# Food as Medicine

So
il

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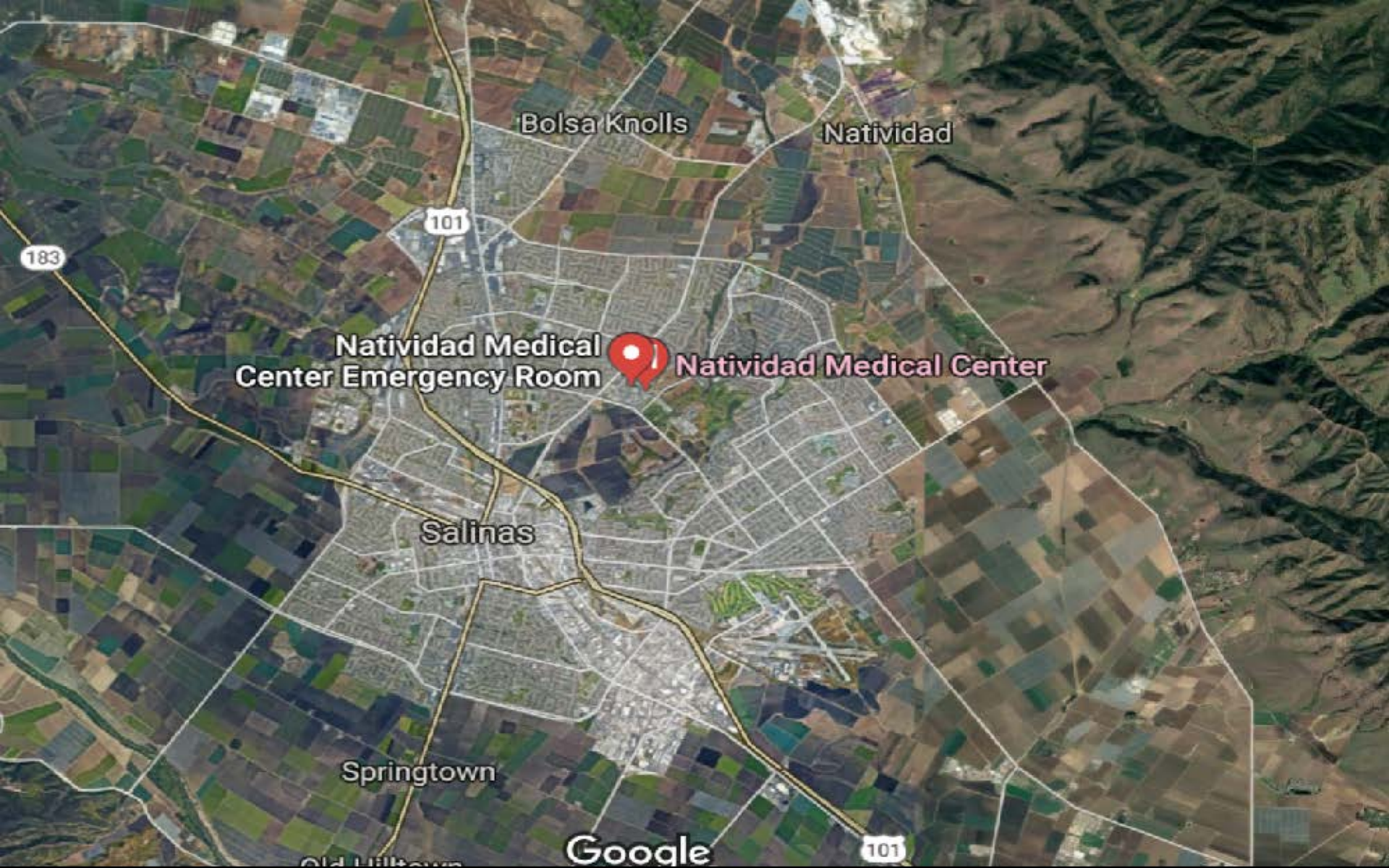
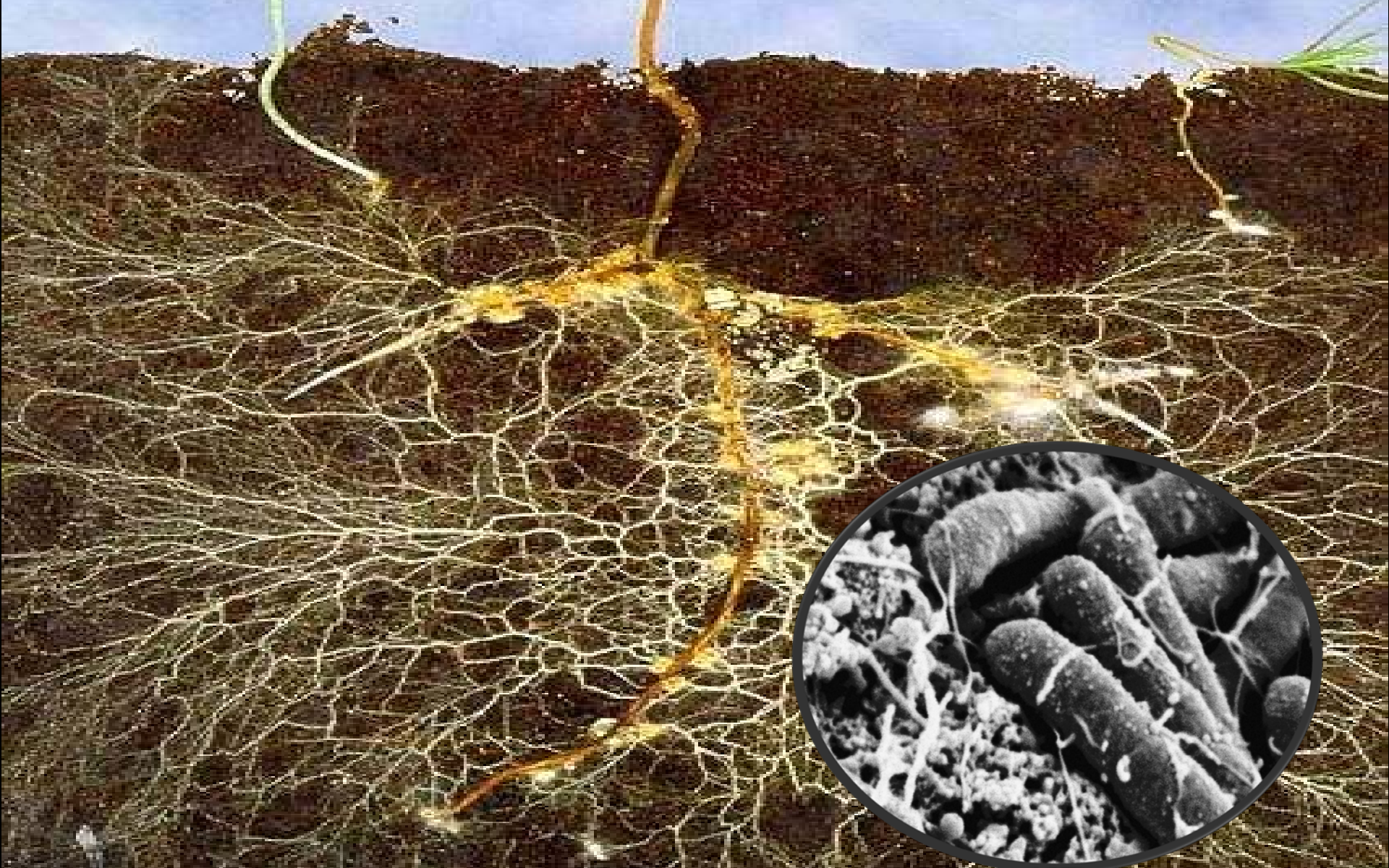
Jill
Clapperton

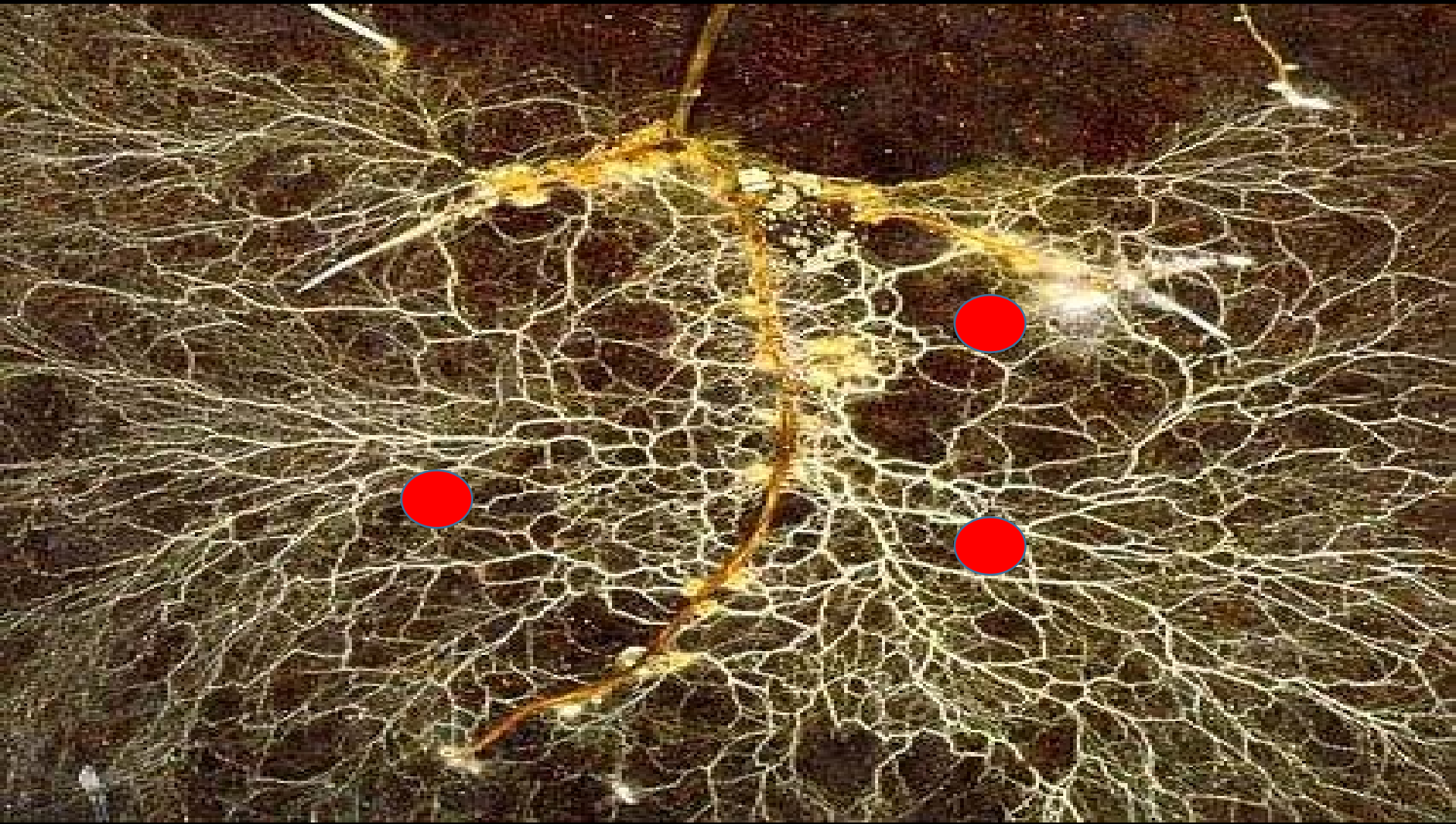

Bolsa Knolls
Natividad
101
183
Natividad Medical
Center Emergency Room
Natividad Medical Center
Salinas
Springtown
Google
101

Radon
Heavy metals
Pesticides
Pathogenic yeast
Antibiotic resistant bacteria
Tetanus


The Bronx District Public Health Office
NYC
Health


RALPH LAUREN





# Nutrient density and quality

Research and Professional Briefs

# Simple Measures of Dietary Variety Are Associated with Improved Dietary Quality

SUZANNE P. MURPHY, PhD, RD; JANET A. FOOTE, PhD; LYNNE R. WILKENS, DrPH; P. PETER BASIOTIS, PhD; ANDREA CARLSON, PhD; KAMI K. L. WHITE, MPH; KIM M. YONEMORI, RD

**ABSTRACT**

The objective of this study was to identify a measure of predictor of dietary quality, is relatively simple to calculate, and is easy to explain to consumers.

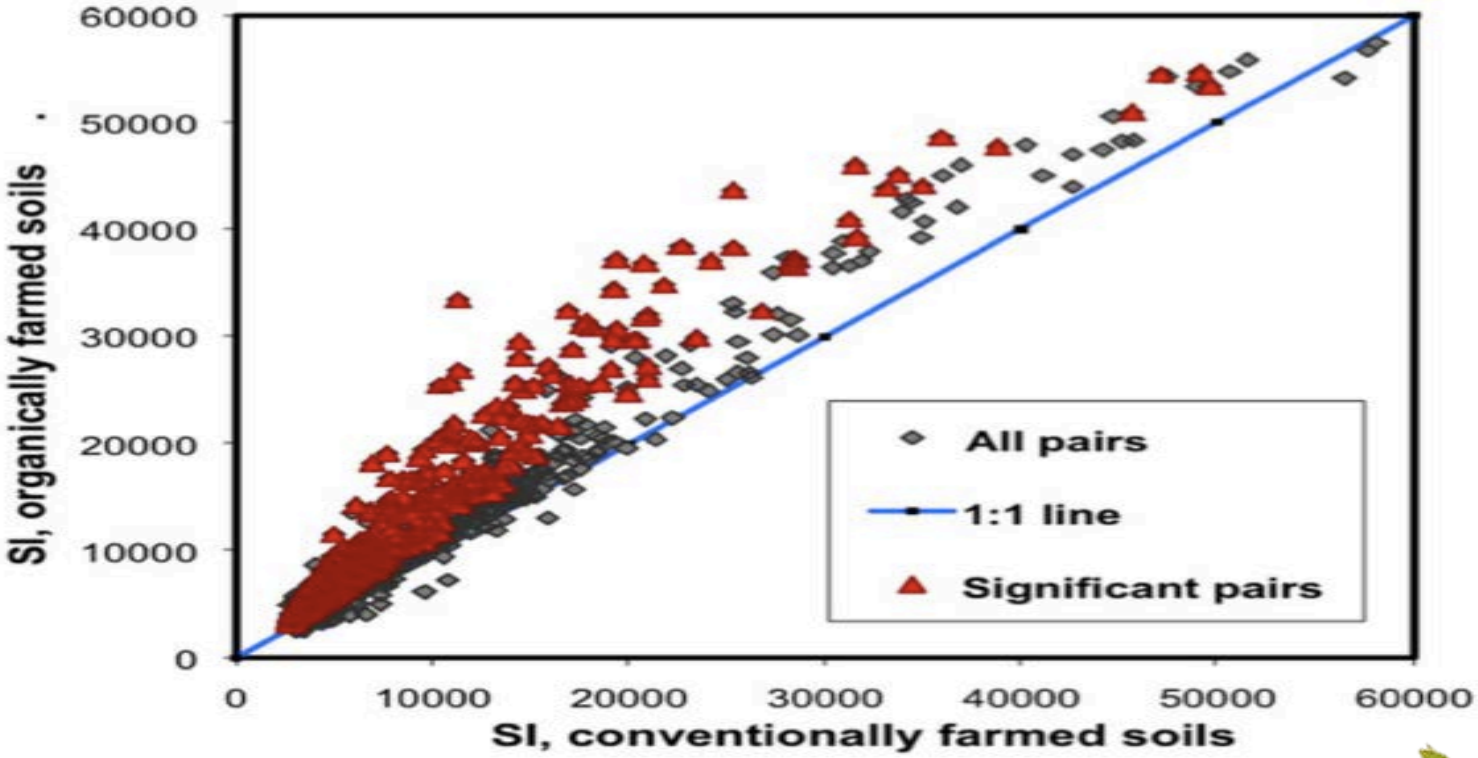
*J Am Diet Assoc. 2006;106:425-429.*

The Journal of Nutrition
Nutritional Epidemiology

# Plant Protein Intake and Dietary Diversity Are Independently Associated with Nutrient Adequacy in French Adults[1–3]

Clélia M Bianchi,[4] Manon Egnell,[4] Jean-François Huneau, and François Mariotti*

UMR Physiologie de la Nutrition et du Comportement Alimentaire, AgroParisTech, INRA, Université Paris-Saclay, 75005, Paris, France




Reganold, PLoS ONE, 2010

| Nutrient | High biodiverse/ Low biodiverse | *P* value |
|---|---|---|
| antioxidant activity | 1.08 | 0.019 |
| phenolics | 1.10 | 0.0003 |
| ascorbic acid | 1.10 | 0.009 |

Research

Open Access

# Soil anti

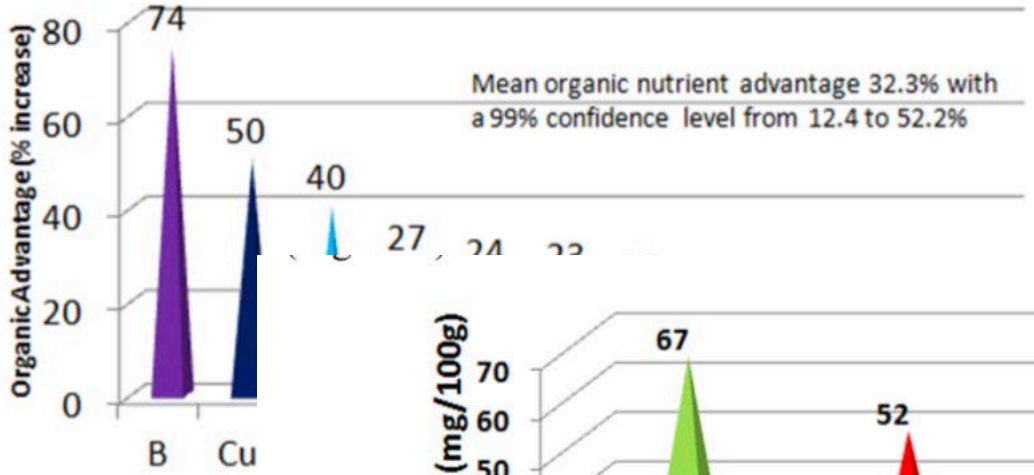



**Figure 2** Organic f
organic soil system
comparing organic a
System Trial 2003, Ku

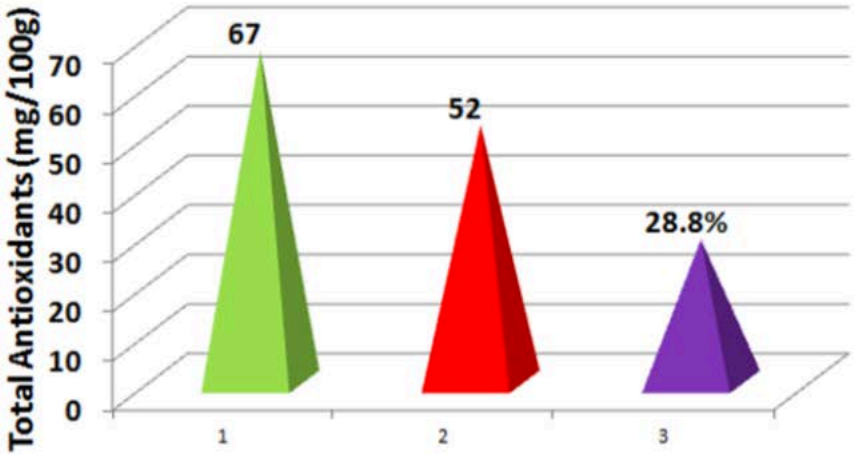



**Figure 6** Total carrot antioxidants (mg/100g) green organic legacy (green) conventional (red)and organic percent advantage (violet) from Rodale FST Kutztown, PA 2005.

**Abstrac**

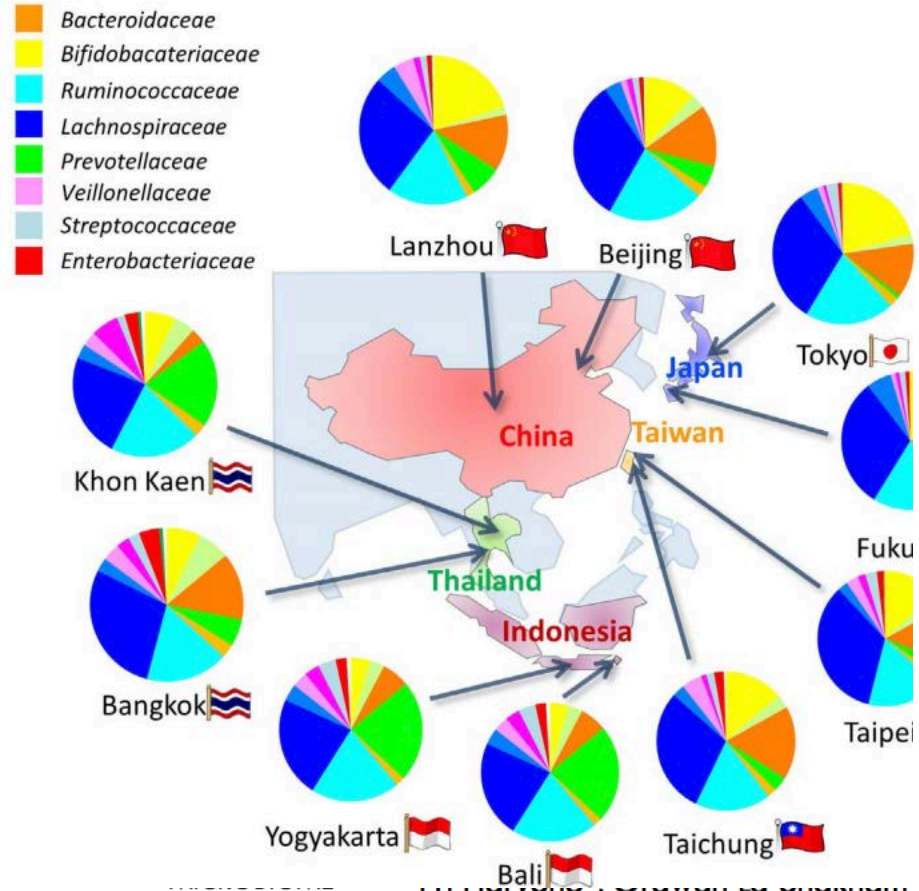
Since 198
conventic
potential
system n
first 5 years, org systems were increase
farming systems do not employ org re
instead they relied on biologically b
rotation and organic amendment. Cor
herbicide without biological based inp
SOC and SON but were not statistic
SON opened a research venue suppo
can affect i) crop nutrition ii) disease
system legacies allowed effective SOC/SON differentiations and comparison. Different soil
levels were compared under the same location and same genotypes eliminated confounding

CHAPTER 3.3

# Linking Soil Biodiversity and Human Health: Do Arbuscular Mycorrhizal Fungi Contribute to Food Nutrition?

**Pedro M. Antunes, Philipp Franken, Dietmar Schwarz, Matthias C. Rillig, Marco Cosme, Martha Scott, and Miranda M. Hart**

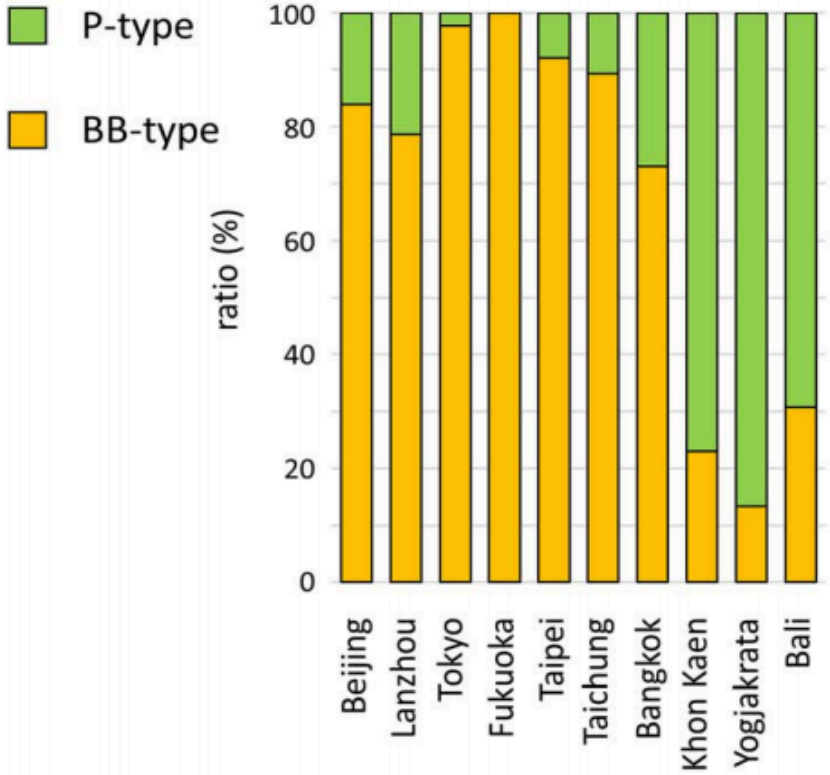
*Soil Ecology and Ecosystem Services*. First Edition. Edited by Diana H. Wall *et al*.



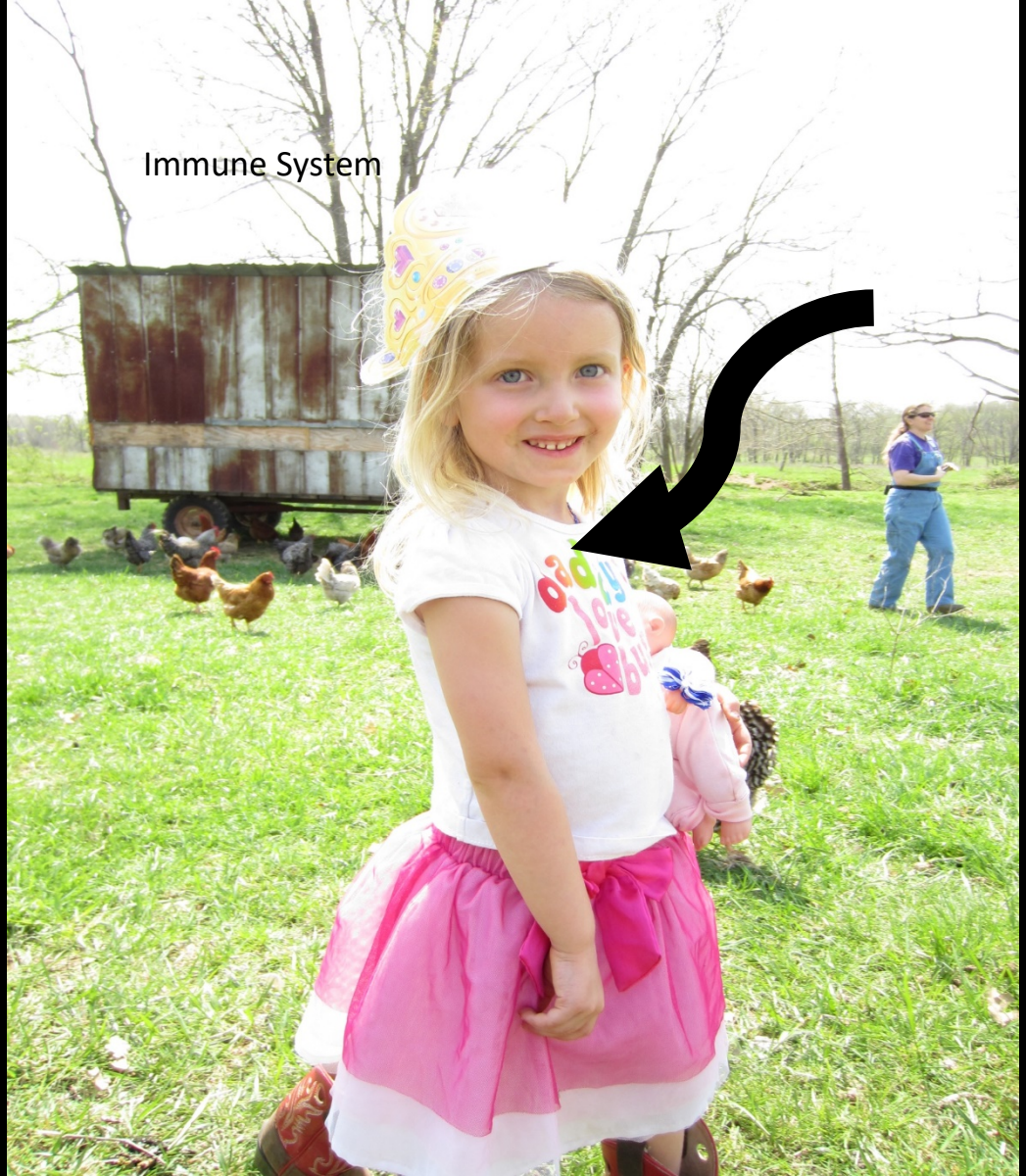

MICROBIAL ECOLOGY

Received
4 September 2014

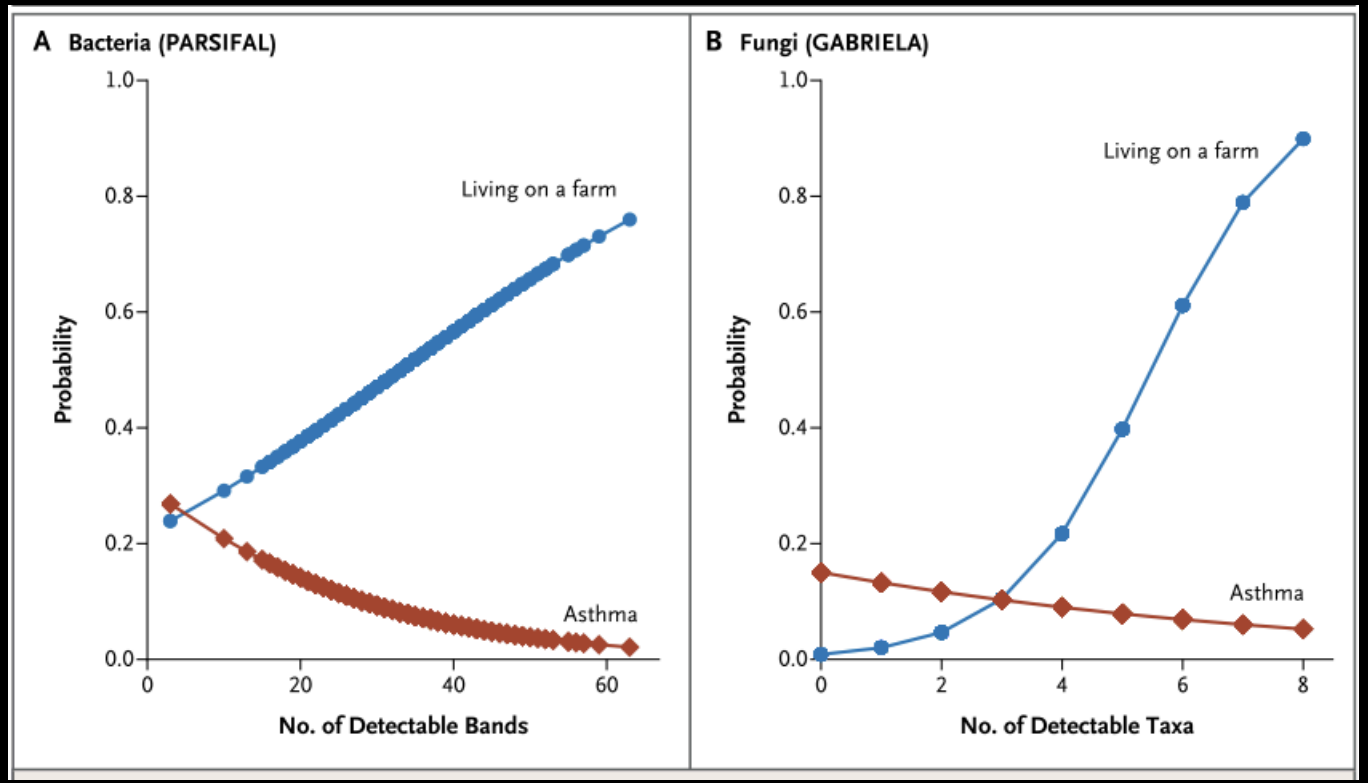
Kang-Ting Chen[9], Yen-Po Chen[10], H
Chikako Kiyohara[12], Takashi Kurak
Hirokazu Tsuji[2], Ming-Ju Chen[10], Vi
Endang S. Rahayu[5], Fa-Zheng Ren[8],



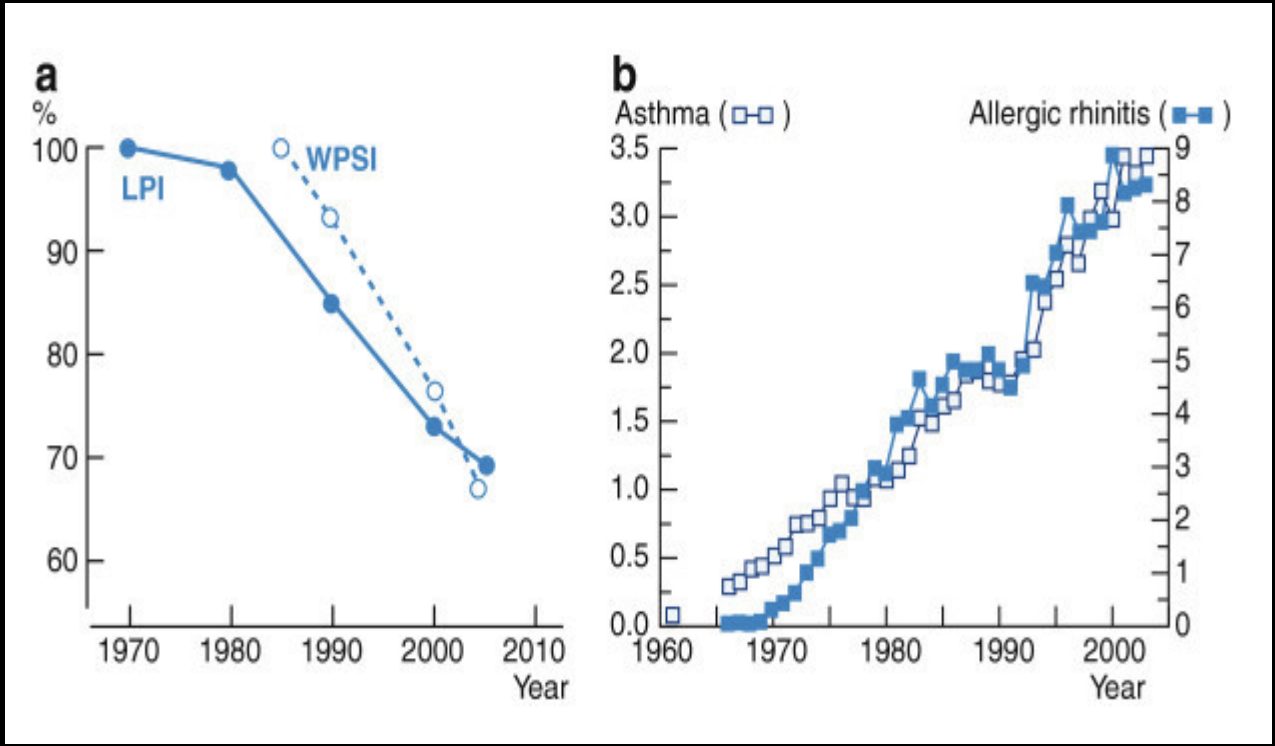
# Nutrient density and quality


Immune System

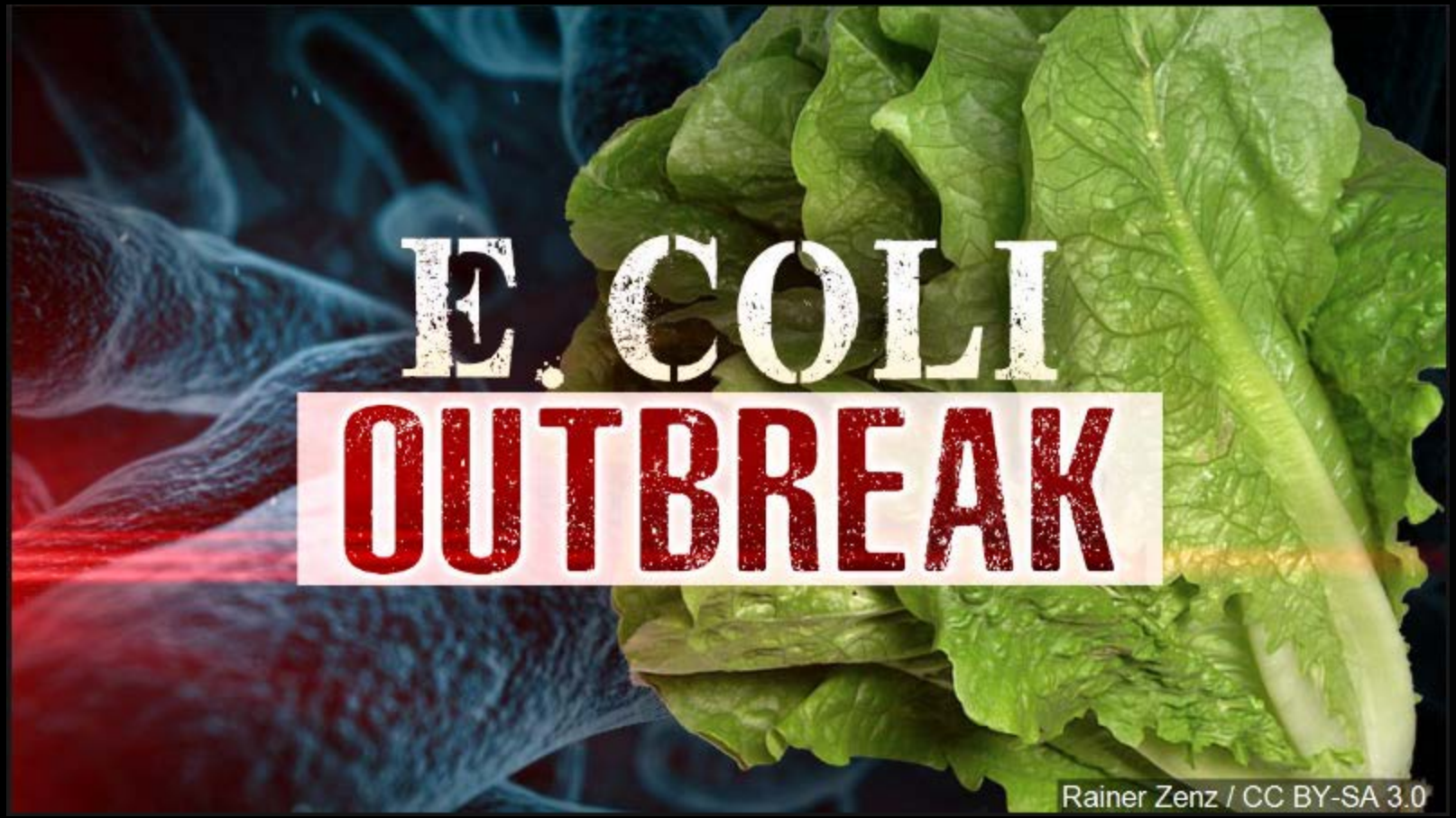
# Microbial diversity and asthma

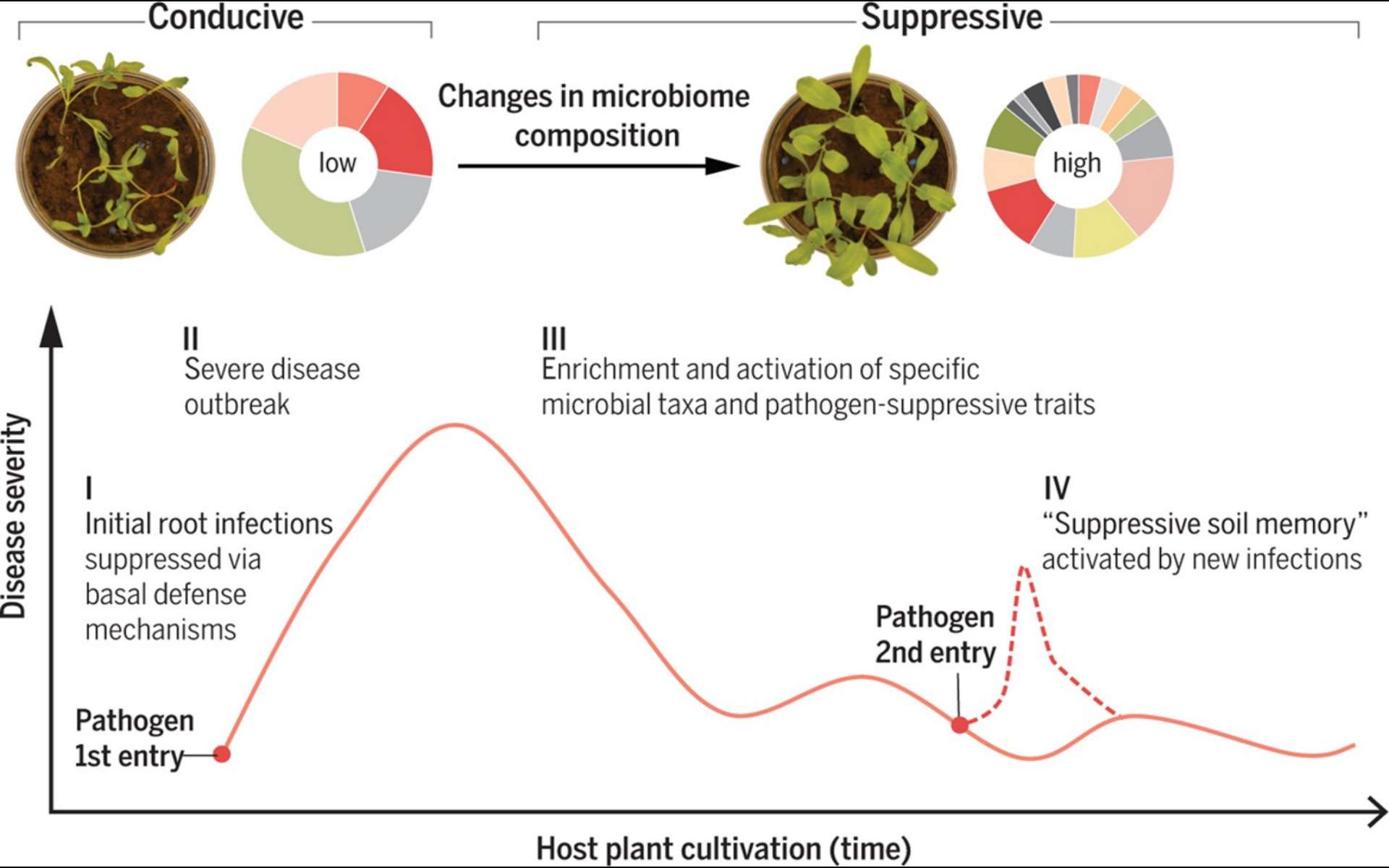


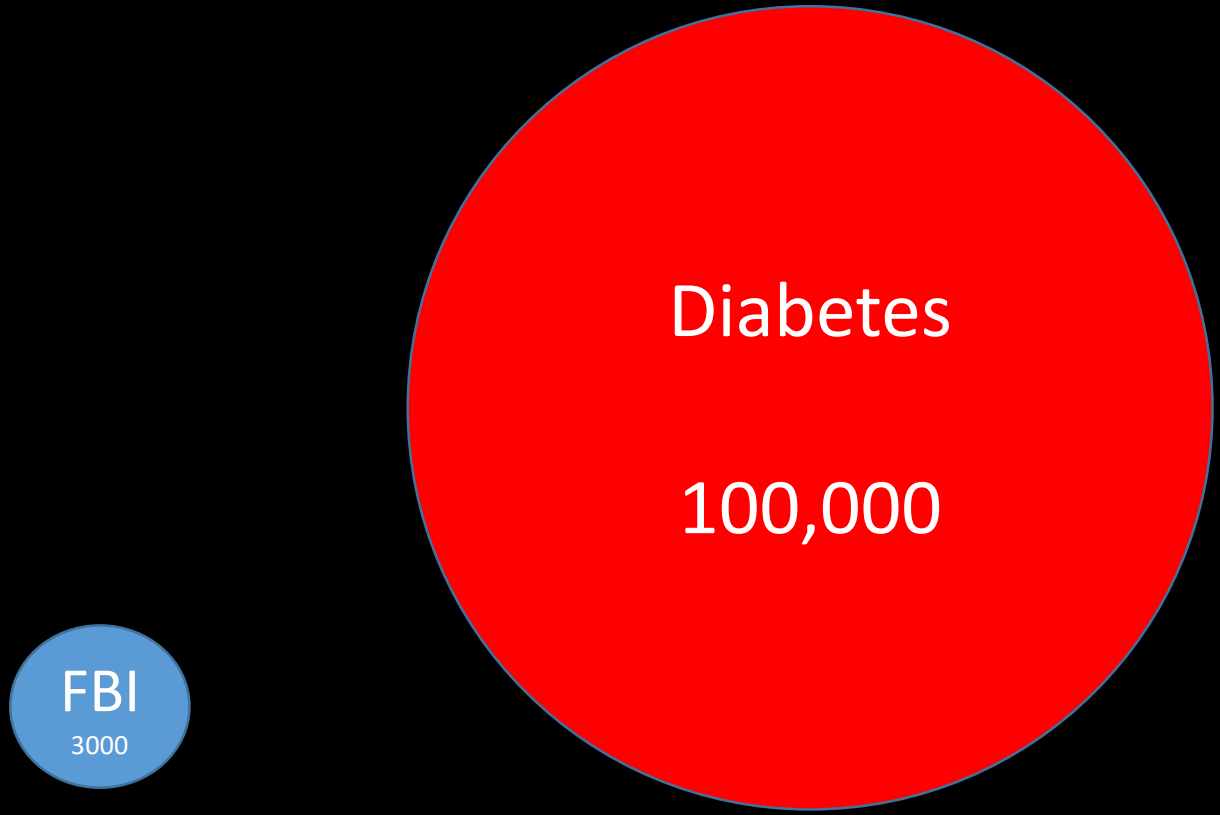

Ege, NEJM: 2011




http://www.waojournal.org/content/6/1/3


E. COLI
OUTBREAK
Rainer Zenz / CC BY-SA 3.0


Conducive
Suppressive
low
Changes in microbiome composition
high
II
Severe disease outbreak
III
Enrichment and activation of specific microbial taxa and pathogen-suppressive traits
I
Initial root infections suppressed via basal defense mechanisms
IV
"Suppressive soil memory" activated by new infections
Pathogen 2nd entry
Pathogen 1st entry
Disease severity
Host plant cultivation (time)


Diabetes
100,000
FBI
3000
$15 billion
$825 billion

OP-ED | ENVIRONMENT & HEALTH

# A Soil Microbe Saved My Life

BY

Emily Cassidy, ENSIA

PUBLISHED

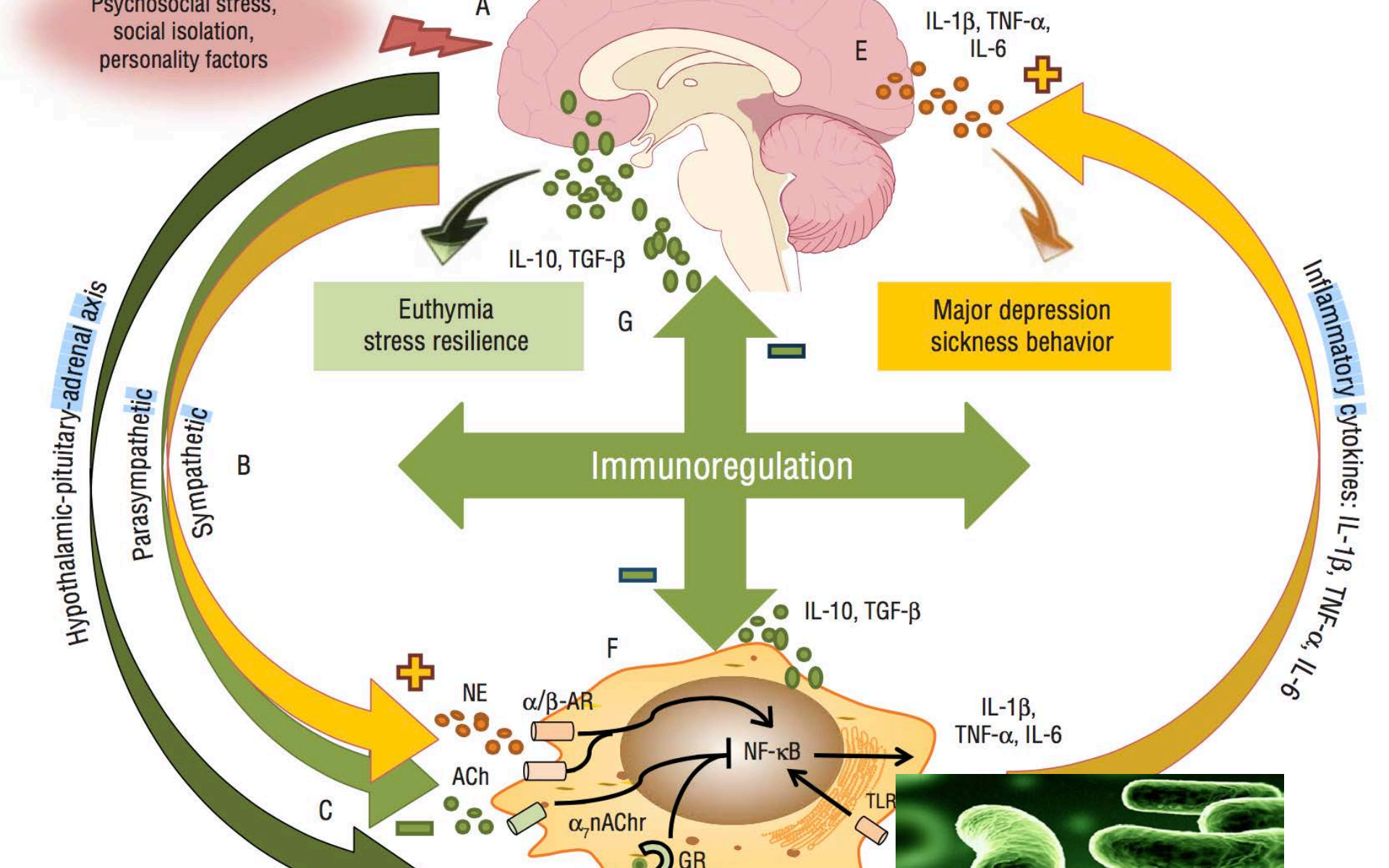
December 25, 2018

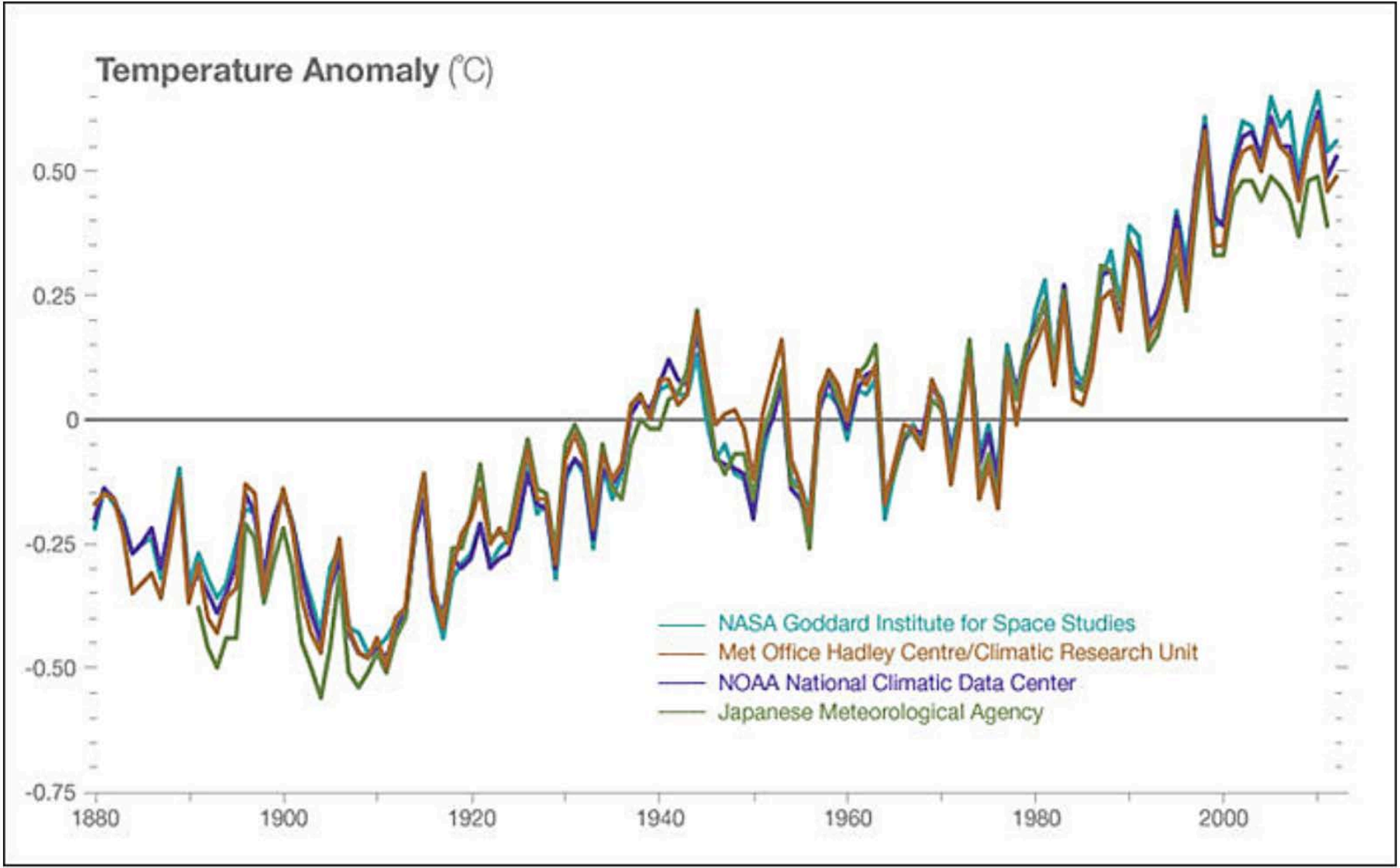


"After nature helped me recover from cancer, I recognize the value of protecting it more than ever."

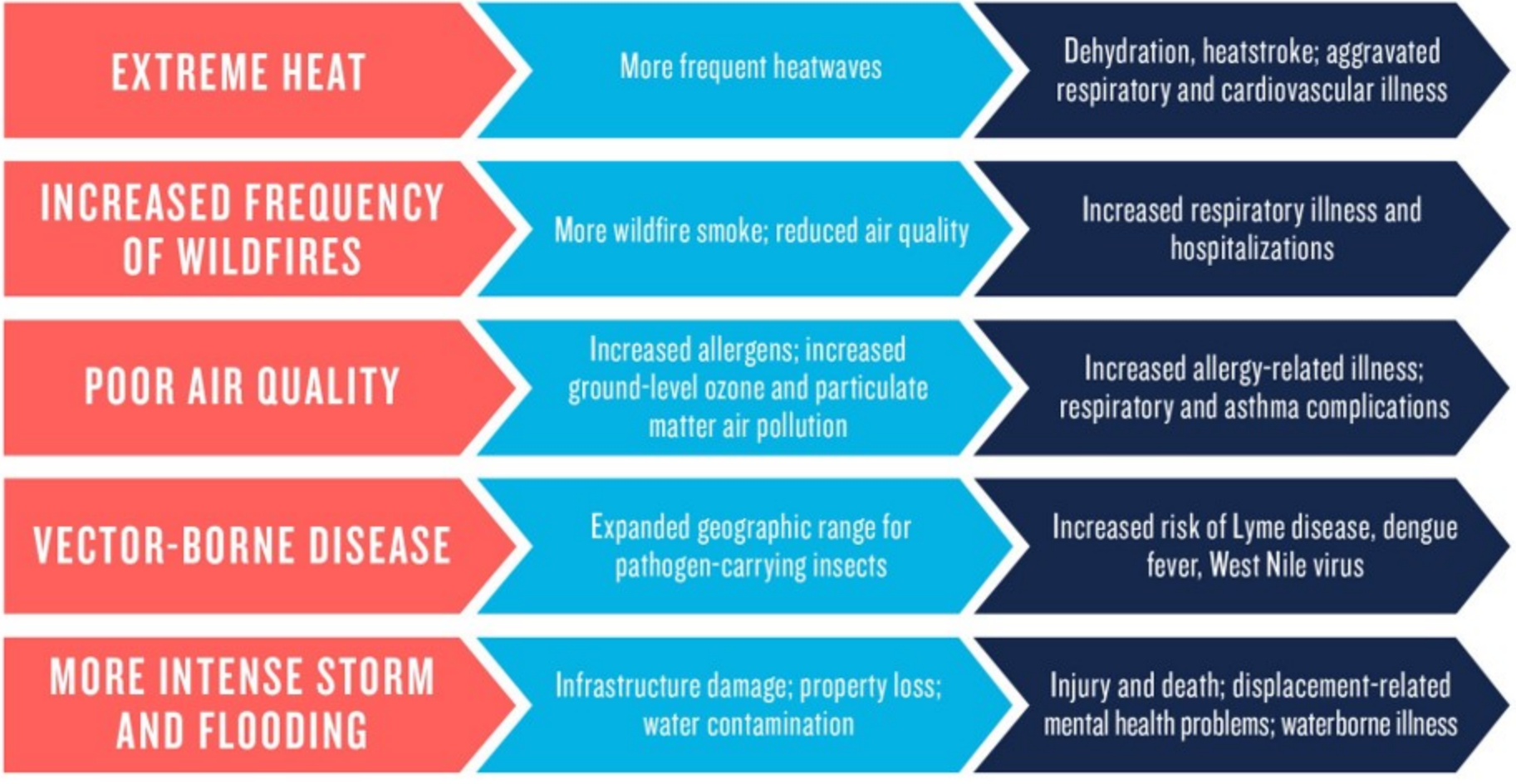
COURTESY OF EMILY CASSIDY


Myco
bacterium
vacca


Psychosocial stress,
social isolation,
personality factors
A
E
IL-1β, TNF-α,
IL-6
IL-10, TGF-β
Euthymia
stress resilience
G
Major depression
sickness behavior
Hypothalamic-pituitary-adrenal axis
Parasympathetic
Sympathetic
B
Immunoregulation
Inflammatory cytokines: IL-1β, TNF-α, IL-6
IL-10, TGF-β
F
NE
α/β-AR
ACh
NF-κB
TLR
C
α7nAChr
GR
IL-1β,
TNF-α, IL-6


Temperature Anomaly (°C)
0.50
0.25
0
-0.25
-0.50
-0.75
1880
1900
1920
1940
1960
1980
2000
NASA Goddard Institute for Space Studies
Met Office Hadley Centre/Climatic Research Unit
NOAA National Climatic Data Center
Japanese Meteorological Agency

# CLIMATE CHANGE THREATENS HUMAN HEALTH

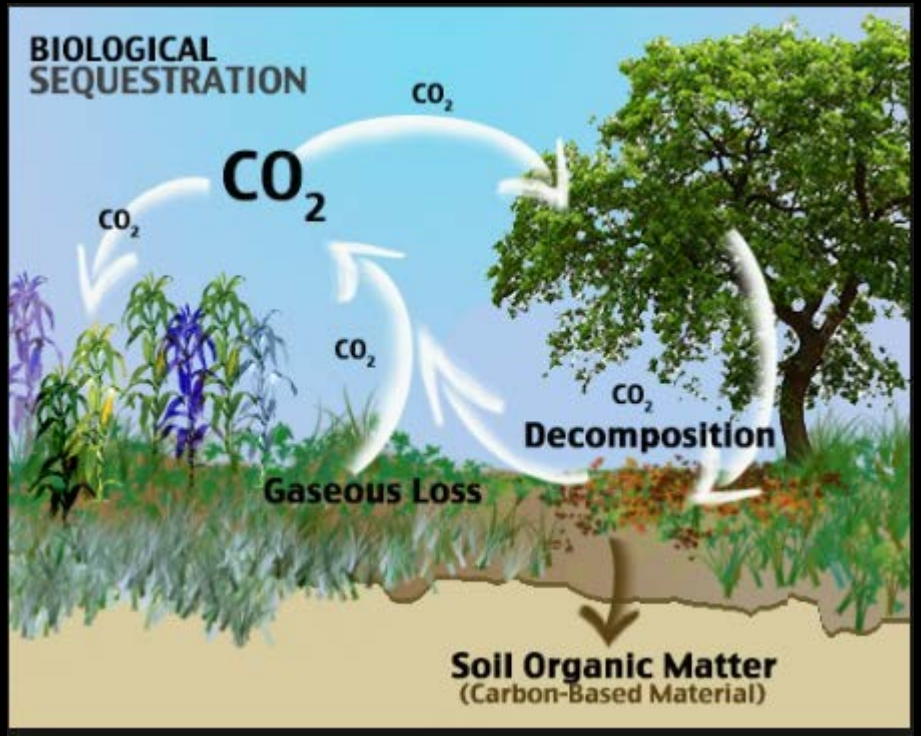


# THE CARBON FARMING SOLUTION

A Global Toolkit of Perennial Crops and Regenerative Agriculture Practices for Climate Change Mitigation and Food Security

ERIC TOENSMEIER

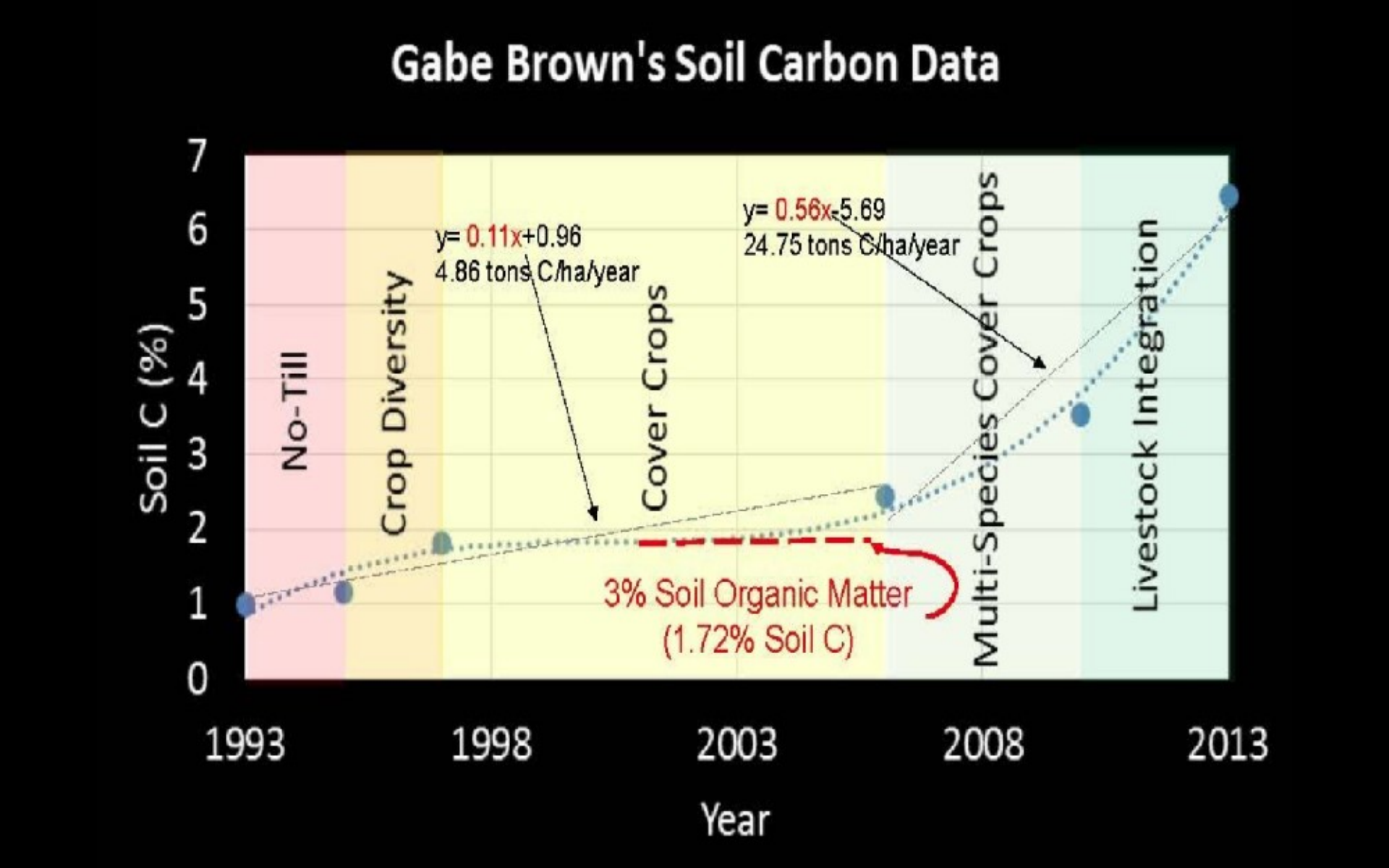
Foreword by Dr. Hans Herren

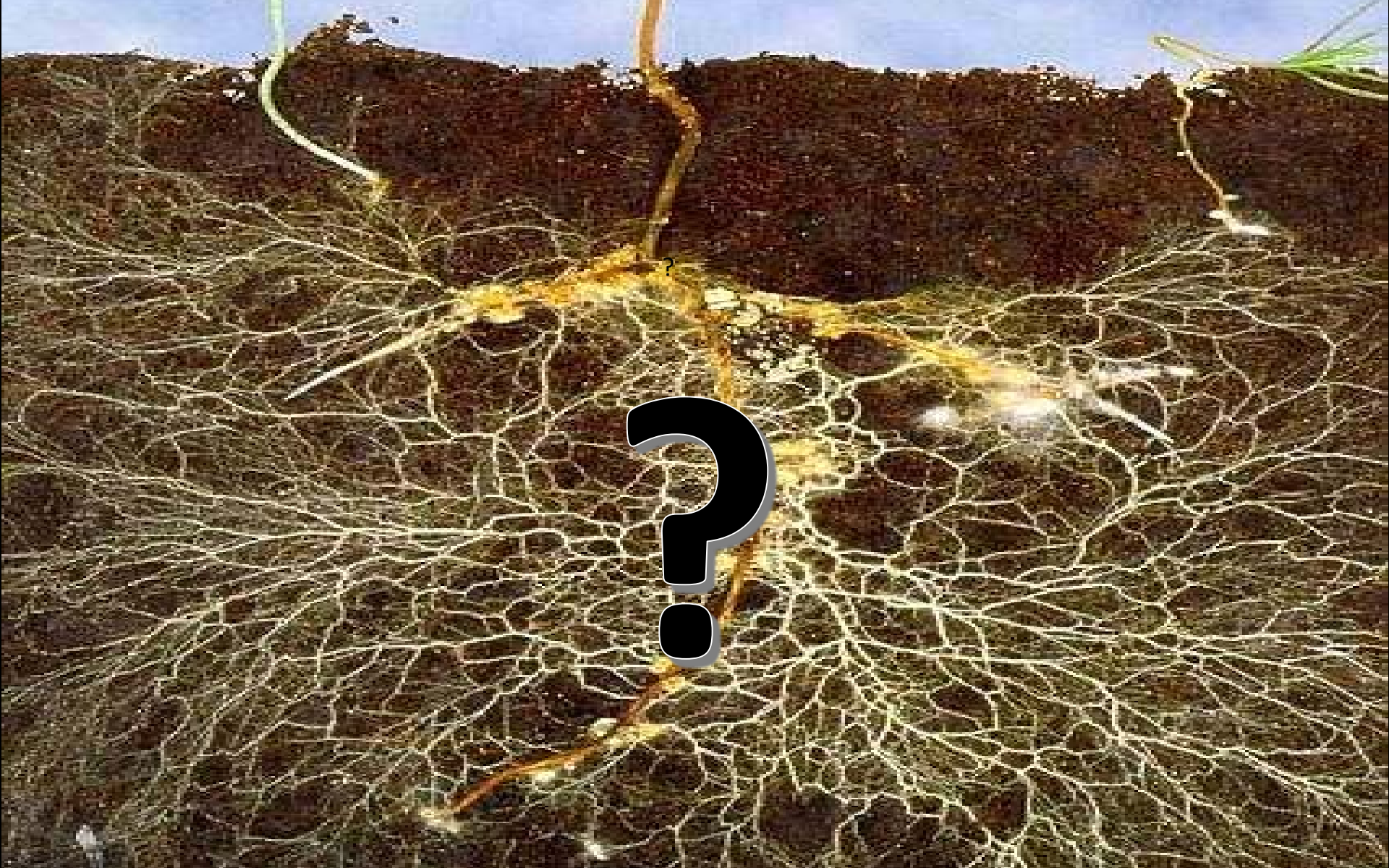


# WELCOME TO THE"4 PER 1000" INITIATIVE



## WHAT IS THE "4 PER 1000" INITIATIVE


Gabe Brown's Soil Carbon Data
Soil C (%)
0
1
2
3
4
5
6
7
1993
1998
2003
2008
2013
Year
No-Till
Crop Diversity
Cover Crops
Multi-Species Cover Crops
Livestock Integration
y= 0.11x+0.96
4.86 tons C/ha/year
y= 0.56x-5.69
24.75 tons C/ha/year
3% Soil Organic Matter
(1.72% Soil C)




University of California
Div. of Agriculture and Natural Resources
WEST SIDE
Research & Extension Center
17353 W. Oakland Avenue
Fresno Co. Dept. of Agriculture
Huron District Office

Diversity of plantings

Avoid disturbance

Minimal inputs


Diversity
of plantings


TWO
CITIES
HALF-SK


Avoid
disturbance
MaxEmergePlus
VacuMeter


Minimal inputs

Diversity of plantings

Avoid disturbance

Minimal inputs


RANCHO CIENEGA
DE LOS
PAICINES
ROBERT B. LAW
Decolonize

## *Priority Transdisciplinary Research Themes*

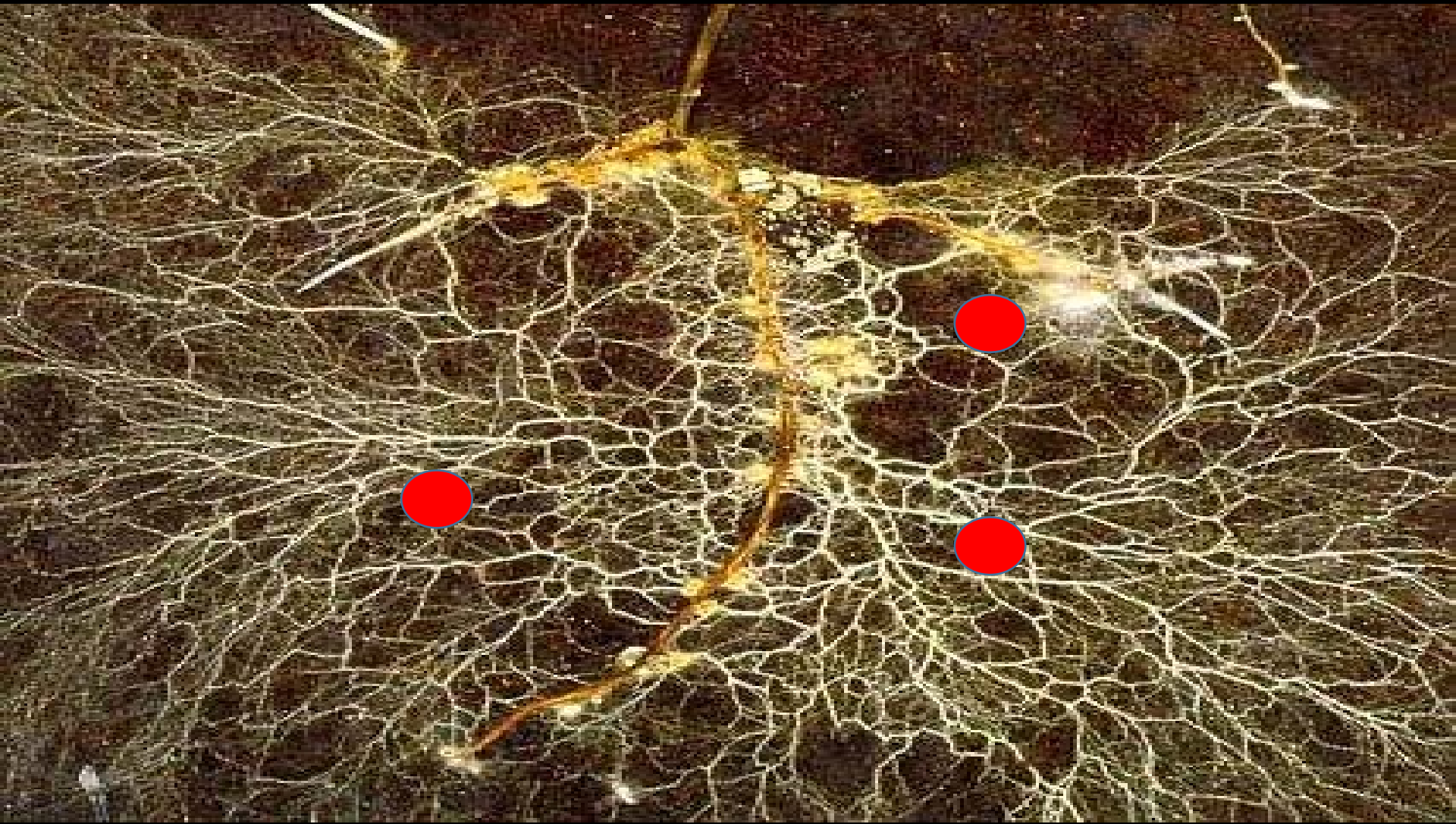
- ✔ Understand soil health and regenerative systems around the world and their impacts on the environment and the global food system. Validate methods for soil health measurement across soils and regions. Involve farmers in research efforts. Use existing programs in Agricultural Extension and Farm Bill programs to assist in implementation, motivation, and education.

- ✔ Understand the fundamental microbiome structures and functions related to land management, soil health, and human health. Connect existing research on the human microbiome to the soil microbiome.

- ✔ Determine how the known suite of soil health practices can impact human wellness, economy, and the environment. Determine the mechanism linking soil management with nutrition (density) and content of the food produced.

- ✔ Characterize human-soil interactions for exposure analyses, health impacts, and avenues for intervention. Communicate results with scientific, grower, and technical stakeholders at various scales and locations.

- ✔ Identify specific partners to increase and optimize bioavailability in soil health agricultural management systems to decrease contamination and promote community well-being.



RESEARCH ARTICLE

# The Mental Health of the Organic Farmer

## Psychosocial and Contextual Actors

Christina Brigance[1], Francisco Soto Mas[1], Victoria Sanchez[1], and Alexis J. Handal[1]

**Abstract:** Despite the large body of research and literature on the health and mental health of farmers, we should not assume that research findings necessarily apply to the organic farmer. The limited literature on the mental health of the organic farmer points to potential differences. Research has found that workers on organic farms may be happier than their counterparts; others have identified added sources of stress related to the perceived need of organic farmers to embrace concepts linked to the organic movement. However, further research is needed to identify both risk and protective factors for mental health among organic farmers. The purpose of this qualitative descriptive study was to explore the psychosocial and contextual factors that may relate to the mental health of the organic farmer. Key informant interviews were conducted with 10 farm producers and 20 farm workers. The findings indicated that respondents recognized mental health as influential in the workplace and the future of organic practices (e.g., the mental, financial, physical stress). Some of the risk factors mentioned by participants reflected those experienced

Agency for Safety and Health at Work, 2016; Waddell & Burton, 2006), there are many intrapersonal and external factors that may contribute to job-related injury and illness, including psychological disorders. Failure to address occupational risks can be costly for employers, workers, and societies in general (F. Bond, Flaxman, & Loivette, 2006; Cooper, Cartwright, Liukkonen, & European Foundation for the Improvement of Living and Working Conditions, 1996; de Greef & van den Broek, 2004). The work environment can affect performance and generate both physical and mental stressors that may lead to occupational injury and illness (M. Bond et al., 2007; Holmberg, Thelin, Stiernström, & Svärdsudd, 2004; Rosário, Fonseca, Nienhaus, & da Costa, 2016). In Europe, for example, 50% to 60% of all lost working days are attributed to work-related stress (International Labour Organization, 2014). Farmers in particular confront a variety of psychosocial and contextual issues that may affect their mental health and compromise their safety.

Occupational psychosocial factors have traditionally referred to the organization of work process including schedule

Neuroscience. 2007 May 11;146(2):756-72. Epub 2007 Mar 23.

# Identification of an immune-responsive mesolimbocortical serotonergic system: potential role in regulation of emotional behavior.

Lowry CA[1], Hollis JH, de Vries A, Pan B, Brunet LR, Hunt JR, Paton JF, van Kampen E, Knight DM, Evans AK, Rook GA, Lightman SL.

Author information

**Abstract**

Peripheral immune activation can have profound physiological and behavioral effects including induction of fever and sickness behavior. One mechanism through which immune activation or immunomodulation may affect physiology and behavior is via actions on brainstem neuromodulatory systems, such as serotonergic systems. We have found that peripheral immune activation with antigens derived from the nonpathogenic, saprophytic bacterium, Mycobacterium vaccae, activated a specific subset of serotonergic neurons in the interfascicular part of the dorsal raphe nucleus (DRI) of mice, as measured by quantification of c-Fos expression following intratracheal (12 h) or s.c. (6 h) administration of heat-killed, ultrasonically disrupted M. vaccae, or heat-killed, intact M. vaccae, respectively. These effects were apparent after immune activation by M. vaccae or its components but not by ovalbumin, which induces a qualitatively different immune response. The effects of immune activation were associated with increases in serotonin metabolism within the ventromedial prefrontal cortex, consistent with an effect of immune activation on mesolimbocortical serotonergic systems. The effects of M. vaccae administration on serotonergic systems were temporally associated with reductions in immobility in the forced swim test, consistent with the hypothesis that the stimulation of mesolimbocortical serotonergic systems by peripheral immune activation alters stress-related emotional behavior. These findings suggest that the immune-responsive subpopulation of serotonergic neurons in the DRI is likely to play an important role in the neural mechanisms underlying regulation of the physiological and pathophysiological responses to both acute and chronic immune activation, including regulation of mood during health and disease states. Together with previous studies, these findings also raise the possibility that immune stimulation activates a functionally and anatomically distinct subset of serotonergic neurons, different from the subset of serotonergic neurons activated by anxiogenic stimuli or uncontrollable stressors. Consequently, selective activation of specific subsets of serotonergic neurons may have distinct behavioral outcomes.

PLOS ONE

RESEARCH ARTICLE

# High-throughput sequencing of microbial community diversity in soil, grapes, leaves, grape juice and wine of grapevine from China

**Yu-jie Wei[1☯‡], Yun Wu[1☯‡*], Yin-zhuo Yan[2], Wan Zou[1], Jie Xue[2☯‡*], Wen-rui Ma[1], Wei Wang[1], Ge Tian[1], Li-ye Wang[1]**

**1** College of Food Science and Pharmacy, Xinjiang Agricultural University, Urumqi, China, **2** China National Research Institute of Food & Fermentation Industries, Beijing, China

☯ These authors contributed equally to this work.
‡ YW and JX also contributed equally to this work. YJW, YW, and JX are joint senior authors on this work.
* 825728388@qq.com (JX); wuyunster@sina.com (YW)



## Abstract

# The Effect of a Multispecies Probiotic Mixture on the Symptoms and Fecal Microbiota in Diarrhea-dominant Irritable Bowel Syndrome

## *A Randomized, Double-blind, Placebo-controlled Trial*

*Bong Ki Cha, MD,* Seung Mun Jung, MD, PhD,* Chang Hwan Choi, MD, PhD,* In-Do Song, MD,* Hyun Woong Lee, MD, PhD,* Hyung Joon Kim, MD, PhD,* Jae Hyuk Do, MD, PhD,* Sae Kyung Chang, MD, PhD,* Kijeong Kim, MD, PhD,† Won-Seok Chung, MSc,‡ and Jae-Gu Seo, PhD‡*

**Background:** The clinical effect of probiotics on irritable bowel syndrome (IBS) is still controversial.

**Aims:** We aimed to evaluate the effects of a probiotic mixture on IBS symptoms and the composition of fecal microbiota in patients with diarrhea-dominant IBS (D-IBS).

symptoms. The therapeutic effect of probiotics is associated with the stabilization of intestinal microbiota.

**Key Words:** irritable bowel syndrome, probiotics, fecal microbiota

(*J Clin Gastroenterol* 2012;46:220–227)

50 YEARS WITH IMPACT

Journal of Applied Ecology

British Ecological Society

*Journal of Applied Ecology* 2014, **51**, 880–889 doi: 10.1111/1365-2664.12254

# Urban cultivation in allotments maintains soil qualities adversely affected by conventional agriculture

**Jill L. Edmondson[1]*, Zoe G. Davies[2], Kevin J. Gaston[3] and Jonathan R. Leake[1]**

[1]*Department of Animal and Plant Sciences, University of Sheffield, Sheffield S10 2TN, UK;* [2]*Durrell Institute of Conservation and Ecology (DICE), School of Anthropology and Conservation, University of Kent, Canterbury Kent CT2 7NR, UK; and* [3]*Environment and Sustainability Institute, University of Exeter, Penryn Cornwall TR10 9FE, UK*

## Summary

1. Modern agriculture, in seeking to maximize yields to meet growing global food demand, has caused loss of soil organic carbon (SOC) and compaction, impairing critical regulating and supporting ecosystem services upon which humans also depend. Own-growing makes an important contribution to food security in urban areas globally, but its effects on soil qualities that underpin ecosystem service provision are currently unknown.
2. We compared the main indicators of soil quality; SOC storage, total nitrogen (TN), C : N ratio and bulk density (BD) in urban allotments to soils from the surrounding agricultural region, and between the allotments and other urban greenspaces in a typical UK city. A questionnaire was used to investigate allotment management practices that influence soil properties.
3. Allotment soils had 32% higher SOC concentrations and 36% higher C : N ratios than pastures and arable fields and 25% higher TN and 10% lower BD than arable soils.
4. There was no significant difference between SOC concentration in allotments and urban

RESEARCH Open Access

# Allotment gardening and health: a comparative survey among allotment gardeners and their neighbors without an allotment

Agnes E van den Berg[1,2*], Marijke van Winsum-Westra[1], Sjerp de Vries[1], Sonja ME van Dillen[2,3]

## Abstract

**Background:** The potential contribution of allotment gardens to a healthy and active life-style is increasingly recognized, especially for elderly populations. However, few studies have empirically examined beneficial effects of allotment gardening. In the present study the health, well-being and physical activity of older and younger allotment gardeners was compared to that of controls without an allotment.

**Methods:** A survey was conducted among 121 members of 12 allotment sites in the Netherlands and a control group of 63 respondents without an allotment garden living next to the home addresses of allotment gardeners. The survey included five self-reported health measures (perceived general health, acute health complaints, physical constraints, chronic illnesses, and consultations with GP), four self-reported well-being measures (stress, life satisfaction, loneliness, and social contacts with friends) and one measure assessing self-reported levels of physical activity in summer. Respondents were divided into a younger and older group at the median of 62 years which equals the average retirement age in the Netherlands.

**Results:** After adjusting for income, education level, gender, stressful life events, physical activity in winter, and access to a garden at home as covariates, both younger and older allotment gardeners reported higher levels of physical activity during the summer than neighbors in corresponding age categories. The impacts of allotment gardening on health and well-being were moderated by age. Allotment gardeners of 62 years and older scored significantly or marginally better on all measures of health and well-being than neighbors in the same age category. Health and well-being of younger allotment gardeners did not differ from younger neighbors. The greater health and well-being benefits of allotment gardening for older gardeners may be related to the finding that older allotment gardeners were more oriented towards gardening and being active, and less towards passive

AEM
Journals.ASM.org

# Organic Cultivat in the Flour-Sou

Carlo Giuseppe Rizzello,[a] Ivana
Francesca De Filippis,[c] Marco G
Department of Soil, Plant and Food Scie
Department of Agricultural Sciences, Di

***Triticum turgidum*** **subsp. *dur***
**($O_{MAN}$) or green manure ($O_{LE}$**
**tween $C_{ONV}$ and organic flour**
**highest number of gliadins, ar**
**were prepared at the laborato**
**tion was described by 16S rRN**
**bacterial diversity. Flours wer**
***ria*. Mature sourdoughs were**
**for mature sourdoughs made**

Food Research International 107 (2018) 206–215

Contents lists available at ScienceDirect

Food Research International

journal homepage: www.elsevier.com/locate/foodres

# Health benefits of ancient grains. Comparison among bread made with ancient, heritage and modern grain flours in human cultured cells

Veronica Valli[1], Annalisa Taccari, Mattia Di Nunzio, Francesca Danesi, Alessandra Bordoni*

*Department of Agri-Food Sciences and Technologies (DISTAL), University of Bologna, Piazza Goidanich 60, 47521 Cesena, Italy*

## ARTICLE INFO

*Keywords:*
Ancient wheat
Heritage wheat
Modern wheat
KAMUT® khorasan wheat
Spelt
Cultured cells
Antioxidants
Inflammation

## ABSTRACT

Nowadays the higher nutritional value of whole grains compared to refined grains is recognized. In the la
decade, there has been a renewed interest in the ancient wheat varieties for producing high-value food produc
with enhanced health benefits.

This study compared two ancient grains, two heritage grains, and four modern grains grown in the sam
agronomic conditions considering not only their chemical characteristics, but also their biological effects. Whol
grain flours were obtained and used to make bread. Bread was *in vitro* digested, the digesta were supplemented t
HepG2 cells, and the biological effects of supplementation were evaluated. In addition, cells previously sup
plemented with the different digested bread types were then exposed to inflammatory agents to evidence po
sible protective effects of the pre-treatments. Despite the impossibility to discriminate bread made with differen
grains based on their chemical composition, results herein reported evidence that their supplementation t
cultured cells exerts different effects, confirming the potential health benefits of ancient grains. This researc
represents an advancement for the evaluation of the apparent positive effects of ancient grains and the fo


Rhizospheric Thinkers

The Journal of Nutrition
**Community and International Nutrition**

# Farm-Level Agricultural Biodiversity in the Peruvian Andes Is Associated with Greater Odds of Women Achieving a Minimally Diverse and Micronutrient Adequate Diet

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# Not all farming environments protect against the development of asthma and wheeze in children

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# Fruit and Soil Quality of Organic and Conventional Strawberry Agroecosystems

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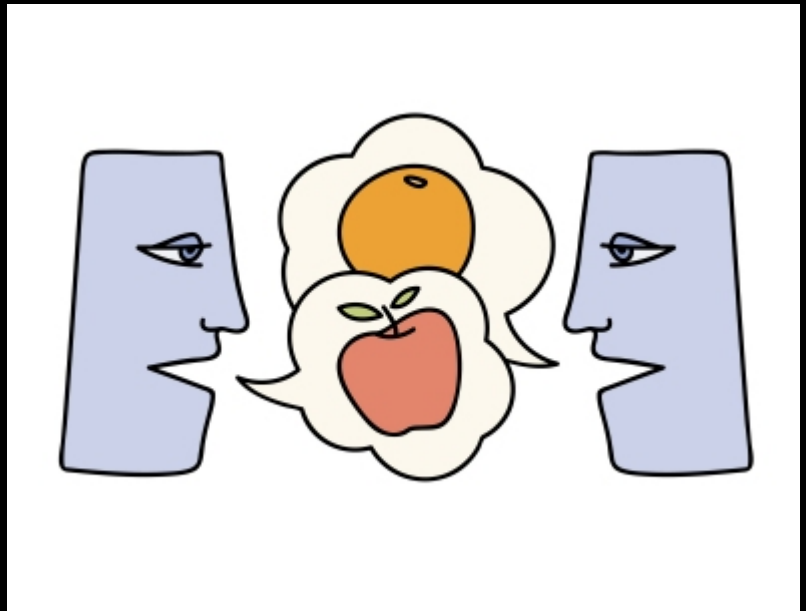
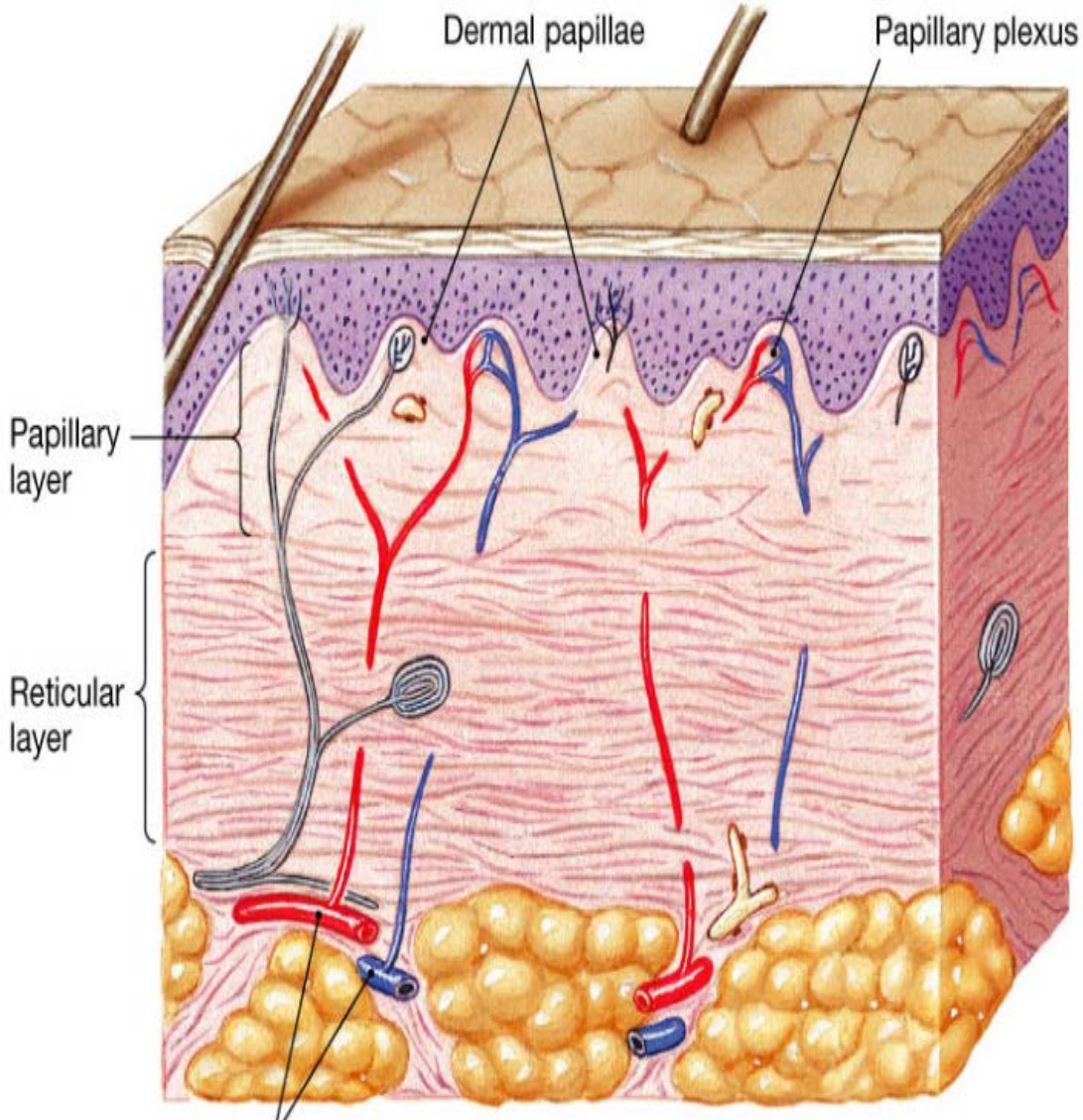
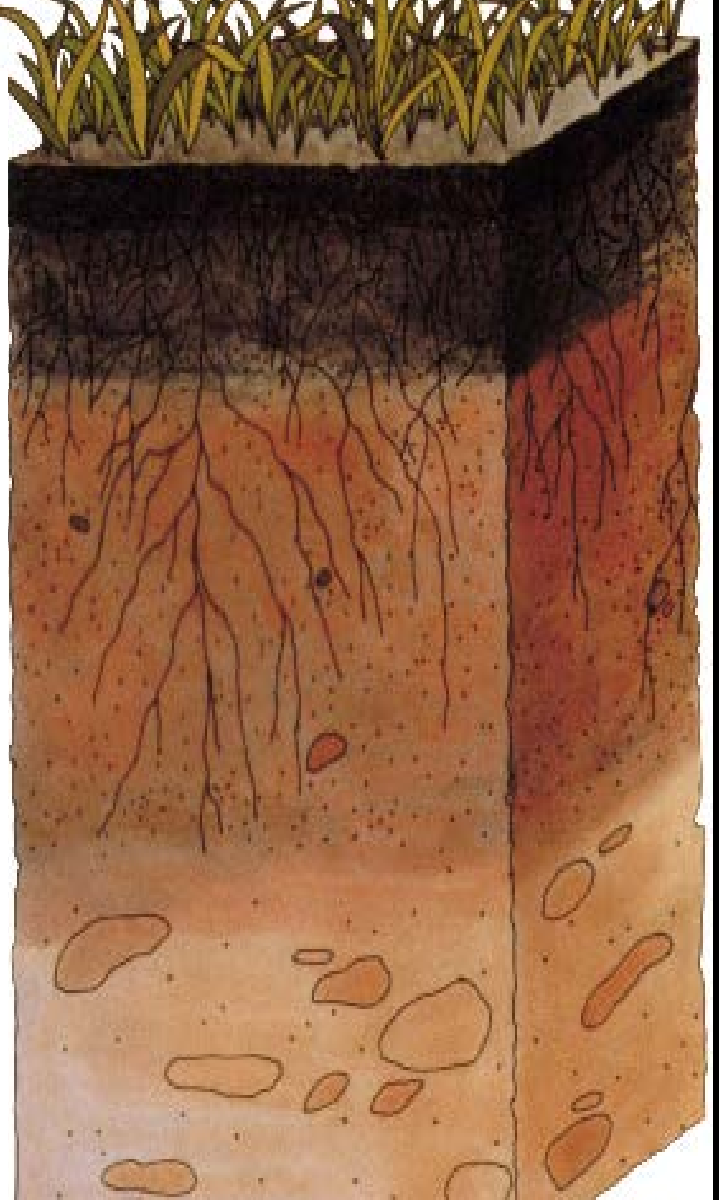
## Abstract

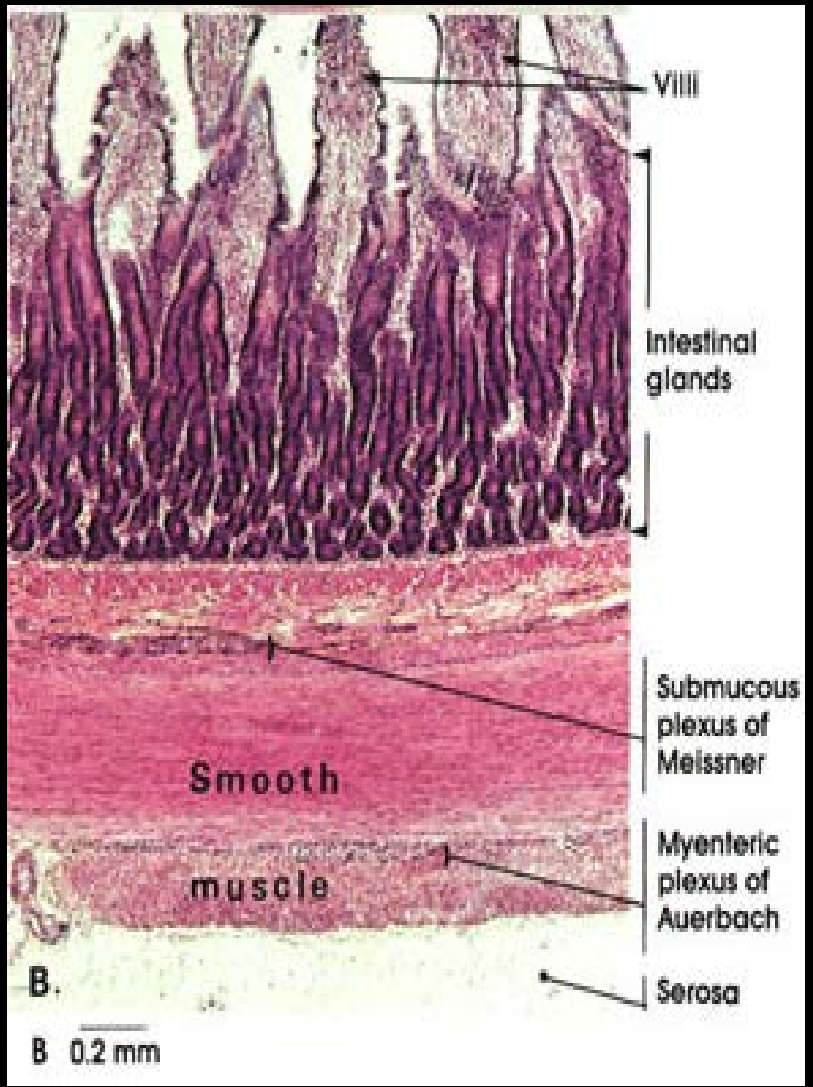
***Background:*** Sale of organic foods is one of the fastest growing market segments within the global food industry. People often buy organic food because they believe organic farms produce more nutritious and better tasting food from healthier soils. Here we tested if there are significant differences in fruit and soil quality from 13 pairs of commercial organic and conventional strawberry agroecosystems in California.

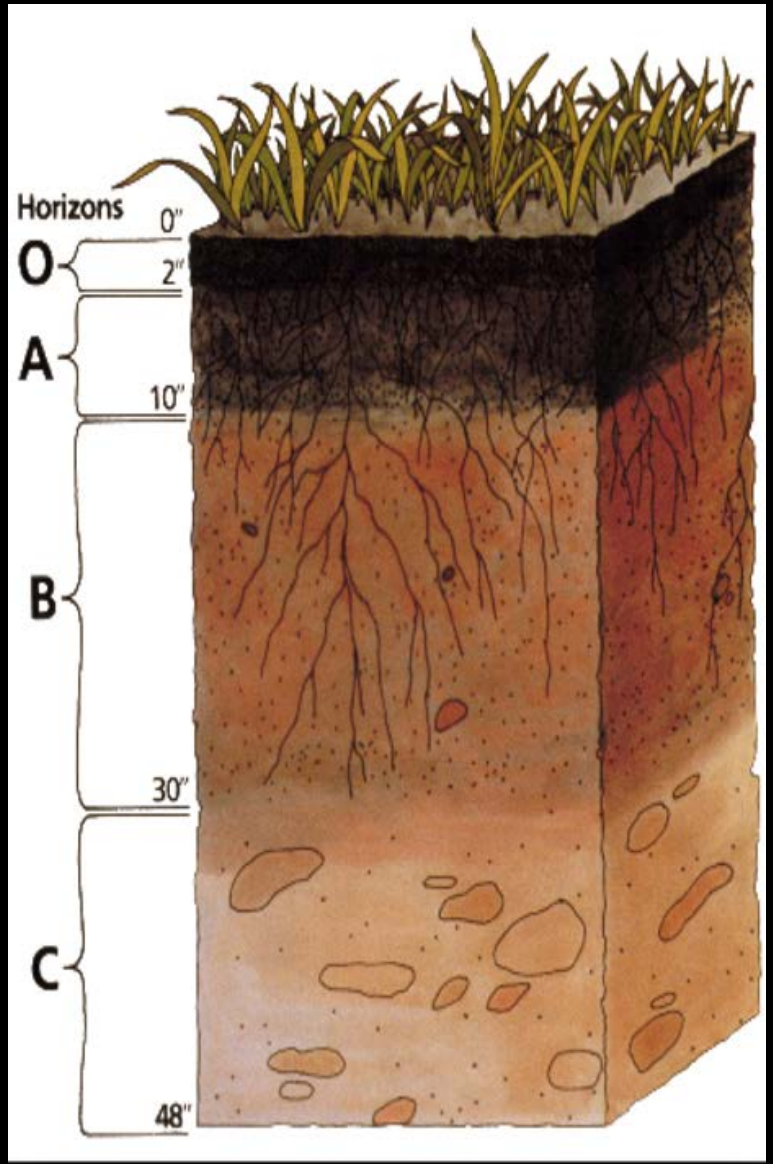
***Methodology/Principal Findings:*** At multiple sampling times for two years, we evaluated three varieties of strawberries for mineral elements, shelf life, phytochemical composition, and organoleptic properties. We also analyzed traditional soil properties and soil DNA using microarray technology. We found that the organic farms had strawberries with longer shelf

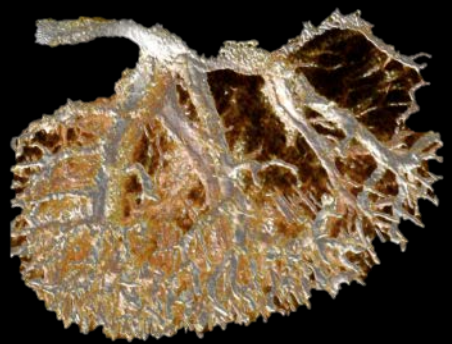


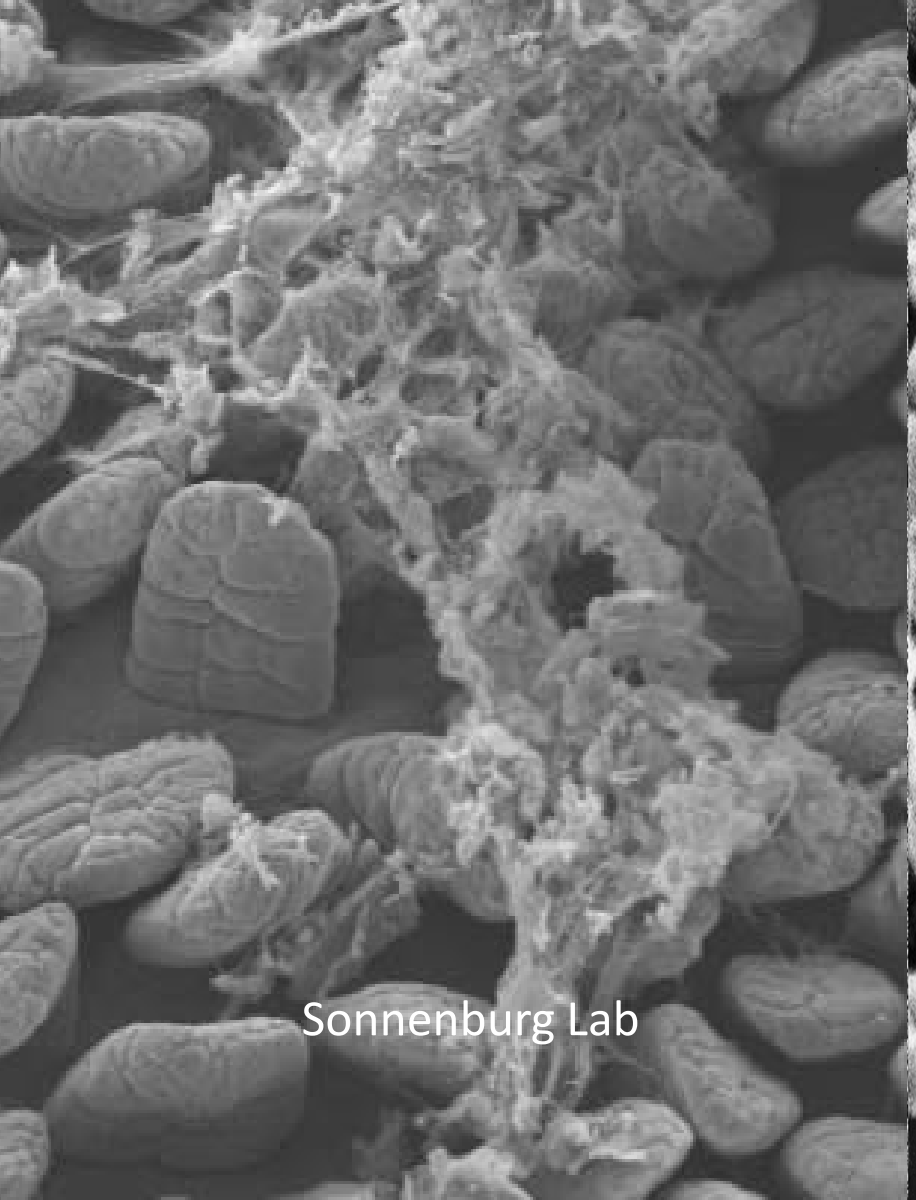

Dermal papillae
Papillary plexus
Papillary layer
Reticular layer

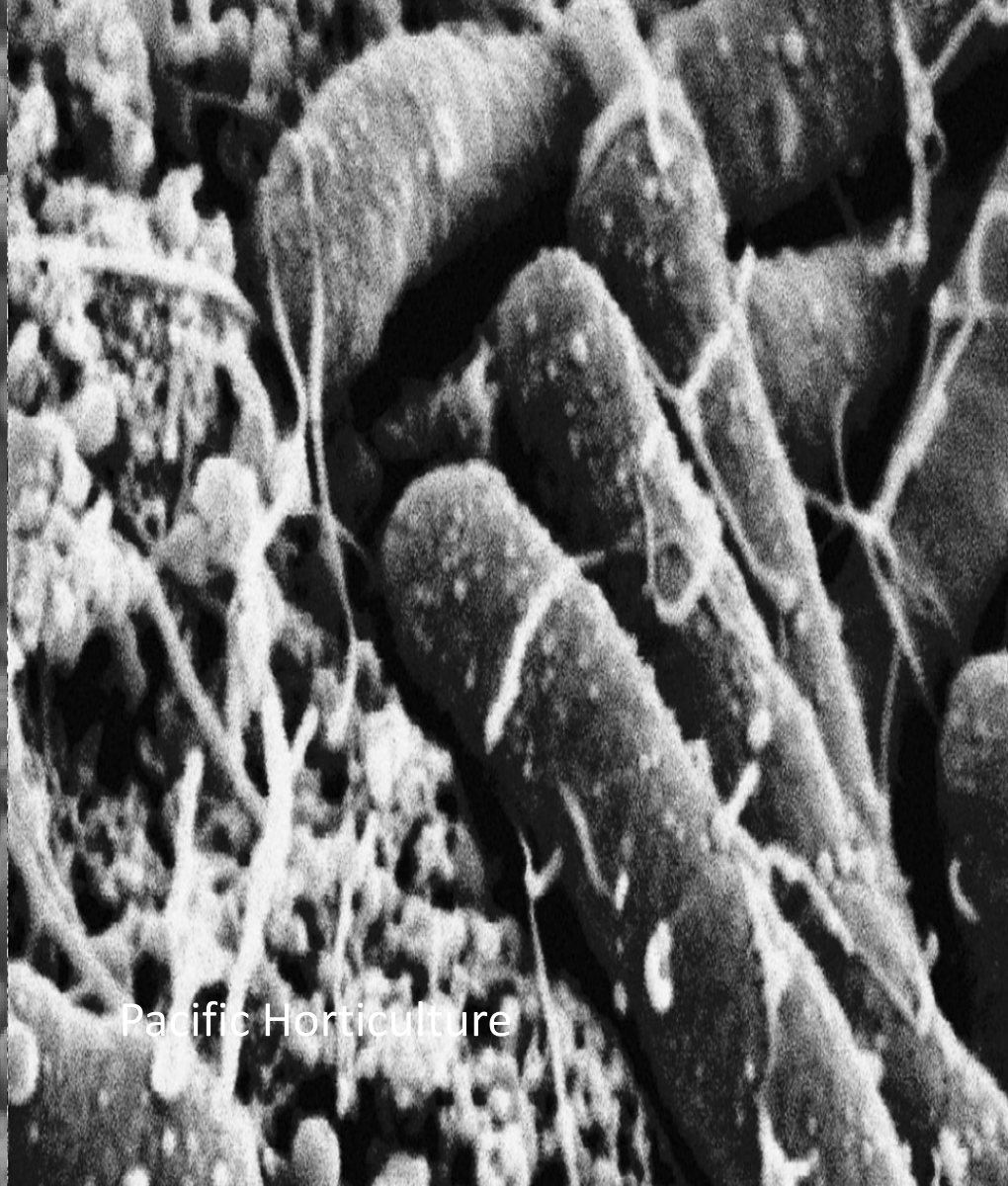


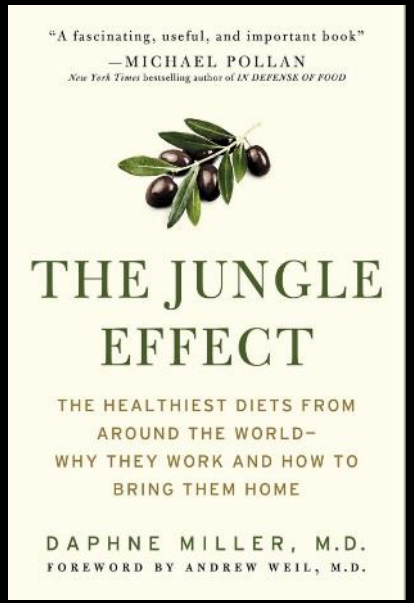

Villi
Intestinal glands
Submucous plexus of Meissner
Smooth muscle
Myenteric plexus of Auerbach
Serosa
B.
B 0.2 mm


Horizons
0"
O
2"
A
10"
B
30"
C
48"




Sonnenburg Lab


Pacific Horticulture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Daphne Miller, M.D.
Author of The Jungle Effect


Farmacology
닥터 밀러가 농장에서 찾은 치유 비전
닥터의 의사에게 가르쳐준 것
好農業
是最好的醫生
FARMACOLOGY