



# Organic Land Management Improves Soil Stewardship & Human Nutrition

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International Organic Inspectors Association (IOIA)

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*& American Society of Agronomy 2013 in Tampa*



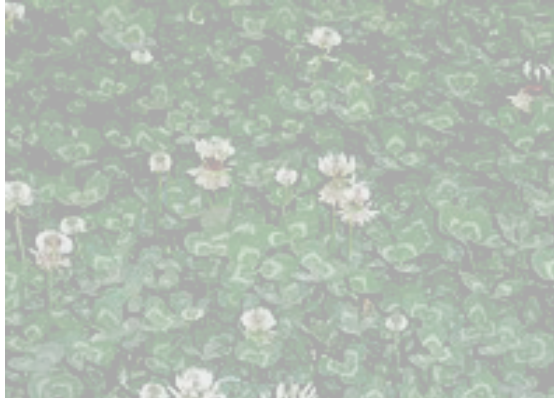
# Introduction

- This presentation will provide US and worldwide research perspectives on the  
**(1) benefits of organic land management that**  
**(2) improves soil stewardship that then**  
**(3) enhances plant nutrition, which in turn**  
**(4) improves the quality of human nutrition.**



# Organic Land Management

- Using leguminous crop rotation, **organic land management can fix sufficient nitrogen to replace synthetic fertilizers.**



*Renewable Agriculture & Food Systems: 22(2); 86-108, June 2007*

# Organic Land Management

- Adoption of **organic production practices** can, over time, **increase crop yields 150%**, **improve ascorbic acid,\* beneficial phenolics,\*** and **lycopene\*** content, resulting in **longer product shelf life**.

\*more details later on each nutrient benefit

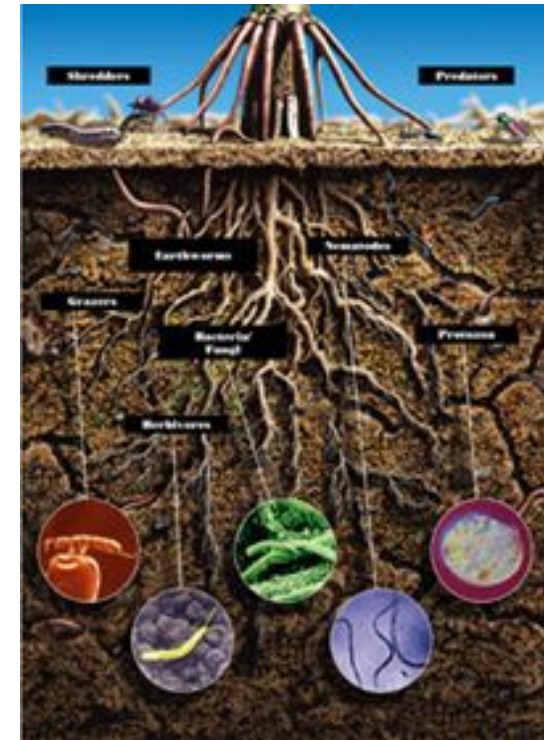
*UN-FAO Organic Agriculture & Food Security, 2007.*

*Access to Land and the Right to Food, 2011.*

# Organic Land Management

**Organic soils excel in**

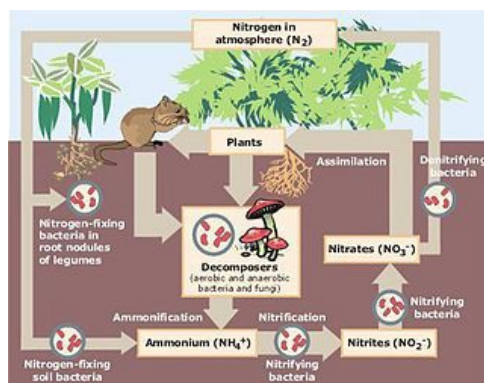
- (1) carbon sequestration,**
- (2) nitrogen fixing,**
- (3) microbial biomass,**
- (4) enzyme activities, and**
- (5) micronutrient assimilation.**



*Rodale Institute, 2007*

# Soil Stewardship

## Improved soil stewardship through mitigation of close/fix nutrient cycles



“Organic agriculture has much to offer in mitigation of climate change thru its emphasis on closed nutrient cycles and its resilient and productive system of adaptation strategies”

*International Trade Centre Report on Organic Farming*

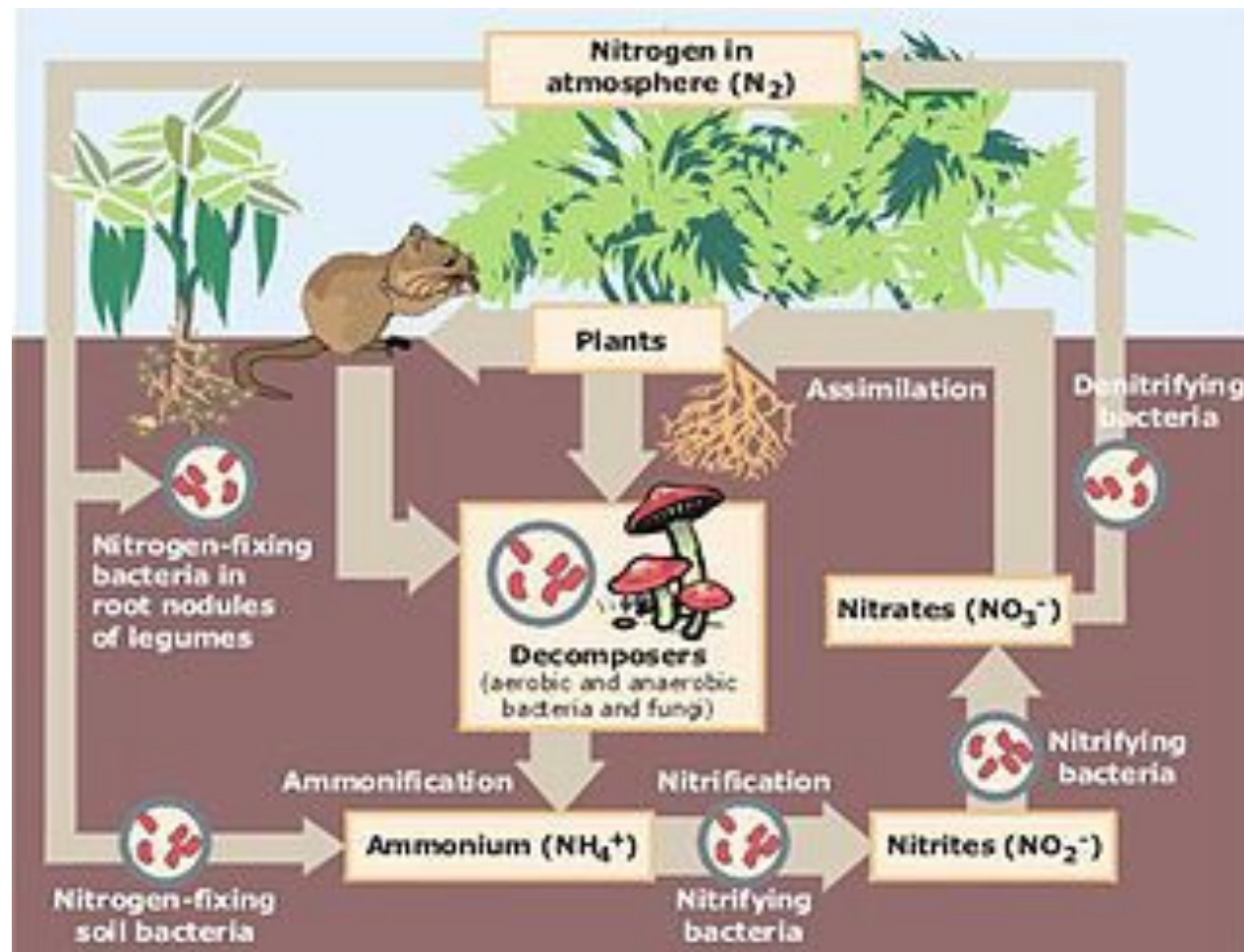
# Soil Stewardship



**Improved soil stewardship through resilient and productive adaption strategies will optimize soil tilth (“health”) and nutrient retention, thus improve bio-availability for plant synthesis ...**

*UN Conf. on Trade & Development (UNCTAD) Technical Draft*

# Biological Nitrogen Fixation from Air to Plants



Source: Smil, V (2000). *Cycles of Life*. Scientific American Library.



# Soil Stewardship

**Improved soil stewardship through resilient and productive adaptive strategies also prove drought resistance, through greater water-holding capacity and better root colonization of mycorrhizal fungi.**

*American Journal of Alternative Agriculture, September 2003*



# Biological Diversity

- **Organic farming enhances biological diversity at every level of the food chain from bacteria to mammals, while providing habitat and food sources for life-enhancing and essential pollinators.**



*Biological Conservation, Volume 122, page 113*

# Enhanced Plant Nutrient Uptake

**Enhanced plant nutrient uptake** has been found with ...

the **antioxidant\* defense system** of **pears** and **peaches** being altered to **higher tocopherol\*** levels;

\*more details later on each nutrient benefit



*Journal of Agricultural & Food Chemistry, 50 (19), 5458-5462*

# Enhanced Plant Nutrient Uptake

**Enhanced plant nutrient uptake** found in ...  
fifteen **wines studied** showing significantly  
**higher antioxidant\*** levels, the **highest level**  
**of total healthy polyphenols\*** yet concurrently  
with a **300% lower mycotoxin\*** contamination



\*more details later on each nutrient benefit

*Journal of Wine Research, Vol. 14, 2-3*



# Improved Nutritional Food Quality

**Improved nutritional quality of organically-produced foods ...**  
revealed that **organic blueberries** had significantly **higher antioxidant activity, longer shelf life, and more dry matter content\***;



\*more details later on each nutrient benefit

*Journal of Agricultural & Food Chemistry. 56 (14), 5788-5794.*

# Improved Nutritional Food Quality

**Improved nutritional quality of organically-produced foods ...**

**provided comparative evidence that organic foods contained a 25% higher concentration of eleven nutrients\***



\*more details later on  
each nutrient benefit



*Journal of Agricultural & Food Chemistry (volume 55, 2007)*

# Improved Nutritional Food Quality

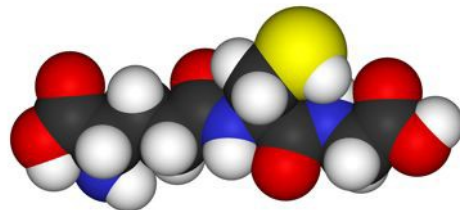
## ORGANIC VS CONVENTIONAL

		Minerals (in milliequivalents)						
Vegetables	Type of Soil Management	Calcium	Magnesium	Potassium	Sodium	Manganese	Iron	Copper
<b>Snap Beans</b>								
	Organic	40.5	60.0	99.7	8.6	60.0	227.0	69.0
	Conventional	15.5	14.8	29.1	0.0	2.0	10.0	3.0
<b>Cabbage</b>								
	Organic	60.0	43.6	148.3	20.4	13.0	94.0	48.0
	Conventional	17.5	15.6	53.7	0.8	2.0	20.0	0.4
<b>Lettuce</b>								
	Organic	71.0	49.3	176.5	12.2	169.0	516.0	60.0
	Conventional	16.0	13.1	53.7	0.0	1.0	1.0	3.0
<b>Tomatoes</b>								
	Organic	23.0	59.2	148.3	6.5	68.0	1938.0	53.0
	Conventional	4.5	4.5	58.6	0.0	1.0	1.0	0.0
<b>Spinach</b>								
	Organic	96.0	293.9	257.0	69.5	117.0	1584.0	0.0
	Conventional	47.5	46.9	84.0	0.8	1.0	19.0	0.5

Research conducted by Firman E. Bear at Rutgers University in the Natural Gardener's Catalog (1995)

# Nutrients Matter, because ...

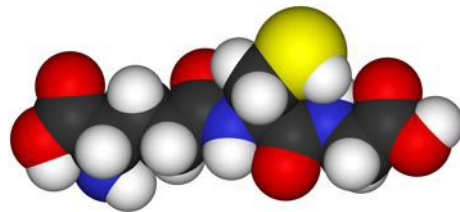
- **Higher Ascorbic Acids** = Vitamin C = An antioxidant that protects animals and plants from oxidation damage at the tissue level.
- **Higher Lycopene** = A potential cancer preventative agent (esp. for prostate cancer).
- **Higher Tocophenol** = Vitamin E = “*Means to Carry a Pregnancy*” and deficiencies cause neurological problems and anemia.





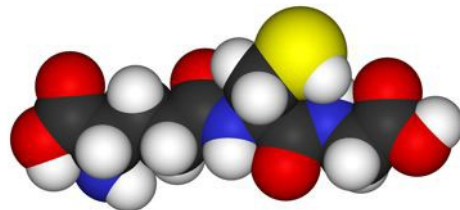
# Nutrients Matter, because ...

- **More Antioxidants** = Better at fighting disease since they help prevent cancer, coronary heart disease, and altitude sickness
- **More Phenolics** = Improve the taste of wines and have chemo-preventive properties, thus assist the body in fighting environmental or nutritional imbalance or contamination



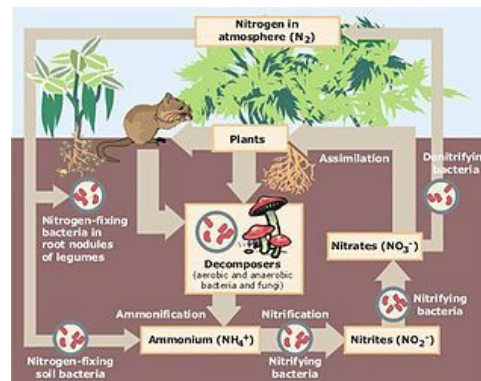
# Nutrients Matter, because ...

- **Lower Mycotoxins** = Mold-producing mycotoxins in/on plants are not easily killed by cooking or freezing, thus a persistent concern to avoid through healthy growing / handling of produce and products
- **More Dry Matter** = Solids in food (without water) = Higher nutrient content of carbohydrates, fats, proteins, vitamins, minerals and antioxidants



# In Summary ...

**Managing the land organically, using better soil stewardship practices, improves not only the soil itself, but increases the potential for producing nutritionally-enhanced human food.**



Thank you.

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