

Soil Health, Carbon Farming: Tools in soil building



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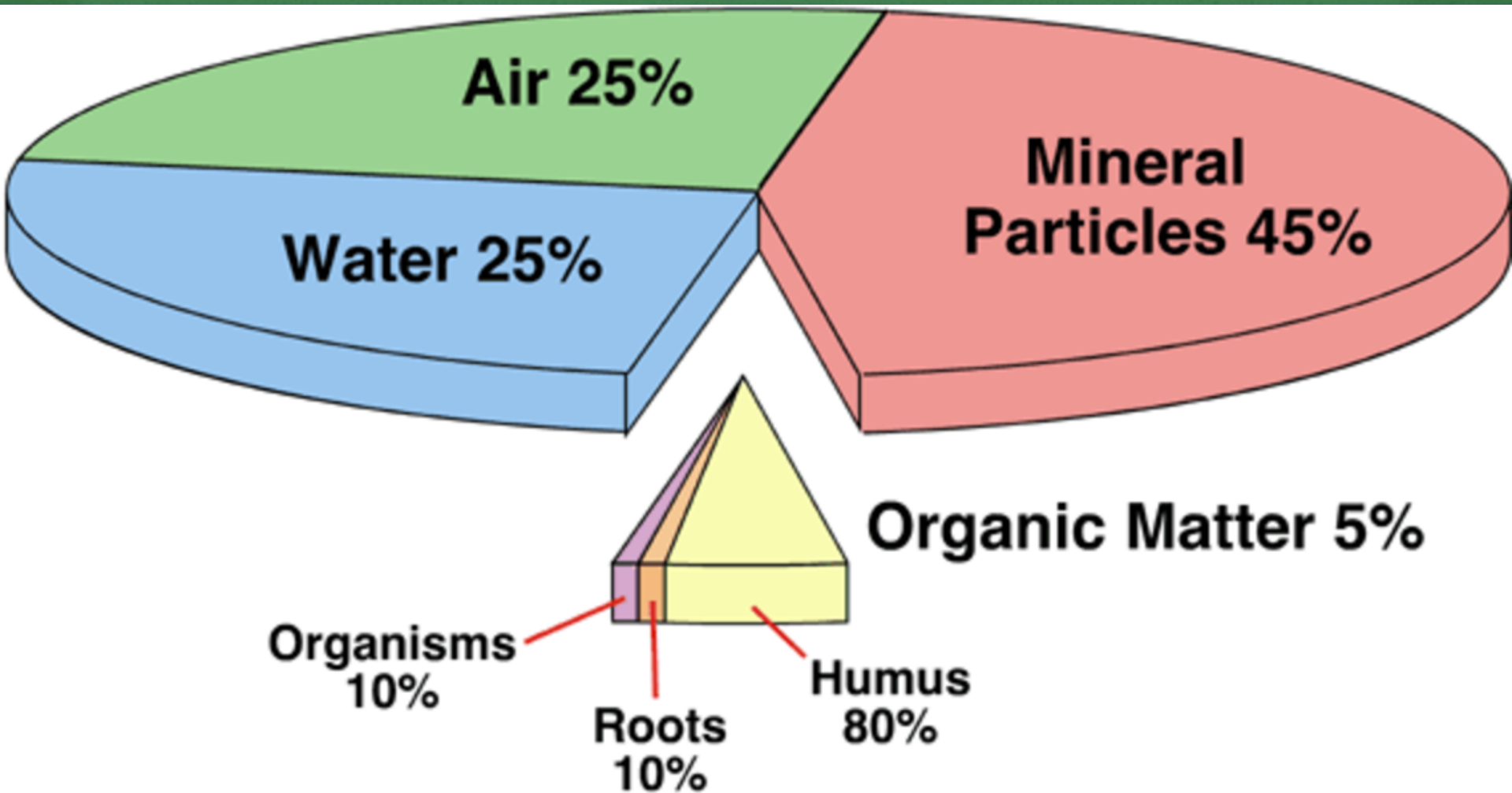
Soil Health

1. promotes a resilient population of soil organisms
2. has a symbiotic relationship with plant roots
3. is in balance with plant pathogens , insect and weed infestations
4. recycles, conserves and fix nutrients
5. provides good soil structure to maximize root penetration
6. improves soil water management
7. 'maximizes' crop production

Benefits of Compost

1. Diversity of microorganisms
2. Promotes healthy plant growth
3. Tool in IPM
4. Nutrient management
5. Improves soil structure
6. Soil moisture management

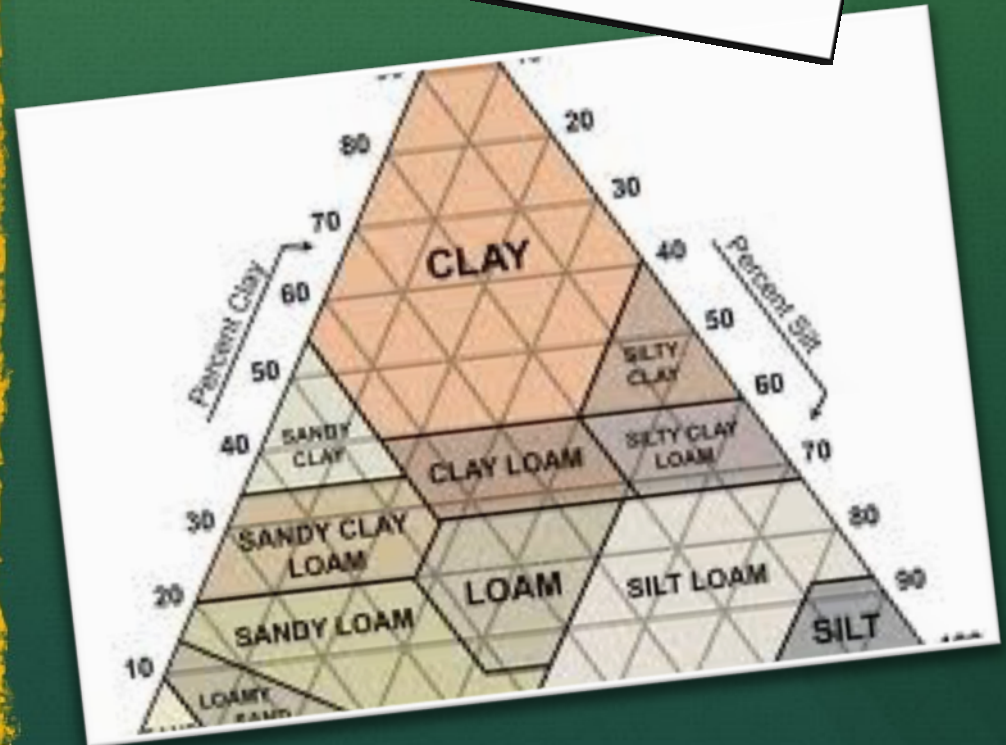
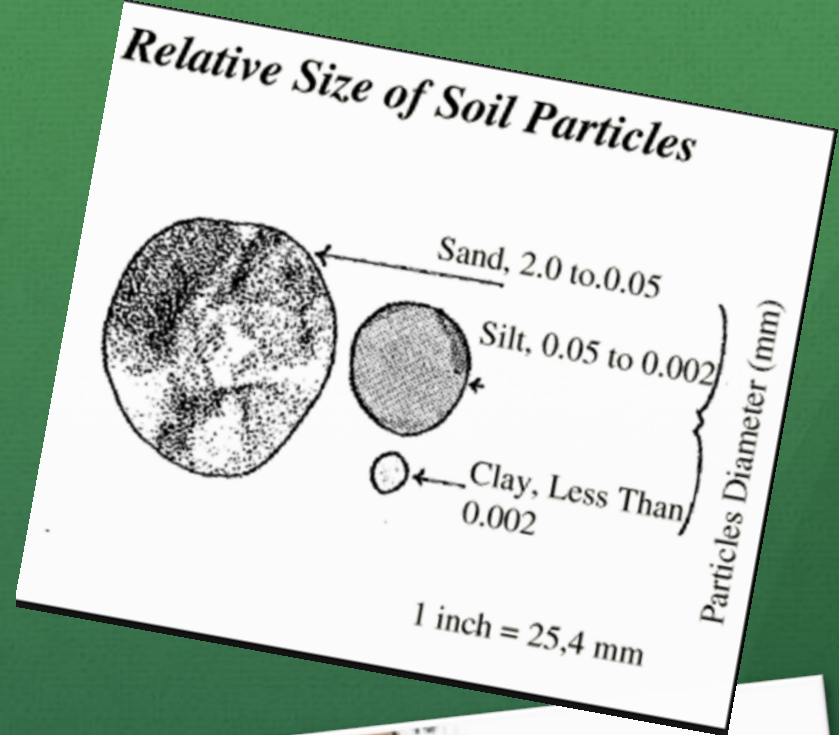
What is in the soil?



Soil Structure

Can't change texture.
What does soil
structure do?

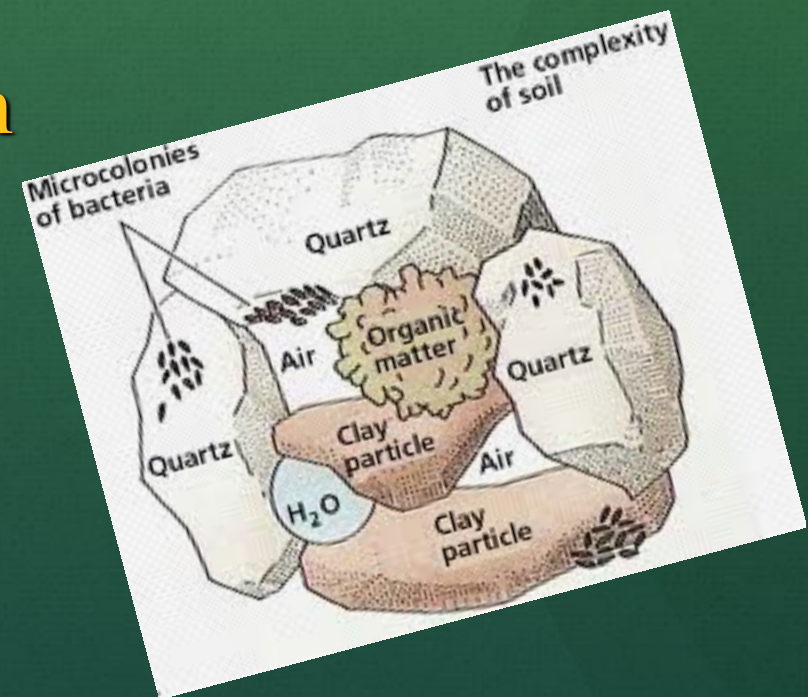
Affects water
infiltration rate and
water holding capacity,
erodibility. Enhances
root penetration,
optimizes soil aeration,
stimulates microbial
diversity



Soil Aggregation

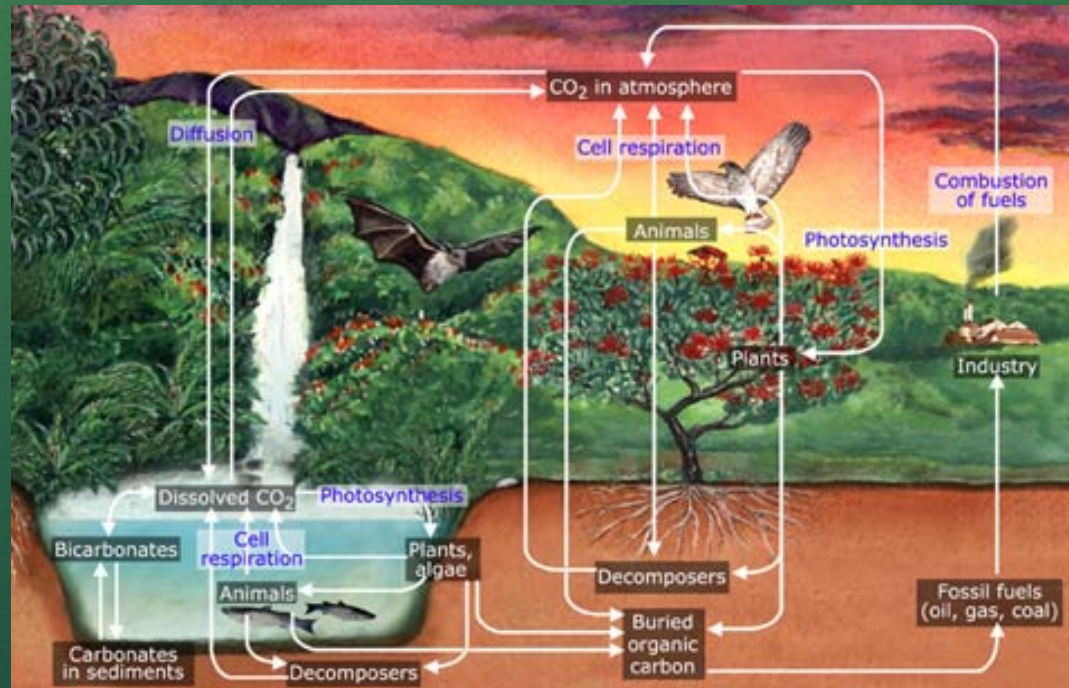
- Tilth, Friability, Soil Structure
- Aggregation Formation
- Aggregation Destruction
- Soil Aeration
- Root Penetration

90% of roots in top 18" of soil

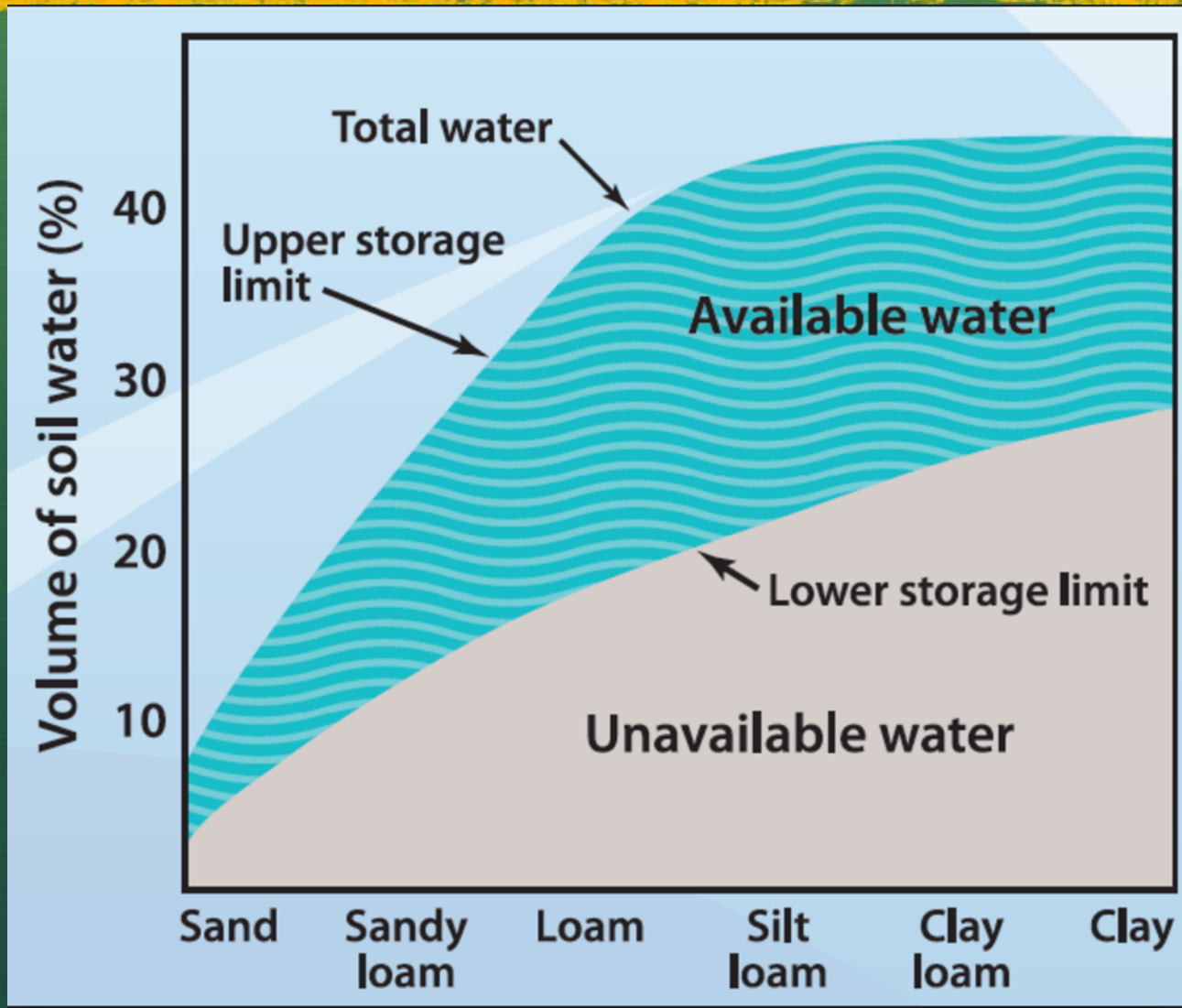


Nutrient Management

- Increase CEC
- Immobilize Water Soluble Nutrients
- Long Term Nutrient Release
- Nitrogen Fixing Micoorganisms

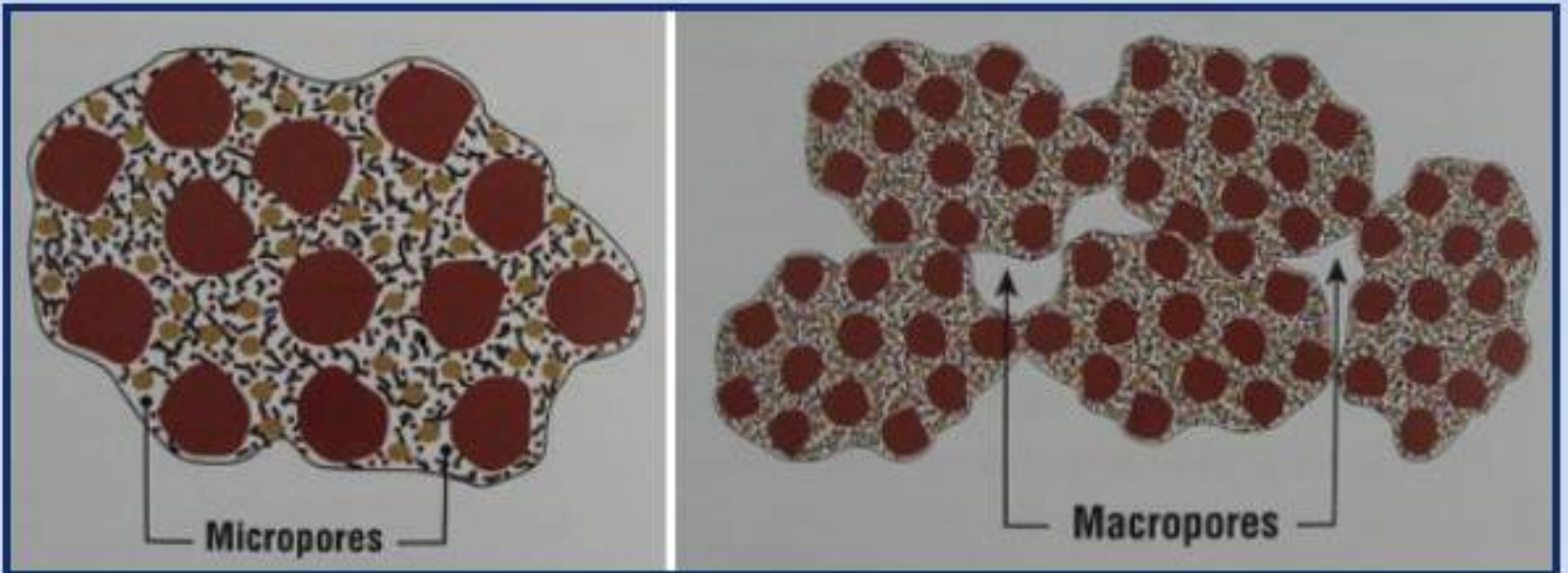


Soil Moisture Management



Soil Water Availability

- Increased Water Holding Capacity (Sandy)
- Increased Water Permeability (Clay)

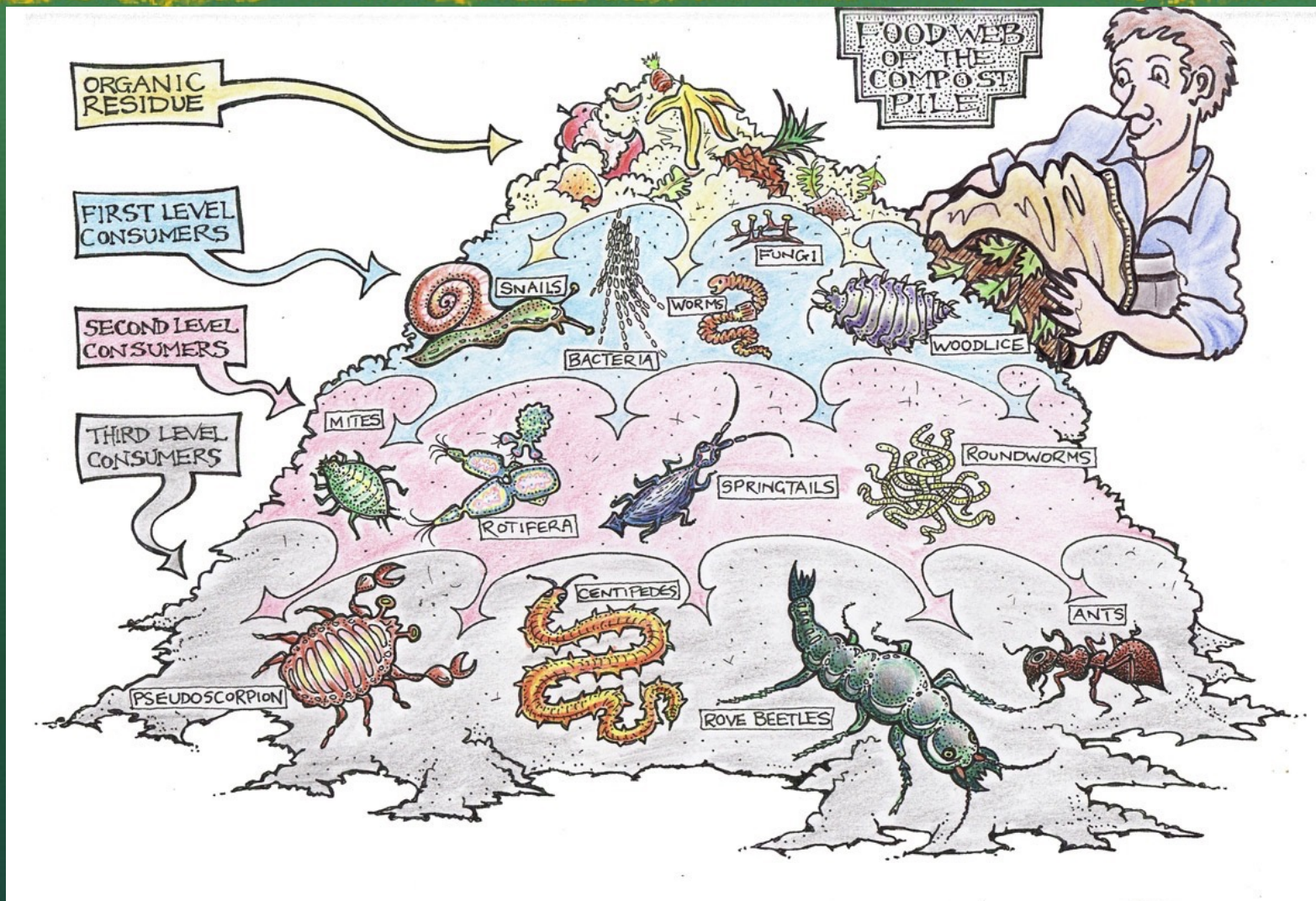


Water Conservation

- 4 inch layer of mulch can save 130,000 gallons of water/acre in vineyards
- Water holding capacity increased by 40%
- 49% greater water Marin Carbon Project 1/2 inch compost one time 2600 gallons/acre



Diversity of Soil Microorganisms



Diversity of Soil Microorganisms

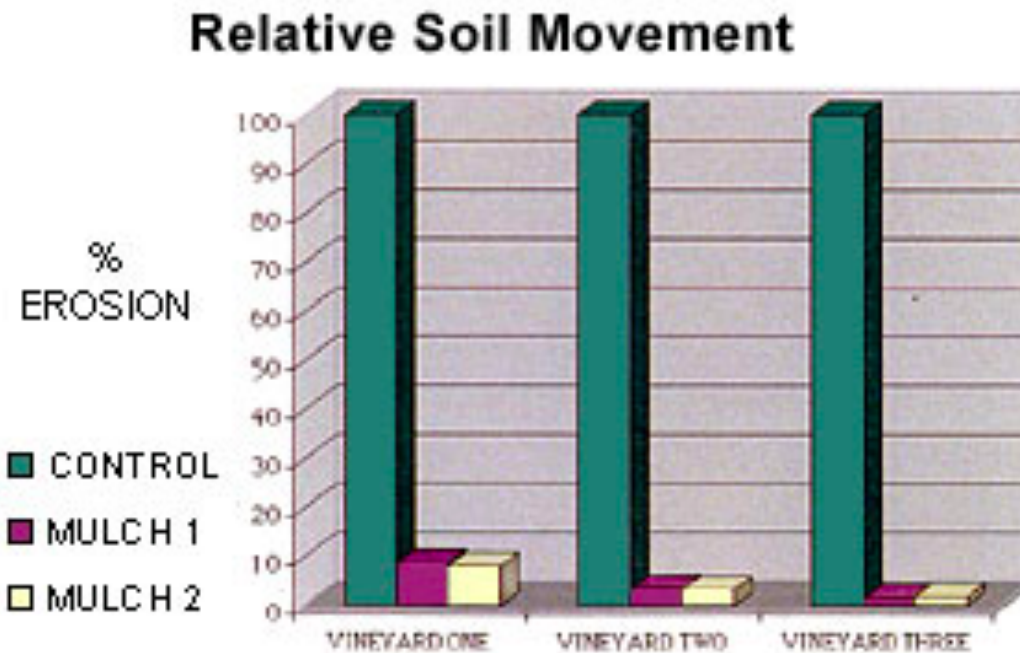
- A Tool in IPM
 - Turns on plant's natural disease fighting mechanism
 - Increased Competition for nutrients and energy
 - Predation
 - Site Occupation
 - Nutrient Management
 - Fungal Presence for Aggregation

Diversity and abundance of microbes are indicators of soil health

Compost vs. Mulch

- In/on top of the Soil
 - Supplies Nutrients
 - Improves Soil Structure
 - Affects Soil Water Management
 - Improves CEC
 - Some Erosion Control
- On Top of the Soil
 - Zero Nutrient Input
 - Slow Soil Structure Improvement
 - Conserves Water
 - No CEC Change
 - Reduced Erosion

Erosion Control in Vineyards

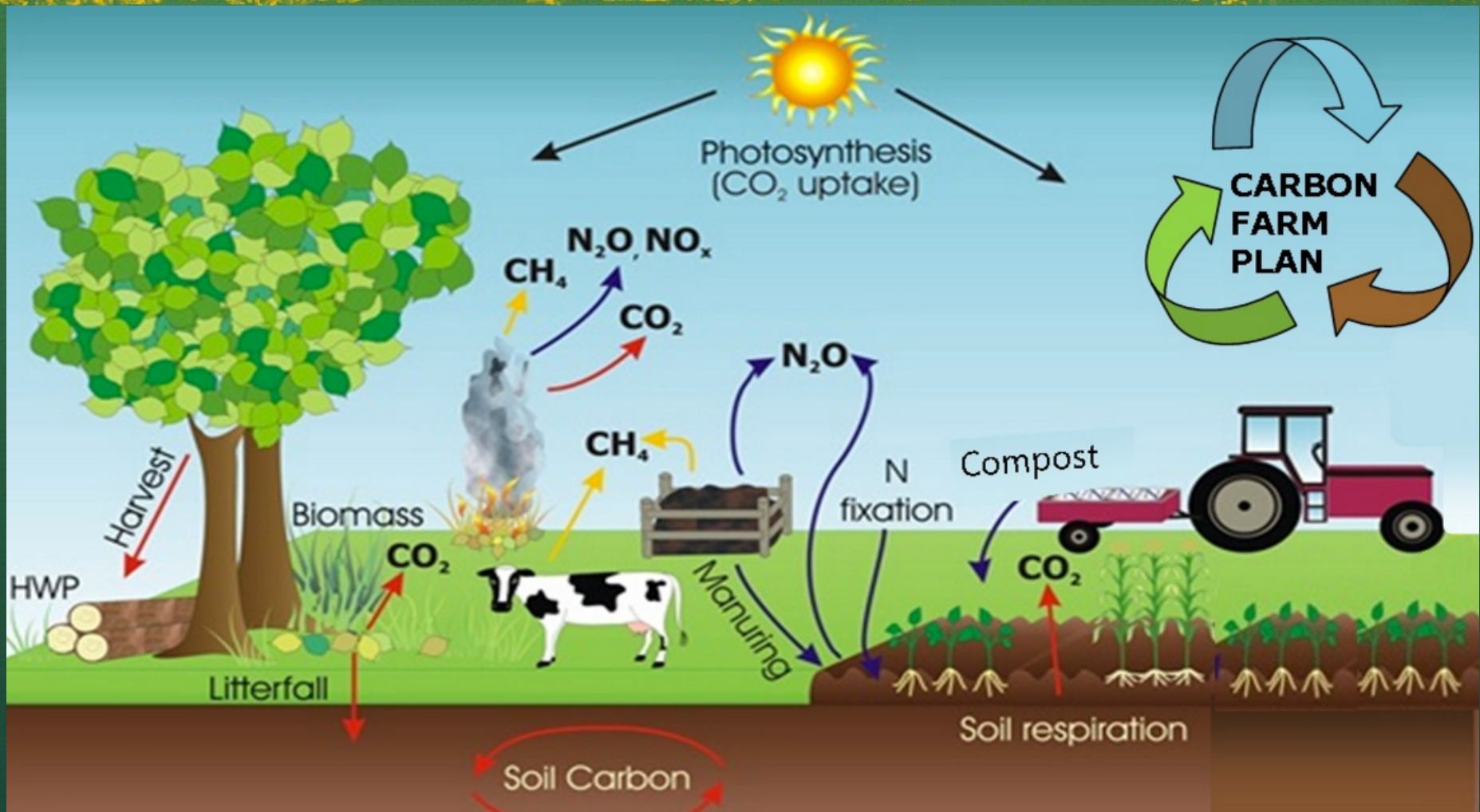


Soil erosion is expressed in percent of control. Control has no mulch applied. Mulch 1 and 2 had 3 inches of mulch applied in the fall of 1999. Mulch 2 has received an additional 1.5 inches of mulch in the fall of 2000.

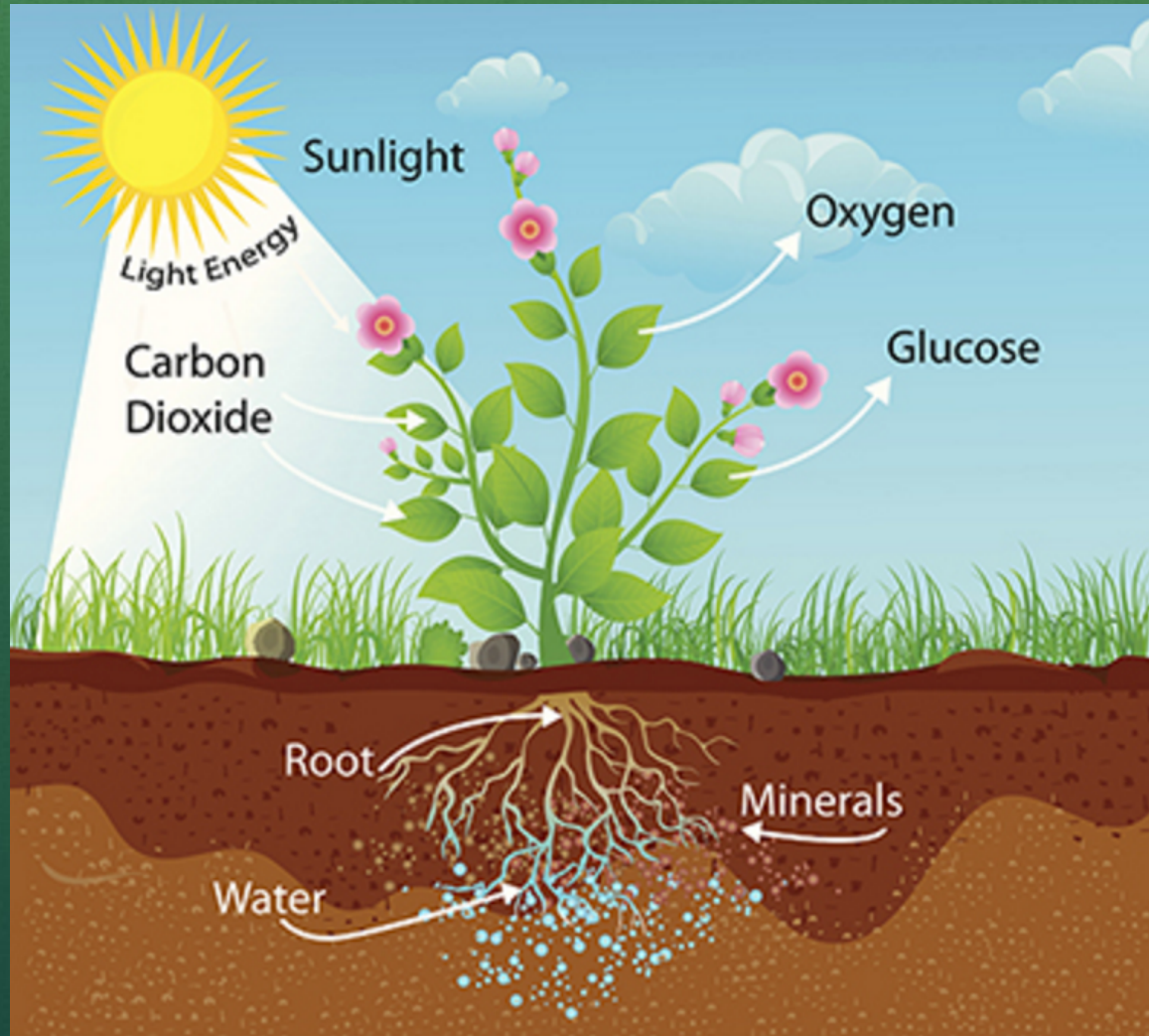
Biochar in Compost

- Reduces emissions, conserves N
- Strips off available carbon
- Inoculates the biochar
- One application, rather than two
- Most effective in sandy or clay soils

Carbon Farming



Photosynthesis



Without Compost With



Carbon Depletion/ Restoration

- It is estimated 150 – 200 billion tons of soil organic matter has been lost over the past century.
- In 2012 it was estimated that 9 billion tons of CO₂ are annually released in to the atmosphere from fossil fuel consumption.
- With the implementation of the appropriate management practices, soil organic matter content could be restored to pre-industrial agricultural levels within 50 years.

Carbon Cycle Institute

Table 1. CO₂e Reduction/Sequestration Potential, Cachuma Ranch (8000 acres),
Santa Barbara County, CA

Practice	Average Annual CO ₂ e Sequestration	20 yr CO ₂ e Sequestration	CO ₂ e Sequestration at Maturity
Rangeland Compost	638 Mg	98,847 Mg	162,619 Mg (30 years)
Cropland Compost (590)	2,060 Mg	23,200 Mg	43,374 Mg at 5% SOM
Shelterbelts (380)	98 Mg	1,960 Mg	7,840-19,260 Mg at 80 years.
Hedgerows (422)	6 Mg	120 Mg	120 Mg
Prescribed Grazing (528)	1,460 Mg	29,200 Mg	29,200 Mg
Riparian Restoration	410 to 1,535 Mg	6,144-23,035 Mg at 15 years	18,431-69,106 Mg at 45 years.
No Till (329)	39 Mg	780 Mg	780 Mg
Minimum-Tillage (345)	100 Mg	2,000 Mg	2,000 Mg
Silvopasture (381)	660 Mg	13,200 Mg	214,000 Mg
Nutrient Management (590)	610 Mg	12,200 Mg	48,800 Mg
Totals	6,081- 7,206 Mg	187,651 - 204,542 Mg	527,164 - 589,259 Mg

Guidelines

- Make wisely use of compost and mulch
- Use mature compost
- Have a soil test done for baseline and amendments
- Monitor Soil Organic Matter (SOM) levels

Quantity and Cost Calculator

Mulch/compost calculations. Only fill in the non-shaded, green areas							
Product	Compost/Mulch depth (In.)	Number of acres you want to put mulch/compost on	Cost per Cubic Yard	Cubic yards per Acre	Cubic Yards for Total Farm	Cost per Acre	Total Cost of Mulch needed for Total Vineyard
Sonoma Compost	0.2	3	\$20.00	26.9	80.7	\$537.78	\$1,613.33

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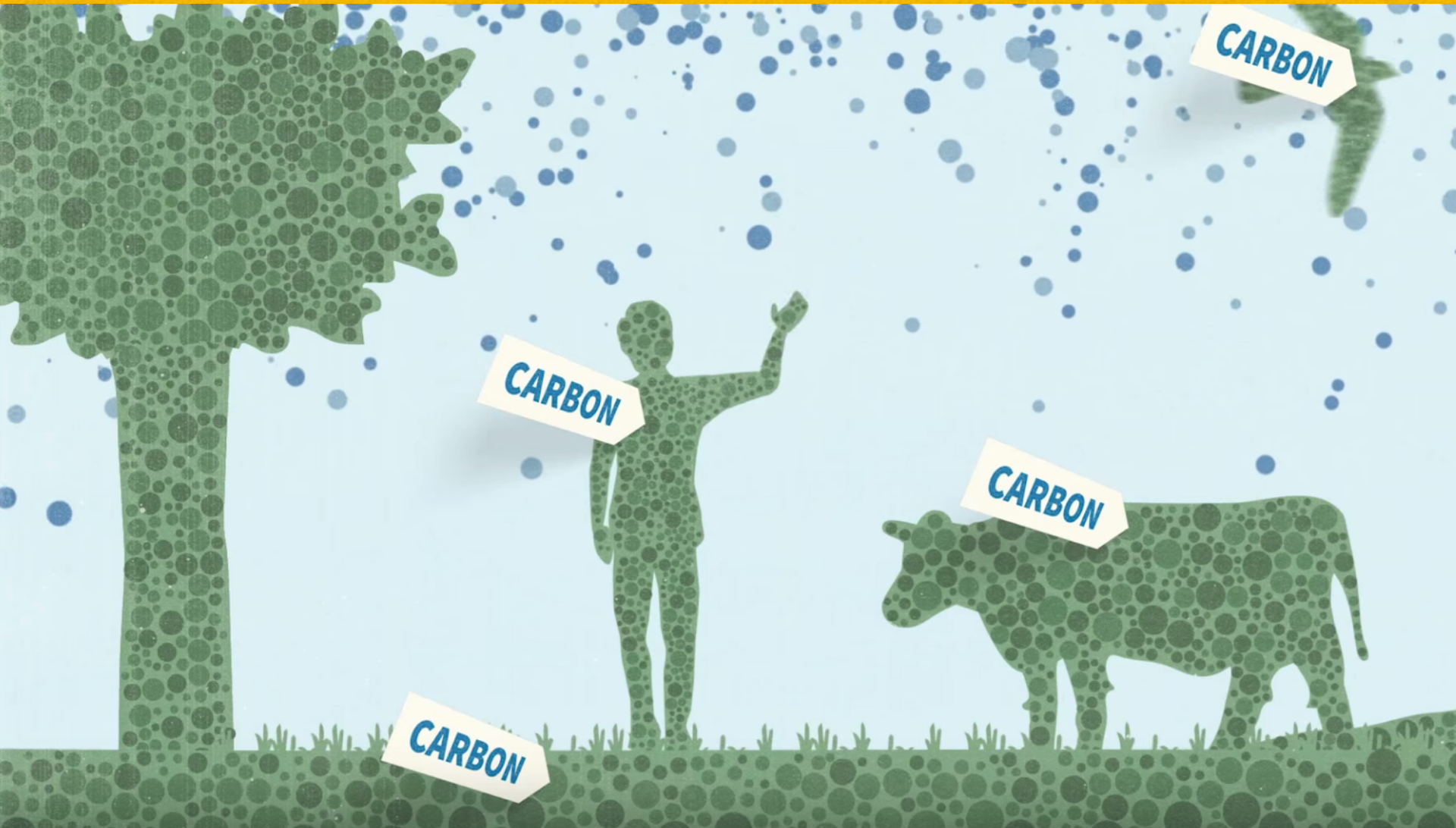
Mulch/Compost Calculations.											
Field Name	Vine Row Swath (Ft.)	Vine Row Spacing (Ft.)	Percent of one Vineyard Acre that mulch will be applied to	Number of Vineyard Acres that you want to put mulch on	Total number of "treated acres" that mulch will be applied to	Depth of mulch to be Applied (In.)	Cost per Cubic Yard Delivered	Cubic Yards/ Acre*	Total Cubic Yards Needed	Mulch Cost/ Acre	Total Mulch Cost for Vineyard
Your Winery	2	8	25.00%	10	2.5	2	\$25.00	67.2	672.2	\$1,680.56	\$16,805.56
Sonoma Compost Co.											
Will Bakx											
707 664 9113											

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SPREADING THE GOODS



The Compost Story



Thank you Questions?



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