The Barnegat Bay Soil Health Scorecard

Presented by,
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The History

- **Preservation and protection of the blue crab (Callinectus sapidus) as an important economical species both commercially and recreationally as well as an indicator of ecosystem health.**
- The "*Blue Card for the Blue Crab Program*" initiated locally by the OCSCD, with technical assistance from the NRCS, is designed to train specific target audiences to evaluate existing soil conditions utilizing easily measured indicators.

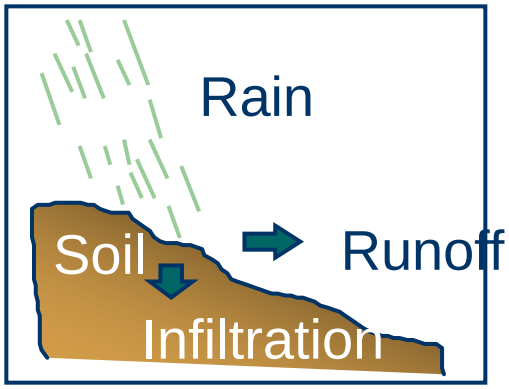
The Purpose of the Card

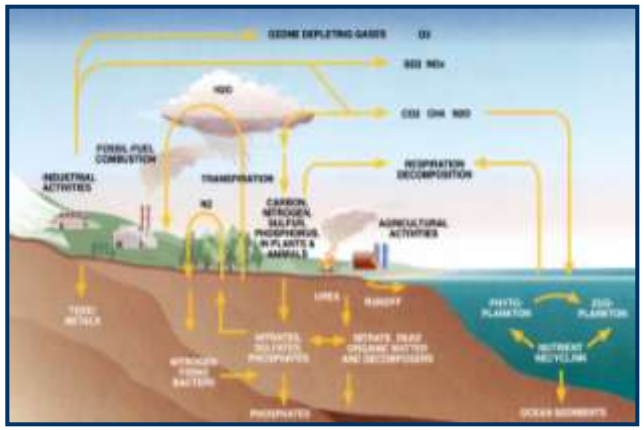
- **Provide an overview on the soil health concept**
- The Soil Health Card uses easily measurable indicators to give a “soil health overview.”
- **The Soil Health Card is not meant to provide specific data that may be necessary for proper soil evaluation, but is a guide.**

Soils Perform 5 Vital Functions

Sustaining plant and animal life below and above the surface

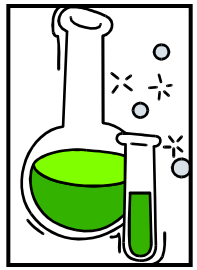
Regulating and partitioning water and solute flow





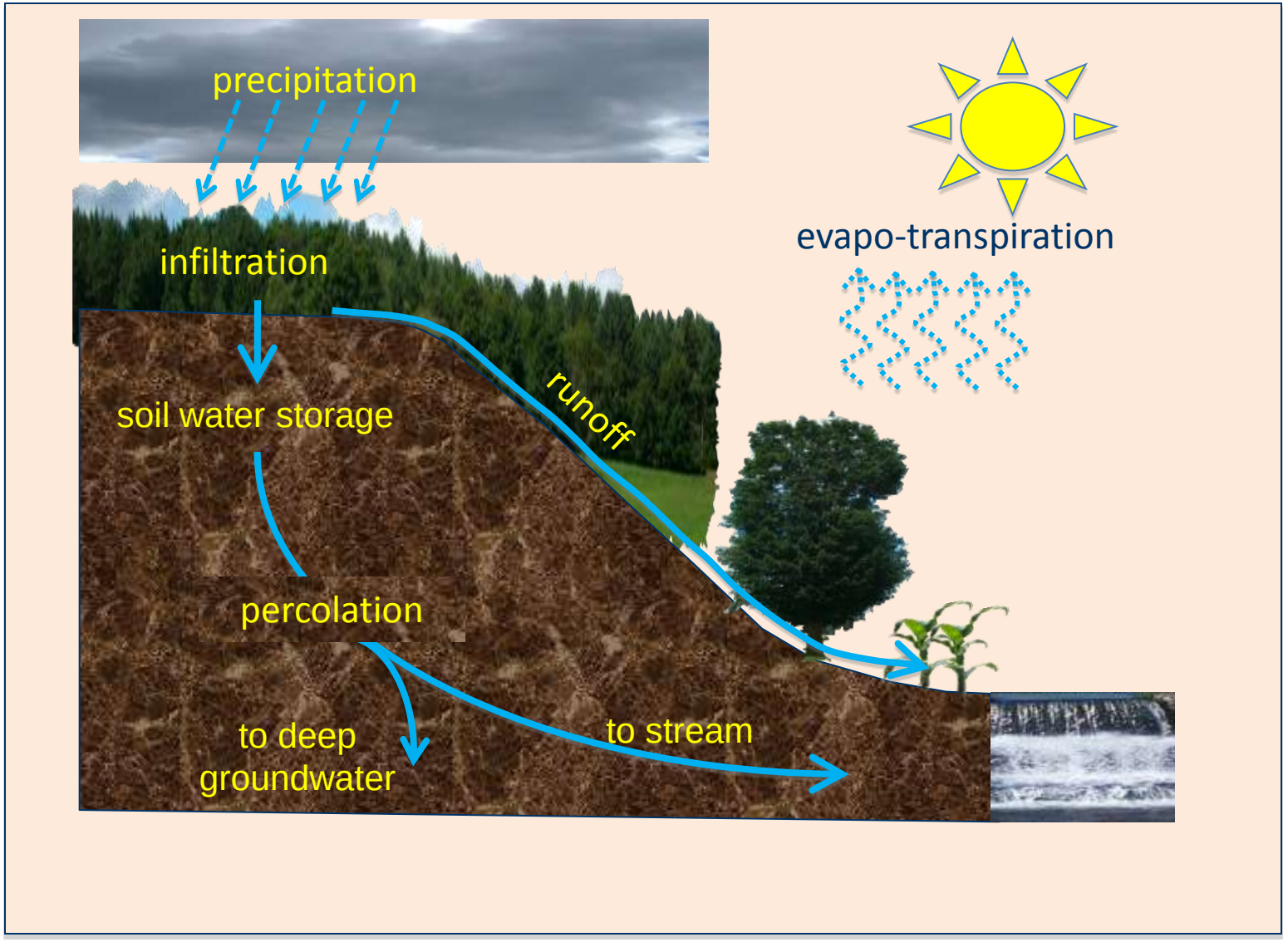
Filtering, buffering, degrading, immobilizing, and detoxifying

Storing and cycling nutrients



Providing support to structures

The Soil Water Cycle



Infiltration is key!

Infiltration

Water infiltration into soils occurs as a result of two forces:

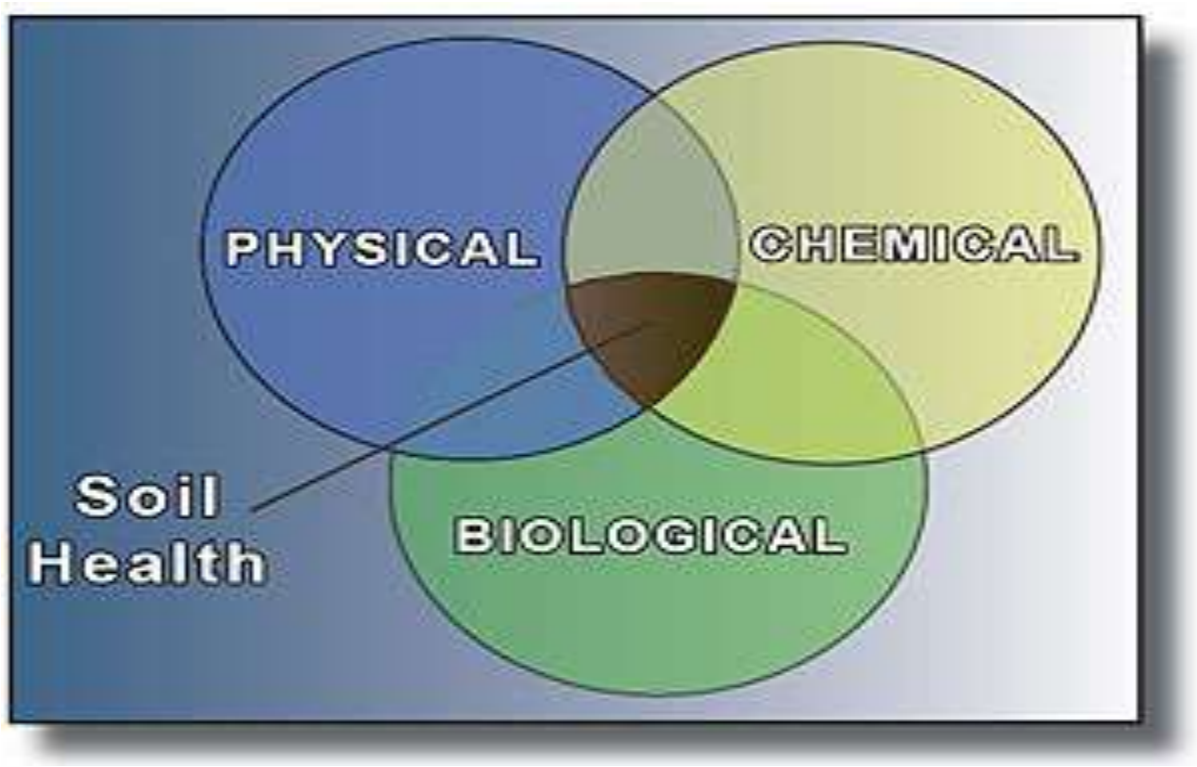
- gravitational force
- soil water tension force (related to soil dryness)

The gravitational force is constant in time. Soil dryness affects infiltration in that as the soil wets up, the infiltration rate decreases.

Factors Affecting Infiltration

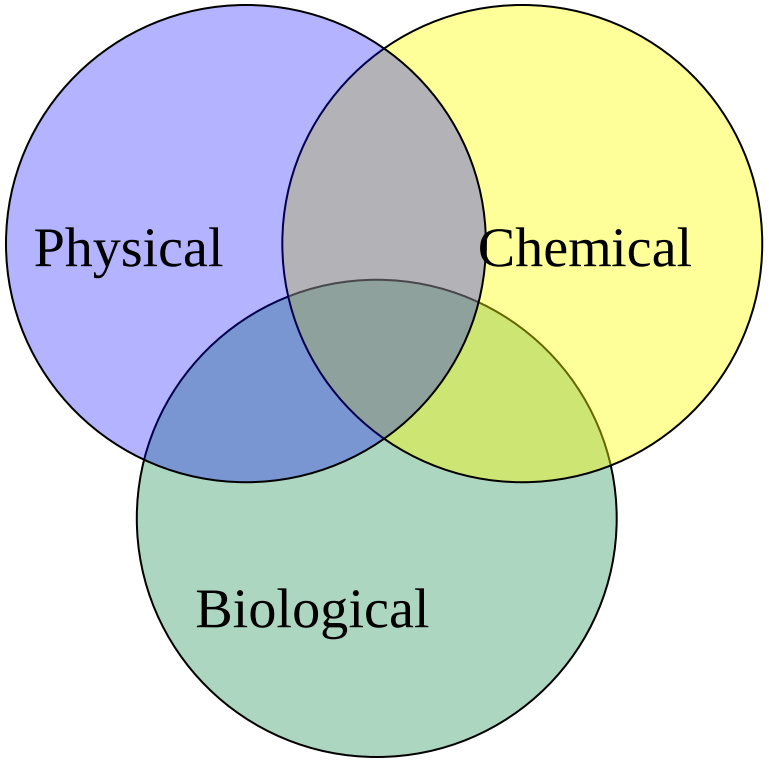
- Soil Type
- Aggregation/Crusting/Sealing
- Surface Storage Capacity
- Plant Canopies
- Surface Cover and Mulch
- Soil Freezing
- Hydrophobicity

Three Aspects of Soil Health



Soil Health and Physical Processes

- Physical support for plants
- Aeration
- Soil water storage and movement
- Resistance to soil erosion
- Physical root proliferation and organism movement



- Nutrient storage and release
- Soil reactions
- Energy (C) storage

- Pest suppression
- N mineralization
- OM decomposition
- Support of microbial community

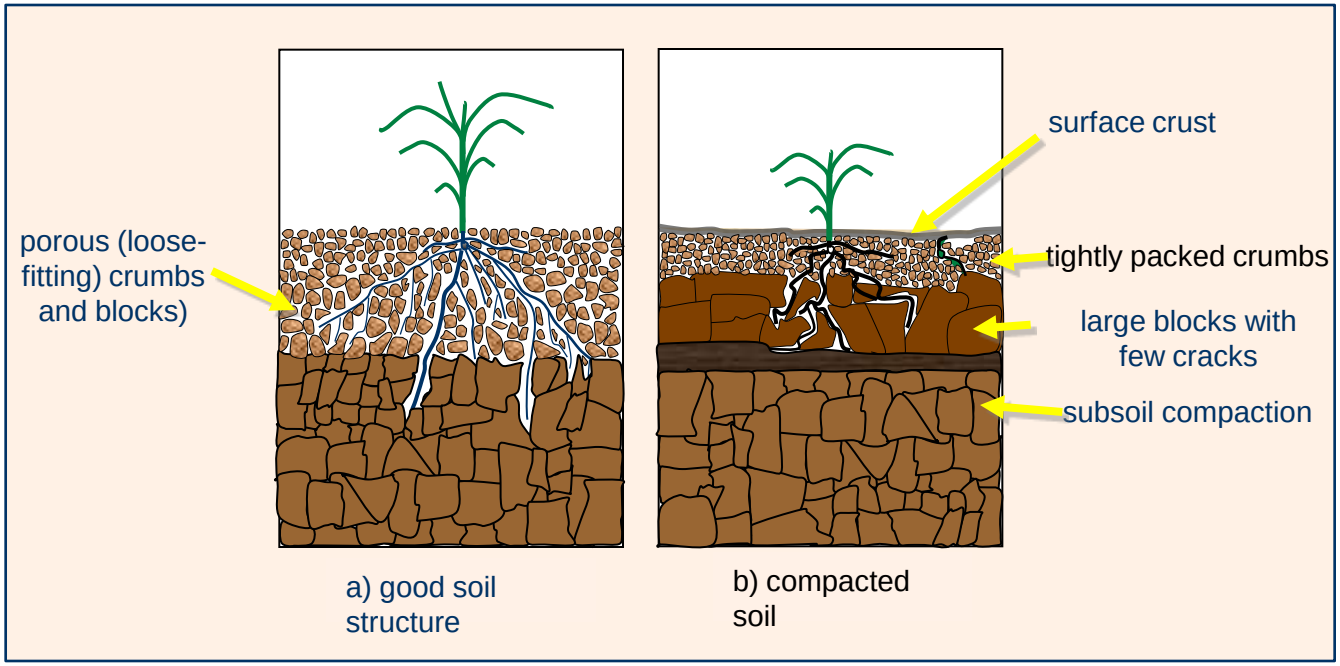
Examples of Physical Interactions

- **Hard soil reduces rooting**
- **Compacted soil suppresses beneficial biological processes**
- **Compaction increases root diseases and denitrification losses**
- **Organic matter decomposition increases aggregation**
- **Prolific rooting decreases compaction**
- **Poor drainage reduces rooting and aerobic biological processes**
- **High sodium contents reduce aggregate stability, drainage, aeration, and rooting**

Physical Components of the Card

- Surface Hardness/Soil Compaction- use wire flag to determine ease of penetration
- Soil Tilth- overall physical character of the soil (crumbly, hard, powdery) how does it break up?
- Erosion- observe rills, gullies, clear or cloudy runoff
- Drainage/Infiltration- how long does water stay ponded

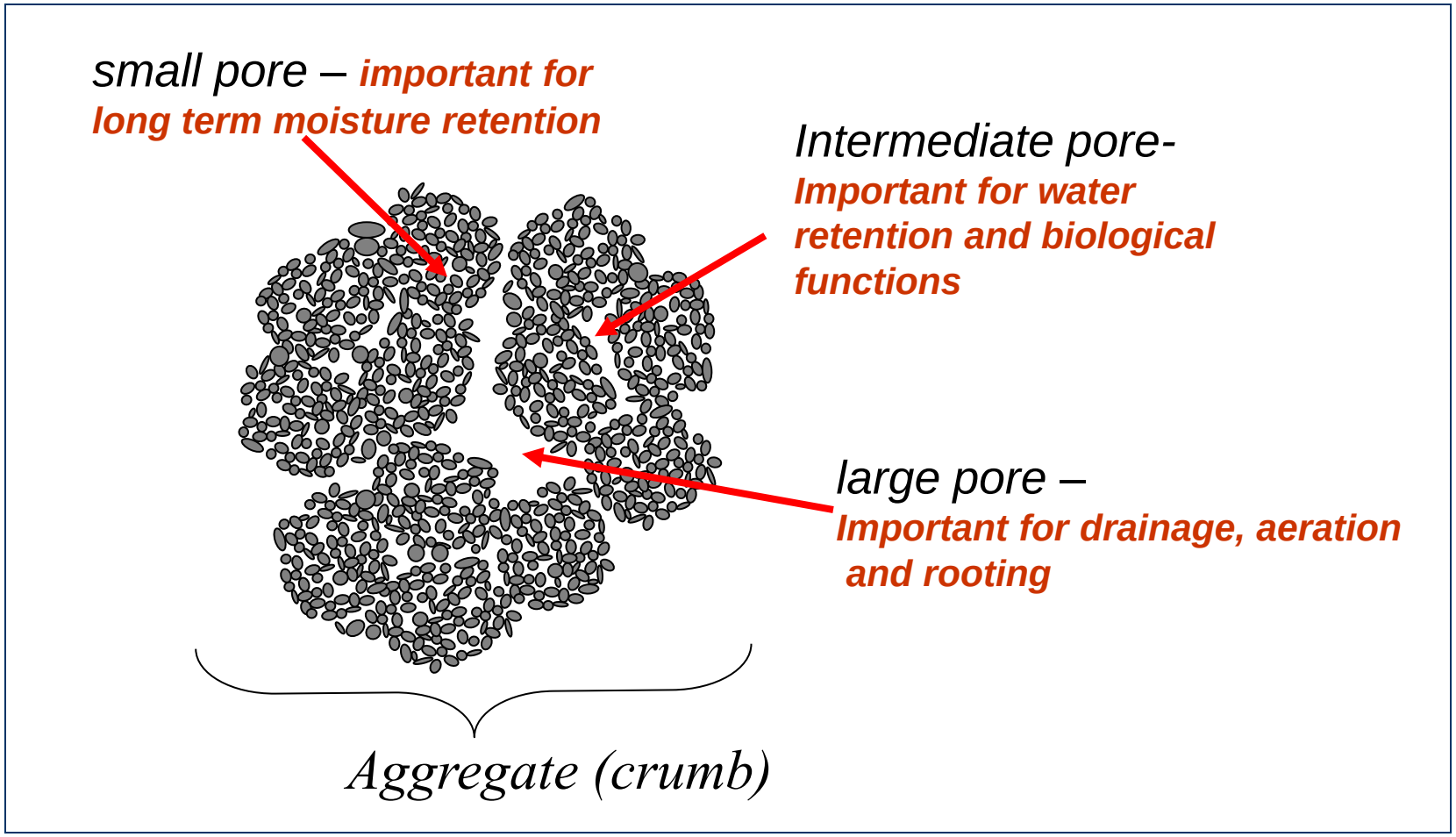
Soil Compaction



Causes of Compaction

- Loss of organic matter (and thereby aggregate stability) from intensive tillage
- Lack of OM additions
- Traffic when soil is wet
- Soil settling from heavy rain

Aggregate Stability



A well aggregated soil has a range of pore sizes.

This medium size soil crumb is made up of many smaller ones. Very large pores occur between the medium size aggregates.

Surface Sealing and Crusting

Crusting is a symptom of the breakdown of soil structure that develops especially with intensively and clean-tilled soils

Erosion

Water Induced Erosion- observe rills & gullies on sloping ground.

Soil Health and Chemical Processes

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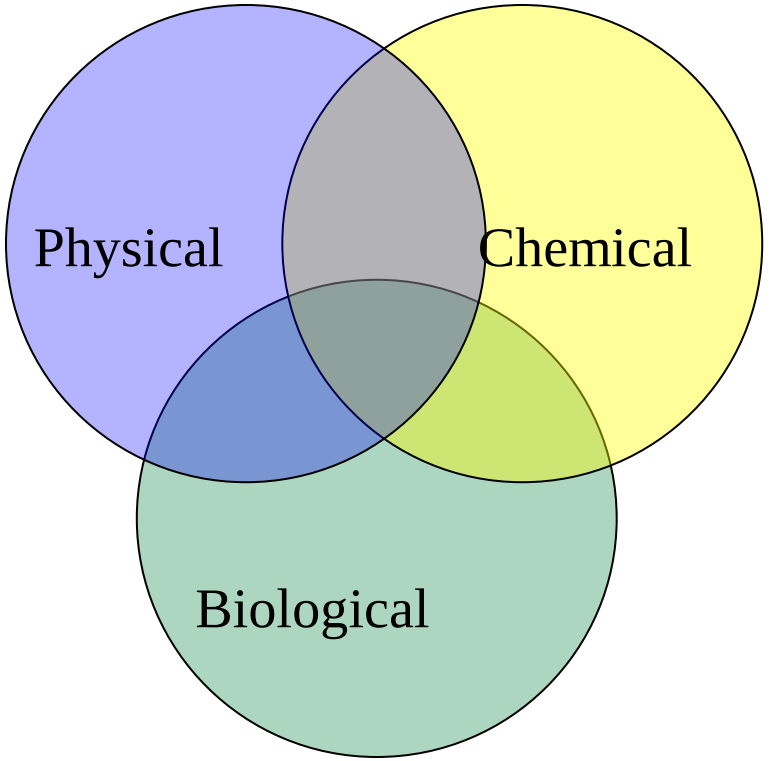
- Aeration
- Soil water storage and movement
- Resistance to soil erosion
- Physical root proliferation and organism movement



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Chemical Aspects of the Card

- Values are based on laboratory soil test results from an accredited lab or University.
- Soil test reflect nutrient needs and pH for desired plant
- Should be done over a 3-5 year period and at the same time each year.

Soil Health and Biological Processes

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- Aeration
- Soil water storage and movement
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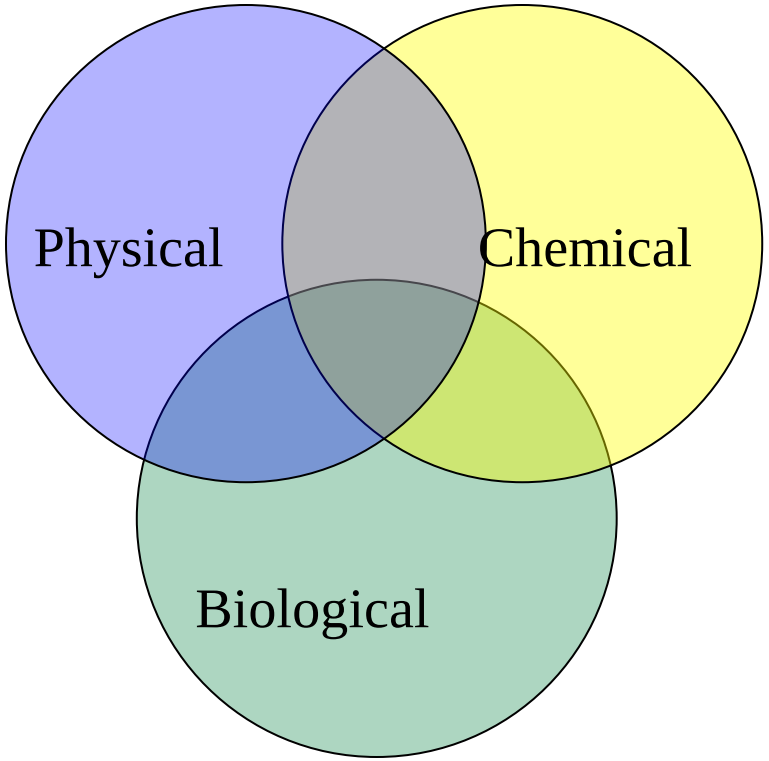

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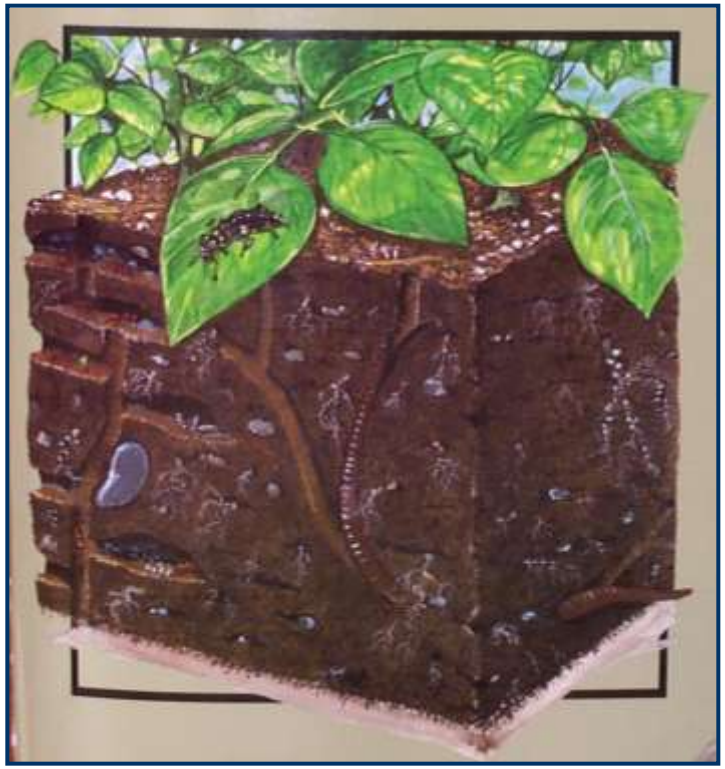
Soils Support Life

Organism Types

bacteria
fungi
protozoa
nematodes
arthropods
earthworms

Roles & Benefits

decomposition
release nutrients
create pores
stabilize soils



Biological Components of the Card

- Organic Matter and Roots
- Presence of Earthworms or Other Soil Organisms
- Plant Growth- Visual observation

Soil Color

- Indicator of different soil types
- Indicator of certain physical and chemical characteristics
- Due to humus content and chemical nature of the iron compounds present in the soil

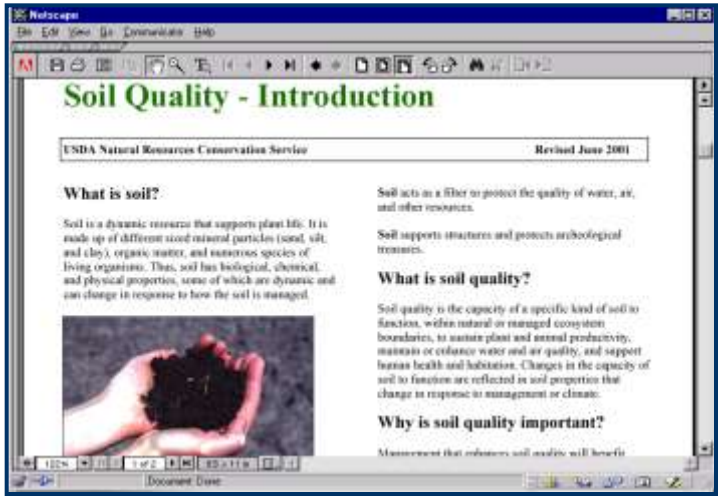
Soils Have Limitations Which Must Be Understood

Concerns for life and properties

allergies
corrosivity
dust
flooding
gypsum dissolution
piping
rapid runoff
sand blowing
septic failure
sinkholes
soil borne disease
sulfidic materials
water tables
contaminants
crop loss
erosion
frost action
liquefaction
radon
salt build up
sedimentation
shrink-swell
slope failures
subsidence
urban hydrology

Soil Management Affects Soil Quality

Soil Quality



Directions for Using the Card

- Tools Needed- shovel or spade, wire flag, and visual observation
- Dig a hole 8-12” deep to make relevant observations
- Follow to best of ability
- Enter totals and add to get Total Value Score. Higher the number the better the overall Soil Health.

TRY IT OUT AND SEE!

- Pilot this card and see what revisions need to be made.
- Changes or improvements in indicators or terms may be necessary.
- Frequent use will dictate improvements.
- Send me your comments!
- eileen.miller@nj.usda.gov

A nation that destroys its' soil destroys itself. **Theodore Roosevelt**

THANK YOU!!!!!!