

# Soil Health: The Natural Approach

Prepared by:  
Etobicoke Master Gardeners



Etobicoke Master Gardeners  
[www.etobickemastergardeners.ca](http://www.etobickemastergardeners.ca)

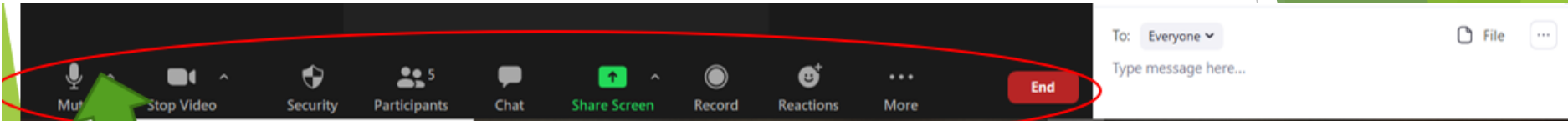
Presented with:  
Humber Arboretum



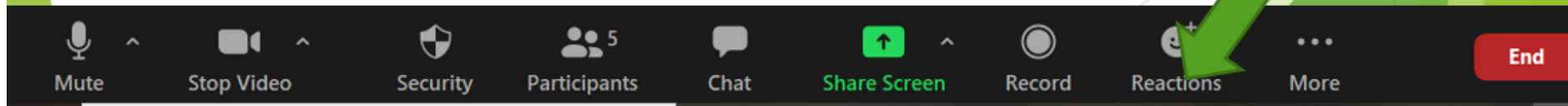
Humber Arboretum  
[www.humberarboretum.on.ca](http://www.humberarboretum.on.ca)

# Welcome to the virtual world

## Zoom Tips & Tricks

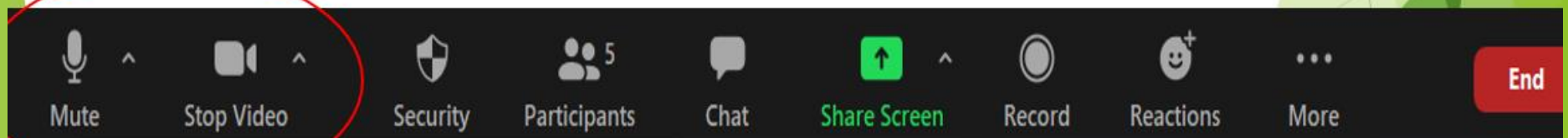


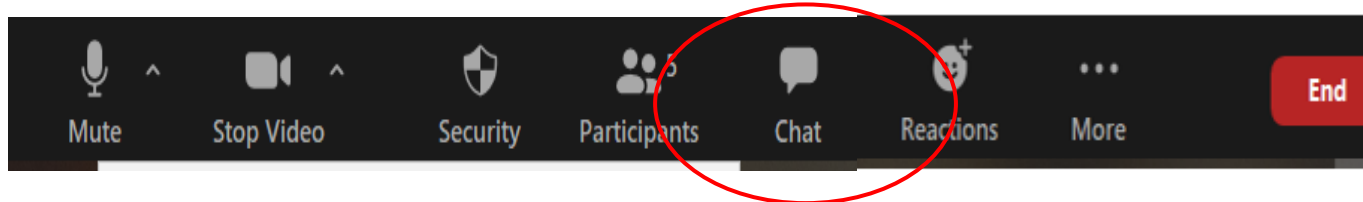
“Mouse over” the screen area to wake up the functions.



**KR** Your Name

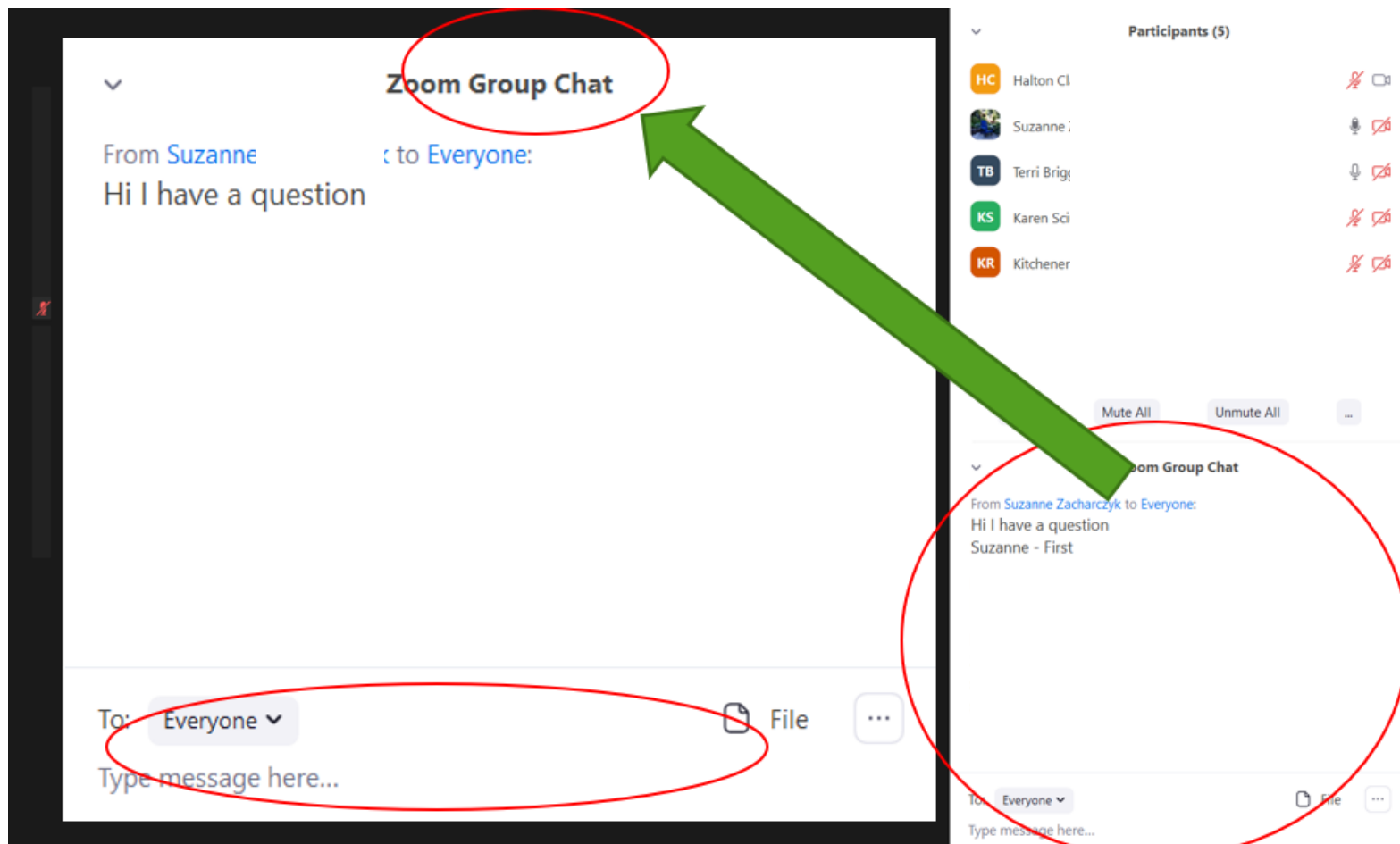
Mute yourself and turn off video unless you are the presenter.





## How to ask a question:

- ✓ Click on “Chat” in the functions
- ✓ Type in your question. A moderator will read it.



# Master Gardeners of Ontario



Etobicoke Master Gardeners

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[COMMUNITY ACTIVITIES](#)

## Etobicoke Master Gardeners

**Etobicoke Master Gardeners (EMG)** was formed in January 2005 and is meant to cover the west side of Toronto and take in those people who want to study for the Master Gardener (MG) designation.

Meetings are held at the [Montgomery Inn](#) on the fourth Wednesday of most months from 7 to 10 p.m.

EMG comprises 36 active members: 26 Master Gardeners (MG) and 10 Master Gardeners in Training (MGIT) who are in the process of studying for Master Gardener Certification. We welcome inquiries from enthusiastic and interested individuals wishing to learn more about joining our



# Humber Arboretum



A partnership of:



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# Soil Health – The Natural Approach

## ✓ Soil

- ✓ What is it made of
- ✓ What does good soil provide to plants
- ✓ Testing for basic soil types

## ✓ Composting

- ✓ What are the benefits
- ✓ Greens vs. Browns
- ✓ Simple methods of composting
- ✓ Compost Tea
- ✓ Vermicomposting

## ✓ Mycorrhizae

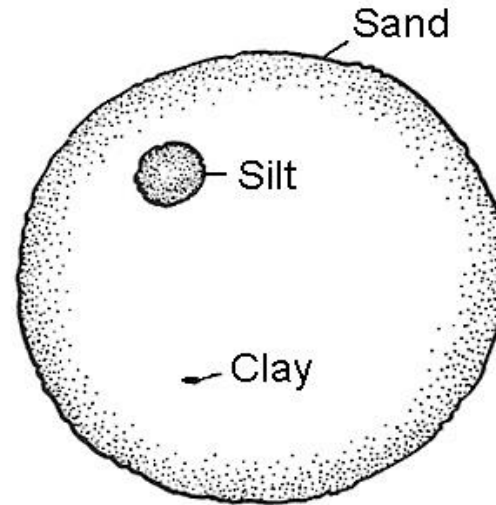
- ✓ What is it & the relationship
- ✓ How do we use it



Soil

# Soil – what is it made of?

- ✓ Weathered rock material broken down over many years
- ✓ Sand, silt and clay
- ✓ Micro-organisms
- ✓ Organic matter
- ✓ Water and Air



<http://pnwmg.org/images/soilparticlesize.gif>



<http://foodstorageandbeyond.com/wp-content/uploads/2011/03/types-of-soil.jpg>

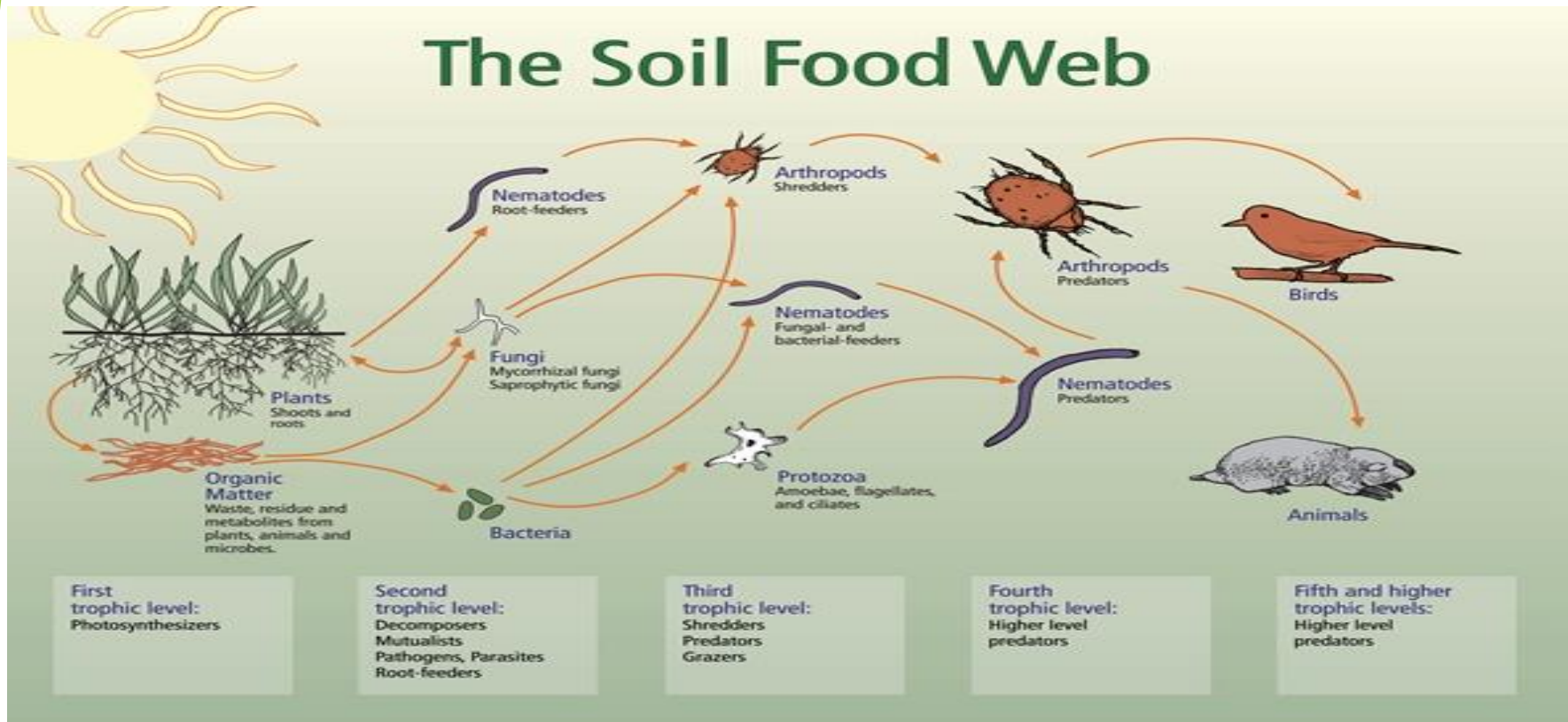
# What does good soil provide to plants?

- ✓ Temperature control during very hot/cold periods
- ✓ Oxygen that roots need to breathe
- ✓ Anchoring support to stay upright
- ✓ Water that roots need to drink
- ✓ Food, food and more food!!!



***SOIL***

# What does good soil provide to plants?



Natural Resources Conservation Service

# Testing for Basic Soil Types



— **O horizon** - Leaf litter and other organic debris

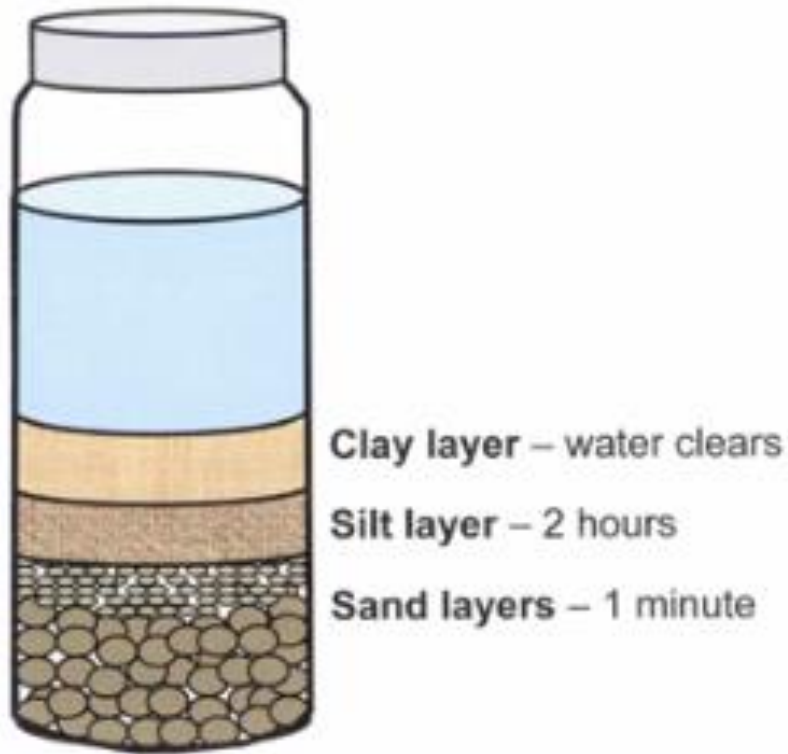
— **A horizon** – A surface mineral horizon showing coloration due to organic matter accumulation

— **B horizon** – A subsurface horizon showing depletion of organic matter and an accumulation of clay. Clay is typically iron and aluminum based compounds

— **C horizon** – A subsurface layer of soil forming parent materials. Could be weathered rock, unconsolidated floodplain sediments or loose sands

— **R horizon** – Hard bedrock

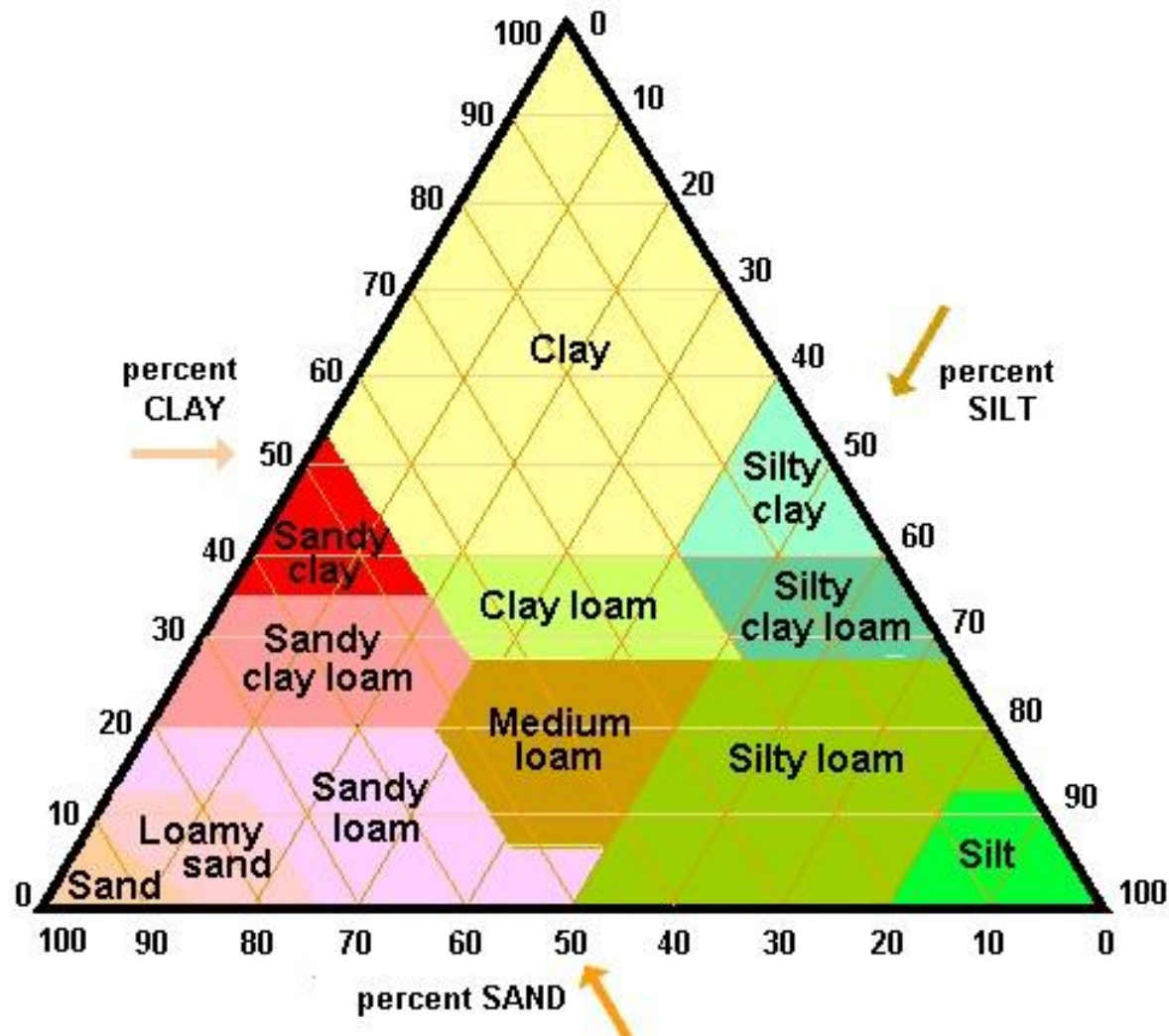
# Sample Soil Test & the Mason Jar test



Things our soil tests will tell us:

- ✓ How much amending we need to do
- ✓ How much digging we may have to do
- ✓ What vegetables we choose

# Basic Soil Types



# Testing for Basic Soil Types



✓ Ribbon Test

# Testing for Basic Soil Types



✓ Drainage Test

# Testing for Basic Soil Types



✓ Smell Test

✓ Visual Test

✓ Taste Test ☺

# Testing for Basic Soil Types



✓ Testing kit

Example of Soil Test Report from MU Soil Testing Labs for Lawns and Garden Fertility Test:

**University Extension**  
University of Missouri  
Columbia

**Soil Test Report**  
For Lawns and Gardens  
—MU Laboratories—

23 Mansfield Hall  
Columbia, MO 65211  
(573) 883-0623

or

P.O. Box 160  
Portageville, MO  
(313) 379-5431

Serial No.  
**H46109H-1**

County  
**Boone**

Region

Submitted  
**3/27/2010**

Processed  
**3/29/2010**

<http://www.soiltest.psu.missouri.edu/>

Sample ID: Home garden 1

Lab No: CO103997

This report is for:  
Lawn Garden  
1000 Univ. Ave  
Columbia, MO 65201

Last Limed: unknown

SOIL TEST RESULTS		RATING					
		Very low	Low	Medium	High	Very high	Excess
pHs	5.5	*****					
Phosphorus (P)	7 lbs/a	***					
Potassium (K)	191 lbs/a	*****					
Calcium (Ca)	5253 lbs/a	*****					
Magnesium (Mg)	495 lbs/a	*****					
Organic Matter:	2.6 %	Neutr. Acidity:		2.0 meq/100 g		CEC: 16.0 meq/100g	

**Fertilizer & Limestone Recommendations (lbs/1000 sq ft)**

Crop	Nitrogen(N)	Phosphorus(P <sub>2</sub> O <sub>5</sub> )	Potash (K <sub>2</sub> O)	Zinc(Zn)	Sulfur(S)	LIME
1 vegetables	0.5	4.0	0.5			100
2 blueberries	1.0	4.0	1.0		50	0

**Comments:**

\*\*\*Fertilizer rates are given in pounds of actual nutrient per 1000 sq. ft to be applied

\*\*\*The soil needs additional organic matter for gardens and crops other than lawns. See MU Publication G6950, "Steps in Fertilizing Garden Soil" and G6956, "Making and Using Compost".

\*\*\*Lime takes two to three months to react with the soil. Apply lime three to six months before planting.

\*\*\* For blueberries soil needs to be treated with 50 lbs of elemental S per 1000 sq. ft to acidify the soil. It takes 3 months for S to react with the soil and acidify the soil.

---The soil should be tested every 2 to 3 years to determine the effects of your fertilization practices and to develop a new set of fertilizer and limestone guidelines.

✓ Lab Test



# Composting

# Composting – what are the benefits?

- ✓ Reusing and recycling
- ✓ It's natural – occurs in nature!
- ✓ Helps grow strong healthy plants
- ✓ Good for soil health and structure



<http://www.planetnatural.com>

# Composting – what are the benefits?

- ✓ Adds micro-organisms to root zone
- ✓ Reduces needs for synthetic fertilizers
- ✓ Improves water drainage in clay soils
- ✓ Improve water retention in sandy soils
- ✓ Soil remediation



# Composting

## What are the benefits?

- ✓ **Brown** matter (Carbon)
- ✓ **Green** matter (Nitrogen)
- ✓ Water / Air
- ✓ Ideal temperature in the middle of pile +130degF (55degC)



# Greens vs. Browns



# Greens vs. Browns

- ✓ Greens are high in **nitrogen or protein**.
- ✓ Greens help microorganisms to multiply fast in the piles.
- ✓ Greens help internal temperatures in hot compost piles.
- ✓ Browns are high in **carbon or carbohydrates**.
- ✓ Browns supply the energy / food that soil organisms need.
- ✓ Browns also help stop odors.
- ✓ Browns help stop the nitrogen in the piles from leaching.
- ✓ Browns are essential in the faster formation of humus

# Composting – simple methods

- ✓ Build your own
- ✓ Reuse old skids



<http://www.planetnatural.com>



<http://www.planetnatural.com>

# Composting

## Simple methods



Pile on the ground



Leaf mould containers



# Composting – simple methods

- ✓ Compost tumbler
- ✓ No turn vs. turned compost
- ✓ Compost in ‘situ’



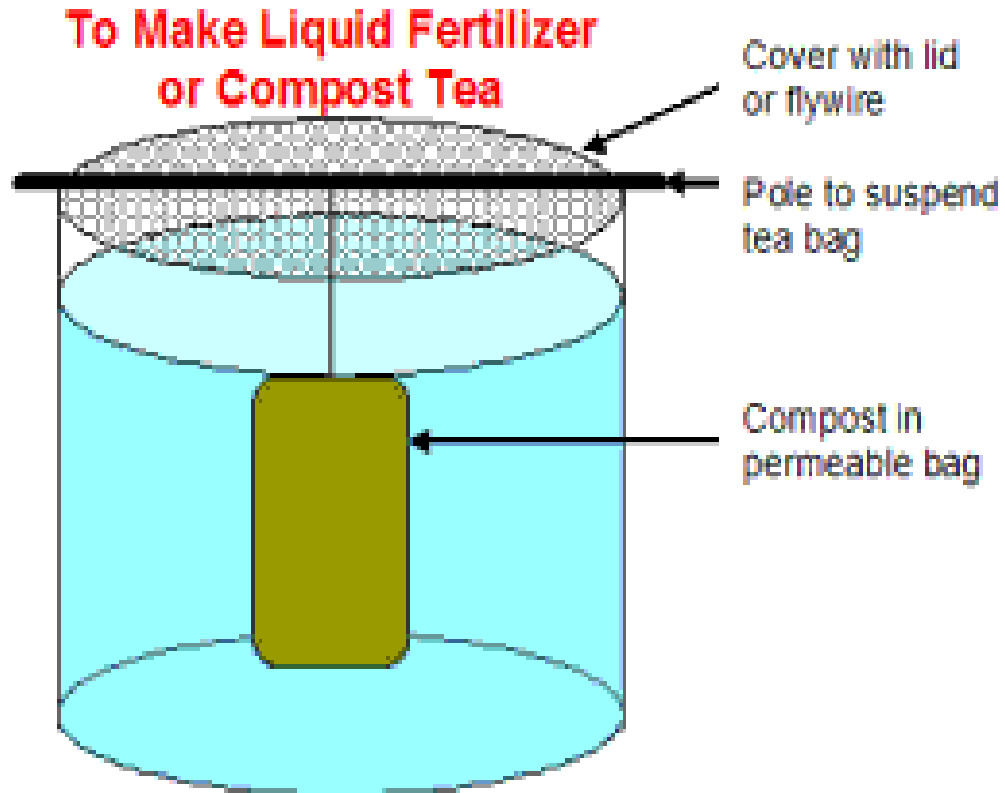
<http://www.self-sufficient.co.uk/OtherImages/composttumbler.jpg>



# Composting – do's and don'ts

Do	Don't
Ensure proper moisture	Let it dry out
Turn your pile when needed	Use meat or fish scraps
Pay attention to C:N ratio (25:1)	Use Black Walnut leaves
Try to have a pile 4' tall by 3' wide	Use banana peels, orange rinds, etc.
Chop up large pieces to speed it up	Use thick layers of grass or sawdust
Use it as a soil additive - not as a soil	Use weeds - especially mature ones!
Ensure your pile is covered (water + heat)	Don't add in diseased plant material

# Compost Tea!



<http://www.small-farm-permaculture-and-sustainable-living.com>

- ✓ Fast acting
- ✓ Easy to make
- ✓ Foliar feed or soil drench
- ✓ More microbes than compost

# Compost Tea – Do's and Don'ts

Do	Don't
Use rainwater or dechlorinated water	Use fresh tap water (chlorine/chloramine)
Use finished compost (Humus)	Use under composted compost
Use 400micron bags	Use screens too big or small
Add Kelp meal + others	Under or Over mix tea (12-48 hours)
Add molasses (food for microbes)	Let bacteria become anaerobic (stinky)
Aerate your mixture (max 2 days)	Use your brewer without cleaning it
Use within 4 hours of aerating	Drink it yourself - plants only!

# Vermicomposting = Worm Castings

- ✓ Composting with specialty worms known as ‘Red Wigglers’



Gardenworms.com

# Why vermicompost?

- ✓ Simple low cost
- ✓ Odourless
- ✓ Can be done indoor
- ✓ Year round
- ✓ Low maintenance
- ✓ Reduce organic household waste
- ✓ A nitrogen rich natural fertilizer
- ✓ Conserves moisture
- ✓ Improves soil conditions



Peakradar.com

# Vermicomposting



- ✓ Making your 'bedding'
- ✓ Bin preparation & location
- ✓ Adding the worms to the bin

# Feeding the worms!

- 
- ✓ Fruit/vegetable peels
  - ✓ Tea bags
  - ✓ Cooked pasta & rice
  - ✓ Leaves/grass clippings
  - ✓ Coffee grounds/filters
  - ✓ Crushed eggshells
  - ✓ Egg cartons/coffee trays
  - ✓ Newspaper (no colour print)
  - ✓ Plant cuttings
  - ✓ Brown paper towels
  - ✓ Breads/cereals/grains
  - ✓ Beans


# Vermicomposting

- ✓ The 'harvest'
  - ✓ 'Dump and Sort', or 'Side to Side'
- ✓ What problems might occur





# Mycorrhizae

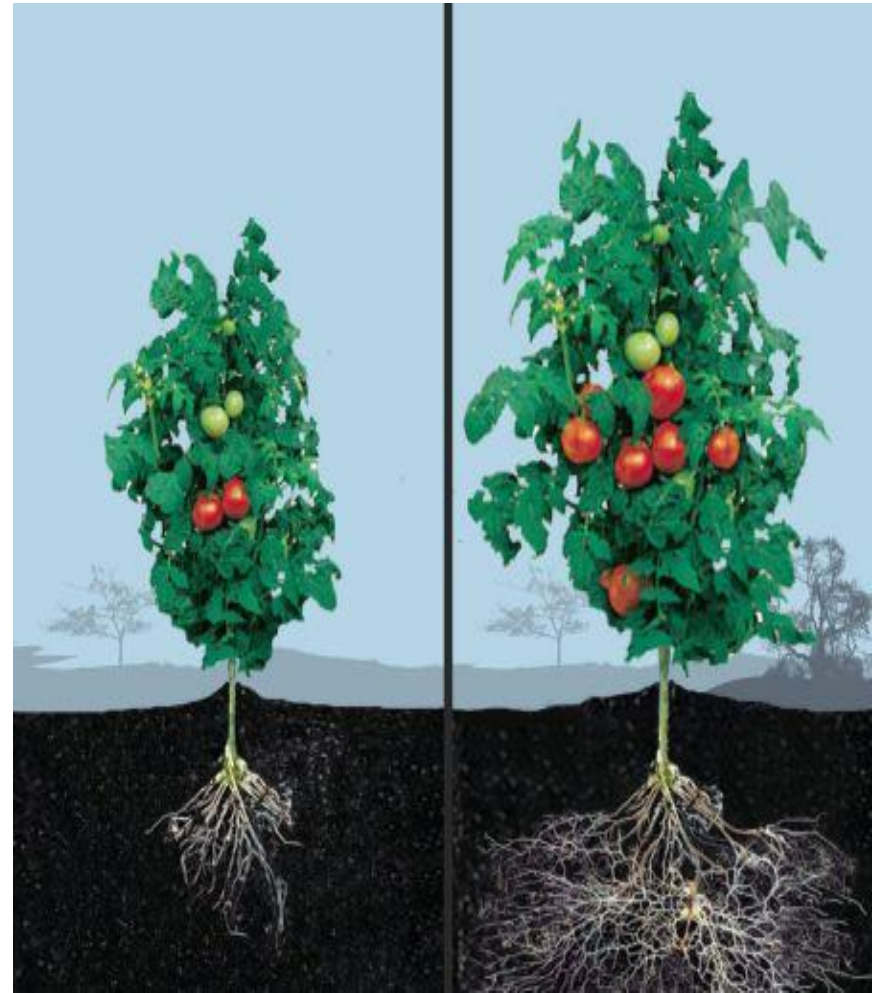
A microscopic image showing a plant root with a thick, yellowish, fuzzy coating of mycorrhizal fungi. Numerous thin, white, thread-like hyphae extend from the root into the surrounding dark soil.

# Mycorrhizae - What is it?

- ✓ = fungus root (Greek)
- ✓ 95% of all plants are involved
- ✓ Beneficial fungi – good not bad!
- ✓ ‘Hyphae’ goes where most roots won’t
- ✓ Naturally multiplies as root systems enlarge
- ✓ Naturally occurring in almost all plant/soil ecosystems

# Mycorrhizae – What is the relationship?

- ✓ Increases yield
- ✓ Increases plant growth
- ✓ Increases root mass and density
- ✓ Improves drought stress tolerance



<http://giantveggiegardener.com>

# Mycorrhizae – What is the relationship?

- ✓ Fungus attaches to roots of plants
- ✓ Symbiotic relationship – not parasitic
- ✓ Plants need nutrients and water to survive
- ✓ Fungus needs sugars to survive > no photosynthesis
- ✓ One time application required for the life of plant😊

# Mycorrhizae – which plants benefit?

- ✓ Almost all plants other than brassicas (turnips, radishes etc.)
- ✓ Almost all tree species, grasses and annuals

Beans	Leeks	Tomatoes
Bulbs	Lettuce	Basil
Cantaloupe	Melons	Sage
Carrots	Onions	Mint
Celery	Peas	Lavender
Corn	Potatoes	Dill
Cucumbers	Pumpkins	Thyme
Garlic	Strawberries	+ 1000's more!!!!

# Mycorrhizae – How do we use it

- ✓ Single application!
- ✓ Often a granular form
- ✓ The smaller the plant the better
- ✓ Must make contact with the root zone
- ✓ Best to use at time of planting or transplanting



# Mycorrhizae – Do's and Don'ts

Do	Don't
Ensure direct contact with roots	Overwater
Try to apply when plants are smallest	Over fertilize (especially with P)
Use the right product for the right plant	Use chicken manures in compost (P)
	Over till the soil



Wrap-Up

# Putting it all together – 3 steps to sleep on!

1. Make your own finished compost (humus)
2. Using your humus, brew your own compost tea
3. Add mycorrhizae to your compost tea just before application!!



# Feed the Soil, Not the Plant!



<http://kurillastration.blogspot.ca/2011/05/post-earth-day.html>

# Join us an upcoming workshop

Saturdays 10 - 11 am (\*exception 10-10:30)

Good Bugs - Bad Bugs - February 20, 2021

Growing Your Own Food- April 17, 2021

Bird Friendly Gardening - May 15, 2021

Benefits of Gardening - June 12, 2021\*

Pruning - October 16, 2021

Pests & Pathogens - November 13, 2021

# **Etobicoke Master Gardeners**

**Thank you!**

**Questions**

