

### Connections: Soil, People, and Farming



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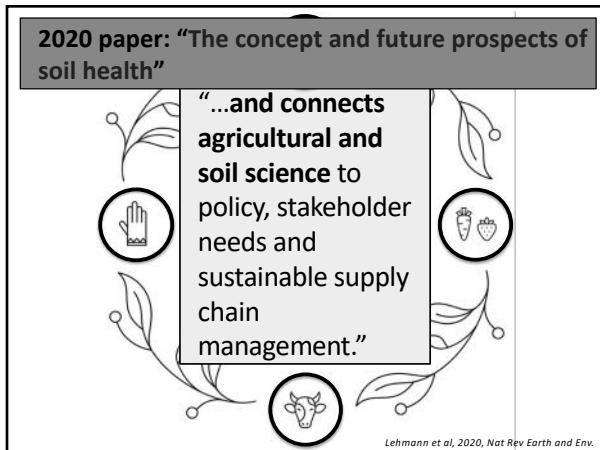
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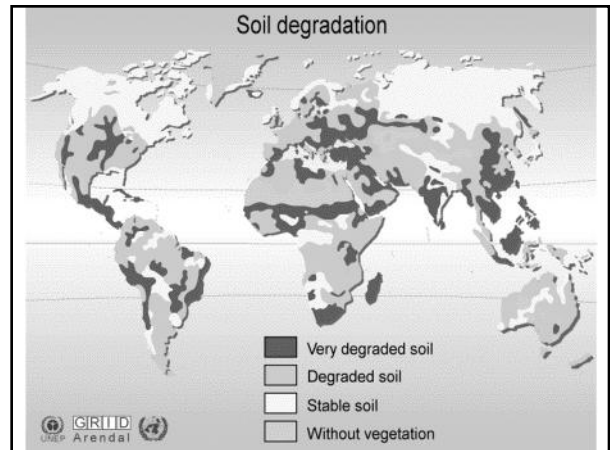
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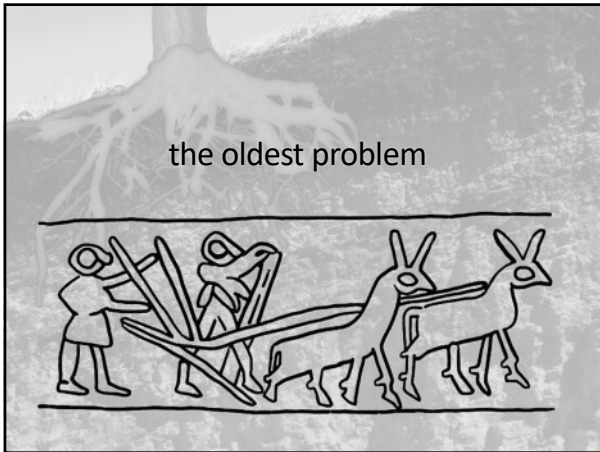
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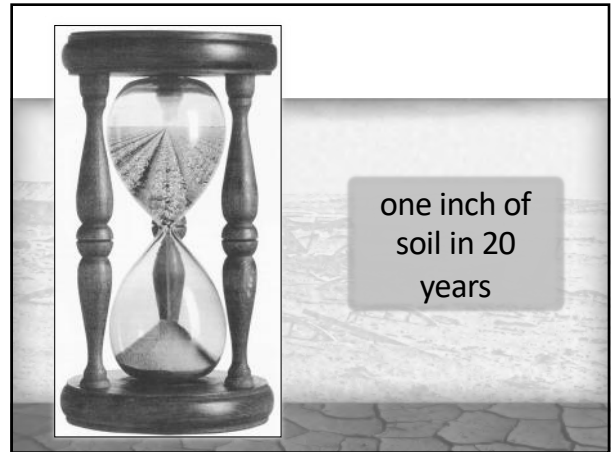
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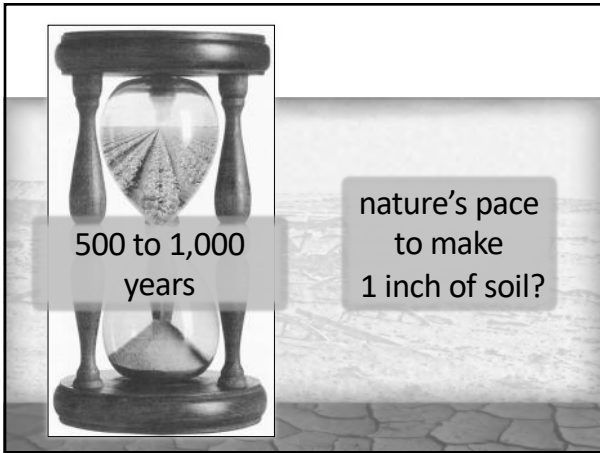
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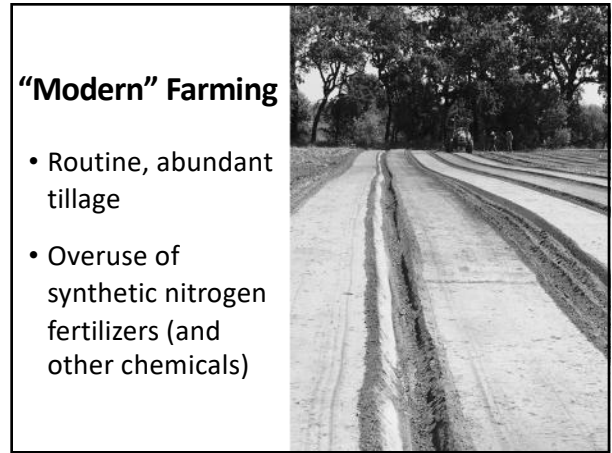
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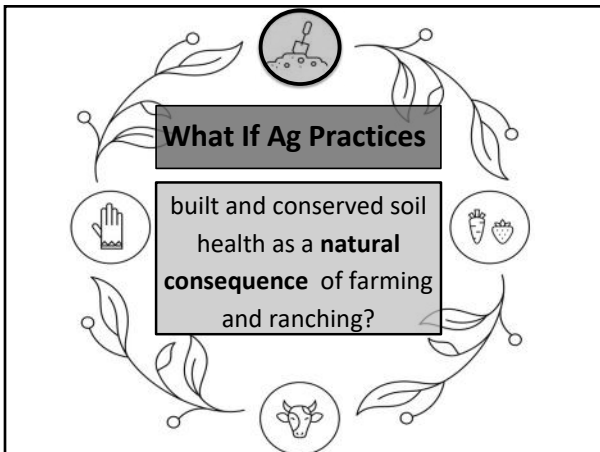
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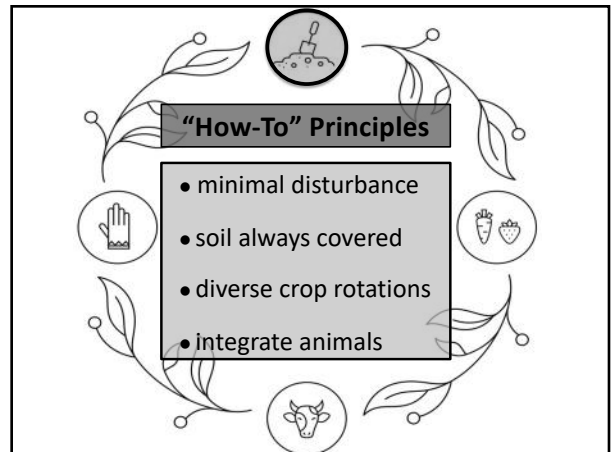
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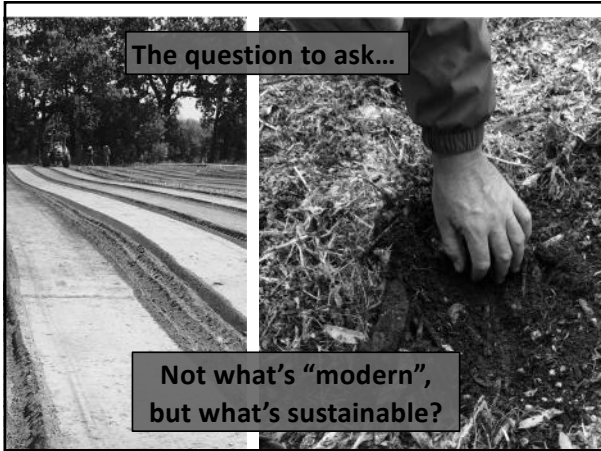
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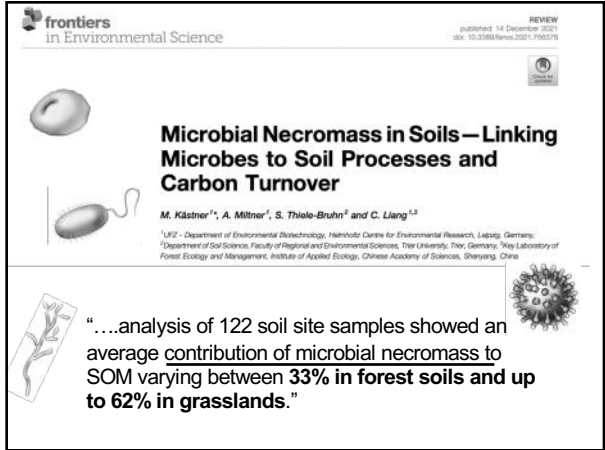
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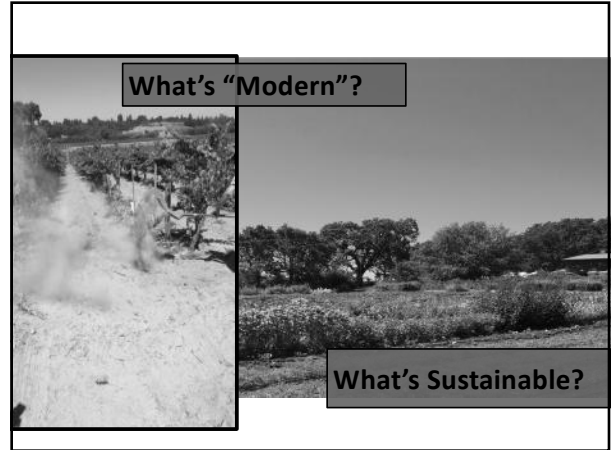
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**Benefits of Healthy Soil**

- higher farmer profits
- comparable yields
- less fertilizer, pesticide, and fossil fuel use
- more carbon & water in soil, less off-farm pollution

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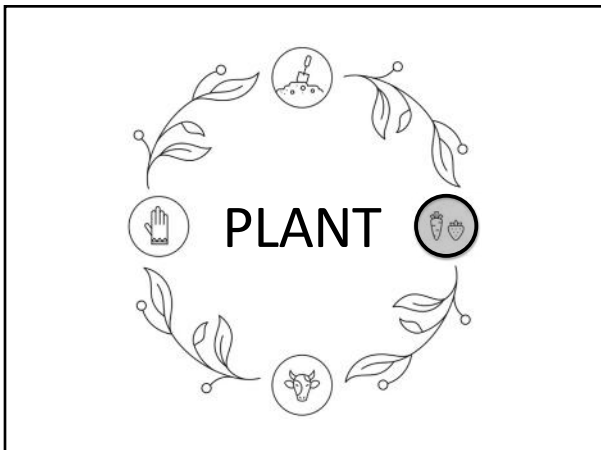
**The Greatest Gut on Earth**



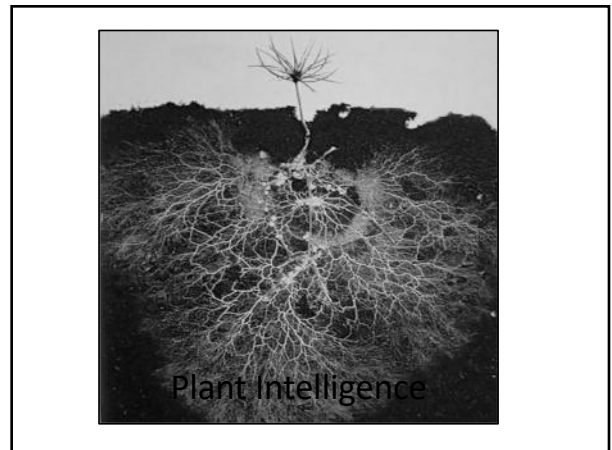
**Use the gut to get to the brain**

credit: Conservation Research Institute, 1995

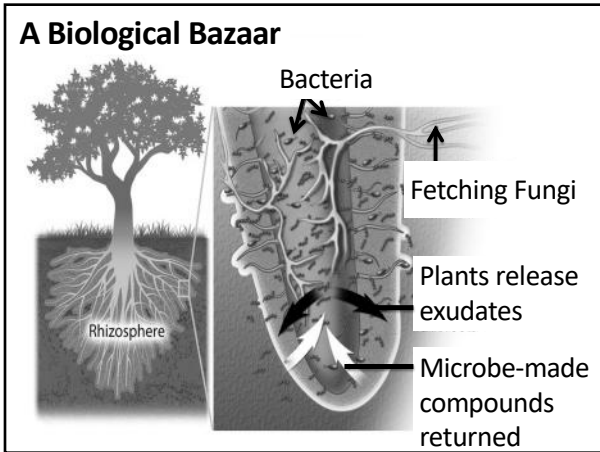
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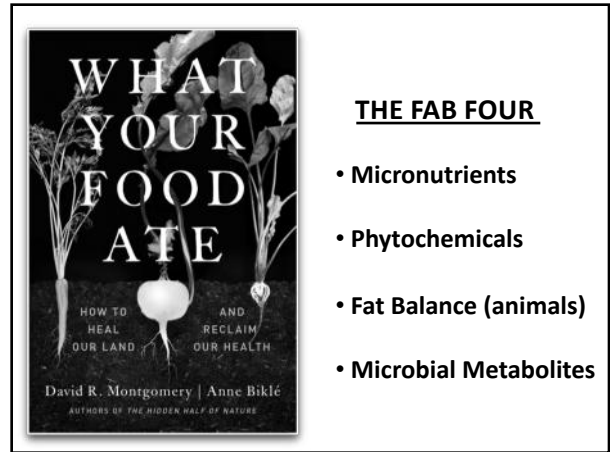
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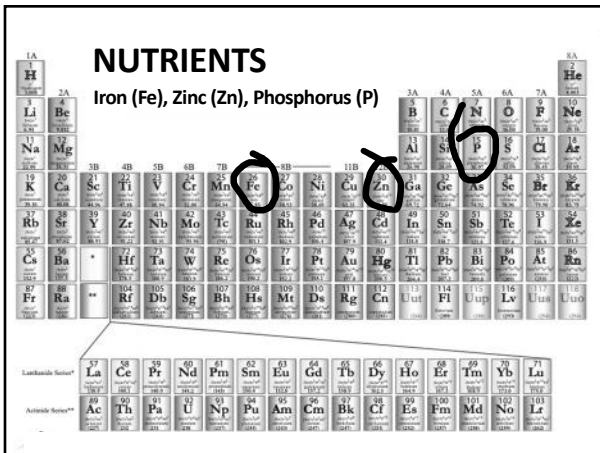
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*Journal of Plant Nutrition*, 29: 657-665, 2006

#### Solubilization of Insoluble Inorganic Phosphate by Hyphal Exudates of Arbuscular Mycorrhizal Fungi

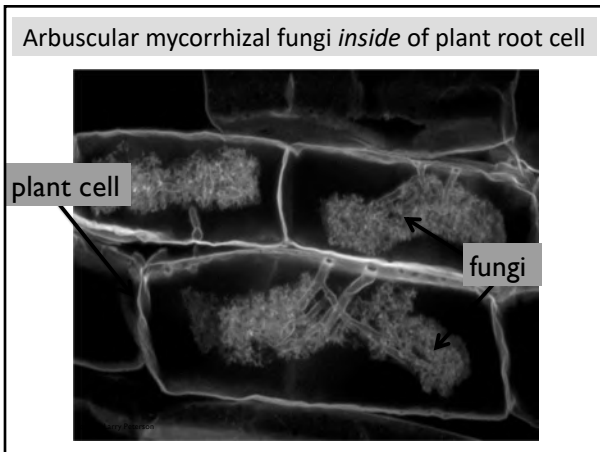
Keitaro Tawarayama, Makoto Naito, and Tadao Wagatsuma  
Faculty of Agriculture, Yamagata University, Tsuzuka, Japan

Table 1  
Shoot dry weight, P concentration, P uptake, and mycorrhizal colonization of onion with or without AM fungi 50 d after sowing

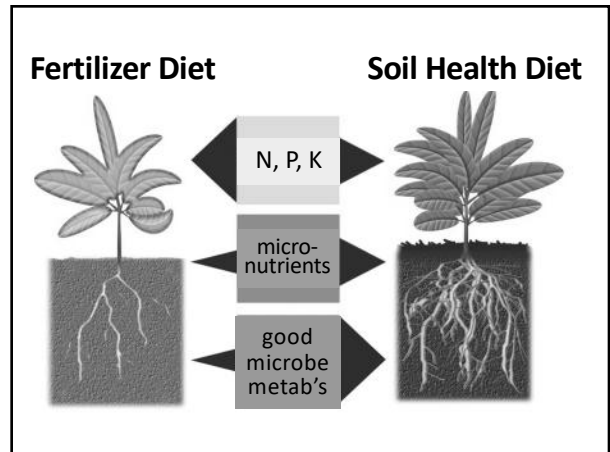
AM fungi	Dry weight (mg/plant)	P concentration (mg P/g)	P uptake ( $\mu$ g P/plant)	AM colonization (%)
Control	18.8 $\pm$ 3.8	1.342 $\pm$ 0.08	24.9 $\pm$ 4.5	0
<i>G. margarita</i>	53.7 $\pm$ 2.1	4.968 $\pm$ 0.15	266.7 $\pm$ 2.6	100
<i>G. etunicatum</i>	87.8 $\pm$ 24.3	2.125 $\pm$ 0.043	184.6 $\pm$ 49	87

Means  $\pm$  standard errors are indicated.

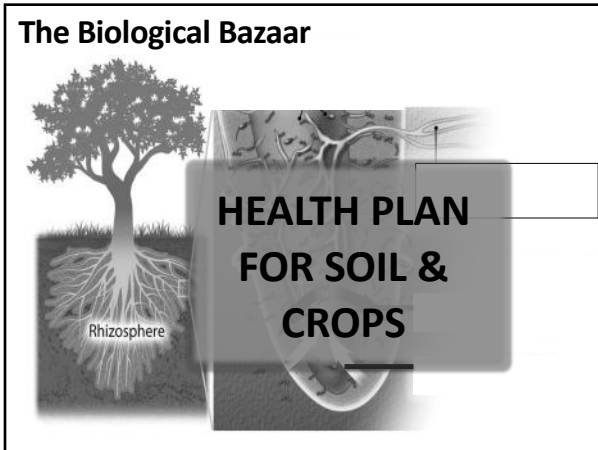
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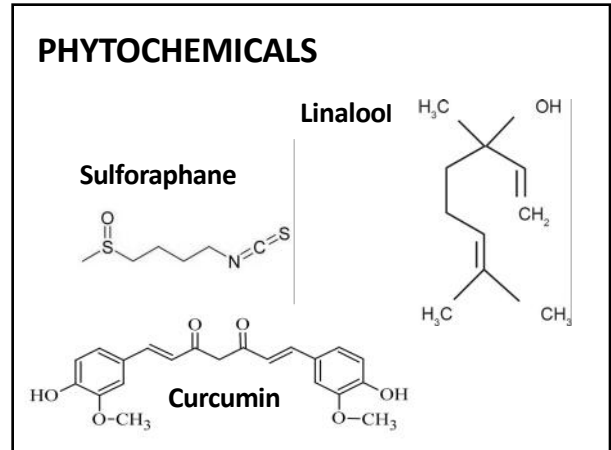
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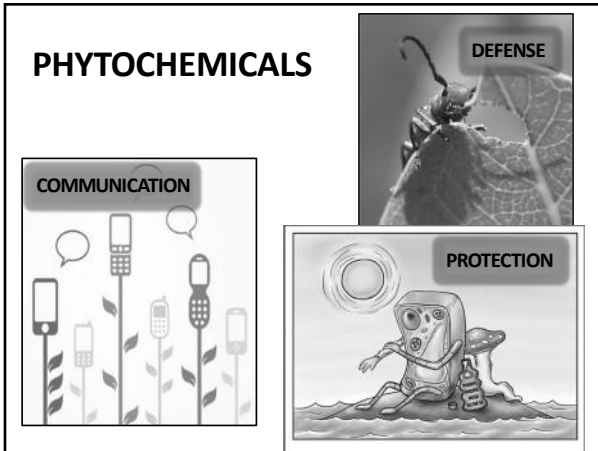
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**PeerJ**

**Soil health and nutrient density: preliminary comparison of regenerative and conventional farming**

David R. Montgomery<sup>1</sup>, Anne Biklé<sup>2</sup>, Ray Archuleta<sup>3</sup>, Paul Brown<sup>4</sup> and Jazmin Jordan<sup>5</sup>

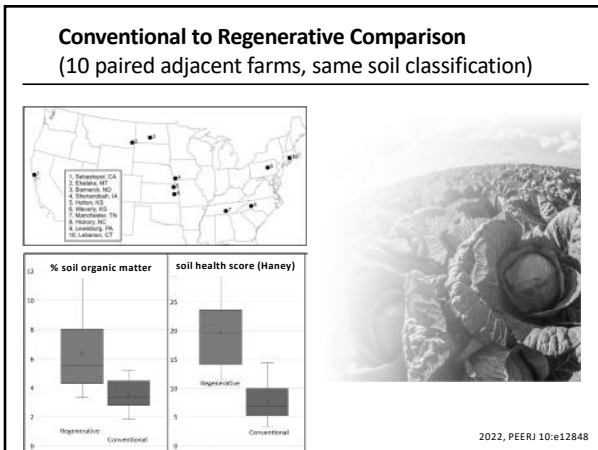
January, 2022

<sup>1</sup> Department of Earth and Space Sciences, University of Washington, Seattle, WA, United States  
<sup>2</sup> Dig2Grow.com, Seattle, WA, USA  
<sup>3</sup> Unaffiliated, Seymour, MO, USA  
<sup>4</sup> Brown's Ranch, Bismarck, ND, USA

**ABSTRACT**

Several independent comparisons indicate regenerative farming practices enhance the nutritional profiles of crops and livestock. Measurements from paired farms across the United States indicate differences in soil health and crop nutrient density between fields worked with conventional (synthetically-fertilized and herbicide-treated) or regenerative practices for 5 to 10 years. Specifically, regenerative farms that combined no-till, cover crops, and diverse rotations—a system known as Conservation Agriculture—produced crops with higher soil organic matter levels, soil health scores, and levels of certain vitamins, minerals, and phytochemicals. In addition, crops from two regenerative no-till vegetable farms, one in California and the other in Connecticut, had higher levels of phytochemicals than values

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**Conventional to Regenerative Comparison**  
(average values – cabbage, corn, peas, sorghum, soy)

Carotenoids	+15%
Phenolics	+20%
Phytosterols	+22%
Vitamin K	+34%
Vitamin C	+17%
Vitamin E	+15%
Vitamin B1	+14%

2022, PEERJ 10:e12848

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**PeerJ**

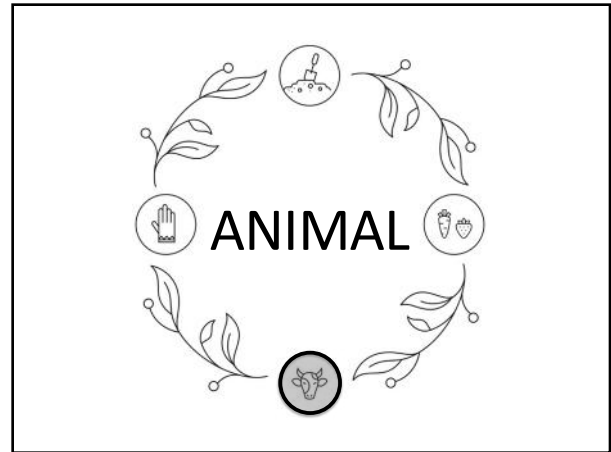
**Soil health and nutrient density: preliminary comparison of regenerative and conventional farming**

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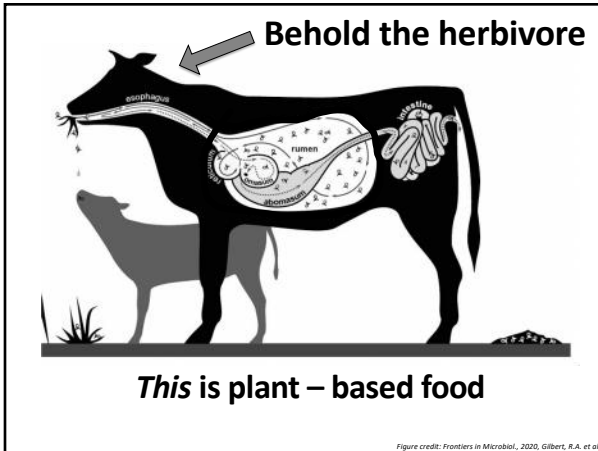
FARMS	COMPONENT	AVG. DIFFERENCE
10 PAIRS across U.S.	<b>PHYTOCHEMICALS</b> (carotenoids, phenolics, phytosterols)	↑ 15% to 20%
<b>CROPS</b> Cabbage Corn Peas Sorghum Soy	<b>MICRONUTRIENTS</b> (Vit's. C, E, K, B1)	↑ 15% to 30%
	<b>SOIL HEALTH SCORES</b> (e.g. organic matter, microbial activity)	↑ 30% to 2.5 times

2022, PEERJ 10:e12848

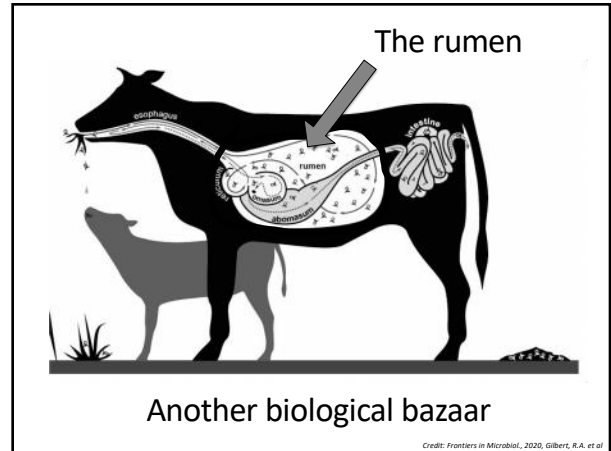
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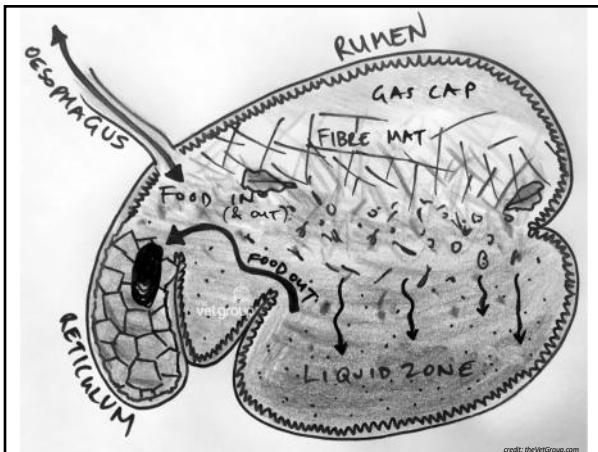
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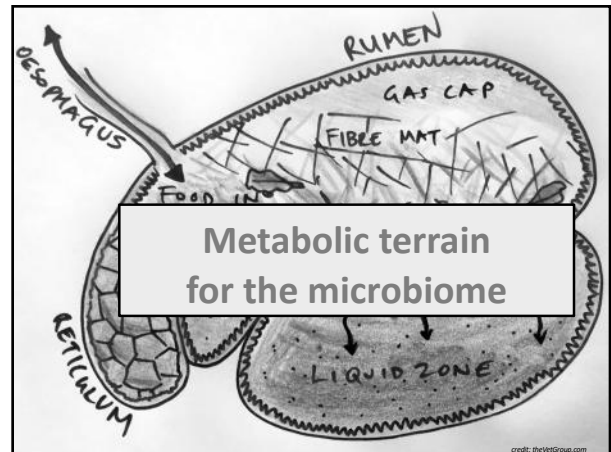
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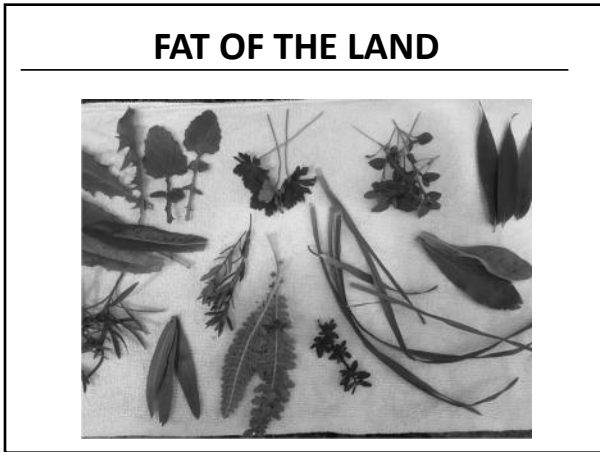
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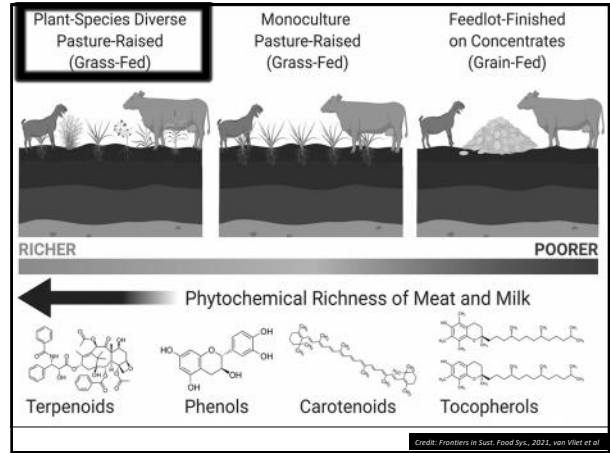
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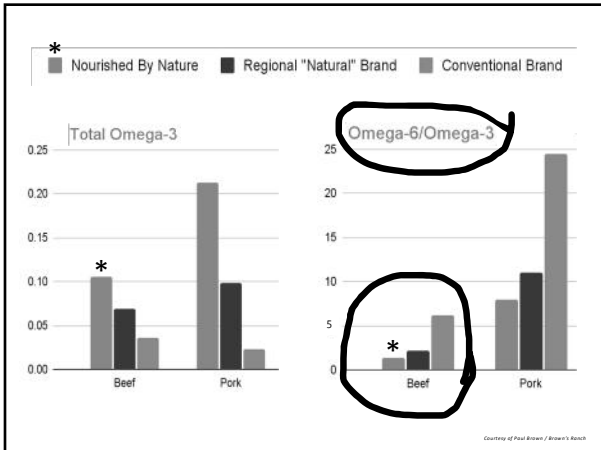


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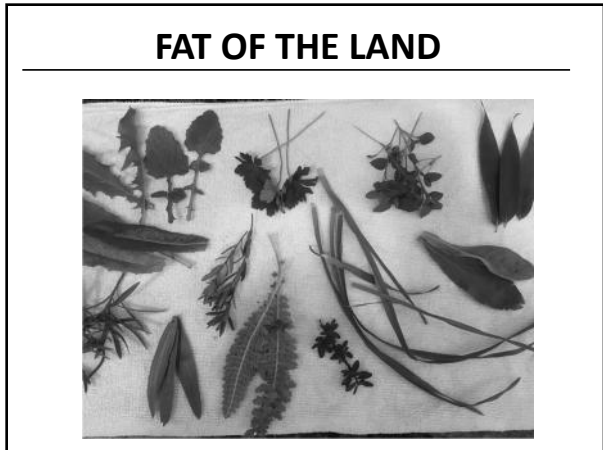


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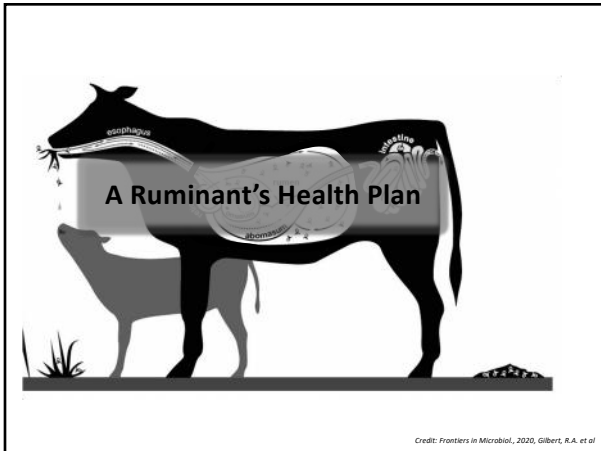




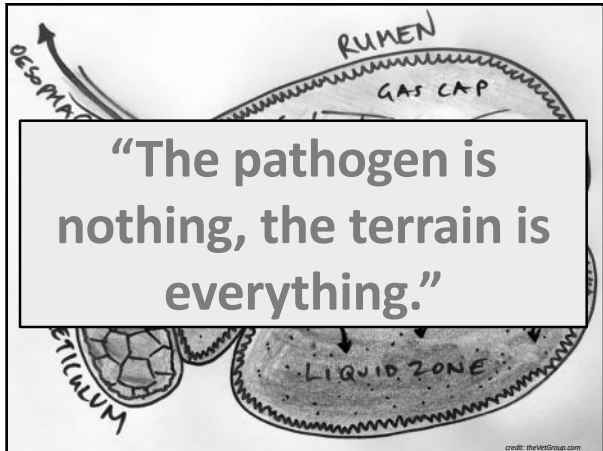
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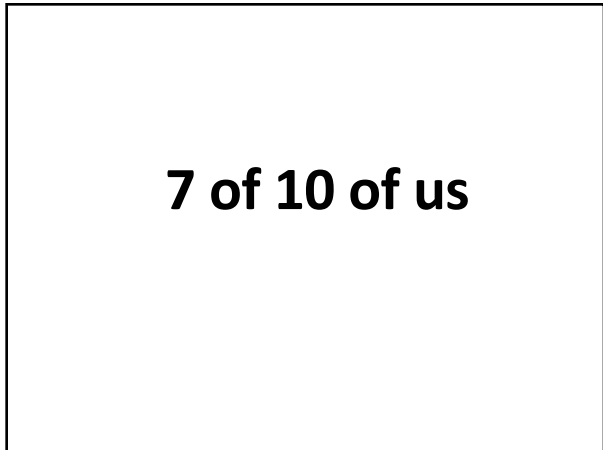
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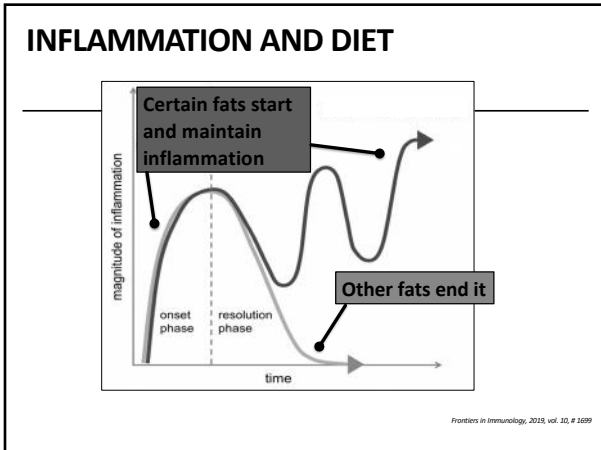
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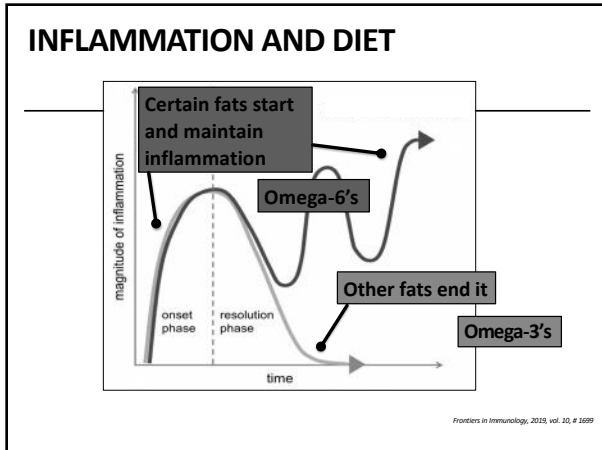
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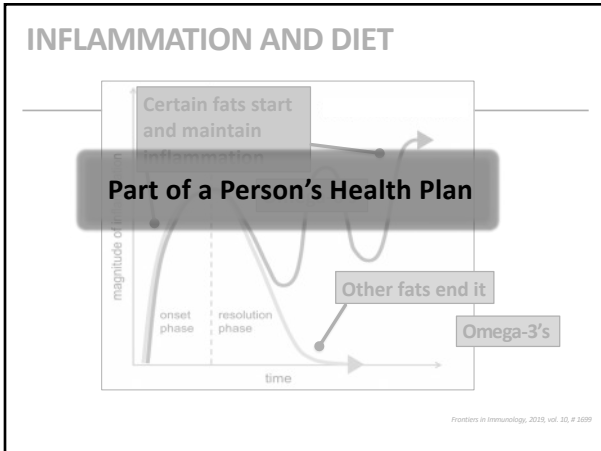
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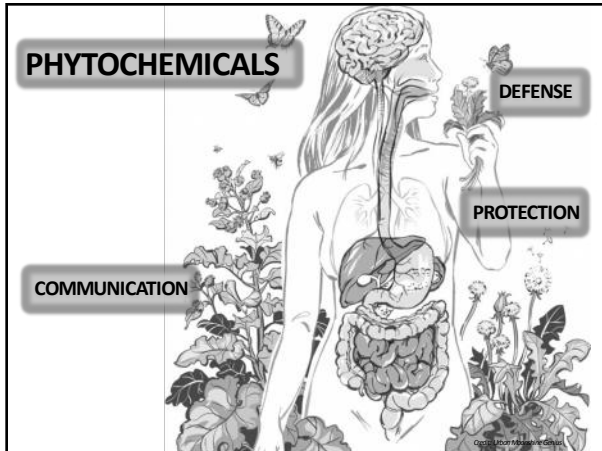
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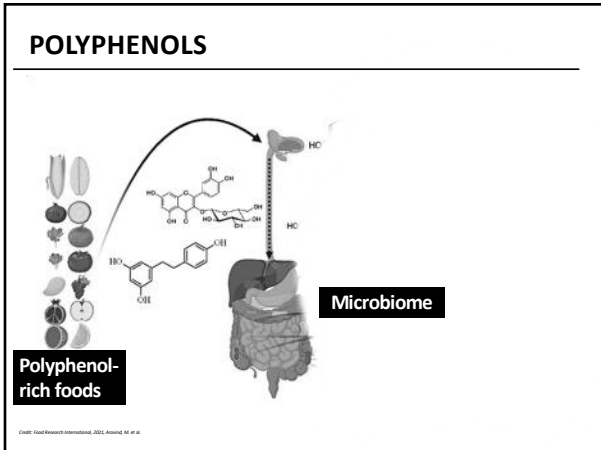
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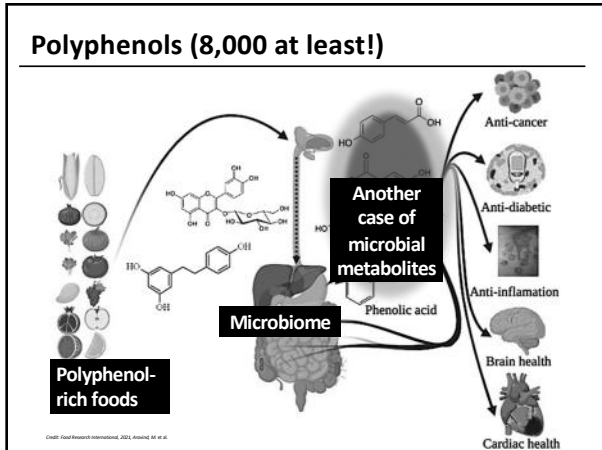
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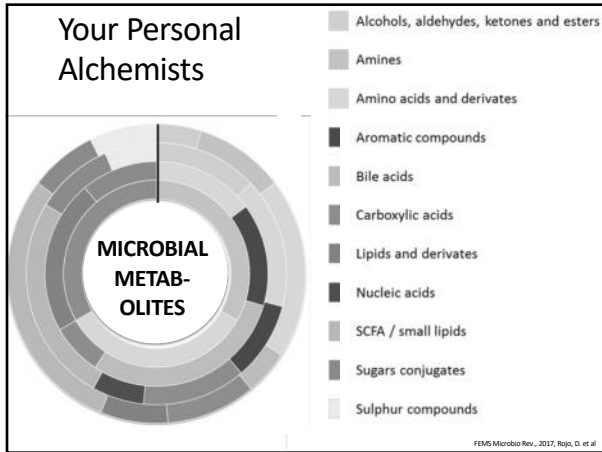
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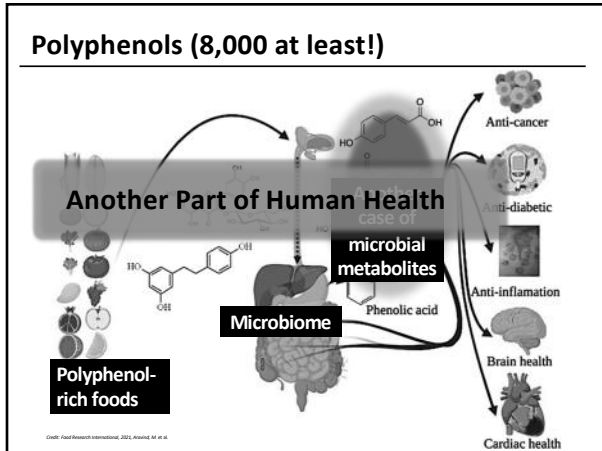
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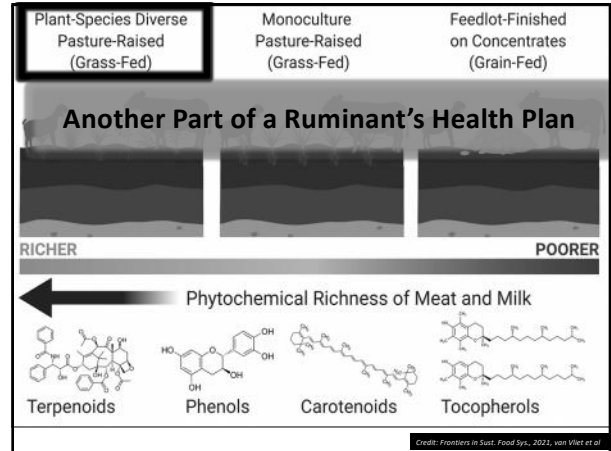
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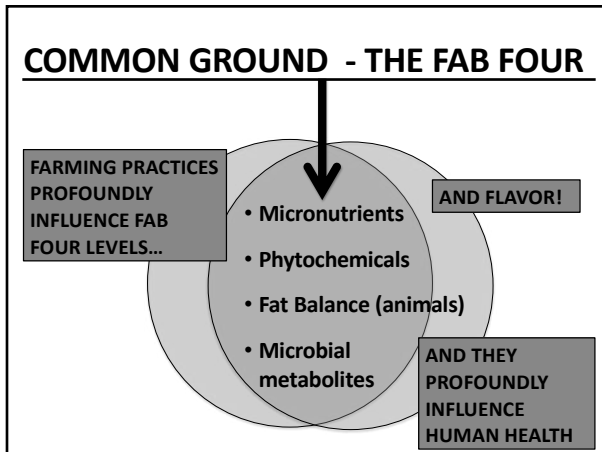
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### REGENERATIVE PRACTICES FOR ALL FARMING SYSTEMS

- 1: an act or the process of regenerating: the state of being regenerated;
- 2: spiritual renewal or revival;
- 3: renewal or restoration of a body, bodily part, or biological system (such as a forest) after injury or as a normal process.

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