

# Living Soil, Lovely Garden!

Organic, soil-focused gardening for  
healthy plants and efficient water use

With Connie Kuramoto, Gardens on the Go  
[www.gardensonthego.net](http://www.gardensonthego.net)



Source: [npic.orst.edu](http://npic.orst.edu)



Source: [greenbeanconnection.wordpress.com](http://greenbeanconnection.wordpress.com)



# WHY CONSERVE WATER?

In the summer months, water use **DOUBLES** or can even **TRIPLE** due to outdoor water use.

If you live in Qualicum your water comes from groundwater wells, maybe even your own private well.

If you live in the City of Parksville, your water comes from the Englishman River.

In many cases the water that people irrigate with is wasted.....

- EVAPORATION
- RUN OFF
- POOLING



**HYDROPHOBIC SOIL...** Repels water, water runs off



**OVERSATURATED SOILS...** Too much water can suffocate soil life



**ANAEROBIC ENVIRONMENT**

# Start with the soil

Soil with high organic matter content can hold up to 90% of its weight in water.

In this way, soil is like a **sponge**, it's a **storage** facility for **water**... we can use this to be water smart in our gardens.



**The answer is soil structure!**



## Connie Kuramoto, Organic Master Gardener

- Over 20 years at Malaspina **University College's Horticulture** Department as a student, a technician and an instructor
- Four years of bringing her knowledge and experience in Horticulture directly to people in their gardens or meeting places through Gardens of the Go
- Has graduated hundreds of students from Gaia College's Organic Master Gardener Program
- Written articles for Coastal Grower, Synergy and Eagle Eye1





## Connie Kuramoto, Organic Master Gardener

### Where to Begin...

Building a Water-wise, Living Soil Garden Bed

How to help hold water in your soil right from the start



# Soil Texture

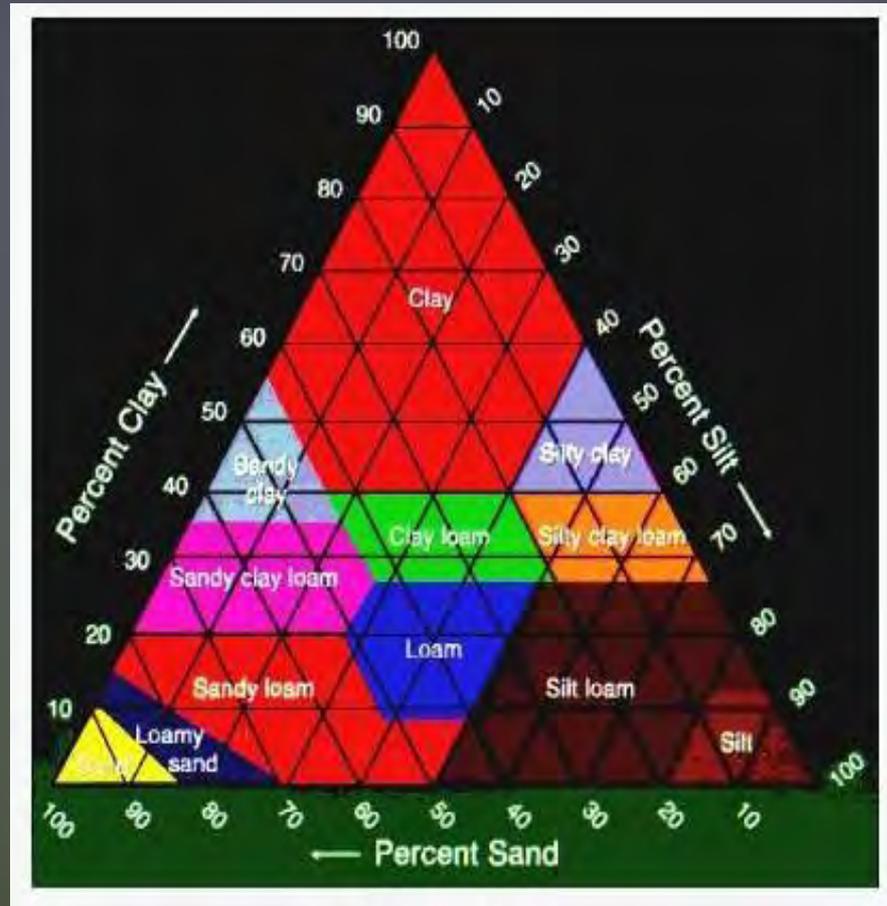
The first thing people think  
**about when describing soil...**

- Is it clayey, sandy, rocky?
- Only part of the story of soil!
- Sedimentation/Jar Test description



Source: Royal Horticultural Society, 2011

# Soil Texture Triangle



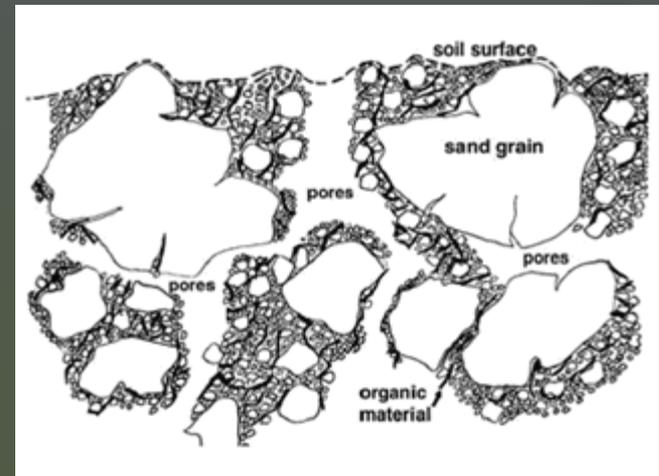
# Soil Texture

Can we manipulate soil texture to increase water retention ?

→ Think Soil **STRUCTURE...**



Source: [www.small-farm-permaculture-and-sustainable-living.com](http://www.small-farm-permaculture-and-sustainable-living.com)



Source: [blogs.oregonstate.edu](http://blogs.oregonstate.edu)

## CASE IN POINT:

# The Harvard Trial

### Results:

Irrigation in the Test Plot was reduced by over 30%

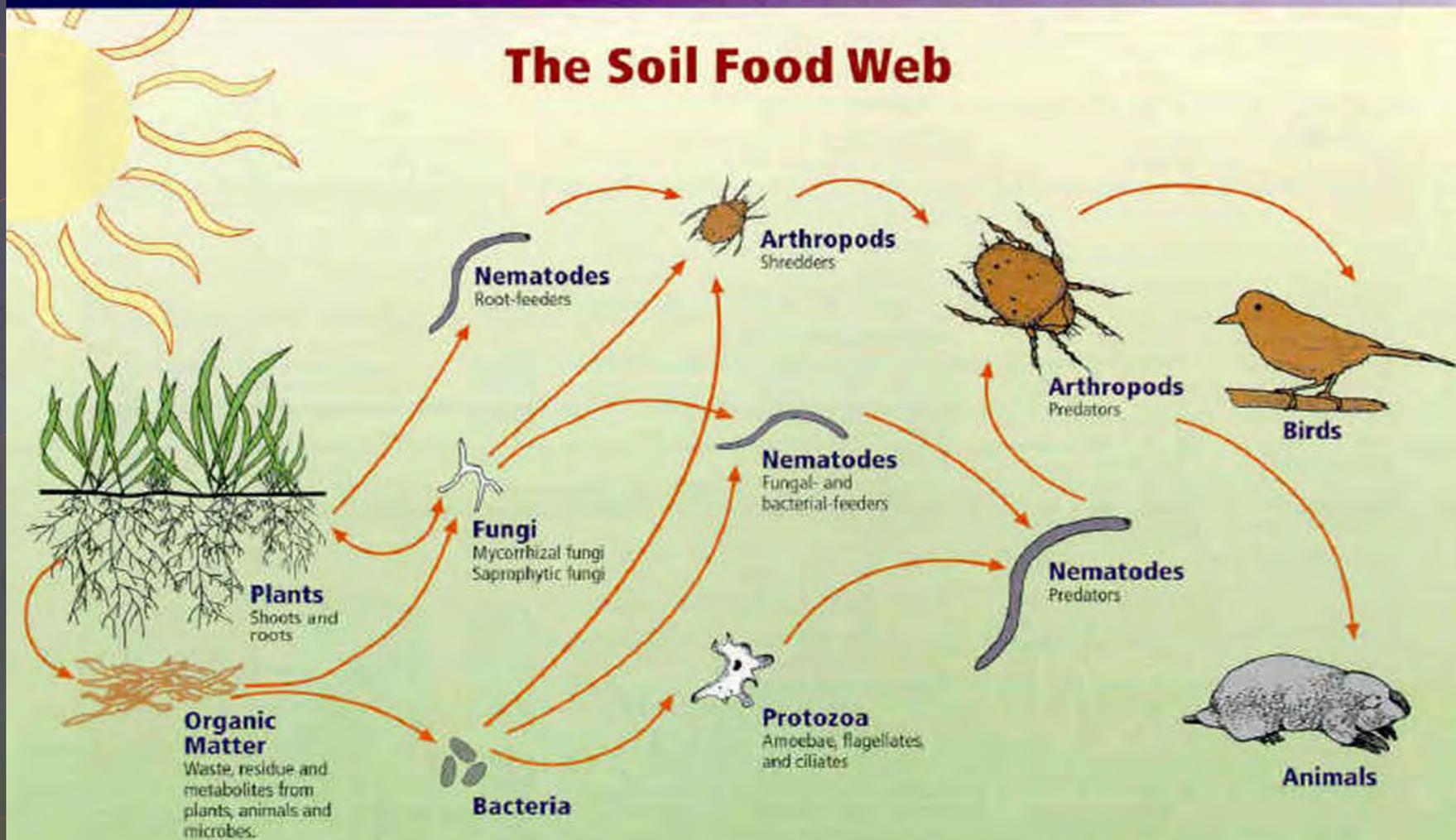
### How?

Improved moisture retention capacity of the deeper root structures.



Projected irrigation reduction of 50% will result in the yard saving more than 2 million gallons of water annually!

# The Soil Food Web



**First trophic level:**  
Photosynthesizers

**Second trophic level:**  
Decomposers  
Mutualists  
Pathogens, parasites  
Root-feeders

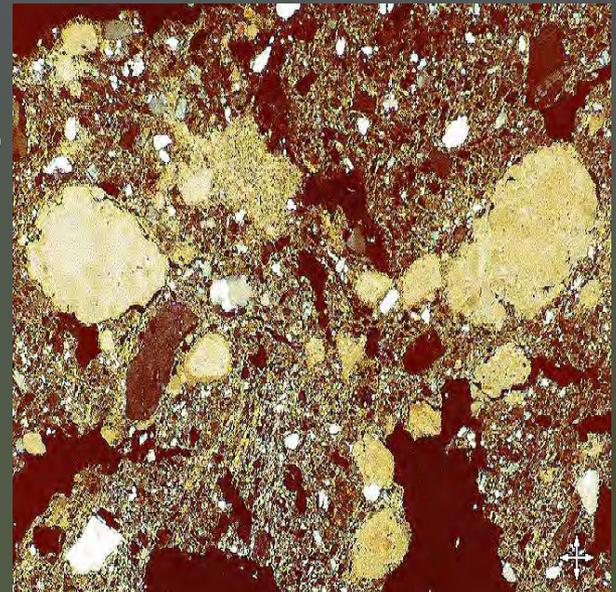
**Third trophic level:**  
Shredders  
Predators  
Grazers

**Fourth trophic level:**  
Higher level predators

**Fifth and higher trophic levels:**  
Higher level predators

# Soil Structure

- What is it?
- Who creates it?
- How is it constructed?



# Bacteria create the bricks



- Form a glue that binds smallest particles
- Hold organic matter on sand, silt and clay
- Create micro-aggregates — the bricks!



# Fungi build the walls



Create strands that bind micro aggregates together

*Aggregates =  
Clumps*

Put mortar into the structure, creating macro-aggregates



# Walls become hallways



# Micro and Macro-arthropods



Build living and dining rooms



# Earthworms build swimming pools



Their slime creates sealed pores that hold water against the flow of gravity.

These are the spaces where water is stored in the soil!



# Soil Structure

How we can affect it:

- Create/support soil food web
- Feed (with organics)
- Water (when necessary)

Soil is alive!

Start with mineral particles of sand, silt, or clays.



Add manures and compost, old leaves, and branches!



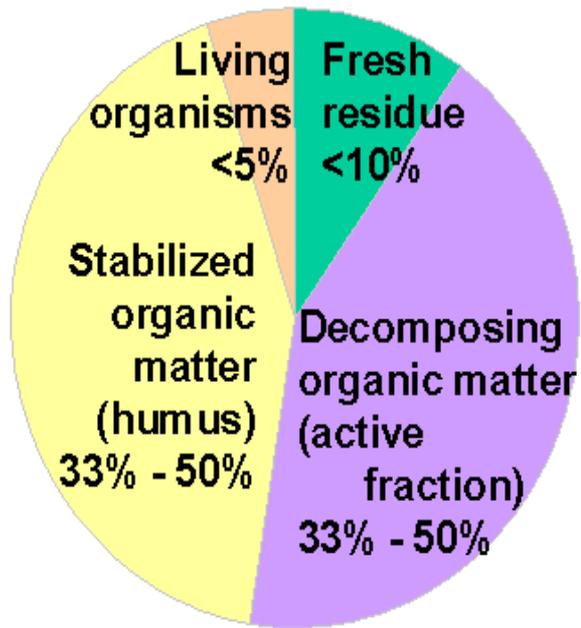
Let bacteria & fungi do their work. Feed & excrete, feed & excrete.



Soil binds together in sticky chunks. The ability to hold water and nutrients is increased.

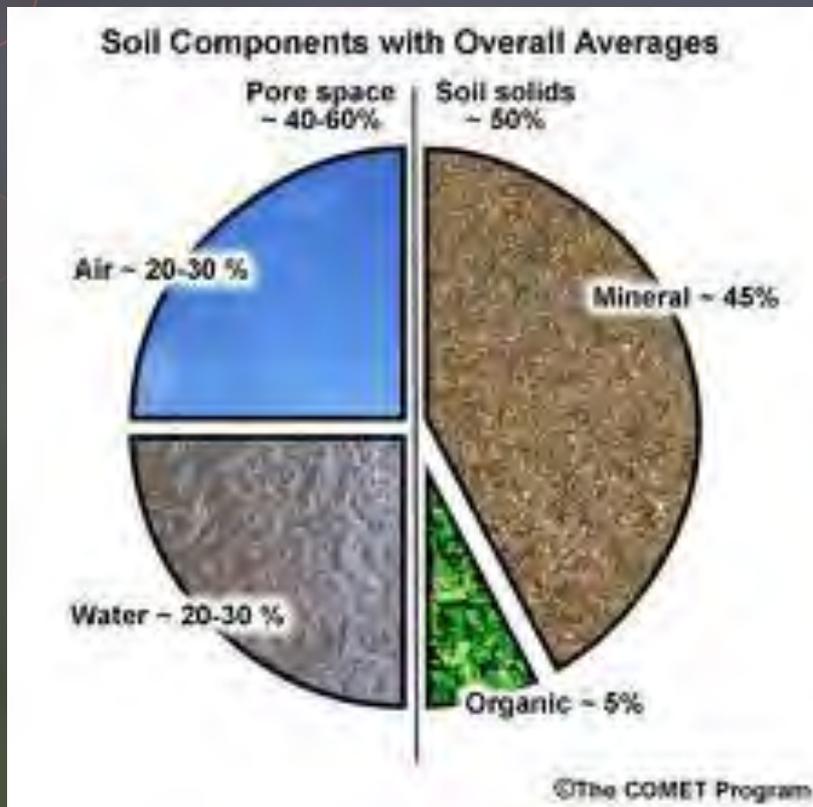


# Organic Matter



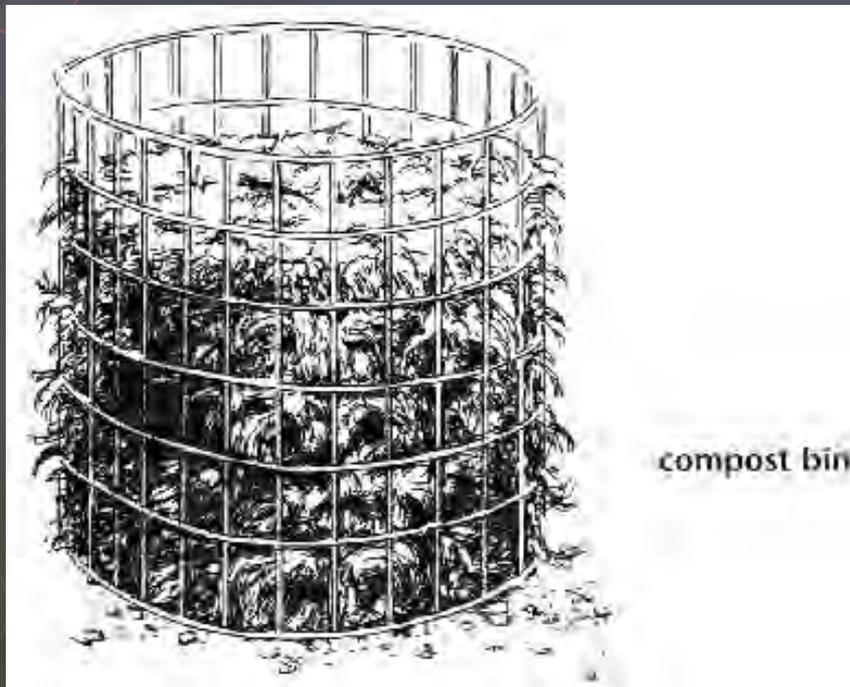
Consider Soil Stratification in nature  
...what is found on a forest floor

# Importance of Organic Matter



- Nature adds organic matter from the top
- Soils that have 5% organic matter can hold 5 times the amount of water as soils that have 1% organic matter, meaning they will not dry out as quickly
- Soils high in organic matter also hold lots of air even though they hold lots of water.

# Ways to Add Organic Matter



- Top dress with Compost
- Mulch
- Cover Crop

# Types of Mulch



- Straw
- Grass Clippings
- Shredded Paper
- Leaves
- Wood Chips
- Seaweed
- Garden Residues
- Comfrey Leaves

# Benefits of Mulch

- Help with weed & pest problems. Organic mulches feed the soil microbes, to keep the soil food web in balance.
- Conserve moisture by reducing the amount of soil water lost through evaporation.
- Maintain a uniform soil temperature. They act as insulators, keeping the soil warmer during cool weather and cooler during the warm months of the year.
- Minimize soil erosion and compaction from heavy rains and aid in water penetration.
- Increasing the water holding capacity of the soil, which means less water will need to be applied.

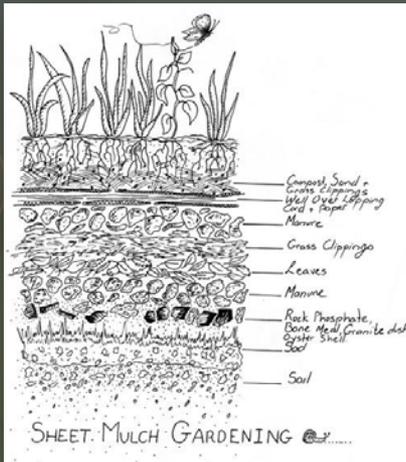
# Lasagna Garden Bed (Sheet Mulching)



There are huge advantages to building a no-dig sheet mulched bed!

1. Adds organic matter where you most need it.
2. Keeps soil moist even during dry spells, thereby reducing water use.
3. It leaves the microbes and the worms protected and undisturbed, in addition to being well fed and hydrated.
4. It keeps down weeds
5. You will get better harvests.
6. It is dead easy!!!

# Lasagna Beds



**Final Layer:**  
Compost or Manure

**\*Repeat layers 2-5 until Garden is 2-feet deep\***

**Layer 5:**  
"Greens"

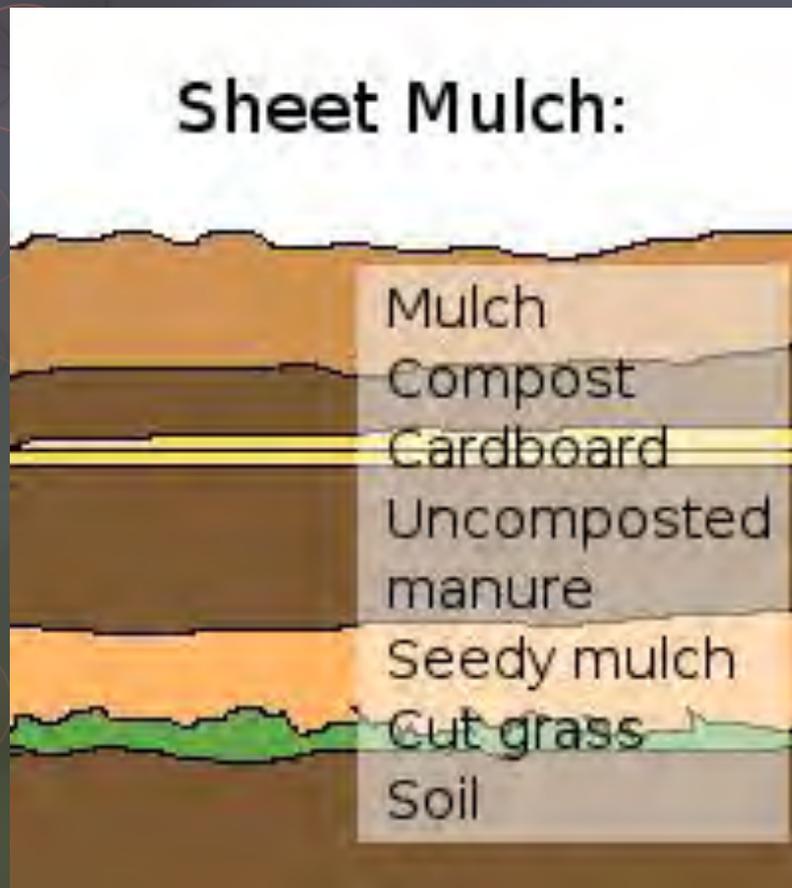
**Layer 4:**  
"Browns"

**Layer 3:**  
Organic "Greens"- ex: vegetable scraps, garden trimmings, and grass clippings.

**Layer 2:**  
Organic "Browns"- ex: Fall leaves, shredded newspaper, peat, and pine needles.

**Layer 1:**  
Corrugated Cardboard or Newspaper

# KISS BED



## Keep it simple!!

1. Cut grass or weeds down
2. Add a layer of unfinished compost, partly composted manure
3. Lay down a layer of cardboard or 6 sheets thick newspaper, making sure they overlap well
4. Add a 3 inch minimum layer of soil mixed with compost or straight compost
5. Mulch with chopped leaves, wood chips, or seaweed.

Can be done on existing beds or new shrub and tree beds



- Plant trees and shrubs or work around ones already planted
- Repeat the layers as on the last slide, laying down unfinished compost, cardboard, finished compost and mulch

# Seedling Beds



- When planting young seedlings use newspaper instead of cardboard so the roots can more easily penetrate the material
- Plant the seedlings right into the compost mix on top, and then mulch with leaves, chopped leaves, straw, or partly decomposed wood chips.

# Direct Seeding in a Lasagna Bed



- You can also seed directly into the lasagna bed if you use newspaper instead of cardboard.
- Roots will easily penetrate moist newspaper

# Cover Cropping

Organic Matter: grow your own!!

## Non Leguminous

- Rye
- Oats
- Wheat
- Forage turnips
- Buckwheat (at right)

## Leguminous adds Nitrogen

- Clovers
- Hairy Vetch
- Field peas
- Alfalfa

# Cover Cropping



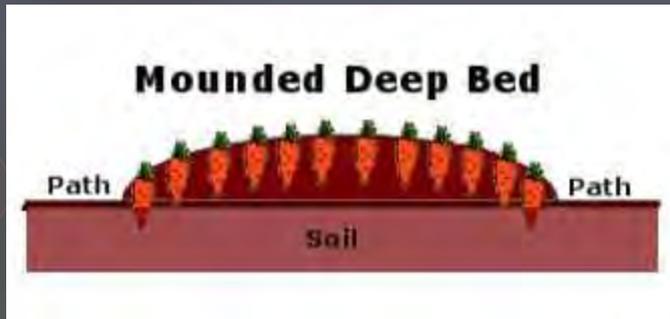
# Benefits of Cover Crops

- Adds organic matter and, in some cases, Nitrogen.
- Attract earthworms
- Increase beneficial microorganisms in the soil
- Attract pollinating insects
- Help aerate the soil
- Provide weed control
- Protect against soil and nutrient loss
- Some cover crop plants will excrete substances that kill off soil diseases or discourage soil borne pest insects
- Provide more soil nutrition than manure
- **Improve soil water retention**

# Cover Cropping Lasagna Beds (no digging required)

1. Plant cover crops in the early spring or fall
2. 6 weeks before you want to plant your veggies chop the crop down
3. Lay some unfinished compost on top of the chopped down crop.
4. Cover with newspaper (spring) or cardboard (fall)
5. Weight newspaper down, wait at least 6 weeks
6. Add a layer of compost/compost soil mix
7. In spring you can now plant the bed. In fall mulch heavily with leaves. Keep mulch wet until the rains begin.

# Mounded beds



- A mounded bed will actually lose less water and still provide nice growing space for roots.
- Another advantage of a mounded bed is that plants can be planted right down to the path level, thereby shading soil

# Plant Intensively

1. Group plants that have shallow roots and deep roots together.
2. Remember plants can share water by keeping water vapor under the canopy
3. The shade created by the leaves also slows evaporation from the soil



# Create/support SFW

## Compost Tea

- Actively aerated version
- Source of microbes
- Demonstration



Source: [www.compostsoup.com](http://www.compostsoup.com)

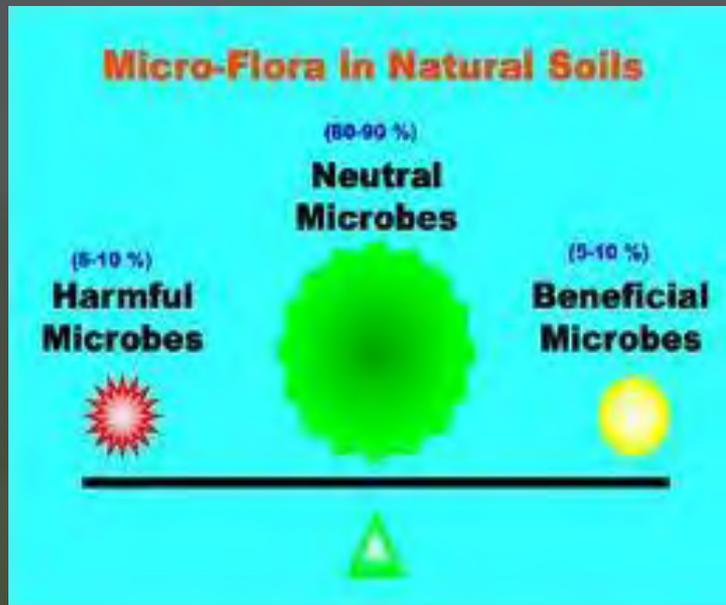


Source:  
[www.instructables.com](http://www.instructables.com)

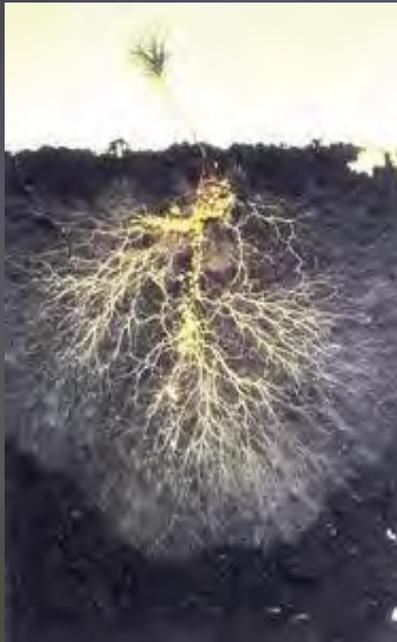
# Effective Microorganisms

Is your soil's "see-saw" out of balance?

EM adds beneficials



# Mycorrhizal Fungi



Some call it  
"extendo-  
root"!



[www.gardensonthego.net](http://www.gardensonthego.net)

# Watershed Friendly Yard Campaign

- Incorporating features such as a golden lawn, native plantings, xeriscaping, etc. helps to protect the entire watershed
- To promote Watershed Friendly Yards, the RDN is giving away FREE yard signs to anyone in the RDN with a water wise yard feature!
- **Email your photo to [watersmart@rdn.bc.ca](mailto:watersmart@rdn.bc.ca)**

