

Course Curriculum/Guide: Teaching Organic Veggie Gardening to Home Growers

Canadian Organic Growers Ottawa Chapter

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This Course Curriculum/Guide contains a table of contents and five modules. Each module sets out teaching guidelines, teachers' references, expected outcomes, suggested visual aids and possible hands-on activities. The modules cover:

1. Organic gardening basics;
2. Organic seeds, sowing, transplanting;
3. Organic vegetable growing;
4. Organic veggie growing on balcony & patio; and
5. Organic approach to garden weeds & insects.

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MODULE 1: ORGANIC GARDENING BASICS

TEACHING INFORMATION

ORGANIC PRINCIPLES

It is important to discuss “organic” as it applies to home gardening. Not only the dangers of chemicals in our food but also the question of environmental sustainability. Discuss benefits/dangers of using even organic pesticides/herbicides.

LIVING SOIL LIFE CYCLE

This concept is very important and should be taught with visuals and concrete examples.

Discuss pros and cons of tillage in organic gardens. Permaculture philosophy and techniques can be discussed here.

Also, discuss crop yield expectations during and after transition to organic gardening.

SOIL COMPOSITION: STRUCTURE, TEXTURE

“Soil structure describes the way soil particles are grouped into aggregates or crumbs.”¹ Tillage changes soil structure. Discuss.

“Soil texture is a classification system based on mineral particle size.”² Participants should identify the texture of their garden soil. Discuss how they can work with it rather than trying to replace it.

1 ORGANIC FIELD CROP HANDBOOK, SECOND EDITION, CANADIAN ORGANIC GROWERS, EDITOR: JANET WALLACE, P48

2 ORGANIC FIELD CROP HANDBOOK, SECOND EDITION, CANADIAN ORGANIC GROWERS, EDITOR: JANET WALLACE, P50

PLANT NUTRIENTS; PH FACTOR

PLANT NUTRIENTS: Keep it brief and deal only with the three main plant nutrients, i.e. nitrogen (N), phosphorous (P) and potassium (K), why plants need them, where they come from, how plants absorb them. Participants can be referred to web sites and books for in depth plant nutrient needs analyses. Emphasis should be on providing nutrients through organic matter and humus (composted manure, compost etc.).

PH FACTOR: This is important. Hand out a table of popular vegetables and their preferred pH.³ Define pH scale, why it is important. Discuss corrective measures to change pH. Provide names and addresses of local soil testing facilities.

SOIL AMENDMENTS/RENEWAL

It is important to add soil amendments during the transition to organic gardening. Provide information about permitted fertility and soil amendments in organic gardens.⁴

COMPOSTING: Define and provide methods. Discuss some benefits derived from applying compost. Hand out a table of organic material and minerals for the composter.⁵

VERMICULTURE: Define and discuss benefits/drawbacks; provide information on sources of materials for participants to start their own.

GREEN MANURE: Define and discuss benefits/drawbacks; why, when to seed/plow down.

MULCH: Define and discuss benefits/drawbacks; when to apply in vegetable garden and why; and what works.

³ TABLE ATTACHED AS ANNEX I

⁴ SEE ORGANIC FIELD CROP HANDBOOK, SECOND EDITION, CANADIAN ORGANIC GROWERS, EDITOR: JANET WALLACE, PP46, 47

⁵ TABLE ATTACHED AS ANNEX II

ROTATION PLANTING: Describe the process emphasizing importance of knowing vegetable families. Provide handout with list of popular vegetables and their families.⁶

VISUALS

- Flip chart walk-through of living soil life cycle
- Composter hand book

REFERENCES

- Canadian Organic Growers website, Gardeners, Organic Gardening Info, Publications Reference Series, #1 - Part 2, Selected Books and Websites, “Organic Field Crop Handbook”
- Master Gardener website (Bob Duff’s article on composting)
- Canadian Organic Growers website, Gardeners, Organic Gardening Info, Publications Reference Series, #4- “Composting for Gardeners”

OUTCOMES

- Good understanding of how composting works
- Ability to set up and maintain a composter
- Ability to undertake vermiculture

HANDS-ON ACTIVITIES

- Identify soil structure and texture of samples

⁶ HANDOUT IS ATTACHED AS ANNEX III

MODULE 1

MODULE 1: ANNEX 1 - PREFERRED PH OF SOME VEGETABLES

The pH value of soil refers to the concentration of hydrogen ions (electrically charged particles) in water. The pH value of water is neutral = 7.

A soil value below 5 is referred to as acid.

A soil value above 8.5 is referred to as alkaline.

When the soil pH value is between 5 and 7, the soil is referred to as slightly acid. As you can see in the table below, most vegetables prefer a slightly acid soil.

VEGETABLE	PREFERRED PH	VEGETABLE	PREFERRED PH
Beans (bush)	6.0 – 6.5	Mustard Greens	5.5 – 7.0
Beans (pole)	6.5 – 7.5	Okra	6.0 – 8.0
Beets	7.0 – 7.5	Onions	6.0 – 7.5
Broccoli	7.0 – 7.5	Parsnips	6.0 – 6.5
Brussels Sprouts	7.0 – 7.5	Peas	6.0 – 7.0
Cabbage	7.0 – 7.5	Peppers	5.5 – 7.0
Carrots	6.0 – 6.5	Potatoes	5.0 – 6.5
Cauliflower	7.0 – 7.5	Pumpkins	6.0 – 6.5
Celeriac	6.5 – 7.0	Radishes	4.5 – 6.0
Celery	6.0 – 7.0	Salad Greens	5.5 – 7.0
Collards	6.0 – 7.0	Spinach	6.5 - 7.5
Corn	6.5 – 7.0	Squash (Summer)	6.0 – 6.5
Cucumbers	6.5 – 7.0	Squash (Winter)	5.5 – 6.5
Eggplant	6.0 – 6.5	Sweet Potatoes	5.5 – 6.5
Garlic	6.0 – 7.0	Swiss Chard	6.0 – 7.0
Kale	6.0 – 7.0	Tomatoes (indeterminate)	6.0 – 6.5
Leeks	6.0 – 7.5	Tomatoes (determinate)	6.0 – 6.5
Lettuce (Head)	6.5 – 7.0	Turnips/Rutabagas	6.4 – 7.2
Lettuce (Leaf)	6.5 – 7.0	Watermelons	6.5 – 7.0
Melons	6.5 – 7.0		

MODULE 1: ANNEX II -ORGANIC MATERIALS AND MINERALS FOR THE COMPOSTER

Does properly managed compost smell bad? NO! Why not? It's not rotting – it's being broken down aerobically by microorganisms.

Bacteria break down plant tissue. Fungi and actinomycetes produce nitrogen to further the process. Centipedes, millipedes, beetles and earthworms finish off the process.

Applying bacterial cultures to your compost pile boosts biological activity.

Alkaline (Carbon)(dry, brown, yellow, bulky)	Acidic (Nitrogen)(green, moist, sloppy)
Egg shells	Alfalfa hay (C:N 12:1)
Greensand	Ash leaves (C:N 25:1)
Kelp meal (apply 10-15lbs/1000 sq ft)	Blood meal/fish meal
Limestone (calcium carbonate)	Chicken feather meal
Oak leaves (C:N 50:1)	Coffee grounds
Oyster shells (Ground)	Cottonseed meal
Paper (C:N 170:1)	Grass clippings (C:N 20:1)
Pine needles (dry) (C:N 75:1)	Gypsum
Sawdust (C:N 300:1)	Kitchen scraps (fruit/vegetable peels)(C:N 15:1)
Straw (C:N 100:1)	Peat Moss
Wood ash	Rock Phosphate
	Sulfur
	Timothy hay (C:N 25:1)
	Vinegar

Compost Tea: Soak compost in cloth bag in pail of water. Dilute to light tea color.

COMPOSTING:

Use Energy Sources (Carbon) and Protein Source (Nitrogen)

Rule of thumb: 30 carbon units/1 nitrogen unit (energy: protein) by volume

E.G. 1 pail of oak leaves with 1 pail of kitchen scraps = 65carbon:2 nitrogen OR
(32.5 carbon:1 nitrogen)

MODULE 1

MODULE 1: ANNEX III - FAMILIES OF POPULAR VEGETABLES

For crop rotation it is important to know which family each vegetable plant belongs to.

Leguminosae (Pea family):

Bush Beans	Peas
Peanuts	Pole Beans (rotate with corn)

Umbelliferae (Carrot family):

Cilantro	Carrots
Dill	Fennel
Parsley	Parsnip
Celery	Celleriac (rotate with non-root crop)

Cruciferae (Cabbage family):

Arugula	Broccoli
Brussels Sprout	Cabbage
Cauliflower	Mustard Seed
Garden Cress	Horseradish
Kale	Kohlrabi
Radishes	Rutabaga
Turnips	

Cucurbitaceae (Cucumber family):

Cucumbers	Melons
Summer squash	Winter squash
Pumpkins and Gourds	

Solanaceae (Tomato family):

Eggplant	Peppers
Potatoes	Tomatillos
Tomatoes	Ground Cherries

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MODULE 2 – ORGANIC SEEDS, SOWING, TRANSPLANTING

TEACHING INFORMATION

JOYS OF SEED STARTING

Define organic seeds and reliability of seed packet labeling. Discuss other terminology on packaging.

Differentiate between genetically engineered seed and traditional hybridizing.

Briefly discuss the implications/concerns surrounding genetic engineering.

Why start your own seeds? Interact with students by jointly creating a list of advantages

- Knowing that what you eat is organic starting with the seed
- Controlling growing environment of the seedling
- Timing planting out specific to your region
- Satisfaction watching germination and seedling growth
- Being adventurous by trying new vegetables

ORGANIC SEED SOURCES

Help participants identify best source for them. Commercial seed houses, seed exchanges, and seed saving

COMMERCIAL SEED HOUSES

List a few commercial organic seed houses that you have dealt with. Discuss ease of ordering via internet. Offer other alternatives, i.e. local nurseries or other outlets in your area that stock commercial organic seeds.

SEED EXCHANGES

Encourage participants to join horticultural societies and attend seed exchange events such as Seedy Saturday.

Fellow gardeners in community gardens are often a good/convenient source of seeds.

SEED SAVING

MODULE 2

Describe good seed saving practices, starting with good quality seed, collection and storage.

SEED STARTING REQUIREMENTS

This section should include a discussion of which vegetables to start indoors (or in cold frames) and which to start directly in the garden and why. Refer students to the excellent Vegetable Planting Guide for the Ottawa Area on the Gloucester Allotment Garden Association website: http://gaga.ncf.ca/Garden_Tips.html.

There are 4 basic requirements for successful seed starting:

- Viable seed
- Growing medium
- Heat source
- Light source

SEED-LIFE

Provide participants with a list of popular vegetables and their expected seed-life.⁷

Describe a method to test viability of seeds on hand.

Mention need for stratification or scarification or soaking/softening of certain seeds.

SEED SOWING MEDIUM

Impress upon participants the need for cleanliness in the growing environment

Discuss need for sterile seed-starting medium because of soil borne pests/diseases

Discuss need for good air circulation

Discuss seed starting medium (soilless mix) and best local sources. Organic potting soil must not contain synthetic wetting agents or synthetic fertilizers.

⁷ TABLE ATTACHED AS ANNEX I

ORGANIC SEEDS, SOWING, TRANSPLANTING

HEAT SOURCE

Discuss need for heat in seed germination.

Discuss possible heat sources (bottom heat is best) from handy radiators to purchased heating cables/mats

LIGHT SOURCE

Discuss need for light/darkness in seed germination.

Discuss pros/cons of different light sources – window sills, fluorescent, and incandescent.

Refer participants to Artificial Light fact sheet on Indoor Plants Page of Montreal Botanical Garden website.

PRICKING OUT

Discuss reasons for doing this and when to do it. Don't forget to label each new pot. Keep a record of the date and quantities, and establish a watering/fertilization schedule.

Separating and moving very small seedlings to a flat or pot in which they will grow until they are transplanted into the garden requires gentle mastery. Stress the need to prick out sooner rather than later to minimize root damage. A good watering beforehand helps.

Show difference between first leaves and true leaves (live samples or photos/drawings). Show how to tease the roots/stems apart and handle gently holding seedlings by the leaves to avoid injury to the stems.

GROWING ON

A growing medium must be chosen. Organic potting soil cannot contain synthetic wetting agents or synthetic fertilizers.

Discuss growing medium needed at this stage including homemade potting soil blends.⁸

⁸ TABLE ATTACHED AS ANNEX II

MODULE 2

Discuss fertilizer/temperature/water needs and air circulation

Good sources of information for growing vegetables from seed are seed packets and seed catalogues.

TRANSPLANTING TO THE GARDEN

Before transplanting to the open garden it is important to harden off the seedlings. Describe this process.

Timing is also important. Discuss last frost date in your region, what it means, when it is.

Some plants are cold weather plants, others hot weather plants. Identify and discuss what this means in terms of transplanting seedlings out into the garden. Also choose transplant day wisely to minimize transplant shock.

Discuss watering needs of transplants.

Discuss use of row covers to help the transplants acclimatize.

VISUALS

- Seedlings
- Seedling photos

REFERENCES – TEACHER/STUDENT RESOURCES

- Gloucester Allotment Garden Association website: http://gaga.ncf.ca/Garden_Tips.html. Menu item “Vegetable Planting Guide for the Ottawa Area”.
- Seeds of Diversity website: Resource List 2009
- Montreal Botanical Garden website: Menu item “*Indoor Plants*”. This Page contains all the artificial light information required to successfully grow from seed indoors.
- National Standard of Canada website. This site contains the “*Organic Production Systems Permitted Substances Lists*”. Permitted/prohibited seed treatments and potting soil ingredients are listed.

ORGANIC SEEDS, SOWING, TRANSPLANTING

- Canadian Organic Growers website, Publications Reference Series, #1, Part 2 Selected Books and Websites, Seed Saving/Breeding, *“How to Save Your Own Seeds”*
- Canadian Organic Growers website, Publications Reference Series, #1, Part 2 Selected Books and Websites, Seed Saving/Breeding, *“Saving Seeds – The Gardener’s Guide to Growing and Storing Vegetable and Flower Seeds”*
- Canadian Organic Growers website, Publications Reference Series, #1, Part 2 Selected Books and Websites, Seed Saving/Breeding, *“Seed to Seed”*
- Canadian Organic Growers website, Publications, Reference Series, #2 *“Seed Sources for Organic Growers”*

OUTCOMES

- Interest in starting vegetables from seed
- Ability to handle seedlings
- Strengthened commitment to the vegetable garden

HANDS-ON ACTIVITIES

- Identifying seeds
- Handling seedlings
- Preparing sweet potato slips for rooting

MODULE 2

MODULE 2: ANNEX I - SEED-LIFE IN YEARS

The following table shows approximately how long you can reasonably save the seeds of each vegetable and expect to have a good germination rate (75% - 90%).

Vegetable	Seed Life Years (Approximate)					
	1	2	3	4	5	6
Beans (bush)			x			
Beans (pole)			x			
Beets				x		
Broccoli			x			
Brussels Sprouts				x		
Cabbage				x		
Carrots			x			
Cauliflower				x		
Celeriac			x			
Celery			x			
Collards			x			
Corn		x				
Cucumbers					x	
Eggplant				x		
Garlic	x					
Kale				x		
Leeks		x				
Lettuce (Head)						x
Lettuce (Leaf)						x
Melons					x	
Mustard Greens			x			
Okra		x				
Onions	x					
Parsnips	x					
Peas			x			
Peppers		x				
Potatoes						
Pumpkins				x		
Radishes				x		
Salad Greens			x			
Spinach			x			
Squash (Summer)				x		
Squash (Winter)				x		
Sweet Potatoes	x					
Swiss Chard				x		
Tomatoes				x		
Turnips/Rutabagas				x		
Watermelons				x		

ORGANIC SEEDS, SOWING, TRANSPLANTING

MODULE 2: ANNEX II - RECIPE FOR HOMEMADE GROWING MEDIUM

10 litres (2.6 gallons) sphagnum peat
10 litres (2.6 gallons) vermiculite or perlite
60 grams (4 tbsp) bonemeal
30 grams (2 tbsp) ground limestone
30 grams (2 tbsp) bloodmeal
15 grams (1 tbsp) wood ash or kelp meal

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MODULE 3 – ORGANIC VEGETABLE GROWING

TEACHING INFORMATION

WHY GROW YOUR OWN

Growing your own vegetables is important. A good teaching tool is interaction with participants to draw up a list of benefits/advantages. Benefits include produce freshness and exercise. Advantages include absolute knowledge that the produce is organic, possible lower cost and opportunity for experimentation with unusual vegetables.

GROWING SPACE REQUIRED/WHY

We have expectations concerning the yield per plant in our vegetable gardens so before we start to design a garden, we must be realistic about how much space each vegetable plant will require.

Discuss space requirements for optimal root development and fruit production. Catalogues and seed packets are good sources of information concerning spacing.

Discuss row planting, hill planting, and intensive planting
Discuss spacing requirements for square-foot gardening
Briefly discuss succession planting

WHERE TO GARDEN

Vegetable gardens can be designed for large or small spaces i.e. front and back yards, patios and balconies. In some instances, landlords will allocate space on high-rise properties for conversion to vegetable gardening. Participants in seniors' homes can often garden on the grounds in allotted beds. Any participant wishing to garden can apply for a city allotment garden plot.

Provide a list or web site where participants can choose a convenient allotment garden site and apply.

ORGANIC VEGETABLE GROWING

SUN AND WATER REQUIREMENTS

SUN: As a rule of thumb, vegetables require a minimum of six hours of direct sunlight per day.

Discuss the higher/lower needs for sunlight of certain vegetables.

Discuss orientation of taller plants, more shade tolerate plants.

WATER: Vegetable gardens need a convenient, clean water source. Many of our streams and rivers today carry pollutants including chemical fertilizer run-off from agricultural farms.

Discuss the importance of clean water.

HOW TO OPTIMIZE USE OF AVAILABLE WATER

Discuss the many methods to minimize water use, e.g. use mulch, water in the morning or late afternoon, don't use water sprinklers, use pail and dipper in small gardens, water only when needed (rule of thumb one inch per week) make flood plains, use water barrels to recycle rain water, recycle gray water.

HERBS, EDIBLE WEEDS/FLOWERS

Take advantage of the vegetable garden to grow herbs and edible weeds/flowers.

Distinguish between annual, perennial, biennial, hardy, and tender plants.

Provide information for easy access to lists of edible weeds/flowers.

VISUALS

- Handout – small space garden design
- Photos of gardens
- Photos of produce grown by allotment gardeners

MODULE 3 REFERENCES

- Community Gardening Network of Ottawa website home page contains a list of community gardens across Ottawa including contact information
- Montreal Botanical Gardens website. Follow the menu buttons – “The Green Pages” to “Vegetable Gardening”. This menu item contains information for vegetable gardening e.g. location, dimensions, planning and a table on spacing, days to maturity, companion plants and when to seed.
- Public Library References⁹
- COG website, Farmers, Standards and Regulations, Technical Info, ***NEW: Frequently Asked Questions Database***

OUTCOMES

- Recognition of advantages of growing your own vegetables
- How to design a vegetable garden
- How to locate a convenient community/allotment garden

HANDS-ON ACTIVITIES

- Design a garden taking into consideration:
 - ✓ Plant families
 - ✓ Light requirements
 - ✓ Rotation planting
 - ✓ Succession planting
- Visit an allotment garden site

⁹ TABLE ATTACHED AS ANNEX I

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MODULE 4: ORGANIC VEGGIE GROWING ON BALCONY & PATIO

TEACHING INFORMATION

BENEFITS OF CONTAINER GARDENING

The “Why Grow Your Own” section of Module III applies here.

It is important to note the freshness of produce and knowledge that the food you eat is chemical free from the roots up.

In addition, growing in containers on balconies and patios can add very attractive landscaping features such as

- Vines: Red/Green Stem Malabar Spinach, Scarlet Runner Beans and non-ornamental Sweet Potatoes;
- Colourful vegetables: hot/sweet peppers and tomatoes;
- Foliage plants: bok choy, kale, lettuce.

CONSIDERATIONS FOR CONTAINER GARDENING INCLUDING:

WATER SOURCE

Discuss tap water versus rain water including water temperature.

Discuss water requirements of potted plants, how much, how often.

ORIENTATION

Discuss effects of growing vegetables in shade from attached/ neighbouring buildings or full south-side sun.

Discuss which vegetables will tolerate some shade and best/worst growing scenarios depending on balcony/patio orientation.

Discuss effects of wind and heat build-up on cement balconies and effects of poor air circulation on enclosed patio/balconies.

OTHER CONSIDERATIONS INCLUDING:

CHOICE OF VEGETABLES

Discuss which vegetables are good candidates for container growing for reasons such as size, rate of growth, yield per plant, etc.

CHOICE OF CONTAINERS

Discuss pros and cons of various options. Include ready-made containers, recycled/adapted containers, suitability for moisture retention, weight (ability to lift/move), and appearance.

Container size is important. Provide a list of common vegetables with container sizes appropriate for each one.¹⁰

CHOICE OF GROWING MEDIUM

Container growing medium must absorb water quickly and drain more freely than ordinary garden soil and do so without becoming dense and compacted. It should be free of weed seeds, disease organisms, harmful insects and their eggs and larvae.

Because soilless mixes have no nutrient content, provide participants with recipes to achieve an acceptable nutrient rich medium that allows for frequent watering without compaction.

CHOICE OF FERTILIZERS

Container grown plants must get most of their nutrients from fertilizer applications. There are many organic products on the market but because the roots of plants grown in containers are constrained to a small space, care must be taken not to burn the roots with high concentrations of N-P-K. Discuss the various organic products available and how to achieve a balanced fertilizer program.

¹⁰ TABLE SHOWING CONTAINER SIZES REQUIRED TO SUCCESSFULLY GROW SOME VEGETABLES IS ATTACHED AS ANNEX I.

ORGANIC VEGGIE GROWING ON BALCONY & PATIO

Participants often ask where they can purchase these products. Be prepared to refer to “organic” suppliers in your area. The Canadian Organic Growers Association in your area should be able to provide a list.

VISUALS

- Photos of vegetables growing in containers
- Handout: Container Sizes/Soil Quantities Required to Grow Vegetables in Containers

REFERENCES

- *Square Foot Gardening* by Mel Bartholomew, Rodale Press, 1981
- *Organic Production Systems Permitted Substances Lists*, published by Canadian General Standards Board,
www.certifiedorganic.bc.ca/standards/032_0311_2006-e.pdf
- National Sustainable Agriculture Information Service (ATTRA),
www.attra.org.

OUTCOMES

- Recognition of advantages of growing vegetables near at hand
- Ability to grow vegetables in pots

HANDS-ON ACTIVITIES

- Preparing pots with growing medium and seedlings

MODULE 4

MODULE 4: ANNEX I - POT SIZES/SOIL QUANTITIES REQUIRED TO GROW VEGETABLES IN CONTAINERS

Vegetable	Soil (Approximate) Quantity	Soil (Approximate) Depth	Spacing (Approximate)
Bean	Window box/ 3 gal.	min. 10" deep	3" apart
Beet	10" pot /window box	min. 10" deep	5 beets /3" over whole surface
Broccoli	3 gal.	min. 10" deep	1 plant per container
Brussels Sprouts	3 gal.	min. 10" deep	1 plant per container
Cabbage	3 gal.	min. 10" deep	1 plant
Carrot	1-½ gal./window box	min. 6" deep	6/2" over whole surface
Cauliflower	3 gal.	min. 10" deep	1 plant per container
Celeriac	3 – 5 gal.	min. 10" deep	2 plants per container
Collards	3 gal.		3 plants per container
Cucumber	5 gal.	min. 10" deep	3 plants per container
Eggplant	5 – 10 gal.	min. 12" deep	1 plant per container
Garlic (12" deep)	1-½ gal.		2" apart (10 cloves)
Kale	1-½ gal.	min. 10" deep	1 plant
Leek	3 gal.	min. 12" deep	2" apart
Lettuce (Head)	4" pot		1
Lettuce (Leaf)	1-½ gal.	min. 4" deep	4 – 5" apart
Melon	5 gal.	min. 12" deep	2 plants
Mustard Greens	8" pot		3 plants 3" apart
Okra	3 gal.	min. 10" deep	3 plants - compact varieties
Onion (12" deep)	3 gal.	min. 10" deep	6 plants
Pea	5 gal. or window box		2" apart
Pepper	2 gal.	min. 8" deep	1 plant per container
Potato	½ whiskey barrel or 5 gal.	min. 12" deep	3 plants or 1 plant
Pumpkin	5 gal.	min. 12" deep	1 bush types
Radish	8" pot		15 radishes - 1" apart
Salad Greens	3 gal.		2 to 3" apart
Spinach	4" pots		3" apart
Squash (Summer)	5 gal.	min. 12" deep	1 plant per container
Squash (Winter)	5 gal.	min. 12" deep	1 bush type or trellis
Sweet Potato	3 gal.	min. 12" deep	1 plant
Swiss Chard	3 gal.	min. 8" deep	3 plants
Tomato (indeterminate)	5 - 10 gal.	min. 12" deep	1 plant
Tomato (determinate)	13" pot	min. 12" deep	1 plant
Turnip	8" pot	min. 8" deep	2 turnips
Watermelon	5 gal.		1 bush type

Approximate volume of round pots in gallons and litres:

1 gallon pot = approximately 7" diameter x 6" in depth – 15cm pot

2 gallon pot = approximately 9" diameter x 8" in depth – 20cm pot

3 gallon pot = approximately 11" diameter x 10" in depth – 12L

4 gallon pot = approximately 13" diameter x 12" in depth – 16L – 30cm pot

5 gallon pot = approximately 13" diameter x 13" in depth – 20L

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MODULE 5 – ORGANIC APPROACH TO GARDEN WEEDS & INSECTS

TEACHING INFORMATION

IDENTIFYING WEEDS

Usually a weed is defined as a plant that grows where you don't want it to.

Discuss the need to identify “unwanted plants” before deciding what to do with them. Knowing a plant's name makes it easier to find information about it. It is important to know a weed's growth habits and whether it is edible or perhaps a source of food for beneficial insects, e.g. goldenrod attracts Soldier Beetles (Family Cantharidae) and Soldier Beetles prey on insect pests such as cucumber beetles, corn rootworms, aphids, grasshopper eggs, caterpillars and beetle larvae. Many so-called weeds are often a nutritious food source for butterflies, birds, animals and humans. And although you wouldn't want them growing directly in your garden, having them nearby is beneficial.

Discuss the many ways of identifying weeds, e.g.

- Take photos and then work your way through an Identification Key comparing your weed's characteristics to those identified in the Key.
- Take advantage of the internet Weed ID Services provided by www.Ontarioweeds.com. The website has a submission form with prompts for written descriptions and accompanying photos. This service also has a Glossary accompanied by excellent photos of an example of each term in the Glossary.
- Bring a book to the garden e.g. Publication 505, Ontario Weeds, published by the Ontario Ministry of Agriculture, Food and Rural Affairs (www.omafra.gov.on.ca). This publication contains an Identification Key that enables field identification.
- Ask a fellow gardener.

Discuss beneficial weeds as pollinator attractors, as ground covers to prevent soil erosion, and as nutritious edible plants.

MODULE 5

Discuss undesirable weeds. Weeds are usually unwanted because they vie with vegetable plants for nutrients and water thereby reducing crop yield. Plant growth can also be interfered with in other ways such as the choking effect of bindweed. Other weeds cause allergic reactions – ragweed and poison ivy.

Discuss available organic methods of weed control including the pros and cons of each e.g. hand pulling, cutting/mowing, cultivating, burning, mulching, herbicides. Before attempting to control unwanted plants it is important to consider the impact of the various methods.

Weeds can generally be divided into two main categories: those that propagate solely by seed (annuals) and those that propagate by developing each year from underground stems, roots or crowns.

ANNUAL WEEDS

Most garden weeds are annuals and because they propagate by seed it is not necessary to remove their root systems. They should be cut off level with the soil before setting seed. This prevents them from propagating further. The green part that has been cut off should be left on the soil to wither and dry and complete its life cycle as organic material in the soil.

Discuss tools that minimize the effort required to cut off weeds at soil level e.g. Dutch hoe, half-moon hoe, shuffle hoe, loop hoe.

PERENNIAL WEEDS

Perennial weeds propagate not only by seed but also by developing each year from underground stems, roots or crowns. It is therefore necessary to control the seed propagation of unwanted perennial weeds and also destroy their underground root systems. In home gardens, this is usually done by digging, sifting the soil and removing the roots by hand.

HOW TO USE KEYS FOR QUICK IDENTIFICATION

Participants should be encouraged to look up some weeds either electronically on the www.Ontarioweeds.com site or in a good weed reference book using an identification key.

ORGANIC APPROACH TO GARDEN WEEDS & INSECTS

Some time should be spent explaining how identification keys work and guiding the participants through the process with one or two sample weeds.

REVIEWING SOME COMMON GARDEN WEEDS

The most persistent common weeds that I find in my Ottawa garden are yellow nut sedge, quack grass, also known as twitch grass (chiendent) and Lamb's quarters (chou gras). There are many reference books that provide detailed information about these and other weeds. One such reference is Ontario's Ministry of Agriculture, Food and Rural Affairs Publication 505 '*Ontario Weeds*'. .

IDENTIFYING INSECTS

Insects are an integral part of nature's food chain.

Discuss the need to identify garden insects. As with weeds, being able to identify an insect in your garden makes it easier to find information about it. It is important to know if it is a **beneficial** i.e. pollinator, decomposer, parasitoid, beneficial predator, food source for other beneficial insects, birds, toads, etc. **or pest** i.e. defoliator, fruit destroyer, stem invader, disease vector, etc.

BENEFICIALS

Many garden insects are beneficial. Organic gardeners must weigh the degree of damage to fruit and plants (aesthetic damage) vs damage that causes reduced crop yield.

It is important to convey the dangers of pesticides, even organic ones.

PESTS

Insect pests can affect yield and spread plant diseases (viruses, wilts).

Discuss the importance of targeting the specific pest while causing as little damage to other life forms as possible, including other insects.

Over time, insects develop immunity to controls whether organic or chemical. We must balance our need for control with responses that are in line with the severity of the danger posed by insects.

MODULE 5

Discuss integrated pest management approaches, i.e. controlling pests by preventing problems and using thresholds to decide how and when to intervene when problems arise.

Discuss preventing problems with organic management methods e.g. cultivating healthy soil, selecting trouble-free plants, feeding plants regularly, encouraging diversity, rotating crops, avoiding monocultures and encouraging natural predators.

Discuss organic interventions e.g.

- physical controls (traps), manual controls (handpicking, shaking insects off plants, spraying water), baits/lures, barriers (floating row covers, mulches);
- biological controls – encouraging beneficials (insects, animals, micro organisms);
- organic controls – sprays and dusts

Participants should be encouraged to identify insects they see in their gardens. Bringing a magnifying glass to the garden and comparing the insect in hand with photos, drawings and texts in reference books such as Peterson's Field Guild '*Insects*' is very often sufficient to identify it. The Peterson Book has a 'How to Use This Book' section that explains what to look for to identify insects.

Another way to identify insects is to take photos of them and note the plant on which they were found.

REVIEWING SOME COMMON GARDEN INSECTS

Several articles are posted on the Gloucester Allotment Garden Association website (http://gaga.ncf.ca/Garden_Tips.html) covering most common garden insects, both beneficials and pests, with excellent photos and suggestions for control.

GOOD GARDENING PRACTICES

As with most things, moderation is often the best way to go forward in the garden. Most gardening books promulgate total fall clean up in the garden to prevent over-wintering weed seeds, insects and diseases. However, beneficial insects such as bees over-winter in hollow plant stems. It is also often advised to mulch, mulch, mulch, and yet many beneficial insects make their nests in the soil and can't reach the soil if there is a heavy layer of mulch. A good rule of thumb is to leave insect/disease-free plant stems

ORGANIC APPROACH TO GARDEN WEEDS & INSECTS

on the soil in the fall to complete the organic cycle. Mulch where necessary, but leave some bare soil for soil-nesting insects such as bees.

VISUALS

- Photos

REFERENCES

- Ontario Ministry of Agriculture, Food and Rural Affairs website www.omafra.gov.on.ca.
- Weed ID Services website www.Ontarioweeds.com.
- Gloucester Allotment Garden Association Website <http://gaga.ncf.ca>
- Ontario's Ministry of Agriculture, Food and Rural Affairs, Publication 505, Ontario Weeds,
- The Organic Gardener's Handbook of Natural Insect and Disease Control, Edited by Barbara W. Ellis and Fern Marshall Bradley,

OUTCOMES

- Recognition that weed/insect identification is very important
- May give rise to interest in plant identification/research data base

HANDS-ON ACTIVITIES

- Photography or butterfly net field outing
- In-house weed/insect identification