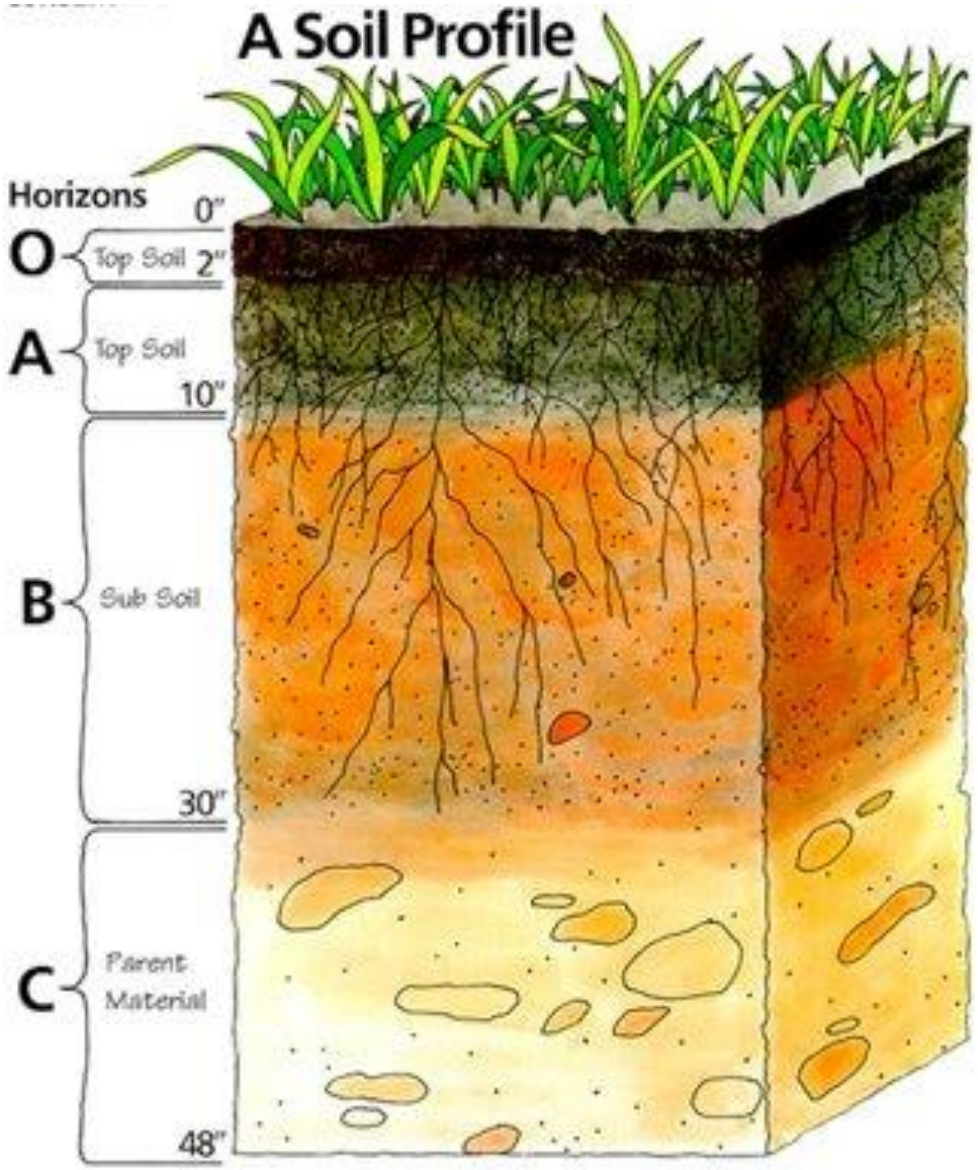
BASIC SOILS

ALEXIS SHEFFIELD

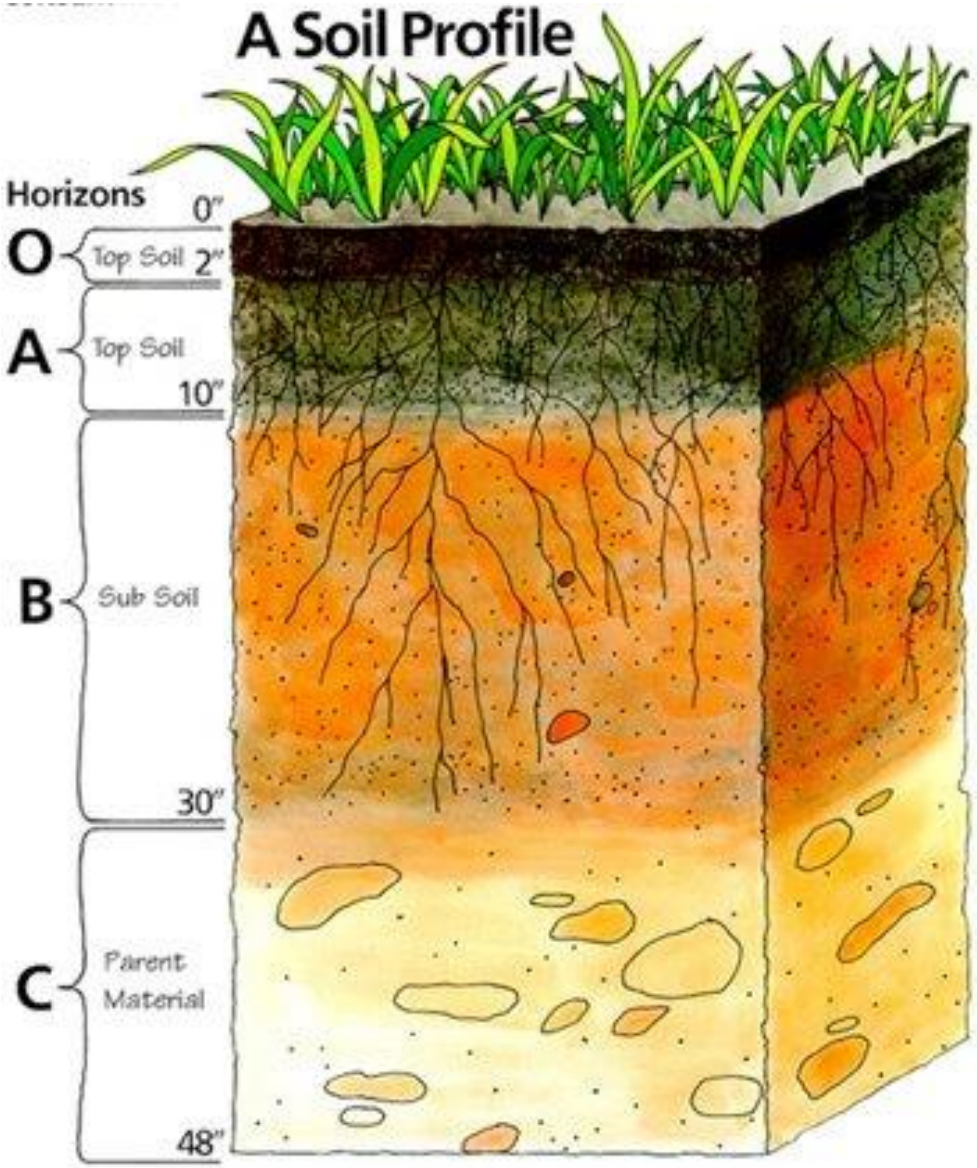
BOYLE CO. AGENT FOR HORTICULTURE



THE SOIL PROFILE

3 DISTINCT LAYERS

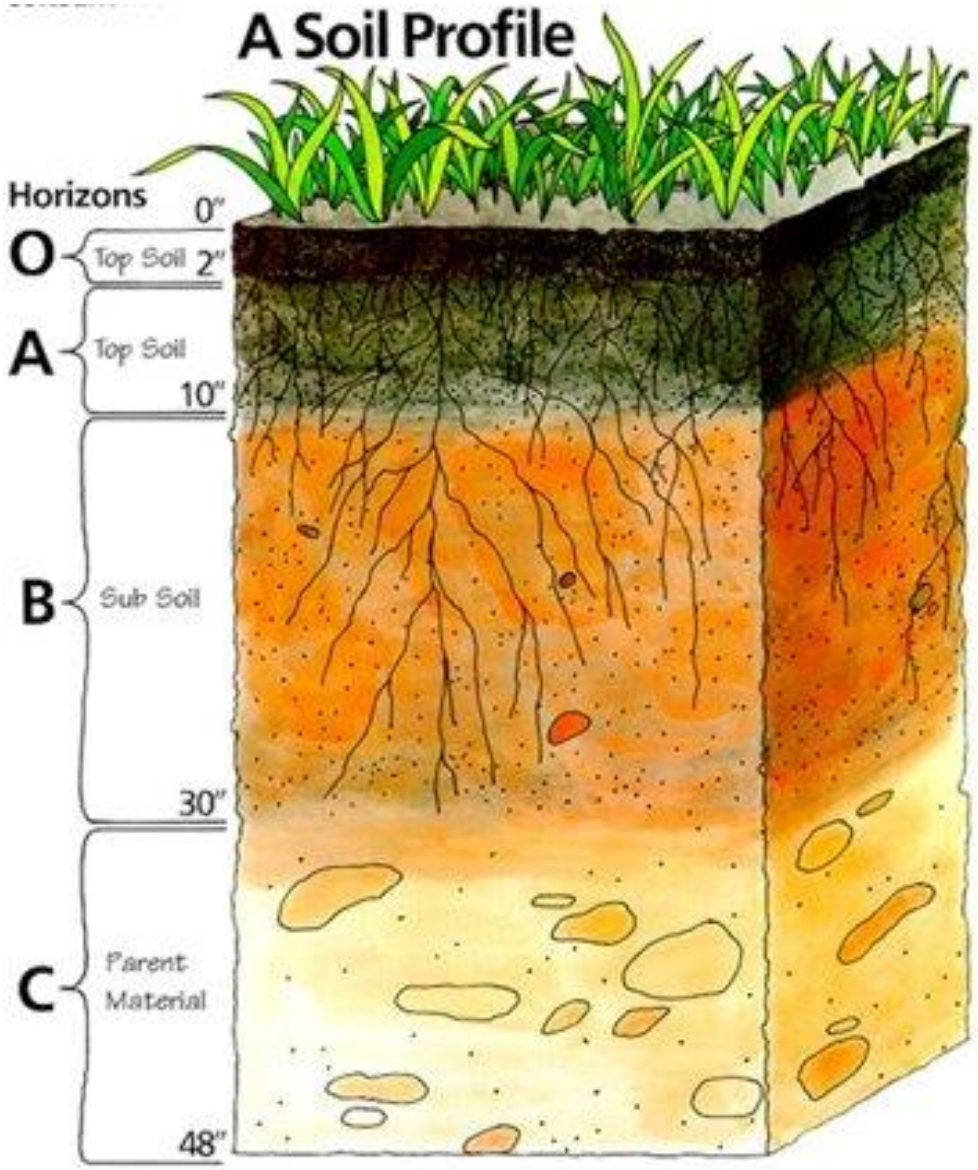
- A - TOP SOIL
- B - SUBSOIL
- C – PARENT MATERIAL



SOIL HORIZONS

A HORIZON

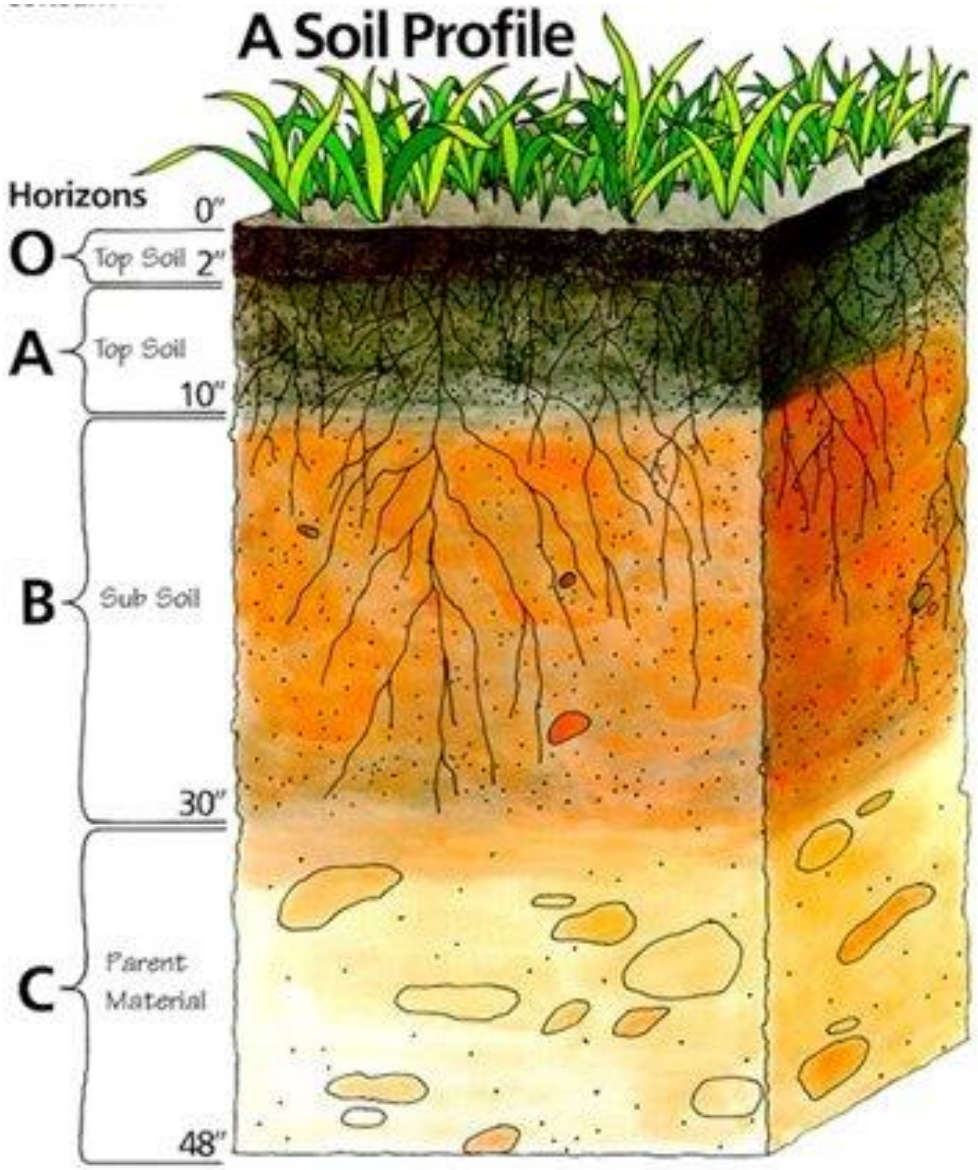
- "A" HORIZON USUALLY HAS THE COARSEST TEXTURE, IS MOST FERTILE, HAS THE MOST ROOTS, AND IS DARKEST IN COLOR
- HIGHEST IN OM
- PLANTS OBTAIN MUCH OF THEIR NUTRIENTS AND WATER



SOIL HORIZONS

B HORIZON

- "B" HORIZON IS FINER IN TEXTURE, LOWER IN ORGANIC MATTER, LOWER IN FERTILITY AND IS OFTEN EITHER RED, BROWN OR YELLOW IN COLOR.
- FIRMER, SERVES AS A RESERVOIR FOR STORAGE OF NUTRIENTS AND WATER FOR THE SURFACE SOIL
- REGULATES SOIL TEMPERATURE AND PROVIDES OXYGEN



SOIL HORIZONS

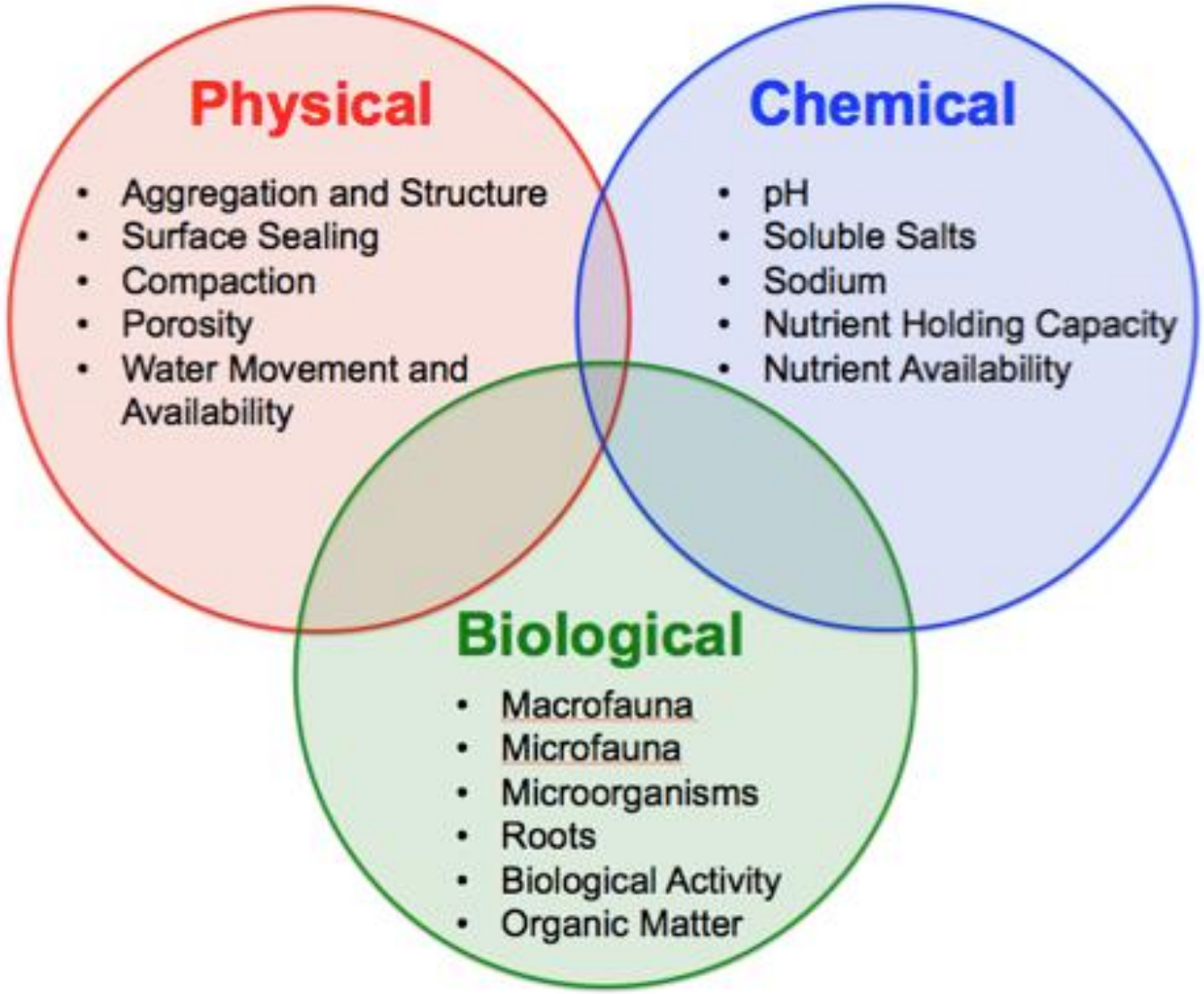
C HORIZON

- "C" HORIZON OR PARENT MATERIAL IS OFTEN A SOIL/ROCK MIXTURE OR DECOMPOSED ROCK, EVEN LOWER IN FERTILITY, AND USUALLY A LIGHTER SHADE OF THE "B" COLOR.

SOIL HORIZONS

PROPERTIES OF SOIL

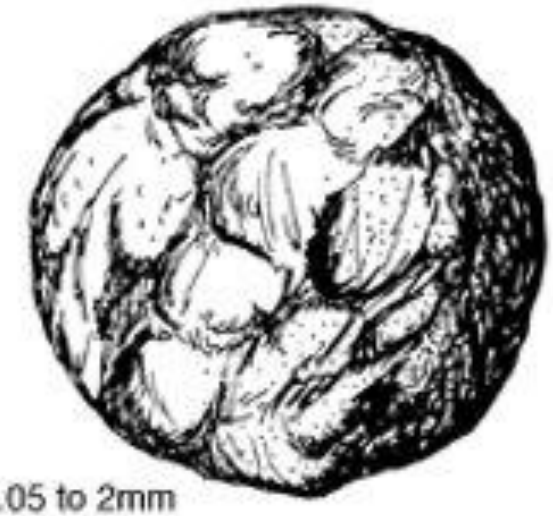
IMPORTANT TO PLANT GROWTH



TEXTURE

DETERMINED BY THE AMOUNT OF:

- SAND – LOOSE GRAINS
  - Basketball
- SILT – FLOUR LIKE, SMOOTH
  - Golf Ball
- CLAY- SLICK, STICKY WHEN WET
  - Lifesaver



Sand .05 to 2mm
feels gritty

Silt .002 to .05 mm
feels smooth

Clay <.002 mm
feels smooth

Sandy Soils

- Fast infiltration
- Fast leaching
- Low water holding
- Easily tilled
- Rapid spring warm up

Silty Soils

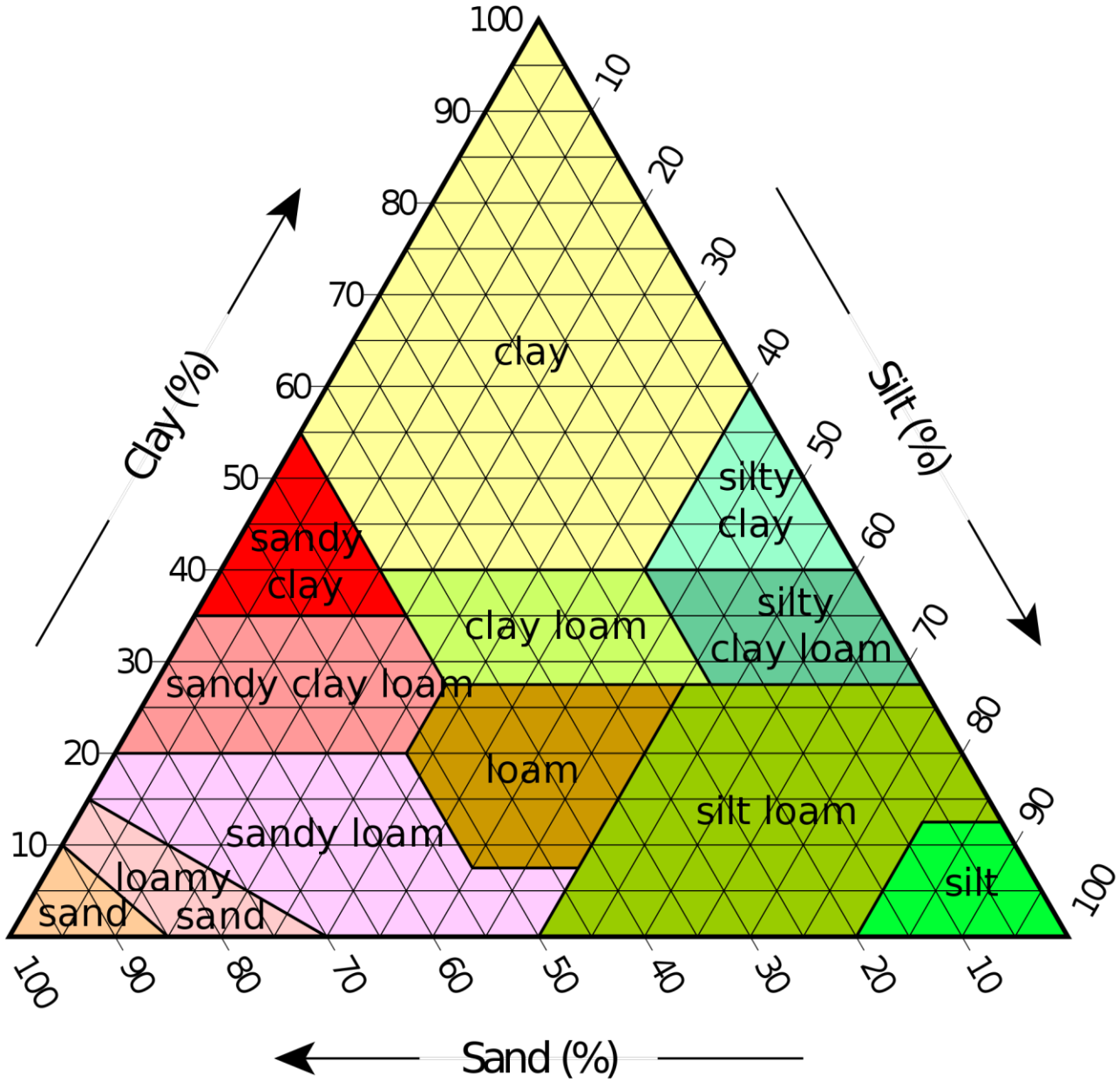
- Medium leaching & infiltration
- Medium water holding
- Easily tilled
- Medium spring warm up
- Surface crusting

Clay soils

- Slow infiltration and leaching
- High water holding capacity
- Can be hard to till
- Slow to warm in spring

LOAM

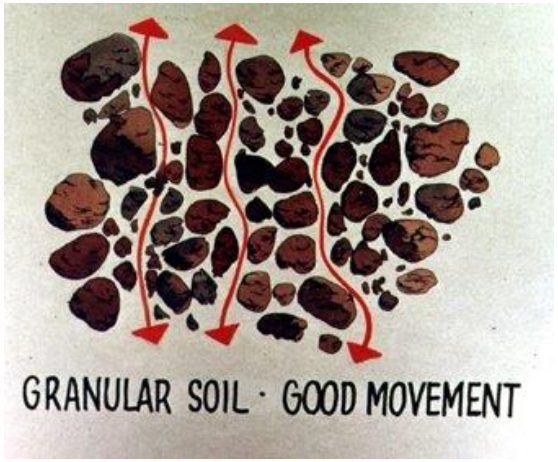
- A TEXTURAL CLASS DESCRIBING A "DESIRABLE" SOIL WITH MODERATE AMOUNTS OF SAND, SILT AND CLAY.
- MORE THAN 20 DIFFERENT SOIL CLASSES

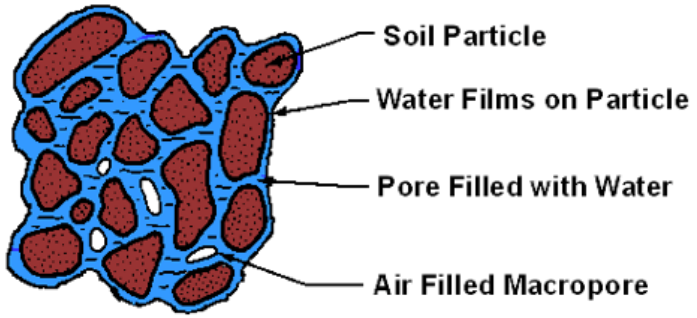


THE RIBBON TEST

HTTPS://WWW.DPI.NSW.GOV.AU/__DATA/ASSETS/PDF_FILE/0005/164615/DETERMINING_SOIL_TEXTURE_USING_-RIBBONING_TECHNIQUE.PDF

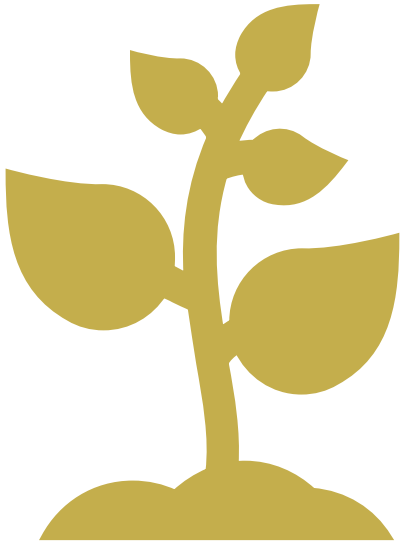
SOIL STRUCTURE





A schematic relationship between solids, liquids and air in the soil.

- PORE SPACE – SPACE BETWEEN SOIL PARTICLES
- PORE SPACE IS FILLED WITH AIR AND WATER
- ROOTS MOVE THROUGH THE PORE SPACES
- SOIL SOLUTION - THE LIQUID THAT FILLS THE PORES IN BETWEEN SOIL PARTICLES AND CONTAINS MOST OF THE IONS AVAILABLE FOR PLANT GROWTH

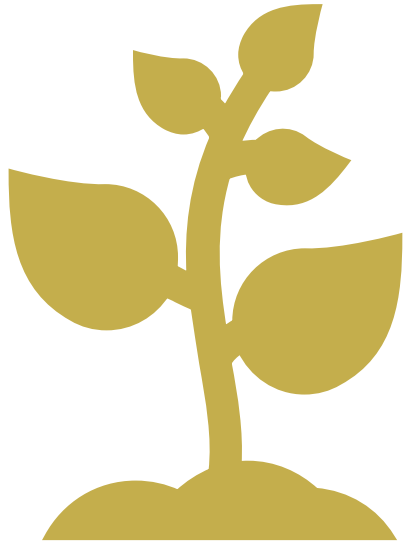


SOIL CHEMISTRY

- CATION EXCHANGE CAPACITY (CEC) IS THE SOIL'S NUMBER OF HOW MANY EXCHANGEABLE CATIONS IT CAN HOLD.
  - CEC is affected by types of clays and organic matter present.
  - Low CEC=Low OM (sandy soils, eroded soils, low clay)
- THE HIGHER THE CEC, THE MORE CATIONS THE SOIL CAN RETAIN.
  - The harder it is to change the pH
- CEC INCREASES WITH CLAY CONTENT AND ORGANIC MATTER.
- SANDY SOILS HAVE LOW CEC'S WHILE CLAY SOILS HAVE HIGH CEC'S

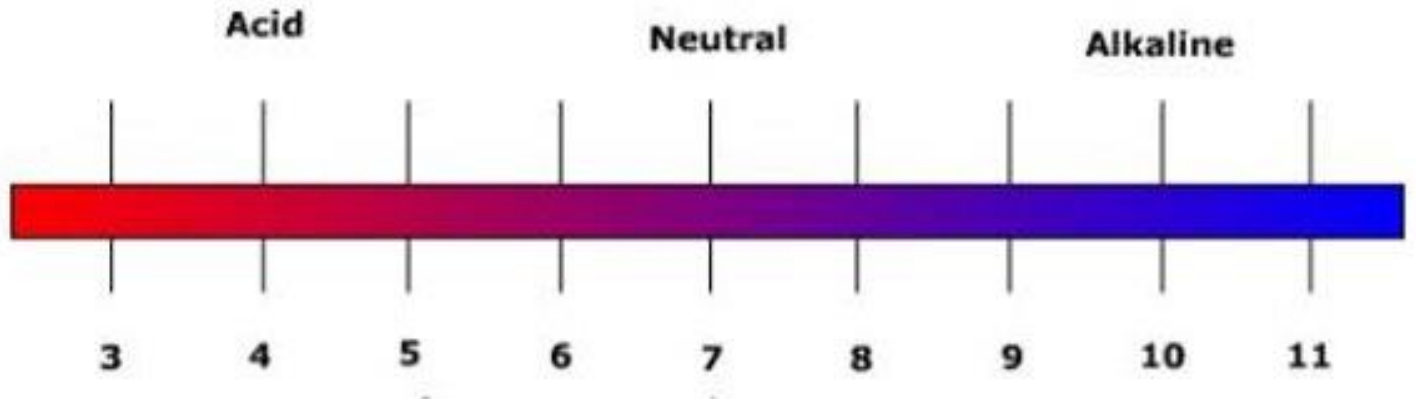
WHY IS THIS IMPORTANT?

- A LARGE CEC INDICATES A SOIL WITH A HIGH NUTRIENT HOLDING CAPACITY.
- THESE SOILS CAN RETAIN NUTRIENTS BETWEEN FERTILIZATION PERIODS.
- A HIGH CEC AIDS AGAINST NUTRIENT LEACHING
- PROVIDES A BUFFER FROM ABRUPT CHANGES IN SOIL SALTS AND PH.



SOIL PH

- MEASUREMENT OF H+ OR ACID-FORMING ION ACTIVITY OF THE SOIL.
- A MEASURE OF ACIDITY OR ALKALINITY
- THERE ARE 14 PH UNITS CENTERED AROUND NEUTRAL (7).
  - Below 7 = acidic soils (sour)
  - Above 7 = alkaline soils (sweet)

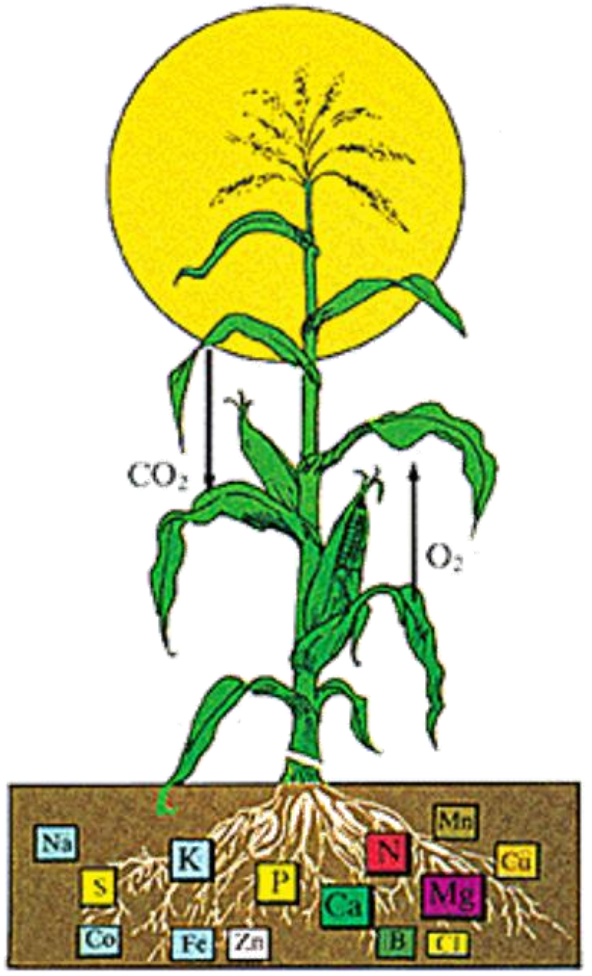


SOIL PH

- AFFECTS NUTRIENT AVAILABILITY
- ACID SOILS – CA, P, MG ARE "TIED UP" AND MN AND COPPER APPEAR IN TOXIC LEVELS
- ALKALINE SOILS – P, MN, FE AND OTHER IONS ARE NOT AVAILABLE
- Most plants like neutral to slightly acid but some will grow from pH 3.5 to 10.

N-P-K

- N – FOR LEAFY TOP GROWTH
- P – FOR ROOT AND FRUIT PRODUCTION
- K – FOR COLD HARDINESS, DISEASE RESISTANCE, WATER UPTAKE, AND GENERAL PLANT DURABILITY



N-P-K

- CONTAINER IS LABELED WITH 3 NUMBERS
  - N – P – K
- THESE NUMBERS ARE % BY WEIGHT OF N, P2O5, AND K2O.
- USUALLY REFERRED TO AS N, P, K

NUTRIENT MANAGEMENT TIPS

- HEAVY N FERTILIZATION BEFORE FLOWER ON TOMATOES WILL ENCOURAGE ALL VINES AND NO FRUIT.
- SLOW-RELEASE FERTILIZERS OR MANURE CAN CAUSE THIS PROBLEM AND PUSH FRUIT AND VEGETABLE PRODUCTION UNTIL LATE IN THE SEASON.
- KEEP SOILS PH AT LEVELS BETWEEN 6 & 7 WHEN APPROPRIATE.
- USE ORGANIC MATTER. SOIL MICROBES IN OM DECOMPOSE NUTRIENTS AND RELEASE IT INTO A PLANT USABLE FORM.
- BAND IN NUTRIENTS AT THE ROOT ZONE.
- GOOD WATERING PRACTICES WILL MAXIMIZE NUTRIENTS

YOUR TURN…

WHAT QUESTIONS DO YOU HAVE FOR ME?