UF/IFAS Extension

The Journey to Sustainability Begins with Education

Sarasota County
scgov.net | 941.861.5000 | TV19

UF/IFAS Sarasota County Extension
6700 Clark Road
Twin Lakes Park
Sarasota, Florida 34241
(941) 861-5000

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Contemplative Food Gardening:

"ANCIENT TRADITIONS "

(COMPANION PLANTING & BIODYNAMIC AGRICULTURE)

Robert Kluson

Ag/NR Extension Agent III

UF/IFAS Sarasota County Extension

OUTLINE

- **Overview & Goals of Contemplative Food Gardening Presentation Series**
- **Short Review of Contemplative Food Gardens**
- **Ancient Traditions**
  - **3 Sisters**
  - **Biodynamics**
  - **Worldwide**

Contemplative Food Gardening Series Titles

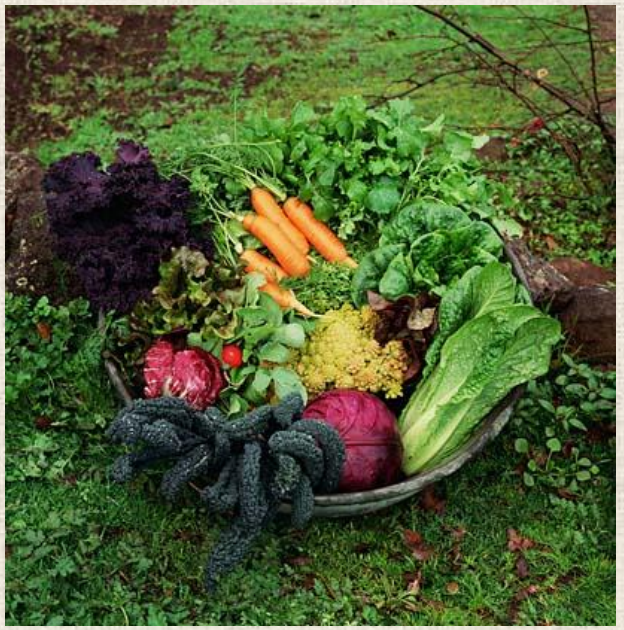
- Introduction
- Feed Your Head (Edible Landscaping & Design)
- Growing Food When People & Place Matter (FL Climate, Crops and Soils)
- Ancient Traditions (Companion Planting and Biodynamic Agriculture) 
- Sacred Community (Attracting Beneficials)
- Soil Food (Compost & Earthworms)
- Back to the Future (Contemplative Design & Container Gardening)

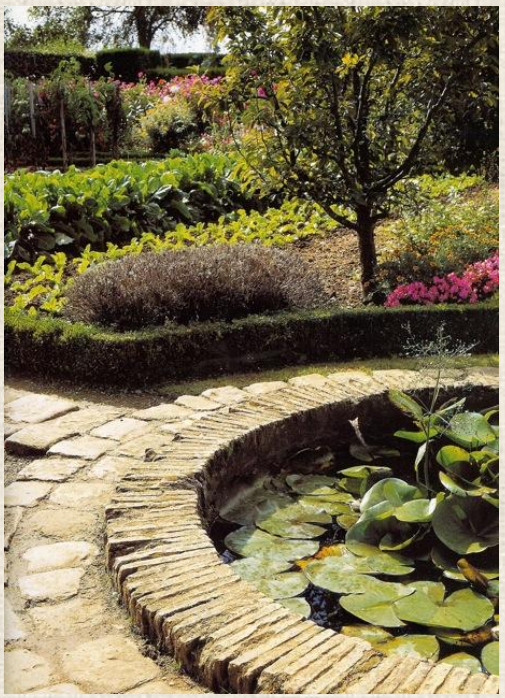
Goals for Talks on Contemplative Food Gardening

- Food for your freshest nutrition
- Food for thought
- Food for community benefits
- **Food for your soul**

Approach of Talks on Contemplative Food Gardening

- Integrate the concepts of contemplative gardens to edible landscaping, using organic food gardening practices
- Provide background information on the science and principles from agroecology for successful organic food gardening
- Offer an opportunity to participate in the setup of a contemplative food garden
- Provide additional educational resources

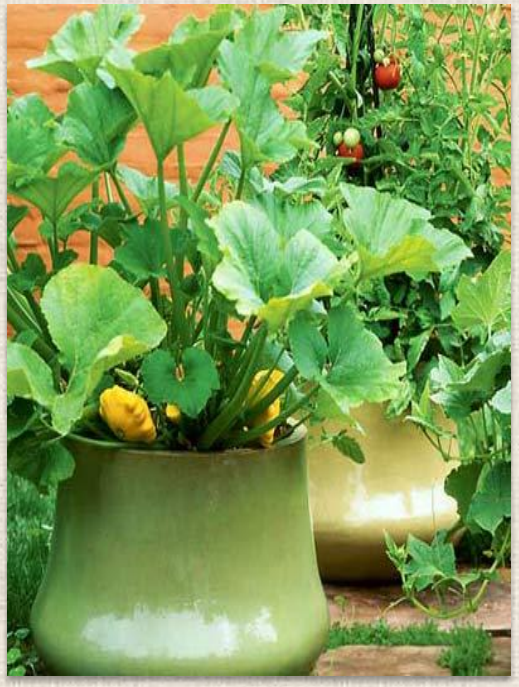




Review: Contemplative Food Gardening

Gardening outside the rows…creatively for personal inspiration and growth, as well as physical nourishment and growth

Review: What is Edible Landscaping?



The thoughtful arrangement of edible plants in the landscape into a unified, functional biological whole to maximize their aesthetic appeal and food production.

Treating Edibles as Ornamentals

Review:
What Is Organic Food Gardening?

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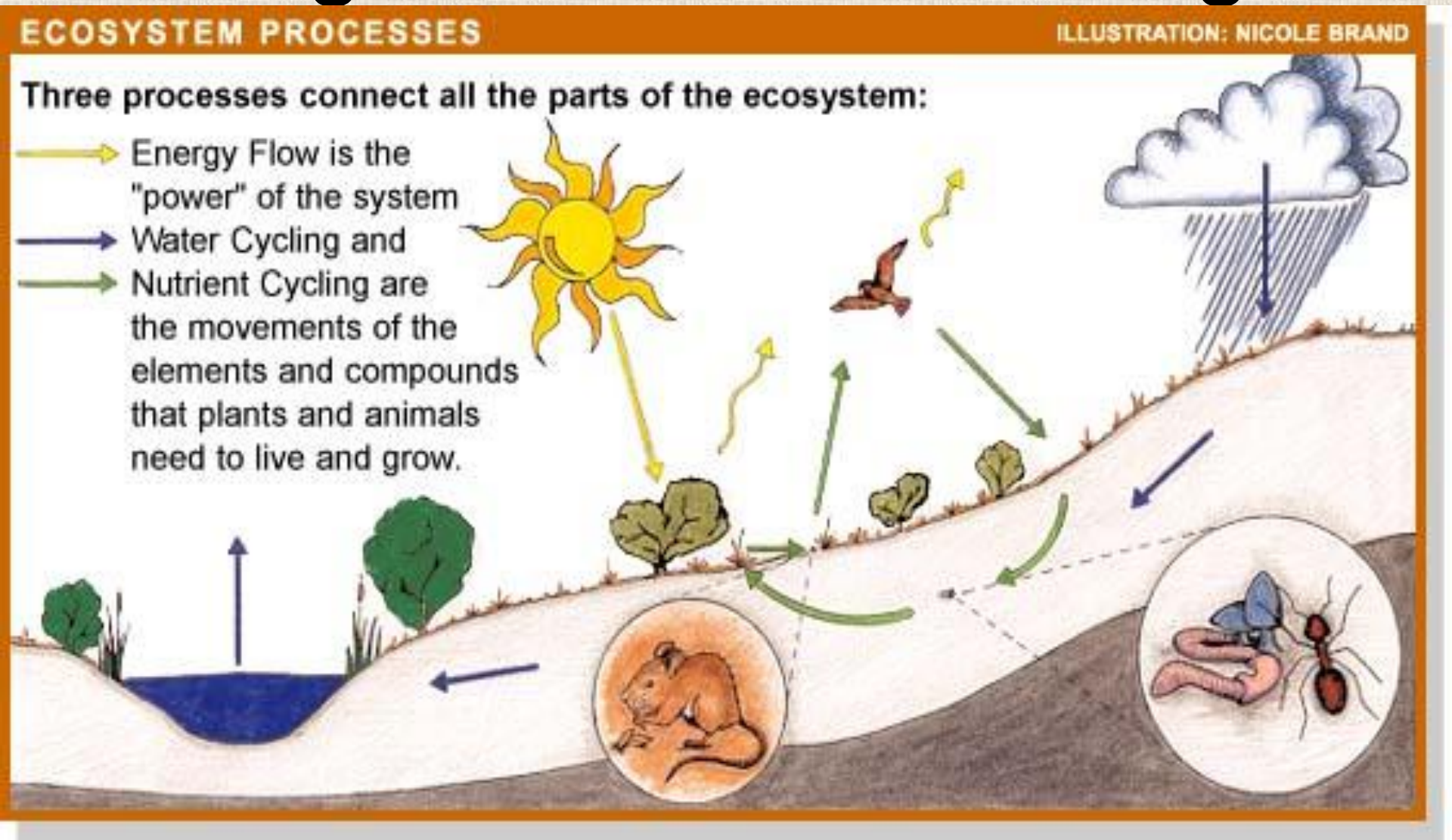
Review:Organic Food Gardening

- It's a science and art
- Incorporates the entire landscape design and environment, e.g., to improve and maximize the garden soil's health, structure, & texture
- Maximizes the production and health of developing plants without using synthetic commercial fertilizers, pesticides, or fungicides

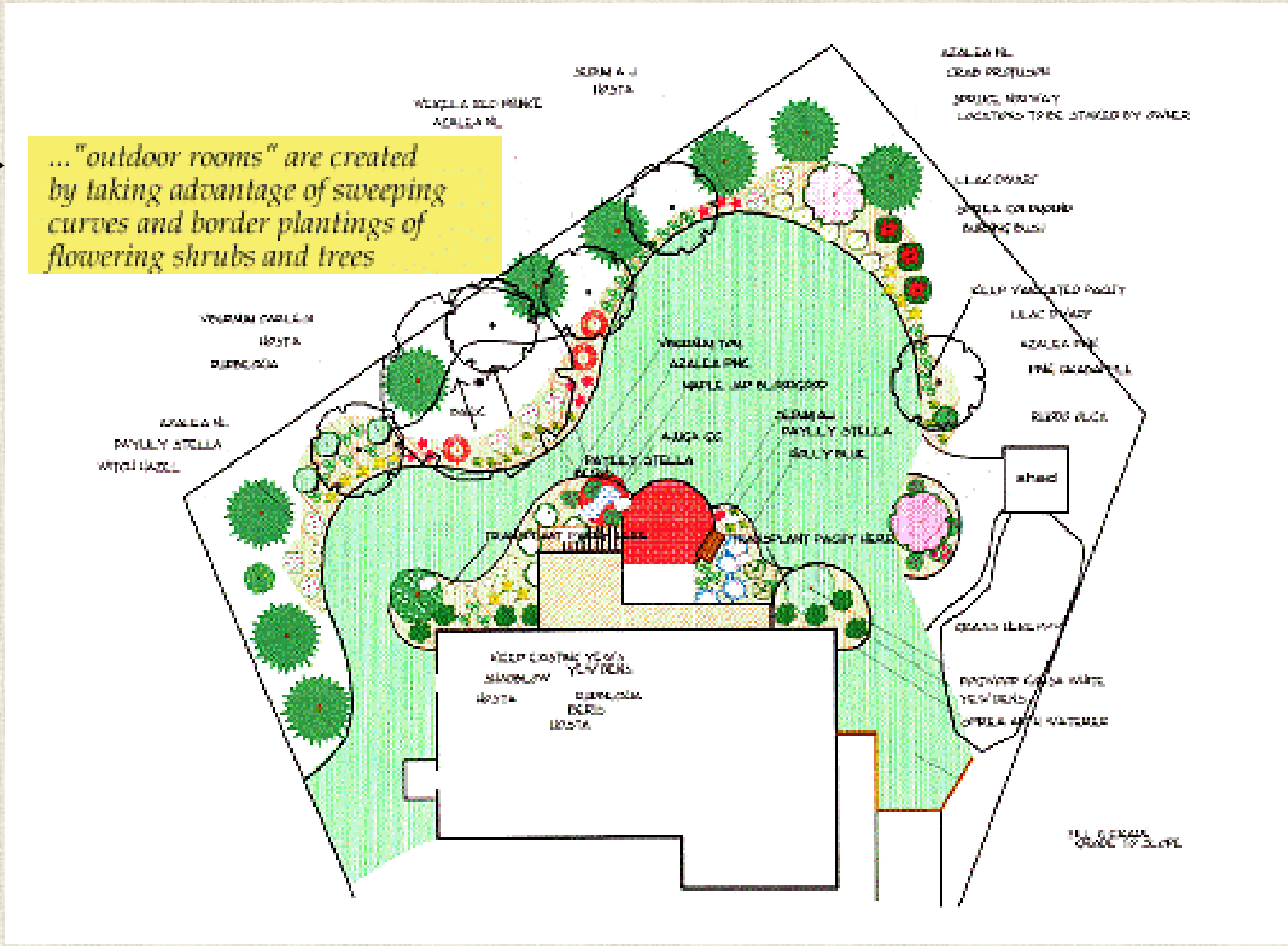
David Knauft, Horticulture Department, Univ. of GA
www.caes.uga.edu/extension/clarke/anr/documents/**Organicgardening**.pdf

Agro-Ecosystem Model for Organic Food Gardening

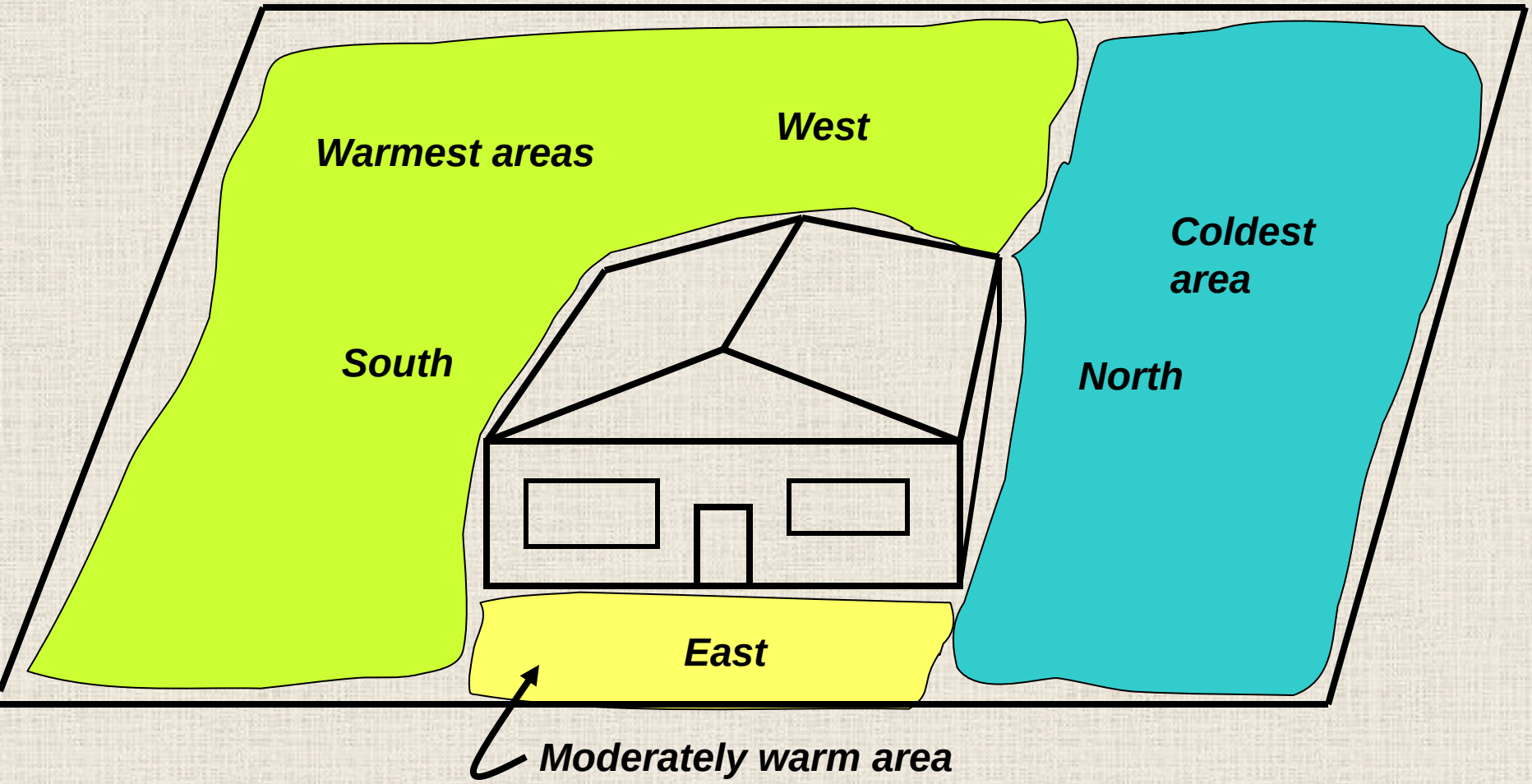


Review: Edible Landscape Design Approach

..."outdoor rooms" are created by taking advantage of sweeping curves and border plantings of flowering shrubs and trees



Homestead Environment Example
Site selection - temperature

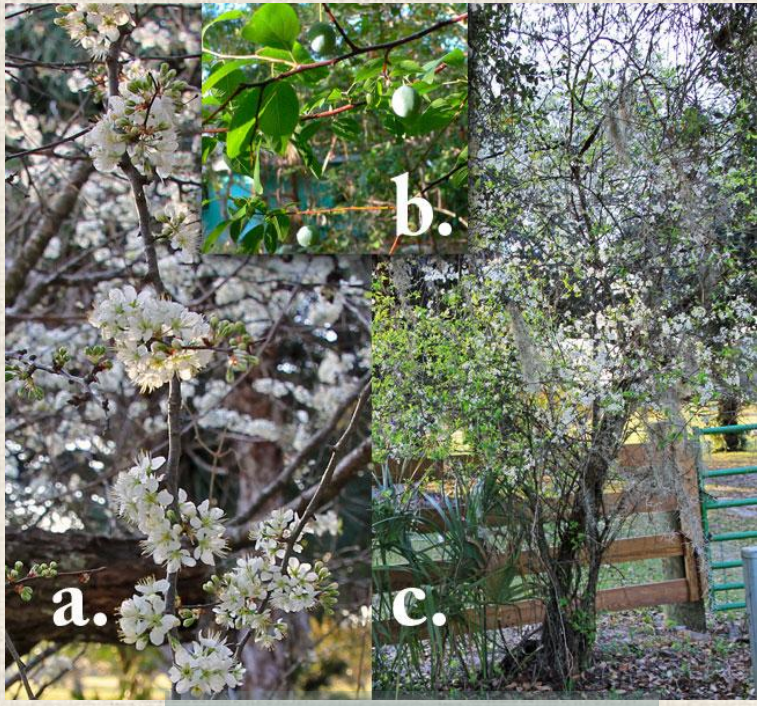


Review: Harvest Seasonality: Food Crop Examples

Review: Edible Native Plants in Southcentral Florida

Elderberry

Red Mulberry



Plum Flatwoods

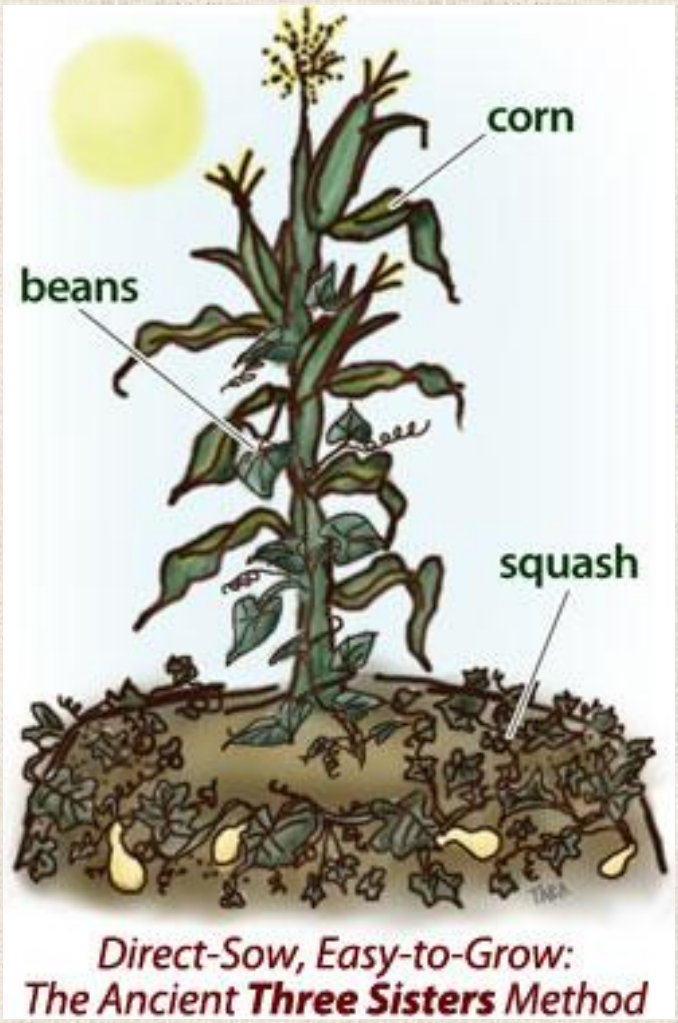
American Persimmon

Ancient Traditions of Food Production

- The science of agroecology—the application of ecological concepts & principles to the design & management of sustainable food production—provides a framework incorporating the lessons of the ancient traditions of indigenous cultures.
- Ancient, traditional management in the form of raised fields, terraces, polycultures (with a number of crops growing in the same field), agroforestry systems, etc., document a successful indigenous agricultural strategy and constitutes a tribute to the “creativity” of traditional farmers worldwide.

http://monthlyreview.org/2009/07/01/agroecology-small-farms-and-food-sovereignty

Ancient Traditions Example
'Three Sisters' Planting Method



"Sustainers of Life"

The Legend of the Three Sisters

- The term "Three Sisters" emerged from different myths of native Americans, for example, this Iroquois creation myth.
- It was said that the earth began when "Sky Woman" who lived in the upper world peered through a hole in the sky and fell through to an endless sea.
- The animals saw her coming, so they took the soil from the bottom of the sea and spread it onto the back of a giant turtle to provide a safe place for her to land. This "Turtle Island" is now what we call North America.

Legend of the Three Sisters

- Sky woman had become pregnant before she fell. When she landed, she gave birth to a daughter. When the daughter grew into a young woman, she also became pregnant (by the West wind). She died while giving birth to twin boys. Sky Woman buried her daughter in the "new earth."
- From her grave grew three sacred plants—corn, beans, and squash. These plants provided food for her sons, and later, for all of humanity. These special gifts ensured the survival of the Iroquois people.

The Legend of the Three Sisters

- Another myth from the Sappony tribe in NC
- The legend of “Three Sisters” originated when a woman of medicine who could no longer bear the fighting among her three daughters asked the Creator to help her find a way to get them to stop.
- That night she had a dream, & in it each sister was a different seed. In her dream, she planted them in one mound in just the way they would have lived at home & told them that in order to grow and thrive, they would need to be different but dependent upon each other.

The Legend of the Three Sisters

- They needed to see that each was special and each had great things to offer on her own and with the others.
- The next morning while cooking breakfast, she cooked each daughter an egg, but each was different: one hard-boiled, one scrambled, and one over-easy.
- She told her daughters of her dream and said to them, “You are like these eggs. Each is still an egg but with different textures and flavors. Each of you has a special place in the world and in my heart.”

The Legend of the Three Sisters

- The daughters started to cry and hugged each other, because now they would celebrate their differences and love one another more because of them.
- From that day on, Native people have planted the three crops together—Three Sisters helping and loving each other.

The Legend of the Three Sisters

- Corn, beans and squash were among the first important crops domesticated by ancient Mesoamerican societies.
- Corn was the primary crop, providing more calories or energy per acre than any other.
- According to Three Sisters legends corn must grow in community with other crops rather than on its own - it needs the beneficial company and aide of its companions.

http://www.reneesgarden.com/articles/3sisters.html

The Legend of the Three Sisters

- Like the myths, the application of this tradition was varied across the different indigenous tribes of Mesoamerica.
- Instead in each region the planting design was modified according to the site specific conditions in soil, weather, rain, growing season length, varieties, etc.
- In other words, the concept also was based on a “sense of place”

http://www.reneesgarden.com/articles/3sisters.html

3 Sisters Planting Management

- Example different spatial arrangements for native American “3 sisters” planting:

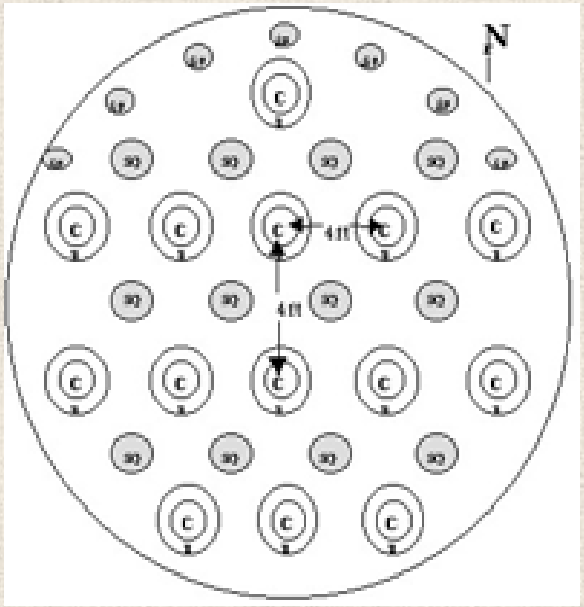


Figure 1: Circular Wampanoag Garden (Northeast & South)

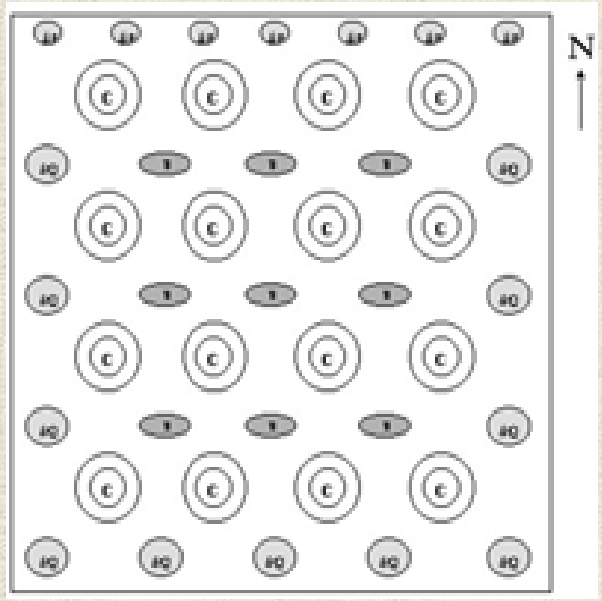


Figure 2: Hidatsa Garden Design (Northern Plains)

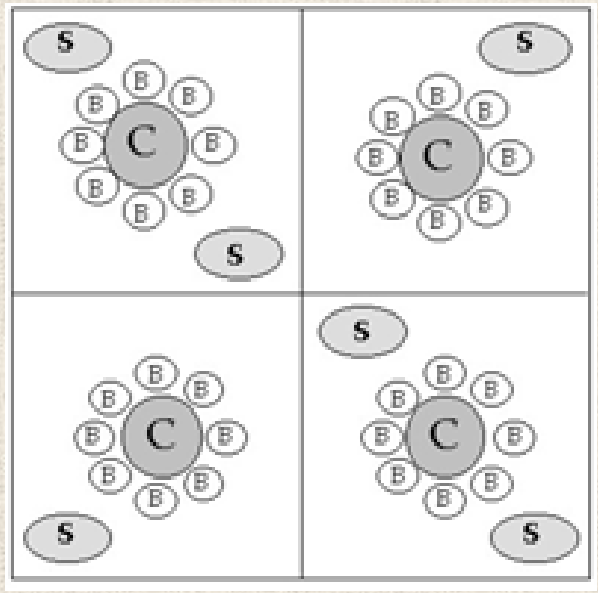
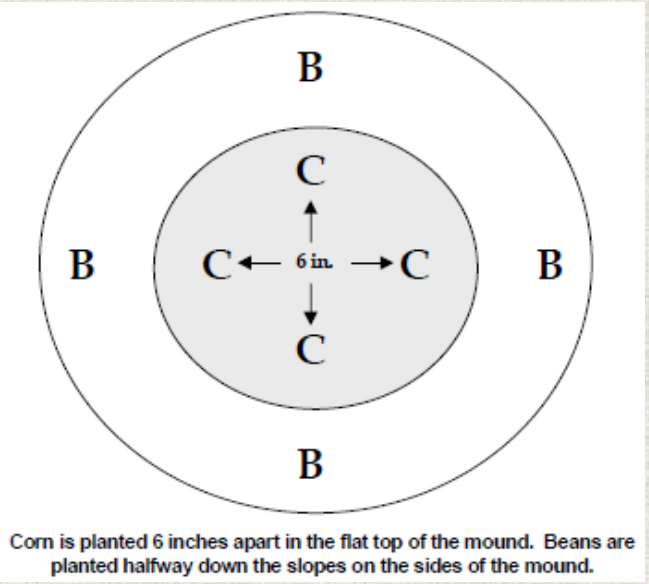


Figure 3: Zuni Waffle Garden (Southwest Desert)

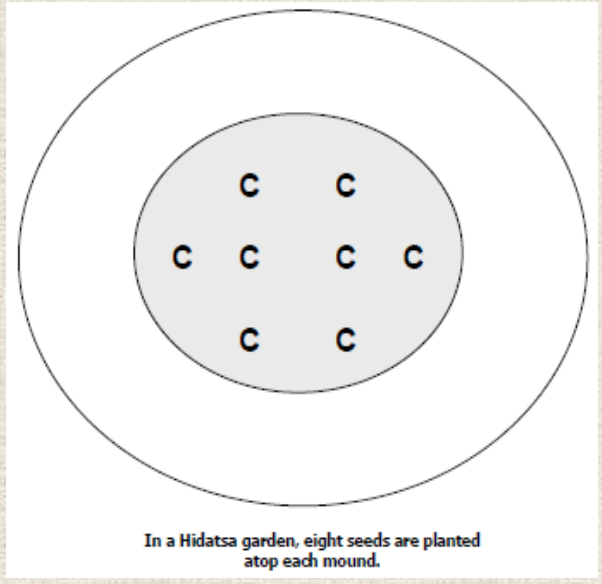
3 Sisters Planting Management

- Example different spatial arrangements for native American “3 sisters” planting:

Seeds Planted on Mounds



Corn is planted 6 inches apart in the flat top of the mound. Beans are planted halfway down the slopes on the sides of the mound.



In a Hidatsa garden, eight seeds are planted atop each mound.

Seeds Planted In Holes

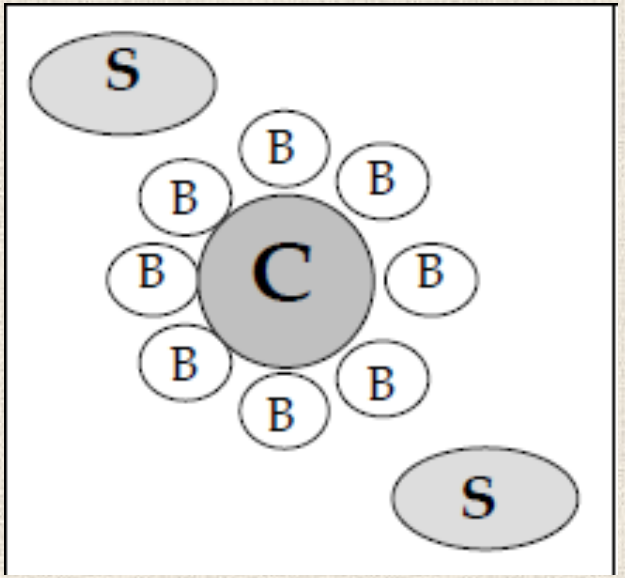


Figure 1: Circular Wampanoag Garden (Northeast & South)

Figure 2: Hidatsa Garden Design (Northern Plains)

Figure 3: Zuni Waffle Garden (Southwest Desert)

Contemplations from The Legend of the Three Sisters

- Concept of Companion Planting of food crops for beneficial interactions
- Concept of Nutrition Complementarity
- Concept of Sense of Place for its application.
- Success with a Three Sisters garden involves careful attention to timing, seed spacing, and varieties. In many areas, if you simply plant all three in the same hole at the same time, the result will be a snarl of vines in which the corn gets overwhelmed!

What is Companion Planting?

- It’s the establishment of two or more plant species in close proximity so that some cultural benefit that results in higher yields is derived.
- Groups of plants which grow well together are called "companions."

Companion Planting Examples

Table 1. COMPANION PLANTING CHART FOR HOME & MARKET GARDENING (compiled from traditional literature on companion planting)

CROP	COMPANIONS	INCOMPATIBLE
Asparagus	Tomato, Parsley, Basil	
Beans	Most Vegetables & Herbs	
Beans, Bush	Irish Potato, Cucumber, Corn, Strawberry, Celery, Summer Savoury	Onion

Beans, Pole	Corn, Summer Savoury, Radish	Onion, Beets, Kohlrabi, Sunflower
Cabbage Family	Aromatic Herbs, Celery, Beets, Onion Family, Chamomile, Spinach, Chard	Dill, Strawberries, Pole Beans, Tomato
Carrots	English Pea, Lettuce, Rosemary, Onion Family, Sage, Tomato	Dill
Celery	Onion & Cabbage Families, Tomato, Bush Beans, Nasturtium	

Corn	Irish Potato, Beans, English Pea, Pumpkin, Cucumber, Squash	Tomato
Cucumber	Beans, Corn, English Pea, Sunflowers, Radish	Irish Potato, Aromatic Herbs
Eggplant	Beans, Marigold	
Lettuce	Carrot, Radish, Strawberry, Cucumber	

Onion Family	Beets, Carrot, Lettuce, Cabbage Family, Summer Savory	Beans, English Peas
Parsley	Tomato, Asparagus	
Pea, English	Carrots, Radish, Turnip, Cucumber, Corn, Beans	Onion Family, Gladiolus, Irish Potato
Potato, Irish	Beans, Corn, Cabbage Family, Marigolds, Horseradish	Pumpkin, Squash, Tomato, Cucumber, Sunflower

Pumpkins	Corn, Marigold	Irish Potato
Radish	English Pea, Nasturtium, Lettuce, Cucumber	Hyssop
Spinach	Strawberry, Faba Bean	
Squash	Nasturtium, Corn, Marigold	Irish Potato

Tomato	Onion Family, Nasturtium, Marigold, Asparagus, Carrot, Parsley, Cucumber	Irish Potato, Fennel, Cabbage Family
Turnip	English Pea	Irish Potato

Why Companion Planting?

- While companion planting has a long history, the mechanisms of beneficial plant interaction have not always been well understood.
- Recently identified mechanisms for higher yields include
  - Pest control via biochemicals & biocontrols
  - Nutrient uptake
  - Physical spatial interactions

Why Companion Planting?

- The concept provides strategies that increase the biodiversity of garden agroecosystems by mimicing the non-negative examples of biodiversity of natural ecosystems.
- A key to success is experimentation and observation of plant to plant interactions in your garden agroecosystem

Companion Planting Management

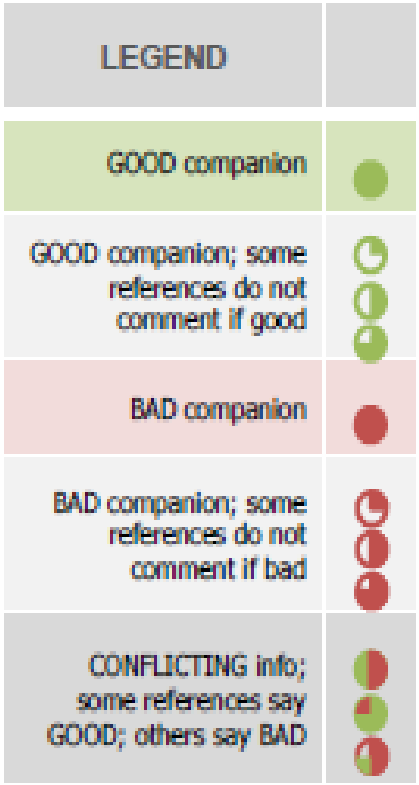
- Success Factors Include:
  - *Spatial arrangement*
  - *Plant density*
  - *Maturity dates*
  - *Plant structure*
- However, most recommendations do not specify them. Therefore, experimentation is required.

COMPARISON OF COMPANION PLANTING GUIDES FOR MOST COMMON GARDEN VEGETABLES

- ✓ Differences among recommendations demonstrate the importance of management factors

OBJECTIVE: This guide surveys four companion planting guides to reveal the relative degrees of agreement among four selected gardening book authors (see references). **However, regardless of consensus, companion planting recommendations are not always effective due many influences on a vegetable garden.** Record your own observations to determine the best companions in your garden!

HOW TO READ THE TABLES



REFERENCES

- Carr, Anna 1985. *Good Neighbors: Companion Planting for Gardeners*, Emmaus, PA: Rodale Press.
- Riotte, Louise 1975. *Carrots Love Tomatoes*, Pownal, VT: Storey Publishing.
- Little, Brenda 2008. *Secrets of Companion Planting*, Sandy, UT: Silverleaf Press
- Smith, Edward C. 2000. *The Vegetable Gardener's BIBLE*, North Adams, MA: Storey Publishing

Table I

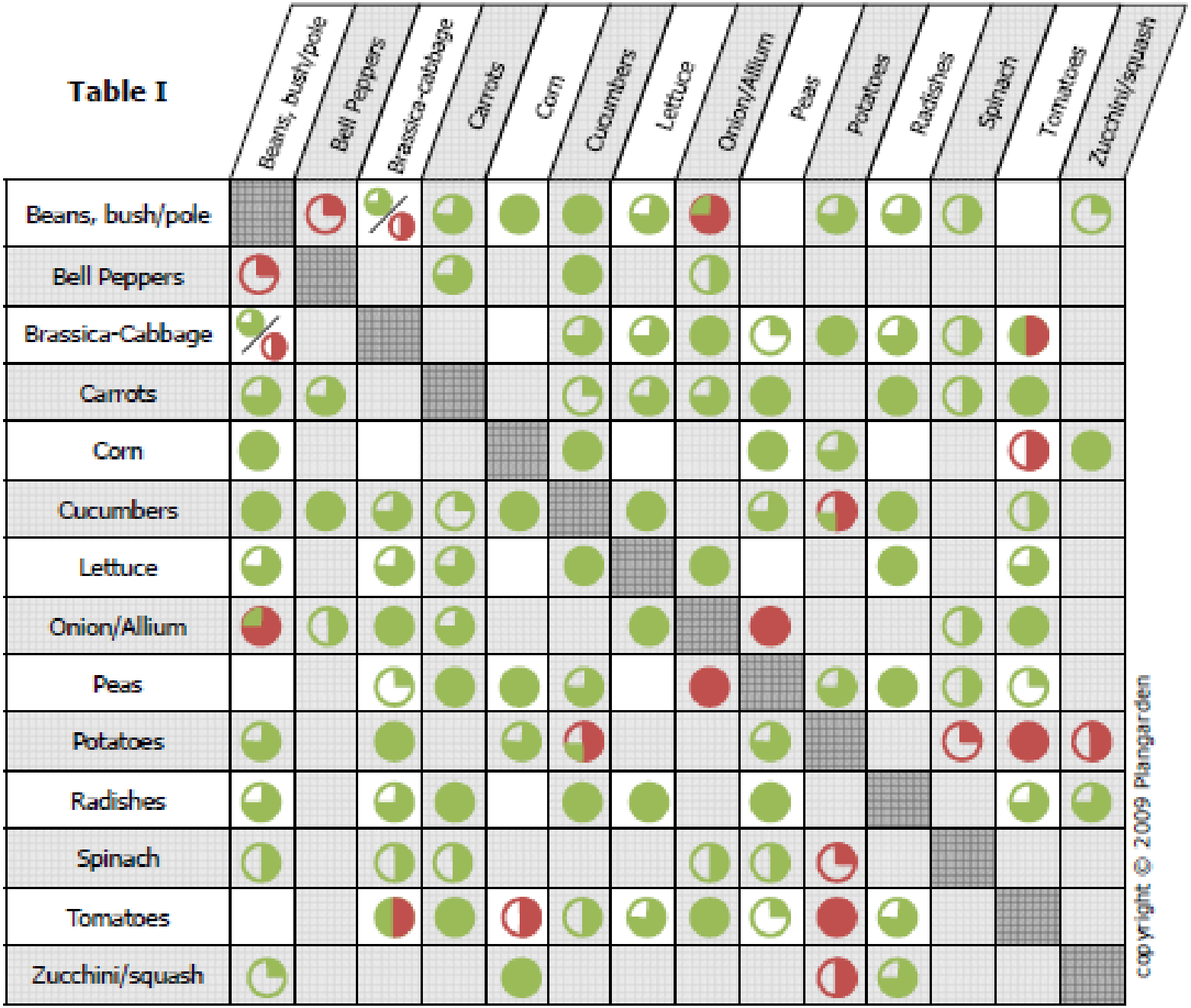
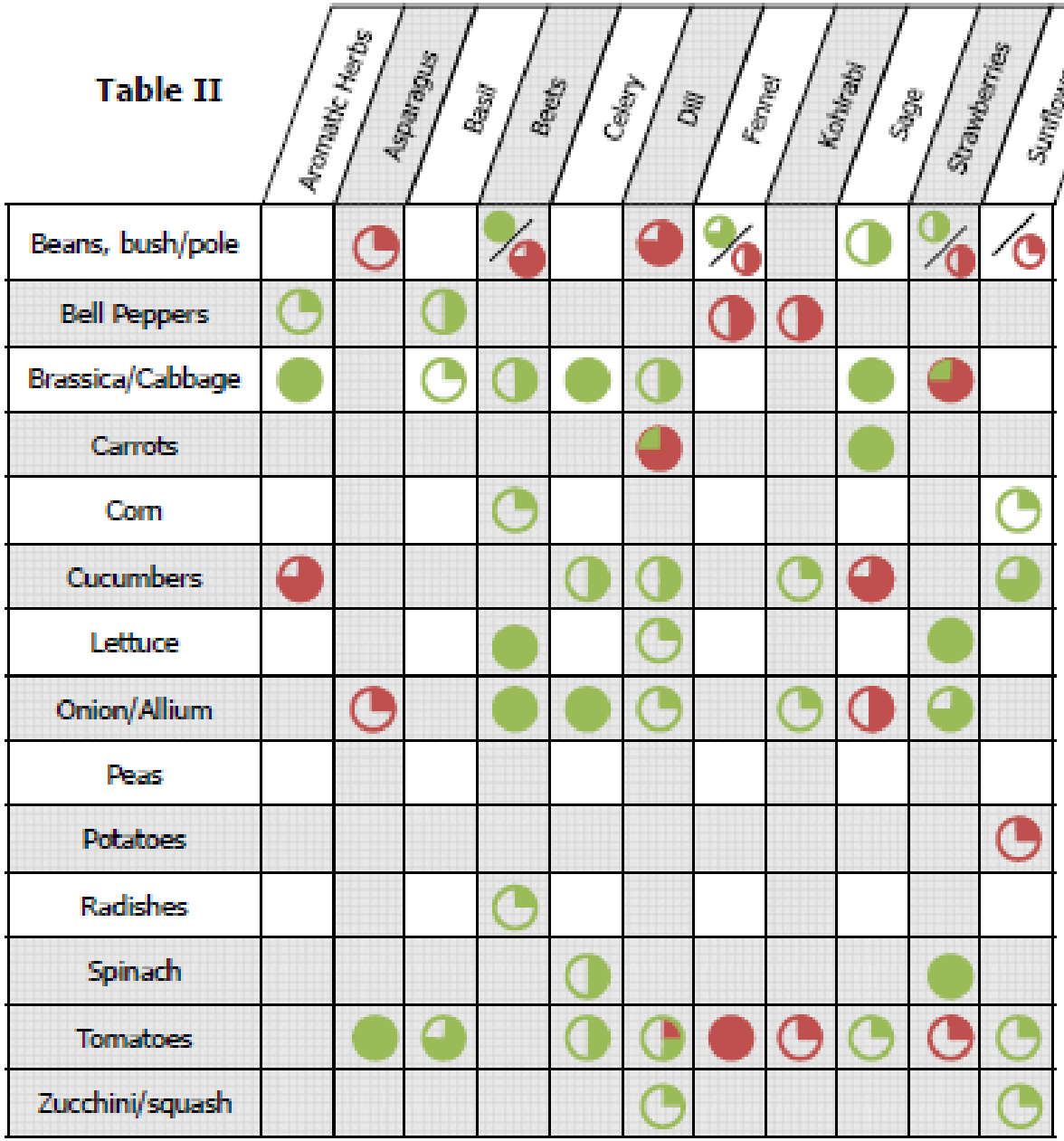
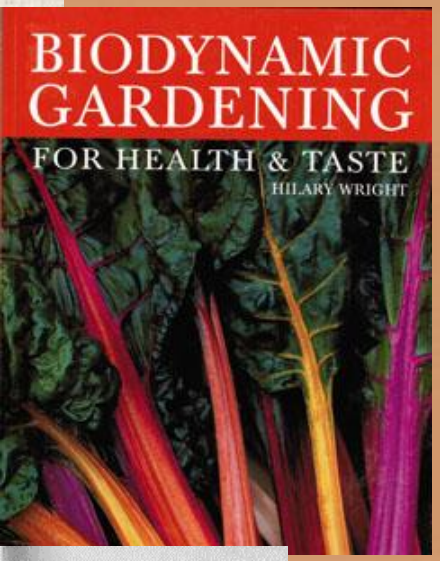


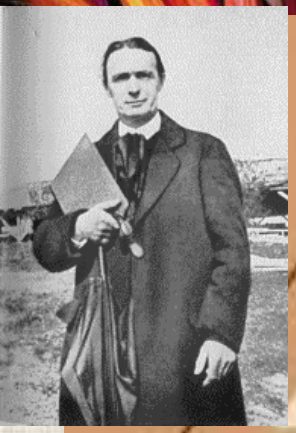
Table II shows other companions

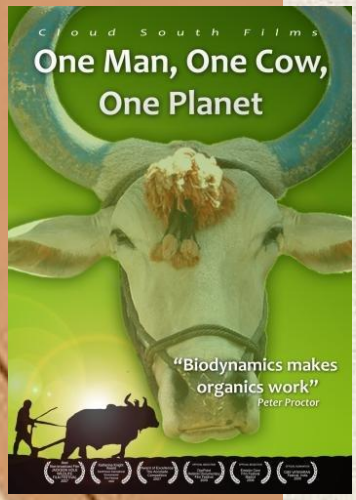
Table II



Ancient Traditions Example Biodynamic Agriculture







Spirit

Life Force

Working With the Cycles of Nature

Biodynamic Preparations

Closed Nutrient System

Self-Regulating Systems

Traditional Estate Farming

Observation, Anticipation, Personal Connection to the Land

Biodynamic Agriculture

- Biodynamic farming is one of the first modern forms of sustainable agriculture that is commonly practiced in Europe and the United States.
- It is a spiritual-ethical-ecological approach to agriculture, food production and nutrition.
- It began in 1913 and received widespread acceptance in the 1920s & continues today with the Demeter International certified biodynamic foods & farms

Biodynamic Agriculture

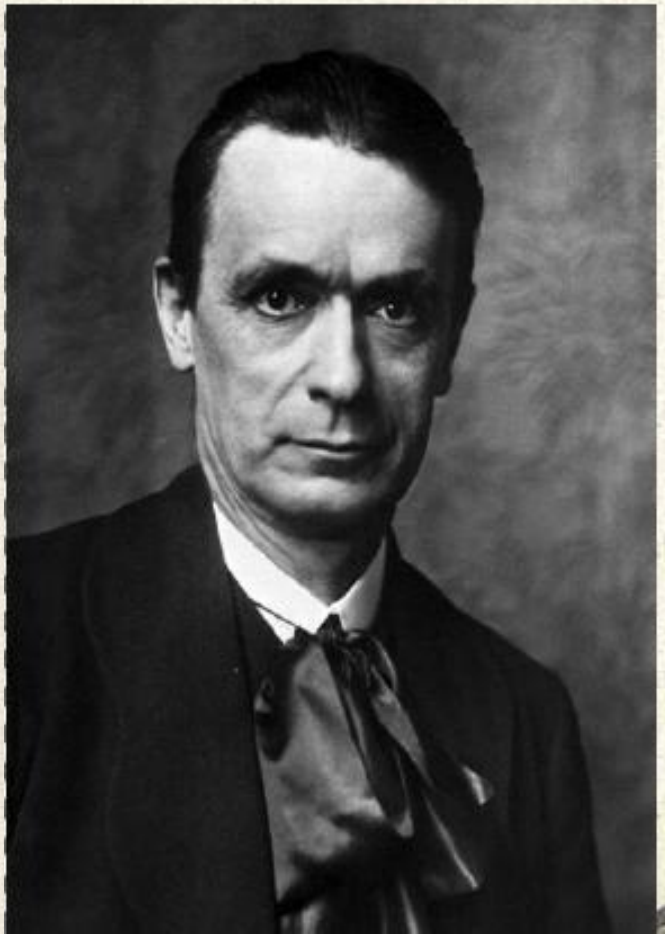
Brief History

- Before 1845 all agriculture was organic.
- In 1845, a German chemist, Justus von Liebig, began the synthetic fertilizer industry
- By 1920 many European farmers were becoming concerned by problems caused by artificial fertilizers – poor flavour, pest and disease problems, declining animal health, and reduced seed vitality.

http://www.bdgrowing.com/mediaLibrary/files/PDF/BriefhistoryofBD.pdf

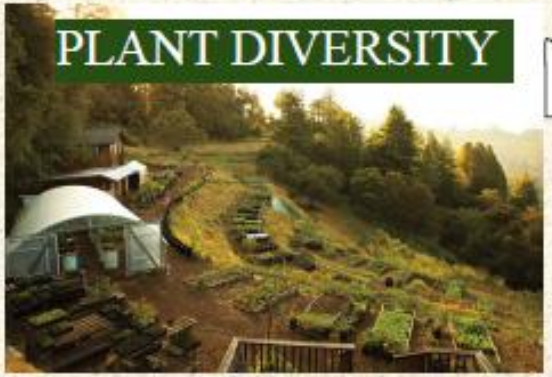
Biodynamic Agriculture

Rudolf Steiner
Father of Biodynamic Agriculture



- Founded Waldorf educational system for children
- Created philosophy of Anthroposophy
- Created the movement art known as Eurythmy
- Architect
- Social economist

Basic Principles



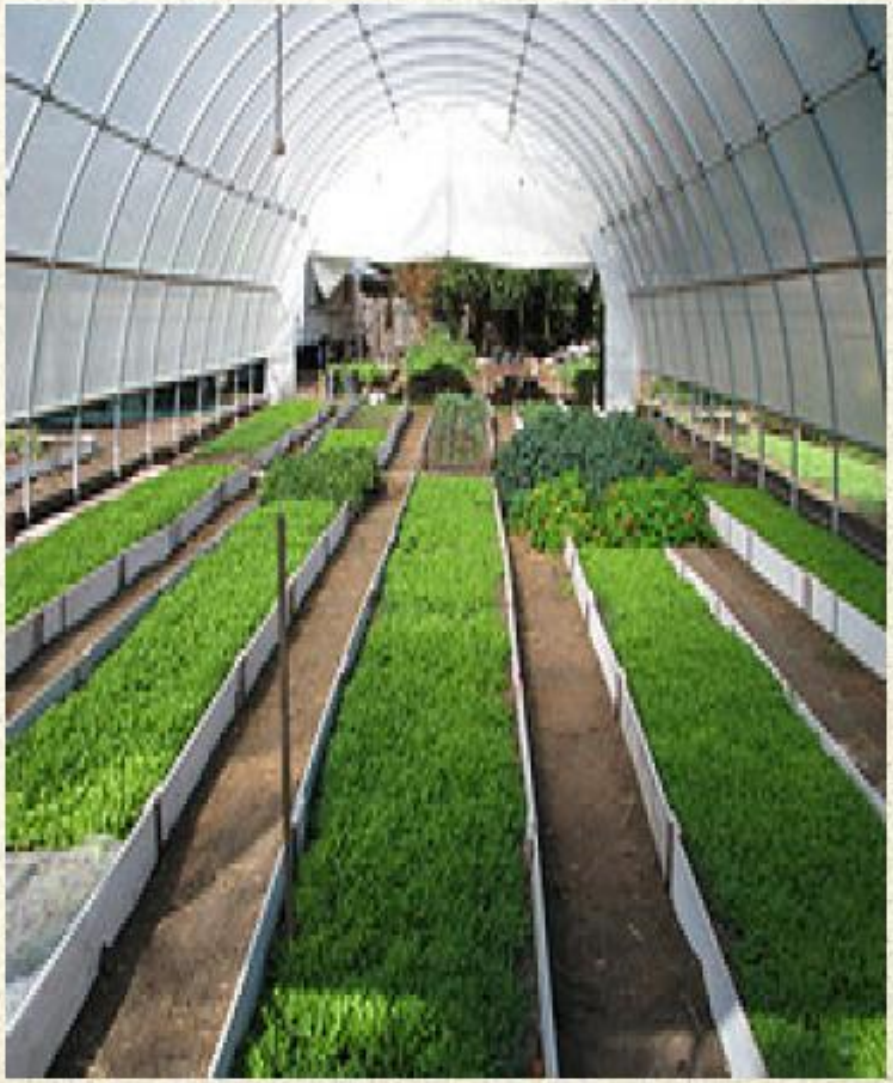
Basic Principles

- Broadens Our Perspective of Agriculture
- Reading the Book of Nature
- Cosmic Rhythms
- Plant Life is Intimately Bound Up with the Life of the Soil
- A New View of Nutrition
- Medicine for the Earth: Biodynamic Preparations
- The Farm Organism as the Basic Unit of Agriculture
- Economic Based on Knowledge of the Job

Basic Principles

Farm is a Closed Loop System

- Stresses low carbon footprint
- Farm produces own fertility
- Compost and green manures used
- Animals are fed from farm
- Seed is saved
- Biodynamic farms close their loop via local, direct marketing



Basic Principles

Creating Your Own Compost is Required

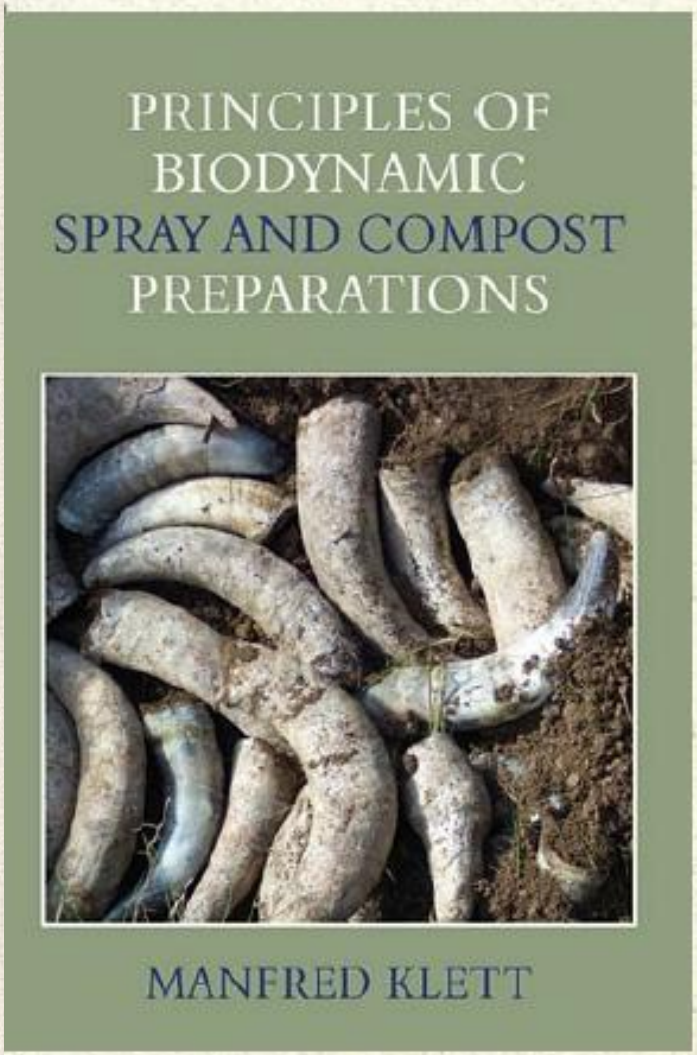
Basic Principles

Animals are Required on a BD Farm

- Animals provide manure for compost piles
- Key difference between organic growing & BD
- Animals are fed from farm products
- Farmer usually expected to eat animals or their products
- Animals must be treated humanely

Basic Principles

Special "Preparations" Are Used



- Applied to both soil and compost piles
- Steiner believed each prep maintains or enhances fertility or reduces pests and diseases
- Homeopathic quantities used
- Farm doesn't have to create them, but encouraged to do so
- Difficult preps created by groups of farms

Basic Principles

Astrological Planting Calendar

- Steiner believed moon & stars influence plants
- Plants categorized into 4 types:
  - Leaf (like lettuce)
  - Root (like carrot)
  - Fruit (like tomato)
  - Flower (like broccoli)
- The 4 types of plants affected by planets, moon, stars:
  - Leaves are water signs (like Pisces)
  - Roots are earth signs (like Taurus)
  - Fruits are fire signs (like Leo)
  - Flowers are air signs (like Libra)

Basic Principles

Biodiversity Required

- Demeter requires 10% of farm be forests, wetlands, riparian corridors, or intentionally planted insectaries
- Crops must be rotated
- Monocultures discouraged

Study on the Quality of Two Soil Samples

Left: Original degraded soil
Right: Soil after two years of Biodynamic farming

Study of the Effect of Soil Quality on Plants grown under different conditions

- Left: control plant
- Center: with chemical fertilizers
- Right: in Biodynamic soil

Societal Benefits

- Towards Community Based Farming/Small-scale Farming
- Alternative to large-scale, industrial farming
- Better for the Local Economy
- Cuts out the Middle Man
- No Hierarchy

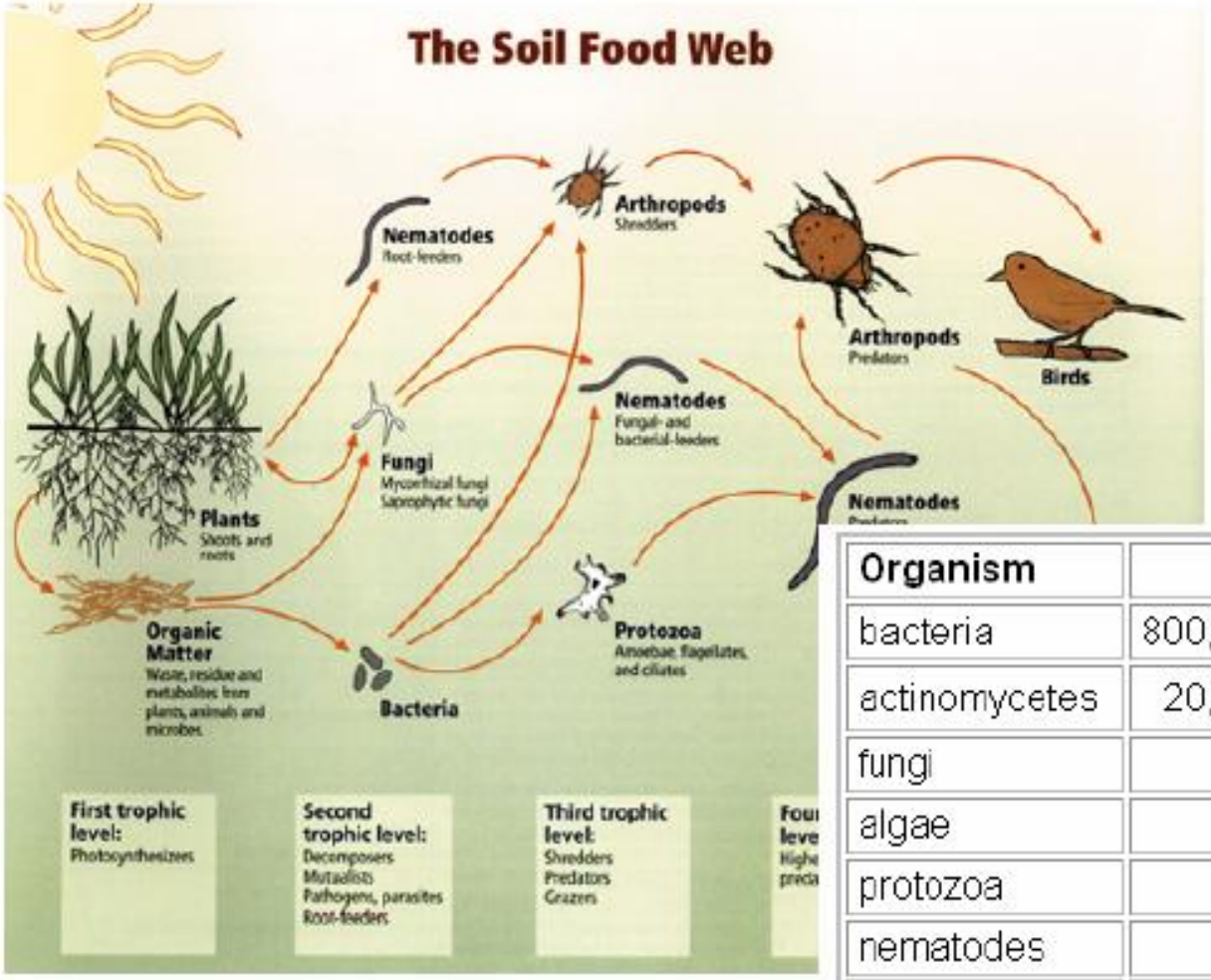
Health Benefits

- More Nutritious Foods
  - Better Quality Soil leads to Better Quality Food
- Reduced or Non-existent Exposure to Toxic Chemicals
  - Pesticides, Herbicides, Fertilizers, etc.
- Since most of the food comes from CSA's, less exposure to the packaging materials used on large-scale, corporation farms
- Therapeutic
  - Biodynamic Farms are often used for mental health care such as for mentally handicapped or stressed-out people

Contemplations from Biodynamic Agriculture

- Concept of agro-ecoystem of a food garden
- Concept of a local foodshed
- Concept of Sense of Place for its application.
- Success depends on enhancement and management of biodiversity, especially in the soil

Soil is Alive



Importance of Soil Biology

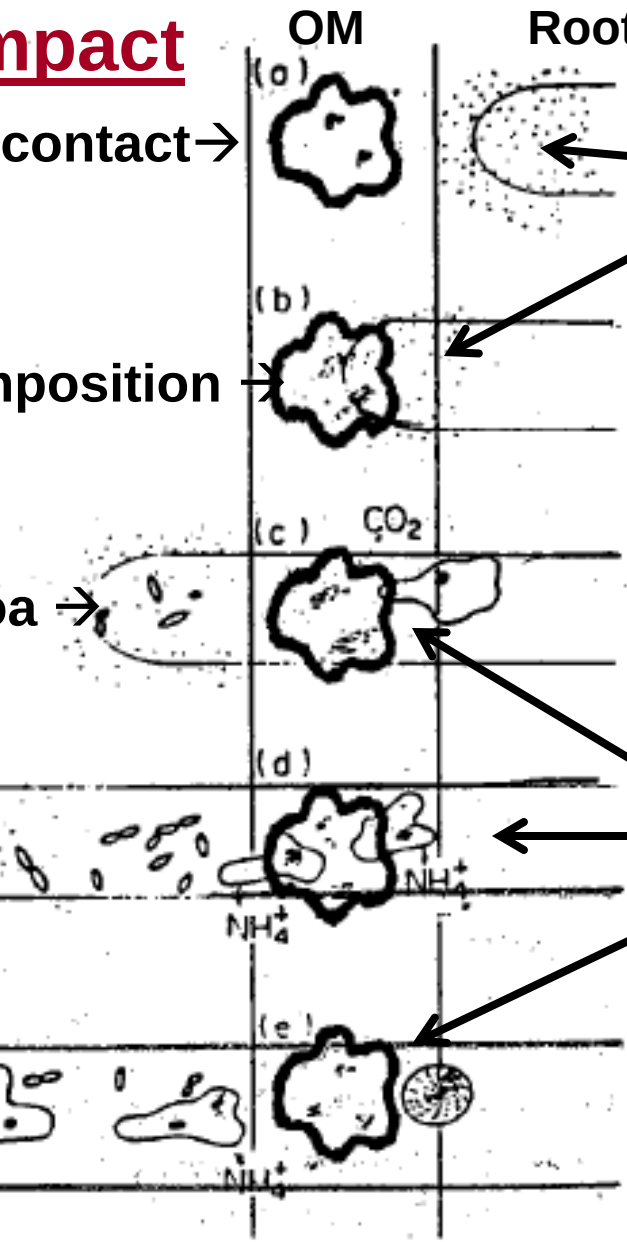
- diversity
- nutrient cycling
- pest/pathogen suppression
- symbioses

Organism	Number/acre	Lbs./acre
bacteria	800,000,000,000,000,000	2600
actinomycetes	20,000,000,000,000,000	1300
fungi	200,000,000,000,000	2600
algae	4,000,000,000	90
protozoa	2,000,000,000,000	90
nematodes	80,000,000	45
earthworms	40,000	445
insects & other arthropods	8,160,000	830

Source: Thompson and Troeh, 1978

Organic Matter & Plant Nutrition:Rhizosphere

Soil Food Web Impact



Root tip & OM contact →

Rhizosphere OM decomposition →

Rhizosphere & protozoa →

Protozoa N wastes →

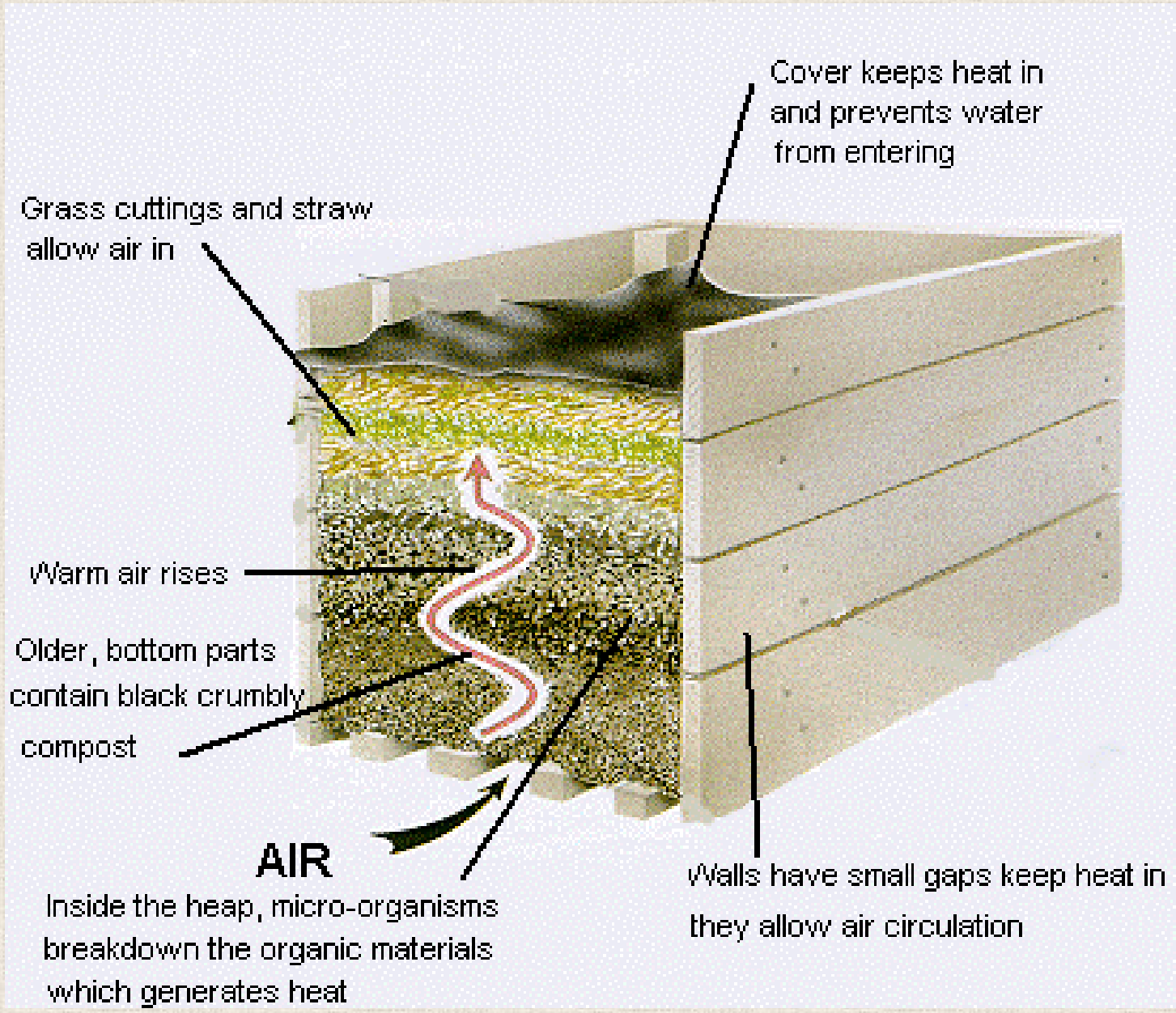
Root uptake of N wastes →

Rhizophere microbes

Food web

Clarhom, M.C., 1985

Aerobic Composting Basics



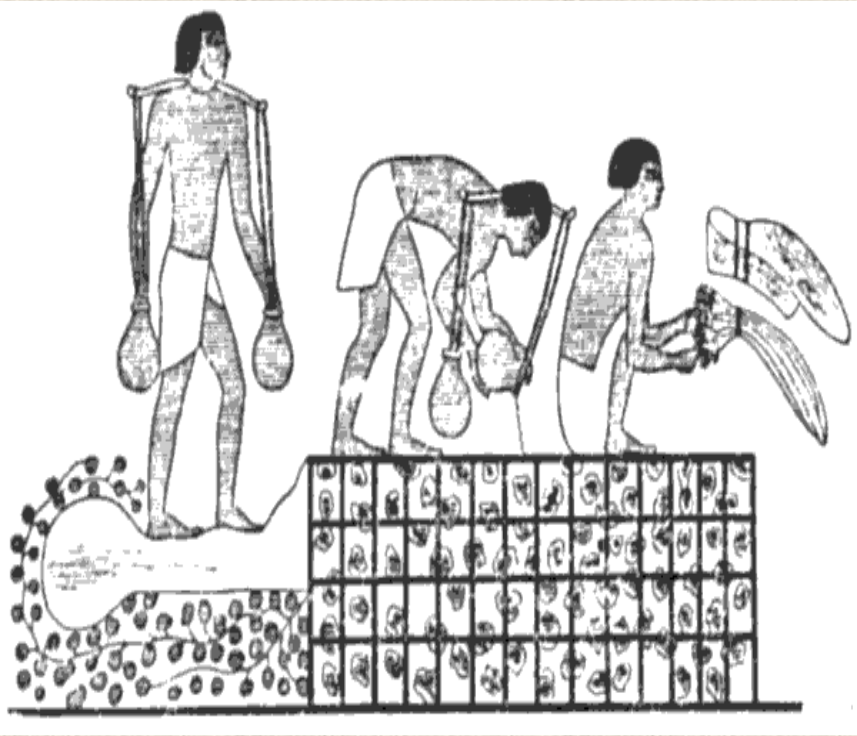
Farmscaping

- A whole system, ecological approach to pest management for farms & gardens
- It can be defined as the use of hedgerows, insectary plants, cover crops, and water reservoirs to attract and support populations of beneficial organisms such as beneficial insects.

http://attra.ncat.org/attra-pub/farmscape.html

Ancient Traditions Worldwide

Irrigating and harvesting in an ancient Egyptian vegetable gardens



Early beginnings of concepts in irrigation & food growing

Ancient Traditions Worldwide

The Floating Vegetable Gardens in Myanmar/Burma

Inspirations for concepts in hydroponic food growing

Summary

- Food gardens from cultures and epochs from around the world have many traditions that reflect an understanding of a “sense of place” & an ecologically based food production.
- The technical aspects of these traditions often served as the foundation of our understanding of many of today’s horticultural principles and concepts
- The cultural & horticultural aspects of these food traditions offer us many contemplations

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