

OSU's Plant Protection Center
Corvallis, OR
28 January 2011



THE SOIL FOOD WEB

Our soil teems with a multitude of organisms which provide the necessary work for healthy plants to grow free from disease, pests, and infertility. These interconnected interactions and feeding relationships (quite literally "who eats who") help determine the types of nutrients present in soil, its depth and pH, and even the types of plants which can grow

Let use of your demands to your food has greatly improved our soil, water, lakes, streams and oceans. In many areas of the world, pesticides and herbicides have

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Chapter 1

Understanding Soil

Lecture 1 – Soil: Two Opposing Definitions

Introduction to the Soil Food Web

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Soil Foodweb Inc

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Research Fellow, University of Georgia

Assistant, Associate Professor, Oregon State University (1986 – 2001)

Rodale Institute, Chief Scientist 2011 – 2013

President, Soil Foodweb Inc., 1996 – present

Labs in many places around the world


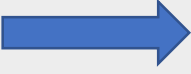
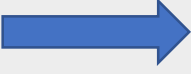
Introduction to the Soil Food Web

Camperdown Compost Melbourne Oz.



Introduction to the Soil Food Web

ZZ2 Tomatoes, Limpopo, South Africa

<u>Conventional Chemical Agriculture</u>		<u>Dr. Elaine's™ Soil Food Web Approach</u>
<ul style="list-style-type: none">• 1-2 yrs Production then 10 yrs Fallow – due to huge pests & disease problems		<ul style="list-style-type: none">• Worst land: 3yrs Production then 1yr Fallow• Best land: Continuous Production
<ul style="list-style-type: none">• Production: Grade 1 Tomatoes 18%		<ul style="list-style-type: none">• Production: Grade 1 Tomatoes 50%
<ul style="list-style-type: none">• Total Yield 80 ton/Ha		<ul style="list-style-type: none">• Total Yield 100-110 ton/Ha. Expected 120.





**Is this
soil?**

**Great
Plains
during the
Dust Bowl**



What is soil?

As defined by Hans Jenny, the Father of Soil Science:

1. Mineral: Sand, silt, clay - All minerals properly balanced
1. Organic matter
1. (Aerobic) Organisms

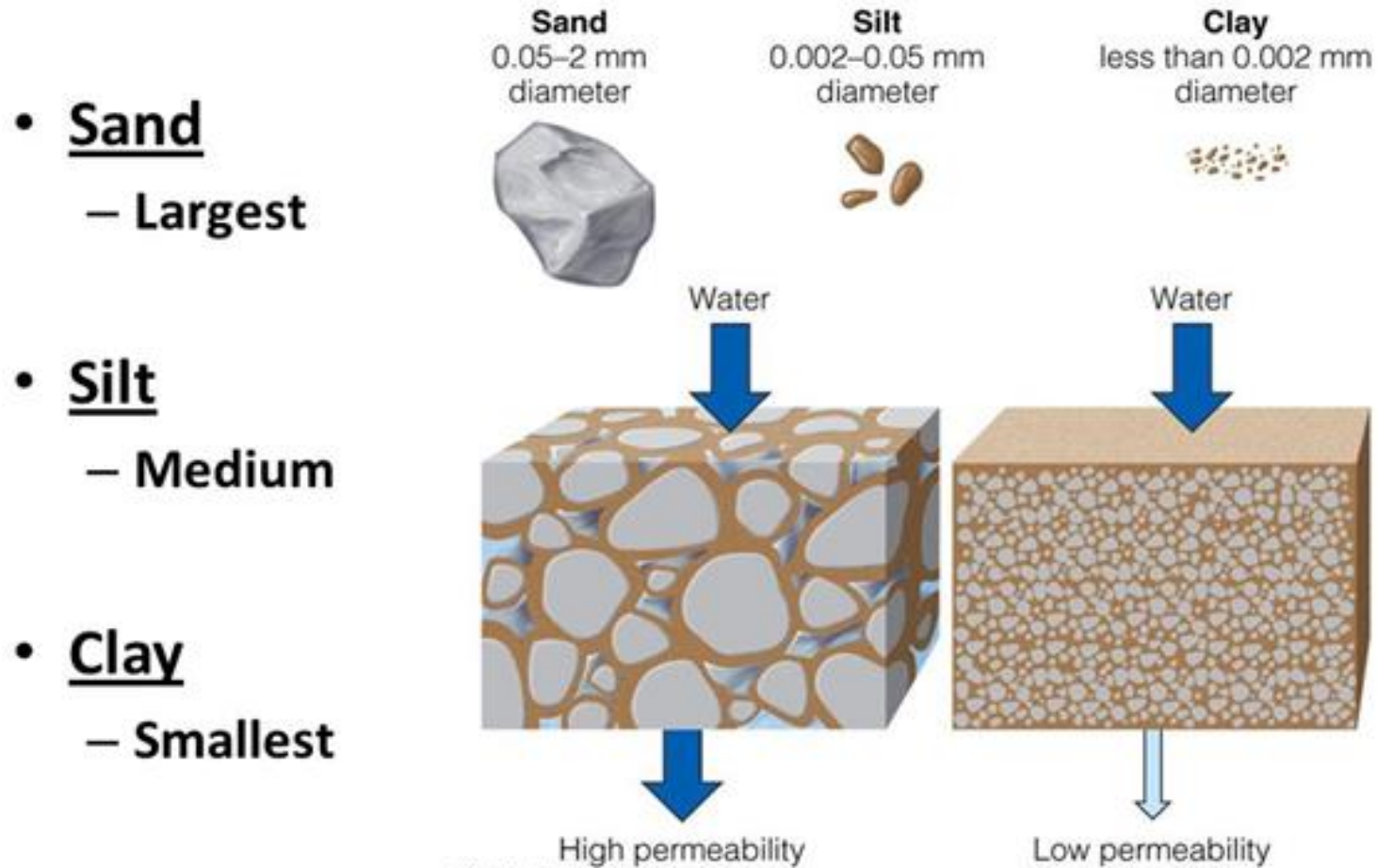
As defined by the “Green Revolution” and scientists trained by the chemical industry:

1. Mineral: Sand, silt, clay - All minerals properly balanced

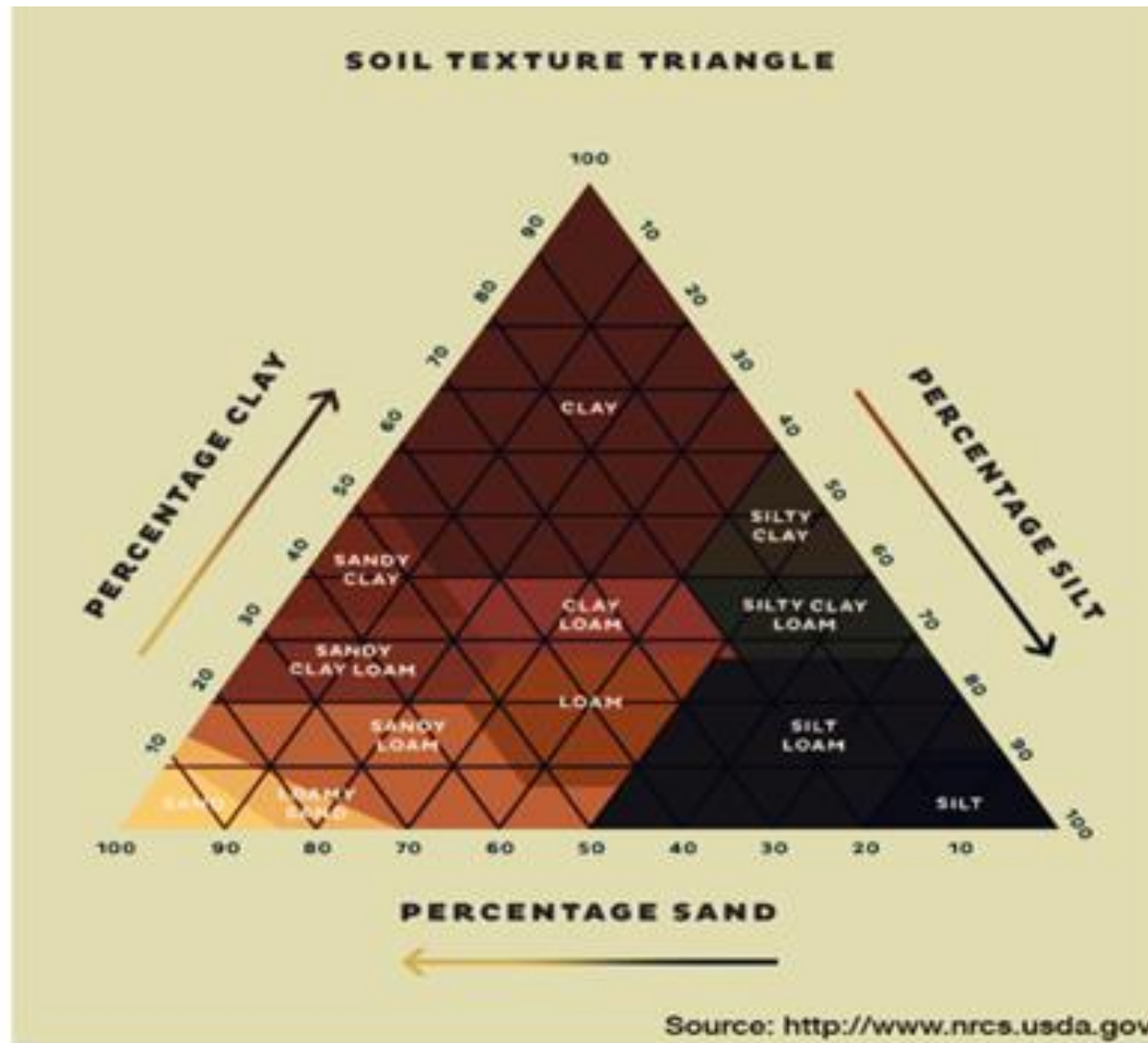
Inorganic, soluble, minerals (NPK) must be added to this ‘inert support matrix’ to supply plants with nutrients

Soil Mineral Particles

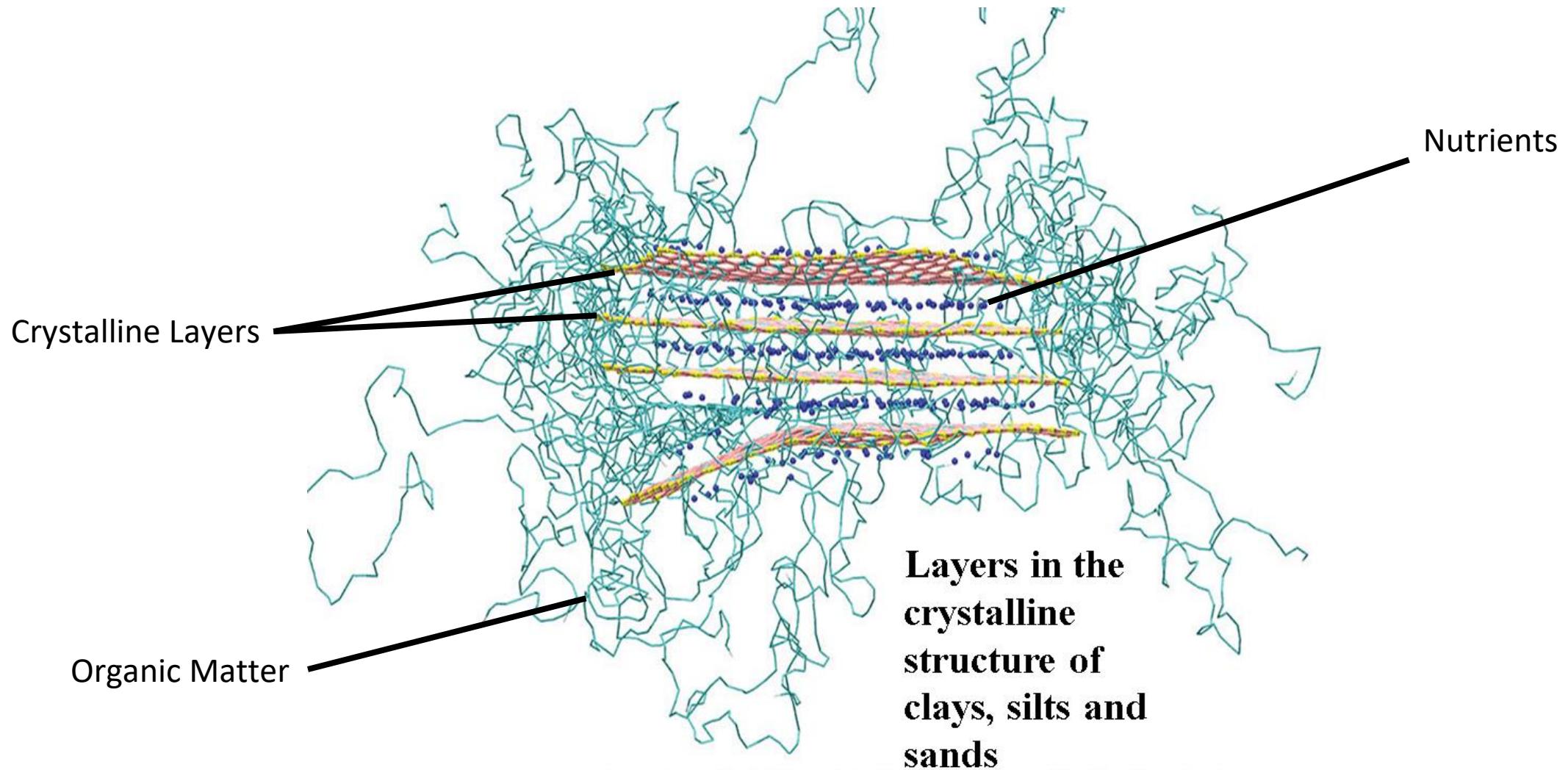
Soil Particle Size



Soil Texture



Nutrients in the Soil



Minerals in the Soil (Sparks 2003)

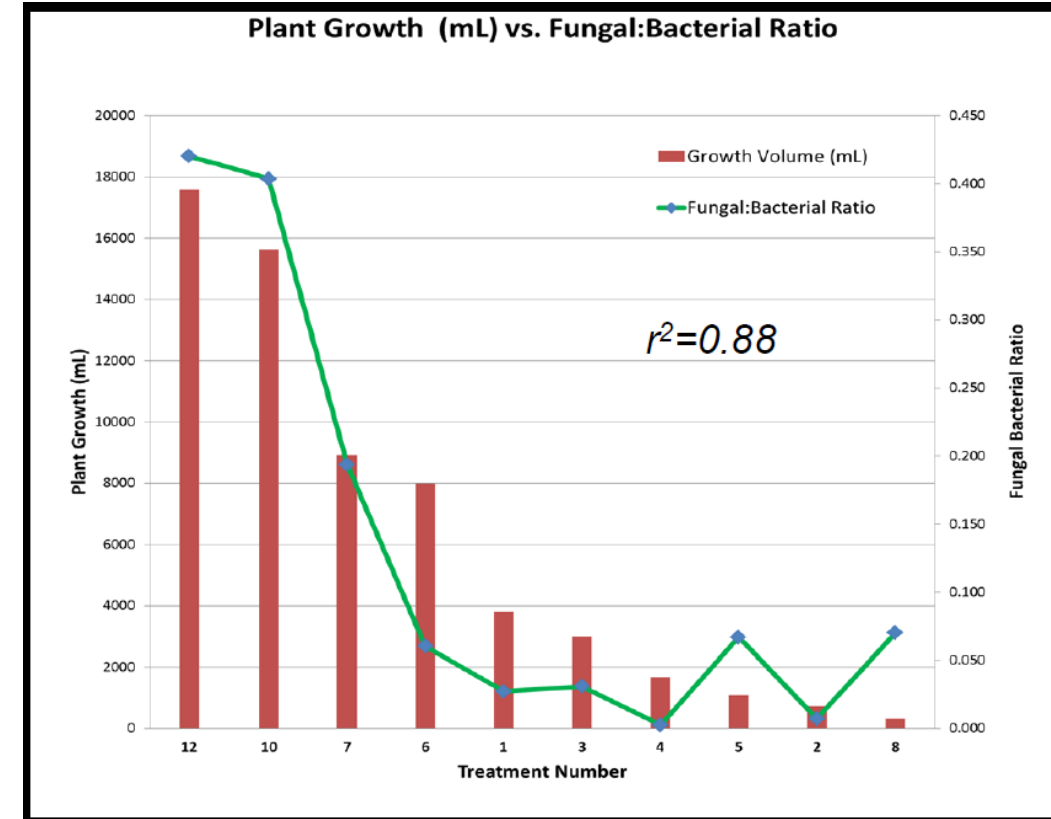
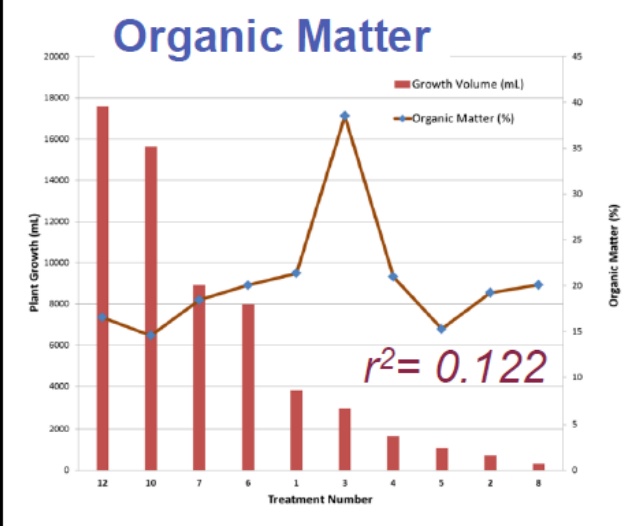
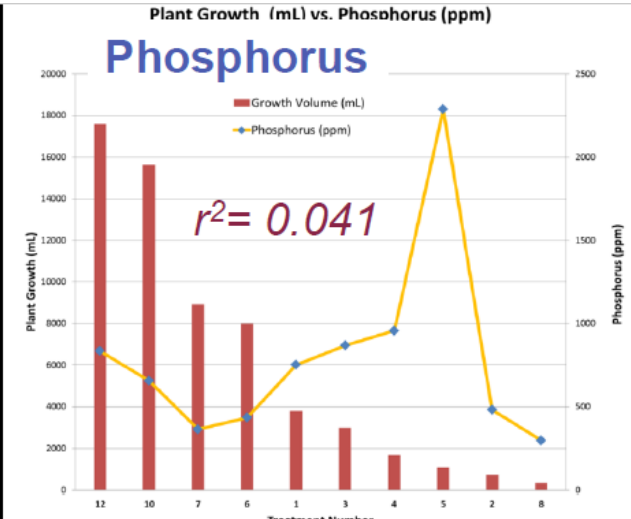
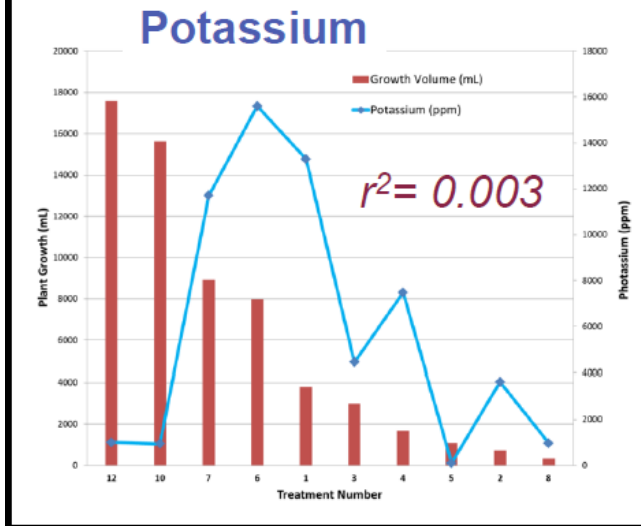
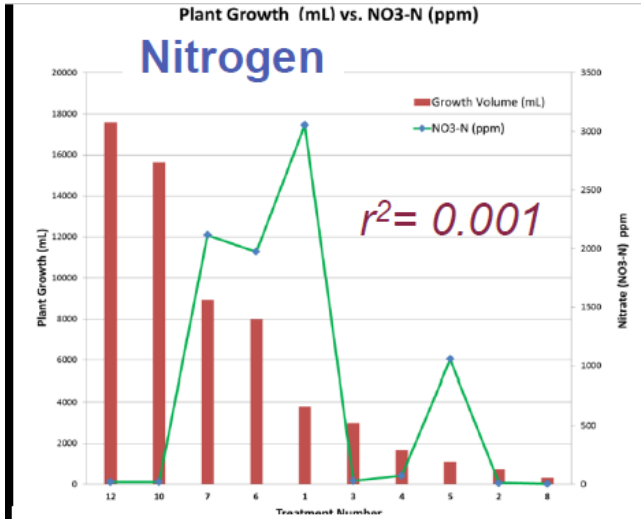
Element	In Soils		In the Earth's Crust (mean)	In Sediments (mean)
	Median	Range		
O	490,000	-	474,000	486,000
Si	330,000	250,000-410,000	277,000	245,000
Al	71,000	10,000-300,000	82,000	72,000
Fe	40,000	2,000-550,000	41,000	41,000
C (total)	20,000	7,000-500,000	480	29,400
Ca	15,000	700-500,000	41,000	66,000
Mg	5,000	400-9,000	23,000	14,000
K	14,000	80-37,000	21,000	20,000
Na	5,000	150-25,000	23,000	5,700
Mn	1,000	20-10,000	950	770
Zn	90	1-900	75	95
Mo	1.2	0.1-40	1.5	2
Ni	50	2-750	80	52
Cu	30	2-250	50	33
N	2,000	200-5,000	25	470
P	800	35-5,300	1,000	670
S (total)	700	30-1,600	260	2,200

All units are in mg/kg or ppm

All the mineral nutrients plants need are already in soil

- Why would there be a need to add more minerals?
- Why do plants grow better when inorganic fertilizers are added?
- Because mineral nutrients have to be converted to **SOLUBLE** forms for plants to take them up
- What converts minerals to soluble forms?
- **SOIL LIFE**

Does the SFW really work???



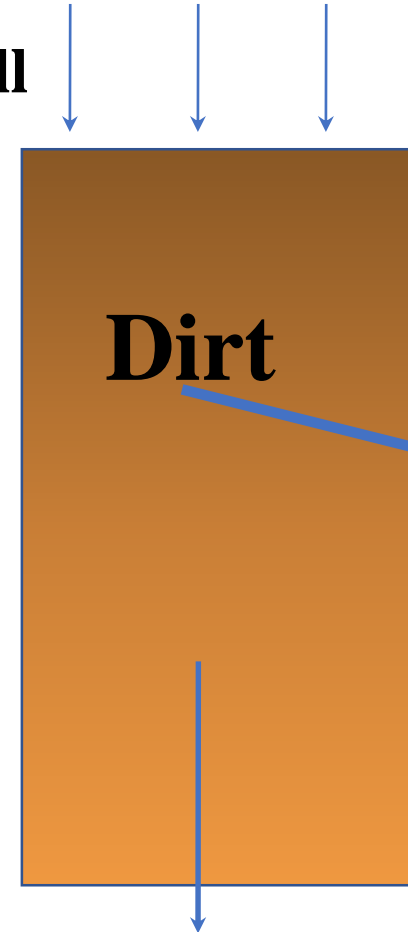
Soil results in clean water; dirt results in problems

Organisms build structure
Nutrients held
Water is retained and moves slowly thru the soil



Clean Water

Rainfall



Water moves clay, silt and inorganic chemicals so no "cleaning" process

No organisms, no structure

Nutrients move with the water

Water not held in soil pores, moves rapidly thru soil

Leaching, erosion and run-off are problems